PREFACE

This Report of the Comptroller and Auditor General of India for the year ended March 2011 containing the results of the Performance Audit of Water Pollution in India has been prepared for submission to the President of India under Article 151 of the Constitution.

The Performance Audit was conducted during July 2010 to February 2011 through document analysis, collection of responses to questionnaires, physical collection and testing of samples. Records and documents relating to the issues in the Performance Audit were examined:

- in the Ministry of Environment and Forests, Central Pollution Control Board, Ministry of Water Resources and Central Ground Water Board between July 2010 to February 2011.
- in 25 States and State Pollution Control Boards, State Environment Departments, State Urban Local Bodies, Nodal Departments and implementing agencies for National River Conservation Plan and National Lake Conservation Plan and selected blocks in districts for ground water. The sample consisted of 140 river projects, 22 lakes and 116 ground water blocks in 25 States.

The results of audit, both at the Central level and the State level, were taken into account for arriving at audit conclusions.

Executive Summary

Why did we decide to examine this issue?

In July 2009, various stakeholders working in the field of environment flagged water pollution as the most important environmental issue that concerns us. We also held a detailed two-day International Conference on Environment Audit - Concerns about Water Pollution in March 2010. This conference was attended by various civil society organisations, government agencies, international agencies and regulatory bodies. The heads of Supreme Audit Institutions from Austria, Bhutan, Maldives and Bangladesh also shared their concerns about water pollution. The Conference flagged many important areas of concern with regard to river, lake and ground water pollution. Further, we put out advertisements in various national and local newspapers all across India, inviting suggestions from the general public regarding the water pollution problems faced by them. Based on feedback from these consultations, we decided to take up a Performance Audit of Water Pollution in India during 2010-11.

What were our audit objectives?

The review was undertaken to ascertain whether:

- ***Inventory of water sources has been prepared and whether the overall status of quality of water in rivers, lakes and groundwater has been adequately assessed in India;***
- ***Risks of polluted water to health of living organisms and the impact on environment have been adequately assessed;***
- ***Adequate policies, legislations and programmes have been formulated and effective institutions been put into place for pollution prevention, treatment and restoration of polluted water in rivers, lakes and ground water;***
- ***Programmes for pollution prevention, treatment and restoration of polluted water in rivers, lakes and ground water have been planned, implemented and monitored efficiently and effectively;***
- ***Funds were utlised in an efficient and economic manner to further the aim of reduction of water pollution;***
- ***Adequate mechanisms have been put in place by the government to sustain measures to tackle water pollution; and***
- ***Programmes for the control of pollution had succeeded in reducing pollution levels in ground water and surface water and restoring water quality.***

What did our performance audit reveal?

Our Performance Audit revealed that:

Legislative and Policy framework	*Water pollution has not been adequately addressed in any policy in India, both at the central and the State level. In the absence of a specific water pollution policy which would also incorporate prevention of pollution, treatment of polluted water and ecological restoration of polluted water bodies, government efforts in these areas would not get the required emphasis and thrust.* *(Paragraph 2.1, 2.3)*
Planning for control of pollution of rivers, lakes and ground water	*It was observed that MoEF and a number of States:* • *did not undertake complete inventorisation of rivers/lakes and keystone species associated with them.* *(Paragraph 3.1)* • *did not carry out identification of existing pollution levels in rivers and lakes in terms of biological indicators.* *(Paragraph 3.2)* • *had not identified and quantified contaminants in rivers, lakes and ground water.* *(Paragraph 3.3)* • *were yet to identify and quantify human activities that impact water quality.* *(Paragraph 3.4)* • *had not assessed the risks of polluted water to health and environment.* *(Paragraph 3.5)* • *had not adopted the basin level approach for control of pollution.* *(Paragraph 3.6)* • *had not developed water quality goals, corresponding parameters for each river/lake and failed to enforce these.* *(Paragraph 3.7)* *As such, overall planning for the control of pollution on part of MoEF and the States falls short of an ideal situation. This would have repercussions on implementation of programmes for control of pollution and their outcomes as discussed later in the report.*
Implementation of programmes for control of pollution of rivers, lakes and ground water	*With regard to implementation of programmes for control of pollution of rivers, lakes and ground water, it was observed that:* • *Current programmes for control of pollution of rivers, lakes and ground water were insufficient.* *(Paragraph 4.1)* • *Institutional set-up to manage programmes for control of pollution in rivers, lakes and ground water was inadequate.* *(Paragraph 4.2)*

	• *Inclusion of rivers and lakes into National River Conservation Plan and National Lake Conservation Plan, respectively, was flawed.* *(Paragraph 4.2 & 4.3)* • *Performance of projects undertaken under NRCP was unsatisfactory. 82 per cent of the projects were completed after the scheduled date of completion. 28 projects costing ₹ 251.27 crore were constructed but not utilised as yet. States implementing the projects faced problems in land acquisition, getting requisite permissions, especially forest clearances, technical problems, problems from contractors etc.* *(Paragraph 4.4)* • *NLCP as a programme has been ineffective in achieving the objective of conservation and restoration of lakes in India. Only two of the sampled 22 projects had been completed and the rest were either continuing beyond the sanction date of completion or had been abandoned. Problems like resistance from locals over proposed construction of STPs etc., dispute over site, inability to arrest sewage flow, non-availability of land etc., have contributed to non-completion of the projects.* *(Paragraph 4.5)* *Thus, programmes to control pollution of rivers and lakes in India have not had the desired results.*
Monitoring of programmes for control of pollution of rivers, lakes and ground water	*Inspection and monitoring of projects being implemented under NRCP and NLCP was inadequate at all three levels, i.e., local level, State level and Central level.* *(Paragraph 5.1)* *There was paucity of network for tracking pollution of rivers, lakes and ground water as there were inadequate number of monitoring stations, no real- time monitoring of water quality was taking place and the data on water quality had not been disseminated adequately.* *(Paragraph 5.2)* *As such, monitoring of programmes was inadequate which points to weak internal controls existing at all levels of government.*

Results of programmes for control of pollution in India	*River cleaning and control of pollution programmes for our polluted rivers are being implemented since 1985. The programmes seek to address pollution from point and non-point sources through construction of Sewage Treatment Plants, low cost sanitation, electric crematoria etc. However, the data on the results of these programmes are not very encouraging.* *Ganga in certain stretches, Yamuna, Gomti, Godavari, Musi, Cauvery, Cooum, Mahananda, Khan, Kshipra, Vaigai, Chambal, Rani Chu, Mandovi, Sabarmati, Subarnarekha, Bhadra/Tungabhadra, Pennar, Pamba, Betwa, Krishna, Sutlej etc., continue to be plagued by high levels of organic pollution, low level of oxygen availability for aquatic organisms and bacteria, protozoa and viruses which have faecal-origin and which cause illnesses.* *(Paragraph 6.1)* *Most lakes in India are under threat from nutrient overloading which is causing their eutrophication and their eventual choking up from the weeds proliferating in the nutrient-rich water. Implementation of NLCP in conserving these lakes has had no discernible effect.* *Pichola, Pushkar, Dimsagar, Banjara, Kotekere, Bellandur, Veli Akkulam, Shivpuri, Powai, Rankala, Twin lakes, Bindusagar, Mansagar, Mansiganga, Rabindra Sarovar, Mirik, Kodaikanal lake, Dal lake, Durgabari lake, Laxminarayanbari Lake, Dimsagar Lake etc., have shown poor water quality. However, there have been some success stories like Nainital lake, Kotekere lake, Sharanabasaveshwara lake and Mansagar where water quality has improved after completion of conservation programmes.* *(Paragraph 6.2)*
Resources and Utilisation of Funds	*Funds available for control and prevention of water pollution and restoration of wholesomeness of water were not adequate.* *(Paragraph 7.1)*
Overall conclusion	**We began the audit of Water Pollution in India with certain audit objectives (in Page 5) which sought to examine the broad contours of policy, programmes, institutions and initiatives taken by MoEF to address water pollution in India. We also sought to examine availability of data regarding water pollution, assessment of risks to health and environment and sustainability of measures to address water pollution in India. Finally, we also examined whether the efforts to clean up rivers and lakes in India have lead to any improvements in water quality. Our audit examination extended to 140 projects across 24 polluted stretches of rivers, 22 lakes and 116 blocks across 25 States of India. All the findings, discussed in Chapter 2 to 8, lead us to conclude the following against the objectives set out for the study:** • *Inventory of water sources has not been prepared and the overall status of quality of water in rivers, lakes and groundwater has not been adequately assessed in India;* • *Risks of polluted water to health of living organisms and the impact on environment have been not been adequately assessed;*

- *Adequate policies, legislations and programmes have not been formulated and effective institutions have not been put into place for pollution prevention, treatment and restoration of polluted water in rivers, lakes and ground water;*
- *Programmes for pollution prevention, treatment and restoration of polluted water in rivers, lakes and ground water have not been planned, implemented and monitored efficiently and effectively;*
- *Funds were not utlised in an efficient and economic manner to further the aim of reduction of water pollution;*
- *Adequate mechanisms have not been put in place by the government to sustain measures to tackle water pollution; and*
- *Programmes for the control of pollution have not succeeded in reducing pollution levels in ground water and surface water and restoring water quality.*

What do we recommend?

- MoEF/States, in the policy on water pollution, need to specifically take into account prevention and control of water pollution as well as ecological restoration of degraded water bodies.
- MoEF/CPCB should initiate steps, along with Ministry of Water Resources and all the States to draw up a comprehensive inventory of all rivers, lakes and ground water sources in India. It should also undertake a survey to list all the keystone species associated with each river and lake in India. This should also be placed in the public domain.
- MoEF/CPCB should intensify its efforts in developing biological indicators which would shed light on whether the functional integrity of aquatic ecosystems are safeguarded.
- MoEF should take into account the basin approach while planning for reduction of pollution of all rivers and lakes in the country.
- With respect to lakes, all three attributes of the lake, i.e., the basin, the water body and the command area need to be conserved instead of the present focus of NLCP on the water body only.
- MoEF needs to establish enforceable water quality standards for lakes, rivers and ground water that would help protect human and ecosystem health. Penalties need to be levied for violations of water quality standards. Further, MoEF, in conjunction with Ministry of Agriculture, needs to develop standards for pollutants like nitrogen, phosphorus etc., which arise from agricultural practices, use of pesticides and fertilisers as pollution from agricultural sources is one of the biggest non-point source of pollution.
- The Jawaharlal Nehru National Urban Renewal Mission is already funding sewerage projects in some of the same States where funds are being provided by MoEF for the same purpose. It needs to focus on projects which seek to regenerate and conserve the river instead of those which focus largely on treatment of sewage. MoEF/States should conceive programmes which address different sources of pollution flowing into rivers, lakes and ground water with focus being not only on prevention of pollution but also conservation and ecological restoration of our water bodies.
- Right now, there are multiple agencies involved in river and lake conservation, right from

planning to implementation and monitoring. There is a need to consolidate all these functions under an umbrella agency for better coordination and accountability.

- In conjunction with the Ministry of Urban Development (MoUD), MoEF and the State should plan drainage for the city as a whole instead of piecemeal approval of random STPs and I&Ds. Further, funding for these projects should come from MoUD as the implementing agencies work under the control of MoUD. MoEF should be involved in the design stage and in monitoring the treated effluents if they are being discharged into the river.
- MoEF/States need to ensure that projects for source control of all kind of pollutants entering the lakes is included in projects for conservation and restoration of lakes, especially sewage and agriculture runoff which leads to nutrient over-loading of the lake.
- MoEF should ensure that all lakes facing encroachment and resultant filling up are included in NLCP. Further, all State governments should declare bio-conservation zones around lakes so that encroachment of shoreline is prevented.
- The Water Quality Assessment Authority at the central level and the Water Quality Review Committee in the States should be revitalized and strengthened so that it can act as a cross-sectoral nodal body for water pollution issues.
- States should involve citizens in proposing and monitoring programmes to control pollution of rivers and lakes. This will help in mobilizing support in civil society for the proposed projects and thus the projects will face less resistance from local people. Citizens Monitoring Committee and Local level lake monitoring committees need to be constituted to provide feedback for more effective implementation.
- MoEF/CPCB, in conjunction with the States, should conduct a city-wise assessment of the levels of pollution in our rivers and lakes. They should also evaluate the success of projects undertaken under NRCP in terms of pre-defined indicators developed by MoEF/CPCB. Such impact assessment should be done in a continuous manner so that data is generated to judge whether the programme is meeting its stated objectives.

What was the response of Ministry of Environment and Forests to our recommendations?

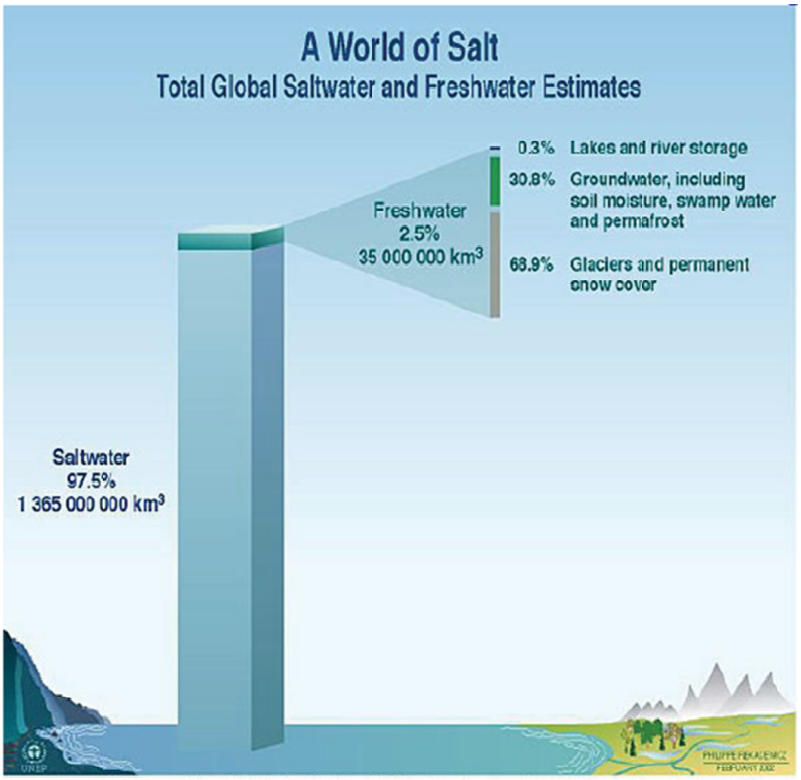
MoEF in May 2011 constituted a Committee to consider the recommendations/observations made in the report by Audit and prepared a roadmap for implementation of recommendations/observations accepted. The Committee consists of representatives of CPCB and representatives from Ministry of Water Resources, Ministry of Urban Development and a representative of CAG. The Committee proposed, *inter alia*, a time-bound action plan to address capacity issues related to sewage treatment, an amendment to the Environment (Protection) Act, 1986 to link penalties for contravention of the Act, strengthening of Water Quality Assessment Authority and constitution of a State-level Monitoring Committee.

Chapter 1: Introduction

"Every year, more people die from the consequences of unsafe water than from all forms of violence, including war"

1.1 About Water Resources

Clean, safe and adequate freshwater is vital to the survival of all living organisms and the smooth functioning of ecosystems, communities and economies. Water-based ecosystems provide a diversity of services vital for human well-being and poverty alleviation. Supporting and regulating services (such as nutrient cycling) are critical to sustaining vital ecosystem functions that deliver many benefits to people. The delivery of fresh water is a particularly important service both directly and indirectly. In addition, water sources have significant aesthetic, educational, cultural and spiritual values and provide invaluable opportunities for recreation and tourism.



Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999.

Water Pollution is the presence of harmful and objectionable material in water in sufficient concentrations to make it unfit for use. Water contamination weakens or destroys natural ecosystems that support human health, food production and biodiversity. Water-borne diseases kill millions people, particularly those under the age of five, world-wide every year. Livelihoods such as agriculture, fishing and animal husbandry are affected by poor water quality. Biodiversity, especially of freshwater ecosystems is under threat due to water pollution.

Water is very important to life and polluted water is a huge concern. Polluted water can lead to serious problems with disease and death of plants and vegetation, humans and animals. Water pollution prevention helps to ensure that there is enough clean water to allow for healthy growth and development of the earth, humans and animals. Prevention and control of water pollution assures that the water can remain safe for consumption of plants and vegetation, humans and animals.

What is water pollution?
It is the presence of harmful material in water in sufficient concentrations to make it unfit for use.

Categories of water pollution

Point source pollution **occurs when harmful substances are emitted directly into a body of water. It is easy to monitor and regulate.**

Non-point source pollution **occurs when pollutants are delivered indirectly through transport or environmental change. Non-point sources are difficult to monitor and control. Today, they account for the majority of contaminants in ground water, streams and lakes.**

1.2 Water pollution in India

India's 14 major, 55 minor and several hundred small rivers receive millions of litres of sewage, industrial and agricultural wastes. The most polluting source for rivers is the city sewage and industrial waste discharge. Presently, only about 10 *per cent* of the waste water generated is treated; the rest is discharged as it is into our water bodies. Due to this, pollutants enter rivers, lakes and groundwater.

Such water, which ultimately ends up in our households, is often highly contaminated and carries disease-causing microbes. Agricultural run-off, or the water from the fields that drains into rivers, is another major water pollutant as it contains fertilizers and pesticides. Ground water accounts for nearly 80 *per cent* of the rural domestic water needs and 50 *per cent* of the urban water needs in India. It is generally less susceptible to contamination and pollution when compared to surface water bodies.

1.3 Water quality criteria in India

To set the standard for the desired quality of a water body, it is essential to identify the uses of water in that water body. In India, Central Pollution Control Board has developed a concept of *designated best use*.

According to this concept, out of the several uses of water of a particular body, the use which demands highest quality is termed its *designated best use*. Five *designated best uses* have been identified. This classification helps the water quality managers and planners to set water quality targets and design suitable restoration programmes for various water bodies.

Table 1: Water quality criteria in India

Designated Best Use	Class of water	Criteria
Drinking water source without conventional treatment but after disinfection	**A**	▪ Total Coliforms Organism[1] MPN[2]/100ml shall be 50 or less ▪ pH[3] between 6.5 and 8.5 ▪ Dissolved Oxygen(DO)[4] 6mg/l or more ▪ Biochemical Oxygen Demand (BOD)[5] - five days 20°C 2mg/l or less
Outdoor bathing (Organised)	**B**	▪ Total Coliforms Organism MPN/100ml shall be 500 or less ▪ pH between 6.5 and 8.5 ▪ Dissolved Oxygen 5mg/l or more ▪ Biochemical Oxygen Demand - five days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	**C**	▪ Total Coliforms Organism MPN/100ml shall be 5000 or less ▪ pH between six to nine ▪ Dissolved Oxygen 4mg/l or more ▪ Biochemical Oxygen Demand - five days 20°C 3mg/l or less
Propagation of Wildlife and Fisheries	**D**	▪ pH between 6.5 to 8.5 ▪ Dissolved Oxygen 4mg/l or more ▪ Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	**E**	▪ pH between 6.0 to 8.5 ▪ Electrical Conductivity at 25°C micro mhos/cm Max.2250 ▪ Sodium absorption Ratio Max. 26 ▪ Boron Max. 2mg/l
	Below E	Not Meeting A, B, C, D & E Criteria

Source: Central Pollution Control Board

1.4 Audit scope

At the **Centre,** audit scope covered the programmes and schemes for control of pollution of rivers, lakes and ground water in MoEF/MoWR. It also covered functioning of NRCD, its role in planning, implementation/monitoring and monitoring activities of CPCB/CGWB, relating to river, lake and ground water pollution relating to the period 2006-07 and 2010-11. Records of Water Quality Assessment Authority (WQAA) were also examined in light of the responsibilities allocated to them.

In the **States,** audit scope covered adequacy of data relating to river, lake and ground water pollution. It also extended to the study of the implementation and monitoring of

[1] Coliforms organisms like faecal bacteria are an indicator of water quality.
[2] Most Probable Number.
[3] It is a measure of the acidity or basicity of a solution. Since pH can be affected by chemicals in the water, pH is an important indicator of water that is changing chemically.
[4] DO is a relative measure of the amount of oxygen that is dissolved or carried in the water body. Adequate dissolved oxygen is needed and necessary for good water quality.
[5] BOD is a chemical procedure for determining the uptake rate of dissolved oxygen by the biological organisms in a body of water and is widely used as an indication of the quality of water.

programmes (NRCP and NLCP) for the control of pollution of rivers and lakes by the designated agencies. Audit scope related to the States also covered implementation and monitoring of schemes, if any, for the control of pollution of ground water.

For this, we test-checked records of the State governments, implementing agencies (mainly municipalities and lake development authorities), State Pollution Control Boards and WQRC in the States covering the period 2006-07 to 2010-11.

1.5 Audit methodology

The audit methodology was guided by the following:

(a) Stakeholders' Conference on Environment Audit

In July 2009, the office of the Comptroller and Auditor General of India organised a Stakeholders' Conference on Environment Audit to flag major environmental issues in India and to identify significant areas for audit enquiry in the future. Experts from Civil Society organisations, from Ministries of Environment & Forests and Urban Development, from the Indian Meteorology Department and representatives/corporate bodies working in the field of environment attended the Conference.

Some vital issues highlighted during the Conference were:

- Audit should look at issues of ecological sustainability, equity in distribution of environmental resources and efficiency of environmental programmes.
- Audits should take place during the process of implementation of the programmes so that inputs can be provided to improve performance.
- Need to evolve standards for involvement of public/public participation in agencies handling environment as well as in the audit of the environment.
- Need to emphasize on social audit where involvement of local communities in the audit process is important.
- Need to disseminate audit reports more widely.

(b) International Conference on Environment Audit-Concerns about Water Pollution

Once the topic had been identified, we held a two-day ***International Conference on Environment Audit-Concerns about Water Pollution*** in March 2010. This conference was attended by members of various Civil Society Organisations, Government Agencies, International Agencies and Regulatory Bodies like Jheel Samrakshan Samity, Arghyam, Tarun Bharat Sangh, WaterAid India, Ministry of Environment and Forests, Central Pollution Control Board, Central Ground Water Board, Jammu & Kashmir Lakes & Waterways Development Authority, International Union for the Conservation of Nature, Food and Agriculture Organisation, GTZ etc. The Heads of Supreme Audit Institutions from Austria, Bhutan, Maldives and Bangladesh also shared their concerns about water pollution.

The Conference flagged important areas of concern with regard to river, lake and ground water pollution. Some of the issues raised during the Conference were:

- Lack of coordination and ownership between the different agencies that are involved in its implementation;

- Need for the government to review the low levels of budgetary priority given to environment programmes in the country;
- Need to strengthen truly representative public participation in governmental programmes;
- Need to co-relate the reality that the number of citizens dependent on water bodies for livelihood with the creation of programmes for conservation;
- The imperatives of a comprehensive river basin approach for curbing river pollution as opposed to the extant town-based approach;
- The requirement of legislations for maintaining minimum amount of water/flow in lakes and setting standards for nitrogen and phosphorus as measures of water quality;
- Commitment from Supreme Audit Institutions to carry their mandate of environment audit forward and be more proactive in the field of environment audit.

(c) Advertisement in newspapers

We put out advertisements in various national and local newspapers all across India, inviting suggestions from the general public regarding the water pollution problems faced by them. We received more than 500 e-mails and letters. All these inputs facilitated us in the framing of audit objectives, sub-objectives and questionnaires for our Performance Audit. Some of the issues raised by the public were:

- Pollution of River Chandrabhaga
- Pollution of River Yamuna
- Pollution of groundwater in Maharashtra
- Pollution of Bellandur Lake
- Pollution of Dal Lake
- Depletion of groundwater in Kerala

Once areas of audit enquiry and audit questions were framed, our audit methodology consisted of document analysis, responses to questionnaires, examination of reports & records at various levels to collect audit evidence. Based on the feedback from these consultations, we decided to take up a Performance Audit of "Water Pollution in India" during 2010-11.

An Entry Conference with the Ministry of Environment & Forests was held on 30 July 2010 wherein the audit objectives, scope of audit, audit criteria and audit methodology were discussed. Exit Conference on 6 June, 2011 was held with MoEF where audit findings were discussed.

1.6 Audit Objectives

The review was undertaken to ascertain whether:

- ***Inventory of water sources has been prepared and whether the overall status of quality of water in rivers, lakes and groundwater has been adequately assessed in India;***
- ***Risks of polluted water to health of living organisms and the impact on environment have been adequately assessed;***

- ***Adequate policies, legislations and programmes have been formulated and effective institutions been put into place for pollution prevention, treatment and restoration of polluted water in rivers, lakes and ground water;***
- ***Programmes for pollution prevention, treatment and restoration of polluted water in rivers, lakes and ground water have been planned, implemented and monitored efficiently and effectively;***
- ***Funds were utilised in an efficient and economic manner to further the aim of reduction of water pollution;***
- ***Adequate mechanisms have been put in place by the government to sustain measures to tackle water pollution; and***
- ***Programmes for the control of pollution had succeeded in reducing pollution levels in ground water and surface water and restoring water quality.***

1.7 Audit criteria

The following audit criteria were utilised:

a. The Water (Prevention and Control of Pollution) Act, 1974.
b. Agenda 21 document of the World Commission on Sustainable Development of the United Nations Conference on Environment and Development, held in Rio in June 1992.
c. Guidelines for implementation and monitoring of National River Conservation Plan and National Lake Conservation Plan.
d. National Water Policy, 2002.
e. National Environment Policy 2006.
f. Implementation guidelines for Integrated Water Resources Management, specifically Integrated River Basin Management and Integrated Lake Basin Management.
g. Guidelines of United Nations Environment Programme (UNEP).

1.8 Audit sample

We selected the audit sample on the basis of assessment of risks like expenditure, criticality of the project in pollution control and feedback received from the public to the advertisement placed in newspapers.

- Out of 1079 projects for pollution control of 24 rivers across 19 States being implemented, we scrutinized 140 projects being implemented for control of pollution for 24 rivers.
- Out of projects for conservation of 58 lakes in 14 States, we studied 22 projects for conservation of lakes across 14 States.
- Out of a total of 6053 blocks across India, we examined 116 blocks for implementation and monitoring programmes relating to ground water pollution.
- Audit also studied the administrative structures and activities related to water pollution in 25 States of India.

Details of sample selected are attached as **Annexure 1**.

Chapter 2: Legislative, policy and institutional framework

Legislations, policies and programmes for water pollution in India

Table 2: Policies, legislations and programmes for water pollution in India

Legislation	Policy	Programmes
•Water (Prevention and Control of Pollution) Act, 1974 •Water (Prevention and Control of Pollution) Rules, 1975 •The water (Prevention and Control of Pollution) Cess Act, 1977 •Environment (Protection) Act, 1986 •Environment (Protection) Rules 1986	•National Water Policy, 2002 •National Environment Policy, 2006	•National River Conservation Plan •National Lake Conservation Plan •Jawaharlal Nehru National Urban Renewal Mission** •Urban Infrastructure Development Scheme for Small and Medium Towns**

***Note: Jawaharlal Nehru National Urban Renewal Mission and Urban Infrastructure Development Scheme for Small and Medium Towns are schemes implemented by the Ministry of Urban Development.*

2.1 Legislative framework

The goal of compliance to environmental laws is to assure the average citizen that natural values are protected that specific violators can be identified and that they comply with legal provisions. This is needed in order to safeguard human health and environment and to deter future violations. Legal and institutional frameworks for water quality protection must evolve from the present fractured and often unenforceable, guidelines to a comprehensive approach to pollution prevention and source water protection.

2.1.2 At the Centre

Water (Prevention and Control of Pollution) Act was enacted in 1974 under article 252 of Constitution which provides power to the Parliament to legislate for two or more States by consent and adoption of such legislation by any other State. The Act provides for the prevention and control of water pollution and for the maintaining or restoring of wholesomeness of water in the country.

To achieve this objective, the Act provided for establishing Boards at the Central and State level for the prevention and control of water pollution and conferred and assigned powers and functions relating this to these Boards.

It lays down a system of consent whereby no industry or operator process or any treatment and disposal system can be established without the previous consent of the State Board.

Similarly, no industry or process can discharge sewage or trade effluent into a stream or well or sewer or land in excess of the standards.

Contravention of the provisions of this Act is punishable in monetary as well non-monetary terms.

The Water (Prevention and Control of Pollution) Cess Act, 1977 provides for the levy of cess on use of water by various users of water i.e. industry and local authorities which are entrusted with duty of supplying of water under the law. This cess was meant to augment the funds required by State pollution Boards for their effective functioning in discharge of duties under the Water (Prevention and Control of Pollution) Act, 1974.

The cess is collected by the State Government concerned and paid to the Central Government. The proceeds are credited to the Consolidated Fund of India. After this, the Central Government, after due appropriation made by Parliament by Law, disburses such sums of money as if may think fit to the Central Board and the State Boards, having regard to the amount of cess collected by the State Government concerned.

Environment (Protection) Act, 1986 provides for the protection and improvement of environment and for matters connected there with. The definition of "environment" includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

The Central Government has the power to take all such measures as it deems necessary or expedient for the purpose of protecting and improving the quality of the environment and preventing controlling and abating environmental pollution. Thus, MOEF has the responsibility of controlling water pollution under Environment (Protection) Act, 1986.

The Water (Prevention and Control of Pollution) Act foresees a balance of strategies to ensure compliance: education and assistance; monitoring and inspections; communication and outreach. However, it falls short in the vital aspect of developing fair and differentiated responses to non-compliance. There is little evidence of the design of enforcement programmes to deter illegal conduct by creating negative consequences.

Inadequate penalty provisions

The penalty provisions under various Acts relating to control and prevention of water pollution is given in the table below.

Name of the Act/ Provision	The Water (Prevention and Control of Pollution) Act, 1974	The Water (Prevention and Control of Pollution) Cess Act, 1977	The Environment (Protection) Act, 1986
Provision relating to penalty	Failure to comply with provisions or for contravention of the provisions of the act and the rules, orders and directions shall, in respect of each such	Failure to comply with provisions or for contravention of the provisions of the act and the rules, orders and directions shall, in respect of each such	Failure to comply with provisions or for contravention of the provisions of the act and the rules, orders and directions shall, in respect of each such

	failure or contravention, be punishable with	failure or contravention, be punishable with	failure or contravention, be punishable with
	• Imprisonment for a term which may extend to three months to six years • Fine which may extend to ₹ 10 thousand and In case of the failure continues, with an additional fine which may extend to ₹ five thousand for every day during which such failure continues after the conviction for the first such failure.	• Imprisonment which may extend to six months • Fine which may extend to ₹ one thousand • Or with both.	• Imprisonment for a term which may extend to five/seven years • Fine which may extend to ₹ one lakh, continued failure or contravention, with additional fine which may extend to ₹ five thousand for every day during which such failure or contravention continues after the conviction for the first such failure or contravention. • Or with both.

We observed that the maximum penalty prescribed under **The Water (Prevention and Control of Pollution) Cess Act, 1977 was only ₹ one thousand, while the same under The Water (Prevention and Control of Pollution) Act, 1974 was** ₹ 10 thousand rupees. The maximum penalty under the **Environment (Protection) Act, 1986** was ₹ one lakh. However, in the case of water pollution, the fine or penalty prescribed under **The Water (Prevention and Control of Pollution) Act, 1974 would be applicable as per sub section 2 of section 24 of the Environment Protection Act 1986.** Thus, the maximum penalty/fine is limited to ₹ 10 thousand for case relating to water pollution.

We observed that powers relating to filing of cases of violations are exercised by the SPCBs, While CPCB conducts random checks of Industries or other stake holders contributing to water pollutions and cases of violations are reported to the respective SPCBs for their action and in cases of serious violations are dealt with for notice of closure or closure under section 5 of the Environment Protection Act 1986. The CPCB/MOEF did not compile any information on cases of violations relating to water pollution filed by the SPCBs and amount of penalty/fine realized. The information relating to the cases , where the closure notices or final closure were ordered by CPCB was awaited. In absence of information on the extent of violations of provisions of Acts relating to water pollution in various States, it was not clear

how the effectiveness of implementation of these Acts were analyzed and monitored by the CPCB/MOEF in relation to water pollution. Thus, CPCB/MOEF was not aware of how the provisions, particularly provision of the levy of penalty under **The Water (Prevention and Control of Pollution) Cess Act, 1977 and The Water (Prevention and Control of Pollution) Act, 1974** were being enforced, extent of violations compared to total users and extent of enforcement etc . We felt that the low quantum of penalty of ₹ 10 thousand as also the failure of the State in enforcing the provisions of the Act strictly to secure prevention and control of water pollution, has led to the situation where the cost of non compliance became significantly lower than the cost of compliance with the provisions of rules and orders under the Acts. Thus, there was need to strictly enforce the provisions of the Acts , while reviewing the quantum of penalty as also the wide disparity prevailing under the various Acts which ranged from ₹ 10 thousand to ₹ one lakh prescribed in **Environment Protection Act 1986.**

While the responsibility of management and development of ground water rests with CGWB, the prevention of water pollution comes under the purview of MOEF.

While the Act envisages both monetary and non-monetary penalties, ultimately, a highly tolerant inspection regime of the SPCBs ensures that the costs of defiance, non-adherence and violations are lower than the costs of compliance.

MoEF stated in its reply of June 2011 that it had enacted legislations like Water (Prevention and Control of Pollution) Act and the Environment Protection Act for control of water pollution in India. It further stated that as per sections 25/26 of the Water Act, 1974 no industry or operator process or any treatment and disposal system can be established (which is likely to discharge sewage or effluents) without the previous consent of the State Board and no industry or process can discharge sewage or trade effluent into a stream, well, sewer or land in excess of the standards and without the consent of the Board.

MoEF has not framed any legislation which specifically identifies pollution as an environmental offence and restoration of water bodies as a priority action.

2.1.2 In the States

- Of the 25 States test checked, **Water (Prevention and Control of Pollution) Act 1974** was adopted by all the 25 States and States pollution Control Board/ committee were framed in all these States.

2.2 International Best practices

Several international conferences have been held to address the issue of water pollution world-wide. The following are particularly notable as they set the global agenda for management of water bodies. India also participated in these deliberations and concurred with their findings.

Table 3: International conferences on water quality

International Conferences	Main issue
UN Conference on Human Environment, Stockholm, 1972	Preservation and enhancement of human environment
UN Conference on Water, Mar del Plata, 1977	Assessment of water resources, water use and efficiency
International Conference on Water and Environment, Dublin, 1992	Water and sustainable development
UN Conference on Environment and Development (UNCED, Earth Summit), Rio de Janeiro, 1992	Agenda 21, holistic management of freshwater and integration of sectoral water plans programmes within the framework of national economic and social policy
First World Water Forum, Marrakech, 1997	Water and sanitation, management of shared waters, preserving ecosystems, to encourage the efficient use of water
International Conference on Water and Sustainable Development Paris, 1998	Management, protection and equitable use of freshwater resources
Second World Water Forum, The Hague, 2000	World Water Vision: Making Water Everybody's Business
International Conference on Freshwater, Bonn, 2001	Water – key to sustainable development
Third World Water Forum, Kyoto, 2003; Fourth World Water Forum, Mexico, 2006; 5th World Water Forum Instanbul, 2009.	Raise the importance of water on the political agenda, support the deepening of discussions towards the solution of international water issues in the 21st century, formulate concrete proposals and bring their importance to the world's attention and generate political commitment.

2.3 Policy framework

Strong policy framework is an essential first step in effectively regulating water quality. Lack of a comprehensive approach has often led to costly and ineffective water policies. Good and enforceable regulations must follow creation of an overall water quality policy. With respect to **policy formulation** by the government, we observed the following at the Central and State levels.

2.3.1 At the Centre

The National Water Policy was adopted in 1987 and was reviewed and updated by National Water Policy 2002 by the Ministry of Water Resources in 2002. This policy aimed at meeting the challenges that have emerged in the development and management of water resources including water pollution. The following are the salient features of National Water Policy relating to water pollution:

- Both surface water and ground water should be regularly monitored for quality. A phased programme should be undertaken for improvements in water quality.
- Effluents should be treated to acceptable levels and standards before discharging them into natural streams.
- Minimum flow should be ensured in the perennial streams for maintaining ecology and social considerations.
- Principle of 'polluter pays' should be followed in management of polluted water.
- Necessary legislation is to be made for preservation of existing water bodies by preventing encroachment and deterioration of water quality.
- As maintenance of water resource schemes is under non-plan budget, it is generally being neglected. The institutional arrangements should be such that this vital aspect is given importance equal or even more than that of new constructions.
- Improvements in existing strategies, innovation of new techniques resting on a strong science and technology base are needed to eliminate the pollution of surface and ground water resources, to improve water quality. Science and technology and training have to play important roles in water resources development and management in general. It emphasises on water quality and recycling and re-use of water.

"National Conservation Strategy and Policy Statement on Environment" and "National Environment Policy" were enacted in 1992 and 2006 respectively which are broad policy frameworks on environmental issues.

National Environment Policy 2006 has outlined following elements of an action plan to address the water pollution.

- Develop and implement, initially on a pilot scale, public-private partnership models for setting up and operating effluent and sewage treatment plants. Once the models are validated, progressively use public resources, including external assistance, to catalyze such partnerships. Enhance the capacities of municipalities for recovery of user charges for water and sewage systems.
- Prepare and implement action plans for major cities for addressing water pollution, comprising regulatory systems relying on a appropriate combination of fiats and incentive based instruments, projects implemented through public agencies as well as public-private partnerships for treatment, reuse, and recycle where applicable, of sewage and wastewater from municipal and industrial sources, before final discharge to water bodies.
- Take measures to prevent pollution of water bodies from other sources, especially waste disposal on lands.
- Enhance capacities for spatial planning among the State and Local Governments, with adequate participation by local communities, to ensure clustering of polluting industries to facilitate setting up of common effluent treatment plants, to be operated on cost recovery basis. Ensure that legal entity status is available for common effluent treatment plants to facilitate investments, and enable enforcement of standards.

- Promote R&D in development of low cost technologies for sewage treatment at different scales, in particular, replication of the East Kolkata wetlands and other bio-processing based models for sewage treatment, to yield multiple benefits.
- Take explicit account of ground water pollution in pricing policies of agricultural inputs, especially pesticides, and dissemination of agronomy practices.

The 2006 policy deals with water quality pointing out that improvement in existing strategies and innovations are needed to eliminate pollution of surface and ground water resources. It also States that resources should be conserved and availability augmented by maximising retention, eliminating pollution and minimising losses. Thus, addressing water pollution is one of the thrust areas of National Water and Environment Policy.

In June 2011, MoEF stated that the National Environment Policy declared by MoEF in 2006 briefly describes the key environmental challenges currently and prospectively facing the country, the objectives of environment policy, normative principles underlying policy action, strategic themes for intervention, broad indications of the legislative and institutional development needed to accomplish the strategic themes, and mechanisms for implementation and review.

Any policy is only as good as its implementation. The National Environment Policy outlines a significant number of new and continuing initiatives for enhancing environmental conservation. A formal, periodic high level review of implementation of the different elements of the National Environment Policy is essential at least once a year. The findings of the review should be publicly disclosed, so that stakeholders are assured of the seriousness of the Government in ensuring implementation of the Policy. However, no such review has taken place.

2.3.2 In the States

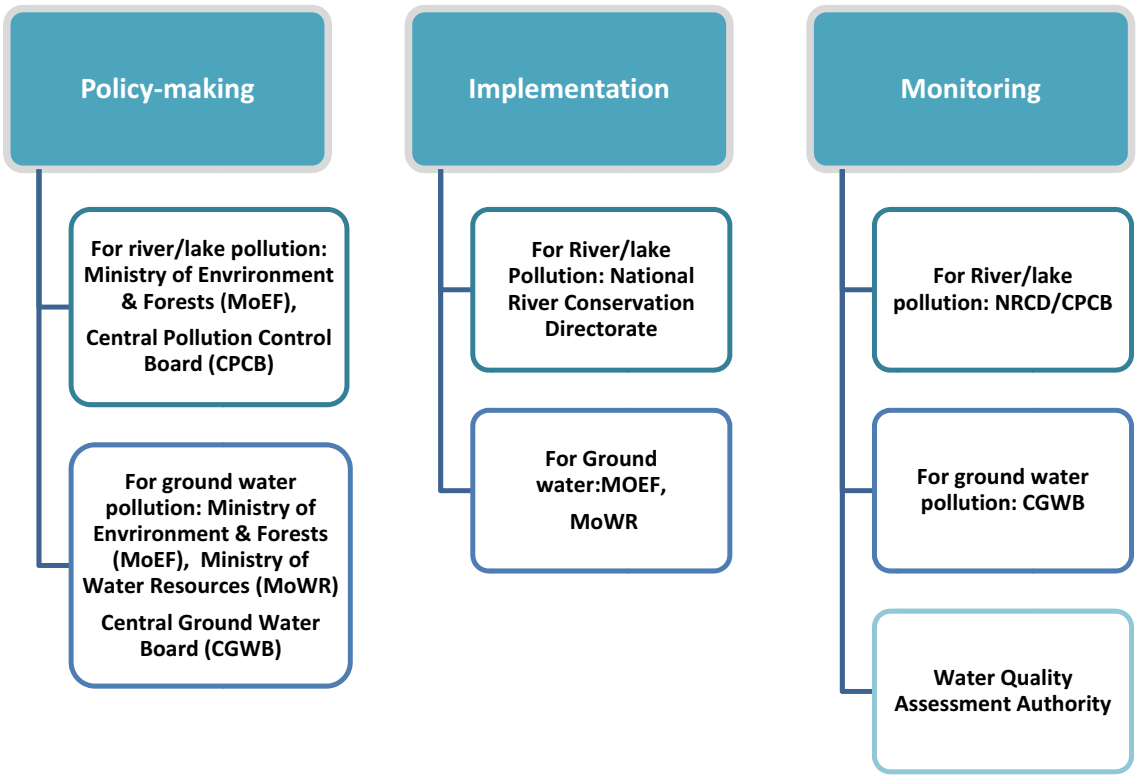
National Water Policy 2002 envisaged that within a time bound manner, say a period of two years, States would frame and adopt State Water Policy. With respect to State water policy formulations, it was observed that 18 States have framed water policy and in the remaining seven States, water policy was yet to be finalised. Only Kerala formulated a separate policy to deal with water pollution. Further water policy of most of the States also does not give adequate emphasis on prevention and control of water pollution.

The State government of Kerala has formulated a separate policy for addressing water pollution.
The policy addresses pollution issues by stating "There shall be specific plan of action for implementing location specific sewerage in all urban areas and appropriate sanitation system in all rural areas. Appropriate sanitation sub policy and action plan shall be formulated and implemented. The potential for recycling and reuse of water shall be recognized and all water users shall be directed to adopt measure to recycle for incremental reduction in water extraction."

2.4 Institutional arrangements for managing water pollution in India

2.4.1 At the Centre:

Table 4: Institutional arrangements for water pollution in India



2.4.2 In the States:

Specific programmes for river or lake pollution control, abatement or restoration of quality through NRCP/NLCP are executed through different State government departments. These vary from State to State.

In most States, the responsibility of control of water pollution is assigned to State Pollution Control Boards, and not specifically to State government departments.

2.4.3 Central Pollution Control Board (CPCB):

Water (Prevention and Control of Pollution) Act, 1974 lays down the following functions for **CPCB:**

- Plan and cause to be executed, a nation-wide programme for the prevention, control or abatement of water;
- Collect, compile and publish technical and statistical data relating to water and the measures devised for their effective prevention, control or abatement;
- Disseminate information in respect of matters relating to water and their prevention and control; and,
- Lay down, modify or annul, in consultation with the State Governments concerned, the standards for stream or well

- Provide technical assistance and guidance to State Boards, carry out and sponsor investigations and research relating to problems of water pollution and prevention, control or abatement of water pollution.

State Pollution Control Board (SPCB)

The Act laid down important functions that the SPCB would perform. Some of the important ones are as follows:

- To plan and execute programmes for prevention, control and abatement of pollution of streams and wells in the State.
- To collect and disseminate information on pollution;
- To conduct investigations relating to problems of pollution;
- To inspect sewage or industrial effluents and review the systems for the disposal of the same;
- To lay down, modify or annul effluent standards for sewage and trade effluents;
- To evolve economical methods of sewage and effluent disposal and treatment.
- SPCBs are empowered by the Act to obtain information, to take samples of water for the purpose of analysing effluent discharge from any stream or well and to enter and inspect any place in relation to the duties entrusted to the SPCB.

We observed that CPCB and SPCBs are autonomous of each other. While CPCB is under the administrative control of the MoEF and responsible for overall policy, planning and coordination , the SPCBs are under their respective State governments and are expected to work under the overall policy frame work of CPCB, MoEF and responsible for implementation of provisions of various environmental Acts relating to Water pollution at the ground level. This dichotomy of control finds its source in the Water (Prevention and Control of Pollution) Act, 1974, which further entrusts the SPCB with the critical functions of compliance to and enforcement of pollution control related activities, whereas CPCB is given an advisory and coordination role. SPCBs are not empowered to generate adequate financial resources of its own to effectively discharge its mandate and are dependent on Central Government and State Government for grants even for expenditure on normal monitoring of pollution levels.

Thus, while the outputs of the actions of CPCB and SPCBs are co-related, there is no functional co-relation between them at the input stage. This dichotomy of control causes a situation whereby there is no single agency to take charge of the issue of control of water pollution on a nation-wide basis.

2.4.4 Water Quality Assessment Authority (WQAA):

The Water Quality Assessment Authority (WQAA) was set up at the central level in May, 2001 for exercising powers under the Environment Protection Act, 1986 relating to issuing directions for protection and conservation of the environment and preventing, controlling

and abating pollution and to direct agencies (government/ local bodies/non-governmental) in the field of water pollution.

The mandate of this Authority is to direct agencies to standardize water quality monitoring methods, ensure proper treatment of wastewater to restore the water quality of surface and ground waters, take up R&D activity related to water quality management and promote recycling and reuse of treated wastewater.

Since 2001 only seven meetings of Water Quality Assessment Authority have taken place.

Till date WQAA had issued only Uniform Monitoring Protocol (UMP) in 2005 for uniform procedure for sampling, analysis, data storage and reporting amongst the agencies operating Water Quality monitoring networks in the country. It also set up a Task Force which has made recommendations for development of Water Quality data information system and recommends steps for co-ordination in collection, use and dissemination of data; to review of Water Quality Monitoring network and recommend optimum network for the country and a system for accreditation of water quality laboratories in the country.

Apart from this, it had not taken any action towards promoting recycling/re-use of sewage/trade effluents, drawing up action plans for quality improvements in water bodies, schemes for restriction of water abstraction, reviewing the status of national water resources, identifying hotspots etc.

The **Water Quality Review Committees** were constituted in some States with an objective to improve coordination amongst the Central and State agencies. They were to review/assess schemes launched/to be launched, to improve quality of water resources, review water quality data analysis and interpretation in order to identify problem areas. Their remit also included developing action plans for improving quality on a sustainable basis, identify hot spots for surveillance monitoring.

Water Quality Review Committees have been set up in Assam, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra ,Odisha, Punjab, Sikkim, Tripura, UP and West Bengal.
But the Committee has met regularly only in Maharashtra and Himachal Pradesh.

Conclusion

While India has the Water (Prevention and Control of Pollution) Act 1974 in place, the law does not address the issue of restoration of the polluted water bodies. It also does not define stricter financial and non-financial penalties to environmental offenders.

Although the concerns related to water pollution have been adequately addressed in National Water Policy and National Environment policy in India, both at the central and the State level, provisions for generation of resources for prevention of pollution, treatment of polluted water and ecological restoration of polluted water bodies are not adequate.

Recommendation 1

MoEF/States, in the policy on water pollution, need to specifically take into account prevention and control of water pollution as well as ecological restoration of degraded water bodies. There is a need to strictly enforce the provisions of the Acts, and review the existing levels of penalty in various Acts relating to control and prevention of water pollution.

Recommendation 2

Legislations should be introduced by MoEF/States to specifically prevent water pollution. Further, it needs to craft a well thought out legislation for control of pollution which takes into account pollution from both point and non-point sources. It should also introduce legislations for restoration of degraded water bodies so that these degraded water bodies do not pose risks to ecological environment and human health.

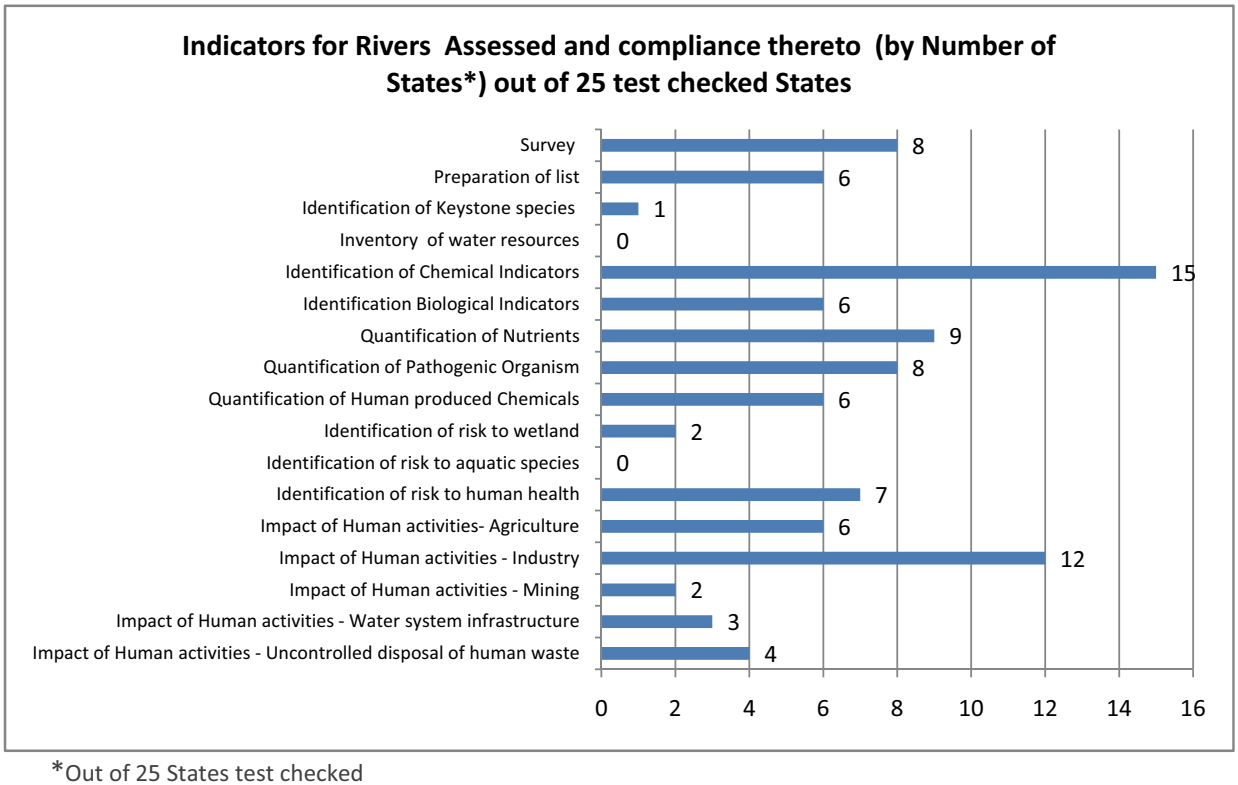
Chapter 3: Planning for control of pollution of rivers, lakes and ground water

A prerequisite of efficient protection of water resources against pollution is the preparation of a comprehensive and detailed plan of protection which takes into consideration all point and diffuse sources of pollution, pollution processes and movements, consequences and all possible structural and administrative measures of protection against pollution.

Assessment of the quantity and quality of water resources includes identification of potential sources of freshwater supply and determination of sources, extent, dependability and quality of water resources and of the human activities that affect those resources. However, for assessing surface water and ground water resources, governments require adequate and comparable information. This data on water resources, both quantitative and qualitative, becomes the basis of sound decisions.

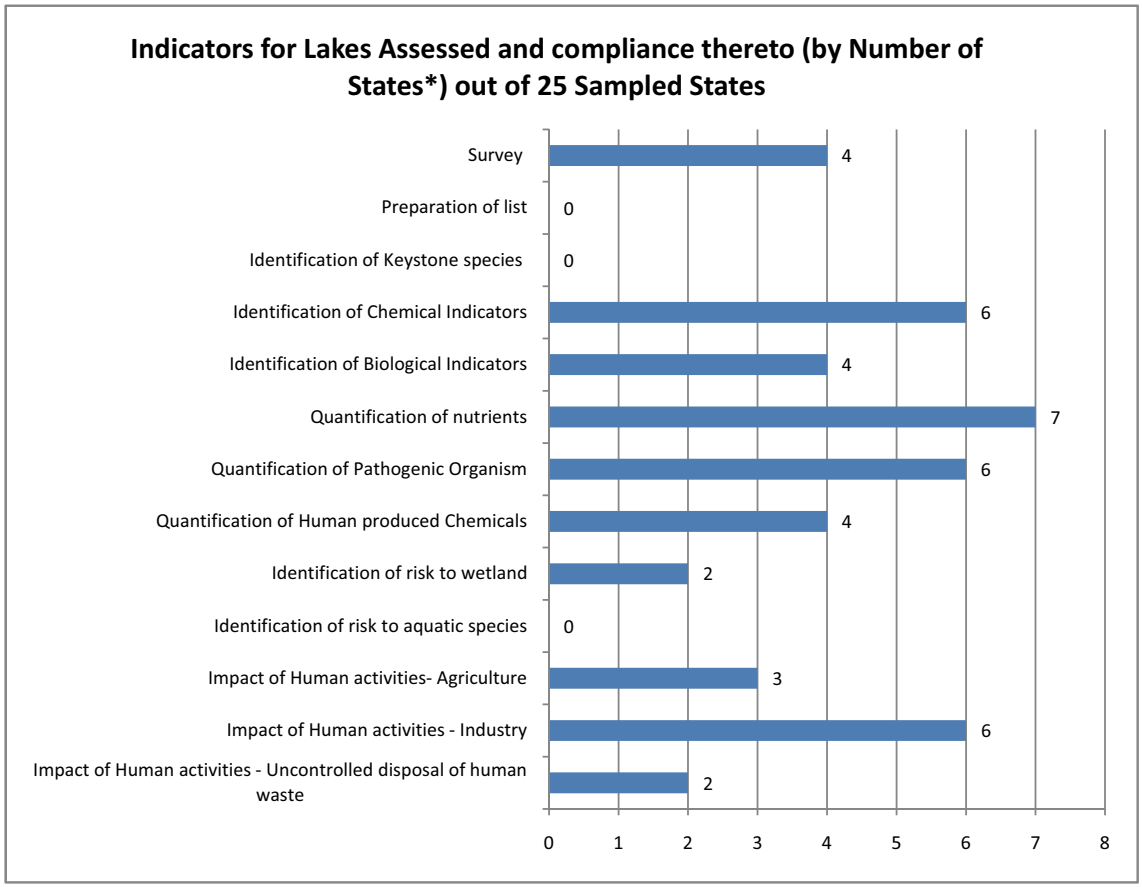
Polluted water in rivers, lakes and ground water poses risks to environment as well as health of people exposed to the polluted water. The basin approach is being recognised as a comprehensive basis for managing water resources more sustainably and will lead to social, economic and environmental benefits. Water quality goals are the minimum acceptable standard of quality of surface water and ground water. These goals, in the nature of standards, are minimum acceptable standards which are enforceable by water pollution control agencies.

The identification of various indicators of water pollution for rivers and lakes were examined in audit and a summary position of the compliance for 25 States test checked is shown in the chart below:



*Out of 25 States test checked

In the case of the chart pertaining to rivers, shows that out of 25 States test checked, the compliance to relevant indicators in terms of enumeration/identification/quantification etc. has been very dismal. At the best, in the case of one indicator namely identification of chemical indicators, there was compliance by 60 per cent of the States test checked. In the case of two indicators namely inventory of water resources and identification of risk to aquatic species, not a single State in the country had been able to comply with the standard.



*Out of 25 States test checked

In the case of the chart pertaining to lakes, shows an even more dismal position with regard to enumeration/identification/quantification of the relevant indicators. In the case of quantification of nutrients in the lakes, the compliance was by 28 percent of the States, in the case of three out of 13 indicators namely preparation of list, identification of Keystone species and identification of risk to aquatic species there was no compliance by any of the States.

The succeeding paragraph brings out the position in terms of individual States and the position obtaining at the Centre.

3.1 Inventory of rivers/lakes and keystone species associated with them

3.1.1 Preparation of inventory of rivers, lakes and ground water

In order to make comprehensive and workable plans to tackle water pollution, it is necessary to establish databases on the availability of all types of hydrologic data at the national level and to identify surface and ground water resources and potential sources of water supply and prepare national profiles. In this regard, we observed that

At the Centre

Detailed inventory of **rivers** and **lakes** had not been made by MoEF. MoEF stated that no survey to identify all rivers and lakes was done and no identification and classification of rivers and lakes as major/minor rivers and lakes had been done by it.

It also stated that since assessment of ground water resources in the country was not in the mandate of MoEF the same has not been done. Audit observed however that the Ministry of Water Resources operates a Ground Water Information System which maps, among other things, hydrological boundaries, land use, drainage and water level.

In the States

With respect to inventory of **rivers, lakes and ground water** resources and identification of keystone species audit scrutiny showed that:

- Only eight States, Punjab, Andhra Pradesh, Goa, Gujarat, Karnataka, Kerala, Maharashtra and West Bengal, had carried out a survey to identify rivers in their States and six States, Goa, Gujarat, Karnataka, Kerala, Maharashtra and Orissa had prepared an exhaustive list of rivers running in their States.
- Only four States, J&K, Kerala, Tamil Nadu and West Bengal had carried out a survey to identify the lakes in their States.
- 14 States, Punjab, Haryana, Andhra Pradesh, Bihar, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, West Bengal, Delhi and Rajasthan had carried out district-wise assessment of ground water resources.

In the absence of an inventory for rivers and lakes, MoEF, which is the nodal ministry for pollution related issues in India, would not have adequate knowledge and information on the water resources which is the key part of the platform for setting objectives for water pollution prevention and control and implementing responses to it.

The absence of such an inventory will also hamper the water pollution management by the States.

3.1.2 Preparation of inventory of keystone species

A keystone species is a species so critical to an ecosystem that its removal could potentially destroy the entire system. The concept of keystone species has become an important issue in conservation today as the loss or decline of keystone species may have far-reaching consequences for the structure and functioning of the eco-systems in which they live.

At the Centre

MoEF has not identified keystone species associated with each **river** and **lake** for major river systems and lakes in India. This has been done only in the case of Ganga River where river dolphin was identified as a keystone species. Such identification is imperative as it would not only act as indicator of the health of the eco-system but would also help MoEF to design programmes to protect species threatened by water pollution.

In the States

- Only Himachal Pradesh had identified keystone species associated with some of the rivers running in their States.
- No State had identified keystone species associated with lakes in their States. Himachal Pradesh had identified some species of flies like Perlidae, Taenioperygidae, Ephemerellidae, Heptageneiidae and Hydropsychidae which live in streams. However, these were not keystone species.

In June 2011, MoEF stated that identification of keystone species was location-specific and need-based. Further, MoEF stated that it had notified the Gangetic River Dolphin as the national aquatic animal. However, the reply was silent about preparation of inventory of keystone species for other major river systems and lakes in India.

Absence of inventory of water bodies and keystone species associated with them leads to an incomplete understanding of water quantity and quality. The absence of such a database weakens the process of planning comprehensive and effective pollution control programmes.

3.2 Identification of existing pollution levels in terms of chemical and biological indicators

Chemical indicators like BOD, COD, faecal coliform and total coliform are traditional methods of water quality which provide an indication of organic pollution. However, due to complexity of effluents now entering the water bodies and the inability to develop analytical methods for each and every pollutant, use of biological indicators[6] is now assuming importance. Biological monitoring goes beyond the conventional measures of water quality to address questions of ecosystem function and integrity.

3.2.1 At the Centre

- Identification of chemical indicators of water pollution like faecal coliform, total coliform, dissolved oxygen and biochemical oxygen demand in **rivers** and **lakes** was

[6] It involves the measurement of species or a group of species like invertebrates whose population is used to determine environmental integrity

done by MoEF under the National River Conservation Programme and by CPCB under the Monitoring of Indian National Aquatic Resources (MINARs) programme.

- CPCB had also identified chemical indicators of pollution of **ground water** in the country like arsenic, nitrate, iron, fluoride and salinity. Identification of indicators of pollution by industries which emit contaminants had been done by CPCB by means of indicators like anions, other inorganic ions and micro pollutants. However, these were tested only once a year.
- This assumes significance in terms of the high levels of industrial pollutants which are being discharged into rivers, lakes and ground water in India as discussed later in this report.
- It was observed that CPCB has identified biological indicators (benthic macro-invertebrates) for some **rivers** in India such as Yamuna, Narmada, Krishna, Cauvery, Tungabhadra, Gomti, Kosi, Mahanadi and Brahmani. However such identification was not done for each river in India due to insufficient infrastructure facilities.

Biological indicators had not been identified for any lake in India by MoEF/CPCB.

MoEF stated in its reply of June 2011 that it had carried out studies relating to biological indicators and identified some limitations of such indicators. It also stated that biological indicators can supplement but not replace the chemical indicators. Also, agreeing with audit conclusions, MoEF stated that biological indicators reflect the effect of pollution on the water bodies.

The reply of MoEF has to be seen in light of the fact that biological indicators go beyond the conventional measures of water quality to address questions of ecosystem function and integrity and give a complete picture of the extent of pollution of rivers, lakes and ground water in India.

3.2.2 In the States

Audit scrutiny revealed that:

- 15 States, Punjab, Andhra Pradesh, Bihar, Chhattisgarh, Goa, Gujarat, Himachal Pradesh, J&K, Jharkhand, Tamil Nadu, Odisha, Uttarakhand, West Bengal, Delhi and Kerala had identified some chemical indicators of pollution of rivers while only six States, Himachal Pradesh, J&K, Odisha, Tamil Nadu, Uttarakhand and West Bengal had done so for lakes.
- Biological indicators of pollution for some rivers had been developed by six States: Punjab, Andhra Pradesh, Bihar (for only two rivers), Himachal Pradesh, Tamil Nadu and West Bengal while only four States, Andhra Pradesh, Himachal Pradesh, Tamil Nadu and Uttarakhand had done for some of the lakes in the State.
- With respect to ground water, 17 States, Punjab, Haryana, Andhra Pradesh, Bihar, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Tamil Nadu, Maharashtra, Uttarakhand, West Bengal, Delhi and Rajasthan had identified existing pollution levels in terms of arsenic, nitrate, salinity etc.

The scenario of identification of chemical and biological indicators of pollution in rivers and lakes in the States reveals a particularly dismal position in respect of biological indicators.

This also indicates that the planning process cannot be symmetrical as no comprehensive data is available to give a holistic picture of the nature and quantum of pollution in India's surface water bodies.

3.3 Identification and quantification of contaminants

A wide range of human and natural processes affect the biological, chemical, and physical characteristics of water and thus impact water quality. Contaminants[7] can harm aquatic ecosystems and make water unsuitable for human use.

3.3.1 At the Centre

Identification and quantification of contaminants like nutrients, erosion and sedimentation, water temperature, acidification, salinity, pathogenic organisms (bacteria, protozoa and viruses), human produced chemicals and other toxins, introduced species and other biological disruptions etc., had not been done in respect of any **river** or **lake** in India by MoEF, CPCB or by MoWR.

Identification and quantification of pollution levels in **ground water** in terms of arsenic, nitrate, iron, fluoride and salinity in ground water for each of the States in India has been done by CGWB. However, no identification and quantification has been done regarding presence of nutrients, human produced chemicals and other toxins in ground water.

3.3.2 In the States

With respect to identification and quantification of contaminants, audit scrutiny revealed:

- Nine States, Andhra Pradesh, Goa, Gujarat, Himachal Pradesh, Kerala, Maharashtra, Odisha, Tamil Nadu and West Bengal had identified and quantified nutrients in some rivers.
- Six States, Andhra Pradesh, Bihar, Karnataka, Odisha, Tamil Nadu and West Bengal had identified and quantified human produced chemicals in some rivers.
- Eight States, Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Maharashtra, Uttarakhand and West Bengal had identified and quantified pathogenic organisms affecting quality of water in some of the rivers.
- Seven States, Andhra Pradesh, Himachal Pradesh, J&K, Kerala, Odisha, Tamil Nadu and West Bengal had identified and quantified nutrients in respect of lakes.
- Four States, Andhra Pradesh, Karnataka, Tamil Nadu and West Bengal had identified and quantified human-produced chemicals in some lakes and

[7] Contaminants like nutrients, erosion and sedimentation, acidification, salinity, pathogenic organisms (bacteria, protozoa and viruses), human produced chemicals and other toxins, introduced species and other biological disruptions etc

- Six States, Andhra Pradesh, Gujarat, Karnataka, Kerala, Uttarakhand and West Bengal had identified pathogenic organism affecting quality of water in some of the lakes in their respective States.

In June 2011, MoEF stated that CPCB had undertaken comprehensive studies/inventories of pollution sources and their effect in river basins like Ganga, Brahmaputra, Brahmini, Sabarmati etc., and published a document on assessment of industrial pollution which provided the pollution load from major industries.

MoEF also stated that control of agricultural pollution was difficult and Ministry of Agriculture needs to devise suitable policy in this regard.

CPCB had conducted studies on pollution sources and their effects. However, these studies took place between 1980 to 1995 and did not cover all rivers and all sources of pollutants.

As such, these studies have not taken into account the impact of the rapid pace of industrial development which has added complexity to the quantity and type of pollutants.

3.4 Identification and quantification of human activities that impact water quality

Numerous human activities including agriculture, industry, mining, disposal of human waste, population growth, urbanisation, climate change etc. impact water quality. Agriculture can cause nutrient and pesticide contamination and increased salinity and nutrient enrichment has become one of the most widespread water quality problems of the planet.

3.4.1 At the Centre

MoEF/CPCB/MoWR have not carried out assessment and quantification of the effect of activities which affect the quality of water in **rivers** and **lakes** from an activity-based perspective such as mining or agriculture, or industrial sector. The water quality monitoring is presently carried out by CPCB's 1700 monitoring stations including 490 locations for ground water on the basis of 28 parameters consisting of physio-chemical and bacteriological parameters.

Further, CGWB had carried out only a few special studies regarding the effect of human activities on **ground water** like agriculture and uncontrolled disposal of human waste on the quality of ground water.

No studies have been carried out by MoEF/CPCB to probe the effects of industrial activities like paper mills, pharmaceutical industry, chemical plants, distilleries, tanneries, oil refineries, sugar factories and mining.

3.4.2 In the States

With respect to assessment and quantification of the effect of activities which affect the quality of water in rivers and lakes, audit scrutiny revealed that with regard to

Quality of water in rivers:

- Effect of *agriculture* had been assessed only by six States: Andhra Pradesh, Assam, Goa, Odisha, Tamil Nadu and West Bengal;
- Effects of *industrial activities* had been assessed only by 12 States: Delhi, Haryana, Andhra Pradesh, Assam, Gujarat, Himachal Pradesh, Kerala, Madhya Pradesh, Odisha, Tamil Nadu, Uttarakhand and West Bengal;
- Effects of *mining* had been analysed by only two States: Goa and Odisha;
- Effects on the *water system infrastructure* has been assessed only by three States: Andhra Pradesh, Himachal Pradesh and Tamil Nadu;
- Effects of *uncontrolled disposal of human waste* had been assessed by only four States: Himachal Pradesh, Maharashtra, Odisha and West Bengal.

Quality of water in lakes:

- Effect of *agriculture* had been assessed by three States: Andhra Pradesh, Tamil Nadu and West Bengal;
- Effects of *industrial activities* had been assessed by six States: Andhra Pradesh, Gujarat, Himachal Pradesh, Kerala, Tamil Nadu and West Bengal; and
- Effects of *uncontrolled disposal of human waste* had been assessed only by two States: Himachal Pradesh and West Bengal.

Quality of ground water:

- Effects of *agriculture* had been assessed only by seven States: Punjab, Haryana, Andhra Pradesh, Goa, Kerala, Tamil Nadu and West Bengal;
- Effects of *industrial activities* had been assessed only by nine States: Haryana, Andhra Pradesh, Assam, Goa, Gujarat, Himachal Pradesh, Tamil Nadu, West Bengal and Delhi;
- Effects of *uncontrolled disposal* of human waste on quality of water in the ground water had been assessed only by four States: Haryana, Himachal Pradesh, Kerala and West Bengal.
- Effect of *mining* on the quality of ground water had not been assessed by any State.

In June 2011, MoEF stated that the entire impact of human activities had been assessed by CPCB and for sewage generation, collection, treatment and disposal, separate documents had been produced.

The reply of MoEF needs to be viewed in light of the fact that the CPCB reports have essentially focussed on only one of the human activities, i.e., uncontrolled disposal of human waste which affect the quality of river water. Further, the reports do not address the impact of other human activities such as agriculture, mining etc., which impact the quality of water. Further these studies are more than two decades old and have not been done with respect to all the rivers, lakes and ground water sources in India.

3.5 Assessment of risks of polluted water to environment and health

Polluted water in rivers, lakes and ground water poses risks to environment as well as health of people exposed to the polluted water. With respect to assessment of risks, audit scrutiny revealed the following:

3.5.1 At the Centre

MoEF had not identified wetlands associated with each **river/lake** and no identifications of risks to these wetlands due to pollution of river water/lake water had been carried out by MoEF/CPCB. Further, MoEF/CPCB had not identified the major aquatic species, birds, plants and animals facing risks due to pollution of rivers and lakes. As such, MoEF/CPCB was unaware of the risks being faced by the environment as a result of pollution of rivers and lakes.

We observed in audit that risks to human health from water borne diseases and water based diseases as a result of pollution of **rivers and lakes** has not been assessed by MoEF/CPCB.

In 2009, Ministry of Health and Family Welfare reported that 1.14 crore cases of acute diarrheal diseases occurred in India.

With respect to assessment of risks to human health from pollution of **ground water,** MoEF/CPCB stated that it had not been done while CGWB stated that such risk assessment was outside its purview. Thus, MoEF/CPCB/CGWB were unaware of the risks to human health being posed by polluted rivers, lakes and ground water.

3.5.2 In the States

- Risks to wetlands from pollution of rivers and lakes have been assessed by only two States: Punjab and Tamil Nadu.
- None of the States in India have identified the major aquatic species, birds, plants and animals facing risks due to pollution of rivers.
- Risks to human health from water-borne diseases and water-based diseases as a result of pollution of rivers had been assessed by only seven States: Goa, Haryana, Jharkhand, Kerala, Madhya Pradesh, Himachal Pradesh and Odisha.
- Risks to human health from arsenic, zinc, iron, mercury, copper, chromium, cadmium, lead, persistent organic pollutants like dioxins, furans and polychlorinated biphenyls as a result of pollution of ground water had been assessed by only two States: Assam and Karnataka.

In June 2011, MoEF stated that risk assessment was taken into account while developing the water quality objectives, criteria and standards. It also stated that diseases caused as a result of contamination of water are well known and such incidents are also well documented.

Both Union and State governments have failed to conduct comprehensive assessment of risks to environment and health. Such studies on risk assessment would have enabled them to put in place preventive measures to lessen the deleterious impacts of water pollution on human health as well as the fragile freshwater ecosystem.

3.6 Basin level approach for control of pollution

The basin approach[8] is recognized as a comprehensive basis for managing water resources more sustainably and will lead to social, economic and environmental benefits.

With respect to planning for control of pollution at the basin level, we observed that MoEF established a long-term vision for only Ganga river basin as against the 24 major river basins existing in India.

For the river Ganga, the National Ganga River Basin Authority (NGRBA) was constituted in February 2009. We, however, observed that only government level stakeholders namely, Ministers of Urban Development, Water Resources, Deputy Chairman, Planning Commission and Minister of State for Environment were involved in consultations while setting up NGRBA. MoEF had taken very limited action on integration of policies, decisions and costs across sectoral interests relating to pollution such as industry, agriculture, urban development, navigation, fisheries management and conservation, including through poverty reduction strategies.

Further, it did not engage in strategic decision-making at the river basin scale which guided actions at sub-basin or local levels. No involvement of private sector/civil society in investment decisions in the planning process was found. With respect to **lakes**, no planning was found to have been done according to the basin approach.

In June 2011, MoEF stated that the need for a river basin approach for conservation had been already recognised by the Central Government and National Ganga River Basin Authority (NGRBA) had been set up as an empowered planning, financing, monitoring and coordinating authority for the Ganga River with new institutional structures. It further stated that the objective was to have the river basin as the unit of planning, to shift from town-centric to river-basin approach and to have a comprehensive response covering water quality and flow, sustainable access, environment management, prevention and control of pollution in the form of a national mission.

Audit acknowledges the fact that the basin approach has been adopted for conservation of river Ganga and MoEF must now start planning similar basin approaches for all the river basins in India, starting with the ones which are the most polluted like River Yamuna.

3.7 Development of water quality goals, corresponding parameters for each river/lake and their enforcement

Water quality goals are the minimum acceptable standard of quality of surface water and ground water. These goals, in the nature of standards, are minimum acceptable standards which are enforceable by water pollution control agencies. Action should be taken against agencies that violate such standards.

[8] Basin approach promotes the coordinated development and management of water, land and related resources of the whole river basin to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

In this regard, it was observed that MoEF had failed in development of water quality goals and corresponding parameters for each **river and lake**. MoEF also had not established enforceable water quality standards that protect human and ecosystem health. It had only developed water quality criteria for five activities and general standards under Environment Protection Act, 1986 for wastewater discharge to a water body, land and sea.

The Environment (Protection) Act (EPA) introduced in 1986 sought to take steps for the protection of environment and prevention of hazards to human beings, other living creatures, plants and property.

Section 15 the act laid down that "*whoever fails to comply with or contravenes any of the provisions of this Act, or the rules made or orders or directions issued there under 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 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.*"

MoEF/CPCB have set no water quality goals for the country. They have also not set any standards for agricultural practices and runoff pollutant levels for rivers and lakes.

With respect to **ground water**, it was observed that standards for agricultural practices and runoff pollutant levels for ground water had not been set by either MoEF or CGWB. CGWB stated that it was outside its purview. No monitoring of pollution caused by agricultural practices and runoff pollutant levels were being done by MoEF/CPCB/CGWB. While MoEF stated that information was available with Ministry of Agriculture and Departments like Indian Council of Agricultural Research, CGWB stated it was outside its purview. Enforceable water quality standards that protect human and ecosystem health have not been set by MoEF. CGWB stated that it was outside its purview.

Conclusions

The compliance in terms of enumeration/identification/quantification of indicators have been very dismal by the States. The absence of a comprehensive inventory of rivers/lakes and keystone species associated with them, which form a key step in planning the control of pollution in aquatic resources, reflects deficiencies in the planning process.

The Ministry failed to adopt a wide-ranging approach towards identifying pollution levels in different water bodies. This was so because of its focus on chemical indicators and its lack of attention to biological indicators.

The risk assessment procedures of MoEF/CPCB and the States were deficient as they failed to carry out comprehensive identification and quantification of human activities which impact water quality and the different sources which affect water quality. No agency in the country has assessed the risks of polluted water in rivers/lakes/ground water to health and environment.

The enforcement of standards of water quality are bound to meet with limited success given that MoEF has not adopted the basin-level approach for control of pollution of rivers and lakes. It has also not developed water quality goals and corresponding parameters for each river/lake.

As such, overall planning for the control of pollution on part of MoEF and the States was inadequate which would have concomitant repercussions on implementation of programmes for control of pollution and their outcomes as discussed in the succeeding chapters.

Recommendation 3

MoEF/CPCB should initiate steps, along with other client ministries like Ministry of Water Resources and all the States to draw up a comprehensive inventory of all rivers, lakes and ground water sources in India. It should also undertake a survey to list all the keystone species associated with each river and lake in India. This inventory should also be placed in the public domain.

Recommendation 4

MoEF/CPCB and most States need to intensify their efforts in developing biological indicators to ensure that the functional integrity of aquatic ecosystems are safeguarded.

Recommendation 5

MoEF/CPCB and most States need to undertake a comprehensive assessment to identify and quantify the contaminants present in each river and lake in India. This would not only help MoEF and States in designing regulations for their control but also help in safeguarding health of humans as well as the ecosystem. Identification and quantification of nutrients, pesticides etc., need greater priority due to immense damage they cause to health of ecosystems as well as human health. This process of identification and quantification should also be taken up on priority basis as a high proportion of ground water is used for potable supply.

Recommendation 6

MoEF and most of the States need to also take steps to identify and quantify the effect that human activities like industries, agriculture, mining, urbanisation etc., have on water quality of rivers, lakes and ground water. This will enable MoEF and States to design targeted programmes which would seek to regulate those human activities which are causing the most pollution.

Recommendation 7

MoEF and CPCB, along with most States need to undertake assessment of risks posed to health and environment due to pollution of rivers, lakes and ground water in India. MoEF can also coordinate with Ministry of Health and Family Welfare in assessment of risks to health posed by polluted water and get diseases caused by water pollution included in the Health Status Indicators published by the Ministry of Health and Family Welfare.

Recommendation 8

MoEF should take into account the basin approach while planning for reduction of pollution of all rivers and lakes in the country. The basin approach will allow it to address the

pollution of rivers and lakes holistically and integrate policies and plans with other ministries and civil society/research organisation which will be more effective in tackling pollution issues in the long run.

Recommendation 9

With respect to lakes, all three attributes of the lake, i.e., the basin, the water body and the command area need to be conserved instead of the present focus of NLCP on the water body only.

Recommendation 10

MoEF/ States needs to develop water quality goals and corresponding parameters for each river and lake which is essential for regulating ecosystem health and integrity.

Recommendation 11

MoEF also needs to establish enforceable water quality standards for rivers, lakes and ground water that would help protect human and ecosystem health. Penalties need to be levied for violations of water quality standards. Further, MoEF, in conjunction with Ministry of Agriculture, needs to develop standards for pollutants like nitrogen, phosphorus etc., which arise from agricultural practices, use of pesticides and fertilisers as pollution from agricultural sources is one of the biggest non-point source of pollution.

Chapter 4: Implementation of programmes for control of pollution of rivers, lakes and ground water

4.1 Programmes for control of pollution of rivers, lakes and ground water

4.1.1 At the Centre

With respect to programmes for source protection, treatment and restoration of rivers, we observed the following:

In the case of rivers Ministry of Environment and Forests (MoEF), Government of India launched Ganga Action Plan (GAP) Phase-I in 1985 to address the issue of pollution of river Ganga. Subsequently, the programme was extended to other rivers and all the projects were included in National River Conservation Plan (NRCP) in December 1996 and the programme is ongoing.

Table 5: Activities covered under National River Conservation Plan

Interception and Diversion works	•to capture the raw sewage flowing into the river through open drains and divert them for treatment
Sewage Treatment plants	•for treating the diverted sewage
Low Cost Sanitation works	•to prevent open defecation on riverbanks
Electric Crematoria	•to conserve the use of wood and help in ensuring proper cremation of bodies brought to the burning ghats
River Front Development Works	•improvement of bathing ghats
Public awareness	•through media and other outreach programmes
Human Resources Development	•capacity building, training and research in the area of river conservation

For **lakes**, MoEF has implemented the National Lake Conservation Plan (NLCP) since June 2001 for conservation and management of polluted and degraded lakes in urban and semi-urban areas of the country where degradation was primarily on account of discharge of waste water into lakes.

Table 6: Activities covered under National Lake Conservation Plan

Prevention of pollution from point sources	•sewerage and sewage treatment for the entire lake's catchment area
In-situ measures of lake cleaning	•desilting, deweeding, bio remediation- aeration, bio-manipulation, nutrient reduction, constructed wetland approach
Catchment area treatment	•afforestation, storm water drainage, silt traps etc.
Lake front eco-development	•strengthening of bund, lake fencing, shoreline development etc.
Public awareness	•outreach programmes with citizens of different age groups
Human Resources Development	•capacity building, training and research in the area of lake conservation

Agriculture is widely practiced in our major river basins and runoff from agriculture like fertilizer runoff, chemical pesticides runoff seep into the ground water or flow untreated into rivers/lakes. This has contributed significantly to infusion of nitrogen into our rivers/lakes and choking them with weeds and causing eutrophication.

No programmes have been introduced for tackling agricultural non-point source pollution of rivers and lakes by measures like promoting the use of organic manure, banning use of synthetic pesticides and fertilizers, integrated pest management.

For the mitigation of pollution of ground water, we observed the following:

According to MoEF, the Non-point source from agricultural practices does not come under the purview of MoEF. Awareness programmes of MoEF are projecting the issues of pollution from agriculture sector and the same would have to be dealt by Ministry of Agriculture. Programmes for source water protection of **groundwater** and for tackling agricultural non-point source pollution of **groundwater** have been introduced by MoEF.

The Ministry of Water Resources has implemented a scheme for repair, renovation and restoration of water bodies with domestic as well as external assistance. This scheme launched in 2005, has been sanctioned in respect of 1098 water bodies in 26 districts of 15 States. Its goals are to improve select tank systems and their catchment areas, recharge the water bodies, and increase water use efficiency. This scheme, however, has a more quantitative than qualitative focus.

4.1.2 In the States

Audit scrutiny on this issue revealed:

- Only Tamil Nadu had framed programmes for source water protection of rivers and lakes;

- Programmes have been framed for pollution prevention of rivers by only five States: Andhra Pradesh, Assam, Delhi, Haryana and Kerala;
- Only Kerala and Tamil Nadu had designed programmes for pollution prevention of lakes;
- Only Andhra Pradesh, Goa, Kerala and Sikkim had framed programmes for tackling agricultural non-point source pollution of rivers;
- Only Goa, Sikkim and Kerala had framed programmes for tackling agricultural non-point source pollution of lakes; and
- Only Andhra Pradesh, Goa and Kerala had framed programmes for tackling non-point source pollution of ground water.

MoEF stated in June 2011 that pollution from industrial sources was required to be tackled through enforcement of pollution control laws by the State Pollution Control Boards by means of obtaining consent to establish and operate from the concerned Pollution Control Board.

It also stated that action was to be initiated against the defaulters by the concerned SPCB under the provisions of the Water Act 1974 and EPA Act 1986. However the fact remains that these were not included under NRCP and various reports of CPCB illustrate the fact that these standards were not strictly enforced and industrial effluents continued to pollute river and lake water.

4.1.3 Criteria laid down by NRCD for selecting a river/lake for Conservation:

A lake/river may be selected for conservation under the NRCP/NLCP if

- The water body-river, lake or the sea is so degraded that it cannot be put to its traditional and desired use.
- The people are strongly aware of the degradation.
- They highly value the restoration of the water body.
- lakes smaller than 10 hectares and less than three metres depth or temporary/seasonal lakes which dry up every year should not be covered.

4.1.4 Criteria for selecting towns for taking up Conservation of rivers and lakes

Works may be proposed in a town if :

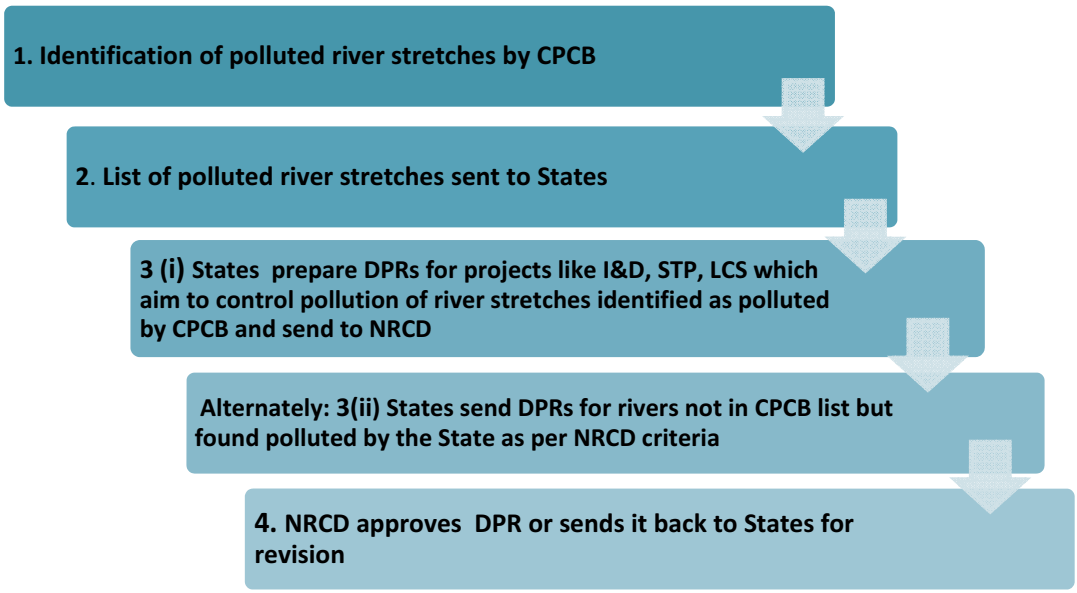
- The town is located on the bank of river or lake or is a coastal town.
- The population of the town is at least one lakh.
- The water body (river/lake) is highly degraded and cannot be put to its traditional/designated use because of:
    - Discharge of domestic waste water/industrial waste
    - municipal solid waste
    - other non-point sources of pollution

- The flood plain is heavily encroached.
- Wrong land use in violation of the Master Plan leading to heavy soil erosion and sediment transport to the water body.
- There is high level of awareness about the city being the major cause of degradation of the water body leading to the demand from the residents of the town to take up conservation measures.
- The citizens are willing to demonstrably raise additional resources and make financial contribution of a minimum of 10% of the project cost and to meet the recurring expenses of O& M and other heads.
- The local body is willing to make its contribution and take responsibility for preparing and implementing the project and carrying out O&M at its own cost.
- The residents of the town, the local body and the State Government together are willing to contribute a minimum of 30% of the project cost, out of which the citizens are willing to contribute a minimum of 10% of the project cost

4.2 The process of inclusion of rivers under NRCP

The process of inclusion of rivers into NRCP is shown in the graph below:

Table 7: inclusion of rivers into NRCP



Audit findings:

4.2.1 Selection of rivers

At the Centre

Assessment of pollution of rivers from different sources not comprehensive

There was no comprehensive assessment of the pollution levels of all the rivers in India from the different sources before MoEF initiated NRCP. The pollution load discharged by cities and towns in Ganga river basin was worked out in 1984. In 1988-89, CPCB identified 10 polluted river stretches to concentrate the pollution control efforts. The study of polluted river stretches formed the basis for formulation of River Action Plan. CPCB identified 39 polluted river stretches during the year 1992 and subsequently increased to 139 polluted river stretches in 2006 and to 150 polluted river stretches in 2008. The pollution load generated by Class I Cities and Class II towns, river basin-wise, was first worked out and published in the document in the year 2003.

CPCB has laid down the liquid effluent discharge standards for 42 industries. These include battery manufacturing, dairy, fertilisers, hotels, oil drilling and refining tanneries and thermal plants. However, it had not quantified the effluent load in all the rivers by each source. That is to say, it did not take into account small, medium and large industries, distilleries, mines, oil refineries, tanneries, paper and pulp industries, sugar factories, agriculture runoff, pesticides and insecticides sprayed on crops as potential causes of pollution.

In June 2011, MoEF affirmed Audit's conclusions stating that the projects for abatement of pollution on rivers had been selected by NRCD on the basis of quality of water. The project proposals submitted by the State Governments contained information on details of waste water generated in the town/city, the extent of treatment capacity available and details of industrial pollution. Further, MoEF stated that detailed guidelines for the preparation of DPRs under NRCP hitherto followed have now been revised.

Further, NRCP focussed on sewage and crematoria as the sources of pollution of rivers. Other kinds of pollution (like industrial pollution) were not considered which had an equal, if not more, adverse effect on health and environment.

Although CPCB has created a list of the sources of pollution, MoEF has not created programmes to prevent effluents entering the rivers. NRCD projects deal only with stretches where pollution has already occurred.

In the States

- Only Bihar, Goa, Odisha and Punjab had conducted a survey to quantify pollution caused by sewage to all the rivers by all the towns/cities situated on banks of rivers flowing in the State.
- Only Odisha and Punjab had made some attempts to quantify pollution caused by industries and agriculture runoff flowing into its rivers.

- Only eight States, Bihar, Delhi, Haryana, Kerala, Odisha, Rajasthan, Tamil Nadu and Uttarakhand, had sent a list of polluted rivers in the State, based on assessment of amount of pollution, to MoEF for inclusion under NRCP.
- Of the 20 States in which rivers have been included in NRCP, the State governments in only eight States, viz., Bihar, Goa, Maharashtra, Odisha, Rajasthan, Sikkim, Tamil Nadu and Uttarakhand planned to address the complete reduction of pollution of the river.

In June 2011, MoEF stated that the collection of sewage and providing adequate infrastructure for its treatment and disposal was the responsibility of the State Governments. It further stated that MoEF was not mandated to carry out projects for providing sewerage facilities in the States and MoEF was only supplementing efforts of State Governments by providing financial assistance.

It also stated that with the modest resources allocated for the programme, only certain rivers and certain cities could be taken up for implementing pollution abatement programmes which was dependant on the proposals received from the State Government with their willingness to provide the required 30 per cent share of project cost and commitment for operation and maintenance of created assets. MoEF also stated that it was primarily the responsibility of the industry concerned to adhere to the effluent standards prescribed, which was being monitored by the State Pollution Control Boards under the provisions of the Water (prevention and control of pollution) Act 1974.

MoEF's reply fails to address the concerns raised by audit regarding the planning of pollution control programmes. While it is an undisputed fact that the responsibility for creating infrastructure for collection, treatment and disposal of sewage rests with the States, as per Section 16(2) (f) of the Water (Prevention and Control of Pollution) Act, 1974, it is the responsibility of CPCB to collect, compile and publish data relating to water pollution and devise measures for its effective prevention and control.

Further, there is no comprehensive database on the pollution load entering water bodies across the country. Also, data on sewage generation published by CPCB in December 2009 pertains only to Class I and II towns while the rural hinterland remains unrepresented. Similarly, the data on Common Effluent Treatment Plant (CETP) pertains to 78 CETPs in this country relating to the period 2002-2005. The reply is silent on these issues of identification of towns and cities which were most responsible for polluting the rivers flowing through and MoEF has shifted the onus of responsibility for such identification onto SPCB. It is agreed that industry-specific effluent standards and action plans have been devised by CPCB, however, there is no indication that such data has been used to plan the programme for reduction of pollution of rivers.

4.2.2 Inclusion of rivers under NRCP not based on their pollution levels

As mentioned in para 4.1.3 and 4.1.4, priority is to be accorded to those stretches of a river which has been identified by CPCB as being most polluted. The projects are formulated on City Sanitation Plan. The emphasis is on the entire town, rather than the entire river, even though a token nod is made for the need to adopt a holistic approach. Since projects are being selected in a fragmented manner and not primarily for reduction of pollution of the entire river, the efforts to clean up the river are bound to only yield fractional results.

- Audit scrutiny showed that rivers in States like Assam, Himachal Pradesh, Manipur, Tripura, Chhattisgarh, Meghalaya and Puducherry figured in the list of polluted river stretches but no river was selected for inclusion under NRCP.
- Similarly, in the case of Goa, river Mandovi was not identified as most polluted stretch but was included in NRCP.
- It was also observed that in Kerala, the most polluted stretches were along rivers Karamana, Puzhackal and Kadambayar but Pamba, which did not figure in this list, was selected under NRCP.
- Similarly in Uttarakhand, most polluted stretches were along river Kosi, Dhela and Kichha and Bahalla but Ganga, which does not figure in this list was selected.
- Two rivers namely, Mandovi and Beehar did not figure in any survey of polluted stretches and the lists of polluted rivers produced by CPCB over the years.

Audit observed instances where polluted rivers were not selected under NRCP and others, which were less polluted, were selected for pollution control.

CPCB stated that the polluted stretches were identified based on the network of 980 monitoring stations on rivers. It also stated that since all the streams in the country were not monitored, it was not possible to conclude that all the polluted stretches of rivers in the country were identified. The reply reveals that rivers were to be included under NRCP only if they figured in the list of most polluted rivers and illustrates the fact that CPCB surveys were not comprehensive.

In June 2011, MoEF stated that water bodies not meeting the desired water quality criteria had been identified as polluted. While 10 river stretches not meeting the desired criteria were identified during 1988-89, 37 were identified in 1992 and 150 were identified in 2008. Towns and cities were included under NRCP for abatement of pollution of rivers on the basis of proposal received from the State Governments and approved under NRCP on the basis of funds available under the Plan from time to time.

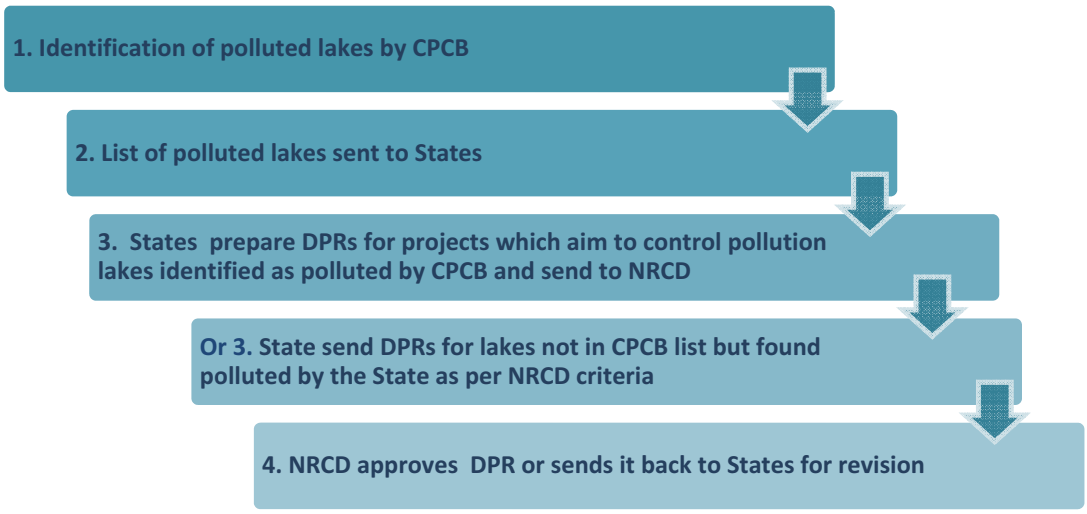
The reply of MoEF needs to be viewed in light of the fact that given that CPCB data is accessible, or indeed, under the control of MoEF, this data was not utilised to point out the discrepancies to State governments while scrutinising their proposals. This is an indicator of the fact that mere preparation of database is not a sufficient condition for the efficient implementation of a programme. Audit found no evidence to show that the said data was being co-related to the DPRs being forwarded by States.

The State-wise selection of rivers in NRCP was asymmetrical. For example, 69 projects for Madhya Pradesh and 83 for Tamil Nadu were approved under NRCP. By comparison, only 69 were approved for Maharashtra, Gujarat and Andhra Pradesh put together, despite the fact that the latter group had more number of polluted rivers.

4.3 The process of inclusion of lakes under NLCP

The process of inclusion of lakes under NLCP is shown in the chart below:

Table 8: inclusion of lakes into NLCP



4.3.1 At the Centre

Prior to introduction of NLCP, a National Committee set up by MoEF in 1993, identified 21 highly degraded urban lakes for conservation and management. Later in 1994, the lakes were prioritized and 10 polluted & degraded urban lakes having some tourism potential were proposed for conservation.

4.3.1.1 Quantification of pollution of all the lakes not done

Quantification of pollution of all the lakes in terms of sewage, small/medium/large industries, distilleries, mines, tanneries, paper and pulp industries, sugar factories, agricultural runoff, pesticides/insecticides was not done by MoEF/CPCB. In the absence of this information, MoEF would not be able to target the reduction of pollution being caused by these sources.

4.3.1.2 Inclusion of lakes under NLCP which were not included in the priority list

In order to identify polluted and degraded lakes across the country, a study was carried out at the instance of Planning Commission. A list of 62 lakes requiring conservation was prepared under the study. In November 2002, MoEF asked all State Governments to send priorities for lakes in their States for consideration under NLCP. This prioritisation was to be done on the basis of hydrological data (relating to the quantity of water), scientific criteria (based on CPCB's "Designated Best Use'' norms) and Administrative criteria (based on heavy public demand and if stakeholders promised to bear 10% of the costs out of the State's share).

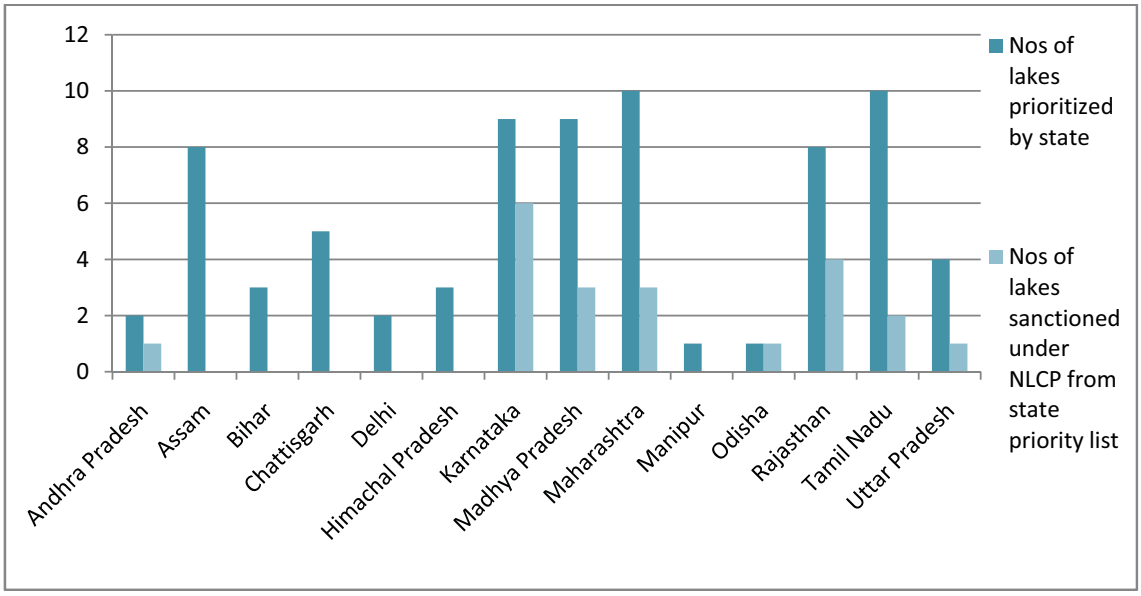
The response of the States was limited so, in June 2004, in order to develop objectivity in the selection of lakes for conservation and to consider the priorities of the State governments, MoEF again requested States to take up the exercise of prioritizing the lakes in their States.

The consolidated priority list furnished by MoEF to audit in respect of all the States/UTs revealed that only 12 States/UTs had prioritized their lakes which indicated the low priority attached by the States to this vital activity.

Further, 12 projects covering 23 lakes were included under NLCP even though these did not figure in the priority list of lakes prepared by the States concerned.

Scrutiny also showed that although seven States[9] had sent MoEF a priority list of lakes to be included under NLCP, MoEF sanctioned no funds to these States. It was also observed that out of 28 States and seven Union territories in India, NRCD had funded projects in only 14 States. Out of 58 lakes, 16 lakes were funded in Karnataka, 14 in Maharashtra and five each in Uttarakhand and Rajasthan.

Chart showing number of lakes prioritized by state and out of those number of lakes sanctioned under NLCP



4.3.2 In the States

- Seven States, namely, Chhattisgarh, Himachal Pradesh, Bihar, Delhi, Andaman and Nicobar, Manipur and Assam had furnished priority list but no lake was funded in these seven States.
- Six States namely Jammu and Kashmir, Kerala, Uttaranchal, West Bengal, Tripura and Nagaland had not furnished their priority list of lakes but NRCD funded eight projects covering 15 lakes in these States and
- 12 projects covering 23 lakes were funded even though these were not included in the priority list of lakes furnished by the respective States.

In June 2011, MoEF stated that in order to identify polluted and degraded lakes across the country and at the instance of Planning Commission, a study was carried out by it in November 2003 as a result of which, a list of 62 lakes across the country requiring

[9] Chhattisgarh, Himachal Pradesh, Bihar, Delhi, Andaman and Nicobar, Manipur and Assam

conservation was prepared. State Governments were asked to review this list and to prioritize the lakes in their States for submission of proposals under NLCP. MoEF further stated that while States like Chhattisgarh, Himachal Pradesh, Bihar, Manipur, Assam etc, furnished priority lists but either did not submit any proposal for consideration under NLCP, or the same were not found meeting NLCP guidelines, other States sent their proposals, which were examined by MoEF and approved for funding under NLCP.

The reply needs to be viewed in light of the fact that selection of lakes was not based on objective pollution-related criteria. MoEF, while confirming the position outlined by audit, is silent on the specific reasons as to why certain proposals were approved/not approved. The fact remains that there was no quantification of pollution load of each lake by way of sewage, industrial effluents or agricultural runoff and as a result, it is likely that some lakes which were more polluted than the ones selected for abatement, were not included under NLCP. As the nodal agency for pollution prevention in India, MoEF should have played a more proactive role in selection of polluted lakes, based on pollution-related criteria, under NLCP.

4.4 Performance of projects undertaken under NRCP

4.4.1 No technical evaluation of DPRs

The DPRs were appraised in-house by MoEF and were not sent to a specialist task force/panel of scientists from reputed institute for evaluation. As a result, expert feedback was not available while sanctioning projects under NRCP. From the evidence made available to Audit, it is not clear how MoEF ensured that the DPRs were complete, that they addressed the right concerns and would ensure effective and efficient implementation. MoEF had not fixed any time limit for preparation and submission of DPRs by the States to MoEF and for approval of DPRs by MoEF.

In June 2011, MoEF endorsed the audit findings and stated that the project proposals submitted by State Governments were being examined by the NRCD scientists till recently. MoEF also stated that presently projects are being appraised by independent appraisal institutions after which these are taken for approval before the competent authorities.

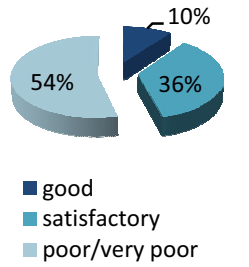
While it is recognised that MoEF now has the DPRs vetted by technical experts, the fact remains that DPRs sent to it since the 1980s have been scrutinised by MoEF in-house. To that extent, the assessment of the DPRs and the plan of implementation contained in the DPRs may not have been a process informed by technical know-how and therefore, could end up contributing to less than optimal outcome.

Some details to be contained in DPRs:

- Review of the status of the river/lake system.
- Identification of degraded stretches & towns responsible for it.
- Selection of Towns in order of priority where conservation works should be taken up and the justification for their selection.
- Information about the river/lake and basin/ catchment useful for system and component design.
- Investigation carried out for DPR Preparation.
- Design of system and components.
- Human, physical and financial resources required for Operation & Maintenance and the manner in which they will be ensured.
- Plan for Public Awareness & Public participation.
- Monitoring & Evaluation plan.
- Cost Estimates with drawings and specifications.

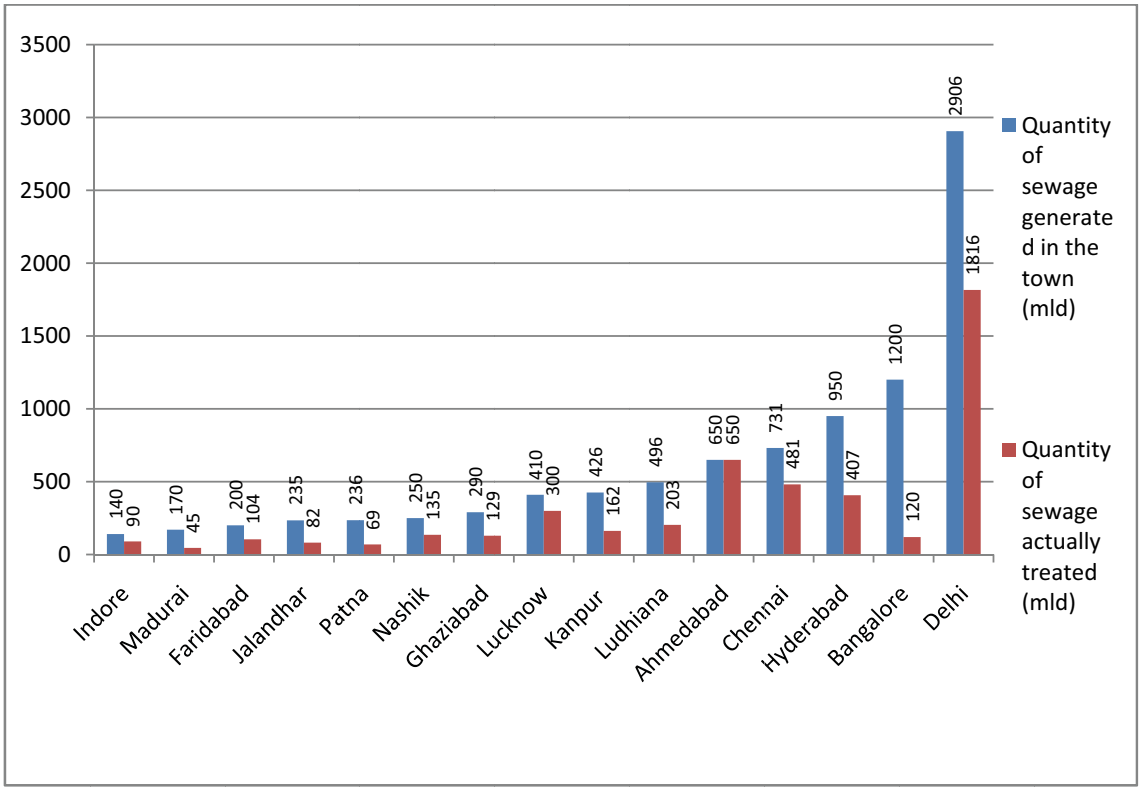
4.4.2 Inadequacies in performance of sewage treatment plants

Table 9: Performance of STPs as per CPCB, 2007



As already discussed, the treatment of sewage has been the primary focus of projects selected under NRCD. CPCB had evaluated the performance of 84 of the 175 STPs built under NRCP in 2007. According to this evaluation, the performance of 46 STPs was poor or very poor, eight were rated good, while the performance of the balance 30 was satisfactory. The CPCB Report pointed out that capacity utilisation was inadequate. It also stated that sludge removal was the most neglected area with most of the sludge handling facilities being out of order. The Report observed that the task of operating the STPs was given to contractors who were deputing unqualified staff for the task, which was a factor in the poor performance of the STPs. As a result the gap between total generation of sewage and what is actually treated is extremely wide. The chart below brings out the position.

Chart showing town-wise quantity of sewage generated (mld) and quantity of sewage actually treated (mld)



As is evident, even the National Capital was treating 62 *per cent* of sewage generated; Bangalore only a miniscule *10 per cent* and Hyderabad *43 per cent.* Among the large cities, checked in audit, only the city of Ahmedabad had the capacity to fully treat sewage generated.

Thus, STPs which were the mainstay of NRCP, were not achieving the objectives set out for them.

In June 2011, MoEF endorsed the audit findings and stated that due to a variety of unforeseen reasons, full utilisation of installed capacity is not possible. It further stated that one of the reasons for under-utilisation of capacity was inadequate collection of sewage from city due to incomplete network of sewers. MoEF's reply highlights the urgent need for holistic view of sewage treatment which requires not just construction of STP, but also assessment of sewer drains, efficiency of sewage collection, removal of sludge around STP and the need for uninterrupted power supply to them.

4.4.3 In the States

Audit test checked 140 projects across 19 States and 41 towns situated on banks of 24 rivers for detailed scrutiny. Results of audit scrutiny of implementation of these projects are discussed below:

- Out of 140 projects test checked, 75 *per cent (105 projects)* were completed. 30 remained incomplete, work was stopped in two projects, two projects were abandoned and no information was available to verify the status of one project.
- Out of 105 completed projects, 86 projects were completed after the scheduled date of completion. The extent of delay in completion is given in the table below:

Table 10

Extent of delay	Number of projects
Between 1 month and 1 year	26
More than 1 year to upto 2 years	11
More than 2 years to upto 3 years	6
More than 3 years to upto 5 years	26
5 years and above	17

- Out of 94 completed projects pertaining to STP, I&D, MPS, LCS, SWM, Sewer Line, Crematoria, Disinfection Plant etc, 50 projects were able to perform as envisaged, in 14 projects, performance was hampered due to infrastructural problems and for remaining 30 projects, information was not available to verify the status.
- Of the completed projects, 28 projects costing ₹251.27 crore were constructed but not utilised as yet. The list of projects constructed but not utilised is attached as **Annexure 2.**
- Out of the 105 completed projects, only in 14 projects, the State governments had assessed whether installed capacity was fully utilised. For 62 projects, this information was not available and for remaining 53 projects, the State governments had not assessed whether installed capacity was fully utilised.
- Of the 47 STPs test checked, 37 STPs were completed. Out of 37 completed projects, targets for effluents treatment were met in 13 STPs and in seven projects, targets were met partially. Two projects were shut down due to infrastructural problems and for remaining 15 projects, information was not available to verify the status.

Detailed Audit findings with regard to implementation of NRCP projects of 19 States are discussed below

Andhra Pradesh

Audit test checked six projects for cleaning up Godavari and Musi rivers in Rajamundry, Ramagundam and Hyderabad. We found that none of the projects test checked had met their intended objectives of pollution control.

- **In Ramagundam town, two STPs were not working according to installed capacity. The interception and diversion project was not serving its purpose as pumps were found missing and the pump house was not put to use.**
- **In Rajahmundry town, one test checked project was completed after a delay of more than 5 years.**
- **In Hyderabad, one test checked completed project, levels of Faecal Coliform had increased in Musi after leaving Hyderabad.**

Bihar

We test checked six projects in the cities of Barahaya and Patna sanctioned for control of pollution of Ganga river. None of these projects met their objectives of controlling pollution entering the Ganga.

- **Two of the projects, viz., construction of diesel crematoria at Danapur and River Front Development of GulbiGhat, Patna remained incomplete.**
- **In Patna, ghats constructed in 2003 were either defunct or not being maintained.**
- **Another River Front Development at Danapur was also in a deplorable condition and was not being used.**
- **The project for River Front Development at Barahaya completed in July 2002 was not found to be existing as the course of Ganga has shifted from the proposed sites. Both the ghats were completely destroyed due to erosion.**

Delhi

In Delhi, 10 projects which aimed to control pollution in river Yamuna were test checked.

- **Capacity of the test checked STP at Sen Nursing home was 10 mld whereas the total sewage generated was around 60-70 mld; the rest of 50-60 mld untreated sewage was being discharged into the Yamuna river.**
- **In respect of test checked STP at Delhi Gate Nala, capacity of created STP was 10 mld whereas total sewage generated was around 40-50 mld. Remaining 30-40 mld untreated sewage was falling into the Yamuna river.**
- **Two other STPs were designed to treat 3 mld of sewage each, but each of them was treating 1 mld of sewage, the rest being discharged into the Yamuna.**
- **Another STP of 2 mld was constructed but the plant had been shut down since 2007 and all the sewage (2 mld) was being discharged into river Yamuna through drain/nallah without treating.**
- **Another STP was still not complete.**
- **Low Cost Sanitation project completed in 2003, envisaged construction of 1146 units but only 959 units were built, out of which only 471 were functioning.**

Goa

In Goa, out of five sanctioned projects for control of pollution of Mandovi river in Panaji town, four were test checked by Audit.

- **Two projects were completed and were functioning as envisaged.**
- **No information was available regarding completion date of the remaining 2 projects.**

Gujarat

In Gujarat, out of 13 projects selected for control of pollution of Sabarmati in Ahmedabad, nine projects were test checked by Audit.

- **All the test checked projects were completed and were working as envisaged. The capacity of the STP is higher than the quantity of sewage generated. Currently, no sewage flows into the Sabarmati from the city.**

Haryana

In Haryana, Audit selected 10 projects in the cities of Faridabad and Panipat for detailed scrutiny.

- **Seven test checked projects were completed after delay of up to a year.**
- **In Faridabad city, STP was constructed to treat 20 mld of sewage but was treating only 14 mld and the rest 6 mld was flowing into the Yamuna.**
- **In Panipat, no information was available regarding the utilisation of the test checked projects.**

Jharkhand

Four projects which aimed to control pollution of river Subarnarekha in Jamshedpur and Ranchi cities were test checked in audit.

- **In Ranchi, one test checked project has not yet been completed.**
- **In Jamshedpur, the projects involving construction of low-cost sanitation and river front development projects were still incomplete.**

Karnataka

Audit test checked three projects for control of pollution of Bhadra, Tungabhadra and Pennar rivers in the citites of Bhadravati, Devanagare and Bangalore.

- **Interception and diversion project for Bhadra river in Bhadravati city scheduled to be completed in July 2005 was still not complete.**
- **STP in Davanagere was built after a delay of 4 years due to delay in handing over of land.**
- **In Bangalore, the I&D Environment Action Plan for rehabilitation of sewers was not yet complete.**
- **The total sewage generated in Bangalore was 1200 mld and only about 10 *per cent* (120 mld) of this sewage was currently being diverted for treatment.**

Kerala

In Kerala, all the six projects sanctioned for control of pollution of river Pamba being implemented in Pamba city were test- checked in Audit.

- **Two of the test checked projects had not yet begun though these were scheduled to be completed by 2007.**
- **Construction of STPs at Pamba and Sabarimala have not yet commenced due to non-availability of forest land and changes in design of STP.**

Madhya Pradesh

Eight projects for control of pollution of rivers Khan at Indore, Betwa at Vidisha and Kshipra at Ujjain were test-checked in Audit.

- **All projects were completed but after significant delays of 3-5 years.**
- **STP in Indore was treating only 40 mld of sewage and 50 mld of untreated sewage was being discharged into river Khan.**
- **In Vidisha, STP was not treating the sewage according to its capacity and 1.8 mld of sewage was flowing directly into Betwa.**
- **In Ujjain, the STP was not being maintained properly and 5 MLD of untreated sewage was being discharged into Kshipra.**

Maharashtra

In Maharashtra, nine projects to control pollution of Krishna and Godavari rivers in the towns of Karad, Nashik, Sangli and Nanded were test checked.

- **While seven projects were completed after delays, two were not yet complete.**
- **In Karad, all the projects was delayed.**
- **In Sangli city, construction of STP and I&D was not yet complete and the entire 27 mld of untreated sewage of Sangli city was being discharged into the river Krishna.**
- **In Nashik, STP at Chehdi did not perform to its full treatment capacity and the STP treated only 15 mld sewage.**
- **In Nanded, the whole intercepting sewer was submerged during the rainy season, increasing possibility/chances of mixing of sewage with river water.**

Odisha

In **Odisha,** Audit test checked seven projects to control of pollution of Mahanadi in Cuttack city and coastal areas in Puri.

- **All the projects except those in Puri were completed after significant delays of more than 3 years.**
- **In respect of STP constructed in Matagajpur, Cuttack, 42.5 mld of untreated sewage was still being discharged into the Mahanadi.**
- **In Puri, the project, which included construction of I&D, STP & MPS, was scheduled to be completed in 2006 was not yet complete.**

Punjab

In Punjab, eight projects for control of pollution of Sutlej river in Ludhiana and Jalandhar were test checked by Audit. It was observed that projects were completed after delays of more than four years.

- **In Jalandhar city, STP at Garha (Pholriwal) was constructed to treat 100 mld of sewage but was treating only 82 mld sewage.**
- **STPs at Baloke in Ludhiana was also treating only 74 mld of sewage while the STP capacity was 152 mld.**
- **STP at Jamalpur, Ludhiana was affected due to inflow of industrial waste, delay in chlorination work and non-availability of uninterrupted power.**
- **Main Pumping Stations at Jamalpur and Baloke were shut frequently due to power cuts, thus affecting their capacity to pump sewage into STPs.**

Rajasthan

In Rajasthan, four projects being implemented for control of pollution of Chambal river in Kota city were test-checked.

- **One project was still in progress.**
- **The projects involving construction of improved wood crematoria /river front development and LCS were completed and working as planned.**

Sikkim

Two projects for control of pollution of Rani Chu river being implemented in Gangtok city were test checked by Audit.

- **One project was completed after a delay of 2 years 10 months , the other project was still incomplete, despite scheduled for completion in 2010.**
- **STP built in Gangtok did not achieve its purpose as sewage of 11 mld was reaching the STP as against the STP capacity of 8 mld and 3 mld of sewage still being discharged into Rani chu.**
- **The other test checked project 'Rehabilitation of Main Sewer Line and construction of STP is still going on though it was Stated to be completed in July 2010.**

Tamil Nadu

Audit test checked 11 projects in Tamil Nadu for control of pollution of Adyar and Cooum river being implemented in Chennai town, for control of pollution of Cauvery river being implemented in Tiruchirapally and for control of pollution of Vaigai river being implemented in Madurai city.

- **Four STPs built to check the flow of untreated sewage from Chennai city in Adyar/Cooum were working as envisaged. However, it was observed that the combined sewage treatment capacity of all the 4 STPs was 481 mld which was inadequate as the estimated sewage flow from Chennai was 731 mld.**
- **Both the STP and interception and diversion projects in Tiruchirappalli-Srirangam were delayed by two years and 8 months.**
- **One project in Madurai city for control of pollution of Vaigai river was not completed and work of STP phase 2 was dropped due to non identification of land for STP under NRCD, which was later taken up by Corporation under JNNURM.**

Uttar Pradesh

14 projects for control of pollution of Yamuna river in the city of Ghaziabad, for control of pollution of Ganga river in Kanpur city and for control of pollution of Gomti river in Lucknow city were test checked by Audit.

- **Only 9 of these 14 projects were complete and the rest were ongoing, beyond the scheduled date of completion.**
- **5 out of 6 projects in Kanpur remained incomplete and continued without extension from MoEF.**
- **In Ghaziabad, two STPs, at Hindon and in Trans-Hindon were not functioning as per prescribed standards of SPCB , as a result of which the entire untreated sewage was directly being discharged into river Yamuna/Hindon.**
- **In Lucknow, STP at Daulatganj was not being utilised at its full capacity and was treating only 34 mld of sewage against designed capacity of 42 mld. Further, the treated sewage did not meet standards prescribed by NRCD indicating that the entire un treated sewage of 34 mld was discharged into river Gomti.**

Uttarakhand

Nine projects were test checked in Uttarakhand which aimed to control pollution of river Ganga in Haridwar/Rishikesh, Srinagar and Uttarkashi.

- **7 of 9 projects were completed and the remaining 2 were not yet complete though the scheduled completion date was October 2009.**
- **In Haridwar/Rishikesh, the project for I&D and STP works at Lakhshman Jhula and Swarg Ashram were scheduled to be completed in October 2009 but were yet to be completed**
- **STP at Bhopatwala in Haridwar on river Ganga was to be completed in October 2009 but project was yet to start due to non-transfer of land from UP Irrigation Department.**
  As a result of delay in construction of this STP, it was observed that the I&D work at Loknath Nala at Bhupatwala was affected.
- **In Srinagar, all projects were completed after delays.**
- **In Uttarkashi, the capacity of the STP Part I on river Bhagirathi planned to treat 0.25 mld but actually no sewage was being treated.**

West Bengal

10 projects for the control of pollution of river Ganga in Barrackpore, Gayeshpur, Halilshar & Kancharapara and control of pollution of river Mahananda in Siliguri were test-checked in Audit.

- **In Siliguri, one project was completed after delay while the status of another project was not clear. The STP was not completed though scheduled date of completion was June 2011. The Main Pumping Station (MPS) for STP-I, II & III was scheduled for completion in October 2007 but was still not complete.**
- **In Barrackpore, it was observed that though the river front development project (Kolkata) was completed, it was not yet commissioned and was lying unused. Similarly, though the Main Pumping Station was complete, it was not yet commissioned due to the fact that the linked project, i.e., interception and diversion work was not yet complete.**
- **In Gayespur/Halilshar, the Lifting Stations was yet to be commissioned though these were completed in 2004-2009.**

In June 2011, MoEF endorsed the audit findings and stated that after approval of the project, implementation of the project including tendering, execution of works etc., was done by the State Implementing Agency. It further stated that cost and time overruns in projects were due to a variety of reasons which include lack of inter-agency coordination at field level, delays in acquisition of land for STPs & pumping stations, contractual problems, court cases, etc.

MoEF also stated that it had taken several steps to prevent time and cost overrun like signing Memorandum of Understanding and tripartite agreements between the implementing agency, State nodal agency and local body to avoid time and cost escalation.

The reply of MoEF needs to be viewed in light of the fact that almost 83 *per cent* of the completed projects were delayed which points to the fact that measures taken by MoEF to prevent time and cost overruns were ineffective. MoEF's reply also highlights concerns which plague the implementation of projects by State governments which have been planned and funded by the Central government.

4.5 Performance of projects undertaken under NLCP

Details of these projects may be seen in relevant State-specific chapters.

4.5.1 At the Centre

4.5.1.1 Inadequate Inspection of projects by MoEF

Projects being implemented by the States under NLCP were not being regularly inspected by MoEF. As such, MoEF would be unaware of the difficulties faced during implementation and the opportunity to make mid-course corrections was lost. Out of 22 lakes project test checked, all were not monitored regularly, with most projects being monitored only once during the implementation.

4.5.1.2 In the States

22 lake projects included under NLCP for restoration and conservation across 14 States were test checked by Audit for detailed scrutiny. We observed that out of the test checked 22 projects:

- Only projects relating to two lakes viz, Kotekere and Powai Lake were completed. Projects relating to 18 lakes remained incomplete beyond the date of completion and one lake project was abandoned. The targeted date of completion of one projects (Twin lakes in Mokokchung, Nagaland) was still not over. The extent of delay is depicted in the table below:

Table 11

Extent of delay	Number of projects
Between one month and 1 year	Pushkar, Dal lake[10]
More than 1 year to up to 2 years	Shivpuri lake, Mansi ganga
More than 2 years to up to 3 years	Rankala lake
More than 3 years to up to 5 years	Banjara, Sharanabasaveshwara, Veli Akkulam, Bindusagar, Laxminarayanbari, Nainital, Kotekere, Durgabari, Dimsagar lake
More than 5 years	Mansagar, Ravindra Sarovar, Kodaikanal, Mirik lake

- Projects relating to Bellandur lake were abandoned while projects relating to two lakes, viz., Laxminarayanbari and Durgabari lakes in Agartala were yet to commence.
- Of the two completed projects, it was observed that water quality after implementation of the project was restored to the criteria for Designated Best Use classification for B class waters in case of Kotekere lake, while in the case of Nainital Lake, the water quality report of December 2010 revealed that criteria for designated best use classification for B class water for all parameters was achieved except Total Coliform (TC) and Biochemical Oxygen Demand (BOD). Further, in case of Sharanabasaveshwara lake also, there was significant improvement its water quality after the ongoing restoration works.

[10]Has been extended upto 2012.

- Out of test checked lakes, in the case of three lakes namely, Kotekere, Nainital and Twin lakes, Bio-conservation zones around the lake for better safeguard of the lake surroundings from the growing pollution potential and encroachments had not been notified. No information was available for the rest of the projects.

The success story of the Project to restore Nainital lake:

- **Transparency of the lake has increased.**
- **Decrease in concentrations of toxic gases like carbon dioxide, ammonia, hydrogen sulphide and methane.**
- **Decrease in concentrations of nutrients like nitrogen and phosphorus.**
- **No algae bloom observed after aeration.**
- **Suitable conditions for the growth and breeding of environment friendly fish species like mahseer.**
- **Concentrations of dissolved oxygen in the lake have increased from the bottom of the lake to the surface.**
- **No fish fatalities have occurred after the aeration work.**
- **BOD levels came down from 21mg/lt to 6.8 mg/lt and improvements in other parameters.**
- **Whole lake catchment area has been covered by sewer line. No sewage is entering the lake.**
- **Open defecation has been controlled by constructing the community toilets.**
- **After launching Mission Butterfly, solid waste, garbage of the whole town is being managed in a more sustainable way.**
- **There is improvement in aesthetic view within periphery of lake.**

Nainital Lake

Details of implementation of all the test checked lakes/projects are discussed below:

Banjara Lake – Andhra Pradesh

In February 2005 NRCD sanctioned the project 'Rehabilitation and Rejuvenation of Banjara lake' at a total cost of ₹ 2.76 crore with scheduled date of completion by August 2006. Work on the project involved activities like construction of STP, lake rejuvenation, lake front development area, establishment of compost plant/laboratory and diversion of storm water drain.

Project not completed due to dispute over the proposed site for sewage treatment plant which was an essential component of the project.

Dal Lake – Jammu and Kashmir

The project was approved / sanctioned at a cost of ₹ 298.76 crore and the target date of its completion was March 2010, which was extended upto March 2012. The project has two components viz. Lake Conservation Programme and Rehabilitation Programme.

Work on the project suffered due to problems like infirmities in the DPR, inefficient working of Sewage Treatment Plants, non-development of housing colonies under Rehabilitation Programme etc.

Bellandur Lake – Karnataka

The project for restoration and conservation of Bellandur lake was sanctioned in January 2003 and was slated for completion in August 2004.

- **Lake Development Authority, Bangalore (LDA) in June 2004, entrusted execution of work to a contractor, to be completed by January 2005 with commitment that it would take responsibility for stoppage/diversion of sewage entering the lake.**
- **However, LDA failed to stop/ divert the inflow of sewage in the lake and as a result, oxygenation of the lake proved inadequate and ineffective and rendered the lake non-conducive for bio-remedial treatment.**
- **The contractor complained in April 2005 against failure to stop sewage inflow. Experts from Indian Institute of Science, Bangalore in May 2005 attributed failure of the project mainly due to discharge of untreated sewage directly into the lake.**
- **In April 2006, LDA decided to suspend the project till stoppage of sewage inflow was achieved and to go for arbitration regarding the contract and thereafter challenge the arbitral award in High Court of Karnataka. As a result, execution of the project was remained suspended.**

Kotekere Lake – Karnataka

The activities to be undertaken for restoration and conservation of Kotekere lake comprised of construction of STP, Low Cost sanitation, de-silting, de-weeding, lake fencing etc. The

originally sanctioned date of completion of the project was March 2006 but the project was actually completed in May 2009.

- **Delay in completion of the project: due to increase in scope of work of de-silting the lake and heavy rains disrupting desilting of lake.**
- **Activities like construction of STP, construction of low cost sanitation, strengthening of bund, lake-fencing, and shoreline development, de-silting and de-weeding carried out as planned.**
- **Water quality in Kotekere lake after implementation of the project was restored to the criteria for Designated Best Use classification for B class waters.**
- **As such, the project had achieved its objective of conservation and restoration of Kotekere lake.**

Sharanbasaveshwara Lake - Karnataka

The activities to be undertaken for restoration and conservation of Sharanabasaveshwara lake comprised of construction of STP, interception and diversion works, low cost sanitation etc., at a sanctioned cost of ₹ 4.89 crore. The originally sanctioned date of completion of the project was September 2006 but the project is still on going and the date of completion had not been revised.

- **The project was incomplete due to heavy dewatering and de-silting of the lake.**
- **Water quality of the lake had improved due to diversion of sewage by the underground drainage system.**

VeliAkkulam Lake – Kerala

The activities to be undertaken for restoration of VeliAkkulam lake included construction of STPs at Ulloor & Valiathura, dredging, bioremediation etc., at a cost of ₹24.56 crore, to be shared 70:30 ratio between the Centre and State. The project was sanctioned in August 2005 and scheduled to be completed in August 2007.

- **No work had begun and funds released by MoEF had been deposited into Savings Bank Account in 2006.**
- **An MoEF site visit report of September 2010 revealed that the de-weeding and de-silting work was under progress but no other activities had been undertaken.**

Shivpuri Lake – Madhya Pradesh

Project under NLCP was sanctioned at a cost of ₹ 51.99 crore for restoration and conservation of Shivpuri lake for completion by August 2009.

- **Work on the project involved activities like de-weeding, de-silting, storm water drains, construction of low-cost sanitation, bathing ghats, lake- front development, and public participation. All of these were still incomplete.**

Powai Lake – Maharashtra

The project for restoration and conservation of Powai Lake was sanctioned in June 2001 at an estimated cost of ₹ 6.62 crore with a scheduled date of completion by April 2003. The activities for conservation and restoration included water treatment and bioremediation through de-weeding, de-sludging, aeration, applying special bio-products for treatment and revival of the lake etc.

- **The project was declared completed by MoEF despite non-submission of project completion report along with final utilization certificate by the implementing agency (Municipal Corporation of Greater Mumbai) to MoEF.**
- **Therefore, it is not possible to comment whether the water quality of Powai Lake was restored to the criteria for Designated Best Use classification for B class waters after implementation of the project.**

Rankala Lake - Maharashtra

In October, 2006, MoEF sanctioned a project for restoration and conservation of Rankala Lake to Kolhapur Municipal Corporation at an estimated cost of ₹ 8.65 crore with completion scheduled for January 2009. Some of the activities envisaged under the project included demarcation of lake boundaries, cleaning and removal of aquatic weeds, aquatic plants etc., removing sediments in the lake, desilting of feeder canals, treatment of lake body and lake peripherals etc.

Though the sanctioned period of the project had expired in January 2009, project was still continuing without any extension.

Twin Lakes (Amok Lushi and Yimdong Awatsung) – Nagaland

The total cost of the project was ₹ 25.83 crore, to be shared in the ratio 90:10 by Government of India and Government of Nagaland. The project involved construction of sewers and manholes, sewage pumping unit, de-weeding, de-silting, storm water management, building check dams/silt traps, measures for shore line protection/stabilization, inlet and outlet management, low cost sanitation works, lake front development, aquaculture etc. The first instalment was sanctioned in October 2009 and the project was scheduled to be completed in two years. The States' share of ₹ 0.65 crore was released in April 2010.

- **The two Lakes were selected for this programme even though they did not qualify for selection under NLCP based on the requisite depth criterion, nor on the basis of scientific criteria of discharge of industrial and domestic waste water into the lake and degradation of quality of lake water.**
- **Joint inspection of the lake site by Audit and State government showed that there was no discharge of any domestic, industrial or municipal waste water into the lake.**
- **The Nagaland Government could incur an expenditure of ₹ 6.46 crore upto March 2011.**

Bindusagar Lake – Odisha

Bindusagar Lake in Odisha was selected under NLCP for restoration and conservation at the sanctioned cost of ₹3.36 crore. Activities envisaged for restoration and conservation of the lake were providing simple & biological treatment using aquaculture; providing sanitary facilities for pilgrims and community members; restoration of the lake by de-weeding, de-watering & de-silting; aesthetic development & beautification; setting up of an Interpretation Centre etc. The project was to end in 2007 but it was not yet complete.

- **Low cost sanitation had not yet been built and the construction of the interception and diversion sewers was also not complete.**
- **The State government did not provide reasons for non-completion of the project.**

Mansagar Lake - Rajasthan

The project for conservation and restoration of Mansagar Lake was sanctioned in September 2002 by MoEF at an estimated cost of ₹22.39 crore. This was revised to ₹ 24.72 crore in December 2002. The activities for restoration and conservation of Mansagar lake included construction of lake front promenade, construction of check dam in forest valley, construction of three nesting islands, installation of physio-chemical treatment plant, construction of artificial wetland and in-situ bio-remediation system. The scheduled date of completion was March 2004 which was revised to March 2007 but the project is still not declared commissioned /completed. An expenditure of ₹24.72 crore was incurred upto May 2011.

- **Project delayed due to delay non- availability of land for construction of physio chemical Treatment Plant.**
- **BOD levels had improved, but they were still above the danger level indicating high organic pollution.**

Pushkar Lake – Rajasthan

Pushkar lake was facing problems due to siltation, scanty rains, lack of facilities for tourist and consequent degradation of water quality. Hence, it was included under NLCP and a project was sanctioned for its restoration and conservation. The restoration involved activities like de-silting, lake front development, aeration with ozoniser, afforestation, inlet-outlet arrangement etc. The scheduled date of completion was August 2010, but the work was still incomplete.

- **Until November 2010 the de-silting work and building of toilets, aeration, construction of inlet-outlet and settling tank was completed.**
- **The lake front development works, works relating to afforestation were still on going.**

Pichola Lake – Rajasthan

Pichola lake in Udaipur was being subject to heavy anthropogenic pressure by Udaipur city. As such, it was included under NLCP and the Project for conservation and sustainable management of Pichola Lake System was sanctioned in February 2009 at an estimated cost of ₹ 84.75 crore with scheduled date of completion by February 2012.

- **An expenditure of ₹3.84 crore was incurred and further progress was not made due to stay granted by the Court for STP land and not demarcating the lake boundry by the Water Resource Department.**

Kodaikanal Lake - Tamilnadu

The project was sanctioned at the cost of ₹ 5.13 crore and was scheduled to be completed by December 2002. MoEF included it under NLCP and sanctioned a project for its conservation and restoration as domestic sewage from Kodaikanal city was polluting Kodaikanal lake.

- **The original site for location of STP for the project for interception and diversion of sewage from 19 outfalls and carry the same to STP was at a site situated near the lake.**
- **A citizens' group filed a writ petition on the plea that the location of STP would pollute the lake.**
- **Similar objections were raised on two more locations. As a result, land for the project is yet to be acquired.**

Dimsagar Lake – Tripura

The project for restoration and conservation of Dimsagar Lake envisaged activities like building of a pathway, retaining wall, drain, weeding, de-silting, sitting arrangement, fencing, landscaping etc. Sanctioned cost of the project was ₹ 0.69 crore and a total of ₹ 0.43 crore had been spent till date. The project was envisaged to be completed in March 2006 but it was still in progress.

- **Dimsagar Lake was 3.3 acres and depth was only 1.70 meters and did not qualify for selection under NLCP.**
- **Approved DPR envisaged the construction of a surface drain from the surrounding residences responsible for pollution of the lake but the Agartala Municipal Corporation could not construct the drain due to encroachments.**
- **85 *per cent* of the total expenditure till date had been incurred on beautification and landscaping works and rest 15 *per cent* incurred on measures to control pollution.**

Laxminarayanbari & Durgabari Lakes- Tripura

Both lakes were included under NLCP with sanctioned cost of ₹0.70 and ₹0.63 crore respectively. Activities for restoration of Laxminarayanbari and Durgabari lakes envisaged construction of pathway, weeding, de-silting, seating arrangement, fencing, landscaping, building of toilets etc.

- **Laxminarayanbari was not as polluted as other lakes in Tripura.**
- **Activities for restoration of the lakes could not commence as a heritage building (royal palace of erstwhile kings' of Tripura) was in close proximity of the lakes.**

Mansi Ganga – Uttar Pradesh

The project for restoration and conservation of Mansi Ganga Lake was sanctioned in March 2007 and was slated for completion in March 2009. Activities under this project included construction of Low Cost Sanitation, lake front development, construction of STP etc. It was observed that the project was still ongoing even though the sanction period of the project had expired.

- **With respect to construction of STP, 90 *per cent* progress of the work has been reported till November 2010 by the implementing agency.**
- **With respect to LCS, only 8 out of the planned 10 LCS units/toilet blocks had been completed till November 2010 as land was not available for remaining 2 units.**
- **Lake front development work has not yet started and with respect to afforestation , only 40 per cent had been completed till November 2010.**
- **The delay in implementation of the project was due to non-release of funds by NRCD, delay in obtaining permission from Forest Department, land acquisition for STP.**

Ravindra Sarovar – West Bengal

With a view to improve the quality of water and also to save the lake from further degradation, MoEF sanctioned in October 2002, a project for "Revival of Ravindra Sarovar, Kolkata in West Bengal" at a total cost of ₹ 6.96 crore with scheduled date of completion being March 2004. The expenditure was to be incurred on components like bio-remediation, upkeep, Lake bank protection and fencing and lake beautification.

- **Though bio-remediation was originally proposed for improvement of water quality of Ravindra Sarovar as huge numbers of slum squatters were using the lake water for bathing & washing of clothes, the work was not initiated.**
- **Water quality reports of Jadavpur University Sea Explorers' Institute, and West Bengal Pollution Control Board for the year of 2007, 2009 and 2010 revealed the presence of BOD, TC and FC in excess of permissible limits.**

Mirik Lake – West Bengal

In August 2004, NRCD sanctioned a project for 'Revival of Mirik lake', Darjeeling in West Bengal at total cost of ₹ 4.01 crore with scheduled date of completion being February 2006. The expenditure was to be incurred on components like bank protection, fencing work, construction of silt & debris arrestor, afforestation, de-siltation and public participation.

- **MoEF released the first instalment to Kolkata Metropolitan Development Authority (KMDA) which could not be spent.**
- **KMDA had also not submitted any progress reports to MoEF.**
- **In September 2008, NRCD intimated the Urban Development Department, Government of West Bengal regarding slow progress of the project and had also requested it to issue instructions for refund of unspent balance to MoEF to prevent any further parking of funds.**

4.6 Performance of programmes for control of pollution of ground water

At the central level, MoEF does not implement any programme for treatment and restoration of ground water.

No State had introduced any specific programmes for the restoration and treatment of ground water. Tamil Nadu and Rajasthan have initiated programmes which address the issue of polluted ground water, but these are restricted to a few specific areas.

The schemes operated by MoWR focus on exploration, monitoring of the ground water regime through 15640 ground water monitoring wells located all over the country. This data is used for assessment of ground water resources and changes in the ground water regime. Similarly, CGWB seeks to regulate withdrawal of ground water and identify critical and over-exploited areas. However, none of its programmes or studies specifically address the issue of pollution of ground water.

As the ground water in Tamil Nadu contained contaminants like fluoride, salinity, chloride, iron, nitrate etc., it was observed that the State government had initiated Fluorisis Mitigation Project in June 2010 in districts like Dharmapuri and Krishnagiri which were endemic with respect to excess fluoride content in the ground water because of which there was high prevalence of fluorisis in these districts. The scheduled date of completion of the programme was May 2013.The programme is now being implemented with assistance from Japan international Cooperation Agency and was being executed by the Tamil Nadu Water Supply and Sewerage Board. The sanctioned cost of the project was ₹28.44 crore. The technology for fluoride mitigation was adopted by the implementing agency after appropriate study which proved its efficacy. Regular inspection of the facilities set up was taking place by the implementing agency and follow-up was taking place as and when required.

Conclusions

Neither MoEF nor the States have introduced any programmes to prevent pollution of ground water. They have also not addressed the concerns of pollution from agricultural sources.

Although accountability structures at the central level have been established for management of pollution of rivers and lakes, the situation is more complicated with respect to groundwater with no central agency taking complete responsibility for ground water pollution. Also, the control activities which ensure accountability of technical and financial aspects of the projects are weak.

Although CPCB has created a list of the sources of pollution, MoEF has not created programmes to prevent effluents entering the rivers. NRCD projects dealt only with stretches where pollution has already occurred.

Inclusion of rivers and lakes into NRCP and NLCP was flawed as MoEF/CPCB/ States did not conduct a comprehensive survey to assess pollution levels in rivers/lakes all across the country. The total amount of pollutants being discharged into all the rivers of India from sources like industries, mining, tanneries, distilleries etc., was also not worked out before initiation of NRCP/NLCP. Selection of rivers/lakes under NRCP/NLCP was not based on

pollution level of the river/lake and NRCP/NLCP was not planned by MoEF to address the reduction of entire pollution of selected rivers and lakes.

At the level of the States, implementation of the projects was very unsatisfactory. Projects were delayed beyond the scheduled completion dates and many of them were not completed even as of now, though they were sanctioned more than five years back.

Out of the completed projects, 82 per cent of the projects under NRCP were completed after the scheduled date of completion. 28 projects costing ₹251.27 crore were constructed but not utilised as yet. States implementing the projects faced problems in land acquisition, getting requisite permissions, especially forest clearances, technical problems, problems from contractors etc.

Many projects faced resistance from local populace, especially for building of STPs. Projects like STPs, LCS, interception and diversion projects failed to function as envisaged, thus being unable to achieve the objectives of pollution control of rivers.

Implementation was especially poor in States like Andhra Pradesh, Bihar, Jharkhand, Haryana, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Sikkim, Uttar Pradesh and West Bengal.

NLCP as a programme has been ineffective in achieving the objective of conservation and restoration of lakes in India. Only two of the test checked 22 projects had been completed and the rest were either continuing beyond the sanction date of completion or had been abandoned. Problems like resistance from locals over proposed construction of STPs etc., dispute over site, inability to arrest sewage flow, non-availability of land etc., have contributed to non-completion of the projects.

As a result, water quality parameters of only three lakes namely Sharanabasaveshwara, Nainital lake and Kotekere lake has been restored to the designated criteria, while these parameters in respect of other lakes like Banjara, Dal, Bellandur, Veli Akkulam, Shivpuri, Powai, Rankala, Mansagar, Pichola, Pushkar, Kodaikanal, Twin Lakes, Bindusagar, Durgabari , Dimsagar and Laxminarayanbari, Mansi Gang and Rabindra Sarovar could not be restored to the designated criteria.

Bio-conservation zones have not been notified around the lake to prevent encroachment of lake shoreline.

As such programmes to control pollution of rivers and lakes in India have not been implemented adequately.

Recommendation 12

The Jawaharlal Nehru National Urban Renewal Mission is already funding sewerage projects in some of the same States where funds are being provided by MoEF for the same purpose. MoEF, therefore, needs to focus on projects which seek to regenerate and conserve the river instead of those which focus on treatment of sewage. MoEF/States should conceive programmes which address different sources of pollution flowing into rivers, lakes and ground water with focus being not only on prevention of pollution but also conservation and ecological restoration of our water bodies.

Recommendation 13

At present, there are multiple agencies involved in river and lake conservation, right from planning to implementation and monitoring. There is a need to consolidate all these functions and entrust their execution to an umbrella agency for better coordination and accountability.

Recommendation 14

In conjunction with the Ministry of Urban Development (MoUD), MoEF and the State should plan drainage for the city as a whole instead of piecemeal approval of random STPs and I&Ds. Further, funding for these projects should come from MoUD as the implementing agencies work under the control of MoUD. MoEF should be involved in the design stage and in monitoring the treated effluents if they are being discharged into the river.

Recommendation 15

NRCP should be remodelled to first collect data on the problems affecting each river and then tailor different programmes for each river, depending on the socio-economic context of the area around that river as well as the sources of pollution most affecting the river.

Recommendation 16

MoEF/States need to ensure that projects for source control of all kind of pollutants entering the lakes is included in projects for conservation and restoration of lakes, especially sewage and agriculture runoff which leads to nutrient over-loading of the lake.

Recommendation 17

States should prepare the Detailed Project Reports for river and lake conservation projects taking into account all the sources of pollution as well as issues like land acquisition while preparing DPRs so that projects are not delayed once started.

Recommendation 18

MoEF should ensure that all lakes facing encroachment and resultant filling up are included in NLCP. Further, all State governments should declare bio-conservation zones around lakes so that encroachment of shoreline is prevented.

Recommendation 19

MoEF should lay down a time-bound programme in consultation with other Central Ministries, CPCB, States and implementing agencies to ensure that projects are completed in time. There should also be a mechanism for discussions on problems in implementation so that suitable interventions can be made to complete projects in time.

Chapter 5: Monitoring of programmes for control of pollution of rivers, lakes and ground water

The targeted impact of schemes or programs can be achieved only with the proper and effective implementation. In turn, effective monitoring can aid effective implementation. For the monitoring to be effective, an organisation develops the system which covers the micro monitoring at the ground level of implementation i.e. at the implementing agency level. On the other hand, macro monitoring at the apex level will ensure that such monitoring system is working effectively. The different levels and agencies involved in monitoring projects under NRCP and NLCP are depicted in the table below.

5.1 Monitoring of projects for control of pollution in rivers and lakes

5.1.1 At the Centre

Table 12: Monitoring of projects under NRCP/NLCP at central level

National River Conservation Authority	• Headed by Prime Minister •Task: Six-monthly review of progress •Last meeting: June 2003
Monitoring Committee	•Headed by Member, Planning Commission •Task: Quarterly review of progress •Last meeting: April 2002
Standing Committee	•Headed by Union Minister, Environment & Forests •Task: Quarterly review of progress •Last meeting: March 2003
Steering Committee	•Headed by Secretary, MoEF •Task: Quarterly review of progress •Last meeting: December 2007

- The National River Conservation Authority (NRCA), headed by Prime Minister, was to conduct a six-monthly review of progress. The Chief Ministers concerned, among others, are the members of this Committee. However the last meeting of NRCA was held on 16th June 2003. Thereafter, no meeting of NRCA was convened.
- Monitoring Committee headed by Member Environment, Planning Commission was to conduct a quarterly review of the progress of scientific and technical aspects of the programme as well as the impact of works on the river water quality. However, we observed that the 31st meeting of the Committee was held in December 2001 and the last meeting the 32nd one of the Committee was held in April 2002.
- A Standing Committee headed by the Union Minister of Environment & Forests was to review performance of the projects on a quarterly basis. The fourth and last meeting of the committee was held in March 2003.

- A Steering Committee headed by Secretary of the Ministry was to carry out quarterly review of the progress of various programmes/projects and give necessary directions to the implementing agencies. This Committee also has Chief Secretaries of the States concerned and experts in the Public Health Engineering Department and other related areas as its members. Between 2002 and 2010 only six meetings of the Steering Committee of the NRCP were held and the last meeting took place in December 2007.

The four Committees listed above do not exist in a hierarchy and operate independently of each other. There is no functional connect between the Committees. It was therefore difficult for Audit to assess whether the findings and recommendations of the different committees were being shared with the next higher level, and whether any action was being taken on the same. There was no evidence of sharing in the other direction to the Implementing Agencies.

5.1.2 In the States

Table 13: Monitoring of projects under NRCP/NLCP at State level

High Powered Committee	•Headed by Chief Minister of the State • Task: *Periodical review
State Steering Committee	• Headed by the Chief Secretary of the State • Task: *Periodical review
Inter -departmental Committee	•Headed by the Chief Secretary with Principal Secretaries of the Departments concerned • Task : to ensure timely implementation & effective monitoring of programme even after its execution.
Review by nodal implementing agency	•Monthly review of progress by Chief Executive
Divisional Project Monitoring Cell (DPMC)	•Task: *Periodical review
Lake-Specific Coordination Committee	•This was proposed as an alternative mechanism at the district level.**

*[*Note: the periodicity of review varied from State to State.*
*** As seen in "Guidelines for NLCP"]*

With regards to monitoring, it was observed at the State level that:

- Out of 140 projects under NRCP which were test checked for monitoring, monthly review of progress was conducted at the Chief Executive level of the nodal implementing agency only in *40 per cent* of the projects.
- Out of 140 projects under NRCP test checked for monitoring, only *13 per cent* of the projects were periodically reviewed by Divisional Project Monitoring Cells.

- Periodical review of progress was conducted by the State Steering Committee chaired by the concerned Chief Secretaries only in *19 per cent* of the test checked NRCP projects.
- Only *14 per cent* of the test checked NRCP projects were reviewed by a High Powered Committee under the Chairmanship of Chief Minister.
- Inter-Departmental coordination committee was constituted at the State level to ensure effective monitoring of NLCP only in *36 per cent* of the test checked projects.
- Only four out of test checked 14 States constituted Steering Committee at the district level to ensure effective monitoring of NLCP.
- Lake specific Monitoring Committee was constituted at the local level by the State government to ensure effective monitoring of the programme in only 36 *per cent* of the test checked projects.
- Water quality monitoring plans were prepared by the State governments only for *three* of the 22 test checked lakes.
- Pesticides monitoring was not included by Lake Development Authority of the State/implementing agency in any of the projects.
- For only *two* out of the test checked 22 lakes, a conservation plan was prepared by the Lake Development Authority of the State/implementing agency to ensure that the water quality after implementation of the project was restored to the criteria for Designated Best Use classification for B class waters.

The project-wise detailed break-up of monitoring of rivers and lakes by different agencies in test checked projects **are given in Annexure 4.**

In June 2011, MoEF stated that Monitoring Committees at the State level have been constituted by most of the States, whereas the Committees at local levels viz. City Level Monitoring Committees (CLMCs) have been constituted in some States to directly monitor implementation of lake conservation works.

Further, at the Central level, regular review of NLCP as a scheme and also with the individual States, have been conducted at various levels. Also, site visits to the lakes, both before and during implementation, have been carried out by NRCD officers from time to time.

The reply of MoEF needs to be viewed in light of the fact that regular meetings of National River Conservation Authority, Steering Committee, Standing Committee and Monitoring Committee headed by Member Environment, Planning Commission were not held. Further, MoEF was also silent about the names of States which had constituted Monitoring committees at the State level and at the City Level. Constitution of local level committees would have helped solve problems raised by locals living in and around the river/lakes and would have made them stakeholders in the conservation efforts. Poor monitoring is an example of weak internal control and inevitably reflects on overall atmosphere of accountability within the organisation.

5.2 Paucity of network for tracking pollution of rivers, lakes and ground water

5.2.1 Insufficient number of monitoring stations

Under NRCP, water quality monitoring locations on **rivers** had been identified for manual monitoring and a total of 158 locations were being monitored for 10 rivers by different Universities & Research Institutes in the country.

Further, CPCB also monitored river water quality through 980 monitoring locations on 353 rivers for the assessment of river water quality all across the country. It was observed that the average distance between monitoring locations was 49 kilometres for major rivers and was 45 kilometres for tributary streams and medium & minor rivers. CPCB stated that the existing stations cannot achieve the objective as desired and CPCB had presented the requirement of expansion of monitoring network to MoEF for reducing the distance to 10-20 kilometres.

With respect to **lakes**, CPCB had established 117 monitoring locations on 107 lakes till 2010 all across the country for the assessment of water quality of lakes in terms of chemical parameters. It was observed that the average area covered by monitoring locations was 40,000 hectares.

CPCB stated that the existing stations cannot achieve the objective as desired and CPCB had presented the requirement of expansion of monitoring network to MoEF for reducing the area covered to 10,000 hectares.

With respect to **ground water**, CPCB had established a network of 490 groundwater locations under National Water Quality Monitoring Programme (NWQMP). Further, CGWB had 15640 observation wells all across the country from which samples are collected once a year.

5.2.2 Lack of classification of locations

According to UNEP and the Hydrology Project of Ministry of Water Resources, all monitoring stations have to be classified as baseline, trend and flux stations.

- Baseline stations are established in areas away from human influence, these give data for comparison purposes.
- The purpose of trend stations is to test for long-term changes in water quality and identify trends of pollution.
- Flux stations determine fluctuations of critical pollutants from river basin to ocean or regional sea.

It was observed that MoEF/CPCB had classified 475 locations on **rivers** and 108 locations on **lakes** as baseline stations. Another 499 locations on rivers and 9 stations on **lakes** were classified as trend stations and CPCB stated that these also functioned as flux stations.

But this contention of CPCB was not correct as trend stations could be set up anywhere on the **river**/**lakes** whereas flux stations needed to be established on mouth of major rivers. Also, the purpose of both the stations was different. As such, MoEF/CPCB had not clearly distinguished between the three kinds of stations which would have an effect on the reliability and validity of data generated from these stations.

- No monitoring of pollution from agricultural non-point sources was being done.
- With respect to **ground water** also it was observed that monitoring locations had not been classified as baseline or trend stations by CGWB as required under the monitoring guidelines.

5.2.3 Lack of real-time monitoring of water pollution

CPCB/CGWB do not carry out real-time monitoring of water pollution in **rivers**, **lakes** and **ground water**. According to CGWB, the required set up for real-time monitoring is not available at present (January 2011).

MoEF in its reply in June 2011 stated that automatic water quality monitoring stations are being established on river Ganga and Yamuna under a World Bank-assisted project by Ministry of Water Resources.

5.2.4 Lack of assessment of trophic status of rivers and assessment of ecological/biological indices of rivers/lakes

Trophic status is a measure of biological productivity of lakes/rivers, which simply is a measure of how many plants and animals are in the lake/river. Thus, it is an indicator of health of a river. MoEF had not assessed whether there was improvement in trophic status of rivers during implementation/completion of projects under NRCP. It had also not assessed whether there was measureable improvement in ecological and biological indices of rivers during implementation/completion of projects under NRCP.

In its reply in June 2011, MoEF stated that water quality monitoring for rivers has presently been restricted to physio-chemical & bacterial parameters and that biological parameters including biological indices & trophic status can supplement the existing monitoring in providing a more comprehensive status of the river. While endorsing the audit observation, MoEF stated that it required more finances and technical expertise to do this and it proposed to revamp the monitoring protocol for river Ganga to include bio-monitoring along with other physio-chemical parameters. While revising the monitoring protocol for river Ganga by including bio-monitoring is a good first step, MoEF needs to take this process forward and devise measurements of trophic status for all major rivers and lakes in India.

5.2.5 Lack of revision and updating parameters of water quality

Regular updating and revision of parameters of water quality being monitored by MoEF/CPCB is essential to identify the new and emerging sources of pollution, especially those which have an industrial base. As new manufacturing methods and new technological advances are being made, the nature and kinds of pollutants entering our water bodies are also changing. It was observed that MoEF/CPCB did not carry out regular updating and revision of its standards for water quality.

MoEF in its reply in June 2011 stated that CPCB had been monitoring 64 parameters in river/ lake/ ground water samples taken from rivers, lakes, ponds, creeks etc and station specific parameter is selected on the basis of source in the vicinity of monitoring station. It further stated that for inclusion of new parameters, toxicity study is carried out in the laboratory before taking it up for regular monitoring.

However, the fact remains that no actual updating and revision of parameters of water quality has taken place and revised parameters should be based on identification of new toxins entering water bodies.

5.2.6 Poor quality of data on water

With regard to dissemination of data on Water Quality Monitoring, we observed that besides CPCB and NRCD, CWC, CGWB, State government departments of irrigation and ground water were involved in monitoring of water quality. As per the Uniform Protocol on Water Quality Monitoring Order, 2005, *"Each monitoring agency shall process the analytical data and report the data after validation to the Data Centre at the Central Pollution Control Board. The Central Pollution Control Board shall store the data and disseminate through website or electronic mail to various users on demand"*. However, it was observed in audit that:

- CPCB had established Environmental Data Bank but CPCB had not received any data from Water Quality Monitoring agencies other than SPCBs as yet.
- The data received in Environmental Data Bank was in public domain and anyone can access the data by accessing the website of CPCB (http://cpcbedb.nic.in/). Since March 2010, the link to Environment Data Bank has not been working as the system was hacked.

The data collected by CPCB is thus not accessible to any agency at present.

5.2.7 Inspection of the projects by MoEF

Projects being implemented by the States under NRCP were to be regularly inspected by MoEF; however, these projects were not inspected by MoEF. As such, MoEF would not be in a good position to be aware of the difficulties faced during implementation and the opportunity to make mid-course corrections was lost.

Out of 140 river projects test checked, MOEF submitted information only in respect of 99 projects. Of these, 25 per cent of the projects were not inspected by MoEF even once during implementation. Out of 105 projects completed, MOEF submitted information in respect of 77 projects. MoEF had not inspected 43 per cent of these projects after completion.

In June 2011, MoEF stated that projects under execution were being monitored by the officers of the MoEF at regular intervals and observations were communicated to the implementing agency/ State Government for appropriate action. The reply was not acceptable in audit as substantial number of projects were either not inspected by MoEF even once during implementation or after completion.

5.2.8 Availability of Completion Reports

Once the project was complete, the State government has to send a completion report to MoEF to certify that the project was complete. However, it was observed that completion reports of projects being implemented under NRCP were not available for all the projects. Out of 105 completed river projects test checked, MOEF did not provide information for 15 projects. Out of the remaining, completion reports were not received by MoEF for 67 projects. As such, MoEF was not able to insist on timely submission of project completion

report by State Government /implementing agency and could not ensure whether the projects had met the timelines and objectives of the projects.

In its reply of June 2011, MoEF was silent about this issue.

Conclusions

Inspection and monitoring of projects being implemented under NRCP and NLCP was inadequate at all three levels, i.e., local level, State level and Central level. It was observed that the data for monitoring the schemes as available in MoEF provides a user-friendly means of understanding the current status of the relevant policy and is reasonably cost-effective to operate. However, it did not describe in detail the stages or events used for rating progress (when this method was used). It also did not provide a rationale for how future performance targets were being set in the Ministry.

Poor monitoring of network to track pollution of water in rivers and lakes, failure to update and revise water quality parameters, absence of database, poor dissemination of data: these are all indicators of the system of internal controls which frame such a vital activity. In turn, poor internal controls reveal the low level of transparency in the activities of the Ministry and their impact on its overall accountability.

Recommendation 20

The Water Quality Assessment Authority at the central level and the Water Quality Review Committee at the level of the States should be revitalized and strengthened so that it can act as a cross-sectoral nodal body for water pollution issues.

Recommendation 21

States should involve citizens and other stakeholders in proposing and monitoring programmes to control pollution of rivers and lakes. This will help in mobilizing support in civil society for the proposed projects and thus the projects will face less resistance from local people. Citizens Monitoring Committee and Local level lake monitoring committees need to be constituted to provide feedback for more effective implementation.

Recommendation 22

Monitoring network should be strengthened by converting all monitoring locations into stations and reclassifying them as baseline, trend and flux stations for achieving better quality data. MoEF should also start real time monitoring so that red flags are raised immediately when pollution levels rise alarmingly and remedial action can be taken in time.

Recommendation 23

MoEF should immediately take steps to increase the frequency of inspections carried out by it and by the States so as to assess the efficiency of the implementation of its programmes.

Chapter 6: Results of programmes for control of pollution in India

Assessment of results is an important step in reaching a conclusion about efficacy of any programme. It is undertaken to ensure that projects, programmes and policies are economically viable, socially equitable and environmentally stable and delivering the intended results.

6.1 Change in water quality of rivers as a result of implementation of NRCP

Ganga Action Plan (GAP) was introduced in 1985 and was subsequently extended to other rivers under NRCP in 1996. As such programmes for preventing and cleaning up of major rivers in India have been in operation for more than 20 years now. Hence, it is important to assess whether NRCP has achieved its major aim of improvement in the water quality of the major rivers. Issues relating to impact of NRCP/NLCP on our rivers and lakes at the central and State level are discussed in the succeeding paragraphs:

When queried about improvement in water quality of rivers included under NRCP, MoEF stated that it monitored water quality of rivers which was analysed for Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), pH, suspended solids (SS) and coliform etc., which were indicators of pollution and that river water quality reflected the impact of project in the vicinity. It stated that Ganga river water quality data from 1986 to 2009 indicated improvement in water quality between Kannauj and Varanasi.

CPCB stated that the natural flow in rivers and streams has reduced drastically due to diversion of water for irrigation from all the reservoirs in the country and there is little fresh water flow or flow generated due to discharge of sewage and industrial effluents. It also stated that the improvement in various environmental components could not be quantified.

6.1.1 How did the cities fare?

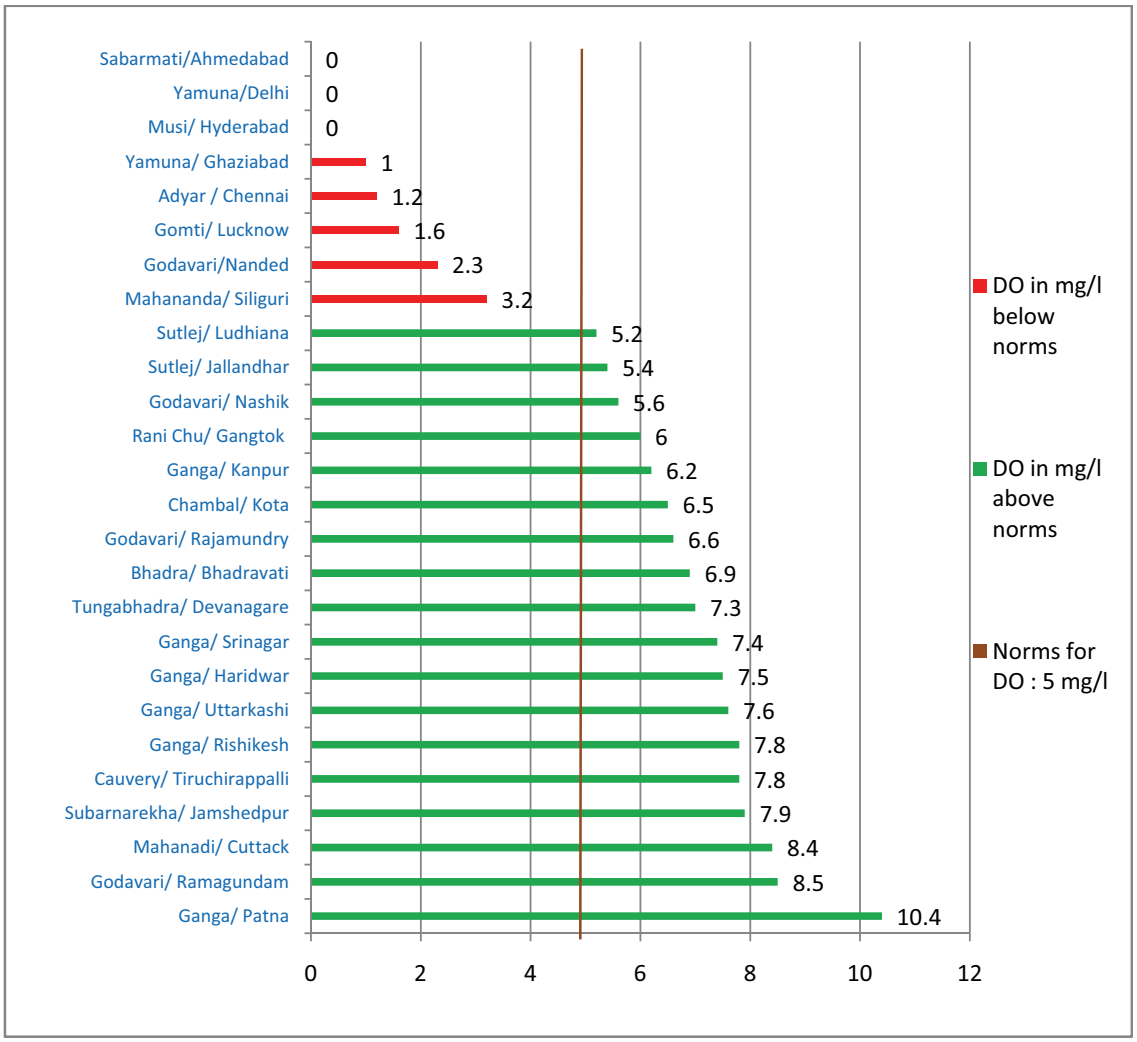
In the course of audit, we looked at the quality of water in test checked rivers in terms of BOD, Dissolved Oxygen (DO) and Total Coliform (TC). These are indicators of organic pollution, of whether the water can sustain aquatic life and presence of harmful, faecal-related bacteria, viruses and protozoa which cause illnesses respectively.

These reports assessed quality of water in the river after it leaves the city where interventions like STPs have taken place. As such, if the interventions are effective, the quality of water in these rivers after they leave the cities should meet the class B criteria (Bathing standards) of CPCB (which is TC-500 MPN/100 ml or less, DO-5 mg/l or more and BOD- 5 days 20^0 C 3 mg/l or less).

DO is a relative measure of the amount of oxygen that is dissolved or carried in the water body. Adequate dissolved oxygen is needed and necessary for good water quality. This is important to the sustainability of a particular ecosystem. Insufficient oxygen in lakes and rivers, tends to suppress the presence of aerobic organisms such as fish. Deoxygenation

increases the relative population of anaerobic organisms such as plants and some bacteria, resulting in fish kills and other adverse events. If water is too warm, there may not be enough oxygen in it. When there are too many bacteria or aquatic animal in the area, they may overpopulate, using DO in great amounts. Oxygen levels also can get reduced through overfertilization of water plants by run-off from farm fields containing phosphates and nitrates (the ingredients in fertilizers). Under these conditions, the numbers and size of water plants increase. Then, if the weather becomes cloudy for several days, respiring plants will use much of the available DO. When these plants die, they become food for bacteria, which in turn multiply and use large amounts of oxygen. As evident from the chart below the level of Dissolved Oxygen was precariously low in the Sabarmati at Ahmedabad, Yamuna at Delhi, Musi at Hyderabad, Yamuna at Ghaziabad, Adyar at Chennai and Gomti at Lucknow.

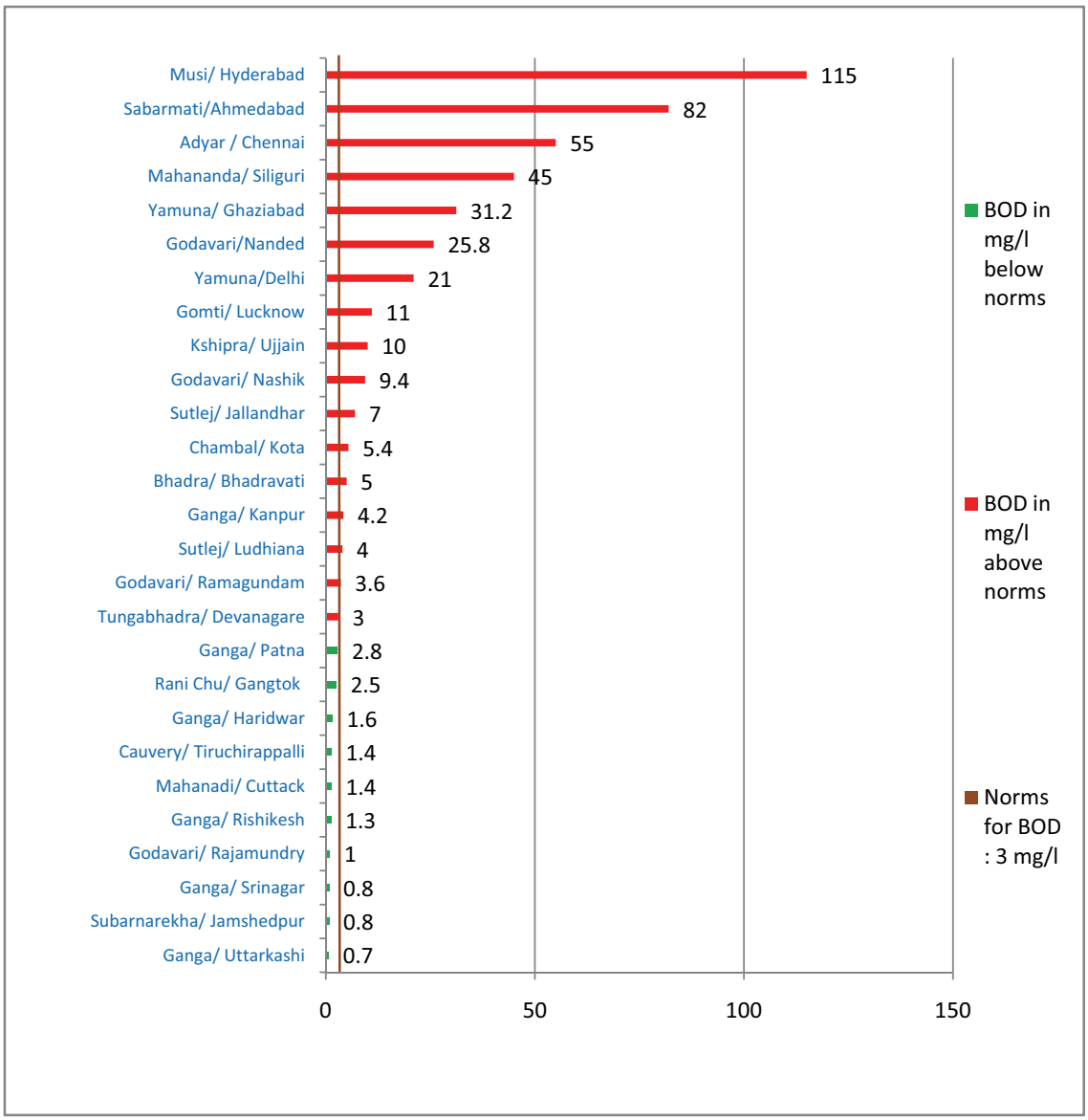
Chart Showing Actual DO in mg/l Against Norms



BOD is a chemical procedure for determining the uptake rate of dissolved oxygen by the biological organisms in a body of water and is widely used as an indication of the quality of

water. It can be used as an indicator of the efficiency of sewage treatment plants. As can be seen from the chart below, the levels of BOD in some major towns was at alarming levels. Thermal discharges, such as water used to cool machinery in a manufacturing plant or a power plant, raise the temperature of water and lower its oxygen content. Fish kills and an invasion and growth of certain types of weeds can cause dramatic changes in a stream or other body of water. Natural sources of organic matter include plant decay and leaf fall. However, plant growth and decay may be unnaturally accelerated when nutrients and sunlight are overly abundant due to human influence. Urban runoff carries pet wastes from streets and sidewalks; nutrients from lawn fertilizers; leaves, grass clippings, and paper from residential areas, which increase oxygen demand.

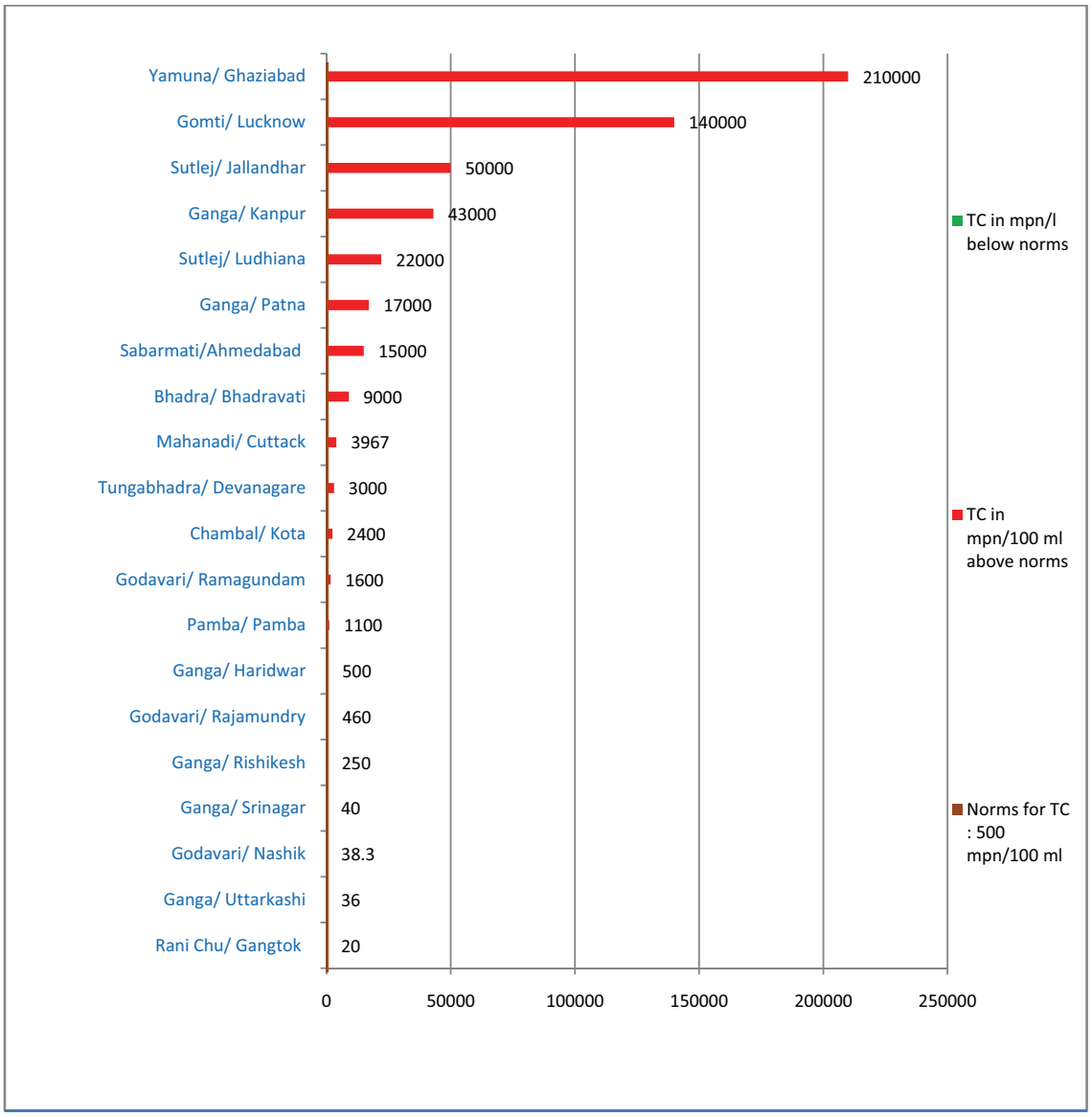
Chart Showing Actual BOD in mg/l Against Norms



TC: Coliforms organisms like fecal bacteria are an indicator of water quality. Coliform bacteria may not cause disease, but can be indicators of pathogenic organisms that cause diseases. The latter could cause intestinal infections, dysentery, hepatitis, typhoid fever,

cholera and other illnesses. Coliform bacteria are organisms that are present in the environment and in the feces of all warm-blooded animals and humans. Coliform bacteria will not likely cause illness. However, their presence in drinking water indicates that disease-causing organisms (pathogens) could be in the water system. These can also occur due to soil, vegetation, sediment, insects entering the water, and their presence indicates that the source is, or recently has been compromised by surface water.

Chart Showing Actual TC in MPN/100 ml Against Norms



The charts above show a particularly dismal position with regard to breach of norms in terms of the three criteria- BOD, DO and TC in the case of Yamuna at Ghaziabad/Delhi, Gomti at Lucknow and Sabarmati at Ahmedabad. In the case of Musi at Hyderabad, for which data on BOD and DO was available, the pollution levels was far beyond the norms.

Table 14: Quality of Water in test checked river stretches

State	River/Town	Quality of water
Andhra Pradesh	Godavari/ Ramagundam	BOD is on the slightly higher side but TC is more than 3.2 times the criteria, indicating the water of Godavari after leaving Ramagundam city is contaminated by harmful, faecal-related bacteria, viruses and protozoa which cause illness.
	Musi/ Hyderabad	Data regarding TC was not available. DO was 0 which indicated inability of Musi to support any aquatic life. Further, BOD was more than 38 times the criteria, indicating high levels of organic pollution of Musi river after it leaves Hyderabad.
	Godavari/ Rajamundry	River quality met desired criteria.
Bihar	Ganga/ Patna	TC was 34 times the criteria in Ganga after it leaves Patna, indicating the presence of disease causing, faecal-related bacteria, viruses and protozoa which cause illness.
Delhi	Yamuna/ Delhi	Data regarding TC were not available. DO was 0 which indicated inability of Yamuna to support any aquatic life. BOD was more than seven times the criteria, indicating high levels of organic pollution of Yamuna river after it leaves Delhi.
Gujarat	Ahmedabad/ Sabarmati	BOD and TC were more than 27 times and 30 times the criteria indicating high levels of organic pollution as well as the presence of disease causing, faecal-related bacteria, viruses and protozoa which cause illness in Sabarmati as it leaves Ahmedabad city. Further, DO levels in Sabarmati were 0, indicating its inability to support aquatic life.
Haryana	Yamuna/ Faridabad	No data was available.
	Yamuna/ Panipat	No data was available.
Jharkhand	Subarnarekha/ Ranchi	No data was available
	Subarnarekha/ Jamshedpur	While levels of TC were not measured, it was observed that levels of BOD met the criteria.
Karnataka	Bhadra/ Bhadravati	TC was 18 times the criteria, indicating the presence of disease causing faecal-related bacteria, viruses and protozoa which cause illness as the Bhadra river leaves Bhadravati.
	Tungabhadra/ Devanagare	TC in Tungabhadra river after it leaves Devanagare town is six times the criteria, indicating the presence of disease causing, faecal-related bacteria, viruses and protozoa which cause illness.
	Pennar/ Bangalore	No data was available.
Kerala	Pamba/ Pamba	While BOD and DO were not measured, TC in Pamba was 2.2 times the criteria as it leaves Pamba town indicating the presence of disease causing faecal-related bacteria, viruses and protozoa which cause illness.
Madhya Pradesh	Betwa/ Vidisha	No information was available.
Maharashtra	Krishna/ Karad	BOD and DO were not measured while TC levels met the criteria in Krishna river as it left Karad city.
	Godavari/ Nashik	While DO and TC met the criteria, BOD was more than 3 times the criteria, indicating high levels of organic pollution in Godavari river after it left Nashik.

	Krishna/ Sangli	No information was available
	Nanded/Godavari	Levels of TC in the river Godavari after it left Nanded city were not available. Levels of BOD were more than eight times the criteria. Further, DO was less than criteria indicating availability of insufficient amount of oxygen for survival of aquatic life indicating loss of ability of river Godavari to support aquatic life after it left Nanded.
Odisha	Mahanadi/ Cuttack	TC was almost eight times the criteria in Mahanadi after it left Cuttack city, indicating the presence of disease causing, faecal-related bacteria, viruses and protozoa which cause illness.
	Coastal area/ Puri	No information was available.
Punjab	Sutlej/ Jalandhar	While BOD was 2.3 times the criteria, TC was 100 times the criteria in Sutlej as it left Jalandhar. This indicated organic pollution as well as presence of disease causing, faecal-related bacteria, viruses and protozoa which cause illness.
	Sutlej/ Ludhiana	While BOD exceeded the criteria and DO did not exceed the criteria, TC was 44 times the criteria in Sutlej river as it left Ludhiana city, indicating the presence of a large number disease causing, faecal-related bacteria, viruses and protozoa which cause illness.
Rajasthan	Chambal/ Kota	While BOD did not meet the criteria and DO met the criteria, TC was almost five times the criteria in Chambal river as it left Kota city indicating the presence of a large number disease causing, faecal-related bacteria, viruses and protozoa which cause illness.
Sikkim	Rani Chu/ Gangtok	BOD and TC met the criteria while DO is less than the required criteria, indicating organic pollution in river Rani Chu as it left Gangtok town.
Tamil Nadu	Adyar & Cooum/ Chennai	BOD was 18 times & seven times the criteria in Adyar & Cooum river respectively, indicating high levels of organic pollution. Further, the DO was less than the criteria indicating insufficient oxygen being available for survival of aquatic life. Further, the TC was much higher than the criteria, indicating that Adyar & Cooum were full of disease causing, faecal-related bacteria, viruses and protozoa which cause illness.
	Cauvery/ Tiruchirapalli	BOD is 1.37 which is less than the criteria indicating that Cauvery was full of disease causing, faecal related bacteria, viruses & protozoa which cause illness.
	Vaigai/ Madurai	No information was available.
Uttar Pradesh	Yamuna/ Ghaziabad	BOD was more than 10 times the criteria in Yamuna river, indicating high levels of organic pollution. Further, the DO was less than the criteria indicating insufficient oxygen being available for survival of aquatic life. Further, the TC was 420 times the criteria, indicating that Yamuna, after leaving Ghaziabad, was full of disease causing, faecal-related bacteria, viruses and protozoa which cause illness.
	Ganga/ Kanpur	BOD was almost 1.4 times the criteria in Ganga river after Kanpur, indicating high levels of organic pollution. Further, the TC was 86 times the criteria, indicating that Ganga, after leaving Kanpur, was full of disease causing, faecal-related

		bacteria, viruses and protozoa which cause illness.
	Gomti/ Lucknow	BOD was more than 3.6 times the criteria in Gomti river, after Lucknow, indicating high levels of organic pollution. Further, the DO was less than the criteria indicating insufficient oxygen being available for survival of aquatic life. Further, the TC was 280 times the criteria, indicating that Ganga, after leaving Lucknow, was full of disease causing, faecal-related bacteria, viruses and protozoa which cause illness.
Uttarakhand	Ganga/ Rishikesh	River quality met the desired criteria.
	Ganga/ Haridwar	River quality met the desired criteria.
	Ganga/ Srinagar	River quality met the desired criteria.
	Ganga/ Uttarkashi	River quality met the desired criteria.
West Bengal	Ganga/ Barrakpore	Not measured.
	Ganga/ Gayeshpur, Halilshar & Kancharapara	No information was available.
	Mahananda/Siliguri	The level of BOD was 15 times in Mahananda river after Siliguri, indicating high levels of organic pollution. Further DO was less than the criteria indicating insufficient oxygen being available for survival of aquatic life.

The table is indicator of the fact that despite more than 26 years of implementation of programme to control pollution in our rivers, water in our rivers remains critically polluted. The levels of BOD, DO and TC are indicators of high levels of organic pollution in our rivers, the inability of our rivers to sustain aquatic life due to presence of pollutants and high levels of disease causing, faecal-related bacteria, viruses and protozoa which cause illness; all of which point to failure of the efforts of the government to control pollution in our rivers through NRCP.

In its reply of June 2011, MoEF stated that:

- In respect of water quality of the river Ganga, the BOD in the year 2010 ranged between 1.48 to 5.51 mg/litre in major monitoring locations as compared to BOD values ranging between 1.7 to 15.5 mg/litre in 1986.
- Levels of bacterial contamination in terms of faecal coliform are reported to be exceeding the maximum permissible limit at a number of locations along the river Ganga. MoEF also stated while water quality in the stretch of the river Yamuna from Tajewala to Palla in Haryana is found to be within the prescribed limits, Yamuna river in the vicinity of Delhi and in parts of Uttar Pradesh does not meet the standards in terms of BOD.
- Water quality of Yamuna had not shown the desired improvement owing to large gap between the demand and availability of sewage treatment capacity and lack of fresh water in the river.
- Pollution load on rivers had increased over the years due to rapid urbanisation and industrialization and abstraction of water for irrigation, drinking, industrial use, power and other purposes compounds the challenge. Also, MoEF was silent about impact of NRCP on water quality of other rivers.

- Conservation of rivers was a collective effort of Central and State Governments and the central Government was supplementing efforts of the State Governments in river conservation through the centrally sponsored NRCP. It also stated that creation of infrastructure for sewage management and disposal was also being undertaken through other central schemes, such as JNNURM and UIDSSMT, as well as under State schemes.

The reply of MoEF corroborated our observation that improvement of water quality had not taken place in all the rivers covered in the sample, barring Ganga in some stretches. Water quality challenges have been exacerbated by abstraction of water for different uses and these reinforce the fact that MoEF needs to move towards basin approach for management of water quality problems as a result of water abstraction for different uses.

Further, the Outcome Budget of MoEF for 2010-11 reflects MoEF's efforts towards building STPs, CETPs, water quality monitoring stations etc., without clear exposition of outcomes achieved. With respect to MoEF's statement that conservation of rivers was a collective effort of the Central and State government, as the primary funding agency for this programmes as well as its mandate as the nodal agency for pollution issues, MoEF cannot avoid its responsibility in ensuring that the programme for conservation and pollution control meets its desired outcomes.

6.2 Change in water quality of lakes as a result of implementation of NLCP

NLCP which aimed to restore and conserve the polluted and degraded lakes of the country was initiated in 2001. It has been in operation for more than 10 years now and it is now imperative to take stock of whether the aim of restoring and conserving the polluted and degraded lakes of the country has been achieved.

MoEF/CPCB had not assessed whether there was measurable improvement in chemical parameters of lakes during implementation/completion of the project. Audit analysed the testing reports of CPCB regarding quality of water in test checked lakes in terms of Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO) and Total Coliform (TC). These are indicators of organic pollution, of whether the water can sustain aquatic life and presence of harmful, faecal-related bacteria, viruses and protozoa which cause illnesses respectively. The results are depicted in the table below:

Table 15: quality of water in test checked lakes

State	Lake	Quality of water
Andhra Pradesh	Banjara	Project still in progress
Jammu and Kashmir	Dal Lake	Quality of water deteriorated even during implementation of project.
Karnataka	Bellandur	Project abandoned
	Kotekere	Met 'B' class water criteria
	Sharanabasaveshwara	Met 'B' class water criteria
Kerala	Veli Akkulum	Project still in progress
Madhya Pradesh	Shivpuri lake	Project still in progress
Maharashtra	Powai	Not being monitored
	Rankala	Project still in progress
Nagaland	Twin lakes	Project still in progress

Odisha	Bindusagar lake	Project still in progress
Rajasthan	Mansagar	Levels of BOD had come down after implementation of project
	Pushkar	Project still in progress
	Pichola	Project still in progress
Tamil Nadu	Kodaikanal	Project still in progress
Tripura	Dimsagar (Agartala)	Project still in progress
	Laxminarayanbari (Agartala)	Project still in progress
	Durgabari (Agartala)	Project still in progress
Uttar Pradesh	Mansi Ganga	Project still in progress
Uttarakhand	Nainital lake	Levels of BOD had come down, D.O increased
West Bengal	Rabindra Sarovar	Project still in progress
	Mirik	Project still in progress

The quality of water in Kotekere & Sharanabasaveshwara in Karnataka, Mansagar in Rajasthan & Nainital lake in Uttarakhand had improved as per indicators of organic pollution laid down by CPCB.

In its reply in June 2011, MoEF stated that water is a State subject and pollution prevention and conservation of water bodies including lakes remains the domain of State Governments. National River Conservation Directorate (NRCD) in MoEF is supplementing efforts of the State Governments in conservation of lakes through centrally sponsored scheme of NLCP for conservation and management of polluted and degraded lakes in urban and semi-urban areas of the country.

MoEF also stated that evaluation of NLCP together with NRCP, is presently being carried out by independent agencies engaged by MoEF. This reply needs to be viewed in light of the fact that MoEF being the primary funding agency as well as being mandated for prevention of pollution needs to take greater responsibility for the projects funded by it. Further, MoEF did not provide any evaluation reports of NLCP carried out by independent agencies. The Ministry in its reply was silent about the impact of NLCP in improving the quality of water in the lakes across India.

6.3 Change in water quality as a result of implementation of programmes for control of pollution of ground water

Despite increasing pollution of ground water sources and the presence of contaminants like arsenic, nitrate, fluoride, salinity etc., no programmes at the Central level and the State level were being implemented for control of pollution and restoration of ground water. Hence, no impact assessment was possible in the absence of programmes.

In West Bengal we observed that the State Government was monitoring groundwater pollution in six blocks but ground water quality monitoring was not taking place regularly in five blocks. It was also found that water quality monitoring laboratories were established in five blocks but the groundwater sources were not being tested more than once in a year by these laboratories in five out of six blocks.

It was observed that the Tamilnadu government had initiated Fluorisis Mitigation Project in June 2010 in Dharmapuri and Krishnagiri districts which were endemic with respect to excess fluoride content in the ground water. The scheduled date of completion was May 2013. The programme, being implemented with assistance from Japan International Cooperation Agency, was being executed by Tamilnadu Water Supply and Drainage Board. The sanctioned cost of the project was ₹ 28.44 crore. The technology for fluoride mitigation was adopted by the implementing agency after appropriate study which proved its efficacy. Regular inspection of the facilities set up was taking place by the implementing agency and follow-up was taking place as and when required.

There is no nation-wide impact assessment relating to the pollution of ground water.

Conclusion

It is important to continuously monitor programmes to confirm whether programmes are achieving the objectives set out for them. River cleaning and control of pollution programmes for polluted rivers are being implemented since 1985.

The thrust of these programmes has been to stop sewage from polluting our rivers. The programmes have also tried to stop non-point sources of pollution through construction of low cost sanitation, electric crematoria etc., however, the data on the success of these programmes are not very encouraging.

With the Exception of Ganga in certain stretches, all the other rivers test checked by us i.e., Yamuna, Gomti, Godavari, Musi, Cauvery, Cooum, Mahananda, Khan, Kshipra, Vaigai, Chambal, Rani Chu, Mandovi, Sabarmati, Subarnarekha, Bhadra/Tungabhadra, Pennar, Pamba, Betwa, Krishna, Sutlej etc., continue to be plagued by high levels of organic pollution, low level of oxygen availability for aquatic organisms and bacteria, protozoa and viruses which have faecal-origin and which cause illnesses. These rivers are the lifeline of India and its States and people depend on them not just for water but also for livelihood.

With respect to lakes across India, many of them have disappeared due to drying up of their catchment areas which have been reclaimed for uses like urbanisation. Most lakes in India are under threat from nutrient overloading which is causing their eutrophication and their eventual choking up from the weeds proliferating in the nutrient-rich water.

Implementation of NLCP in conserving these lakes has had no discernible effect. Lakes support not only humans for livelihood like tourism and fishing but also support very diverse biodiversity which is disappearing from the levels of pollution entering our lakes.

All the lakes test checked by us i.e., Pichola, Pushkar, Dimsagar, Banjara, Kotekere, Bellandur, Veli Akkulam, Shivpuri, Powai, Rankala, Twin lakes, Bindusagar, Mansagar, Mansiganga, Rabindra Sarovar, Mirik, Kodaikanal lake, Dal lake, Laxminarayanbari Lake, Durgabari Lakei, Nainital lake etc., not only support livelihood but are unique eco-systems supporting a wealth of biodiversity.

Recommendation 24

MoEF/CPCB, in conjunction with the States, should conduct a city-wise assessment of the levels of pollution in our rivers. They should also evaluate the success of projects undertaken under NRCP in terms of pre-defined indicators developed by MoEF/CPCB. Such impact assessment should be done in a continuous manner so that data is generated to judge whether the programme is meeting its stated objectives.

Recommendation 25

MoEF/CPCB along with the States should carry out a comprehensive assessment of levels of pollution in the lakes across the country and also assess the impact NLCP has had in improving the water quality of those lakes on the basis of key indicators laid down by MoEF. Impact assessment should be a regular exercise so that data is generated to judge whether the programme is meeting its stated objectives.

Chapter 7: Resources and Utilisation of funds

Financial resources for control and prevention of water pollution comes from Government budgetary support and Water Cess collected under the provisions of the water (Prevention and Control of Pollution) Cess Act, 1977. The Central Government pays the Central Pollution Control Board and State Pollution Control Boards such amount of money as it may think fit for being utilised under the water (prevention and control of pollution) Act 1974 from the proceeds of Water Cess collected after deducting the expenses on collection. MOEF being nodal ministry is responsible for protection of environment including environmental threats arising from Water pollution.

Funds allocated by the government to MOEF and its various agencies for implementation of programmes relating to prevention of pollution of rivers, lakes and ground water all over the country need to be spent effectively, efficiently and economically for the purpose for which it was allocated. This is especially important as funds are transferred directly from the Central government (MoEF) to implementing agencies of State Government such as municipalities, Jal Boards, Sewerage Boards, Lake Development Agencies etc for implementation at the ground level instead of being routed through State Government as was done prior to June 2003.

7.1 Resources generated from Water Cess for control and prevention of water pollution

The objective of control and prevention of water pollution is achieved through CPCB, SPCBs and various programs of MOEF such as NRCP, NLCP under NRCD etc. The resources generated through Water Cess under the provisions of the water (Prevention and Control of Pollution) Cess Act, 1977 and grants disbursed to CPCB and SPCB from cess so collected during last five years are placed below:

Table 16: Details of Water Cess collected and grants disbursed

(₹ in crore)

Year	Water Cess collected	Grants to SPCB	Grants to CPCB	Total
(1)	(2)	(3)	(4)	(5) = (3) + (4)
2005-06	56.4	76.52	47.04	123.56
2006-07	170.3*	76.51	47.12	123.63
2007-08	190.84	130.34	47.96	178.30
2008-09	228.99	79.80	50.63	130.43
2009-10	207.01	209.96	54.77	264.73
Total	853.54	573.13	247.52	820.65

[Source: Detailed Demand of Grants of MoEF and Finance Accounts of Union Government of concerned years]
* Inclusive of other cess

We observed that resources generated from Water Cess for control and prevention of water pollution was very meagre and was distributed to CPCB and SPCB for meeting their administrative expenses mainly for monitoring of pollution level of water, air and other areas. CPCB and SPCB did not have any schemes for reducing water pollution and restoration of quality of water and water bodies. We observed that based on 28 States and seven Union territories, funds allocated from Water Cess comes to only ₹3.28 crores per

State/Union Territories per year during last five years. This miniscule amount of allocation was barely sufficient for monitoring of pollution level.

The Water Cess under the provision of Water (prevention and Control of pollution) Cess Act 1977 was revised two times during the last 34 years in 1992 and 2003. The water cess is payable by various users at the rate ranging from two paisa to fifteen paisa per kiloliter and defaulters failure to comply with the orders/direction issued under provision of Water (prevention and Control of pollution) Act 1974 or Environment Protection Act 1986 are liable to pay higher rate of three paise to thirty paisa per kiloliter. Water Cess rates are set nationally with an extremely low rate structure. There is need of an in depth review of system of collection of Water Cess to ensure that the higher rate of Water Cess from defaulters is effectively recovered. There is also a need to revisit and revise the Water Cess rates keeping in view reasonable resources requirement of CPCB and SPCBs for monitoring, prevention and control of water pollution across the country.

Funds available for control and prevention of water pollution and restoration of wholesomeness of water were not adequate for the country as a whole. The total Water Cess of ₹ 853.54 crore collected during last five years constituted 10.75 per cent of total expenditure of MOEF. The disbursements to CPCB and SPCBs, amounted to ₹ 820.65 crore

Thus, there is a need to explore resources either by improving effectiveness in realization of cess, increasing the rate of Water Cess or exploring other sources of revenue for control of water pollution.

7.2 Expenditure on control and prevention of water pollution

The table below gives the expenditure incurred on control and prevention of water pollution and total budget of MOEF during last five years.

Table 17: Expenditure incurred on control and prevention of water pollution

(₹ in crore)

Year	Expenditure on NRCP	Expenditure on NLCP	Grants to SPCBs	Grants to CPCB	Total expenditure on water pollution	Total expenditure of MoEF
2005-06	274.21	56.22	76.52	47.04	453.99	1254.51
2006-07	275.92	52.66	76.51	47.12	452.21	1371.23
2007-08	252.98	63.20	130.34	47.46	493.98	1583.24
2008-09	271.00	45.00	79.80	50.63	446.43	1710.01
2009-10	360.99	45.00	209.96	54.77	670.72	2019.75
Total	1435.10	262.08	573.13	247.02	2517.33	7938.74

Source: MIS and detailed demand of grants of MoEF for respective years.

We observed that 26 to 36 per cent of MOEF budget was spent on control and prevention of water pollution. It can be seen that out of total expenditure of ₹ 2517.33 crore on control and prevention of water pollution, ₹1697.18 crore were spent on programs of NRCP/NLCP and ₹820.65 crore were given as grants to SPCB and CPCB. The funding patterns of NRCP/NLCP and utilisation of funds allotted to these programmes are discussed below.

7.3 Funding pattern of NRCP/NLCP programme

7.3.1 Funding Pattern of NRCP

The funding pattern for the river cleaning programme has undergone several changes. GAP I which started in 1985 was a 100 *per cent* centrally funded scheme. The funding pattern changed to 50:50 between Central Government and State Government for phase II in 1993. This was revised again to 100 per cent GOI funding from 1997. Finally, from 1st April 2001, the funding pattern for new projects was changed to 70: 30. As per NRCD guidelines:

- NRCD/Government of India shall bear upto 70% of the Project cost.
- States and Local Bodies shall bear 30% of the Project cost of which the share of public would be a minimum of 10% to ensure public participation in the project.
- The O&M shall be a part of the project and the costs thereon shall be borne entirely by the State and local bodies for which additional resources have to be demonstrably raised and committed to O&M.
- The Local Bodies may raise loans from financial institutions such as HUDCO to contribute their share.
- If there is a cost overrun in a project because of delay, inflation or any other reason, the contribution of NRCD/Government shall be limited to its contribution amount initially agreed. Any additional expense on account of any increase in cost shall be borne by the concerned State Government.
- In addition NRCD/Government of India may undertake itself or commission projects to other institutions, voluntary agencies etc. also.

7.3.2 Funding Pattern of NLCP

Initially the scheme was approved with 100 *per cent* central funding. The funding pattern changed from February 2002 to 70:30.

- NRCD/Government of India shall bear upto 70% of the Project cost.
- The States shall bear 30% of the project cost, of which the share of the local body would be up to 10% to ensure public participation in the project. A commitment to this effect also to be provided by the State Government.
- For the lake catchment where sewerage & sewage treatment is being posed/funded from other sources, appropriate synergy of the two programmes is to be ensured. In case, the proposal also includes the internal sewerage as one of the components, the funding pattern shall be 60:40 between the Centre and the respective State. As far as possible, Government land may be identified for creation of infrastructure.
- The O&M shall be a part of the project and the costs thereon shall be borne entirely by the State / local bodies for which additional resources have to be demonstrably raised and committed to O&M. The O&M Plan must reveal the dedicated streams for revenue generation to meet O&M expenses and the same has to be passed as a resolution by the concerned local body.

- If there is a cost overrun in a project because of delay, inflation or any other reason, the contribution of NRCD/Government of India shall be limited to the amount initially agreed to in the Administrative Approval & Expenditure Sanction Order.
- Certain R&D activities considered to be necessary and an integral part of the project, may be undertaken by the State Government through academic institutions within the scheduled time frame of the project.

7.4 Budgeted expenditure under NRCD

7.4.1 NRCP

Since Ganga Action Plan II started in 1993 and its scope was widened into National River Conservation Programme, 1079 projects for ₹ 4724.24 crore had been sanctioned by MoEF against which the funds of ₹ 3041.91 crore had been released up to March 2010. Breakup of funds sanctioned under budget estimates, revised estimates and utilised in form of releases during last ten years (2000-2010) is given below:

Table 18

(₹ in crore)

Year	Budget Estimates	Revised Estimates	Funds released
2000-01	193.50	121.64*↓	121.39
2001-02	174.95	279.17*↑	283.28
2002-03	254.00	278.26	278.26
2003-04	244.00	234.00	219.09
2004-05	304.20	319.00	292.66
2005-06	347.50	297.20*↓	274.21
2006-07	363.00	275.41	275.92
2007-08	264.00	256.69	252.98
2008-09	249.00	271.00	271.00
2009-10	511.00	361.00*↓	360.99
Total	**2905.15**	**2693.17**	**2629.79**

**Years in which budget estimates were revised by more than 20 per cent*

We observed that out of 10 years scrutinised by audit, budget estimates were revised by more than 20 *per cent* in four years. Out of these four years, in three years budget estimates were revised downwards by 24 *per cent* to 37 *per cent*, while in one year budget estimates were revised upwards by 60 *per cent*. This indicated that NRCD was not able to capture accurately assumptions on which budget estimates were based. In the remaining years, revision ranged between three to 14 *per cent*.

7.4.2 NLCP

58 projects for ₹ 883.96 crore has been sanctioned by MoEF and against which the funds of ₹327.89 crore had been released up to March 2010. Breakup of funds sanctioned under the budget estimates, revised estimates and utilised in form of release during last ten years (2000-2010) is given below:

Table 19

(₹ in crore)

Year	Budget Estimates	Revised Estimates	Funds released
2000-01	10.00	7.00*↓	0.20
2001-02	10.00	10.00	10.00
2002-03	30.00	12.19*↓	12.19
2003-04	45.00	44.16	20.00
2004-05	45.00	30.00*↓	23.42
2005-06	68.00	56.22	56.22
2006-07	60.00	58.54	52.66
2007-08	100.00	63.21*↓	63.20
2008-09	80.00	45.00*↓	45.00
2009-10	45.00	45.00	45.00
Total	493	371.32	327.89

We observed that out of 10 years reviewed by audit, budget estimates were revised by more than 20 *per cent* in five years. In these five years, budget estimates were revised downwards by 30 *per cent* to 59 *per cent* indicating that NRCD was not able to capture the assumptions on which the budget estimates were based. In the remaining years, revision ranged between 0 to 17 *per cent*.

We further observed that in three years (2000-01, 2003-04 and 2004-05), there was significant variation even in the revised estimates and final expenditure. In these three years, expenditure was lower by 28 *per cent* to 98 *per cent* as compared to revised estimates, indicating that progress in projects relating to lakes was very slow and implementing agencies were not seeking further release of installments. Thus, NRCD could not reasonably capture progress of works and requirement of funds even in the revised estimates, impacting the financial management and budgetary control.

7.5 Utilisation of funds

7.5.1 Utilisation of funds released under NRCP

The State-wise details of projects sanctioned, projects test checked, funds released and expenditure on all project and projects test checked in respect of NRCP since initiation of Ganga Action Plan II up to March 2010 is given in **Annexure 5** .

We observed that out of 20 States, total expenditure in respect of 10 States was less than the amount released by NRCD. These States are indicated by an asterisk (*) in the **Annexure 5**. The total expenditure of these 10 States was ₹ 540.14 crore out of ₹ 652.11 crore. This indicated that the progress of expenditure was slow and surplus out of NRCD funds amounting to ₹ 111.97 crore in addition to 30 *per cent* share of State was lying in interest-earning accounts of banks as per the terms of sanction and release of MOEF.

Out of ₹3041.91 crore released to 20 States, 87 *per cent* of total release amounting to ₹2660.01 crore was given to eight States namely Andhra Pradesh, Delhi, Haryana , Maharashtra, Punjab , Tamil Nadu, Uttar Pradesh and West Bengal.

In the remaining States, we observed that total expenditure in respect of seven States was less than combined total of funds released by NRCD and State share. Only two States i.e.

Goa and Punjab have spent funds equal or more than total of funds released by NRCD and State share. NRCD could not furnish the information in respect of funds released for test checked projects separately as funds were released directly to implementing agency for clusters of project and not project-wise.

While verifying UCs, we observed that there was no uniformity in submission of UCs by the implementing agency as some implementing agencies had submitted combined UCs for all the projects, while others did so on the basis of individual projects. This had led to ineffective monitoring at NRCD, while affording various options to the implementing agency to conceal crucial financial information and facts as disaggregated data was not required to be disclosed.

In its present format, the system of collecting and analysing data is incapable of detecting diversion of funds, inefficient utilisation of funds, failure to contribute matching share, balances lying unspent from completed projects, interest income earned but credited to account of implementing agency and not disclosed in UCs for adjustment in further release, booking of inadmissible charges/expenditure, cost escalations and overruns.

Out of 1079 projects sanctioned by NRCD, Audit test checked 140 projects costing ₹ 2117.66 crore across 19 States and 41 towns situated on banks of 24 rivers for detailed scrutiny. **Audit observations of projects checked in audit are given below.**

7.5.1. (a) Diversion of funds

Funds sanctioned by MoEF were to be spent only on items approved in the project. However, in some cases it was observed that implementing agencies in the States had spent funds on items of expenditure not included in DPRs. Some of the cases are discussed below:

- **In Bihar,** Bihar Rajya Jal Parishad, Bihar had constructed three low cost sanitation projects at a total cost of ₹ 9.77 lakh in Government high schools and in certain colony at Barahaya, instead at the banks of River Ganga which was in contravention to NRCD guidelines.
- **In Goa**, Department of Science Technology and Environment diverted funds of ₹ 74.28 lakh on procurement of a transformer (₹ 44.65 lakh) and construction of five excess staff quarters (₹ 29.63 lakh). In June 2011, MoEF stated that the State Government has been communicated to take necessary corrective measures.
- In **Punjab**, the Implementing agency (Punjab Water Supply and Sewerage Board) had diverted ₹ 6.91 crore on schemes which had not been included as items of expenditure under the projects approved. It expended ₹ 5.11 crore on salaries and ₹ 1.80 crore on operation and maintenance, which were not covered under NRCP.

  In June 2011 MoEF stated that replies had been sought from the State government, however, the response was still awaited.
- **In Punjab, land acquisition cost booked on MoEF account**: ₹ 74.98 crore was spent on land acquisition in Ludhiana, Jalandhar, Phagwara and Phillaur out of which ₹ 2.38 crore incurred on land acquisition up to 31 March 1997 was booked as central share. However, the actual expenditure incurred on land acquisition up to 31 March 1997 was ₹ 1.55 crore only which was to be shared on 50 *per cent* basis i.e. ₹ 0.77 crore was the central share instead of ₹ 2.38 crore. After being pointed out by audit, in June 2011, MoEF stated that Punjab Water Supply and Sewerage Board is being requested to

credit back the amount to NRCD with only ₹ 0.77 crore being eligible as GoI share for land acquisition.

- In **Tamil Nadu**, the cost of land was to be borne by the State government. However, land cost of ₹ 71.44 lakh for pumping stations for Trichy-Srirangam Underground Sewerage System was charged to works expenditure.

  In June 2011, MoEF stated that the State Government had informed that out of ₹ 71.44 lakh charged towards cost of land, a sum of ₹ 58.68 lakh has already been withdrawn and added as share of Government of Tamil Nadu/ Local Body. The balance amount of ₹ 12.76 lakh would also be withdrawn.

- **In Uttarakhand**, Implementing agency (Uttarakhand Peyjal Nigam) had diverted ₹ 146.38 lakh on items of work (viz., excess centage, work charged establishment, contingency, special tools and plant charges, sub pumping stations, Purchase of Pumping and generator set etc.) which had not been included as items of expenditure under the projects approved.

  In June 2011, MoEF stated that the State Government has been communicated to take necessary corrective measures.

7.5.1 (b) Failure to contribute Matching Grants:

As per the funding pattern, Government of India (GOI) was to bear up to 70 *per cent* cost of the project and the rest 30 *per cent* was to be borne by the State Government. During examination following shortcomings were noticed in certain specific projects test-checked under NRCP:

- **In Bihar,** for survey and investigation and preparation of Pre-Feasibility Reports, an amount of ₹10 lakh was sanctioned by NRCD and matching share of ₹ 10 lakh was to be met by the State Government. However, the State government of Bihar did not release the same.
- **In Uttar Pradesh**, under Gomti Action Plan Phase-I NRCD released ₹ 33.36 crore of its share during 2000-2010 whereas the Government of Uttar Pradesh released ₹ 8.29 crore instead of ₹ 14.30 crore, entailing a short release of ₹ 6.01 crore of its matching share.

7.5.1 (c) Unspent balances from projects completed /funds lying idle

As per General Financial Rules as well as sanctions for the projects, any fund left over after implementation of the project had to be refunded to the fund-granting agency, in this case MoEF. Funds were to be kept in interest-bearing accounts of entities implementing projects as per conditions of sanction. However, in the cases discussed below, it was observed that even though the projects were completed, funds lying unutilised with the implementing agency were not refunded to MoEF.

- In **Jharkhand,** Bihar Rajya Jal Parishad transferred (November 2005) unspent balance of ₹ 61.85 lakh to Mineral Area Development Authority (MADA) of Jharkhand for implementation of the project under the Subarnarekha plan. However, this said amount were lying unspent with MADA since October 2005. In June 2011, MoEF stated that MADA is being advised to indicate their plan to utilise this balance funds towards the completion of the balance projects.

- In **Bihar**, ₹ 13.72 lakh was released by NRCD for preparation of DPRs under GAP-II (Supreme Court towns) out of which only ₹ 6.87 lakh was spent and balance ₹ 8.75 lakh (including interest amount of ₹ 1.90 lakh) was kept idle with the Bihar Rajya Jal Parishad (BRJP) since 1996.
- In **Bihar**, Out of ₹199 lakh released by the State Government to Bihar Rajya Jal Parishad (BRJP) for special repairs of assets created under GAP-I, only ₹121.44 lakh was spent during the period 2003-2008. Out of ₹ 14.75 lakh earned as interest, ₹12.96 lakh was transferred to revenue/establishment account of BRJP. The balance amount of ₹ 79.35 lakh was lying idle in savings/FD account with BRJP. This amount could have been utilised after MoEF approval towards the repair of STP, Chapra which was not functioning since 2003 and STPs at Patna (Pahari, Saidpur and Beur) and Bhagalpur which are not operating at full capacity.
- In **Madhya Pradesh**, ₹113.36 lakh was sanctioned for acquisition of land in May 1996 by NRCD which was transferred to Collector of Indore, Madhya Pradesh for construction of STP. However, the land was not acquired and STP was built on Government land at Katib Kheri instead of private land at Shakker Kheri . But the fund was not returned to NRCD and are lying with the Collectors office, Indore since 1996.
- In **Odisha**, the matching share of State Government of ₹ two crore was kept in non-interest bearing Civil Deposit with Treasury since 2002-03. After being pointed in audit, the released amount had now been kept in interest bearing account.
- In **Tamil Nadu,** unspent balance of ₹1.99 crore was lying with Chennai Metropolitan Water Supply and Sewerage Board Tamil Nadu since September 2008. In June 2011, MoEF stated that the implementing agency would be requested to refund the balance amount without awaiting recouping of funds by the Local Body.

7.5.1 (d) Interest income earned but not disclosed in UCs

According to guidelines of NRCP, a separate interest bearing bank account had to be opened to receive the funds from MoEF. Further, the interest so earned should be credited to the project account and reflected in the Utilisation Certificates. However, in the cases discussed below it was observed that the implementing agencies did not report the interest earned to MoEF:

- In **Goa**, Department of Science, Technology and Environment, which also served as an Implementing Agency had earned interest of ₹ 0.81 crore during 2003-2010 but did not report it to the NRCD.
- In **Kerala**, Kerala Water Authority (KWA) received ₹ 2.75 crore from the GOI under Pamba Action Plan, which was deposited in a separate account. The interest accrued was ₹ 17.36 lakh but the same was neither transferred to project account, nor reported to the NRCD. Further, out of this ₹ 8.82 lakh was transferred to NEERI Nagpur for tender evaluation, and the balance amount of ₹ 8.54 lakh was still lying with KWA.
- In **Tamil Nadu**, the implementing agency (Chennai Metro Metropolitan Water Supply and Sewage Board, CMWSSB) of Tamil Nadu did not report to NRCD interest of ₹ 14.76 crore earned out of the Government grant and credited the entire interest in its accounts. In June 2011, MoEF stated that the interest amount was not reflected in the

UCs submitted by the State. This has been taken up with the CMWSSB and the State Government.

- In **Uttar Pradesh**, Uttar Pradesh Jal Nigam had earned interest of ₹ 11.86 crore but the same was neither credited to the project account, nor reflected in the UCs.

7.5.1 (e) Other points of interest

Some other points of interest are discussed below:

- In **Odisha: Meeting extra expenditure from NRCP funds:** As per terms and conditions stipulated in the sanction, extra expenditure incurred on the project was to be borne by the respective State governments. Contrary to the above provision , on construction of STP at Cuttack extra expenditure of ₹ 83.90 lakh incurred on the project was met from NRCP funds (quantity variation ₹ 54.16 lakh and price variation ₹ 29.74 lakh).
- In **Tamil Nadu: Failure to release of GOI funds by Government of Tamil Nadu (GoTN):** NRCD released ₹ 9.35 crore for works of five towns directly to the GoTN up to March 2000. Of this, the GoTN released only ₹ 8.86 crore to the implementing agencies and the balance amount of ₹ 49.60 lakh was lying with GOTN (January 2008). In another case, the share of ₹ 56.91 lakh of GoTN at 50 *per cent* of the expenditure incurred up to March 1997 was also not released by GoTN. Thus a total amount of ₹ 1.07 crore was not released by the GoTN from March 2000.
- **In Uttar Pradesh: Outstanding advance:** Implementing agency of Uttar Pradesh had made an advance payment of ₹ 50 lakh to contractor for construction of MPS in September 2006. Though the sanctioned duration of the project expired in March 2007, it was not adjusted even after a lapse of four years. In June 2011, MOEF stated that the advance has since been adjusted and the MPS has also been commissioned in the year 2010.
- In **Uttar Pradesh**: Gomti Pollution Control Unit, Lucknow under Uttar Pradesh Jal Nigam did not incur any expenditure under Gomti Action Plan Phase I in four years from 2000-01 to 2003-04 while it received ₹ 26.78 crore (₹ 5.18 crore in 2000-01, ₹ five crore in 2001-02, ₹ 13.60 crore in 2002-03 and ₹ three crore in 2003-04). Similarly, no expenditure was incurred by this unit in two years (2003-04 and 2004-05) although it had received ₹ 25.71 crore under Gomti Action Plan Phase II (₹ 18 crore Central share and ₹ 7.71 crore State share).

7.5.1 (f) Cost escalations and overruns which were not to be shared by NRCD

Due to delays, there were cost overruns in 54 projects out of the test checked 140. The project wise details are given in **Annexure 3**. The total cost over run in these projects was ₹ 129.19 crore and in 21 projects, cost over run exceeded more than ₹one crore ranging from ₹1.10 crore to ₹ 34.59 crore.

7.5.2 Utilisation of funds released under NLCP

The State-wise details of project sanctioned, project test checked, funds released and expenditure on projects test checked in respect of NLCP since initiation of NLCP up to March 2010 is given in **Annexure 6.**

The figures pertaining to expenditure on test checked projects reflected in **Annexure 6** have been compiled by Audit from implementing agencies.

Out of ₹883.96 crore of sanctioned projects to 14 States, 58 per cent of total sanctioned projects amounting to ₹513.73 crore were sanctioned to only two States namely Jammu and Kashmir and Rajasthan.

We compiled the expenditure on test checked projects but could not compare the same with project-wise releases as NLCP could not furnish information in respect of funds released for the test checked projects separately in the cases where one implementing agency was implementing more than one project as funds were released to implementing agency for clusters of projects. Thus, the system was not devised to enable tracking of the last Rupee, thereby hampering effective monitoring of utilisation of funds by implementing agency.

Although NLCP compiled information on approved cost of projects and funds released, it did not compile information relating to project-wise expenditure and total expenditure on all projects based on UCs received from States.

Therefore, we could not compare total expenditure on all projects with total release of funds.

We observed that in absence of effective monitoring of use of funds, NRCD also could not verify diversion of funds, inefficient utilisation of funds, failure of States to contribute their matching share, balance lying unspent from completed projects, interest income earned credited to account of implementing agency but not disclosed in UCs for adjustment in further release etc., as in the case of NRCP.

Further, NRCD did not devise any effective system to exercise proper and effective due diligence in function of financial management and also failed in ensuring that all relevant information was furnished by the implementing agency to enable it to exercise adequate and effective control on utilisation of funds.

Out of projects of 58 lakes sanctioned by NLCP, Audit test checked projects of 22 lakes costing ₹692.06 crore across 14 States for detailed scrutiny. **Audit observations relating to test checked projects are given below:**

7.5.2 (a) Diversion of funds

Funds sanctioned by MoEF were to be spent only on items approved in the project. However, in some cases it was observed that the implementing agencies in the States had spent funds on unapproved items of expenditure. Some of the cases are discussed below:

- In **Jammu and Kashmir**, of ₹143.55 crore released, Implementing agency of Jammu & Kashmir diverted funds on un-approved items of work of ₹2.70 crore (operation & maintenance costs, rent, miscellaneous items and wages). MoEF stated that response from the State Government is still awaited.
- In **Karnataka**, the Implementing agency had diverted ₹64.63 lakh on un-approved items of work i.e., chain link fencing, cattle pond, parking lot, bore well, pump etc. In June 2011, MoEF stated that the factual position was being ascertained from the State Government and action shall be taken accordingly.

- In **Rajasthan**, the Implementing Agency diverted ₹17.15 lakh to meet expenditure on un-approved items of work (construction of Pucca wall at Nag Pahar). In June 2011, MoEF stated that since this was not as per approved scope of work, the State Government has been asked not to book the expenditure of this component under NLCP project.
- In **Uttarakhand**, Implementing agency of Uttarakhand diverted ₹5.83 crore towards construction of new bridge-cum-bypass and solid waste management (₹ five crore) and (₹83.16 lakh) on four unapproved items:
  - repairs and renovation of Nainital Lake through Public Works Department (PWD);
  - repairs, renovation and railing work of Nainital-Almora B-2 road through PWD;
  - installation of closed-circuit TV cameras in and around Nainital Lake and
  - construction of small parking areas, boundary wall and motor road in Commissioners office through Kumaon Mandal Vidyut Nigam.

In June 2011, MoEF stated that it has been reported by the State Government that diversion of funds has been carried out keeping in mind the prevailing scenario of lake conservation only, and after the prior approval of the State level Project Monitoring Committee (PMC). It also stated that the State Government has been requested to explain the detailed reasons for funds diversion and take corrective measures accordingly and that it would be ensured that excess cost, if any, incurred on the project will be borne by the State Government.

7.5.2 (b) Failure of State Governments to contribute proportionate share

The funding pattern of NLCP was changed from February 2002 and NRCD was to bear up to 70 *per cent* cost of the project and the rest 30 *per cent* was to be borne by the State Government. Examination of projects revealed that NRCD released instalments to State Government without ensuring that State Governments also released their share simultaneously. As a result, in seven lakes out of the 22 test checked in audit, we observed that the State Governments did not release their matching share of ₹ 7.77 crore as depicted in table below:

Table 20

(₹in crore)

Name of the State	Name of the Project/ Lake	Funds released by NRCD	Funds released by State		
			Amount due	Amount released	Pending amount
Karnataka	Bellandur	2.63	1.13	1.10	0.03 (S)
Andhra Pradesh	Banjara	0.80	0.34	0.00	0.34 (P)
Tamil Nadu	Kodaikanal	2.00	0.86	0.00	0.86 (P)
Kerala	Veli Akkulam	4.30	1.84	0.00	1.84 (NS)
West Bengal	Mirik	1.00	0.43	0.00	0.43 (P)
Odisha	Bindusagar	2.21	0.95	0.00	0.95 (P)
Madhya Pradesh	Shivpuri	7.75	3.32	0.00	3.32 (P)
Total		**20.69**	**8.87**	**1.10**	**7.77**

[Note: Status of the project is indicated as (S)=Suspended; (P)=Pending; (NS)=Not started]

7.5.2 (c) Unspent balances of completed projects/funds lying idle

As per General Financial Rules as well as sanctions for the projects, any funds left over after implementation of the project has to be refunded to the fund-granting agency, in this case MoEF. However, in the cases discussed below, it was observed that even though the projects were completed, funds lying unutilised with the implementing agency were not refunded to MoEF.

- In **Jammu and Kashmir**, J&K Lakes and Waterways Development Authority (LAWDA) had paid interest free mobilization advance of ₹ 34.64 crore to M/s Thermax for construction of STPs due to which it suffered a loss of interest of ₹ 47.96 lakh (calculated on simple interest @6 *per cent* annum).
- In **Karnataka**, Unspent balance of ₹1.81 crore (₹1.25 crore Central share and ₹ 0.56 crore of State share) was lying with the Implementing agency Lake Development Authority, Bangalore (since January 2005) which was released for restoration and conservation of Bellandur Lake.
- In **Kerala**, it was observed that ₹4.30 crore released to Kerala Sustainable Urban Development Project was deposited in the Special Treasury saving Bank Account and subsequently transferred to Sub Treasury at Vellayambalam. This fund was lying with government treasury account and no interest was realised on this amount from May 2006 to May 2009. The implementing agency suffered loss of interest of ₹1.34 crore up to December 2010 by not investing the same in the interest bearing account with accredited banks. In June 2011, MoEF stated that despite repeated requests, MoEF was not informed of the physical and financial progress of the project by the State Government and the State Government had since been requested to refund the funds released along with the interest accrued so far.
- In **Maharashtra**, in the case of Powai lakes, unspent balance of ₹93.84 lakh was lying with Municipal Corporation of Greater Mumbai (MCGM), Maharashtra since April 2006. In June 2011, MoEF stated that factual position was being ascertained from the State Government and action shall be taken accordingly.
- In **Andhra Pradesh** in the case of Banjara Lake, an amount of ₹80 lakh was released to Andhra Pradesh Tourism Development Corporation, Hyderabad (APTDC) in April 2005. Later, the execution of the project was transferred to Hyderabad Metropolitan Water Supply and Sewerage Board (HMWS&SB). APTDC was supposed to transfer unspent balance of ₹ 62.40 lakhs to HMWS&SB. However, APTDC had transferred only ₹ 31.20 lakh to HMWS&SB and remaining amount of ₹31.20 lakh was still lying with it.
- In **Madhya Pradesh** ₹ 6 crore was released to Municipal Corporation, Shivpuri in October 2007 for implementation of the project for Shivpuri lake. An expenditure of ₹ 25.45 lakh was incurred on tendering and advertising, subsequently the work was transferred to Public Health Engineering Division (PHED), in September 2009. However, the balance fund were lying the Municipal Corporation, Shivpuri and was yet to be transferred to PHED.
- In **Rajasthan**, ₹2.91 crore was transferred to Forest Department for afforestation work in catchment area of Pichola lake. The Forest Department utilised only ₹ 99.53 lakh and the remaining amount of ₹1.92 crore was lying idle with the Forest Department.

7.5.2 (d) Interest income earned but not disclosed in UCs

In all cases of funds being received under NLCP, a separate interest-bearing bank account had to be opened to receive the funds from MoEF. Further, the interest so earned should be credited to the project account and reflected in the Utilisation Certificates. However, in the cases discussed below it was observed that the implementing agencies did not report the interest earned to MoEF:

- In **Madhya Pradesh**, Municipal Corporation, Shivpuri, kept ₹5.90 crore in short-term deposits for different periods and earned interest of more than ₹57.18 lakh. However, the same was not reported to MoEF.

MoEF stated in its reply in June 2011 that efforts would be made to ensure compliance of terms and conditions of sanctions. Action would be taken for refund to MoEF by the implementing agencies of unspent balances, if any, after completion of projects. MoEF also stated that several new measures had been initiated for effective utilisation of funds and improved implementation of project. These include

- Public consultation in project formulation and implementation,
- Signing of tripartite MoAs with States and urban local bodies,
- Appraisal of projects by independent institutions,
- Third Party Inspection to review and monitor performance of the projects funded under NRCP & NGRBA on the basis of detailed on-site review, examination of documents through the entire lifecycle stages of the projects namely pre-construction, construction, commissioning & trial run and post-construction.

As regards improving monitoring for effective utilisation of funds, MoEF stated that it has taken up a project for online reporting and monitoring system for monitoring of NRCP and NLCP programmes which is likely to be operational shortly.

Conclusion

Utilisation of funds

Funds available for control and prevention of water pollution and restoration of wholesomeness of water were not adequate for the country as a whole. There were instances of poor financial management like diversion of funds, non-disclosure of accrued interest, funds not utilised for implementation, funds parked in bank accounts, unspent balances not refunded etc., in the implementation of the projects. The quality of utilisation certificates was poor.

Further, due to tardy implementation, the government had to spend more funds on these projects than originally sanctioned. As such, MoEF needs to exercise greater oversight over utilisation of funds to ensure that funds are spent timely and for the purpose it was sanctioned.

Recommendation 26

There is a need to augment financial resources either by improving effectiveness in realization of cess, increasing the rate of Water Cess or exploring other sources of revenue for control of water pollution.

Recommendation 27

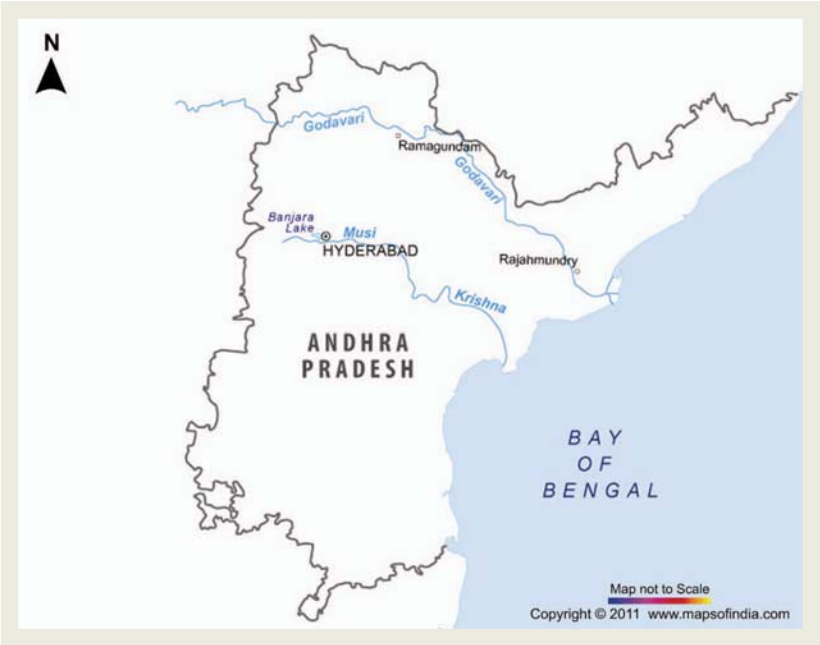
There is a need to strengthen the monitoring system of utilisation of funds. MoEF needs to exercise greater oversight over utilisation of funds to ensure that funds are spent timely and for the purpose for which they were sanctioned. MoEF need to place specific thrust on diversion of funds through improving the system of utilisation certificates in its oversight function.

Chapter: 8
State Specific Findings

State: Andhra Pradesh

1. Background

The major two rivers of Andhra Pradesh are Krishna and Godavari stretching thousands of square kilometres of land and creating largest perennial cultivated area in the country. Musi river is a tributary of Krishna and it flows through a major portion of Hyderabad. Some of the lakes in Andhra Pradesh are: Kolleru lake, Hussainsagar Lake, Banjara lake Palair lake, Shamirpet lake, Durgam Cheruvu etc. According to Central Ground Water Board (CGWB), annual replenishable ground water resource in Andhra Pradesh is 36.50 Billion Cubic meters (BCM) while the net annual ground water availability is 32.95 BCM. Out of 1125 mandals, ground water in 219 mandals is over-exploited, 77 mandals is critical and in 175 mandals, it is semi-critical. Ground water in Andhra Pradesh is contaminated by salinity, fluoride, chloride, iron and nitrate.



Rivers and lakes test checked in Andhra Pradesh

Insitutional arrangements in the State: As per information provided by MoEF, Municipal Administration and Urban Development, Government of Andhra Pradesh is the nodal department for NRCP and the implementing agencies are Public Health Engineering Department (PHED) and Hyderabad Metropolitan Water Supply & Sewerage Board (HMWS&SB). Andhra Pradesh Tourism Development Corporation (APTDC), Hyderabad is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Andhra Pradesh is discussed below:

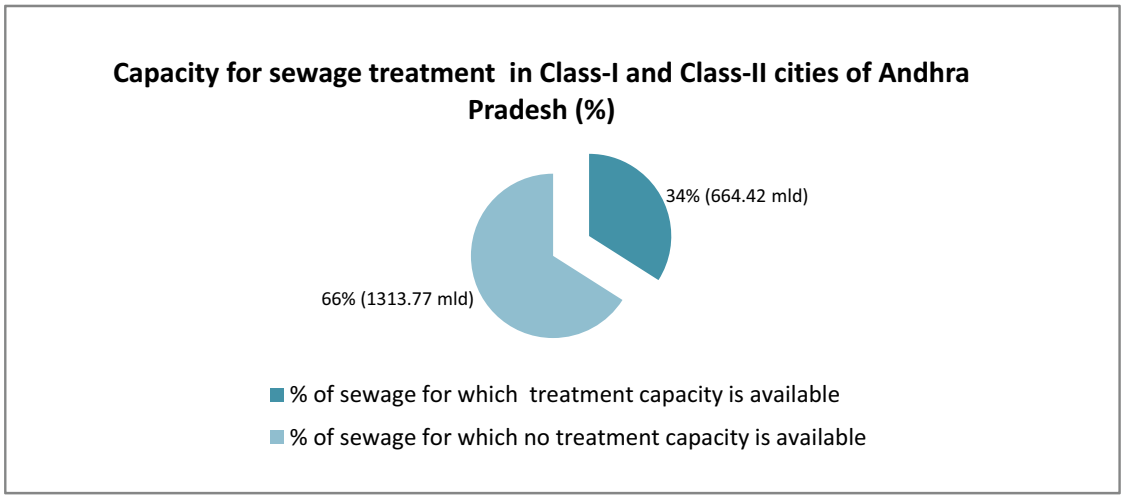
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Done	Could not be verified	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Not Done	Done (arsenic, nitrate, iron, fluoride and salinity)

	b) According to Biodiversity indicators	Done	Done	Not applicable
	c) Quantification of contaminants	Done	Done	Could not be verified
	d) Assessment of impact of human activities	Partially (Agriculture: Done, Industry: Done, Mining: could not be verified, Dam: Done, Uncontrolled disposal of human waste: Could not be verified)	Partially (Agriculture: Done, Industry: Done, Uncontrolled disposal of human waste: could not be verified)	Partially (Agriculture: Done, Industry: Done, Mining: could not be verified)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable
	b) Risks to aquatic species	Could not be verified	Could not be verified	Not applicable
	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Could not be verified	Could not be verified	Could not be verified
5. Programmes for prevention and control of water pollution		Partially (Source water protection: could not be verified, Industry: Done, Agriculture non point sources: Done)	Could not be verified	Done
6. Constitution of Water Quality Review Committee		could not be verified		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Andhra Pradesh



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Andhra Pradesh is 1978.19, out of which treatment capacity is available for only 664.42 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Godavari and Musi rivers had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects are being implemented in five cities[11] on river Godavari and in Hyderabad on river Musi. 25 projects[12] in these five towns were sanctioned under NRCP and sanctioned cost of all the projects was ₹367.51 crore. Expenditure of ₹ 342.48 crore was incurred under NRCP as of March 2010.

6 projects[13] being implemented under NRCP at a cost of ₹ 351.54 crore were test checked for detailed examination. **Results of audit examination are discussed below:**

(i) Physical and financial progress

Name of the river/ location	Name of the project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Godavari at Ramagundam	STP Zone I	0.36	0.16	June 2004	June 2008
	I&D	2.62	1.50	September 2004	Work stopped due to objections raised for safety of coal mines in April 2006
	STP Zone II	1.19	0.82	December 2003	January 2005
	STP WSP 14	0.79	0.45	October 2004	Work stopped due to objections raised for safety of coal mines in April 2006
Godavari at Rajamundry	STP	10.92	10.48	September 2004	March 2010
Musi at Hyderabad	4 STPs, 16 I&Ds and 10 Sewer lines	335.66[14]	281.50	August 2008	For STPs: February 2009, November 2009, June 2009 and one still ongoing For 16 I&Ds and 10 Sewer lines: four delayed

(ii) Performance of projects

(a) Ramagundam

The average sewage generated in the city of Ramagundam is 15 mld. However, only 4.5 mld is treated and the rest 10.5 mld is discharged into the Godavari. Details of four projects test checked in Ramagundam which aim to improve the quality of water in Godavari are discussed below:

Project	Findings
STP	• This project scheduled for completion by June 2004 was completed in

[11] viz. Bhadrachalam, Mancherial, Rajamundry,Hyderabad and Ramagundam
[12] The project on Musi River consist of 30 sub-projects (4 STPs, 16 I&Ds and 10 Sewer lines)
[13] Five projects on Godavari river and one project (consisting of 30 sub-projects) on Musi river
[14] Including land acquisition at a cost of ₹ 37.03 crore

Zone 1	June 2008 after a delay of four years. No information was available regarding submission of completion report and final utilisation certificate to MoEF. • Separate information was not available with the State regarding actual funds spent on the project. • This project was delayed due to water logging conditions, shortage of labour and land acquisition issues. • Though STP capacity was four mld, only one mld was being treated and the rest three mld was flowing into Godavari. No information was available whether the treated sewage met the standards for pH, Total Suspended solids (TSS), Oil & Grease, BOD and COD. The pump sets were not working which hampered the operation of the STP. After its completion, it was not assessed whether the STP was meeting the performance criteria set for it. **As such, it is evident that the STP was not fulfilling the purpose for which it was constructed.**
STP Zone 2	• The project was completed in January 2005 after a delay of one year and one month. The completion certificate was submitted to MoEF in December 2005 but final Utilisation Certificates have not yet been submitted. • This project was delayed due to problems in acquisition of land. • Though the STP was constructed to treat 14 mld of sewage, it was treating only 3.5 mld and the rest 10.5 mld was flowing untreated into the Godavari. No separate information was available whether the treated sewage met the pH, Total Suspended Solids (TSS), Oil & Grease, BOD and COD standards. Pump sets were not working which hampered the operation of the STP. **As such, it is evident that the STP was not fulfilling the purpose for which it was constructed.**
I&D	• Though the project was originally to be completed by December 2000 , it was extended upto September 2004. • The work was stopped in April 2006 due to objection raised for safety for coal mines by authorities of Singareni Collieries Company Limited. • In Zone-I the pumps were not in running condition and in Zone-II, the pumps were found missing and the pump house was not put to use.The State government had not taken any action to rectify the problem. • 1443 RMT of pipes were to be laid under the project, however, only 888 RMT were laid as yet. **As such, the project failed to fulfill the purpose for which it was constructed.**
STP WSP 14	The project was abandoned due to objection raised for safety of coal mines by the authorities of Singareni Collieries Company Limited in April 2006.

(b) Rajamundry

The daily average sewage generated in the city of Rajamundry is 30 mld and the entire 30 mld is treated. Details of project test checked in Rajamundry city which aim to improve the quality of water in Godavari are discussed below:

Project	Findings
STP	• The project scheduled for completion by September 2004 was completed in March 2010 after a delay of five and a half years. No information was available regarding submission of completion report and final UCs to MoEF, even though the project was completed. • The delay was due to submerging of site, unavoidable climatic conditions like heavy rains, scarcity of skilled labour for this type of specialized work etc. • It was proposed to generate biogas from the STP, however, this was not done due to non-connection of household sewage to the STP through the underground drainage network.

(c) Hyderabad

The average daily sewage generated in Hyderabad city is 950 mld, however, treatment capacity exists only for 541 mld but only 407 mld of sewage is treated. As a result, 543 mld of sewage daily flows into Musi river. 23 drains from Hyderabad city open into the Musi but only 17 have been intercepted and six drains were yet to be intercepted. Under NRCP, projects consisting of construction of four STPs, 16 I&Ds & 10 sewer lines were sanctioned in April 2004 at an estimated cost of ₹ 335.66[15] crore. Some of the projects test checked in Hyderabad which aimed at improving the quality of water of Musi River are discussed below:

Project name	Findings
STP, Nagole	• The project scheduled for completion by August 2008 was finally completed in November 2009 after a delay of one year & three months. • Against the original cost of ₹ 47.64 crore, expenditure of ₹ 59.47 crore was incurred on the project. The cost of the project also escalated by 11.83 crore due to increase in quantities of mechanical, electrical, safety and civil works. • The project was delayed due to delay in procurement of bio-gas set with improved designs and specifications from Austria. • The constructed STP with a capacity of 172 mld was treating only 150 mld due to the daily generation of sewage being less than capacity created. 114 mld of untreated sewage from Murki Nala, which was supposed to be diverted to STP Nagole was being let out into Musi River without treatment. Consent was taken from SPCB for construction and operation and it was regularly being inspected by it.
STP, Nallacheruvu	• The project was completed in February 2009 after a delay of six months. • Against the original cost of ₹ 11.33 crore, expenditure of ₹ 15.77 crore was incurred on the project. The cost of the project escalated by ₹ 4.44 crore due to revision of rates.

[15] Includes cost of land acquisition

	• The project was delayed due to delay in preparation of structural drawings, increase in quantities and supplementary items of work, delay in handing over of site etc. • The STP capacity created was 30 mld but the STP was treating only 14 mld due to less receipt of sewage.
STP, Amberpet	• This was completed in June 2009 after a delay of 10 months. Against the original cost of ₹ 93.51 crore, expenditure of ₹ 112.94 crore was incurred on the project. The cost of the project escalated by ₹ 19.43 crore due to reasons like providing power distribution scheme, laying of power cables, construction of administrative building, painting for gas dome etc. • The project was delayed due to problems in land acquisition, increase in quantum of work, hard rock excavation in lagoon, heavy seepage and heavy rains etc. • Though the capacity of the STP was to treat 339 mld of sewage, it was treating only 241 mld and 178 mld was being discharged into Musi. This was due to non-completion of I&D project at Surplus nala.
STP, Attapur	• This project was envisaged to be completed in August 2008 but is still not complete. • Against the original cost of ₹ 23.55 crore, expenditure of ₹ 4.50 crore was incurred on the project. • The project was delayed due to land acquisition issues and non-availability of approach road to STP site • Because of non-completion of STP, three I&D structures were not being put to use and 82.7 mld of untreated sewage was being discharged into Musi river daily.
I&D, Surplus Nala	• This was scheduled to be completed in August 2008 but is still not complete. • Total expenditure of ₹ 2.10 crore was incurred on the project. • The project was delayed due to objection from grass growers at the site, heavy seepage and hard rock, frequent rains and reformation of coffer dam which collapsed due to abnormal flood along the length of nala. • Due to delay in its construction, STP Amberpet was affected and 178 mld of sewage was being discharged into Musi without treatment due to non-completion of I&D.
I&D, Murkinala near Chaderghat Bridge	• This I&D work to divert sewage to STP Nagole for treatment was completed in February 2008. • An expenditure of ₹0.86 crore was incurred on th project. • The I&D work was not put to use due to laying of pipe lines under another work under JNNURM programme. As a result, 114 mld of untreated sewage was being let into river Musi, rendering the entire expenditure of ₹0.86 crore unfruitful, besides polluting Musi river.

I&D,Bahadurpura and Mughal ka nala	• Bahadurpura nala and Mughal ka nala were completed in July 2008. • An expenditure of ₹ 0.61 crore and ₹ 0.35 crore was incurred. • Pumping stations, each having capacity of 40 mld and 30 mld created under the project were not being utilized due to non completion of STP at Attapur.

Thus, projects sanctioned to control pollution of Godavari and Musi rivers had not adequately achieved their objectives.

Blocked I&D at Murinala in Hyderabad

Blocked I&D works at Afzal Sagar I&D in Hyderabad, Andhra Pradesh

4.2 NLCP

One project being implemented under NLCP at a cost of ₹ 4.30 crore was test checked for detailed examination.

(i) Physical and financial progress

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Banjara lake	2.76, revised to 4.30	0.18	August 2006 revised to May 2010	On-going

The project is discussed below:

Project name	Findings
Banjara Lake in Hyderabad	• The work on the project involved activities like construction of STP, lake rejuvenation, lake front development, establishment of compost plant/ laboratory and diversion of storm water drain. • The project was to be completed by August 2006 which was revised to May 2010. However, it was still ongoing. • The sanctioned cost of the project was₹ 2.76 crore which was revised in May 2009 by NRCD to ₹ 4.30 crore. Against release of ₹ 80 lakh, expenditure of ₹ 17.61 lakh was incurred on the project and balance of ₹ 62.39 lakh was lying unspent. • The project was not completed due to dispute over the proposed site for sewage treatment plant which was an essential component of the project. The STP was also not completed. • Andhra Pradesh Tourism Development Corporation (APTDC), Hyderabad was the implementing agency for the project. The work was transferred to the Hyderabad Metropolitan Water Supply and Sewerage Board (HMWS&SB), Hyderabad during March 2010 for execution. An amount of ₹ 31.20 lakh was remitted by APTDC to HMWS&SB, Hyderabad in August 2010 and a balance of ₹ 31.20 lakh (along with interest) was still lying with APTDC. The actual execution of project has commenced from August 2010 by HMWS&SB. **Thus, the work of conserving the Banjara lake was incomplete even after extension of period by four years and seven months.**

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
1 out of 6 projects	1 out of 6 projects	0 out of 6 projects	0 out of 6 projects

5.2 NLCP

By inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
0 out of 1 project	0 out of 1 project	0 out of 1 project	0 out of 1 project

5.3 Ground water (in test checked six blocks)

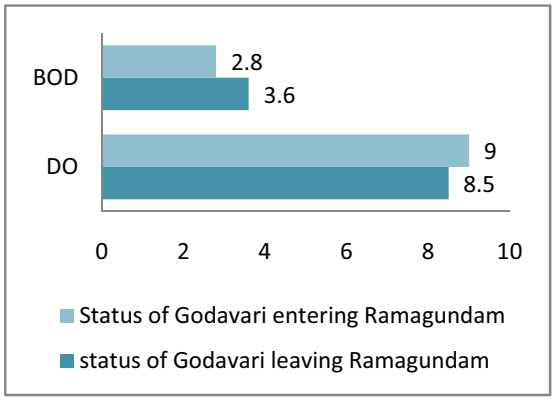
Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes	Yes

6. Outcomes

6.1 NRCP

(a) Water quality of Godavari after Ramagundam

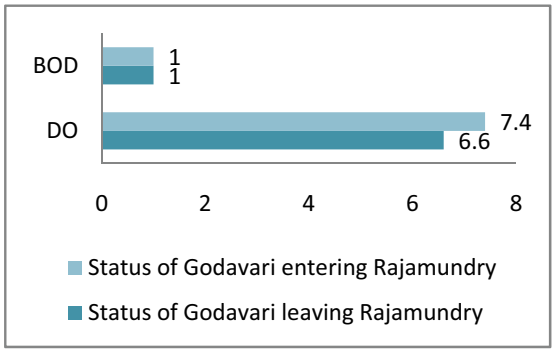
Status of Godavari on entering and leaving Ramagundam in terms of DO and BOD is shown in the chart alongside. It can be seen that BOD actually rises after Godavari leaves Ramagundam, highlighting the inadequate sewage treatment facilities.



BOD is on the slightly higher side but TC is more than 3.2 times the criteria indicating the water of Godavari after leaving Ramagundam city is contaminated by harmful, fecal-related bacteria, viruses and protozoa which cause illness

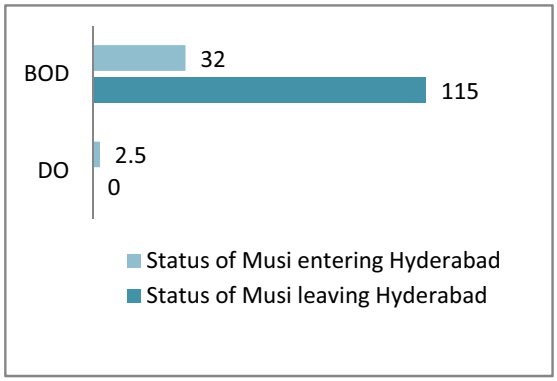
(b) Water quality of Godavari after Rajamundry

Status of Godavari entering and leaving Rajamundry in terms of DO and BOD is shown in the chart opposite.



(c) Water quality of Musi after Hyderabad

Status of Musi entering and leaving Hyderabad in terms of levels of BOD and COD is shown in the chart opposite. Further, levels of Fecal Coliform increase in Musi after Hyderabad; indicating contamination of the water by fecal matter. Further, the Dissolved Oxygen of Musi river falls to 0 after it leaves Hyderabad, indicting the inability of Musi to support any aquatic life. BOD was more than 38 times the criteria, indicating high levels of organic pollution of Musi river after it leaves Hyderabad.



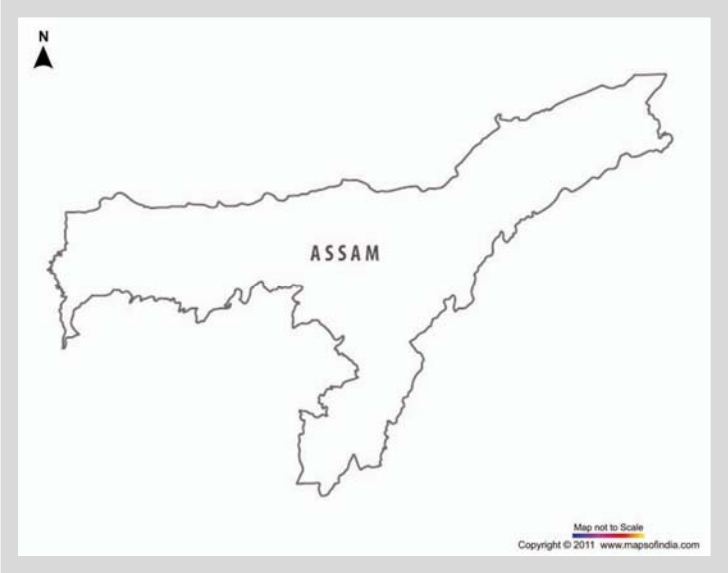
6.2 NLCP

As the project on improving water quality of Banjara lake is still in progress, no conclusions could be drawn about impact of NLCP in restoring the lake.

State: Assam

1. Background

Some of the important rivers of Assam are Brahmaputra, Burhidihing, Dhansiri, Dihing, Manas etc. Some of the lakes in Assam are Deepor Beel, Sareswar beel, Morikolang beel, Maguri beel, Diplai beel, Hakma beel, Sivasagar and Joy Sagar etc. According to central Ground Water Board, the annual replenishable ground water resource in the State is 27.23 BCM and net annual ground water availability is 24.89 BCM. Out of 23 districts in the State, none of them are over-exploited, critical or semi-critical with regard to ground water. Contaminants like fluoride, iron and arsenic affect parts of some districts in Assam.



No river and lake under NLCP and NRCP selected

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Assam is discussed below:

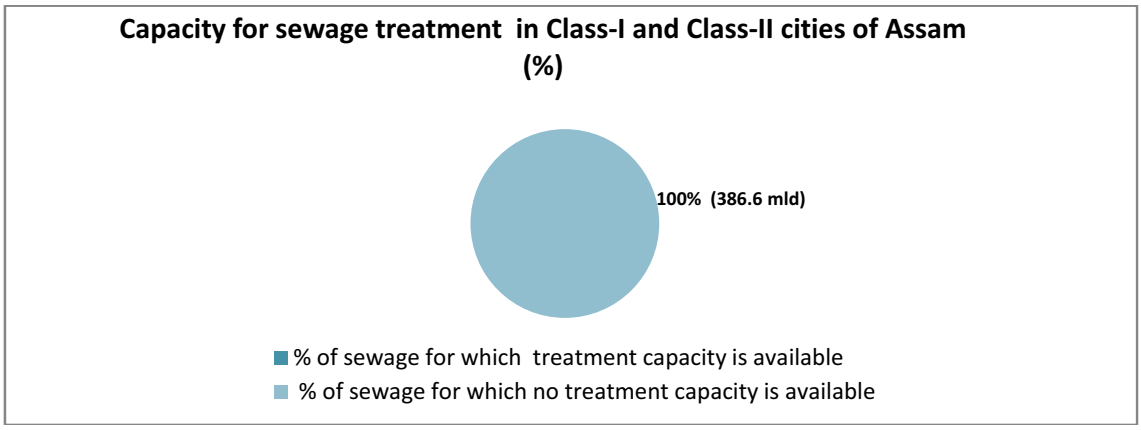
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Not Done	Not Done	Not Done
2. Assessment of water quality	**a) According to chemical Indicators**	Could not be verified	Could not be verified	Could not be verified
	b) According to Biodiversity indicators	Not Done	Could not be verified	Not applicable
	c) Quantification of contaminants	Could not be verified	Could not be verified	Could not be verified
	d) Assessment of impact of human activities	Partially (Agriculture: Done, Industry: Done, Mining: Could not be verified, Dam: Not Done, Uncontrolled disposal of human waste: Not Done)	Could not be verified	Partially (Agriculture: Not Done, Industry: Done, Mining: Not Done)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Could not be verified	Not applicable
	c) Risks to human health	Not Done	Could not be verified	Done
4. Policy for water pollution		Not Done	Not Done	Not Done

5. Programmes for prevention and control of water pollution	Partially (Source water protection: Not Done, Industry: Done, Agriculture non point sources: Not Done)	Could not be verified	Partially (Industry: Done, Agriculture non point sources: Not Done)
6. Constitution of Water Quality Review Committee	Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Assam



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Assam is 386.60 mld, for which no treatment capacity is available.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Even though two rivers in Assam, Bharalu and Kalong figured in the list of most polluted rivers in India, these rivers were not selected under NRCP.

4.2 NLCP

Lakes like Dhir beel, Dighali beel and Sareswar beel were identified by NRCD in its list of polluted lakes. Further, the State in addition to the above-mentioned lakes, had also identified lakes like Morikolang beel, Maguri beel, Diplai beel, Hakma beel, Sivasagar and Joy Sagar as polluted. However, none of these lakes were included for restoration and conservation under NLCP.

5. Monitoring of programmes for control of water pollution

5.1 Ground water (in test checked six blocks)

System for monitoring	Whether monitoring done	Whether laboratories established	Whether Field Testing Kits issued
System existed in four blocks	Partially (taking place in four blocks, not being done in one block,could not be verified in one block)	Partially (established in five out of six blocks and for one block, no information was available)	Partially (made available to all the panchayats in four blocks, sufficient FTKs were not supplied in one block and no information was made available in one block.)

State: Bihar

1. Background

Ganga is the main river of Bihar. Some other rivers are Saryu (Ghaghra), Gandak, Budhi Gandak, Bagmati, Kamla-Balan, Mahananda, Sone, Uttari Koyal, Punpun, Panchane and Karmnasha. Some of the lakes in Bihar are Kanwar lake, Upper lake and Lower lake, Muchilinda Lake, Sagar Pokhar, Harahi Pond, Kabar Tal etc. According to CGWB, the annual replenishable ground water resource in Bihar is 29.19 BCM and the Net Annual ground water availability is 27.42 BCM. In none of the blocks in Bihar is the ground water over-exploited, critical or semi-critical.

Rivers test checked in Bihar

Insitutional arrangements in the State: As per information provided by MoEF, Department of Urban Development, Government of Bihar is the nodal department and the implementing agency is Bihar Rajya Jal Parishad (BRJB), Bihar for NRCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Bihar is discussed below:

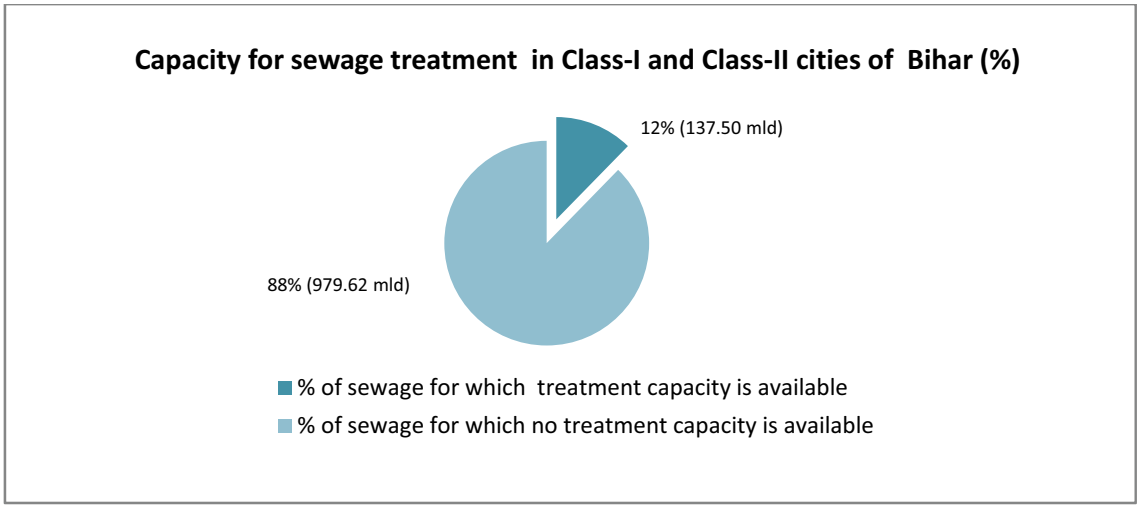
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Could not be verified	Could not be verified	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Could not be verified	Done
	b) According to Biodiversity indicators	Done (for two rivers)	Could not be verified	Not applicable
	c) Quantification of contaminants	Partially (Nutrients: Could not be verified, Pathogenic organism: Done, Human produced chemicals: Done)	Could not be verified	Could not be verified

	d) Assessment of impact of human activities	Could not be verified	Could not be verified	Could not be verified
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Could not be verified	Not applicable
	c) Risks to human health	Not Done	Could not be verified	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Could not be verified	Could not be verified	Could not be verified
6. Constitution of Water Quality Review Committee		Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Bihar



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Bihar is 1117.12 mld, of which treatment capacity is available for only 137.50 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

(a) Planning for NRCP

Ganga river had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects were being implemented in 14 cities[16]. 18

[16] viz. Arrah, Barahaya, Barh, Bhagalpur, Begusarai, Buxar, Chapra, Fatwah, Hazipur, Kahelgaon, Mokamah, Munger, Patna and Sultanganj.

projects in these 14 cities were sanctioned under NRCP. The total sanctioned cost of all the projects was ₹ 3.95 crore.

Six projects[17] being implemented under NRCP at a cost of ₹ 2.17 crore were test checked for detailed examination.

(i) Physical and financial progress

Name of the river/location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Ganga at Barahaya	LCS Barahaya	0.10	0.10	August 1997 revised to February 2003	December 2002
	RFD Barahaya	0.30	0.28	August 1997 revised to February 2003	February 2003
Ganga at Patna	RFD, Patna	0.75	0.65	September 1996 revised to February 2003	April 2003
	RFD Danapur	0.30	0.29	December 2002	May 2007
	RFD Gulbi Ghat, Patna	0.19	0.15	December 2002	Yet to be completed
	Diesel crematoria, Danapur	0.53	0	September2003	Yet to commence

(ii) Performance of the projects

(a) Barahaya

The average sewage generated in the city of Barahaya is 4.5 mld, none of which is treated. However no amount is discharged into the Ganga river, since Ganga river has moved away from the city and as reported the city has around 25 drains which fall in a ditch away from the city. Details of two projects test checked in Barahaya which aim to improve the quality of Ganga's water quality are discussed below:

Project	Findings
LCS	• The project was to be completed in August 1997 but the date was revised to February 2003.The project was actually completed in December 2002. The final UC was submitted to MoEF in April 2008. • The total number of LCS units set up was three units of five seats each and all were found to be functioning. • In contravention to NRCD guidelines, LCSs were constructed in Government high schools and in certain colony instead of at the banks of River Ganga. The responsibility for O&M of each asset created under NRCP was allocated by the State to Nagar Punchayat, Barahaya and it carried out regular operation and maintenance. There was no information on the assessment of the completed projects by the State on basis of set targets/ performance milestones.
RFD	• Originally sanctioned date of completion of the project was August 1997 which was revised to February 2003.The project was actually completed in February 2003 .

[17] Two projects in Barahaya and four projects in Patna.

	• Under the project two ghats were constructed (Vijaygarh ghat and Sojikipari ghat). But both the ghats are not existing as the course of Ganga has shifted from the purported sites and both the ghats were completely destroyed and non existing due to erosion.

(b) Patna

The daily average sewage generated in the city of Patna is 236 mld and the total sewage treated is 68.67 mld. The amount of untreated sewage discharged into the river Ganga is 167.33 mld. Total numbers of drains falling into the river were 29 while a total of three drains intercepted. Details of four projects test checked in Patna which aim to improve the quality of Ganga's water are discussed below:

Project name	Findings
RFD,Patna	• The originally sanctioned date of completion of the project was September 1996 but the same was revised to February 2003 and was actually completed in April 2003. • 7 ghats were created under the project but River Ganga had shifted from Kurjee Ghat, Rajendra Ghat and Indira Ghat and these ghats are defunct. The Collectorate Ghat and Narkat Ghat, where Ganga is still flowing, are not maintained and, thus, in deplorable condition. Mahavir ghat, which was constructed under this project was destroyed and is being redeveloped under another scheme. • The reasons given for lack of proper maintenance of the assets created were that Patna Municipal Corporation was not maintaining these ghats, there was encroachment of river banks and the River Ganga has shifted.
RFD,Danapur	• The originally sanctioned date of completion of the project was December 2002 and it was actually completed in May 2007 but the completion report was not sent to NRCD. • The project was delayed due to delay in publishing NIT and awarding contract and delay in release of fund for electrification. • The river front is not being maintained properly and it was not handed over to Danapur Cantonment Board (local body). • RFD is now completely defunct, the changing room was in a dire state, staircases have been buried under thick layer of sand/mud and the electric poles have been uprooted and electric lamps are broken.
RFD, Gulbi Ghat	• The sanctioned date of completion of the project was December 2002. However, the project was incomplete. • The reasons for the delay in completion were delay in publishing NIT and award of contract, non- inclusion of approach road in the original DPR and the revised cost estimate not being sent to NRCD.
Diesel Crematoria	• The originally sanctioned date of completion was September 2003 but the project has not yet been undertaken due to indecision of the State and NRCD whether to install diesel crematoria or electric crematoria.

Incomplete RFD at Gulbi ghat, Patna

LCS at Barahaya

4.2 NLCP

There was no lake in Bihar in the list of polluted lakes as issued by the MoEF, but there were three lakes listed as polluted by the State government which was sent to MoEF. These were Motijheel at Motihari, Baraila chaur at Vaishali and Manjheel at Muzaffarpur. However, none of these lakes were selected for conservation and restoration under NLCP.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
5 out of 6 projects	0 out of 6 projects	0 out of 6 projects	0 out of 6 projects

5.2 Ground water (in test checked six blocks)

Six blocks were chosen for assessment of monitoring network with respect to ground water. These were: Simri (arsenic affected), Katoria (fluoride affected), Barauni (industrial cluster), Mushahari (industrial cluster), Maner (randomly selected) and Biraul (randomly selected).

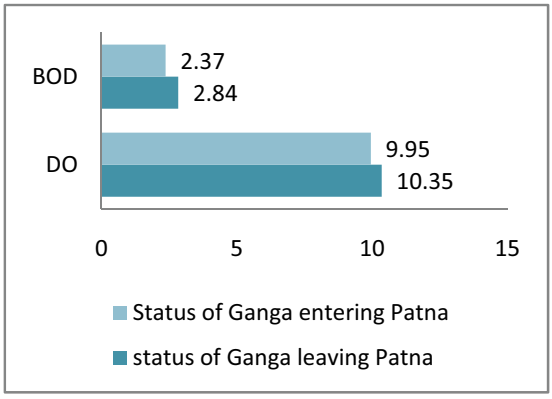
Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes, Qualified staff was appointed in these laboratories except in Katoria block.	Yes, made available to all the panchayats in the block/district by the State government except for Katoria and Mushahari block but these were not utilised by the panchayats.

6. Outcomes

6.1 NRCP

(a) Water quality of Ganga after Patna:

Dissolved oxygen (DO), Bio chemical Oxygen demand (BOD) measured in the river at the time of its entering the city and its leaving the city is shown in the graph alongside. Total Coliform was 34 times the criteria in Ganga after it leaves Patna, indicating the presence of disease causing, fecal-related bacteria, viruses and protozoa which cause illness.



State: Chhattisgarh

1. Background

Mahanadi and Narmada are the principal rivers of Chhattisgarh. Other rivers of the State are Godavari, Brahmani, Sheonath, Indravati etc. Some of the lakes in Chhattisgarh are Vivekananda lake (Burra Talao), Khamhardih lake, Telibandha pond, Maharajabandh pond, Tikarapara pond, etc. According to Central Ground Water Board, annual replenishable ground water resource in Chhattisgarh is 14.93 BCM while the net annual ground water availability is 13.68 BCM. Out of 146 blocks in Chhattisgarh, ground water is not over-exploited or critical in any of the blocks, while in eight blocks it is semi-critical. Ground water in Chhattisgarh is contaminated by fluoride, iron, arsenic and nitrate.

No river or lake selected under NRCP and NLCP in Chhattisgarh

Institutional arrangements in the state: No river/lake has been selected for restoration under NRCP/NLCP in the state.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Chhattisgarh is discussed below:

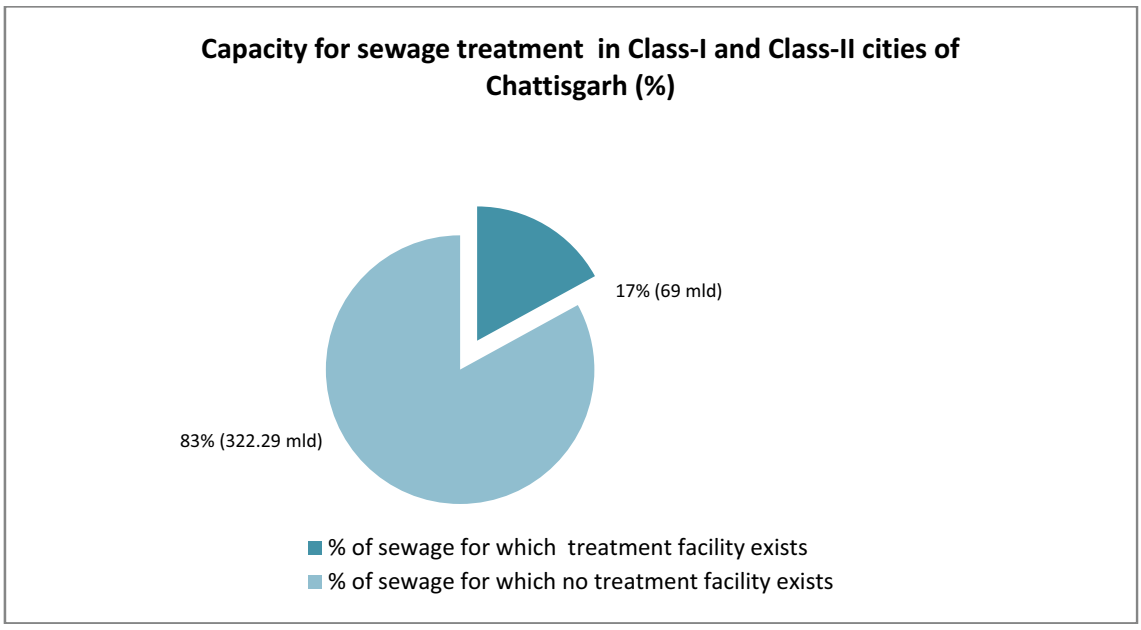
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Not Done	Not Done	Not Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Not Done	Not Done except for nitrate
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Not Done	Not Done	Could not be verified
	d) Assessment of impact of human activities	Could not be verified	Could not be verified	Could not be verified
3. Identification of risks to	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable

environment and health	**b) Risks to aquatic species**	Could not be verified	Could not be verified	Not applicable
	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Could not be verified, Industry: Could not be verified, Agriculture non point sources: Could not be verified)	Could not be verified	Partially (Industry: Not Done, Agriculture non point sources: Could not be verified)
6. Constitution of Water Quality Review Committee		Not Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Chattisgarh



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Chattisgarh is 391.29 mld, of which treatment capacity is available for only 69 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

No rivers were included under NRCP.

4.2 NLCP

Vivekananda lake (Burra Talao) was identified by NRCD in its list of polluted lakes. Further, in addition the State government had also identified four other lakes as polluted. These were Khamardih lake, Telibandha pond, Maharajabandh pond, and Tikarapara pond. However, none of these lakes were included for restoration and conservation under NLCP.

5. Monitoring of programmes for control of water pollution

5.1 Ground water (in test checked six blocks)

Six blocks were chosen for assessment of monitoring network with respect to ground water. These were: Bastar, Chowki (fluoride/arsenic affected) Kartala, Baikunthpur, Bagicha (randomly selected) and Korba (selection from industrial cluster). Out of these six blocks, Korba ranks 5th in most polluted in the list of industrial clusters[18] which are severely affected by pollution.

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes	Yes

[18] According to CPCB

State: Delhi

1. Background

Delhi is situated on the western banks of river Yamuna. The other major sources of water include the Agra Canal, Hindu Canal and the Western Canal. Some of the lakes in Delhi are Bhalswa lake, Purana Qila lake, Roshnara Garden tank etc. According to Central Ground Water Board (CGWB), the annual replenishable ground water resource in Delhi is 0.30 Billion Cubic Meters (BCM) while the net annual ground water availability is 0.28 BCM. Out of 9 districts in Delhi, ground water is over-exploited in 7 blocks. Some of the contaminants that affect ground water in Delhi are salinity, fluoride, chloride and nitrate.

Test checked river in Delhi

Insitutional arrangements in the State: As per information provided by MoEF, the nodal agency was Government of NCT, Delhi and the implementing agencies for NRCP were Delhi Jal Board and Municipal Corporation of Delhi.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Delhi is discussed below:

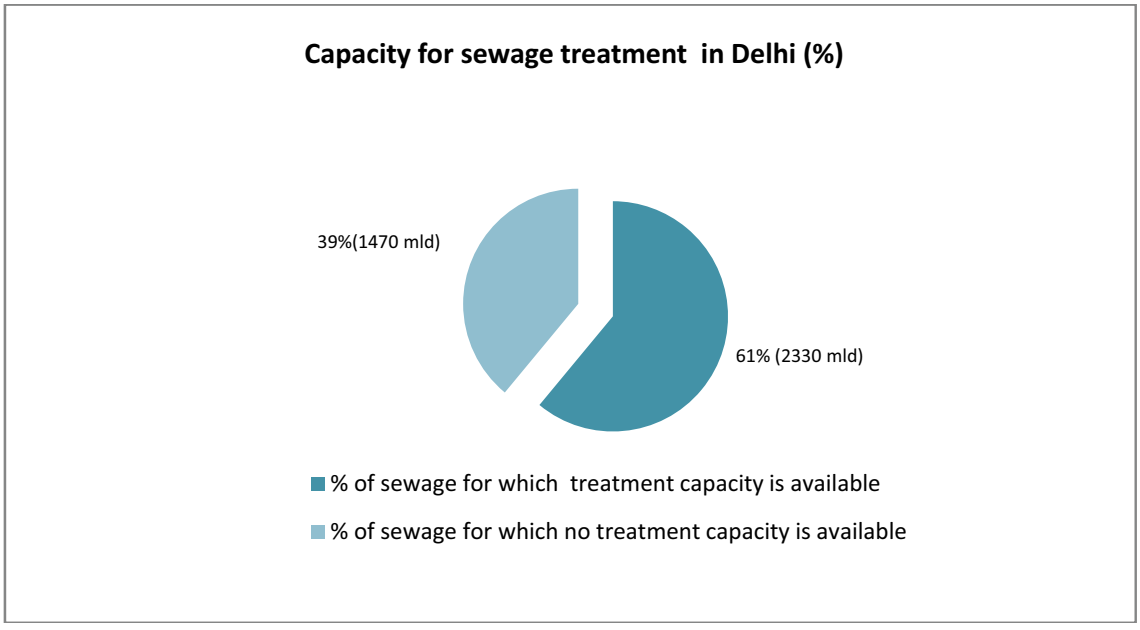
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Not Done	Not Done	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Not Done	Done
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Not Done	Not Done	Could not be verified.
	d) Assessment of impact of human activities	Partially (Agriculture: Not Done, Industry: Done, Mining: Not Done, Dam:	Not Done	Partially (Agriculture: Not Done,

		Not Done, Uncontrolled disposal of human waste: Not Done)		Industry: Done, Mining: Not Done)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Not Done, Industry: Done, Agriculture non point sources: Not Done)	Not Done	Partially (Industry: Done, Agriculture non point sources: Not Done)
6. Constitution of Water Quality Review Committee		Not Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Delhi



[Source: CPCB data, 2005-06]

The total sewage generated in Delhi is 3800 mld, of which treatment capacity is available for only 2330 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Yamuna River had been selected for pollution abatement projects under the National River Conservation Programme **(NRCP)**. 23 projects in Delhi were sanctioned under NRCP out of which 12 were completed as of March 2010. The total sanctioned cost of all the projects was ₹ 650 crore. 10 projects being implemented under NRCP at a cost of ₹ 89.77 crore were test checked for detailed examination.

(i) Physical and financial progress

Name of the river/location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Yamuna/ Delhi	STP Sen Nursing Home	6.21	5.39	December 1996	September 2001
	STP Delhi Gate Nala	7.57	6.31	December 1996	January 2002
	Electric Crematoria	1.45 revised to 1.78	1.78	March 2002	June 2002
	STP 3 mld FAB technology	1.78	1.83	March 2002	December 2002
	STP 3 mld SAFF technology	1.86	1.93	March 2002	December 2002
	STP 2 mld SAFF technology	1.47	1.28	March 2002	March 2003
	LCS	1.49	1.65	March 2002	February 2003
	2 mld disinfection plant at Sen Nursing Home	0.42	0.45	February 2002	March 2002
	Public Participation and Awareness	2.16	1.26	March 2002	ongoing
	STP 135 mld	65.03	79.54	June 2010	On going

(ii) Performance of the projects

Details of ten projects test checked in Delhi which aim to improve the quality of water in the Yamuna are discussed below:

Project name	Findings
10 mld STP at Sen Nursing Home	• The project was scheduled for completion by December 1996 but it was actually completed in September 2001 after a delay of more than four years and nine months. • The project was delayed due to non-approval of layout plan & hydraulic flow design, shortage of cement at central cement stores, heavy rains etc. • The capacity of created STP was 10 mld where as the total sewage generated was around 60-70 mld.This indicated that rest of 50-60 mld untreated sewage was being discharged into the river.

STP, Delhi Gate Nala	• The STP was required to be completed by December 1996 but it was completed in January 2002 after a delay of more than five years. • The project was delayed due to non-availability of site, delay in approval of lay out plan, monsoon period and non-availability of cement at Central Cement Stores. • The capacity of created STP was 10 mld where as the total sewage generated was around 40-50 mld. This indicated that rest of 30-40 untreated sewage was falling into the river.
Electric Crematoria	• Though, the construction of Electric Crematoria was to be completed by March 2002 but it was actually completed by June 2002. • There was a cost overrun of ₹ 0.33 crore for which reasons could not be ascertained. • The constructed crematorium was handed over in June 2006 to Arya Samaj, Lodhi Road for operation and maintenance.
STP 3 mld FAB technology	• The STP was required to be completed by March 2002 but it was completed in December 2002 after a delay of nine months. • The project was delayed due to non getting of approval of plot plan and single line diagram, space constraint and blockage of approach road etc. • Against three mld created capacity, present utilisation of STP was around only one mld (as of November 2010) and daily sewage generation was 1.6 mld. This indicated that 0.6 mld of untreated sewage was falling into Yamuna
STP 3 mld SAFF technology	• The project was scheduled for completion by March 2002 but it was actually completed in December 2002 after a delay of nine months. • The project was delayed due to delay in clearance of site, non-approval of plot plan, delay in conducting reliability test due to insufficient & non-consistent sewage etc. • The STP treated only one mld against the designed capacity of three mld.
STP 2 mld SAFF technology	• The project was scheduled for completion by March 2002 but it was actually completed in March 2003 after a delay of 12 months. • The project was delayed due to delay in handing over of site, revision in hydraulic and structural design and additional work etc. • The plant had been shut down since 2007 and all the sewage (2 mld) was being discharged into the Yamuna through a drain/nallah without treatment.
LCS	• The project was to be completed in March 2002 but it was actually completed in February 2003 after a delay of eleven months.

	• 959 Low Cost Sanitation units were constructed under the project against the target of 1146. Out of these, only 49 *per cent* were functioning and the rest were non-functional. 60 LCS Units were encroached, 223 were lying abandoned and 33 were completely demolished. A proposal for utilizing the space where LCS Units were demolished was being considered by MCD.
2 mld Disinfection Plant at Sen Nursing Home	• The original sanctioned date of completion of the project was February 2002 but it was finally completed in March 2002. • The STP capacity created under the project was two mld but the plant is lying non functional at present.
Public Participation and Awareness	• Asian Center for Organization Research and Development (ACORD) was appointed as apex NGO for implementation of the public participation programme. No agreement was signed between MCD and ACORD for implementation of the project. MCD had not settled the accounts of ACORD due to certain discrepancies found in the utilization certificate furnished by ACORD. • The completion certificate, final utilization certificate furnished to MoEF and date on which completed were also not found.
STP 135 mld	• The project was sanctioned in June 2006 at a cost of ₹ 65.03 crore. The sanctioned date for completion of project was June 2010 but it has still not been completed. • An expenditure of ₹ 79.54 crore was incurred on the project as on March 2011, thereby cost overrun of ₹ 14.51 crore took place.
Thus, all of the projects for control of pollution of Yamuna river test checked by audit did not achieve the objectives of pollution control of Yamuna.	

10 mld STP at Delhi Gate nallah (Untreated sewage passing into yamuna)

10 mld STP at sen Nursing Home (untreated sewage flowing to yamuna)

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
No details of monitoring of the projects sanctioned under NRCP for control of pollution of Yamuna river was available for all the 10 projects.			

5.2 NLCP

No lakes from Delhi had been included for restoration and conservation under NLCP.

5.3 Ground water (in test checked six blocks)

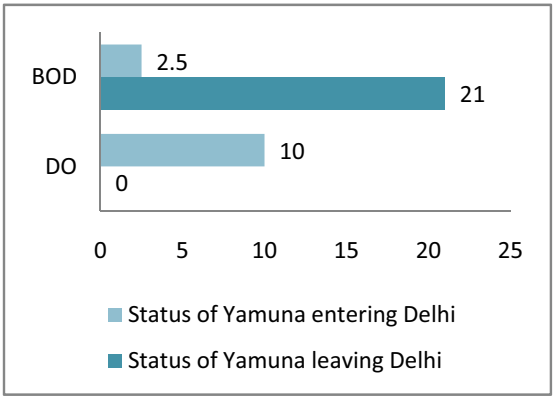
6 blocks were chosen for assessment of monitoring network with respect to ground water. These were: Gandhinagar, Model Town, Anand Parvat, Wazirpur, Defence Colony and Rajouri Garden. Anand Parvat and Wazirpur lie in the Nazafgarh drain basin which is ranked 11th in CPCB's list of crirtically polluted areas.

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Could not be verified	Could not be verified	No	No

6. Outcomes

6.1 NRCP

Status of Yamuna on entering Delhi and after leaving Delhi in terms of levels of DO and BOD is shown in the chart alongside. It can be seen that levels of BOD actually rises after Yamuna leaves Delhi highlighting the inadequate sewage treatment facilities. Further, the Dissolved Oxygen in Yamuna falls to zero after it leaves Delhi, pointing to inability of Yamuna to sustain aquatic life. As such, Yamuna is dead by the time it leaves Delhi. Levels of Total Coliform are not being measured.



State: Goa

1. Background

The major rivers of Goa are Terekhol, Chapora, Baga, Mandovi, Zuari, Sal, Saleri, Talpona, Galgibag. Some of the lakes in Goa are Mayem Lake, Carambolin Lake, Curtorim lake etc. According to Central Ground Water Board (CGWB), the annual replenishable ground water resource in Goa is 0.28 BCM and the net annual ground water availability is 0.27 BCM.

Insitutional arrangements in the State: As per information provided by MoEF, implementing agency for NRCP was Department of Science, Technology and Environment, Government of Goa.

Test checked river in Goa

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Goa is discussed below:

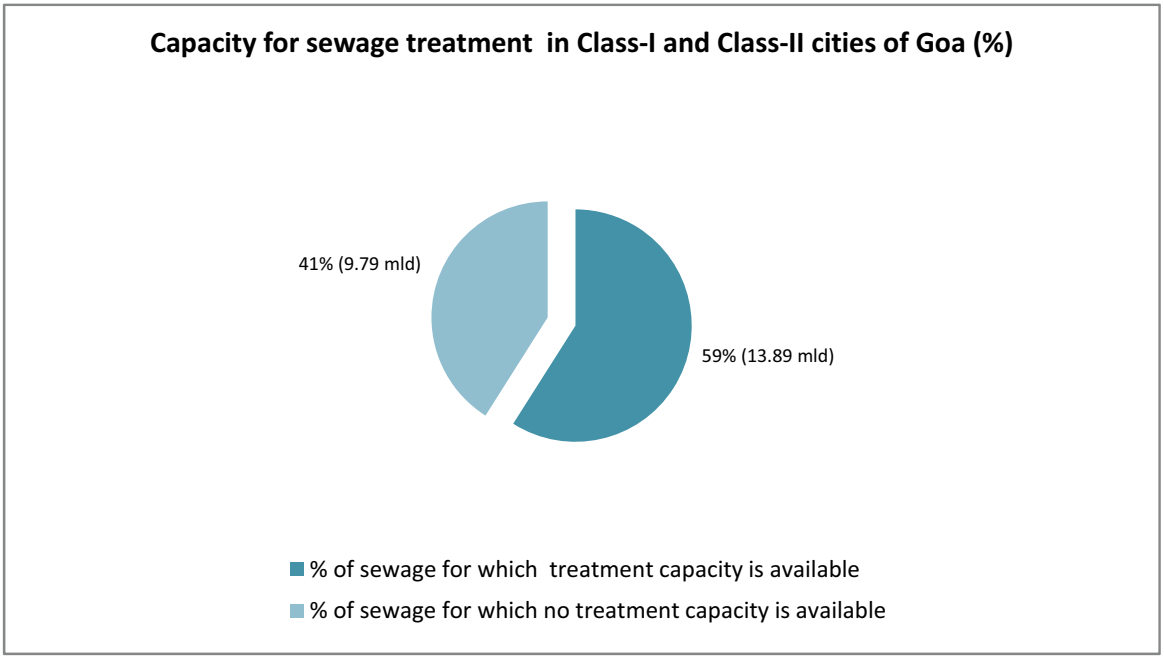
		Rivers	Lakes	Ground water
1. Inventory of water resources		Done	Could not be verified	Could not be verified
2. Assessment of water quality	**a) Chemical Indicators**	Done	Not Done	Done (arsenic, nitrate, iron, fluoride and salinity)
	b) Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Partially (done for nutrients, acidification and temperature)	Not Done	Partially (nutrients, salinity and acidification)
	d) Assessment of Impact of human activities	Partially (done for Agriculture, mining)	Not Done	Partially (Agriculture: Done, Industrial activities: Done)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c) Risks to human health	Done	Done	No information
4. Policy for water pollution		Not Done	Not Done	Not Done

5. Programmes for prevention and control of water pollution	Partially (done only for agriculture)	Partially (done only for agriculture)	No information
6. Constitution of Water Quality Review Committee	Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Goa



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Goa is 23.68 mld, of which treatment capacity is not available for 9.79 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Mandovi river had been selected for pollution abatement projects under the National River Conservation Programme (NRCP) in only one city, Panaji. Five projects were sanctioned under NRCP at a cost of ₹ 14.10 crore. Four projects being implemented under NRCP at a cost of ₹ 14.07 crore (excluding land acquisition at a cost of ₹ three lakh) were test checked for detailed examination.

(i) Physical and financial progress

Name of the river/location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Mandovi/Panaji	I & D	14.10*	14.47*	July 2004	May 2005, except sewer line of 162 m which was completed in April 2009
	STP 12.50 mld				
	STP renovation and re-modeling				No information was available.
	LCS				Construction of five seater community toilets costing (₹ 3.50 lakh was not taken up as the land for this was not available and the said amount was not refunded to MoEF

* Consolidated figure for the Scheme of Environmental Upgradation Phase-I of Panaji City

(ii) Performance of the projects

The average sewage generated in the city of Panaji is 11.5 mld (actual of 2006-07) and it is entirely treated. Details of the projects test checked in Panaji which aim to improve the water quality of Mandovi river are discussed below:

Project	Findings
I&D	• The original sanctioned date for completion of the project was July 2004 but it was completed in May 2005, except sewer line of 162 meters which was completed in April 2009. • The delay was due to late issue of work order. • The number of pumping stations constructed/ commissioned was one with capacity of 0.5 mld and it was entirely utilized.
STP 12.50 mld	• The originally sanctioned date of completion of the project was July 2004 and the actual date of completion of the project was May 2005, except sewer line of 162 meters which was completed in April 2009. • The delay was due to late issue of work order. • No untreated sewage was being discharged into Mandovi.
STP renovation and re-modeling	Details of performance of project were not available.
LCS	Construction of five seater community toilets costing 3.50 lakh was not taken up as the land for this was not available and the said amount was not refunded to MoEF

4.2 NLCP

No lake in Goa has been funded under NLCP.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
In 1 out of 4 projects	0 out of 4 projects	0 out of 4 projects	0 out of 4 projects

5.2 Ground water (in test checked three Blocks)

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
No	Yes	No	Yes

6. Outcomes

6.1 NRCP

Water quality of Mandovi after Panaji

No information was available regarding levels of Dissolved Oxygen and Biochemical Oxygen Demand on Mandovi before it entered and left Panaji.

State: Gujarat

1. Background

The major rivers of central and northern Gujarat include Narmada, Sabarmati, and Mahi. Rivers flowing through the Saurashtra region are Mithi, Khari, Bhadar, Shetrunji and Bhogavo. Rivers in the southern part of the State include Narmada, Tapi, Purna, Ambika, Auranga and Damanganga. Some of the lakes in Gujarat are Kankaria, Vastrapur Lake, Chandola Lake, Gaurishankar Lake, etc. According to Central Ground Water Board, annual replenishable ground water resource in Gujarat is 15.81 BCM while the net annual ground water availability is 15.02 BCM. Out of 184 talukas, ground water in 31 talukas is over-exploited, in 12 talukas it is critical and in 69 talukas, it is semi-critical. Ground water in Gujarat is contaminated by salinity, fluoride, chloride, iron and nitrate.

Test checked river in Gujarat

Insitutional arrangements in the State: As per information provided by MoEF, Urban Development and Urban Housing Department, Government of Gujarat is the nodal department for NRCP and the implementing agency is Ahmedabad Municipal Corporation.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Gujarat is discussed below:

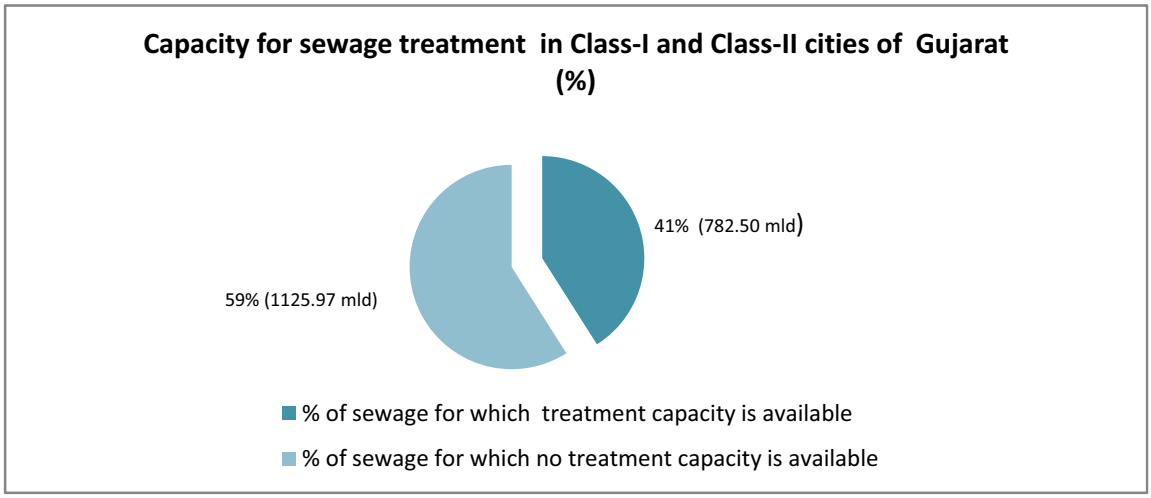
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Done	Could not be verified	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Could not be verified	Done
	b) According to Biodiversity indicators	Not done	Not done	Not applicable
	c) Quantification of contaminants	Partially	Partially (Nutrients: could not be verified, Pathogenic organism: Done, Human produced	Could not be verified

			chemicals: Not Done)	
	d) Assessment of impact of human activities	Partially (Agriculture: Not Done, Industry: Done, Mining: Not Done, Dam: Not Done, Uncontrolled disposal of human waste: Not Done)	Partially (Agriculture: Not Done, Industry: Done, Uncontrolled disposal of human waste: Not Done)	Partially (Agriculture: Not Done, Industry: Done, Uncontrolled disposal of human waste Not Done)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable
	b) Risks to aquatic species	Not done	Not applicable	Not applicable
	c) Risks to human health	Not done	Not done	Not done
4. Policy for water pollution		Not done	Not done	Not done
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Not verifiable, Industry: Could not be verified, Agriculture non point sources: Not done)	Partially (Source water protection: Not Done Industry: Could not be verified, Agriculture non point sources: Not Done)	Partially (Industry: Could not be verified, Agriculture non point sources: Not Done)
6. Constitution of Water Quality Review Committee		Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Gujarat



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Gujarat is 1908.47 mld, of which treatment capacity is available for only 782.50 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Only Sabarmati river in Gujarat had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). 13 Projects were being implemented in one city i.e., Ahmedabad and the total sanctioned cost of these projects was ₹ 101.96 crore. **Nine projects costing ₹ 96.15 crore were test checked out of 13 completed projects for audit scrutiny.**

(i) Physical and financial progress

Name of the river/ location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Sabarmati, Ahmedabad	STP at Pirana	31.22	28.14	January 2003	October 2003
	STP at Vasna	34.75	31.59	November 2003	December 2004
	LCS	1.06	0.73	September 2000	September 2001
	Renovation of sewage pumping station Zone-1 &3	3.11	2.48	December 1999	Project completed but date of completion was not available
	Renovation of sewage pumping station Zone 2	4.01	2.04	December 1999	Project completed but date of completion was not available
	I&D De-silting of sewer	1.01	0.94	June 2001	Project completed but date of completion was not available
	I&D WTS Zone V Part I	1.68	1.85	October 1997	May 1998
	I&D ETS Zone IV Part I	6.40	6.30	December 1998	Project completed but date of completion was not available
	Western Trunk Sewer Zone 5 Part II	12.91	14.82	May 2001	May 2003

(ii) Performance of the projects

Ahmedabad

The average daily sewage generated in the city is 650 mld and the entire 650 mld of sewage is treated as the government has built capacity to treat 730 mld of sewage. As such, no

sewage flows directly into the Sabarmati from the city right now. **Details of some of the projects test checked in Ahmedabad city which aim to improve the quality of water in Sabarmati are discussed below:**

Project name	Findings
STP at Pirana & STP at Vasna	• These were completed in October 2003 and December 2004 respectively after a delay of nine months and one year and one month respectively. No information was available regarding submission of completion report of the project by State government to NRCD. • The installed capacity of STP at Pirana was 106 mld and that of STP at Vasna was 126 mld, both of which were being fully utilized. Regular inspections were being carried out by Gujarat Pollution Control Board and O&M of these STPs were entrusted to Ahmedabad Municipal Corporation (AMC) and preventive maintenance and cleaning was taking place of the STP.
LCS	• This was completed in September 2001 after a delay of a year. No information was available when the completion report for the project was sent by the State government to NRCD. • The project was delayed due to encroachment of site and threat by local residents. 34 LCS units were constructed under the project but only 28 were in use. The remaining six required repairing due to age of construction and tender for the same had already been invited.
Renovation of Sewage Pumping Stations Zone 1&3 and Zone 2	• These were completed but the date of completion was not available. These were working as envisaged. No information was available when the completion report for the project was sent by the State government to NRCD. • Under the project, renovation of three sewage pumping stations and seven pumping stations respectively was envisaged. However, no information was found to indicate the created capacity.
I&D De-silting of sewer, I&D WTS Zone V Part I, I&D ETS Zone IV Part I, Western Trunk Sewer Zone 5 Part II	• All these four projects were completed. However, completion date for I&D De-silting of sewer and I&D ETS Zone IV Part I were not available. • I&D WTS Zone V Part I and Western Trunk Sewer Zone 5 Part II were completed in May 1998 and May 2003 respectively after a delay of seven months and two years respectively. • All these projects were performing as envisaged.

4.2 NLCP

No lake in Gujarat has been funded under NLCP

5. Monitoring of the programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
9 out of 9 projects	0 out of 9 projects	0 out of 9 projects	0 out of 9 projects

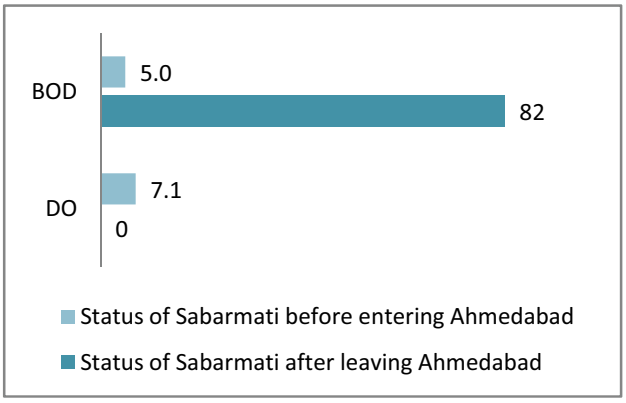
5.2 Ground water (in test checked six Blocks)

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes	Yes

6. Outcomes

6.1 NRCP

Status of Sabarmati on entering Ahmedabad and after leaving Ahmedabad in terms of DO and BOD is shown in the chart alongside. The levels of TC rise from 93 when Sabarmati enters Ahmedabad but rises alarmingly to 15,000 when Sabarmati leaves Ahmedabad showing that harmful germs like viruses, bacteria and parasites might also be found out in the water.



State: Haryana

1. Background

The main rivers that flow through the State are river Yamuna and river Ghaggar. Some of the major lakes in Haryana are Sukhna Lake, Badhkal Lake, Damdama Lake etc. According to Central Ground Water Board (CGWB), the annual replenishable ground water resources in the State are 9.31 Billion Cubic Meters (BCM), while the net annual ground water availability is 8.63 BCM. Out of 108 blocks in Haryana, 55 blocks are over-exploited, 11 blocks are critical and five blocks are semi-critical with regard to ground water development and management. Further, according to CGWB, ground water is contaminated by pollutants like fluoride, chloride, iron, nitrate and salinity.

Test checked rIver in Haryana

Insitutional arrangements in the State: As per information provided by MoEF, Public Health Engineering Department (PHED), Government of Haryana is the nodal department as well as the implementing agency for NRCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Haryana is discussed below:

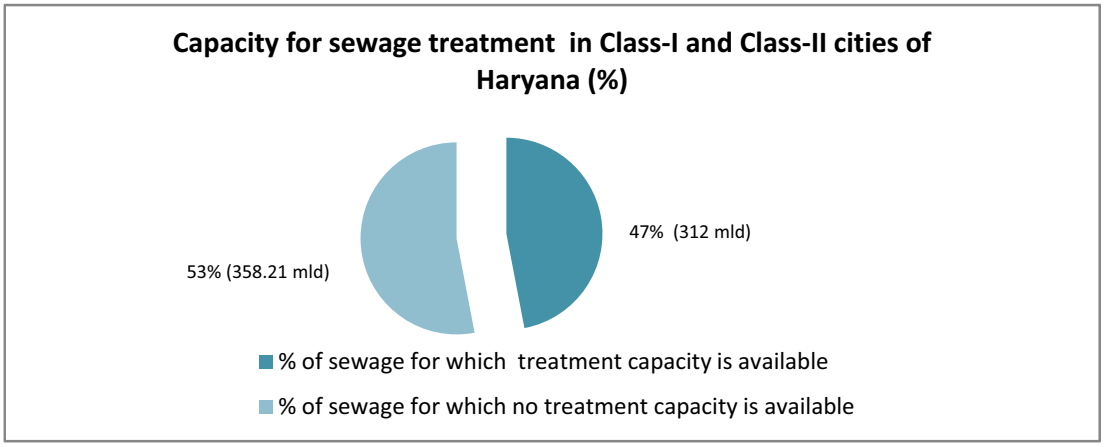
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Not Done	Could not be verifid	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Partially	Could not be verified	Done (arsenic, nitrate, iron, fluoride and salinity)
	b) According to Biodiversity indicators	Could not be verified	Could not be verified	Not applicable
	c) Quantification of contaminants	Could not be verified	Could not be verified	Could not be verified
	d) Assessment of impact of human	Partially (Agriculture: Could not be verified,	Could not be verified	Partially (Agriculture:

	activities	Industry: Done, Mining: Could not be verified, Dam: Could not be verified, Uncontrolled disposal of human waste: Could not be verified)		Done, Industry: Done, Mining: Could not be verified, Uncontrolled disposal of human waste: Done)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable
	b) Risks to aquatic species	Could not be verified	Not applicable	Not applicable
	c) Risks to human health	Done	Done	Could not be verified
4. Policy for water pollution		Could not be verified	Could not be verified	Could not be verified
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Could not be verified, Industry: Done, Agriculture non point sources: Could not be verified)	Could not be verified	Partially (Industry: Done, Agriculture non point sources Could not be verified)
6. Constitution of Water Quality Review Committee		Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Gujarat



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Haryana is 670.21 mld, of which treatment capacity is available for only 312 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

In Haryana, Yamuna, the main river, had been selected for pollution abatement under the national River Conservation Programme (NRCP). Projects are being implemented in 12 towns[19] situated on the banks of river Yamuna. 127 projects in these 12 towns were sanctioned under NRCP and total sanctioned cost of all the projects was ₹ 305.63 crore.

10 projects being implemented under NRCP in the towns of Panipat and Faridabad were test checked for detailed examination. The total sanctioned cost of these projects was ₹ 24.73 crore.

(i) Physical and financial progress

Name of the river/ location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Yamuna at Faridabad	Pilot Plant at 20 mld STP Zone I	1.04	1.04	March 2002	Commissioned in March, 2002 and stabilized In March 2003.
	LCS	2.75	2.73	February 2002	November 2002
	I&D	2.76	2.76	December 2001	March 2002
	Sewer Lines Phase— II/Stage II	8.33	9.29	April, 2009	March 2009
	Public Participation and Awareness	4.10	3.56	May 2010	July 2010
Yamuna at Panipat	LCS	0.28	0.28	December 2001	March 2002
	I&D	1.43	1.44	March 2002	March 2002
	Drying Beds	0.25	0.25	December 2001	February 2002
	Sewer Lines Phase II/Stage II	1.97	1.77	February 2009	March, 2009
	Additional Sewerage Works	1.82	1.77	February 2008	March, 2009

Details of towns test checked under NRCP are discussed below:

(a) Faridabad:

Daily average sewage generated in Faridabad was 200 mld. Currently, only 115 mld capacity to treat sewage is available. The sewage actually treated is 104 mld and balance 96 mld of untreated sewage is discharged into Yamuna.

[19] Chhachhrauli, Faridabad, Gharaunda, Gohana, Gurgaon, Indri, Karnal, Palwal, Panipat, Radaur, Sonepat and Yamunanagar-Jagdri

Details of some of the projects test checked in Faridabad town are discussed below:

Project	Findings
Pilot Plant at 20 mld STP Zone I	• It was scheduled to be completed in March 2002 and commissioned in March 2002. However, it could be stabilized only in March 2003. No information was made available regarding submission of Utilisation Certificates to MoEF. • Even though the STP was to treat 20 mld of sewage, it was treating only 14 mld and the rest six mld was flowing into the river. No information was available regarding the treated sewage meeting the prescribed standards in relation to pH, Total Suspended Solids (TSS), Oil & Grease, BOD and COD.
LCS	• The LCS which consisted of 23 units started functioning in November 2002 instead of scheduled month of February 2002 after a delay of nine months. • The project was not assessed after completion and operation and maintenance of the LCS was transferred to M/s Sulabh International, a private body.

(b) Panipat:

Daily average sewage generated in Panipat is 90 mld. Currently, only 45 mld capacity to treat sewage is available and 45 mld of untreated sewage is discharged into Yamuna.

Details of some of the projects test checked in Panipat are discussed below:

Project name	Findings
I&D project at Panipat	• It was completed in March 2002. • Its cost escalated from ₹ 1.43 crore to ₹1.44 crore due to increase in length of sewer lines, increase in scope of work and increase in rates above ceiling rates. • No information was available regarding its linking to some pumping station.
LCS	• This was completed in March 2002 after a delay of three months due to shortage of material. • Three LCS units were constructed and were transferred to a private agency, M/s Sulabh international. PHED stated that they had no information whether it was functioning at present.

4.2 NLCP

No lake in Haryana was included for conservation and restoration under NLCP.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
No information for all 10 projects	No information for all 10 projects	No information for all 10 projects	No information for all 10 projects

5.2 Ground water (in test checked six Blocks)

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes (2 blocks)	Yes (4 blocks)

6. Outcomes

6.1 NRCP

(a) Water quality of Yamuna after Faridabad

Status of water quality of Yamuna entering Faridabad and after leaving Faridabad town in terms of Biochemical Oxygen Demand, Dissolved oxygen and Total Coliform were not made available to audit.

(b) Water quality of Yamuna after Panipat

No information was made available by the State government regarding status of water quality of Yamuna entering Panipat and after leaving Panipat town in terms of Biochemical Oxygen Demand, Dissolved oxygen and Total Coliform to audit.

State: Himachal Pradesh

1. Background

Some of the major rivers in Himachal Pradesh are Sutlej, Beas, Ravi, Parbati, Sukhna etc and some of the major lakes are Renuka, Rewalsar, Khajjiar, Dal, Dashir, Brighu, Prashar, Kareri, Gobind Sagar, Nako etc. The annual replenishable ground water resource in Himachal Pradesh is 0.43 BCM while the net annual ground water availability is 0.39 BCM. According to CGWB, in none of the 69 blocks is the ground water over-exploited, critical or semi-critical and the quality of ground water is generally good.

No river or lake selected under NLCP and NRCP in Himachal Pradesh

Institutional arrangements in the state: No river/lake has been selected for restoration under NRCP/NLCP in the state.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Himachal Pradesh is discussed below:

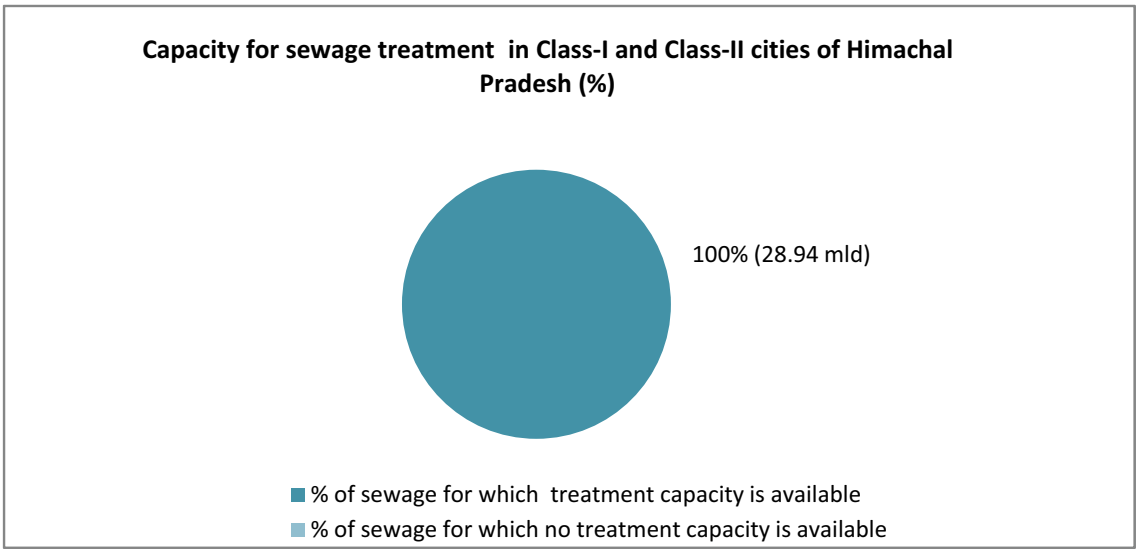
		Rivers	Lakes	Ground water
1.Inventory of water resources		Could not be verified	Not Done	Not Done
2.Assessment of water quality	**a) According to chemical Indicators**	Done	Done	Done (arsenic, nitrate, iron and fluoride
	b) According to Biodiversity indicators	Done	Done	Not applicable
	c) Quantification of contaminants	Partially (Nutrients-Done Pathogenic organism- Could not be verified, Human produced chemicals-Not Done)	Partially (Nutrients-Done. Pathogenic organism-Could not be verified. Human produced	Could not be verified

			chemicals-Not Done)	
	d) Impact of human activities	Partially (Agriculture-Not Done Industry-Done Mining-Not Done Dam-Done Uncontrolled disposal of human waste-Done)	Partially (Agriculture-Not Done. Industry-Done. Uncontrolled disposal of human waste-Done.)	Partially (Agriculture-Not Done. Industry-Done. Uncontrolled disposal of human waste-Done.)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c) Risks to human health	Done	Done	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Not Done	Not Done	Not Done
6. Constitution of Water Quality Review Committee		Done		

[**Note: Not applicable :** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Himachal Pradesh



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Himachal Pradesh is 28.94 mld, of which treatment capacity is available for entire 28.94 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Even though some stretches of rivers Sukhna, Markanda and Beas were in the list of polluted rivers, they were not included under NRCP for control of pollution projects.

4.2 NLCP

It was observed that lakes like Khajjiar lake, Renuka sagar and Rewalsar lake were identified by NRCD in its list of polluted lakes, however projects for their conservation and restoration were not sanctioned under NLCP.

5. Monitoring of programmes for control of water pollution

5.1 Ground water (in test checked six blocks)

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes (except in one block)	No information for four blocks, Yes in one block, No in one block

State: Jammu and Kashmir

1. Background

The main rivers of Jammu and Kashmir are Jhelum, Chenab and Indus draining through the regions of Jammu, Kashmir and Ladakh. The largest lake in the J&K State is Pengong Tso. Wullar and Dal lakes are other important water bodies of the State. According to CGWB, the annual replenishable ground water resource in J&K is 2.70 BCM while the net annual ground water availability is 2.43 BCM. Further, in none of the districts of J&K is the groundwater over-exploited, critical or semi-critical and according to CBWB, the ground water is generally potable.

Lake test checked in Jammu and Kashmir

Insitutional arrangement in the State: As per information provided by MoEF, Housing and Urban Development is the nodal agency for implementation of NRCP. Jammu & Kashmir Lakes and Waterways Development is the implementing agency for NLCP.

2. Planning for water pollution

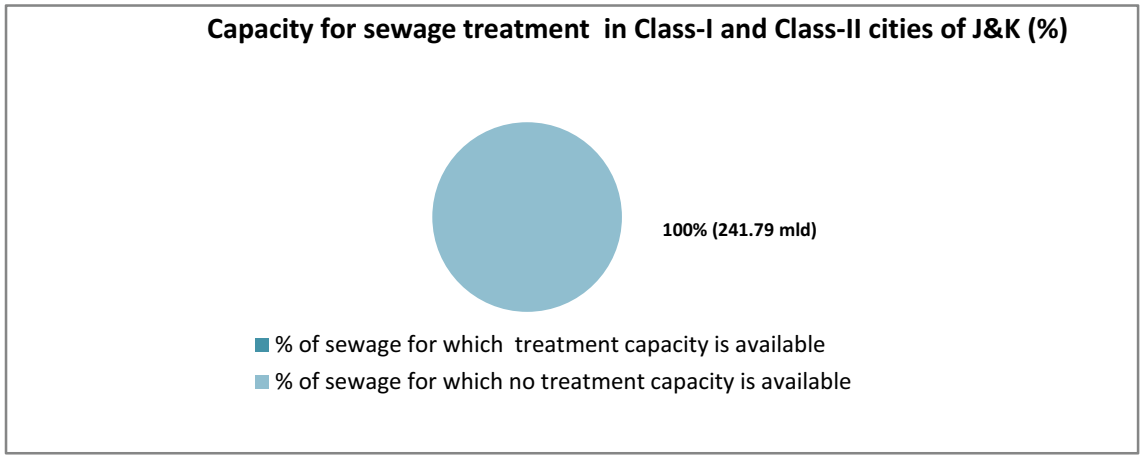
Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Jammu and Kashmir is discussed below:

		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Not Done	Done	Not Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Done	Not Done (arsenic, nitrate, iron, fluoride and salinity)
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Not Done	Partially	Could not be verified
	d) Assessment of impact of human activities	Not Done	Not Done	Not Done
3. Identification of risks to	**a) Risks to wetlands**	Not Done	Not Done	Not applicable

environment and health	**b) Risks to aquatic species**	Not Done	Not Done	Not applicable
	c) Risks to human health	Could not be verified	Could not be verified	Could not be verified
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Could not be verified	Partially	Not Done
6. Constitution of Water Quality Review Committee		Not Done		

[**Note: Not applicable :** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB



Sewage generated/ treatment capacity in Class I and Class II cities of J&K

[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of J&K is 241.79 mld, for which no treatment capacity is available.

4. Implementation of programmes for control of water pollution

Water Resources (Regulation and management) Act in October 2010 was passed in J&K which envisages among other things, management of works with respect to water storage, conservation and protection, irrigation, water supply, drainage, flood control and prevention; improvement in flow of water; protection and improvement in the physical integrity of water resources, lakes and springs; safety and surveillance of dams etc. It also envisaged the establishment of State Water Resources Regulatory Authority for regulating water resources, ensuring judicious, equitable and sustainable management etc. As per the Act, the Regulatory Authority within three months from the commencement of the said Act. However, the Authority had not been established till date.

4.1 NRCP

In February 1998, sanction for ₹ five lakh was accorded for survey and preparation of pre-feasibility report for "Jhelum River Action Plan". The pre-feasibility report was prepared at a cost of ₹6.28 lakh and sent to MoEF in the same year. MoEF had not released the funds upto Nov 2009 due to utilization certificate pending from J&K Lakes and Waterways Development Authority (LAWDA). LAWDA furnished the utilization certificate in Nov 2009 but funds were not transferred till date. As a result, the project did not take off and deprived the State from availing ₹17.14 crore sanctioned for the project.

4.2 NLCP

Dal is the only lake included in NLCP by MoEF and is unique in the sense that people live inside the lake in hamlets and houseboats and make their living by cultivating on floating gardens. In 1977, the State Government had launched a Project "Conservation of Dal–Nigeen Lake" for improving water quality of Dal lake and saving it from further degradation. Work on the project was started through the State Urban Environmental Engineering Department (UEED) in 1996-97 and in March 1997, the project was transferred to LAWDA.

(i) Physical and financial progress

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Dal Lake	298.76	154.18	March 2010 revised to March 2012	Ongoing

(ii) Performance of the project

Project name	Findings
Dal Lake	• The project was sanctioned by NRCD in September 2005 at a cost of ₹298.76 crore and the target date of its completion was March 2010 which has been extended upto March 2012. The Detailed Project Report (DPR) on the programme was prepared by the MoEF through Alternate Hydro Energy Centre, Roorkee (AHEC) and was approved by the MoEF at a cost of ₹1.54 crore. The project has two components viz. Lake Conservation Programme[20] funded by MoEF and Rehabilitation Programme[21] funded by State government. • **Inefficient working of STP costing ₹11.05 crore:** Six STPs at Hazratbal, Laam, Habbak, Brari Nambal, Nala Amir Khan and Hotel Welcome were projected to be constructed in a phased manner. Construction of two STPs at Brari Nambal and Nala Amir Khan was under progress and STP at Hotel Welcome was amalgamated with Brari Nambal. STP at Hazratbal and Habbak were commissioned in February 2006 and April 2006 respectively. Work on STP Laam was completed by October 2006. However, the STP did not work according to its design criteria

[20] Conservation Programme includes sewerage treatment, hydraulic works, restoration and development works, solid waste management etc.
[21] resettlement/ rehabilitation of families living in and around the lake

and concentration of nutrients increased at the outflow stage vis-à-vis inflow stage despite receiving treatment at the STPs. Further tests in 2008, 2009 and 2010 continued to reveal its inefficiency. Levels of phosphorus were also high.

The Scientific Advisory Committee of LAWDA constituted for Dal Lake also felt concerned over the presence of inorganic nutrients like Nitrate-nitrogen discharged by these STPS untreated.

In June 2009, it was decided to either to install de-nitrification units of the STPs or create artificial wet lands. No steps were taken to arrest the problem. Besides, the treated effluents also did not meet the water chemistry / parameters of the lake.

- **Non appointment of Project Management Consultant (PMC):** To ensure effective implementation of the project, a PMC was to be appointed. Despite lapse of more than five years, LAWDA has failed to appoint a PMC.

Waste floating on Dal lake

Untreated sewage on periphery of Dal lake

5. Monitoring of programmes for control of water pollution

5.1 NLCP

By Inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
0 out of 1 project	0 out of 1 project	0 out of 1 project	0 out of 1 project

6. Outcomes

6.1 NRCP

No river was included under NRCP in Jammu and Kashmir.

6.2 NLCP

(a) Changes in the water quality of Dal Lake: Data reveals that there is a drastic change in the water quality which was attributed to intensified release of nutrients due to soil erosion, run-off from immediate catchment area and discharge of urban wastes including inorganic fertilizers. The increase in the values of Total dissolved solids indicated continued siltation, failure of retention of silt by partially commissioned Settling basin and high ingress of sewage into the lake and mineralization process of organic matter.

(b) Dwindling of local fish species in the lake: Notable fish species common in Dal Lake were *Schizothorax esocinus, Schizothorax niger, Schizothorax curvifons, Schizothorax. micropogon, Labeo dera, Carassius carassius.* It was observed that their number has declined sharply in the last thirty years and local species have been since outnumbered by Carpiodes. The decline in fish diversity and yield has been attributed to the changes in hydrological regime and loss of critical habitats. The changes in the species richness has also been attributed to heavy loads of incoming sewage thereby leading to increased eutrophication and impacting on the growth and development of sensitive fish species like Schizothorax. The introduction of carp and pollution of lake has resulted in alteration in the balance of local species richness.

(c) Invasion of exotic species in the lake: Azolla, the exotic species of weed is the new invader to the lake and has assumed the greater area of the lake. The same has been attributed to significant changes in the vegetational pattern of the Dal Lake and its prolific growth in the open areas is attributed to unabated inflow of effluents channels, drains, raw sewage and enrichment of the lake sediments particularly due to heavy load of organic nitrogen and phosphates.

(d) Entrapping of phosphorous and in-organic nitrogen in the lake: It has been assessed that 156.62 tonnes of phosphorus inflows into the lake from non-point/point sources out of which about 80.62 tonnes of total phosphorus leaves the lake, mainly through two outlets. This has resulted in entrapping of about 76.0 tons of total phosphorus in the lake on an annual basis. Similarly, 241.18 tonnes of inorganic nitrogen inflows into the lake from non-point/point sources out of which about 109.22 tonnes inorganic nitrogen outflow from the lake. This has resulted in entrapping of about 131.96 tons of inorganic nitrogen within the

lake system. This nutrient load has been attributed to sewage from the catchment area, agricultural practices in the catchment area, urbanization and waste discharge.

(e) Poor efficiency of settling basin: Water from catchment area / melting glaciers has to pass through settling basin before its entry into Dal Lake. The purpose of the settling basin is to retain sediments of water entering into the lake. It was, however, observed that settling basin was able to retain sediment load ranging from 53-58 *per cent*, only. This indicated poor efficiency / partial working of the settling basin. In-efficiency of the settling basin in holding the sediment load results in decrease in the depth of the lake and enrichment of its bed with the nutrient and consequently increase in the weeds etc.

State: Jharkhand

1. Background

The major rivers of State Jharkhand are Ganga, Subarnarekha, Damodar, Mayurakshi, Barakar, Koyal, Sone etc. Some of the lakes in Jharkhand are Ranchi Lake, Topchanchi lake, Hazaribagh Lake, Kanke reservoir, Getalsud reservoir, Sitarampur etc.

According to Central Ground Water Board (CGWB), the annual replenishable ground water resource in Jharkhand is 5.58 Billion Cubic Meters (BCM) and the net annual ground water available is 5.25 BCM. In none of the blocks of Jharkhand is the ground water over-exploited, critical or semi-critical. The contaminants found in ground water in Jharkhand are fluoride, iron and nitrate.

Test checked river in Jharkhand

Insitutional arrangements in the State: As per information provided by MoEF, Department of Urban Development, Government of Jharkhand was the nodal agency and the Mineral Area Development Authority (MADA) was assigned the responsibility of being the implementing agency for NRCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Jharkhand is discussed below:

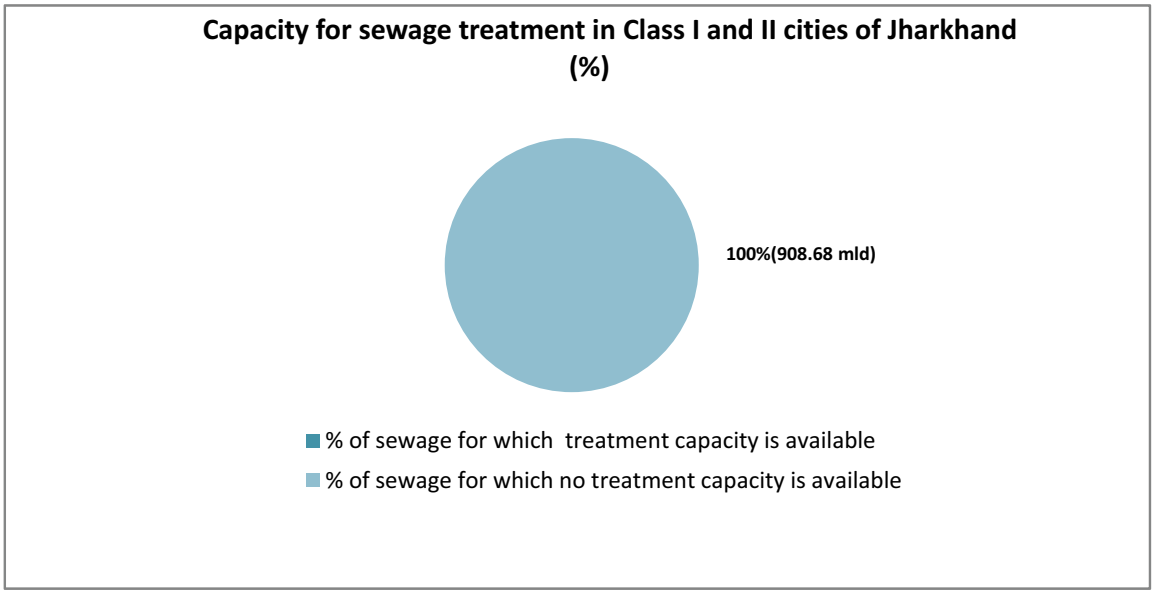
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Not Done	Not Done	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Not Done	Done
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Not Done	Not Done	Could not be verified
	d) Assessment of impact of human activities	Not Done	Not Done	Not Done
3. Identification of risks to environment and health	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable
	b) Risks to aquatic species	Could not be verified	Not Done	Not applicable
	c) Risks to human health	Done	Done	Could not be verified

4. Policy for water pollution	Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution	Not Done	Not Done	Not Done
6. Constitution of Water Quality Review Committee	Not Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Jharkhand



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Jharkhand is 908.68 mld, for which no treatment capacity is available.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Ganga, Damodar and Subarnarekha rivers had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). 15 projects in 12 towns[22] were undertaken at a sanctioned cost of ₹4.38 crore.

4 projects being implemented in cities of Jamshedpur and Ranchi for control of pollution of Subarnarekha river under NRCP at a cost of ₹ 2.20 crore were test checked for detailed examination.

[22] Ghatshilla, Jamshedpur, Ranchi, Bokaro-Kargali, Chirkunda, Dugdha, Jharia, Ramgarh, Sahebganj, Sindri, Sudamdih and Telmachu

(i) Physical and financial progress

Name of the river/ location	Name of the Project	Sanctioned Cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Subarnarekha at Jamshedpur	Crematoria	0.54	Nil	September 1996	Yet to commence
	LCS	0.35	0	August 1997	Not yet completed
	RFD	0.85	0.38	May 1997	2002-03 Construction of three Ghats were not undertaken
Subarnarekha at Ranchi	RFD	0.46	0.36	July, 1997	Four out of five ghats were completed & handed over to Ranchi Municipal Corporation in October 2001

(ii) Performance of the project

a) Jamshedpur

No information received from the State regarding sewage generated and treated/discharged into river Subarnarekha. **Details of three projects test checked in Jamshedpur which aim to improve the quality of water in Subarnarekha's are discussed below:**

Project	Findings
Crematoria (Electric and wood)	• This project was scheduled to be completed by September 1996 but it was not yet commenced. The project was handed over to Parvati Ghat Samiti, Jamshedpur by the Bihar Government In March 1997 and a sum of ₹ 12.50 lakh was released to the Samiti through the Deputy Commissioner, East Singhbhum. After that no further fund was made available to the Samiti by the State government till October 2005. • The nodal department had raised doubt regarding execution of the work and sought progress report and utilization of the work and said that till receipt of the same, no further amount would be released to the Samiti.
LCS	• The project was scheduled to for completion by August 1997 but project has not yet been completed in all respect and revised date of completion, if any, could not be verified. • The reasons for delay were non-execution of boring work, failure of boring due to ash and filled soil etc. • 8 LCS were sanctioned for construction. However, work of four LCS was not taken up till date. Of four LCS taken up, only construction work has been completed but not yet functional.
RFD	• The project was scheduled to be completed by May 1997 but has not yet been completed. • 3 Ghats i.e. Baroda Ghat, River Meet Point and Mango Ghat out of proposed six ghats were completed & handed over to concerned

	local bodies between July 2002 to April 2003. It could not be ascertained whether remaining three ghats were completed or not.

(b) Ranchi

No information was available regarding sewage generated and treated/discharged into the Subarnarekha. **Details of one project test checked in Ranchi which aims to improve the quality of water in Subarnarekha river are discussed below:**

Project	Findings
RFD	• The project was to be completed in July 1997 but out of proposed five ghats, only four ghats i.e. Hatia bridge, Kachnar Toli, Near Subarnarekha bridge and at Namkum (Khijri) bridge were completed and handed over to Ranchi Municipal Corporation in October 2001. • The project was delayed due to delay in publishing NIT and award of contract.

Thus all the test checked projects for control of pollution did not completely achieve their intended objectives.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
0 out of 4 projects	0 out of 4 projects	0 out of 4 projects	0 out of 4 projects

5.2 Ground water (in test checked six Blocks)

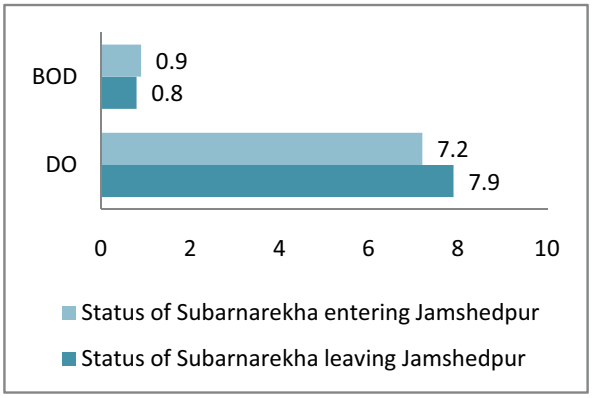
Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
No for 5 out of 6 blocks	No for 5 out of 6 blocks	Yes (in concerned districts of 4 blocks)	No information

6. Outcomes

6.1 NRCP

(a) Water quality of Subarnarekha after Jamshedpur

While levels of Total Coliform were not measured, it was observed that levels of Biochemical Oxygen Demand met the criteria.



(b) Water quality of Subarnarekha after Ranchi

No information was available regarding levels of Dissolved Oxygen and Biochemical Oxygen Demand on Subarnarekha before it entered and left Ranchi.

State: Karnataka

1. Background

The river basins in Karnataka are formed by the Krishna, Cauvery, Godavari, Tungabhadra, North Pennar, South Pennar & Palar. Some of the lakes in Karnataka are Bellandur Lake, Kotekere Lake, Sharanabasaveshwara Lake, Bhishma Lake, Channapatna Lake etc. According to Central Ground Water Board, the annual replenishable ground water resource in the State is 15.93 Billion Cubic meters (BCM) and the net annual ground water availability is 15.30 BCM. Out of 175 talukas in the State, in 65 talukas, the ground water is over exploited, in three talukas it is critical and in 14 talukas it is semi-critical. The ground water in Karnataka has contaminants like salinity, fluoride, chloride, iron and nitrate.

Rivers and lakes test checked in Karnataka

Insitutional arrangements in the State: As per information provided by MoEF, Forests, Ecology and Environment Department, Government of Karnataka and Office of Chief Secretary were the nodal departments for NRCP and the implementing agencies were Karnataka Urban Water Supply and Drainage Board and Karnataka State Pollution Control Board. Lake Development Authority, Government of Karnataka is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Karnataka is discussed below:

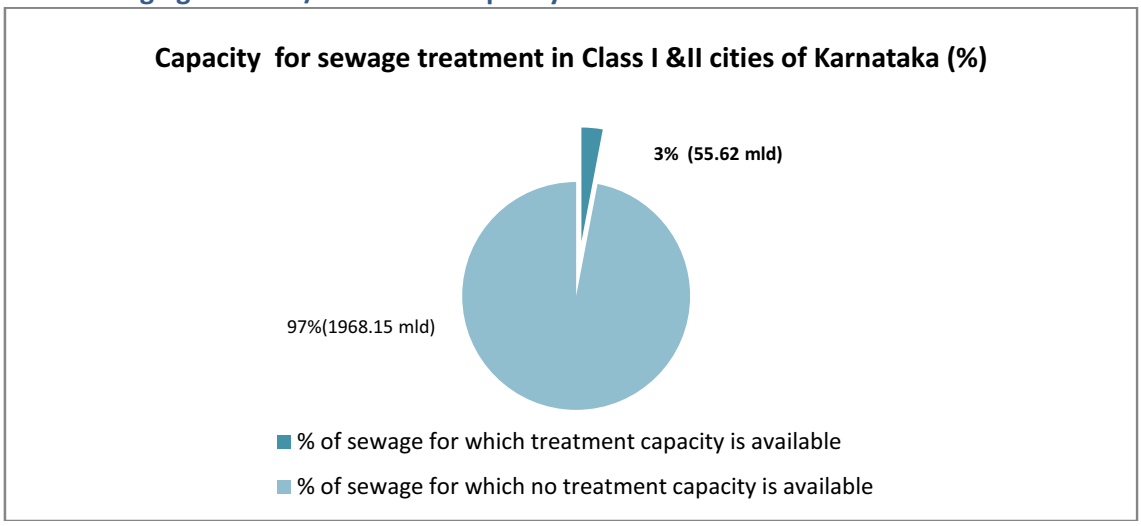
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Done	Could not be verified	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Could not be verified	Could not be verified	Done (arsenic, nitrate, iron, fluoride and salinity)
	b) According to Biodiversity indicators	Could not be verified	Could not be verified	Not applicable

	c) Quantification of contaminants	Partially (Nutrients: Could not be verified, Pathogenic organism: Done, Human produced chemicals: Done)	Partially (Nutrients: Could not be verified, Pathogenic organism: Done, Human produced chemicals: Done)	Could not be verified
	d) Assessment of impact of human activities	Not Done	Could not be verified	Could not be verified
3. Identification of risks to environment and health	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c) Risks to human health	Not Done	Not Done	Done
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Could not be verified, Industry: Could not be verified, Agriculture non point sources: Done)	Could not be verified	Partially (industry: Could not be verified, Agriculture non point sources: Done)
6. Constitution of Water Quality Review Committee		Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Karnataka



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Karnataka is 2023.77 mld, of which treatment capacity is available for only 55.62 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Rivers Bhadra, Tungabhadra, Cauvery, Tunga and Pennar had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects are being implemented in nine cities[23]. 42 projects in these nine cities were sanctioned under NRCP out of which 28 were completed as of March 2010. The total sanctioned cost of all the projects was ₹ 66.25 crore. Three projects[24] being implemented under NRCP at a cost of ₹ 50.54 crore were test checked for detailed examination.

(i) Physical and financial progress

Name of the river/ location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Bhadra at Bhadravati	I&D	1.30 revised to 1.91	2.29	July 2005	Not yet complete
Tungabhadra at Davanagere	STP based on WSP	2.36	1.86	November 2001	November 2005
Pennar at Bangalore	I&D	46.27	47.20	August 2004	Not yet complete

(ii) Performance of the projects

(a) Bhadravati

The average sewage generated in the city of Bhadravati is 4.6 mld. The STP capacity available in Bhadravati to treat sewage is 5.83 mld. However, the STP is treating only 1.49 mld due to non-completion of three wet wells and as a result, 3.11 mld of untreated sewage is being discharged into the river Bhadra. **Details of the Project test checked in Bhadravati city which aim to improve the quality of water in Bhadra is discussed below:**

Project name	Findings
I&D project for Bhadra River	• The project was scheduled to be completed in July 2005 but it was still not complete. There was a delay of more than five years. • Total expenditure of ₹ 2.29 crore was incurred on the project as on September 2010. There was a cost overrun of ₹ 99 lakhs which was due to increase in scope of work, increase in tender premium and change in designs etc. • The project was delayed due to non obtaining of approval of the revised estimate by the State Government and also obtaining clearance from PWD authorities to lay the pipeline. • 6 pumping stations were created under the project but these were not energized.Out of the total sewage generated of 4.60 mld,only 1.49 mld was being treated which was due to non completion of I&D work.

[23] viz. Bhadravati, Davangere, Harihara, KR Nagar, Kollegal, Nanjangud, Shimoga, Srirangapatna and Bangalore
[24] one each on Bhadra, Tungabhadra and Pennar rivers

(b) Davanagere

The average sewage generated in the city of Davanagere is 48 mld.The STP capacity available in Davanagere city can only treat 19.45 mld but no sewage is actually treated due to non functioning of STP. As a result, the entire 48 mld of sewage generated by Davanagere city flows into the river Tungabhadra.

Details of the project test checked in Davanagere city which aim to improve the quality of water in Tungabhadra are discussed below:

Project	Findings
STP based on WSP	• The STP was built in November 2005 after a delay of more than four years. • The project was delayed due to handing over of land by City Corporation of Davanagere. • The STP was constructed to treat 19.45 mld of sewage but no sewage was actually being treated. • The STP was handed over to City Corporation, Davanagere. The Karnataka Urban Water Supply & Drainage Board was not maintaining and also not monitoring the functioning of STPs in Davanagere city.

(c) Bangalore city

Average sewage generated in the city of Bangalore is 1200 mld and STP capacity available in Bangalore city can only treat 463 mld of sewage. However, only 120 mld of sewage is actually treated and 1080 mld of sewage is not treated. Bangalore is not situated on the bank of any river and the sewage is generated in three different valleys and joins Vellanbur lake and Vrishabhavathy stream which ultimately join river Pennar and Cauvery respectively. As a result, untreated sewage of 1080 mld actually ends up polluting water of the rivers Pennar and Cauvery.

Details of the project test checked in Bangalore city which aim to improve the quality of water in Pennar are discussed below:

Project name	Findings
I&D Environment Action Plan in Bangalore city	• This comprised of rehabilitation of sewers. The project was supposed to be completed in August 2004. In January 2010, NRCD extended the project duration upto July 2010 without any revision in project cost. • There was a cost overrun of ₹ 0.93 crore which was due to increase in scope of work and cost escalation. • The project was delayed due to land problems and litigations by the contractor. • The total sewage generated in the city (1200 mld) was too huge to be intercepted and diverted for treatment out of funds under NRCP.

Thus the projects undertaken for pollution control of Bhadra in Bhadravati city were yet to be completed, while the projects envisaged for control of pollution of Tungabhadra river in Davanagere town were not working as envisaged. Further, the project sanctioned for

control of pollution of Pennar river in Bangalore was not sufficient to meet the objective of reduction of pollution in Pennar river.

Flow of untreated sewage into River Bhadra in Bhadravati

Blocked I&D at Davanagere

4.2 NLCP

(i) Physical and financial progress

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Bellandur	5.54	1.91	August 2004	Abandoned
Kotekere	5.64	5.73	March 2006	May 2009
Sharanbhasveshwara	4.89	4.21	September 2006	On going

(ii) Performance of the projects

Project name	Findings
Bellandur Lake	• The project for restoration and conservation of Bellandur lake was sanctioned in January 2003 for 18 months and was slated for completion in August 2004. • In January 2004, Lake Development Authority, Bangalore (LDA) which was implementing this project, entrusted execution of the work to a contractor for completion by January 2005, after committing that it would be responsible for stopping and diverting sewage entering into the lake. However, LDA failed to stop/ divert the inflow of sewage in the lake which promoted prolific growth of weeds in the lake. As a result, oxygenation of the lake proved inadequate and ineffective and rendered the lake non-conducive for bio-remedial treatment. • The contractor complained in April 2005 against non-stoppage of sewage inflow and experts from Indian Institute of Science, Bangalore in May 2005 attributed failure of the project mainly due to discharge of untreated sewage directly into the lake. In April 2006, LDA decided to suspend the project till stoppage of sewage inflow was achieved by suitable means and to go for arbitration regarding the contract. LDA decided to take the opinion of the Law Department and challenge the arbitral award in High Court of Karnataka. Further, LDA decided to terminate the project, till the Master Plan for sewage treatment in the catchment of Bellandur was implemented. • The unspent balance of ₹ 1.81 crore (₹ 1.25 crore Centre share and ₹ 0.56 crore of State share) was lying with the Implementing agency (since January 2005). **Thus, the project failed to achieve its objective of restoration and conservation of Bellandur Lake, despite an expenditure of ₹1. 91 crore.**
Kotekere	• The activities to be undertaken for restoration and conservation of Kotekere lake comprised of construction of STP, Low Cost sanitation, de-silting, de-weeding, lake fencing etc. • The originally sanctioned date of completion was March 2006 but the project was actually completed in May 2009. The delay was due to increase in scope of work of desilting the lake and heavy rains disrupting desilting of lake. • Details of activities undertaken for restoration and conservation of Kotekere lake were as follows: • Construction of I&D: three drains opened into the lake and all three were intercepted under the project. 4.80 kms of sewer lines were laid, as envisaged.

	• Programmes for strengthening of bund, lake fencing, and shoreline development had been carried out as envisaged in the approved project proposal. • Lake was desilted and deweeded as per DPR. The completion report for the project was submitted to NRCD in November 2009 and final UC was submitted in March 2010.
Sharanbhas-veshwara lake	• The lake measured 64 acres and had a depth of 2.1 meters. As such, it did not meet the criteria of depth defined by MoEF according to which the lake to be selected. • The activities to be undertaken for restoration and conservation of the lake comprised of construction of STP, interception and diversion works, low cost sanitation etc. • The originally sanctioned date of completion of the project was September 2006 but the project was still ongoing. • Details of major activities undertaken for restoration and conservation of Sharanabasaveshwara lake were as below: - Desilting and dredging: 3.34 lakh cubic meter of silt was evacuated from the lake, which was substantially higher than the quantity considered in the DPR. - I&D: A sewer line was constructed to prevent entry of sewage into the lake. • The O&M of the lake was entrusted to four private agencies.

Untreated effluents entering Bellandur Lake

Kotekere lake: Before (left) and after (right) conservation efforts

Sharanbhasveshwara lake before (left) and after (right) after conservation efforts. These photographs are a clear testimony of sincere efforts producing results and having the desired impact.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
2 out of 3 projects	0 out of 3 projects	0 out of 3 projects	0 out of 3 projects

5.2 NLCP

By Inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
0 out of 3 projects	0 out of 3 projects	0 out of 3 projects	0 out of 3 projects

5.3 Ground water (in six Blocks test checked)

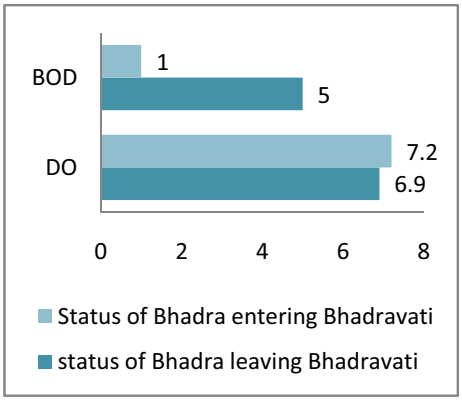
Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes (5 out of 6)	Yes (5 out of 6)

6. Outcomes

6.1 NRCP

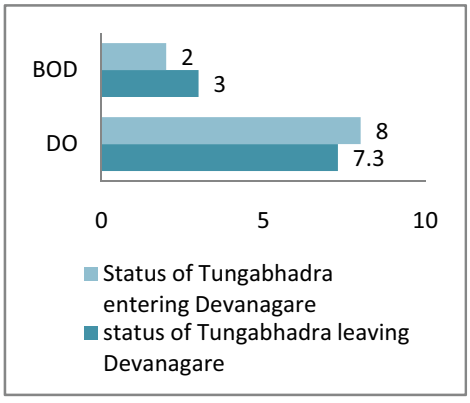
(a) Water quality of Bhadra after Bhadravati

Water quality of Bhadra on entering Bhadravati and after leaving Bhadravati in terms of DO and BOD is shown in the chart alongside. TC was 18 times the criteria, indicating the presence of disease causing fecal-related bacteria, viruses and protozoa which cause illness as the Bhadra river leaves Bhadravati.



(b) Water quality of Tungabhadra after Davanagere

Water quality of Tungabhadra on entering Davanagere and after leaving Davanagere in terms of DO and BOD is shown in the chart alongside. TC in the river rises from 700 at the time of entering Davanagere to 3000 at the time Tungabhadra leaves Davanagere and is six times the criteria, indicating the presence of disease causing, fecal-related bacteria, viruses and protozoa which cause illness.



(c) Water quality of Pennar after Bangalore

No information was available regarding status of Pennar river after Bangalore.

6.2 NLCP

Lake	Water quality status
Bellandur	Work on restoration of the lake has stopped midway.
Kotekere	It was observed that water quality in Kotekere lake after implementation of the project was restored to the criteria for Designated Best Use classification for B class waters. As such, the project had achieved its objective of conservation and restoration of Kotekere lake.
Sharanbhasveshwara	It was observed that water quality in **Sharanbhasveshwara** lake after implementation of the project was restored to the criteria for Designated Best Use classification for B class waters. As such, the project had achieved its objective of conservation and restoration of Sharanbhasveshwara lake.

State: Kerala

1. Background

The important rivers in Kerala are Valapattanam, Chaliyar, Bharathapuzha, Periyar, Pamba. Some of the lakes in Kerala are: Veli Akkulum Lake, Ashtamudi Lake, Kuttanad Lake, Paravur Kayal, Punnamada Lake, Vembanad Lake etc According to Central Ground Water Board (CGWB), annual replenishable ground water resource in Kerala is 6.84 Billion Cubic Meters (BCM) while the net annual ground water availability is 6.23 BCM. Out of 152 blocks, ground water in five blocks is over-exploited, in 15 blocks it is critical and in 30 blocks, it is semi-critical. Ground water in Kerala is contaminated by salinity, fluoride, iron and nitrate.

Test checked rivers and lakes in Kerala

Insitutional arrangements in the State: As per information provided by MoEF, Kerala Water Authority was the nodal department for projects under NRCP but was subsequently replaced by Pamba River Basin Authority in October 2009. Travancore Devaswom Board and Irrigation Department was the nodal implementing agency. Theerapatham Urban Development Project and Tourists Resort Kerala Ltd. were the implementing agencies for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Kerala is discussed below:

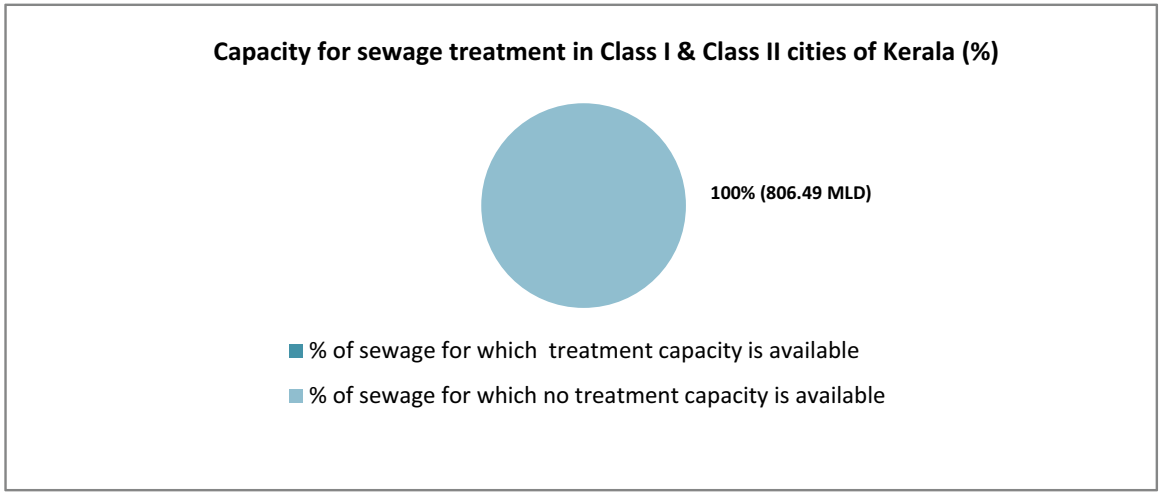
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Done	Done	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Not Done	Done
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Partially (Nutrients: Done, Pathogenic organism: Done, Human	Partially (Nutrients: Done. Pathogenic	Could not be verified

		produced chemicals: Not Done)	organism: Done. Human produced chemicals: Not Done.)	
	d) Assessment of impact of human activities	Partially (Agriculture: Not Done, Industry: Done, Mining: Not Done, Dam: Not Done, Uncontrolled disposal of human waste: Not Done)	Partially (Agriculture: Not Done. Industry: Done. Uncontrolled disposal of human waste: Not Done.)	Partially (Agriculture: Done, Industry: Not Done. Mining:Not Done. Uncontrolled disposal of human waste: Done.)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable
	b) Risks to aquatic species	Could not be verified	Could not be verified	Not applicable
	c) Risks to human health	Done	Partially	Not Done
4. Policy for water pollution		Done	Done	Done
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Could not be verified, Industry: Done, Agriculture non point sources: Done)	Partially (Source water protection: Not Done. Industry: Done. Agriculture non point sources: Done.)	Done
6. Constitution of Water Quality Review Committee		Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Kerala



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Kerala is 806.49 mld, for which no treatment capacity is available.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Pamba river had been selected for pollution abatement projects under the NRCP. Six projects were being implemented in only Pamba city for cleaning up river Pamba of which two were completed as of March 2010. The total sanctioned cost of all the projects was ₹ 18.45 crore.

All the six projects being implemented under NRCP at a cost of ₹ 18.45 crore were test checked for detailed examination.

(i) Physical and financial progress

Name of the river/ location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Pamba/ Sabarimala	LCS	4.60	1.43	May 2007	Completed
	I&D	5.60	No expenditure	May 2007	Not yet commenced
	Public participation	0.25	0.27	May 2007	Completed
	River front Development	0.43	1.39	May 2007	Completed
	STP	4.47	No expenditure	May 2007	Not yet commenced
	SWM	3.10	0.17	May 2007	Completed

(ii) Performance of the projects

Pamba and Sabarimala

The daily average sewage generated in Pamba town was seven mld and 3.5 mld of untreated sewage was being discharged into the Pamba river. The daily average sewage generated in Sabarimala was 10 mld and the entire 10 mld of untreated sewage was being discharged into the river.

Project	Findings
LCS	• Only 160 LCS were constructed at Pamba against target of 300. At Sabarimala, 320 LCS and 80 bathrooms were constructed against the target of 400 and 100 respectively. • The shortfall was due to non-availability of forest land.
I&D works	• These works were to be completed by 2007 but had not yet commenced (March 2010).
SWM	• According to MoEF inspection report of September 2010, these had been completed but no details were available.
RFD	• These were to be completed by May 2007. According to inspection by MoEF in September 2010, these had been completed but no details were available.
STP	• The project scheduled for completion by May 2007 has not commenced as yet.

- The project was delayed due to non availability of forest land and changes in design of STP as the initial draft engineering report was not based on detailed survey and investigation and this necessitated change.

Thus, projects to prevent pollution entering Pamba river have not succeeded in their objectives.

Sewage storage tank at Cheriyanavattom which over flows and sewage reaches the Njunangar stream

4.2 NLCP

(i) Physical and financial progress

Name of the lake	Sanctioned Cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Veli Akkulam lake	24.56	Not available	August 2007	Ongoing

(ii) Performance of the project

Project name	Findings
Veli Akkulam lake	• Activities to be undertaken for restoration of Veli-Akkulam lake included (i) construction of 12 mld and 13 mld STP at Ulloor and Valiathura respectively (ii) dredging including bioremediation and sewage system for Akkulam catchment (iii) site protection and beautification works • The sanctioned cost of the project was ₹ 24.56 crore and was sanctioned in August 2005 with scheduled completion date of August 2007. • The project was entrusted to the Department of Tourism, Government

of Kerala as the nodal agency and implementation was assigned to Kerala State Urban Development Project. Kerala government in January 2006 appointed Theerapadham Urban Development Project as the nodal agency and the Kerala Water Authority and Irrigation Department as implementing agencies. Theerapadham Urban Development Project was merged with Kerala Sustainable Urban Development Project.

- In May 2006 MoEF had released ₹ 4.30 crore for the project.
- In September 2009, the State government ordered that the regeneration work of the lake would be undertaken by funds allotted by the 12th Finance commission for special projects and the required funds were obtained from it and awarded to three public sector undertakings. It was also observed that in the meantime, an STP out of JNNURM funds was to be constructed for management of sewage of Thiruvananthapuram Corporation area and so the construction of STPs proposed for regeneration of Veli-Akkulam was dropped.
- A site visit by MoEF in September 2010 revealed that the de-weeding and de-silting work were under progress. MoEF also noted that Irrigation department which has been appointed as the nodal agency by the State government should regularly monitor the implementation of works.

Thus, the project for restoration and conservation of Velli-Akkulam lake had not achieved its objectives as yet.

Amayizhanjan canal carries municipal waste of Thiruvananthapuram city to Veli-Akkulam lake. A view near Kannammoola Bridge.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
0 out of 6 projects	0 out of 6 projects	0 out of 6 projects	0 out of 6 projects

5.2 NLCP

By inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
0 out of 1 project	0 out of 1 project	0 out of 1 project	0 out of 1 project

6. Outcomes

6.1 NRCP

Pamba/ Pamba	While BOD and DO were not measured, TC in Pamba was 2.2 times the criteria as it leaves Pamba town indicating the presence of disease causing faecal-related bacteria, viruses and protozoa which cause illness.

6.2 NLCP

As the project on improving water quality of Veli Akkulam lake has not started, no conclusions could be drawn about impact of NLCP in restoring the lake.

State: Madhya Pradesh

1. Background

Madhya Pradesh has numerous rivers, the important ones being Narmada, Chambal, Betwa, Kshipra, Sone, Mahanadi, Khan, Indrawati, Tapti, Wain Ganga, Beehar and Mandakini. Some of the lakes in Madhya Pradesh are Tawa Reservoir, Upper Lake (Bhopal), Lower lake (chhota Talab), Kapur Talao, Moti sarovar, Ranguan lake, Shivpuri Lake, Sakhya sagar lake etc. According to Central Ground Water Board, annual replenishable ground water resource in Madhya Pradesh is 37.19 BCM while the net annual ground water availability is 35.33 BCM. Out of 459 blocks, in 24 blocks ground water is over-exploited, in five blocks it is critical and in 19 blocks, it is semi-critical. Ground water in Madhya Pradesh is contaminated by salinity, fluoride, chloride, iron and nitrate.

Test checked rivers and lakes in Madhya Pradesh

Insitutional arrangements in the State: As per information provided by MoEF, Housing and Environment Department, Government of Madhya Pradesh is the nodal department for NRCP and the implementing agencies are Madhya Pradesh Pollution Control Board, Public Health Engineering Department and Environment Planning & Coordination Organization (EPCO). Environmental Planning and Coordination Organisation is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Madhya Pradesh is discussed below:

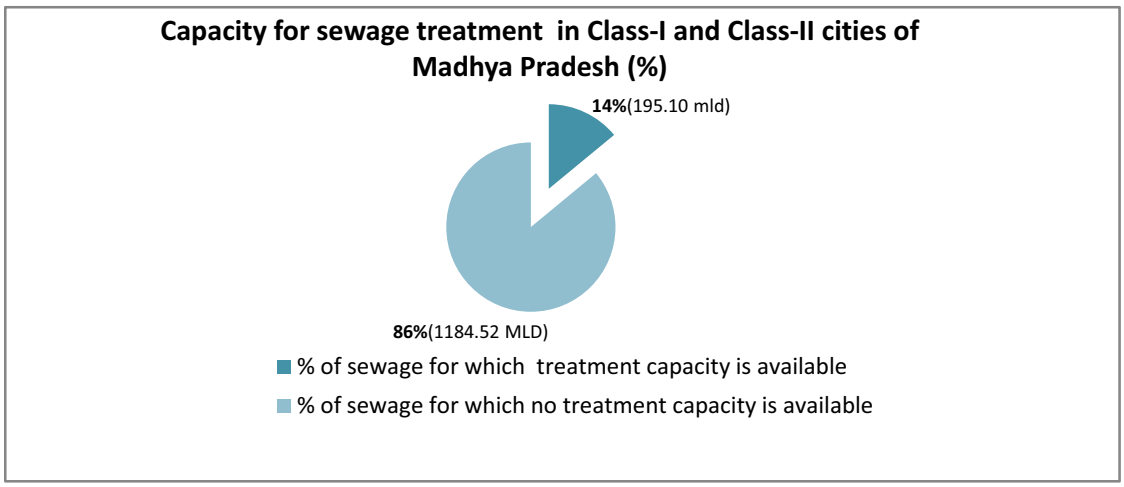
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Could not be verified	Could not be verified	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Could not be verified	Could not be verified	Done
	b) According to Biodiversity indicators	Could not be verified	Could not be verified	Not applicable
	c) Quantification of contaminants	Not Done	Not Done Could not be verified)	Could not be verified

	d) Assessment of impact of human activities	Partially (Agriculture: Could not be verified, Industry: Done, Mining: Not Done, Dam: Not Done, Uncontrolled disposal of human waste: Could not be verified)	Could not be verified	Partially (Agriculture: Could not be verified, Industry: Could not be verified, Mining: Not Done)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable
	b) Risks to aquatic species	Could not be verified	Could not be verified	Not applicable
	c) Risks to human health	Done	Could not be verified	Could not be verified
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Not Done, Industry: Could not be verified, Agriculture non point sources Could not be verified)	Partially (Source water protection: Not Done. Industry: Could not be verified. Agriculture non-point sources: Could not be verified.)	Could not be verified
6. Constitution of Water Quality Review Committee		Could not be verified		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Madhya Pradesh



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Madhya Pradesh is 1379.62 mld, of which treatment capacity is available for only 195.10 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Rivers Betwa, Tapti, Wain Ganga, Khan, Narmada, Chambal, Kshipra, Beehar and Mandakini had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects were being implemented in 14 towns[25]. 69 projects in these 14 towns were sanctioned under NRCP out of which 57 were completed as of March 2010. The total sanctioned cost of all the projects was ₹ 115.38 crore.

Eight projects being implemented in cities of Indore, Vidisha and Ujjain at a cost of ₹ 52.32 crore were test checked for detailed examination.

(i) Physical and financial progress

Name of the river/location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Khan/ Indore	MPS	4.33	4.69	December 2001	February 2005
	I&D Part II	2.53	2.84	December 2001	January 2007
	STP	27.80	26.82	August 2004	April 2008
Betwa/ Vidisha	I&D	2.59	2.58	January 2000, revised to January 2006	January 2007
	STP	1.08	1.06	September 2001	January 2007
Kshipra/ Ujjain	I&D	6.41	6.40	May 2000	December 2003
	STP	2.78	2.87	July 2000	December 2003
	I&D Part II	4.80	5.06	July 2000	December 2003

(ii) Performance of the projects

(a) Indore

The average sewage generated in the city of Indore is 140 mld. However, only 90 mld is treated and the rest 50 mld is discharged into the Khan river. Details of projects test checked in Indore which aim to improve the water quality of Khan are discussed below:

Project	Findings
MPS	• The project was completed in February 2005 after a delay of three years and two months. • No information was available whether the created assets under the project were performing as envisaged.
I&D Part II	• The project was completed in January 2007 after a delay of more than five years. The completion report and final Utilization Certificate for the project were sent to MoEF in August 2007. • The project was delayed due to delay in land acquisition, funds not being received in time, delay in getting power connection from electricity Board and heavy rains. • No assessment was carried out whether the project was actually meeting

[25] viz. Bhopal, Burhanpur, Chapara, Indore, Jabalpur, Keolari, Mandideep, Nagda, Seoni, Ujjain, Vidisha, Hoshangabad, Rewa and Chitrakut.

	the objectives for which it was constructed.
STP	• The project was completed in April 2008 after a delay of three years and eight months. • STP capacity created under the project was 90 mld but it was also observed that 50 mld of untreated sewage was flowing into the river Khan. As per analysis report, the treated sewage was meeting the standards of discharge in terms of BOD. However, levels of oil & grease and COD were not measured.

(b) Vidisha

The average sewage generated in the city of Vidisha is nine mld. However, only 7.2 mld is treated and the rest 1.8 mld is discharged into the Betwa river. Details of two projects test checked in Vidisha which aim to improve the water quality of Betwa are discussed below:

Project	Findings
I&D	• The project was completed in January 2007 after a delay of seven years. • The project was delayed due to delay in tender process, delay in obtaining permission from Railway Department and non-availability of funds. • STP of nine mld capacity was sanctioned under NRCP; however, STP of 7.2 mld capacity only was created. Though 9955 meters of sewer lines were to be laid under the project, only 6490 meters was actually laid.
STP	• This was competed after a delay of five years and four months due to delay in tender process and non-availability of power. • STP capacity sanctioned for Vidisha was of nine mld whereas STP of only 7.2 mld was created.The entire fund for the STP was utilized for creating STP of 7.2 mld. Therefore STP of 1.8 mld could not be created.The treated sewage was being disposed according to Karnal Technology which involves growing trees on ridges and disposing the sewage in furrows. • Though Madhya Pradesh State Pollution Control Board stated that inspections of the STP were conducted regularly, copies of the inspection reports were not made available. As such, actual performance of the STP could not be verified.

(c) Ujjain

The average sewage generated in the city of Ujjain is 57 mld. STP capacity in the city is 52.74 mld and sewage actually being treated is 47.74 mld. As such 9.26 mld of sewage is flowing untreated into the river Kshipra. Details of three projects test checked in Ujjain which aim to improve the water quality of Kshipra are discussed below:

Project	Findings
I&D	• The project was completed in December 2003 after a delay of three years and seven months. The final UC was submitted in 2006 though the project was completed in 2003. • The project was delayed due to delay in obtaining sanction from the local bodies for carrying out certain works such as road cutting, shifting of electrical line etc. • The total length of sewers to be laid under the project was 2199 meters, however, only 1256.50 meters of sewer were actually laid. Five drains were intercepted under this project and two pumping stations were also constructed. • Due to shortage of electricity, manpower and lack of funds, the I&D works were not performing as envisaged. Further, O&M was being carried out by untrained labourers on daily wages though the PHED had written letters to the Government for providing funds for proper O&M of the assets.
STP	• The project was completed in December 2003 after a delay of three years and five months. • The project was delayed due to the fact that part of the land on which the gravity sewer was to be laid had gone into litigation therefore work was delayed till the decision of court.Delay also occurred due to legal formalities and getting due sanction from local bodies for carrying out certain work such as road cutting, shifting of electrical line etc. • It was observed that proper operation and maintenance of the assets was not being carried out due to lack of funds and deficiency of trained staff. Out of 27 sewage pumps installed in Phase-I and Phase-II of NRCP, 12 pumps were not in working condition as of December 2010.Even though 52.74 mld STP capacity was created, it was noticed that only 47.74 mld was being treated and five mld was being discharged into Kshipra. The treated sewage also did not meet prescribed limits and BOD and COD were above acceptable limits. **Thus, the STP was not meeting the envisaged objectives and did not serve to improve the water quality of Kshipra.**
I&D Part II	• The project was completed in December 2003 after a delay of three years and five months. The completion certificate was sent to MoEF only in 2004 and final UC was sent only in 2006. • The project was delayed due to delays in land acquisition and delay in obtaining sanction from local bodies for carrying out certain work such as road cutting, shifting of electrical line etc. • 3865 meters of sewer lines were to be laid, only 2531 meters were laid. Three pumping stations were also planned but actual capacity created was not available.It was observed that shortage of electricity, manpower and lack of funds were hampering its full utilisation and performance. **As such, performance of the I&D project did not meet its envisaged objectives.**

Sewage overflowing (after interception) and discharging directly into river Kshipra

Sewage accumulation due to waste stablisation pond not being cleaned in for STP, Kshipra River, Ujjain

4.2 NLCP

(a) Planning for NLCP

Audit test checked Shivpuri lake for scrutiny as it had the highest sanctioned cost among the four lakes[26] selected under NLCP.

(i) Physical and financial progress

Name of the lake	Sanctioned Cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Shivpuri lake	51.99	1.79	August 2009	On-going

(ii) Performance of the project

Project name	Findings
Shivpuri lake	• Work on the project which involved activities like de-weeding, de-silting, storm water drains, LCS, bathing ghats, lake front development, public participation, etc. • The project was scheduled to be completed in August 2009 but it was still incomplete. • An expenditure of ₹25.43 lakh was incurred for advertisement of tender notices in the newspapers but subsequently three components of the project (1) Sewerage Network (2) Sewage Pumping Station (3) STP were transferred to PHED, Shivpuri in September 2009. No fund for the implementation of the project has yet been released to PHED, Shivpuri. • Information regarding submission of regular progress reports by implementing agency was unavailable and progress of the project was not being assessed periodically by the State government also. **Thus, project for restoration and conservation of Shivpuri lake has not yet been completed, though scheduled for completion in August 2009.**

5. Monitoring of programmes for control of water

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
8 out of 8 projects	8 out of 8 projects	8 out of 8 projects	8 out of 8 projects

5.2 NLCP

By inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
1 out of 1 project	1 out of 1 project	1 out of 1 project	1 out of 1 project

[26] Rani Talab, Sagar, Shivpuri and Chandpatha.

5.3 Ground water (for six blocks test checked)

6 blocks were test checked for assessment of monitoring network with respect to ground water. These were: Indore, Pithampur (industrial cluster), Jabalpur (industrial cluster), Ratlam (fluoride), Khargone (fluoride) and Jhabua (fluoride).

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes	Yes, in 6 blocks

6. Outcomes

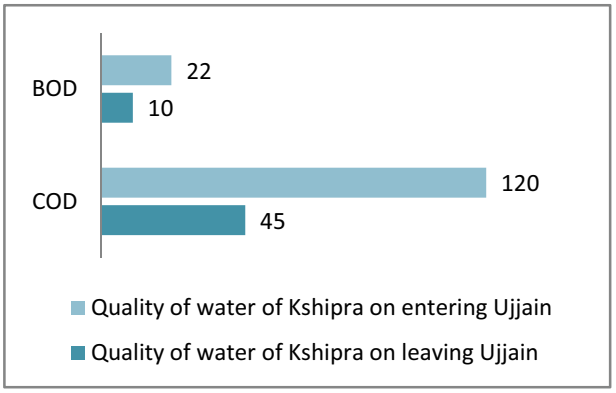
6.1 NRCP

(a) Betwa after leaving Vidisha

No analysis had been carried out by Public Health Engineering Department, Vidisha to test the quality of Betwa on entering Vidisha and after leaving Vidisha in terms of DO, BOD and TC. As such, there is no way to assess whether the projects undertaken for restoration of the Betwa were actually working.

(b) Kshipra after leaving Ujjain

With regard to water quality of river Kshipra, levels of DO and TC were not being measured and quality in terms of BOD and COD is depicted in the graph alongside. This shows an improvement in the status of water quality of Kshipra after it leaves Ujjain. However, in the absence of other indicators like TC and DO, no real conclusions regarding the quality of water in Kshipra can be derived.



6.2 NLCP

Activities relating to restoration and conservation of Shivpuri lake were not complete, as such no conclusion about outcomes could be reached.

State: Maharashtra

1. Background

The major rivers of Maharashtra are Godavari, Krishna, Tapti and Narmada. Some of the lakes in Maharashtra are Lonar Lake, Tulsi Lake, Powai Lake, Tansa Lake, Upwan Rankala Lake etc. According to Central Ground Water Board (CGWB), annual replenishable ground water resource in Maharashtra is 32.96 Billion Cubic Meters (BCM) while the net annual ground water availability is 31.21 BCM. Out of 231 talukas, in seven talukas ground water is over-exploited, in one taluka it is critical and in 23 talukas it is semi-critical. Contaminants like salinity, fluoride, iron and nitrate are present in some of the districts of Maharashtra.

Test checked rivers and lakes in Maharashtra

Insitutional arrangements in the State: As per information provided by MoEF, the Environment Department, Government of Maharashtra was the nodal department for NRCP and the implementing agencies were Maharashtra Jeevan Pradhikaran and Nashik Municipal Corporation, Maharashtra. Department of Environment, Government of Maharashtra and Kolhapur Municipal Corporation are the implementing agencies for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Maharashtra is discussed below:

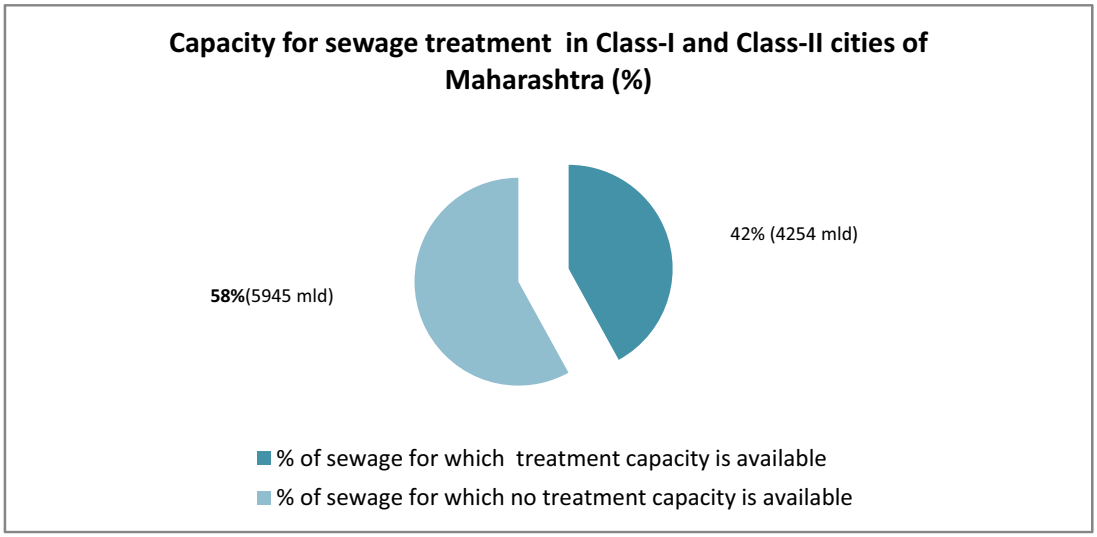
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Done	Not Done	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Not Done	Not Done	Done (arsenic, nitrate, iron, fluoride and salinity)
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable

	c) Quantification of contaminants	Partially (Nutrients: Done, Pathogenic organism: Done, Human produced chemicals: Not Done)	Not Done	Could not be verified
	d) Assessment of impact of human activities	Partially (Agriculture: Not Done, Industry: Not Done, Mining: Not Done, Dam: Not Done, Uncontrolled disposal of human waste: Done)	Not Done	Not Done
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Not Done	Not Done	Not Done
6. Constitution of Water Quality Review Committee		Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Maharashtra



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Maharashtra is 10199 mld, of which treatment capacity is available for only 4254 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Krishna, Godavari and Tapi rivers had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects were being implemented in seven cities[27]. 31 projects in these seven towns were sanctioned under NRCP and the total sanctioned cost of all the projects was ₹ 192.60 crore. **Nine projects [28] being implemented under NRCP at a cost of ₹ 100.74 crore were test checked for detailed examination.**

(i) Physical and financial progress

Name of the river/location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Sechduled date of completion	Actual date of completion
Krishna/ Karad	STP	0.55	0.86	June 2002	December 2006
	I&D	2.64	2.28	June 2002	December 2006
Godavari/ Nashik	I&D	31.46	29.69	March 2003	July 2006
	STP 78 mld at Tapovan	20.82	20.90	March 2003	April 2004
	STP 22 mld at Chehdi	7.00	6.99	March 2003	June 2007
Krishna/ Sangli	I & D	21.06	18.91	March 2007	Not completed
	STP	2.96 revised to 4.49	4.23	August 2004 revised to October 2006	Not completed
Godavari/ Nanded	STP	2.52 revised to 2.77	2.44	March 2000 revised to June 2005	Commissioned-June 2006
	I&D	6.50 revised to 9.95	9.92	March 2000 revised to June 2005	Commissioned-June 2006

ii) Performance of the projects

(a) Karad

The daily average estimated sewage generated in the city of Karad is 7.5 mld and STP capacity of 7.5 mld is available in the city. As such, the entire daily average sewage is treated and no untreated sewage is discharged into the Krishna river. **Details of four projects test checked in Karad which aim to improve the quality of water in Krishna are discussed below:**

Project	Findings
STP	• The project was completed in December 2006 after a delay of four years and six months. • The project was delayed due to change in the type of work. • SPCB regularly monitored the performance of the STP and the treated effluents from the STP met the standards prescribed by NRCD.
I&D	• The project was completed in December 2006 after a delay of four years and six months.

[27] Karad, Nashik, Nanded, Trimbakeshwar, Prakkasha, Kolhapur and Sangli on rivers Krishna, Godavari, Tapi and Panchganga

[28] Five projects on Godavari river and four projects on Krishna river

	• The project was delayed due to change in the type of work. • 4330 meters sewer lines were laid under the project. Further, four pumping stations of 173 LPS capacity were installed under the project. There was no information available to verify the capacity at which those pumping stations were being utilized. The performance of the work was not assessed after completion of the project.

(b) Nashik

The daily average estimated sewage generated in the city of Nashik is 250 mld and 130-140 mld of sewage is treated and the rest of the 110-120 mld untreated sewage is discharged into the River Godavari. **Details of four projects test checked in Nashik which aim to improve the quality of water in Godavari are discussed below:**

Project	Findings
I&D	• The project was completed in July 2006 after a delay of three years and four months. • The project was delayed due to delay in completion of some minor works of Takli Pumping Station. The project completion reports along with final utilization certificate were yet to be submitted to NRCD.
STP at Tapovan	• The project was completed in April 2004 after a delay of one year and one month. The project completion report along with the utilization certificate was yet to be submitted to NRCD. • The State government had not taken mandatory consent from SPCB for installation of STP.
STP at Chehdi	• The project was completed in June 2007 after a delay of four years and three months. • The project was delayed due to non-acquisition of land, change in designand increase in span of rainy seasons etc. • The STP did not perform full treatment capacity due to non-pumping of adequate quantity of sewage and the STP treated only 15 mld sewage. The rest of the seven mld of sewage remained untreated and was being discharged into Godavari river.

(c) Sangli

The daily average estimated sewage generated in the city of Sangli is 26.47 mld and STP capacity available in the city was adequate to treat 13 mld of sewage. However, no sewage was actually being treated and the entire 26.47 mld of untreated sewage was being discharged into River Krishna. **Details of four projects test checked in Sangli which aim to improve the quality of water in Krishna are discussed below:**

Project	Findings
I&D	• The project was scheduled for completion by March 2007.Only 54 per cent of works have been completed as of March 2010 defeating the purpose for which the project was sanctioned. • The project was delayed due to litigation.
STP	• The project was scheduled for completion by August 2004, it was still in progress as of March 2011. No reasons for the delay were available in files.

	• Even after time overrun of more than six years, only 70 per cent of work was completed. **Thus, the entire untreated sewage of Sangli city was being discharged into the river Krishna, defeating the purpose for which the project was sanctioned.**

(d) Nanded

The daily average sewage generated in the city of Nanded is 60 mld and no STP is available in the city. As such, the entire untreated sewage is discharged into the Godavari river. **Details of two projects test checked in Nanded which aim to improve the quality of water in Godavari are discussed below:**

Project	Findings
STP	• The project was completed and commissioned in June 2006 after a delay of six years and three months. • The project was delayed due to land litigation, rainy season and shifting of High Tension power line of Maharashtra State Electricity Board etc. • Entire structure of STP including stabilisation pond, inlet outlet arrangement and canal work were demolished and dismantled by NWMC and work for a new STP of 87 mld proposed under JNNURM was in progress on at the same site. Thus, the entire expenditure of ₹ 2.44 crore incurred on 26 mld STP under NRCP was rendered unfruitful besides non-achieving of desired benefits and water pollution abatement objectives of the scheme. • Avoidable expenditure of ₹ 54.52 lakh was incurred by MJP on watch and ward arrangement on the non-functional STP during June 2006 to December 2010.
I&D	• The project was commissioned in June 2006 after a delay of six years and three months. The completion report was not submitted to NRCD. • The project was delayed due to land litigation, heavy rains etc. • All the 19 drains trapped under NRCP were trapped near the bank of Godavari River well below High Flood Line by way of intercepting sewer line lying adjacent and parallel to the river bank in the backwaters zone; the same remained submerged during high flow. Thus, a polluting nerve in the form of intercepting sewer was created just adjacent to river whose pollution was to be abated. The whole intercepting sewer was submerged in rainy season, increasing the chances of mixing of sewage with river water. • During joint inspection in January 2011, it was found that pumping station and machinery created under the project at a cost of ₹ 1.60 crore were lying in a very neglected condition and the mobile generator set, electrical panel were found in damaged condition. The building glass and electrical fitting were also found in damaged condition. Some parts/spares were stolen from the pumping station.

Untreated sewage from STP in Karad flowing into Krishna

Abandoned works in Sangli

4.2 NLCP

Works relating to restoration and conservation of two lakes, i.e., Powai lake and Rankala lake were selected for detailed examination.

(i) Physical and financial progress

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Powai	6.62	4.32	April 2003	April 2003
Rankala	8.65	2.39	January, 2009	Work in progress

(ii) Performance of the projects

Project name	Findings
Powai	• The activities for conservation and restoration included water treatment and bioremediation through de-weeding, de-sludging, aeration, applying special bio-products for treatment and revival of the lake etc. • The project was sanctioned in June 2001 at an estimated cost of ₹ 6.62 crore with a scheduled date of completion by April, 2003 and was completed in time after incurring the expenditure of ₹ 4.32 crore. The project completion report along with final utilization certificate were yet to be submitted by Municipal Corporation of Greater Mumbai (MCGM) to NRCD. The project was also declared completed by NRCD. However, documents disclosed that the final payment of the contractor was yet to be paid which indicated that the project was still ongoing. • Unspent balance of ₹ 93.84 lakh was retained by Municipal Corporation of Greater Mumbai (MCGM).
Rankala	• In October, 2006, NRCD sanctioned a project to Kolhapur Municipal Corporation at an estimated cost of ₹ 8.65 crore with a scheduled date of completion by January 2009. Even though the sanction period of the project had expired in January 2009, the project was still continuing without any extension. • NRCD released ₹ 2.50 crore to the implementing agency, an expenditure of ₹ 2.39 crore was incurred on the project as of March 2010.

Thus, the project to restore and conserve Rankala lake did not meet its objectives.

Proliferation of weeds in Powai lake

Polluted shoreline of Powai Lake

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
0 out of 9 projects	0 out of 9 projects	0 out of 9 projects	0 out of 9 projects

5.2 NLCP

By inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
0 out of 2 projects	1 out of 2 projects	2 out of 2 projects	0 out of 2 projects

5.3 Ground water (for six blocks test checked)

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes, in 5 blocks	Yes, in 5 blocks	Yes	Yes, in 4 blocks

6. Outcomes

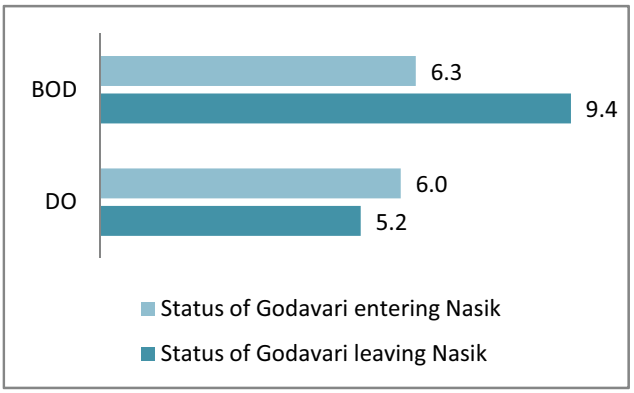
6.1 NRCP

(a) Water quality of Krishna after Karad

The daily average estimated sewage generated in the city of Karad is 7.5 mld and STP capacity of 7.5 mld is available in the city. As such, the entire daily average sewage is treated and no untreated sewage is discharged into the Krishna river.

(b) Water quality of Krishna after Sangli

The Dissolved oxygen (DO), Bio chemical Oxygen demand (BOD) and Total coli form (TC) of Krishna when it enters Sangli city and after lit leaves Sangli city had not been measured. As such, no indicators existed for arriving at any conclusions regarding quality of water in Krishna.

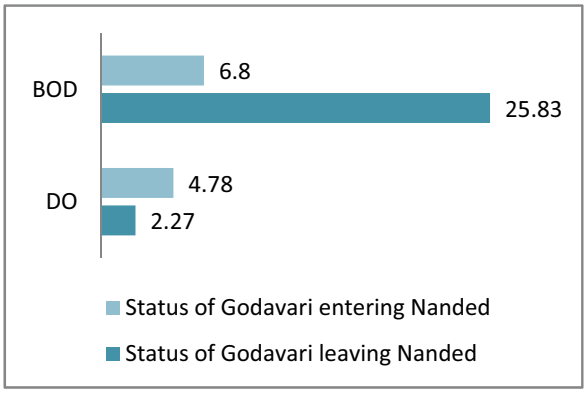


(c) Water quality of Godavari after Nashik

The status of Godavari river entering and leaving Nashik in terms of DO and BOD is shown in the chart opposite. TC at the time of river entering and leaving the town was 22.7 and 38.3 respectively. It can be seen that BOD rises by 49 *per cent* and TC increased by 68 *per cent* after Godavari leaves Nashik. This indicated that system of sewage treatment was inadequate.

(d) Water quality of Godavari after Nanded

Dissolved oxygen (DO) and Bio chemical Oxygen demand (BOD) of Godavari river when it enters Nanded city was 4.78 and 6.8 respectively and after the river Godavari leaves Nanded city, DO and BOD was measured as 2.27 and 25.83 respectively indicating worsening position. However, the TC had not been measured at the time of the river either entering or leaving the town.



6.2 NLCP

As the project on improving water quality of Rankala is still in progress, no conclusions could be drawn about impact of NLCP in restoring the lake. Powai lake water quality was not being monitored by Central Pollution Control Board.

State: Nagaland

1. Background

The main rivers flowing through Nagaland are Dhansiri, Doyang, Dikhu and Jhanji. Nagaland has lakes likes Shilloi which is the largest natural lake in Nagaland. There is also a landslide lake, Twin lake, Dzudu and Oxbow lakes. The annual replenishable ground water resource is 0.36 BCM while the net annual ground water availability is 0.32 BCM. According to CGWB, the status of ground water in Nagaland is generally good.

Test checked lakes in Nagaland

Insitutional arrangements in the State: As per information provided by MoEF, the Department of Public Health & Engineering, Government of Nagaland was the nodal department for NRCP. Department of Public Health & Engineering, Government of Nagaland is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Nagaland is discussed below:

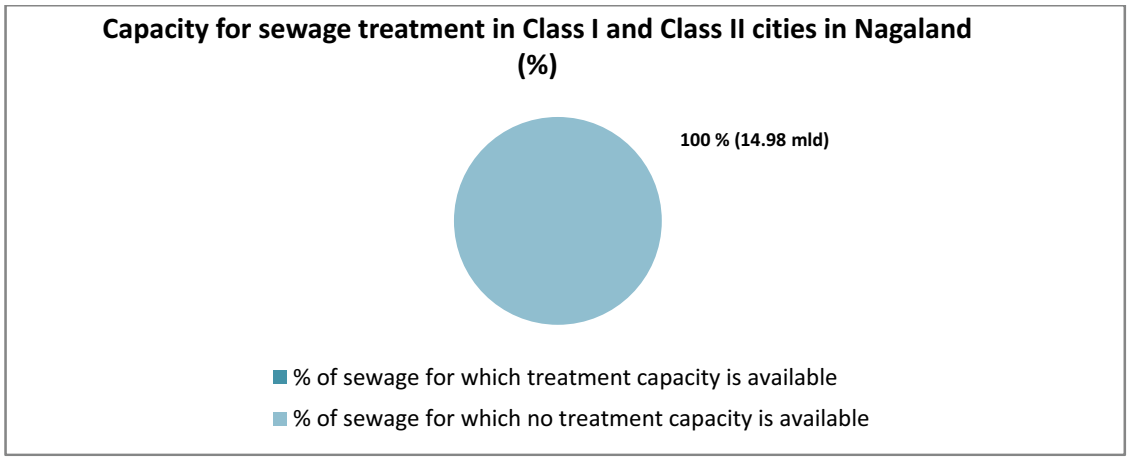
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Could not be verified	Could not be verified	Not Done
2. Assessment of water quality	**a) According to chemical Indicators**	Not Done	Not Done	Not Done
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Not Done	Not Done	Could not be verified
	d) Assessment of impact of human activities	Not Done	Not Done	Not Done
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Could not be verified	Could not be verified	Not applicable
	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done

5. Programmes for prevention and control of water pollution	Not Done	Not Done	Not Done
6. Constitution of Water Quality Review Committee	Not Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Nagaland



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Nagaland is 14.98 mld, for which no treatment capacity is available.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Even though Diphu has been selected for cleaning up under NRCP, it was observed that this river did not figure in the list of polluted rivers prepared by CPCB and this was not critically polluted. As such, taking up this river under NRCP was not justified.

4.2 NLCP

(i) Physical and financial progress

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Twin lake (Amok Lushi and Yimdong Awatsung)	25.83	6.46	October 2011	Not completed

(iii) Performance of the project

Project name	Findings
Twin lake (Amok Lushi and Yimdong Awatsung)	• The selection of Twin lakes under NLCP did not meet the selection criteria set out by MoEF with respect to physical parameters. It was observed that Amok Lushi and Yimdong Awatsung were only 1.85 acres and 0.85 acres respectively. Further, their depth was only 1.65 meters and 1.8 meters respectively. As such, they did not qualify for selection under NLCP. Further, according to MoEF, scientific criteria like discharge of industrial and domestic waste water into the lake and degradation of quality of lake water should be used to select a lake. It was observed that no such data on scientific criteria was available with Nagaland, yet the twin lakes were selected under NLCP. There was no discharge of any domestic, industrial or municipal waste water into the lakes. As such, the selection of the lakes under NLCP was not justified. • The project involved construction of sewers and manholes, sewage pumping unit, de-weeding, de-silting, storm water management, building check dams/silt traps, measures for shore line protection/ stabilization, inlet and outlet management, low cost sanitation works, lake front development, aquaculture etc. • The total cost of the project was ₹ 25.83 crore to be shared in the ratio 90:10 by Government of India and Government of Nagaland. The project was scheduled to be completed in October 2011. The Central Share of ₹ 5.81 crore and the State share of ₹ 0.65 crore were released in October 2009 and March 2010 respectively. • The Nagaland Government could incur an expenditure of ₹6.46 crore upto March 2011.

Lake Omuklushi

5. Monitoring of programmes for control of water pollution

5.1 NLCP

By inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
0 out of 1 project	0 out of 1 project	0 out of 1 project	0 out of 1 project

6. Outcomes

6.1 NLCP

Since the programme to restore and clean up the Twin Lake was still ongoing, no conclusions can be drawn about its impact on improving the quality of water.

State: Odisha

1. Background

Mahanadi, Subarnarekha and Brahmani are the major rivers of Odisha. Some of the lakes in Odisha are Chillika Lake, Bindusagar Lake etc. According to Central Ground Water Board, the annual replenishable ground water resource in the State is 23.09 BCM and the net annual ground water availability is 21.01 BCM. Out of the 314 blocks in the State, in none of them is the ground water over-exploited, critical or semi-critical. Some of the contaminants affecting ground water in Odisha are fluoride, iron and nitrate.

Test checked rivers and lakes in Odisha

Insitutional arrangements in the State: As per information provided by MoEF, Housing & Urban Development Department, Government of Odisha is the nodal department for NRCP and the implementing agency is Odisha Water Supply and Sewerage Board. Bhubaneswar Municipal Corporation (BMC) is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Odisha is discussed below:

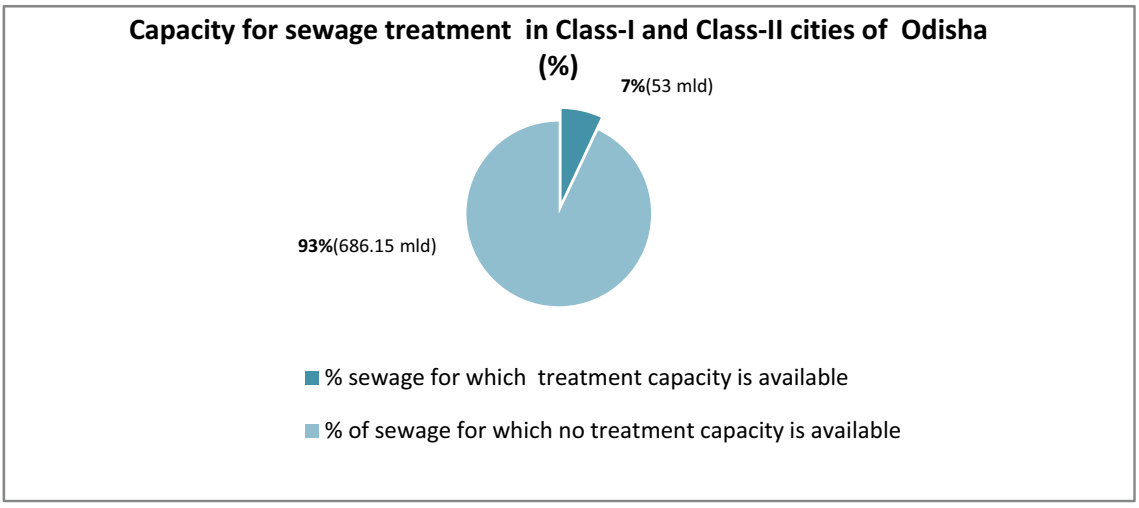
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Could not be verified	Could not be verified	Could not be verified
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Done	Could not be verified
	b) According to Biodiversity indicators	Could not be verified	Could not be verified	Not applicable
	c) Quantification of contaminants	Partially (Nutrients: Done, Pathogenic organism: Could not be verified, Human produced chemicals: Done)	Partially (Nutrients: Done, Pathogenic organism: Could not be verified, Human produced chemicals: Could not be verified)	Could not be verified

	d) Assessment of impact of human activities	Partially (Agriculture: Done, Industry: Done, Mining: Done, Dam: Could not be verified, Uncontrolled disposal of human waste: Done)	Not Done	Could not be verified
3. Identification of risks to environment and health	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable
	b) Risks to aquatic species	Could not be verified	Could not be verified	Not applicable
	c) Risks to human health	Done	Partially	Could not be verified
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Could not be verified	Could not be verified	Could not be verified
6. Constitution of Water Quality Review Committee		Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Odisha



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Odisha is 739.15 mld, of which treatment capacity is available for only 53 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Brahmani and Mahanadi rivers and the coastal area of Puri had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects were being implemented in five cities viz. Chandbali, Cuttack, Dharamshala, Talcher and Puri on rivers Brahmani and Mahanadi and Puri coastal area. 22 projects in these five cities were sanctioned under NRCP out of which 13 were completed as of March 2010. The total

sanctioned cost of all the projects was ₹ 92.74 crore. **Seven projects being implemented under NRCP at a cost of ₹ 81.01 crore were test checked for detailed examination.**

(i) Physical and financial progress

Name of the river/location	Name of the project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Mahanadi/ Cuttack	I&D Part II	1.20	1.40	September 2005	September 2008
	STP, Matagajpur	3.51	3.65	March 2003	August 2006
	I&D Part I	3.20	2.46	March 2003	September 2008
	LCS	0.13	0.18	March 2001	December 2002
Coastal area/ Puri	I&D	51.80	Consolidated expenditure of 48.66 (as on January, 2010) for the Project titled 'Sewage collection and Treatment System for Puri Town in Odisha'	March 2006 (Original), March 2009 (Revised)	The project is not completed as a whole
	MPS	9.95			
	STP	11.22			

(ii) Performance of the projects

(a) Cuttack

The daily average sewage generated in the city of Cuttack is estimated to be 80 mld. However, only 37.5 mld is treated and the rest 42.5 mld is discharged into the Mahanadi. **Details of the projects test checked for improving water quality of Mahanadi river are discussed below:**

Project name	Findings
I&D Part II	• The project was completed in September 2008 after a delay of three years. Information regarding submission of completion report and final UC to MoEF was not available. • The project was delayed due to interference by public as a result of which the contractor could not complete the work in time. • No infrastructural problem was hampering its performance. The responsibility for O&M of the created asset was allocated to Cuttack Municipal Corporation.
STP, Matagajpur	• The project was completed in August 2006 after a delay of three years and five months due to which the project cost escalated by almost ₹ 14 lakh. • The project was delayed due to change in design of the STP. • The STP capacity was being fully utilised.

I&D Part I	• The project was completed in September 2008 after a delay of five years and six months. Further, information regarding submission of completion report and final UC to MoEF was not available. • The project was delayed due to interference by public as a result of which the contractor could not complete the work in time. • Against the target of 2435 meters of sewer lines to be laid under the project, only 2264 meters were laid. • Even though the project had been completed by 2008, it was yet to be taken over by Cuttack Municipal Corporation which was the agency designated for its operation and maintenance.
LCS	• The project was completed in December 2002 after a delay of one year and nine months • The project was delayed due to delay in handing over site, labour problems and non-availability of material in rainy season. • No infrastructural problem was hindering the operation of the LCS.

(b) Puri

The daily average sewage generated in the city of Puri is estimated to be 28 mld. However, only five mld STP capacity is available and no sewage is actually treated. As such, the entire 28 mld of sewage is discharged into the Bay of Bengal. **Details of the project test checked in Puri which aimed to stop the Bay of Bengal from getting contaminated from sewage is discussed below:**

Project name	Findings
Sewage collection and Treatment System	• The project, which included construction of I&D, STP & MPS, was scheduled to be completed in March 2006. Though the scheduled date of completion was revised to March 2009, the project is still not complete. • The project was delayed due to (i) Submission of incorrect original DPR prepared by NEERI, Nagpur, (ii) Unfavourable site conditions and other technical reasons in Zone-B & C-I, (iii) Average soil condition (iv) High water level condition and (v) Delay in obtaining clearance from Odisha State Coastal Zone Management Authority (CSCZMA) etc. Further, delay in construction of I&D impacted the progress of STP proposed under the project.

Untreated sewage flowing into the Mahanadi

Untreated sewage flowing directly from STP into Bay of Bengal in Puri

4.2 NLCP

(a) Planning for NLCP

Bindusagar lake, which was the only lake in Odisha in the list of polluted lakes prepared by CPCB was selected under NLCP.

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Bindusagar lake	3.36	1.21	March 2007	Not completed

The project is discussed below:

Project name	Findings
Bindusagar lake	• Activities envisaged for restoration and conservation of the Bindusagar lake were providing simple and biological treatment using aquaculture, providing sanitary facilities for pilgrims and community members, restoration of the lake by de-weeding, de-watering & de-silting; aesthetic development and beautification, setting up of an Interpretation Centre etc. • The project was to be completed by March 2007 but it was not yet complete as the low cost sanitation had not yet been built and the construction of the interception and diversion sewers was also not complete. Further, it was observed that no remedial action was taken to start the non-functioning Bioremediation Plant and to connect all the septic tanks to the new sewerage system. • The State government did not provide reasons for non-completion of the project.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of Implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered Committee under CM
0 out of 7 projects	0 out of 7 projects	0 out of 7 projects	3 out of 7 projects

5.2 NLCP

By Inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water Quality monitoring plan
0 out of 1 project	0 out of 1 project	0 out of 1 project	0 out of 1 project

5.3 Ground water (in six blocks test checked)

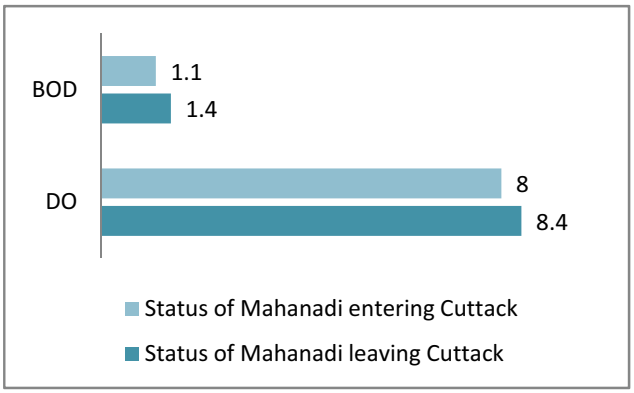
Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes	Yes

6. Outcomes

6.1 NRCP

(a) Water quality in Mahanadi after Cuttack

The daily average sewage generated in the city of Cuttack is estimated to be 80 mld. However, only 37.5 mld is treated and the rest 42.5 mld is discharged into the Mahanadi.Five drains open into the river out of which four have been intercepted and one still needs to be intercepted. Status of Mahanadi on entering Cuttack and after leaving Cuttack in terms of DO and BOD is shown in the chart alongside. It can be seen that BOD actually rises after Mahanadi leaves Cuttack, highlighting the inadequate sewage treatment facilities. Further TC also rises from 1287 mpn/100ml at the time of entering Cuttack to 3967 mpn/100ml when Mahanadi leaves Cuttack.



6.2 NLCP

As the project on improving water quality of Bindusagar lake is still in progress, no conclusions could be drawn about impact of NLCP in restoring the lake.

State: Punjab

1. Background

The State of Punjab derives its name from 'Punj' and 'Aab' i.e. the land of five rivers namely Sutlej, Beas, Ravi, Jhelum and Chenab that flowed through the erstwhile Punjab.

According to the Central Ground Water Board, the annual replenishable ground water resources in the State are 23.78 Billion Cubic Meters (BCM), while the net annual ground water availability is 21.44 BCM. Ground water resources in the State are being used for drinking and irrigation to a large extent. The ground water is contaminated by salinity and presence of fluoride, chloride, iron and nitrate.

Test checked rivers in Punjab

Insitutional arrangements in the State: As per information provided by MoEF, the Department of Local Government, Government of Punjab was the nodal department and Punjab Water Supply and Sewerage Board (PWSSB) was the nodal implementing agency for NRCP in the State.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Punjab is discussed below:

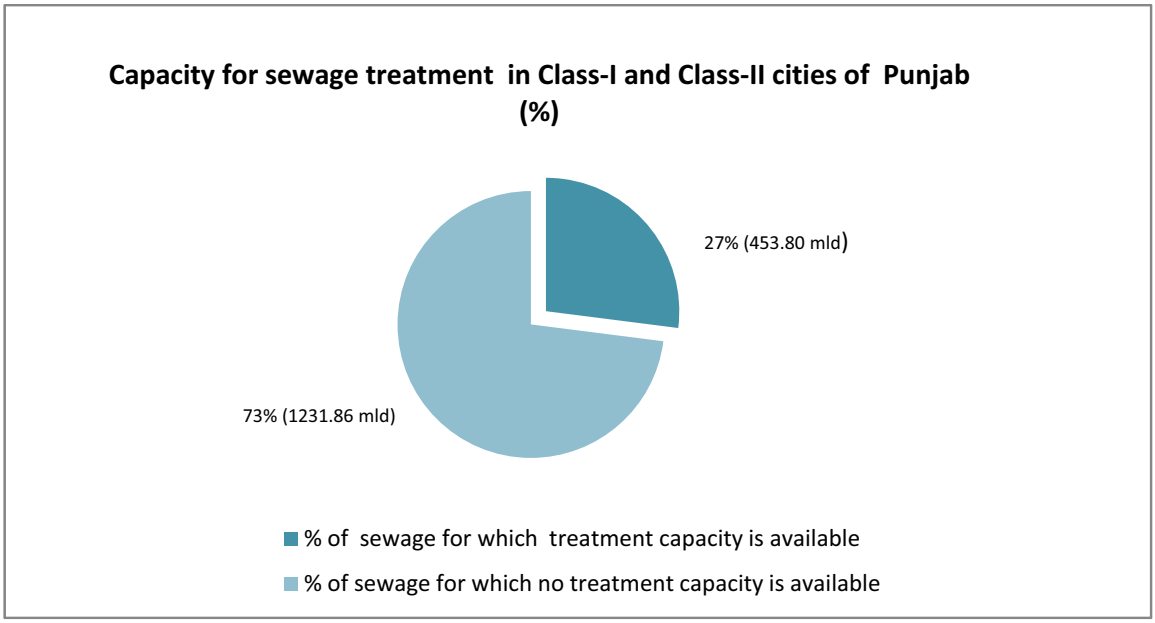
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Done	Could not be verified	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Could not be verified	Done (arsenic, nitrate, iron, fluoride and salinity)
	b) According to Biodiversity indicators	Done	Could not be verified	Not applicable
	c) Quantification of contaminants	Not Done	Could not be verified	Could not be verified
	d) Assessment of impact of human	Not Done	Could not be verified	Partially (Agriculture: Done,

	activities			Industry: Not Done, Uncontrolled disposal of human waste Not Done)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Done	Done	Not applicable
	b) Risks to aquatic species	Not Done	Not applicable	Not applicable
	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Could not be verified, Industry: Could not be verified, Agriculture non point sources: Not done)	Partially (Source water protection: Not Done Industry: Could not be verified, Agriculture non point sources: Not Done)	Partially (Industry: Could not be verified, Agriculture non point sources: Not Done)
6. Constitution of Water Quality Review Committee		Done		

[Note: Not applicable: Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Punjab



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Punjab is 1685.66 mld, of which treatment capacity is available for only 453.80 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Sutlej river had been selected for pollution abatement under the National River Conservation Programme (NRCP). Projects are being implemented in six cities[29] situated on the banks of river Sutlej. 60 projects in these six towns were sanctioned under NRCP out of which 50 were completed as of March 2010. The total sanctioned cost of all the projects was ₹ 215.68 crore. **Eight projects[30] being implemented under NRCP at a sanctioned cost of ₹141.52 crore were test checked for detailed examination.**

(i) Physical and financial progress

Name of the river/location	Name of the project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Sutlej/ Jalandhar	100 mld STP at Pholriwal	22.84	29.14	November 2004	March 2008
	MPS at Garha	8.79	8.79	August 2003	August 2005
Sutlej/ Ludhiana	111 mld STP at Bhattian	34.85	37.59	December 2004	March 2008
	152 mld STP at Balloke	34.79	42.67	January 2005	March 2008
	48 mld STP at Jamalpur	13.46	14.56	September 2005	March 2008
	MPS at Bhattian	8.03	7.50	August 2003	August 2003
	MPS at Balloke	14.92	15.27	August 2003	August 2003
	MPS at Jamalpur	3.84	3.23	August 2003	August 2003

(ii) Performance of the projects

(a) Jalandhar town

The average sewage generated in Jalandhar is 235 mld. However, treatment capacity is only 100 mld and only 82 mld of sewage is treated, leaving 153 mld of waste water to be discharged into the Sutlej. **Details of projects test checked in Jalandhar town to control pollution of Sutlej river are discussed below:**

Project name	Findings
STP at Garha (Pholriwal)	• The project was completed in March 2008 after a delay of three years and four months. The Implementing Agency had not submitted the completion report and final utilisation certificate to NRCD. • An expenditure of ₹ 29.14 crore was incurred against a sanctioned cost of ₹ 22.84 crore resulting in cost overrun of ₹ 6.3 crore. The reasons for cost overrun were late acquisition of land and increase in price of land.

[29] Ludhiana (District Ludhiana), Jalandhar, Phagwara, and Phillaur (District Jalandhar), Kapurthala and Sultanpur Lodhi (District Kapurthala)
[30] Two at Jalandhar and six at Ludhiana.

	• The project was delayed due to late acquisition of land. • The STP was constructed to treat 100 mld of sewage but it was treating only 82 mld sewage and rest 18 mld was flowing untreated into the river. The State government did not initiate any action to address the problem of underutilization. Resource recovery from the STP was also not taking place. • BOD was above prescribed limit in the months of April, June, July and October 2010. TSS was above prescribed limit in the month of June 2010 and pH and COD were within the prescribed limit whereas Oil & Grease were not being tested.
MPS at Garha:	• The project was completed in August 2005 after a delay of two years • The MPS received sewage of 125 mld (against designed capacity of 100 mld), however it pumped only 81.42 mld sewage to STP.

(b) Ludhiana

The average sewage generated in Ludhiana is 496 mld, however, sewage treatment capacity is only 311 mld and only 203 mld gets treated. As a result, 293 mld of untreated sewage is discharged into the Sutlej. **Details of projects test checked in Ludhiana town to control pollution of Sutlej river are discussed below:**

Project name	Findings
STP at Bhattian	• The project was completed in March 2008 after a delay of three years and three months. The Implementing Agency had not submitted the completion report and final utilisation certificate to NRCD. • An expenditure of ₹ 37.59 crore was incurred on the project against the sanctioned cost of ₹ 34.85 crore, resulting in a cost escalation of ₹ 2.74 crore. • The project was delayed due to late acquisition of land. • Though the STP capacity was 111 mld, it was underutilized as it was treating only 81 mld of sewage. The treated sewage is meeting the prescribed standards in relation to pH, BOD, COD and TSS. However, oil and grease were not being tested.
STP at Balloke	• The project was completed in March 2008 after a delay of three years and two months. The Implementing Agency had not submitted the completion report and final utilisation certificate to NRCD. • An expenditure of ₹ 42.67 crore was incurred on the project against the sanctioned cost of ₹ 34.79 crore, resulting in a cost escalation of ₹ 7.88 crore. • The project was delayed due to late acquisition of land and abandonment of work by contractual agency and re-tendering of work. • Though the STP capacity was 152 mld, it was treating only 74 mld of sewage. Further STP was receiving dairy waste i.e cow

	dung, wheat husk and green fodder which was affecting the performance of the STP. The BOD was above prescribed limit in the month of August 2010. TSS, pH and COD were within prescribed limit whereas oil & grease were not being tested.
STP at Jamalpur	• The project was completed in March 2008 after a delay of two years and six months. The Implementing Agency had not submitted the completion report and final utilisation certificate to NRCD. • An expenditure of ₹ 14.56 crore was incurred on the project against the sanctioned cost of ₹ 13.46 crore resulting in cost escalation of ₹1.10 crore. • The project was delayed due to non clearance of site by Municipal Corporation. • The STP's capacity was 48 mld and it was treating 48 mld of waste water. The performance of the STP was being affected due to inflow of industrial waste, delay in chlorination work and non availability of uninterrupted power. BOD and TSS were above prescribed limit in the month of August 2010.
MPS at Bhattian	• The project scheduled for completion in August 2003 was completed on time. • The MPS has been receiving untreated industrial effluents due to which it was overloaded and its condition had deteriorated its performance. The MPS had to be shut down frequently due to power cuts and the case for hot line connection for electricity was pending due to want of fund from Municipal Corporation, Ludhiana.
MPS at Balloke	• The project scheduled for completion in August 2003 was completed on time. • An expenditure incurred on the project was ₹ 15.27 crore against a sanctioned cost of ₹ 14.92 crore resulting in cost escalation of ₹ 35 lakh. • The MPS was receiving dairy waste that is cow dung, wheat husk and green fodder from the nearby dairy complex which was affecting its performance.
MPS at Jamalpur	• The project was scheduled for completion in August 2003 was completed on time. • The MPS was receiving untreated industrial effluents affecting its performance and deteriorating its performance. The MPS had to be shut down frequently due to power cuts and the case for hot line connection for electricity was pending due to want of fund from MC Ludhiana.

Thus, the sewerage treatment facilities installed projects for prevention of pollution of Sutlej in the towns of Jalandhar and Ludhiana were not working to full potential as envisaged.

4.2 NLCP

No lake in Punjab was included for conservation and renovation under NLCP.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered Committee under CM
0 out of 8 projects	0 out of 8 projects	8 out of 8 projects	8 out of 8 projects

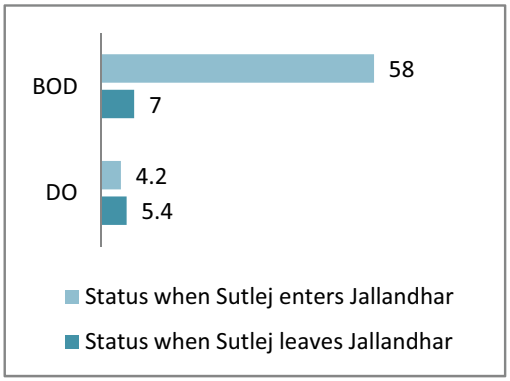
5.2 Ground water (in six blocks test checked)

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	1 out of 6	Yes	Yes

6. Outcomes

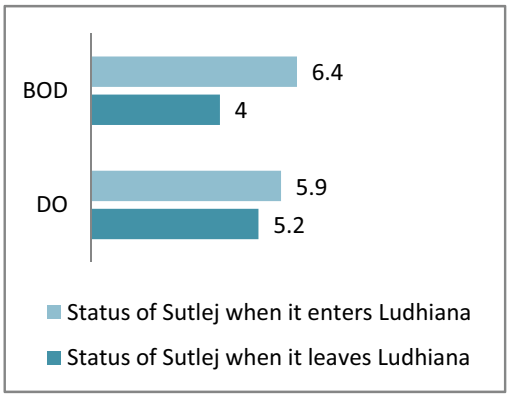
6.1 NRCP

(a) Water quality of Sutlej after Jalandhar



Status of water quality of river in terms of BOD and DO before entering Jalandhar and after leaving Jalandhar town is shown in the figure alongside. Apart from BOD and DO, the TC count of Sutlej falls from 1500000 to 50000 after it leaves Jalandhar. While there was improvement in water quality, BOD was still 2.3 times the criteria, TC was 100 times the criteria in Sutlej as it left Jalandhar. This indicated organic pollution as well as presence of disease causing, fecal-related bacteria, viruses and protozoa which cause illness.

(b) Water quality of Sutlej after Ludhiana



Status of water quality of Sutlej in terms of BOD and DO before entering Ludhiana and after leaving Ludhiana town is shown in the figure alongside. Apart from BOD and DO, the TC count of Sutlej increases from 500 at the time of entering Ludhiana to 22,000 after it leaves Ludhiana which shows decline in water quality. While DO did not exceed the criteria, TC was 44 times the criteria in Sutlej river as it left Ludhiana city, indicating the presence of a large number disease causing, fecal-related bacteria, viruses and protozoa which cause illness.

State: Rajasthan

1. Background

Some of the rivers in Rajasthan are Arvari River, Banas River, Berach River, Chambal River, Ghaggar-Hakra river, Gomati River, Kali Sindh River, Luni River, Mithari River, Sabarmati River, etc. Some of the lakes in Rajasthan are Ana Sagar lake, Balsamand lake, Man Sagar Lake, Nakki Lake, Lake Pichola, Pushkar Lake, Rajsamand Lake, Sambhar Salt Lake etc. According to Central Ground Water Board, the annual replenishable ground water resources in Rajasthan was 11.56 Billion Cubic Meters (BCM) and the net annual ground water available was 10.38 BCM. Out of 236 blocks, in 140 blocks in Rajasthan the ground water was over-exploited, in 50 blocks it was critical and 14 blocks the ground water was semi-critical. Contaminants like salinity, fluoride, chloride, iron and nitrate affected ground water.

Test checked rivers and lakes in Rajasthan

Insitutional arrangements in the State: As per information provided by MoEF, Local Self Government Department, Government of Rajasthan was the nodal department while implementing agencies are Public Health Engineering Department and Rajasthan Urban Infrastructure Development Project for NRCP. Jaipur Development Authority and Rajasthan Urban Infrastructure Development Project (RUIDP), Government of Rajasthan is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Rajasthan is discussed below:

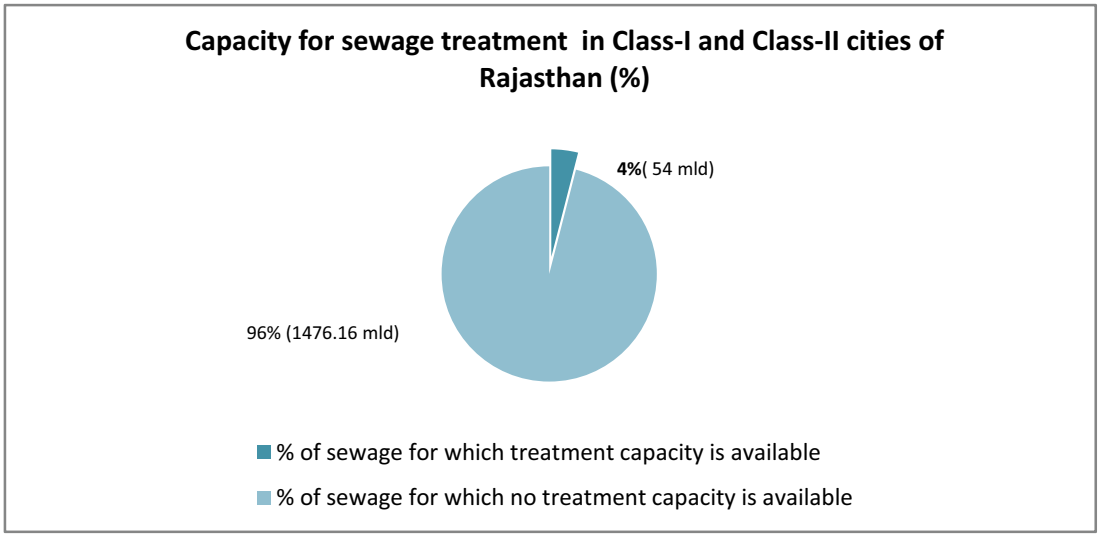
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Could not be verified	Could not be verified	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Not Done	Not Done	Done
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Not Done	Not Done	Could not be verified
	d) Assessment of impact of human activities	Not Done	Not Done	Could not be verified

3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Not Done, Industry: Not Done, Agriculture non point sources: Not Done)	Not Done	Not Done
6. Constitution of Water Quality Review Committee		Could not be verified		

[**Note: Not applicable :** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Rajasthan



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Rajasthan is 1530.16 mld, of which treatment capacity is available for only 54 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

River Chambal Kota had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects are being implemented in two cities viz. Kota and Keshoraipattan.Eight projects in these two towns were sanctioned under NRCP out of which five were completed as of March 2010. The total sanctioned cost of all the projects was ₹ 150.95 crore. **Four projects being implemented under NRCP at a cost of ₹ 150.23 crore were test checked for detailed examination.**

(i) Physical and financial progress

Name of the river/ location	Name of project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Chambal/ Kota	STP 30 & 6 mld and I&D	149.59	25.33	March 2015	On going
	LCS	0.55	0.46	March 2001	Completed but date of completion not available
	RFD	0.07	0.13	December 2000	December 2000
	Improved Wood crematoria	0.02	0.02	April 2000	April 2000

(ii) Performance of the projects

(a) Kota

The average sewage generated in the city of Kota is 97.29 mld. The STP capacity available was only 20 mld. However, the entire 97.29 mld untreated sewage is discharged into the Chambal. 22 drains are falling into the river. However, all drains were yet to be intercepted. **Details of four projects test checked in Kota which aim to improve the quality of water in Chambal are discussed below:**

Project	Findings
STP 30 & 6 mld and I & D	• The project was sanctioned in October 2009 with scheduled date of completion by March 2015. • An expenditure of ₹ 25.33 crore was incurred on the project upto June 2011 and the project was still ongoing.
LCS	• The project was completed after incurring an expenditure of ₹46.44 lakh.
RFD	• The project was completed on time in December 2000. • An expenditure of ₹ 12.54 lakh on the project against the sanctioned cost of ₹ 6.80 lakh, resulting in cost escalation of ₹ 5.74 lakh. The excess expenditure had been incurred in larger public interest by Nagar Nigam Kota from its own resources.
Improved Wood Crematoria	The project was completed on time in April 2000.

4.2 NLCP

Five lakes namely Mansagar lake, Annasagar lake, Pushkar lake, Fatehsagar lake and Pichola lake had been selected for pollution abatement projects under the National Lake Conservation Programme (NLCP). Out of these, three lakes having sanctioned cost of ₹ 157.83 crore were test checked for detailed examination.

(i) Physical and financial progress

Name of lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion

Mansagar	22.39 revised to 24.72	24.72	March 2004 revised to March 2007	Ongoing
Pushkar	48.36	27.14	August 2010	Ongoing
Pichola	84.75	3.84	February 2012	Ongoing

These projects are discussed below:

Project name	Findings
Mansagar Lake	• The activities for restoration and conservation of Mansagar lake included construction of lake front promenade, construction of check dam in forest valley, construction of three nesting islands, installation of physico-chemical treatment plant, construction of artificial wetland and in-situ bio-remediation system. • The scheduled date of completion was March 2004 which was revised to March 2007 but the project is still not declared commissioned/ completed. The commissioning of in-situ Bioremediation and Wetlands was still pending for want of achieving desired quality parameters. • The project was delayed due to land acquisition for setting up constructed wetlands approved as an integral component under the project. However, scrutiny revealed that there was delay in availability of land for construction of physico chemical treatment plant. • An expenditure of ₹ 24.72 crore was incurred upto May 2011. • The levels of Biochemical Oxygen Demand had come down after implementation of the project for conservation and restoration of Mansagar lake, however, they were still above the criteria, signifying high levels of organic pollution in the lake.
Pushkar Lake	• The restoration and conservation of Pushkar Lake involved activities like de-silting, lake front development, aeration with ozoniser, afforestation, inlet-outlet arrangement etc. • The project was scheduled to be completed by August 2010 but it was not yet complete. Till November 2010, the de-silting work and building of toilets, aeration, construction of inlet-outlet and settling tank were completed. The lake front development works, works relating to afforestation were still ongoing. • The works for conservation of Pushkar lake included hydraulic improvement of feeders including Pushkar Feeder with most of its stretch in Forest area. The required clearance from the Forest Department was delayed and could be obtained only in December 2010. The work order for that component was issued in December 2010. As informed by the State Government, the project was now scheduled for completion in December 2011.
Pichola lake	• The restoration and conservation of Pichola Lake involved activities like de-silting, storm water management and development of artificial wetland, hydraulic improvement of feeder and other channels, shore line demarcation and protection etc. • The scheduled date of completion of the project is February 2012.

- An expenditure of ₹ 3.84 crore was incurred on the project up to May 2011.
- The I&D works could not be taken up due to stay granted by Hon'ble High Court on the STP land. Further, the proposal of M/s Hindustan Zinc Ltd. to establish 20 mld STP at the available site was presently under consideration by the project proponents. For other works like de-weeding, water quality monitoring, aeration etc, tenders were invited 2-3 times to select technically responsible bidders. Delay in project implementation was also due to demarcation of Lake Boundary not completed by Water Resources Department.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

Chief Executive of Implementing Agency	Divisional Project Monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered Committee under CM
1 out of 4 projects	0 out of 4 projects	In 1 out of 4 projects	0 out of 4 projects

5.2 NLCP

Inter-Departmental coordination committee	Steering Committee at the district level	Lake specific Monitoring Committee	Water quality monitoring plan
3 out of 3 projects	3 out of 3 projects	3 out of 3 projects	0 out of 3 projects

5.3 Ground water (in five blocks test checked)

5 blocks were chosen for assessment of monitoring network with respect to ground water. These were Udaipur, Jalore, Jaipur, Pali and Tonk.

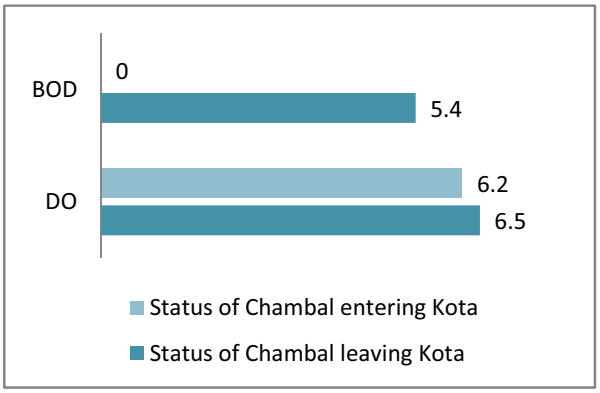
Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Partially (Yes for two blocks, no information for two blocks and absent in remaining 2)	Partially (Yes in 4 blocks, Not Done in two blocks)	Yes	Could not be verified

6. Outcomes

6.1 NRCP

Quality of water in Chambal after Kota

Status of Chambal on entering Kota in terms of DO and BOD is shown in the chart alongside. It can be seen that BOD actually rises after Chambal leaves Kota, highlighting the inadequate sewage treatment facilities. TC was also almost five times the criteria in Chambal river as it left Kota city indicating the presence of a large number disease causing, fecal-related bacteria, viruses and protozoa.



6.2 NCP

As the projects on improving water quality of Pichola and Pushkar lake are still in progress, no conclusions could be drawn about impact of NLCP in restoring these lakes. It was observed that the levels of Biochemical oxygen Demand had come down after implementation of the project for conservation and restoration of Mansagar lake.

7 Monitoring network for tracking pollution of ground water

(i) Implementation of Rajasthan Integrated Fluorosis Mitigation Programme (RIFMP).

To achieve the prevention and control measures for mitigation of fluorosis, the Rajasthan Integrated Fluorosis Mitigation Programme was conceived in which the fluoride affected villages were planned to be covered in three phases

- I Phase started in March 2005 and completed in February 2008
- II phase started in 17 August 2006 and still in progress
- III phase has not yet been started

Audit scrutiny revealed the following:

- There was tardy progress in execution of the scheme as the phase I of the project envisaged to provide fluoride free drinking water to 2643 villages and dhanis through OHSR, HP attached defluoriedunits and DDFUs upto March 2005. But only 1681 villages/habitations (64%) were benefited upto February 2008.
- There was wasteful expenditure of ₹ 79.25 lakh on installation of handpump attached defluoridation units (HPADFUs)
- Funds amounting to ₹ 51.87 lakh were blocked due to non-distribution of domestic defluoridation units.
- Domestic defluoridation units were not maintained properly as the chemical (activated alumina) were not provided to the users.
- 100 roof top rainwater harvesting structures were proposed to be constructed in village/habitation having population less than 100 souls. However, these were not constructed in any of the village/habitation.
- Guidelines of National Rural Drinking Water Programme (NRDWP) envisaged that Field Testing Kits (FTKs) will be provided to each Gram Panchayat for testing the quality of water being made available to villagers to know about the existence of various chemicals including fluoride. It was observed that against the total requirement of 318316 FTKs (Chemical and Bacteriological), 100665 FTKs were short purchased. Further, out of 217651 FTKs purchased, 27152 FTKs were short distributed, due to which the purpose of the scheme to provide safe and fluoride free water to about 40 per cent population could not be achieved.

State: Sikkim

1. Background

Teesta & Rangit are the major rivers of the State. Some of the major lakes in Sikkim are Khecheoperi, Gurudungmar, Lam Pokhari, Changu, Laxmi Pokhari etc. According to Central Ground Water Board, annual replenishable ground water resource in Sikkim is 0.08 Billion Cubic Meters (BCM) while the net annual ground water availability is 0.08 BCM. In none of the blocks is the ground water over-exploited, critical or semi-critical.

Rivers test checked in Sikkim

Insitutional arrangement in the State: As per information provided by MoEF, the nodal agency for implementation of NRCP was Water Security & Public Health Engineering Department, Government of Sikkim.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in Sikkim is discussed below:

		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Not Done	Not Done	Could not be verified
2. Assessment of water quality	**a) According to chemical Indicators**	Not Done	Not Done	Could not be verified
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Not Done	Not Done	Could not be verified
	d) Assessment of impact of human activities	Not Done	Not Done	Could not be verified
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c) Risks to	Not Done	Not Done	Not Done

human health			
4. Policy for water pollution	Could not be verified	Could not be verified	Could not be verified
5. Programmes for prevention and control of water pollution	Partially (Source water protection: Could not be verified, Industry: Could not be verified, Agriculture non point sources: Done)	Partially (Source water protection: Could not be verified, Industry: Could not be verified, Agriculture non point sources: Done)	Could not be verified
6. Constitution of Water Quality Review Committee	Done		

[**Note: Not applicable :** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Implementation of programmes for control of water pollution

3.1 NRCP

In Sikkim, Rani Chu river had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects were being implemented in three cities viz., Gangtok, Singtom and Raniphool. Six projects in these three towns were sanctioned under NRCP out of which one was completed as of March 2010. The total sanctioned cost of all the projects was ₹114.31 crore. **Two projects being implemented under NRCP in Gangtok at a cost of ₹ 25.16 crore were test checked for detailed examination.**

(i) Physical and financial progress

Name of the river/location	Name of project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Rani-Chu/ Gangtok	Sewerage and STP	15.81 revised to 17.17	17.12	March 2008	January 2011
	Rehabilitation of Main Sewer Line including construction of STP	7.99	5.93	July 2010	Not completed

(ii) Performance of the projects

(a) Gangtok:

The average sewage generated in the city of Gangtok is 11 mld. However, only eight mld is treated and the rest three mld is discharged into the Rani Chu.

Details of two projects test checked in Gangtok which aim to improve the quality of Rani Chu's water quality are discussed below:

Project	Findings
Sewerage and STP	• The project was completed in January 2011 after a delay of two years and ten months. • The project was delayed due to reasons like frequent

	blockage of roads, budgetary constraints due to delay in release of State share, unexpected hard rock during excavation of foundation etc. • The completion of the project had not yet been assessed by the State on basis of set targets/ performance milestones.
Rehabilitation of Main Sewer Line and construction of STP	• The project scheduled for completion in July 2010 was not yet complete. • The project was delayed due to reasons like unforeseen blockage of roads and time taken for finalization of appropriate technology for STP.
Thus both the test checked projects had failed to meet the objectives of controlling pollution of Rani Chu river.	

Direct dumping of household waste into Rani Chu

Direct dumping of waste into Rani chu

3.2 NLCP

Despite presence of many lakes in Sikkim, none of them were taken up for restoration under NLCP. None of the lakes in Sikkim however figured in the list of polluted lakes identified by CPCB.

4. Monitoring of programmes for control of water pollution

4.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High Powered Committee under CM
2 out of 2 projects	0 out of 2 projects	2 out of 2 projects	0 out of 2 projects

4.2 Ground water

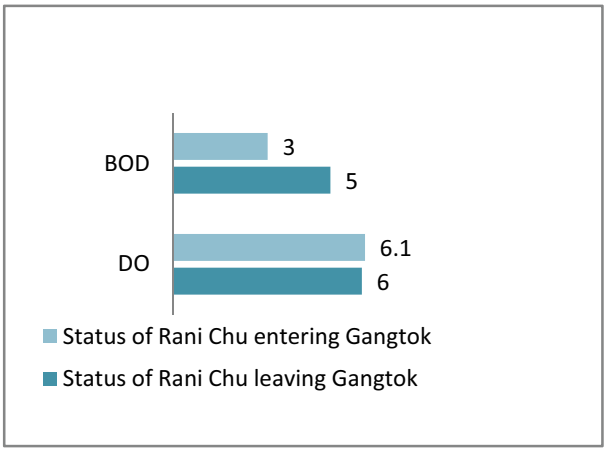
No programmes or monitoring network by the State government exists due to absence of ground water pollution in the State.

5. Outcomes

5.1 NRCP

a) Water quality of Rani Chu after Gangtok

Status of Rani Chu on entering Gangtok and after leaving Gangtok in terms of DO, and BOD is shown in the chart alongside. The DO met the required criteria. However, the value of BOD actually rises after Rani Chu leaves Gangtok signifying inadequate sewage treatment facility.



State: Tamil Nadu

1. Background

The major rivers in Tamil Nadu are Cauveri, Palar, Pennar, Vaigai, Cooum, Vennar and Tamiraparani. Some of the important lakes in Tamil Nadu are Berijam Lake, Chembarambakkam Lake, Kodaikanal Lake, Ooty Lake, Pulicat Lake, Veeranam Lake etc. According to Central Ground Water Board, the annual replenishable ground water resources in the State are 23.07 Billion Cubic Meters (BCM) out of which the net annual ground water availability is 20.76 BCM. Out of 384 blocks in the State, in 142 blocks the ground water is over-exploited, in 33 blocks it is critical and in 57 blocks it is semi-critical.

Test checked rivers and lakes in Maharashtra

Insitutional arrangement in the State: As per information provided by MoEF, Department of Environment & Forests, Government of Tamil Nadu and, Municipal Administration & Water Supply Department (MAWSD) Department Government of Tamil Nadu were the nodal departments and Environmental Management Agency of Tamil Nadu, Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB), Tamil Nadu Water Supply and Drainage Board and Commissioner of Municipal Administration were the implementing agencies for NRCP. Environment Management Agency is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Tamil Nadu discussed below:

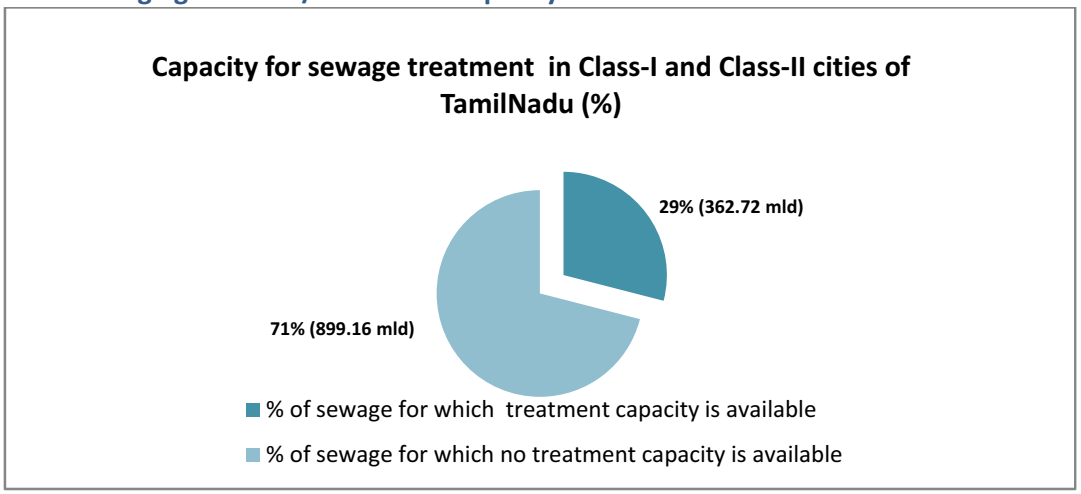
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Could not be verified	Done	Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Done	Done
	b) According to Biodiversity indicators	Done	Done	Not applicable

	c) Quantification of contaminants	Partially (Nutrients: Done, Pathogenic organism: Not Done, Human produced chemicals: Done)	Partially (Nutrients: Done, Pathogenic organism: Not Done, Human produced chemicals: Done)	Could not be verified
	d) Assessment of impact of human activities	Partially (Agriculture: Done, Industry: Done, Mining: Could not be verified, Dam: Done, Uncontrolled disposal of human waste: Not Done)	Partially (Agriculture: Done, Industry: Done, Uncontrolled disposal of human waste: Not Done)	Partially (Agriculture: Done, Industry: Done)
3. Identification of risks to environment and health	**a) Risks to wetlands**	Done	Done	Not applicable
	b) Risks to aquatic species	Could not be verified	Could not be verified	Not applicable
	c) Risks to human health	Could not be verified	Could not be verified	Could not be verified
4. Policy for water pollution		Could not be verified	Could not be verified	Could not be verified
5. Programmes for prevention and control of water pollution		Partially (Source water protection: Done, Industry: Not Done, Agriculture non point sources Could not be verified)	Partially (Source water protection: Done, Industry: Done Agriculture non point sources Could not be verified)	Not Done
6. Constitution of Water Quality Review Committee		Not Done		

[**Note: Not applicable :** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Tamilnadu



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Tamilnadu is 1261.88 mld, of which treatment capacity is available for only 362.72 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Cauvery, Adyar, Cooum, Vennar, Vaigai and Tambrabarani rivers had been included under the National River Conservation Programme (NRCP) for pollution abatement projects. Projects were being implemented in 13 cities[31]. 83 projects in these 13 cities were sanctioned under NRCP out of which 52 were completed as of March 2010. The total sanctioned cost of all the projects was ₹ 915.93 crore. 11 projects[32] being implemented under NRCP at a cost of ₹ 408.01 crore were test checked for detailed examination.

(i) Physical and financial progress

Name of the river/location	Name of the project	Sanctioned Cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Adyar & Cooum/ Chennai	STP at Koymbedu (60 mld)	27.21	25.02	March 2005	April 2005
	STP at Kodungaiyur (110 mld)	41.56	45.96	March 2005	July 2006
	STP at Perungundi	36.88	31.04	March 2005	July 2006
	STP at Nesapakkam	21.21	19.16	March 2005	May 2006
	I& D package VII	14.74	12.44	September 2003	September 2004
	I&D Package VIII	19.49	14.49	September 2003	August 2004
Cauvery/ Tiruchirappalli	I&D and STP	116.67	114.85	September 2006	May 2008
Vaigai/ Madurai	I&D Part I	42.53	46.65	March 2003	July 2005
	I&D Part II	70.25	70.24	October 2005	Februry2010
	I&D Phase IV	7.32	9.66	July 2008	Ongoing
	STP Phase II	10.15	Work dropped from NRCD and taken up under JNNURM	Not applicable	Not applicable

(ii) Performance of the Projects

(a) Chennai

The average estimated sewage generated in the city of Chennai is 731 mld. However, only 481 mld is treated and the rest 250 mld is discharged into the Adyar/Cooum. Out of 638

[31] Bhawani, Chennai, Erode, Kumarapalayam, Pallipalayam, Trichy, Karur, Kumakonam, Mayiladuthurai, Tirichirapalli, Thanjavur, Madurai and Tirunelveli

[32] Six projects pertaining to Adyar & Cooum in Chennai, one project in Tiruchirappalli for river Cauvery and four projects at Madurai pertaining to river Vaigai.

drains opening into the Adyar/Cooum, only 307 have been intercepted and 331 remain to be intercepted. **Details of projects test checked in Chennai which aim to improve the quality of water in Adyar/Cooum are discussed below:**

Project name	Findings
STPs at Koymbedu, Kodungaiyur, Perungundi and Nesapakkam	• One STP at Koymbedu was constructed after a delay of one month; another at Kodungaiyur got delayed for one year and four months due to unprecedented rains, tsunami and problems due to inaccessibility of the site. • The STP at Perungundi also got delayed for one year and four months due to delay in getting permission for laying gravity main in the absence of an alternate route. • The construction of the STP at Nesapakkam got delayed by one year and two months due to additional soil strengthening measures suggested by Anna University. • All the STPs were working at their envisaged capacity and no problems were reported in their functioning. • Completion reports and final utilisation certificates of all the four STPs had not yet been submitted to MoEF despite their completion during 2005-07. • The combined sewage treatment capacity of all the four STPs was 481 mld which was inadequate as the estimated sewage flow from Chennai was 731 mld and hence 250 mld of sewage was left untreated and which flowed into the Adyar/Cooum.
I&D package VII and VIII	• The projects were completed in September 2004 and August 2004 respectively after a delay of almost one year. • Funds received from MoEF for both the projects were not kept in saving bank Account and the interest of ₹3.34 crore earned on mobilization advance was credited to Board's account instead of the Project Account. • Rehabilitation of slum families was envisaged which was not done. Also, sewage outfall outside Chennai area was not assessed as envisaged. On completion, performance of the projects had not been assessed by the State on basis of set targets/ performance milestones.

(b) Tiruchirappalli- Srirangam

The average estimated sewage generated in the city of Tiruchirappalli- Srirangam is 40.50 mld and the same is totally treated.

Details of one projects test checked in Tiruchirappalli**- Srirangam which aim to improve the quality of water in Cauvery is discussed below:**

Project	Findings
I&D and STP	• The projects were completed in May 2008 after a delay of one year and eight months. • The project was delayed due to high water table in Srirangam area and delay in laying deeper sewer.

	• The land cost of ₹ 71.44 lakh for the pumping stations for Trichy-Srirangam UGSS was charged to the works expenditure reported to NRCD and of which ₹ 47.41 lakh was met from the funds of GOI which was unauthorized. In May 2011, Government of Tamil Nadu replied that out of ₹ 71.44 lakh towards land cost a sum of ₹ 58.68 lakh had already been withdrawn and added to Government of Tamil Nadu/Local Body share. For the balance amount of ₹ 12.76 lakh, necessary instructions had been issued to the concerned authorities to withdraw the amount from GOI share. • Certain areas were not covered by providing House Service Connections (HSCs).

(c) Madurai

The average estimated sewage generated in the city of Madurai is 170 mld. However, only 45 mld is treated and the rest 125 mld is discharged into the Vaigai river. Out of 20 drains opening into the Vaigai river, only six have been intercepted and 14 remaining to be intercepted.

Details of four projects test checked in Madurai which aim to improve the quality of water in Vaigai are discussed below:

Project	Findings
I&D Part I and I&D Part II	• The project I&D Part I was completed in July 2005 after a delay of two years and four months. • An expenditure of ₹ 46.65 crore was incurred on the project against the sanctioned cost of ₹ 42.53 crore resulting in cost overrun of ₹ 4.12 crore which was due to price escalation and railway crossing work. • The project was delayed due to delay in carrying out the railways crossing work. • Under of the project, 122.44 kms of pipes were to be laid but only 107.03 kms were actually laid. The created capacity of the pumping station was 16 mld but only eight mld capacity was being utilised till date. • The project I&D Part II was completed in February 2010 after a delay of four years and four months. • The project was delayed due to delay in handing over of the site (National Highway/ State Highway) for construction of pumping station and execution of additional length of collection system. • The pumping station of 36 mld was built under the project but only 26 mld was being utilised. The infrastructure created has been handed over to the Madurai Corporation. • The State Government did not assess the performance of both the projects on the basis of set targets due to non -completion of Phase III.
I&D Phase IV	• The project scheduled to be completed by July 2008, was yet to commence.

	• The project was delayed due to lack of response by contractors to successive tenders.
STP-Phase II	• The work was dropped under NRCD due to non-identification of huge land for STP and was taken up by the Corporation under JNNURM. • The infrastructure created for I&D projects (I&D Phase Part I, Part II and Part IV) under NRCD at a cost of ₹ 116.89 crore were being kept idle for want of completion and commissioning of STP.
Thus projects in Tiruchirappalli- Srirangam, Chennai and Madurai to control pollution of Cauvery, Adyar/Cooum and Vaigai rivers respectively had not completely achieved their objectives.	

4.2 NLCP

Out of the two lakes of Tamil Nadu in the polluted list, one of them, Kodaikanal lake was selected for detailed audit scrutiny.

(i) Physical and financial performance

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Kodaikanal	5.13 revised to 10.42	2.22	December 2002 revised to January 2009	On going

(ii) The project is discussed below:

The activities sanctioned for restoration and conservation of Kodaikanal Lake and its progress was as follows:

Project name	Findings
Kodaikanal Lake	• The project was originally scheduled to be completed by December 2002. In January 2007 the project duration was extended upto January 2009. The start of the project was delayed due to litigation and court stay order. The expenditure on the project till October 2010 was ₹ 2.22 crore.
	Details of implementation of activities under the project are discussed below: **(i) Interception and diversion of sewage from 19 outfalls and carry the same to STP to be built with FAB reactor**: This was to be implemented by Tamil Nadu Water Supply and Sewerage Board. The original site for location of STP was at KKR Kalai Arangam, near the lake. Therefore, the United Citizen Council of Kodaikanal filed a writ petition on the plea that the location of STP would pollute the lake. Similar objections were raised on two more locations. This was due to non-consultation with local public regarding location of STP. Further, there was no coordination between the different implementing agencies

which led to non- completion of the project. Land for the STP had not been acquired as yet.

(ii) In-situ cleaning of the lake using bio-remediation technology:
This was to be implemented by Public Works Department. The court had stopped construction of the STP and as the in-situ cleaning of the lake was independent of construction of the STP and the implementing agency could have sought permission from the courts to proceed with the in-situ works. However, this was not done and the work of de-weeding and bio-remediation remained incomplete, causing an increase in fecal coliform levels as reported by MINARS.

(iii) **Low cost sanitation, de-silting and removal of weeding:**
This was to be implemented by the local body but work had not been taken up as yet.

Thus, the project taken up for restoration and conservation of Kodaikanal lake had failed to meet its objectives and the water in the lake remained polluted and no measures were in place to prevent any more pollution of the lake.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of Implementing agency	By Divisional Project Monitoring Cell	Steering Committee chaired by Chief Secretary of State	High Powered committee under CM
11 out of 11 projects	1 out of 11 projects	0 out of 11 projects	0 out of 11 projects

5.2 NLCP

By Inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
0 out of 1 projects	0 out of 1 projects	0 out of 1 projects	1 out of 1 projects

5.3 Ground water (in six blocks test checked)

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Yes	Yes in 3 out of 6

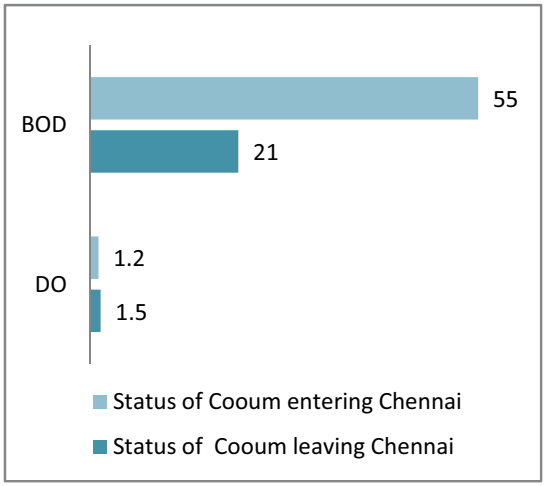
It was also observed that the CPCB conducted the survey to identify the critically polluted industrial clusters as early in December 2009 and Cuddalore industrial cluster was identified as one among them with 77.45 Score. We noticed that a draft action plan was prepared by TNPCB and submitted to its Board during August 2010 for approval. However, approval was still pending. Trade effluents discharged by M/s CUSECS had exceeded the quality pollution parameters prescribed most of the times endangering the health of the people in the impact zone of habitations and finally due to the intervention of the Hon'ble Madras High Court, the operation of M/s CUSECS was stopped vide order dated 21/3/2010. On perusal of renewal of Consent mechanisms of the industries, it was observed in audit that the renewal of consents were given to the industries most of the time even though they did not satisfy completely all the pollution parameters prescribed by the Board.

6. Outcomes

6.1 NRCP

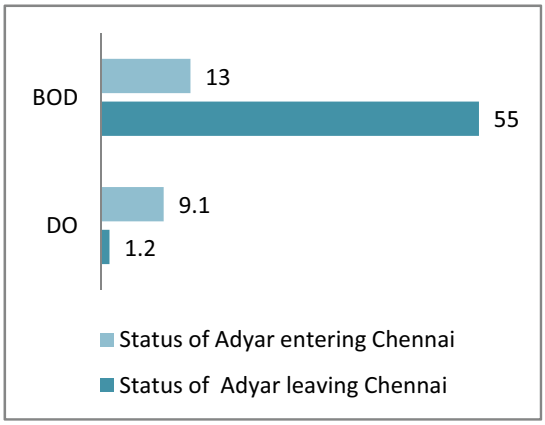
(a) Water quality of Adyar/Cooum after Chennai

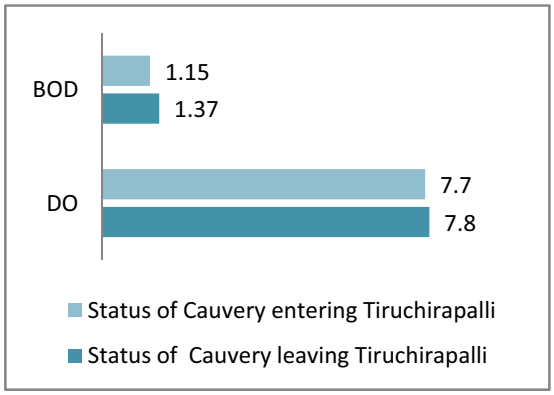
Status of Adyar/Cooum on entering Chennai and after leaving Chennai in terms of DO and BOD is shown in the chart alongside. BOD was more than 18 times and seven times the criteria in Adyar & Cooum river respectively, indicating high levels of organic pollution. Further, the DO was less than the criteria indicating insufficient oxygen being available for survival of aquatic life. Further, the TC was higher than the criteria, indicating that Adyar & Cooum, were full of disease causing, fecal-related bacteria, viruses and protozoa which cause illness.



(b) Water quality of Cauvery river after Tiruchirappalli**- Srirangam**

Status of Cauvery river on entering Tiruchirappalli and after leaving Tiruchirappalli in terms of DO and BOD is shown in the chart alongside. The value of BOD actually rises after Cauvery leaves Tiruchirappalli signifying inadequate sewage treatment facility. While DO met the criteria TC was much higher than the criteria,indicating that Cauvery was full of disease causing, faecal-related bacteria, viruses and protozoa which causes illness.





6.2 NLCP

Since work was not yet complete, no impact of NLCP was felt on the quality of water in Kodaikanal lake, which remained poor.

7. Monitoring network for tracking pollution of ground water

(i) Implementation of Fluoride Mitigation Programme

The ground water in Tamil Nadu contained contaminants like fluoride, salinity, chloride, iron, nitrate[33] etc. it was observed that the State government had initiated Fluorisis Mitigation Project in June 2010 in districts like Dharmapuri and Krishnagiri which were endemic with respect to excess fluoride content in the ground water because of which there was high prevalence of fluorisis in these districts. The scheduled date of completion was May 2013.The programme is now being implemented with assistance from Japan International Cooperation Agency and was being executed by TWAD Board. The sanctioned cost of the project was ₹ 28.44 crore. The technology for fluoride mitigation was adopted by the implementing agency after appropriate study which proved its efficacy. Regular inspection of the facilities set up was taking place by the implementing agency and follow-up was taking place as and when required.

[33] According to CGWB

State: Tripura

1. Background

Some of the rivers flowing in Tripura are Longai, Juri, Dhalai, Gomati, Manu, Khowai, Haora etc. Tripura is blessed with a large number of natural and artificial lakes like Dumboor lake, Durgabari lake, Dimsagar Lake, Laxminarayanbari lake, Rudrasagar Lake, Kamala Sagar etc. According to Central Ground Water Board, the annual replenishable ground water resource in Tripura is 2.19 Billion Cubic Meters (BCM) and net annual ground water availability is 1.97 BCM. Some of the districts in Tripura are affected by iron.

Lakes test checked in Tripura

Institutional arrangements in the state: As per information provided by MoEF, the nodal agency for implementation of NLCP was Urban Develpment Department and Agartala Municipal Council (AMC) is the implementing agency.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Tripura is discussed below:

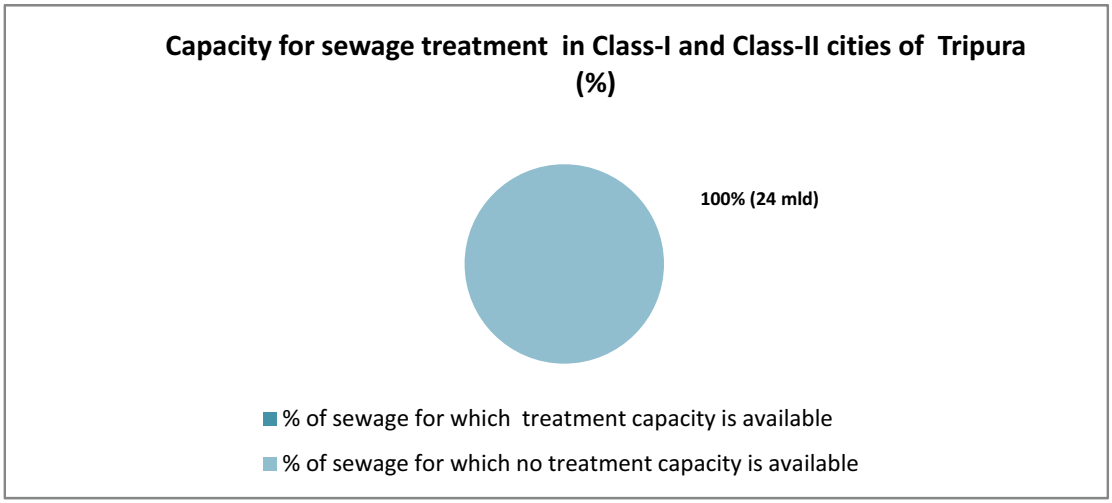
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Not Done	Not Done	Not Done
2. Assessment of water quality	**a) According to Chemical indicators**	Not Done	Not Done	Not Done
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Not Done	Not Done	Could not be verified
	d) Assessment of impact of human activities	Not Done	Could not be verified	Not Done
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done

5. Programmes for prevention and control of water pollution	Not Done	Not Done	Not Done
6. Constitution of Water Quality Review Committee	Done		

[Note: Not applicable: Does not pertain to Ground Water. Could not be verified: Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Tripura



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Tripura is 24 mld, of which no treatment capacity is available.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Though Tripura State Pollution Control Board (TSPCB) had identified polluted stretch in downstream of river Haora in Agartala as polluted, no rivers in Tripura had been included under NRCP.

4.2 NLCP

3 lakes in Tripura, Dimsagar, Laxminarayanbari and Durgabari were selected under NLCP for restoration and conservation. However, selection of the three lakes under NLCP did not meet the selection criteria set out by MoEF with respect to physical parameters and were also not identified by TSPCB as polluted. According to MoEF, only those lakes were to be selected which were more than 10 hectares (25 acres) and which were at least three meters deep. It was observed that Dimsagar was 3.3 acres, Laxminarayanbari was 7.2 acres and Durgabari was 7.3 acres. Further, the lake depths of Dimsagar and Durgabari were only 1.70 meters and 2.50 meters respectively whereas Laxminarayanbari met the depth criteria as it was three meters deep. As such, two of the lakes did not qualify for selection under NLCP.

Before initiation of NLCP, Tripura government conducted a study of 20 lakes of Tripura through a consultant and collected data with regard to their characteristics. After discussion with Urban Development Department, Tripura Government, a list of seven lakes was finalised for investigation, project preparation and submission for inclusion under NLCP. The survey concluded that all the seven lakes in the list were polluted while the level of pollution in Durgabari Lake and Laxminarayanbari lake was lower. The main sources of pollution identified were waste water influx, bathing, washing with use of detergents, ceremonial dumping of idols and use of lakes for dumping solid waste. All the lakes were also found to be weed-infested.

(i) Physical and financial progress

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Dimsagar	0.69	0.43	March 2006	In progress
Laxminarayanbari	0.70	N.A.	March 2006	Yet to commence
Durgabari	0.63	N.A.	March 2006	Yet to commence

(ii) Performance of projects:

Project name	Findings
Dimsagar lake	• The project envisaged activities like building of a pathway, retaining wall, drain, weeding, desilting, sitting arrangement, fencing, landscaping etc. • The project was scheduled to be completed by March 2006 but it was still in progress. • The project was delayed due to encroachment of the east, west and north banks of the lake by unauthorized occupants but no records showing steps taken to evict the unauthorized occupants and the extent of encroached land was made available to Audit. • 85 *per cent* of the total expenditure till date had been incurred on beautification and landscaping works and rest 15 *per cent* was incurred on measures to control pollution. • Further instead of awarding the contract for the project to a single contractor, the Executive Engineer of Agartala Municipal Corporation split the work of Dimsagar Lake into small groups, each costing less than ₹ 30,000 each and awarded the contracts without inviting tenders. This was also contrary of Monitoring Committee's recommendation to award the tender to technical firms by inviting tenders. As such, the decision to award contracts without bidding was against provisions of GFR.
Laxminarayanbari and Durgabari lake	• Comparison with other lakes showed that Laxminarayanbari was not as polluted as other lakes in Tripura. • Activities for restoration of Laxminarayanbari and Durgabari lake envisaged construction of pathway, weeding, desilting, seating arrangement, fencing, landscaping, building of toilets etc.

- The activities envisaged in the DPR could not commence due to the fact that a heritage building (royal palace of erstwhile kings' of Tripura) was in close proximity of the lakes and experts had suggested that re-excavation and dredging of these water bodies might cause severe damage to the heritage building. This also points to the fact that the State government did not carry out a comprehensive survey before initiating the programme which would have indicated the feasibility of taking up projects relating to these two lakes.

As such, despite the scheduled completion date of March 2006, the project for restoration and conservation of Laxminarayanbari and Durgabari lakes had still not commenced.

Thus, restoration and conservation of Dimsagar, Laxminarayanbari and Durgabari lakes had not taken place as envisaged as these projects were still incomplete.

Untreated sewage flowing into Dimsagar lake

Durgabari Lake

Laxminarayanbari Lake

5. Monitoring of programmes for control of water pollution

5.1 NLCP

By Inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
1 out of 3 projects	0 out of 3 projects	0 out of 3 projects	0 out of 3 projects

5.2 Ground water

Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
No information	No information	No information	No information

6. Outcomes

6.1 NLCP

Since the activities to restore and clean up Laxminarayanbari and Durgabari lake did not begin, no conclusions can be drawn about its impact on improving the quality of water in the lakes selected under NLCP. Further, despite spending ₹ 0.43 crore, the objective of restoration of Dimsagar lake could not be achieved.

State: Uttar Pradesh

1. Background

Uttar Pradesh has main rivers namely Ganga and Yamuna. Some of the other rivers that flow in Uttar Pradesh are Ramganga, Gomti and Ghaghara. Some of the lakes in Uttar Pradesh are Keetham Lake, Belasagar Lake, Barua Sagar Tal, Bhadi Tal, Nachan Tal, Mansiganga Lake, Sheikha Jheel etc. According to Central Ground Water Board, annual replenishable ground water resource in Uttar Pradesh is 76.35 Billion Cubic Meters (BCM) while the net annual ground water availability is 70.18 BCM. Ground water in 37 blocks is over-exploited, in 13 blocks it is critical and in 88 blocks it is semi-critical. Ground water in Uttar Pradesh is contaminated by salinity, fluoride, chloride, iron, nitrate and arsenic.

Test checked rivers and lakes in Uttar Pradesh

Insitutional arrangements in the State: As per information provided by MoEF, the Urban Development Department was a nodal Department and the UP Jal Nigam was the implementing agency in the State for NRCP. Uttar Pradesh Jal Nigam is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Uttar Pradesh is discussed below:

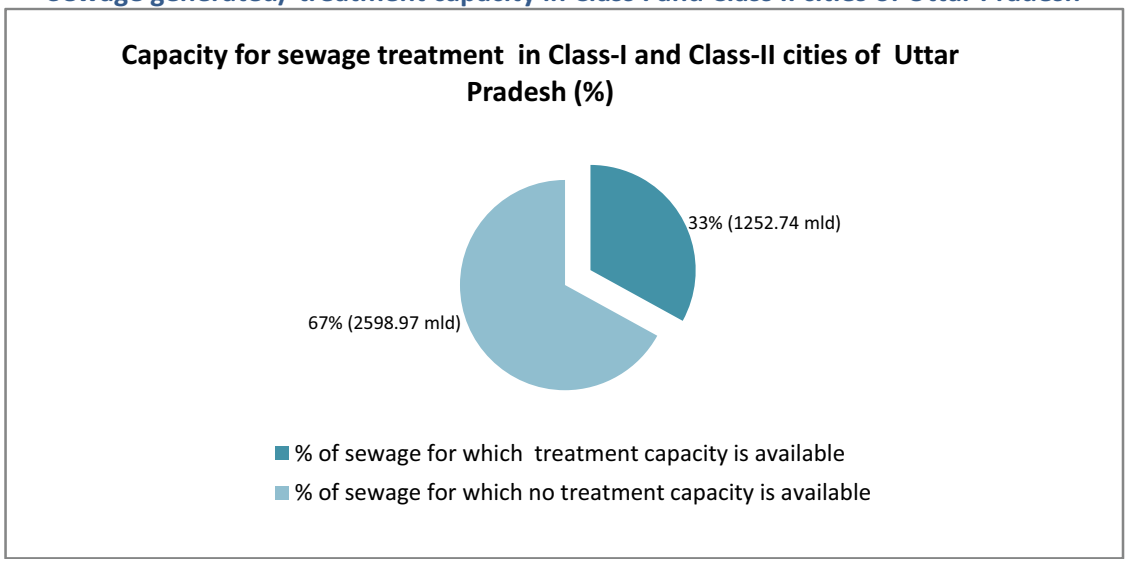
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Could not be verified	Could not be verified	Not Done
2. Assessment of water quality	**a) According to chemical Indicators**	Not Done	Could not be verified	Not Done
	b) According to Biodiversity indicators	Not Done	Not Done	Not applicable
	c) Quantification of contaminants	Not Done	Not Done	Could not be verified
	d) Assessment of impact of human activities	Not Done	Could not be verified	Could not be verified
3. Identification of risks to environment and health	**a) Risks to wetlands**	Could not be verified	Could not be verified	Not applicable
	b) Risks to aquatic species	Could not be verified	Could not be verified	Not applicable

	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Could not be verified	Could not be verified	Could not be verified
5. Programmes for prevention and control of water pollution		Could not be verified	Could not be verified	Could not be verified
6. Constitution of Water Quality Review Committee		Done		

[Note: Not applicable : Does not pertain to Ground Water; Could not be verified: Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Uttar Pradesh



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Uttar Pradesh is 3851.71 mld, of which treatment capacity is available for only 1252.74 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Ganga, Yamuna and Gomti rivers had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects are being implemented in 23 cities[34] viz., 257 projects in these 23 towns were sanctioned under NRCP out of which 216 were completed as of March 2010. The total sanctioned cost of all the projects was ₹ 914.66 crore. **14 projects[35] being implemented under NRCP at a cost of ₹ 404.08 crore were test checked for detailed examination.**

(i) Physical and financial progress

[34] Agra, Allahabad, Anupshaher, Bijnor, Chunar, Etawah, Farrukkabad, Garhmukteshwar, Ghaziabad, Ghazipur, Jaunpur, Kanpur, Lucknow, Mathura, Mirzapur, Mughal Sarai, Muzaffarnagar, Noida, Saharanpur, Saidpur, Sultanpur, Varanasi and Vrindavan

[35] Six projects on Ganga river, four on Yamuna and four on Gomti river

Name of the river/ location	Name of the Project	Sanctioned cost (₹ in crore)	Actual expenditure (₹ in crore)	Sanctioned date of completion	Actual project end date
Yamuna at Ghaziabad	STP Cis Hindon Area	16.60 revised to 17.78	18.63	March 1999	November 2002
	STP trans Hindon Area	15.11	15.12	March 1999	November 2002
	I&D in Ghaziabad	2.69	2.69	December 2002	January 2003
	LCS at Ghaziabad	2.52	2.11	March 2002	March 2002
Ganga at Kanpur	Intermediate Pumping Station Munsi Punwa P-III	7.96 revised to 12.71	9.15	June 2003 Extended to March 2011	Not commissioned
	Intermediate Pumping Station at Rakhimandi	9.38 revised to 18.74	15.19	June 2003 Extended to January 2009	Not commissioned
	Relieving sewer for Bakermandi to Rakhimandi	5.90 revised to 10.81	14.85	October 2001	Ongoing
	SWM Part II	2.86	2.59	September 2004	September 2007
	MPS & Campus Development	18.58 revised to 37.37	16.31	September 2007	Not yet complete
	I & D of Ganda Nala and Halwa Khanda at Pandu /Ganga	10.50 revised to 15.21	13.89	August 2005 Extended upto March 2010	Not yet complete
Gomti / Lucknow	STP at Daulatganj	14.05	14.60	August 2003	January 2002
	STP USAB	104.22 revised to 169.71	138.81	March 2007 Extended upto July 2010	January 2011
	I&D of GH Canal Drain	31.42	27.64	March 2007	January 2011
	MPS at Gwari Culvert	30.10 revised to 53.10	39.98	March 2007 Extended upto June 2010	January 2011

(ii) Performance of the projects

(a) Kanpur

The average sewage generated in the city of Kanpur is 426 mld. However, only 162 mld is treated and the rest 264 mld is discharged into the Ganga. 23 drains were required to be intercepted against which 19 drains were intercepted and the remaining four drains were yet to be intercepted for treatment. **Details of six projects test checked in Kanpur which aimed to improve the quality of water in Ganga are discussed below:**

Project name	Findings
Intermediate Pumping Station at Munsipunwa,	• The project was originally scheduled for completion by June 2003 but was extended upto March 2011. All the major works under the project were completed but the commissioning had been postponed due to non completion of STP at Bingawan.

Kanpur	• The project was delayed due to non-construction of over-bridge adjoining to pumping station and non-availability of permission of road cutting for laying rising main/sewer line on the road.
Intermediate Pumping Station at Rakhimandi, Kanpur	• The project was originally scheduled to be completed by June 2003 but it was actually extended upto January 2009. All the major works under the project were completed but the commissioning had been postponed due to non completion of STP at Bingawan. • The project was delayed due to delay in possession of land from railways, encroachment and non-grant of permission by railways for laying the rising main under the Juhi Railway Bridge.
Relieving Sewer from Bhikermandi to Rakhimandi	• The project scheduled for completion by October 2001 was continuing as of December 2010 without any extension of time. • There was a cost overrun of ₹ 8.95 crore which was due to faulty alignment and nine gaps of length of 1000 metres. • The project was delayed due to non-acquisition of land, delay in finalization of tendering process and re-alignment of sewer passing through busiest road/narrow lanes/lanes having multistoried buildings. • Only three drains were intercepted out of five drains.
Main Pumping Station & Campus Development	• The project scheduled for completion by September 2007 was continuing without any extension. • The project was delayed due to non-availability of land and delay in tendering. The land could be acquired in October 2006 and possession was taken in December 2006.
Solid waste Management (SWM) Part II)	• The project was completed in September 2007, after a delay of three years. • The project was delayed due to delay in finalization of tender. • It could not be verified whether the project had been assessed by the State on basis of set targets/ performance milestones.
Roof of Ganda Nala and Halwa Khanda Nala	• The project was scheduled for completion by August 2005 but was extended upto March 2010. However, it was not yet complete. • There was a cost overrun of ₹ 3.39 crore due to increase in labour and material costs.

(b) Ghaziabad

The daily average sewage generated in the city of Gaziabad is 290 mld but only 129 mld of sewage is treated and the remaining 161 mld of untreated sewage was discharged into the river Hindon which confluences with river Yamuna. **The details of four test checked projects being implemented at Ghaziabad city with the aim to improve the quality of Yamuna's water are discussed below:**

Project name	Findings
STPs at Cis Hindon Area	• The project was completed in November 2002, after a delay of three years and eight months. • There was cost overrun of ₹ 2.03 crore.

	• The project was delayed due to non –availability of land. • The STP was not functioning as per prescribed standards as a result of which the entire untreated sewage was discharged into river Yamuna/Hindon defeating the purpose for which it was constructed. • Further, it was envisaged in the DPR that electricity would be generated from biogas from the STP. However, this was also not happening due to non-functioning of gas holder, gas scrubbing system and power generation units of the plant. **As such, the STP totally failed to meet its objectives**.
STP Trans Hindon Area	• The project was completed in November 2002, after a delay of three years and eight months. • The project was delayed due to non –availability of land. • It was observed that the STP was not functioning as per prescribed standards of SPCB as a result of which the entire untreated sewage was discharged into river Yamuna/Hindon defeating the purpose for which it was constructed. • Further, it was envisaged in the DPR that electricity would be generated from biogas from the STP. However, this was also not happening due to non-functioning of gas holder, gas scrubbing system and power generation units of the plant. **As such, the STP totally failed to meet its objectives**.
Interception and Diversion work at Ghaziabad	• The project was completed in January 2003 after a delay of one month. • The total length of sewer lines laid under the project was 7.72 Km against the original planned 7.93 Kms. • The project had been handed over to the local bodies but no evidence was found to indicate whether it was carrying out preventive maintenance and periodic cleaning of the sewer lines laid.
Low Cost Sanitation at Ghaziabad	• The project was completed in March 2002 on time. The final Utilization Certificate was submitted only in January 2004. • The project envisaged construction of 48 units of LCS, however, only 39 were built. The project had been handed over to Nagar Nigam which was carrying out the O&M of all 39 units through NGOs and Sulabh International. However, no supporting documents were furnished.

(c) Lucknow

The average daily sewage generated in Lucknow town is 410 mld against which on an average 300 mld of sewage is treated. As a result, 110 mld of untreated sewage daily flows into Gomti river. 26 drains from Lucknow town open into the Gomti river but only nine have been intercepted. The civil and electrical works of remaining drains had been completed but the interception and diversion work of these drains could not be put to use due to non-

commissioning of rising main of Kukrail Pumping Station. **All of the four projects test checked under Lucknow which aim at improving the quality of water of Gomti River are discussed below:**

Project name	Findings
STP Daulatganj	• The project was completed in January 2002 on time. • There was a cost overrun of ₹ 0.55 crore for which reasons could not be ascertained. • The STP was not being utilised at its full capacity and was treating only 34 mld of sewage against designed capacity of 42 mld due to non-construction of two drains and resultant blockage of drains. UP Jal Nigam had not initiated any action to rectify the problem. Further, the treated sewage did not meet the standards prescribed by NRCD.
STP USAB	• The project has been completed in January 2011 after a delay of three years and ten months. • There was a cost overrun of ₹ 34.59 crore. • The time and cost overrun of the project was attributable to delay in acquisition of land and the land was acquired in July 2008 after the expiry of completion date of the project.
Interception and Development of GH Canal Drain	• The project completed in January 2011 after a delay of three years and ten months. • The project was delayed due to delay in acquisition of land for construction of pumping station and change in alignment of rising main.
MPS at Gwari Culvert	• The project was completed in January 2011 after a delay of three years and ten months. • There was a cost overrun of ₹ 9.88 crore. • The project was delayed due to problems in acquisition of land and delay in tendering process. • An advance payment of ₹ 50 lakh was paid to contractor in September 2006 which was not adjusted even after a lapse of four years.
As such, projects sanctioned under NRCP in Kanpur, Ghaziabad and Lucknow for control of pollution of Ganga, Yamuna and Gomti could not achieve the desired objectives.	

Incomplete Intermediate Pumping Station at Munsipurwa, Kanpur

Incomplete STP 2.76 mld (WSP technique) at Mathura

4.2 NLCP

(i) Physical and financial progress

Only one lake conservation project relating to Mansi Ganga lake was included under NLCP.

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Mansi Ganga	22.71	16.37	March 2009	On going

(ii) Performance of project:

Project name	Findings
Mansi Ganga	• The activities envisaged for restoration and conservation of Mansi Ganga lake involved construction of an STP, Low cost Sanitation, de-weeding, de-silting, lake front development and afforestation. • The project was scheduled for completion by March 2009 but it was still ongoing. • An expenditure of ₹ 16.37 crore was incurred on the project as of November 2010. • The delay was due to non release of funds by NRCD, in obtaining permission from Forest Department, laying of rising main and land acquisition for STP. • With respect to construction of STP 90 *per cent* progress of the work has been reported till November 2010 by the implementing agency. With respect to LCS, only eight out of the planned ten LCS units/toilet blocks have been completed till November 2010 as land was not available for remaining two. With respect to lake front development, audit scrutiny showed that work under this component has not yet started. With respect to afforestation, only 40 *per cent* of the work under this component has been completed till November 2010. **As such, the objective of restoration and conservation of Mansi Ganga lake had not yet been achieved.**

Temple sewage & solid waste entering in Mansi Ganga Lake

Stored storm water mingled with sewage enters into Mansi Ganga Lake through inlet

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
0 out of 14 projects	0 out of 14 projects	0 out of 14 projects	0 out of 14 projects

5.2 NLCP

By Inter-Departmental Coordination Committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
0 out of 1 projects	0 out of 1 projects	0 out of 1 projects	0 out of 1 projects

5.3 Ground water (in six blocks test checked)

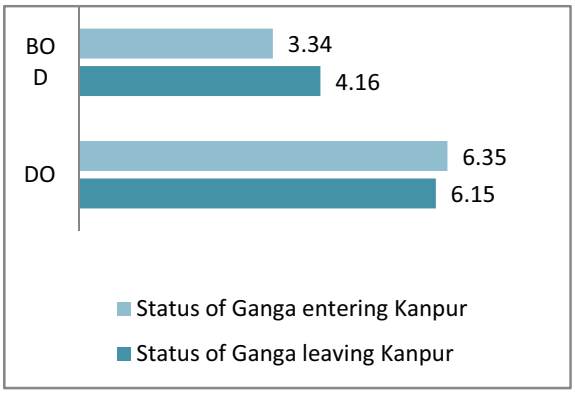
Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
No	No information	4 out of 6	No information

Testing and monitoring agency (SPCB) of the state was unaware of arsenic content in ground water till the School of Environmental Studies Jadhavpur University Kolkata traced arsenic in water in Ballia district in it's study, in 2003. Jal Nigam had identified 1225 habitations effected from fluoride in 1994 in district Unnao. Jal Nigam conducted test and survey of arsenic effected habitations in 2004 with help of UNICEF and identified 310 habitations in district Ballia and 165 habitations in district Lakhimpur Kheri.

6. Outcomes

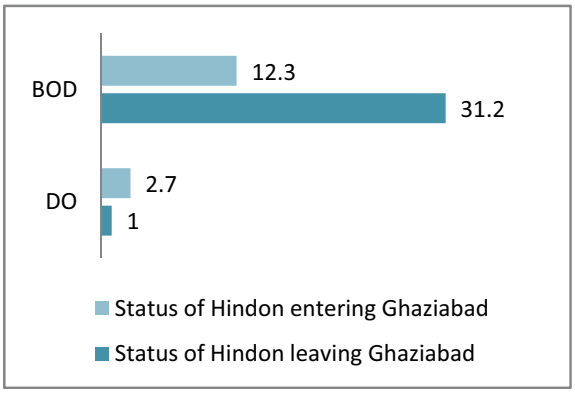
6.1 NRCP

(a) Water quality in Ganga after Kanpur



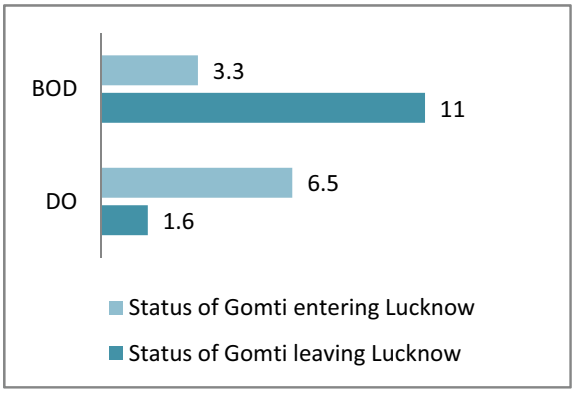
Status of Ganga on entering Kanpur and after leaving Kanpur in terms of DO, BOD and TC is shown in the chart alongside. Both the BOD and TC rise enormously after the Ganga leaves Kanpur, with TC rising by almost 1434 *per cent*. This highlights the inadequate sewage treatment facilities in Kanpur city. BOD was almost 1.4 times the criteria in Ganga river after Kanpur, indicating high levels of organic pollution. Further, the TC was 86 times the criteria, indicating that Ganga, after leaving Kanpur, was full of disease causing, fecal-related bacteria, viruses and protozoa which cause illness.

(b) Water quality in Hindon after Ghaziabad



Status of Hindon entering and leaving Ghaziabad in terms of DO and BOD is shown in the chart opposite. It can be observed that the Dissolved Oxygen decreased whereas BOD was increased by 153 per cent. Further, TC increased from 120000 to 210000, a rise of 75 per cent by the time Hindon left Ghaziabad. BOD was more than 10 times the criteria in Hindon river, indicating high levels of organic pollution. Further, the DO was less than the criteria indicating insufficient oxygen being available for survival of aquatic life. Further, the TC was 420 times the criteria, indicating that Hindon, after leaving Ghaziabad, was full of disease causing, fecal-related bacteria, viruses and protozoa which cause illness.

(c) Water quality in Gomti after Lucknow



Status of quality of water, in terms of DO and BOD, in Gomti while entering and leaving Lucknow are shown in the chart opposite. It can be observed that while leaving Lucknow, DO decreased significantly whereas BOD and TC increased by 233 per cent and 3155 per cent. BOD was more than 3.6 times the criteria in Gomti river, after Lucknow, indicating high levels of organic pollution. Further, the DO was less

than the criteria indicating insufficient oxygen being available for survival of aquatic life. Further, the TC was 280 times the criteria, indicating that Ganga, after leaving Lucknow, was full of disease causing, fecal-related bacteria, viruses and protozoa which cause illness.

Projects sanctioned under NRCP in Kanpur, Ghaziabad and Lucknow for control of pollution of Ganga, Yamuna and Gomti could not achieve the desired objectives and

6.2 NLCP

As the project on improving water quality of Mansi Ganga lake was still in progress, no conclusions could be drawn about impact of NLCP in restoring the lake.

State: Uttarakhand

1. Background

Some of the important rivers in Uttarakhand are Ganga, Yamuna, Bhagirathi, Kali, Gori, Alaknanda, Kosi, Saryu, Bhilangana etc. Some of the important lakes in Uttarakhand are Bhimtal Lake, Dodital, Kedartal, Nainital lake, Roopkund, Panna Tal, Satopanth Tal, Sattal etc. According to Central Ground Water Board, the annual replenishable ground water resources in Uttarakhand was 2.27 Billion Cubic Meters (BCM) and the net annual ground water available was 2.10 BCM. Out of 95 blocks, only two blocks in Uttarakhand were over-exploited and three blocks were semi-critical with respect to ground water. The only ground water contaminant was nitrate which affected ground water in parts of the districts of Dehradun, Haridwar and Udhamsinghnagar.

Rivers and lakes test checked in Uttarakhand

Insitutional arrangements in the State: As per information provided by MoEF, Uttaranchal Peyjal Nigam, Government of Uttrakhand is the nodal department for NRCP and the implementing agency was Uttarakhand Peyjal Nigam. Nainital Lake Region Special Area Development Authority (NLRSADA) is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of Uttarakhand is discussed below:

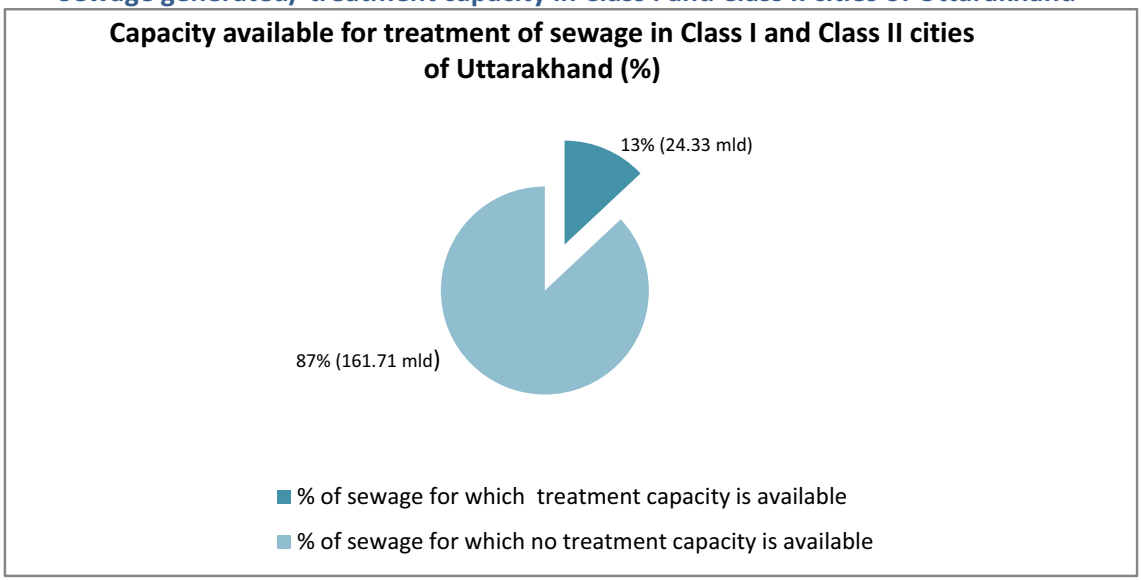
		Rivers	Lakes	Ground water
1. Preparation of inventory of water resources		Not Done	Not Done	Not Done
2. Assessment of water quality	**a) According to chemical Indicators**	Done	Done	Done
	b) According to Biodiversity indicators	Not Done	Done	Not applicable

	c) Quantification of contaminants	Partially (Nutrients: Not Done, Pathogenic organism: Done, Human produced chemicals:Not Done)	Partially (Nutrients: Not Done, Pathogenic organism: Done, Human produced chemicals: Not Done)	Could not be verified
	d) Assessment of impact of human activities	Partially (Industry: Done)	Not Done	Not Done
3. Identification of risks to environment and health	**a) Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c) Risks to human health	Not Done	Not Done	Not Done
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Not Done	Not Done	Not Done
6. Constitution of Water Quality Review Committee		Not Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of Uttarakhand



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of Uttarakhand is 186.04 mld, of which treatment capacity is available for only 24.33 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

River Ganga had been selected for pollution abatement projects under the National River Conservation Programme (NRCP) in Uttarakhand. Projects are being implemented in 10 cities[36] viz. 44 projects in these 10 cities were sanctioned under NRCP out of which 37 were completed as of March 2010. The total sanctioned cost of all the projects was ₹ 70.62 crores. Nine projects being implemented under NRCP at a cost of ₹ 48.34 crore were test checked for detailed examination.

(i) Physical and financial progress

Name of the river/ location	Name of the Project	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Ganga/ Haridwar-Rishikesh	I&D & STP works at Lakhshman Jhula and Swarg Ashram	4.53	3.47	October 2009	Not completed
	STP at Bhopatwala	6.13	2.40	October 2009	Not completed
	Enhancement of capacity & replacement Gravity Main	11.70	11.73	October 2009	January 2010
	Enhancement of STP at Jagjeetpur at Haridwar	15.99	13.36	October 2009	July 2010
Ganga/ Srinagar	I&D Part I (Alaknanda)	2.65	2.65	December 2003	May 2004
	STP 3.50 mld (Alaknanda)	1.61	3.50	January 2006	January 2009
Ganga/ Uttarkashi	STP Part I (Bhagirathi)	0.88	0.88	February 2004	March 2010
	I&D Part I (Bhagirathi)	3.67	4.98	May 2004	September 2009
	I&D Part II (Bhagirathi)	1.18	1.85	December 2003	December 2009

(ii) Performance of the Projects

(a) Rishikesh

The average estimated sewage generated in the city of Rishikesh was 2.6 mld. Though three mld sewage treatment capacity existed in the city, only 1.70 mld was being treated and the rest 0.90 mld was being discharged into the Ganga. Out of 24 drains falling into the river Ganga, 23 have been intercepted and one has yet to be intercepted which is responsible for the 0.90 mld of sewage being discharged into the river Ganga.

(b) Haridwar

[36] Badrinath, Devprayag, Gopeshwar, Haridwar & Rishikesh, Joshimath, Karnaprayag, Ranipur, Rudraprayag, Srinagar and Uttar Kashi

The average estimated sewage generated in the city of Haridwar was 53.09 mld. Though 53 mld sewage treatment capacity existed in the city, only 51 mld was being treated and the rest 2.09 mld was being discharged into the Ganga. Out of 21 drains falling into the river Ganga, 17 have been intercepted and four have yet to be intercepted**. Details of the cities test checked under NRCP are discussed below:**

Project name	Findings
I&D and STP works at Lakhshman Jhula and Swarg Ashram in Rishikesh on river Ganga	• The project scheduled for completion by October 2009 but was not yet complete. • The project was delayed due to public hindrance.
STP at Bhopatwala in Haridwar on river Ganga	• The project scheduled for completion by October 2009 was not yet complete. • The project was delayed due to non-transfer of land from UP Irrigation Department. • Due to the project not taking off as yet, it was observed that the I&D work at Loknath Nala at Bhopatwala (Sanctioned cost Rs. 4.48 crore) was affected.
Enhancement of capacity & replacement Gravity Main in Haridwar on river Ganga	• The project was completed in January 2010 after a delay of three months. The completion report of the project and the final UCs of the project have not yet been sent to MoEF. • The project was delayed due to delay in permission for land from local residents. • Under the project, 8.56 kms of pipe were laid as against the target of 8.06 kms. One pumping station was also replaced and the pumping station was being utilised fully.
Enhancement of STP at Jagjeetpur at Harid at Haridwar on river Ganga	• The project was completed in July 2010 after adelay of nine months. The completion report and final UCs have not yet been submitted to MoEF. • The project was delayed due to late award of contract. • STP of capacity 27 mld was built and 27 mld of sewage was being treated. Further, monthly sampling was being done by State Pollution Control Board.

(c) Srinagar

The average estimated sewage generated in the city of Srinagar was 3.50 mld flowing out from eight tapped drains and for remaining 11 un-tapped drains, no data was available. Total sewage flowing through eight tapped drains was being treated and the rest sewage from the 11 untapped was being discharged into the Alaknanda As such, there would be untreated sewage being discharged from these drains which have not yet been intercepted. **Details of two projects test checked in Srinagar which aim to improve the quality of Alaknanda water are discussed below:**

Project name	Findings
I&D Part I at Srinagar on river Alaknanda[37]	• The project was completed in May 2004 after a delay of five months. The completion report and final UCs have not yet been submitted to MoEF. • Though the project was completed within the allotted funds, it was observed that ₹ 7.61 lakh was incurred on un-approved items. • The project was delayed due to time extension sought by the contractor • 8 drains were intercepted under this project and 5.76 kms of pipes laid, against targeted 4.49 kms.One pumping station was also built and its capacity was being fully utilised
STP 3.50 mld Srinagar on river Alaknanda	• The project was completed in January 2009 after a delay of three years. The completion report and final UCs have not yet been submitted to MoEF. • The cost overrun on the project was ₹ 1.89 crore. • The project was delayed due to delay in release of funds and tender process. • The STP capacity created was 3.50 mld and it was treating 3.50 mld.However, it was observed that untreated sewage was still flowing into the river Alaknanda but its exact amount had not been measured.The treated sewage was meeting the prescribed standards in relation to pH, Total Suspended solids (TSS), BOD and COD.

(d) Uttarkashi

The average estimated sewage generated in the city of Uttarkashi was 2.25 mld and only 0.25 mld capacity for treatment was available in Uttarkashi but no sewage was actually being treated due to the fact that none of the STPs constructed were operational. As a result, the entire 2.25 mld of sewage being generated in Uttarkahi was flowing untreated into the Bhagirati. As such, there would be untreated sewage being discharged from these drains which have not yet been intercepted. **Details of three projects test checked in Uttarkashi which aim to improve the quality of Bhagirathi water are discussed below:**

Project name	Findings
STP Part I in Uttarkashi on river Bhagirathi	• The project was completed in March 2010 after a delay of six years and one month. Completion report and final UC had not yet been submitted by the implementing agency to MoEF. • The project was delayed due to non availability of land.

[37] At Devprayag, Alaknanda meets Bhagirathi and renamed Ganga

	• The STP capacity created was 0.25 mld but actually no sewage was being treated because the sewer line was not connected to the STP.
I&D Part I	• The project was completed in September 2009 after a delay of five years and four months. Completion report and final UC had not yet been submitted by the implementing agency to MoEF. • The cost overrun on the project was ₹1.31 crore due to change in design structure of the project by executing unapproved works. Further, ₹ 49.97 lakh was incurred on un-approved items. • The project was delayed due to resistance by local residents over use of their land for construction work. • The performance of the project had not been assessed by the implementing agency due to non completion of STP-II. Even though under the project one pumping station was built, it was not being utilised. • As such, the entire project was lying unutilized at present.
I&D Part II	• The project was completed in December 2009 after a delay of six years. The completion reports and final UCs have not yet been submitted by the implementing agency to MoEF. • The cost overrun on the project was ₹ 0.67 crore due to change in design structure of the project by executing unapproved works. Further, ₹ 9.82 lakh was incurred on un-approved items. • The project was delayed due to resistance by local residents over use of their land for construction work. • The performance of the project had not been assessed by the implementing agency due to non-completion of STP-II. Two pumping stations were constructed but these were not being utilised at present due to non-completion of STP II. • As such, the entire project was lying unutilized at present.

Thus, the projects sanctioned for prevention of pollution of Alaknanda/Ganga river in cities of Srinagar and Rishikesh-Haridwar were working as envisaged. However, projects sanctioned for prevention of pollution of Bhagirathi in Uttarkashi had not met their objectives.

Untrapped drain in Srinagar

Untreated sewage flowing into Ganga in Haridwar

4.2 NLCP

5 lakes in Uttarakhand, Bhimtal, Naukuchiatal, Sattal, Khurpatal and Nainital had been included under NLCP for conservation and restoration. Out of these five lakes, works undertaken for conservation and restoration of Nainital lake were test checked for detailed audit scrutiny. It was observed that none of these lakes figured in the list of most polluted lakes prepared by NRCD.

(i) Physical and financial progress

Name of the lake	Sanctioned cost (₹ in crore)	Actual Expenditure (₹ in crore)	Scheduled date of completion	Actual date of completion
Nainital lake	47.97	47.97	August 2006	March 2007 (but not yet completed)

(ii) Performance of the Project:

Project name	Findings
Nainital Lake	• NRCD, MoEF in 2003 had sanctioned a project for conservation and management of Nainital Lake at a total cost of ₹ 47.96 crore on 70:30 basis between GOI and State government. • For effective implementation of project, the Project monitoring Committee (PMC) had been constituted by government Of Uttarakhand under the Chairmanship of Commissioner, Kumaon Division. The Lake Development Authority (LDA) was assigned to be the nodal agency for coordinating various works under the project. The PMC entrusted different works to the different government departments/ agencies and private agencies.

The main works under the Naini Lake conservation project were as under:

1. Sewage management			
1.1 Sewer lines and Sewage treatment Plant: Branch lines , STPs			
1.2 Construction of community toilets in the catchment area: Community toilets (29)			
1.3 Solid waste management: Mission Butterfly launched by Solid waste Management for mobilising the community. Manage waste in a sustainable way, optimising recycling and reuse.			
2. Hydraulic Works			
2.1 Outlet works of lake at Tallital	2.2 Protection works at Balia Nala: Bed protection measures, Control measures for stabilisation of landslides, Repair and renovation of drains, Construction of toe walls, check walls etc, Vegetative turfing on the sliding slope		
3. Conservation and Development works			
3.1 Aeration works	3.2 Dredging of deltas: removal of silt	3.3 Bio-manipulation works: Removal of Gambusi, Puntius, Big head carp, Mahseer and silver carp introduced	3.4 Shore line development: jetty, paving of flat area, development of parks, renovation and beautification of Thandi Sadak, renovation of railing and wall and lighting and street furniture

4. Catchment Conservation Works		
4.1 Catchment Conservation Works: Vegetational remedial, Engineering remedial and eradication of Loranthus	4.2 Other conservation works: Renovation of lake retaining wall	
5. Water Conservation and infrastructure facilities		
5.1 Water Quality monitoring: checking of water quality parameters	5.2 Parking	5.3 New bridge cum bypass
6. Public participation and awareness creation for lake conservation • Awareness through print media and electronic media, Launching of lake warden scheme, Talk show, Workshop under Solid Waste Management		

Results and Benefits of the Project: After completion of the different works, the achievements were as under:

- Transparency of the lake has increased
- Decrease in concentrations of toxic gases like carbon dioxide, ammonia, hydrogen sulphide and methane
- Decease in concentrations of nutrients like nitrogen and phosphorus
- No algae bloom observed after aeration
- Suitable conditions for the growth and breeding of environment friendly fish species like mahseer
- Concentrations of dissolved oxygen in the lake have increased from the bottom of the lake to the surface
- No fish fatalities have occurred after the aeration work
- BOD levels came down from 21mg/lt to 6.8 mg/lt and improvements in other parameters
- Whole lake catchment area has been covered by sewer line. No sewage is entering the lake
- Open defecation has been controlled by constructing the community toilets
- After launching mission butterfly, solid waste, garbage of the whole town is being managed in a more sustainable way
- There is improvement in aesthetic view within periphery of lake.

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
8 out of 9 projects	8 out of 9 projects	8 out of 9 projects	0 out of 9 projects

5.2 NLCP

By Inter-Departmental Coordination Committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
1 out of 1 projects	1 out of 1 projects	1 out of 1 projects	1 out of 1 projects

5.3 Ground water (in six blocks test checked)

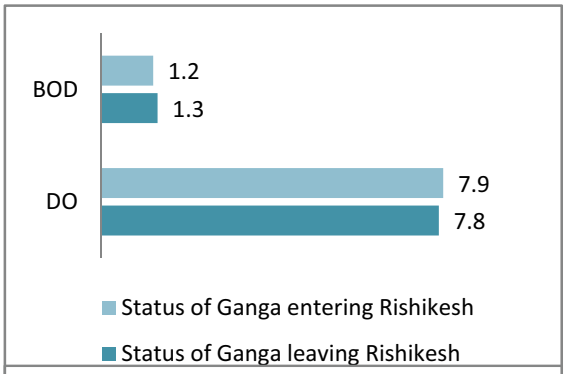
Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	Yes	Not Done, except in Dehradun and Nainital.	Yes (Partially)

6. Outcomes

6.1 NRCP

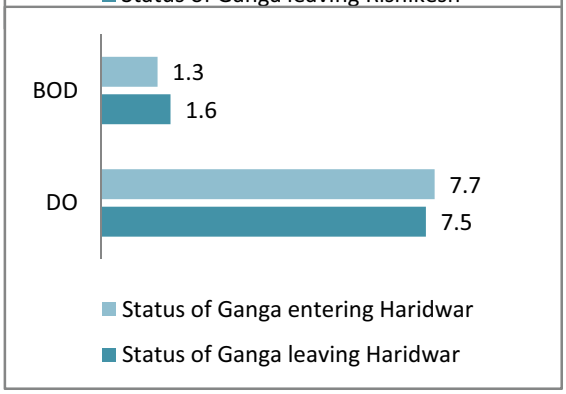
(a) Water quality in river Ganga after Rishikesh

Status of Ganga on entering Rishikesh and after leaving Rishikesh in terms of DO and BOD is shown in the chart alongside. TC of Ganga rises from 220 MPN/100 ml to 250 MPN/100 ml after it leaves Rishikesh.



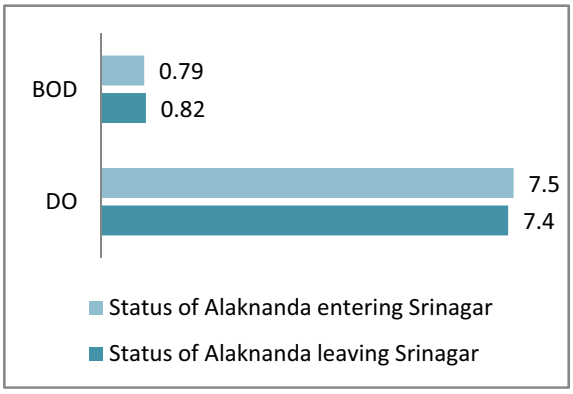
(b) Water quality in river Ganga after Haridwar

Status of Ganga on entering Haridwar and after leaving Haridwar in terms of DO and BOD is shown in the chart alongside. TC of Ganga rises from 280 MPN/100 ml to 500 MPN/100 ml after it leaves Haridwar.



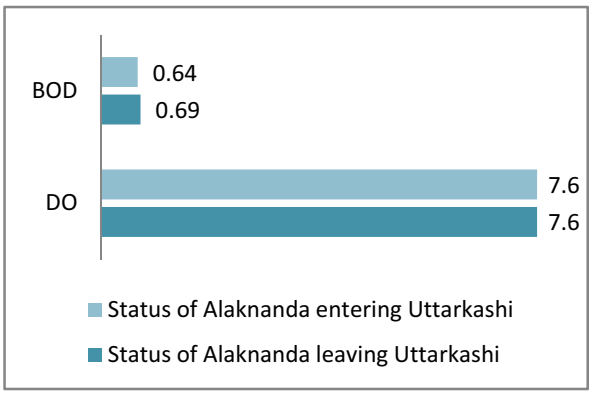
(c) Water quality in river Alaknanda after Srinagar

Status of Alaknanda on entering Srinagar and after leaving Srinagar in terms of DO and BOD is shown in the chart alongside. TC of Alaknanda rises to 40 from 32 when it leaves Srinagar.



(d) Uttarkashi

Status of Bhagirati on entering Uttarkashi and after leaving Uttarkashi in terms of DO and BOD is shown in the chart alongside. TC of Bhagirati rises to 36 MPN/100 ml from 28 MPN/100 ml when it leaves Uttarkashi.



6.2 NLCP

Though the project for restoration and conservation of Nainital Lake was not yet complete as a whole, the water quality report of December 2010 revealed that criteria for designated best use classification for B class water for all parameters was achieved.

State: West Bengal

1. Background

Ganga, Mahananda and Damodar are the important rivers of West Bengal. Some important lakes in West Bengal are Rabindra Sarobar, Rasikbil, Senchal lake, Sagar Dighi, Mirik lake, Mati jheel, Bhangzang Salamander Lake, Talberia etc. Out of 341 blocks in West Bengal, in one block the ground water is critical and in 37 blocks, the ground water is semi-critical. According to Central Ground Water Board, the annual replenishable ground water resource in West Bengal is 30.36 BCM and the net annual ground water availability is 27.46 BCM. Some of the contaminants present in ground water in West Bengal are salinity, fluoride, chloride, iron, nitrate and arsenic.

Test checked rivers and lakes in West Bengal

Insitutional arrangements in the State: As per information provided by MoEF, the Urban Development and Commerce & Industries Department, Government of West Bengal, Kolkata is the nodal department for NRCP and the implementing agency is Kolkata Metropolitan Development Authority, Kolkata and Industries Department. Department of Urban Development, Government of West Bengal is the implementing agency for NLCP.

2. Planning for water pollution

Action taken by the State in planning for programmes for the control of river, lake and ground water pollution in the State of West Bengal is discussed below:

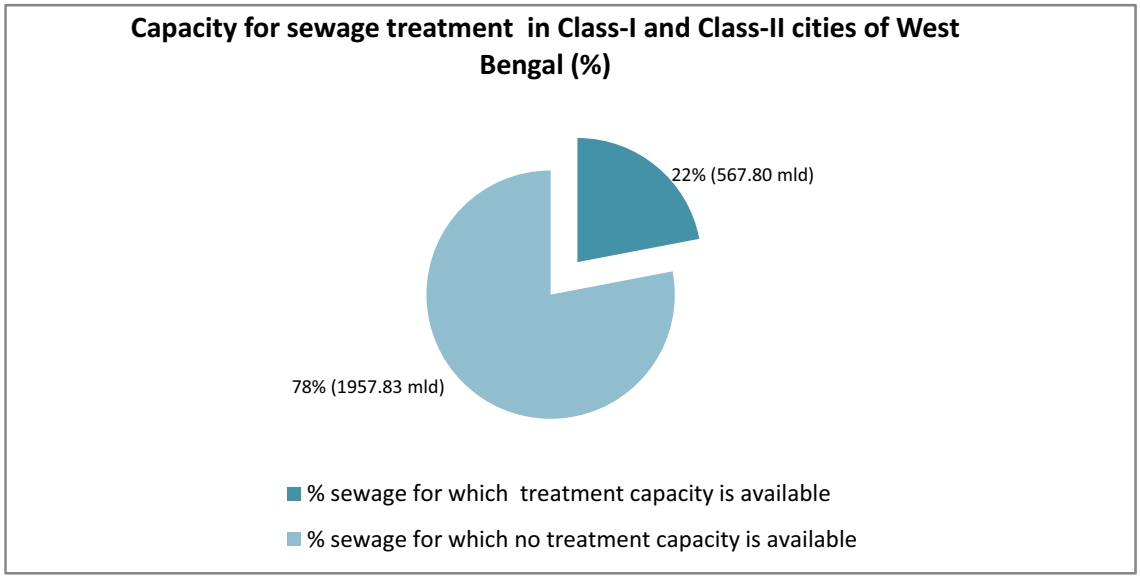
		Rivers	Lakes	Ground water
1. Inventory of water resources		Done	Done	Done
2. Assessment of water quality	a) Chemical Indicators	Done	Done	Done
	b) Biodiversity indicators	Done	Not Done	Not applicable
	c) Quantification of contaminants	Done	Done	Could not be verified
	d) Impact of human activities	Partially (Agriculture-Done.	Done	Partially (Mining-Not

		Industry-Done. Mining-Not Done. Dams-Not Done. Uncontrolled disposal of human waste-Done.)		Done)
3. Identification of risks to environment and health	**a)Risks to wetlands**	Not Done	Not Done	Not applicable
	b) Risks to aquatic species	Not Done	Not Done	Not applicable
	c)Risks to human health	Not Done	Not Done	Could not be verified
4. Policy for water pollution		Not Done	Not Done	Not Done
5. Programmes for prevention and control of water pollution		Not Done	Not Done	Not Done
6. Constitution of Water Quality Review Committee		Done		

[**Note: Not applicable:** Does not pertain to Ground Water**; Could not be verified:** Could not be verified on account of lack of evidence.]

3. Sewage generation and its treatment as per CPCB

Sewage generated/ treatment capacity in Class I and Class II cities of West Bengal



[Source: CPCB data, 2005-06]

The total sewage generated in Class I and Class II cities of West Bengal is 2525.63 mld, of which treatment capacity is available for only 567.80 mld.

4. Implementation of programmes for control of water pollution

4.1 NRCP

Ganga, Damodar and Mahananda rivers had been selected for pollution abatement projects under the National River Conservation Programme (NRCP). Projects are being implemented in 32 cities. 219 projects in these 32 cities were sanctioned with the cost of ₹ 377.39 crore.

10 projects being implemented under NRCP at an estimated cost of ₹ 56.60 crore were test checked for detailed examination

(i) Physical and financial progress

Name of the river/ location	Name of the project	Sanctioned cost (` in crore)	Actual Expenditure (` in crore)	Schedule date of completion	Actual date of completion
Ganaga/ Barrackpore	RFD at Kolkata	4.81	4.81	November 2008	November 2009
	Crematoria at Shantipur	0.83	1.15	July 2007	January 2010
	MPS I	2.00	1.64	August 2003	August 2009
	I&D	3.96	3.96	December 2004 extended upto March 2011	Ongoing
	RFD at Kamarahati	2.86	2.46	March 2009	September 2009
Ganga/ Gayeshpur, Halilshar & Kancharapara	MPS II	3.41	3.12	February 2004	June 2009
	I & D Sewer,Halishar, Kanchrapara, Gayeshpur	1.52	1.52	November 2002	March 2004
	Lifting Station I Southern Part	1.82	1.83	August 2003	April 2009
Mahananda/ Siliguri	I & D,MPS,STP and RFD	32.37	22.06	September 2007	Not completed
	RFD at Siliguri	3.02	3.00	May 2009	May 2009

(ii) Performance of the projects

(a) Barrackpore

The average sewage generated in the city of Barrackpore in 2001 was 24.30 mld. One STP existed in the city but no sewage was being treated and the entire 24.30 mld untreated sewage was being discharged into the Ganga.

Details of four projects test checked in Barrackpore which aim to improve the quality of Ganga's water are discussed below

Project name	Findings
RFD at Kolkata	• The project was completed in November 2009.after a delay of one year . • The project was sanctioned at an estimated cost of ₹ 4.81 crore • Operation and maintenance of the created assets was yet to be started and the assets created at a cost of ₹ 4.81 crore remained without any maintenance for last two years.
RFD at Kamarahati	• The project was completed in September 2009 after a delay of six months • An expenditure of ₹ 2.46 crore was incurred on the project against the sanctioned cost of ₹ 2.86 crore. • The project was delayed due to encroachment and Monsoon. • 250 meters of river front area was actually developed under the project. Assets created at a cost of ₹ 2.46 crore remained without any maintenance for last almost two years because Kolkata

	Metropolitan Development Authority (KMDA) did not receive the required funds.
Main Pumping Station I	• The project was completed in August 2009 after a delay of six years The project completion report along with final utilization certificate was yet to be submitted to NRCD. • An expenditure of ₹ 1.64 crore was incurred on the project. • The project was delayed due to non acquisition of land. • Two pumping stations having capacity of 6.9 mld were constructed under the project. However, these were not handed over to the Municipality for commissioning. Thus, the pumping station constructed at a total cost of ₹ 1.64 crore was lying idle.
Electric Crematoria	• The project was completed in January 2010 after a delay of two years and six months. • An expenditure of ₹ 1.15 crore was incurred on the project against the sanctioned cost of. ₹ 0.83 crore resulting in cost escalation of ₹0.32 crore. • The project was delayed due to change of location of the original site.
I&D	• The project was sanctioned in August 2002 with scheduled date of completion by December 2004. The duration of the project was extended upto March 2011. • The project was delayed due to legal issues in acquisition of land. • Due to non-completion of the I&D work, the Main Pumping Station, constructed at a cost of ₹ 1.64 crore, could not be commissioned.

(b) Siliguri

The average daily estimated sewage generated in **Siliguri** is 59 mld and the entire untreated sewage is let into Mahananda river. There are 350 drains falling into Mahananda river and none of them has been intercepted.

Two projects test checked in Siliguri are discussed below:

Project name	Findings
I&D at Siliguri	• The project scheduled for completion by March 2007 was not yet complete. • The project was delayed due to non-availability of land.
STP at Siliguri	• The project was scheduled for completion by September 2007, was not yet complete • The project was delayed due to non-availability of land.
RFD	• The project scheduled for completion by April 2007 was not yet complete. • The project was delayed due to non-availability of land.
MPS	• The project scheduled for completion by October 2006 was not yet complete.
River Front Development	• The project was completed in May 2009. • An expenditure of ₹ three crore was incurred on the project

at Siliguri	against a sanctioned cost of ₹ 3.02 crore. • 8.7 kilometer river front area was developed under the project and the river front areas were being maintained properly.

(c) Gayespur/Halilshar

The average daily estimated sewage generated in Gayespur/Halilshar is 38 mld. STP capacity of 12.5 mld is available in the city but no sewage is treated and the entire untreated sewage is let into River Hoogly. No Information was available regarding the quality of River Ganga before it enters Gayespur/Halilshar and after it leaves Gayespur/Halilshar.

Projects test checked under Gayespur/Halilshar which aim at improving the quality of water of Ganga River are discussed below:

Project Name	Findings
MPS-II, Halilshar, Kanchrapara, Gayespur	• The project was completed in June 2009 after a delay of five years and four months. • An expenditure of ₹ 3.12 crore was incurred on the project against a sanctioned cost of ₹ 3.41 crore. • The project was delayed due to delay in acquisition of land. • Pumping stations having capacity of 6.5 mld was constructed under the project.
Lifting Station (I&D sewer) Halilshar/ Kanchrapara/ Gayespur	• The project was completed in March 2004 after a delay of one year and four months but the project has not yet been commissioned. • The project was delayed due to non-availability of site, poor sub soil condition for laying sewers and shifting of utility services and narrow width of the road. • The pumping stations having capacity of 6.5 mld was constructed under the project and against the total length of 3233 meters of sewer lines, only 1934 meters sewer line was laid under the project.
LS-I Halisahar, Kanchrapara, Gayespur	• The project was completed in April 2009 after a delay of five years and eight months but the project has not yet been commissioned. • The project was delayed due to delay in acquisition of land. • Under the project, pumping stations having capacity of 6.5 mld was constructed and against the total length of 3233 mtrs sewer lines planned, only 1934 mtrs sewer lines were actually laid. • The project has not been handed over to the municipality and is lying unutilized.
	It was observed that all the three projects were completed. However, these projects could not be handed over to the concerned municipalities due to legal issues.

Non functional STP at Halilshar

RFD at Kamarhati

4.2 NLCP

(i) Physical and financial progress

Name of the Lake	Sanctioned cost (₹ in crore)	Expenditure till date (₹ in crore)	Sanctioned date of completion	Date of completion
Mirik lake	4.01	0.60	February 2006	Ongoing
Ravindra Sarovar	6.96	3.86	March 2004	Ongoing

(ii) Performance of the Project

Project Name	Findings
Mirik Lake	• The restoration and consevation of Mirk Lake included components like bank protection, fencing work, construction of silt & debris arrestor, afforestation, de-siltation and public participation, waste treatment, underground drainage etc. • The project was to be completed by February 2006 but it was still ongoing. • NRCD released ₹ 1.00 crore as first installment but KMDA could spend only ₹ 60.26 lakh till March 2009. KMDA had entrusted the execution of waste treatment and allied works to Siliguri Jalpaiguri Development Authority (SJDA) which were nearing completion. Further, an amount of ₹ 50 lakhs had been released to Darjeeling Gorkha Hill Council (DGHC) in April 2005 for executing the remaining work like bank protection, de-siltation, jhora lining, fencing etc. However, DGHC had not submitted any report to KMDA regarding their progress of work. Thus, the project for restoration and conservation of Mirik Lake was yet to be completed even after a time overrun of more than five years.
Ravindra Sarovar	• The restoration and consevation of Ravindra Sarovar included components like bio-remediation, upkeep, lake bank protection and fencing and lake beautification. • The project was scheduled for completion by March 2004 but it continued without any extension as of March 2011. • The bio-remediation was originally proposed for improvement of water quality of Ravindra Sarovar as huge number of slum squatters were using the lake water for bathing and washing of clothes. However, bio-remediation work was not initiated. • Further, the, water quality reports of Sea Explorers' Institute, Jadavpur University and West Bengal Pollution Control Board for the year of 2007, 2009 and 2010 revealed the presence of BOD, TC and FC in excess of permissible limits. Thus, the project for restoration and conservation of Ravindra Sarovar was yet to be completed even after a time overrun of more than seven years.

Littered shoreline of Rabindra Sarovar

Weeds choking Rabindra Sarovar

5. Monitoring of programmes for control of water pollution

5.1 NRCP

By Chief Executive of implementing agency	By Divisional Project Monitoring Cell	Steering Committee chaired by Chief Secretary of State	High powered committee under CM
8 out of 10 projects	0 out of 10 projects	0 out of 10 projects	0 out of 10 projects

Further, it was observed that regular monitoring of the water body and the environment done by West Bengal State Pollution Control Board (WBSPCB) for two locations- Ganga/Barrackore and Mahananda/Siliguri.

5.2 NLCP

By Inter-Departmental coordination committee	By Steering Committee at the district level	By Lake specific Monitoring Committee	Water quality monitoring plan
2 out of 2 projects	**0** out of **2** projects	**1** out of **2** projects	**0** out of **2** projects

5.3 Ground water (in six blocks test checked)

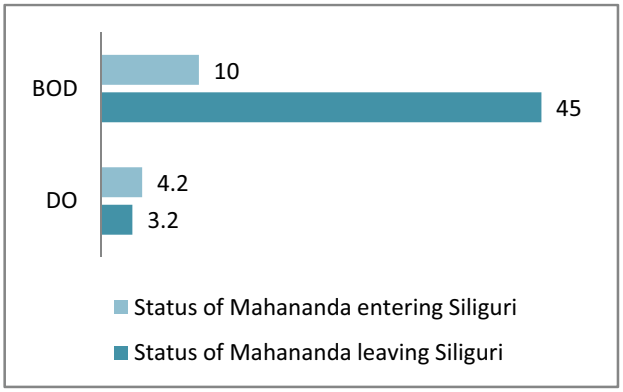
Whether system exists for monitoring of groundwater Pollution	Whether regular monitoring done	Whether water quality laboratories established	Whether Field Testing Kits issued to all the panchayats
Yes	No,in 5 out of 6 blocks	Yes, except in one block	No

6. Outcomes

6.1 NRCP

(a) Water quality of Mahananda after Siliguri

(a) Bio chemical Oxygen demand (BOD) and Dissolved Oxygen (DO) measured in Mahananda river at the time of its entering the town and leaving the town is shown in the graph alongside. It can be seen that BOD levels increase drastically after Mahananda river leaves Siliguri, pointing to inadequacy of pollution control measures. Further DO level in the river also falls.



(b) Quality of water in Hoogly after Gayespur/Halilshar

No Information was available regarding the quality of River Hoogly before it enters Gayespur/Halilshar and after it leaves Gayespur/Halilshar.

(c) Quality of water in Ganga after Barrakpore

Status of Ganga on entering Barrakpore in terms of DO, BOD and TC is 5.6 mg/lts, 3.2 mg/lts and 210000/ 100ml respectively. However, the quality of Ganga after it leaves Barrakpore was not measured. Hence, it could not be ascertained if the quality of water in Ganga had been improved after its inclusion in NRCP.

6.2 NLCP

As the projects on improving water quality of Mirik lake, Darjeeling and Ravindra sarovar lake, Kolkata were still in progress, no conclusions could be drawn about impact of NLCP in restoring the lake.

Chapter 9: Conclusions

Clean, safe and adequate fresh water as mentioned earlier is vital to the survival of all organisms and the smooth functioning of key systems, entities and economies. Water based eco-systems provide a diversity of services vital for human well-being and poverty alleviation. The delivery of fresh water is a particularly important service both directly and indirectly. Water pollution and contamination weakens or destroys natural eco-system that supports human health, food production and bio-diversity. Polluted water can lead to serious problems with diseases and death of humans, animals, plant and vegetation. Water pollution in the 14 major and 55 minor and several hundreds more rivers of India is a serious problem. Millions of litres of sewage, industrial and agricultural waste are discharged into these rivers. At present only 10% of the waste water generated is treated. Similarly lakes and ground water are under severe threat from the impact of pollution. The cost of penalty is far cheaper than the cost of prevention of pollution. There are no effective deterrents for the polluters. Although the concerns relating to water pollution have been addressed in the National Water Policy and National Environment Policy in India both at the Centre and State, the resources available for prevention of pollution, treatment of polluted water and ecological restoration of polluted water-bodies are woefully inadequate.

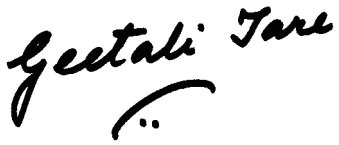
The absence of a comprehensive inventory of rivers, lakes and keystone species associated with them adversely impact the quality of planning. MoEF, CPCB and States failed to carry out the comprehensive identification and quantification of human activities which were a serious threat to the water quality and the different sources which affect the water quality in rivers, lakes and ground water. No agency in the country has assessed the risk of polluted water to health and environment. MoEF is yet to adopt the basin level approach for control of pollution of rivers and lakes except in the case of the Ganges where a beginning has been made. It is yet to also develop water quality guidelines and corresponding parameters for each river and lake.

Inclusion of rivers and lakes into the National River Conservation Programme and the National Lake Conservation Programme was flawed and the States failed to take a comprehensive survey to measure pollution level in rivers, lakes across the country on the basis of which the decision regarding inclusion should have been made. Further neither MoEF nor the States have introduced any programme to prevent pollution of ground water. They have also not addressed the concerns of pollution from agricultural sources.

The implementation of NRCP and NLCP both at the Centre and State left much to be desired. DPRs were not adequately prepared. MoEF failed to get the DPR vetted by technical experts. The monitoring of implementation of the projects by MoEF/CPCB and the States was ineffective. The implementation of the projects at the level of the States also suffered from delays, cost escalations and poor quality work. There was no maintenance of assets after creation. The continuous monitoring of the quality of water after the planned intervention was also missing. The poor monitoring and the failure to establish a network to track pollution of water in rivers, lakes and ground water, failure to update and define water quality parameters, absence of database, poor dissemination of data are all indicators of an

inadequate system to support such a vital activity. In spite of these programmes being implemented for over two decades there has been no discernible effect on the quality of water both in rivers and lakes. All the rivers test-checked continue to be plagued by the high levels of organic pollution, low level of oxygen available for aquatic organisms and bacteria, protozoa and viruses which have faecal origin and cause illness. The lakes in India continue to be under threat from nutrient overloading which is causing their eutrophication and the eventual choking up by various weeds proliferating in the nutrient-rich water.

The funds available for control and prevention of water pollution and restoration of polluted water are inadequate. This situation is further aggravated by poor financial management in the implementation of projects. MoEF and the States need to exercise greater oversight over utilization of funds to ensure that funds are spent timely and for the purpose it was sanctioned.



(GEETALI TARE)
Principal Director of Audit,
Scientific Departments

New Delhi
Dated: 29 – 11-11

Countersigned

(VINOD RAI)
Comptroller and Auditor General of India

New Delhi
Dated: 29 -11 - 11

Annexure 1
Details of Sample

Name of State	River		Lake	Ground water
	Name of river/ town	Name of the project		
1. Andhra Pradesh	Godavari/ Rajamundry	1. STP	Banjara	Anantpur, Nalgonda, Vishakhapat-nam, Medak, Guntur and Khammam
	Godavari/ Ramagundam	2. STP Zone 1 3. I&D 4. STP, WSP, 14 mld 5. STP Zone 2		
	Musi/ Hyderabad	6. STP+I&D		
2. Assam	Sampled only for general issues in water pollution			Borkhola, Dhemaji, Jaleswar, Chandrapur, Mayang, Diphu
3. Bihar	Ganga/ Barahaya	1. LCS 2. RFD		Simri, Katoria, Barauni , Mushahari, Maner, Biraul
	Ganga/ Patna	3. RFD 4. Diesel Crematoria 5. RFD 6. RFD		
4. Chhattis-garh	Sampled only for general issues in water pollution			Chowki, Korba, Kartala, Bagicha, Baikunthpur, Bastar
5. Delhi	Yamuna/ Delhi	1. STP Sen Nursing Home 2. STP Delhi Gate Nala 3. EC 4. STP 3 mld FAB technology 5. STP 3 mld SAFF technology 6. STP 2 mld SAFF technology 7. LCS 8. 2 mld disinfection plant at Sen Nursing Home 9. Public Participation and		Gandhinagar, Model Town, Anand Parvat, Wazirpur, Defence Colony and Rajouri Garden

		Awareness 10. STP 135 mld	
6. Goa	Mandovi/ Panaji	1. I&D 2. STP Plan 12.50 mld 3. STP renovation and re-modeling 4. LCS	Ponda, Bardez and Salcette
7. Gujarat	Ahmedabad/ Sabarmati	1. I&D De-silting of sewer 2. I&D WTS Zone V Part I 3. I&D ETS Zone IV Pt I including of sewer cleaning equipment 4. STP 5. Renovation of 3 STP 6. Western Trunk Sewer Zone 5 Part II 7. LCS 8. STP at Pirana 106 mld 9. STP at Vasna 126 mld	Himatnagar, Godhra, Chotila, Ankleshwar, Sanand and Veraval
8. Haryana	Yamuna/ Faridabad	1. Pilot Plant at 20 mld STP Zone I 2. LCS 3. I&D 4. Sewer Lines Phase—II/Stage II 5. Public Participation and Awareness for 6 towns	Meham, Karnal, Kathura, Faridabad, Panipat and Nathusri-chopta
	Yamuna/ Panipat	6. LCS 7. I&D 8. Drying Beds 9. Sewer Lines Phase II/Stage II 10. Additional Sewerage Works	
9. Himachal Pradesh	Sampled only for general issues in water pollution and for monitoring of ground water resources in blocks of Jassur, Mandi, Baddi, Paonta Sahib, Una, and Shimla.		
10. Jammu and Kashmir			Dal Lake
11. Jharkhand	Subarnarekha/ Jamshedpur	1. CRE (EC+IWB) 2. LCS 3. RFD	Chainpur, Chas, Jamshedpur,

	Subarnarekha/ Ranchi	4. RFD		Lohardaga Sadar, Mandu, and Ormanjhi
12. Karnataka	Bhadra/ Bhadravati	1. I&D	Bellandur, Kotekere, Sharanabasa veshwara lake	Kolar, Gulbarga, Mangalore, Bhadravati, Belgaum block, and Davanagere
	Tungabhadra/ Devanagare	2. STPs based on WSP		
	Pennar/ Bangalore	3. I&D Environment Action Plan		
13. Kerala	Pamba/ Pamba	1. I&D 2. STP 3. RFD 4. LCS 5. SWM 6. Public participation	Veli Akkulam	Alathur, Attappady, Alangad, Edappally, Palakkad and Malampuzha
14. Madhya Pradesh	Khan/ Indore	1. MPS 2. I&D Part II 3. STP	Shivpuri Lake	Indore, Pithampur, Jabalpur, Ratlam, Khargone, Jhabua
	Betwa/ Vidisha	4. I&D 5. STP		
	Kshipra/ Ujjain	6. I&D 7. STP 8. I&D Part II		
15. Maharash-tra	Krishna/ Karad	1. STP 2. I&D	Powai and Rankala lake	Nanded, Jalna, Dombivali, Nashik, Raigad, and Jalgaon
	Godavari/ Nashik	3. I&D 4. STP 78 mld at Tapovan 5. STP 22 mld at Chehdi		
	Krishna/ Sangli	6. I&D 7. STP		
	Godavari/Nanded	8. I&D 9. STP		
16. Nagaland			Twin lake	None sampled
17. Odisha	Mahanadi/ Cuttack	1. I&D Part II 2. STP 3. I&D 4. LCS	Bindusagar lake	None sampled
	Coastal area/ Puri	5. I&D 6. MPS 7. STP		
18. Punjab	Satluj/ Jallandhar	1. STP 2. MPS at Garha		Kot kapura, Ludhiana, Bhikhi, Maur, Abohar and Jallandhar
	Satluj/ Ludhiana	3. STP at Bhattian 4. MPS 5. MPS Baloke 6. MPS at Jamalpur		

		7. STP Baloke 8. STP at Jamalpur		
19. Rajasthan	Chambal/ Kota	1. STP 30 & 6 mld and I&D 2. LCS 3. RFD 4. Improved Wood Crematoria	Mansagar Pushkar Pichola	Udaipur, Jalore, Jaipur, Pali and Tonk
20. Sikkim	Rani Chu/ Gangtok	1. Sewerage and STP 2. Rehabilitation of Main Sewer Line		None sampled
21. Tamil Nadu	Adyar & Cooum/ Chennai	1. STP at Koymbedu 60 mld 2. STP at Koymbedu 110 mld 3. STP at Perungundi 54 mld Package 13 4. STP at Nesapakkam 40 mld, Package 15 5. I&D Package VII 6. I&D Package VIII	Kodaikanal	Manali, Cuddalore, Krishnagari, Dharmapuri, Perambalur and Vellore
	Cauvery/ Tiruchirappalli	7. I&D and STP		
	Vaigai/ Madurai	8. I&D Part I 9. I&D Part II 10. I&D Phase IV 11. STP Phase II		
22. Tripura			Dimsagar, Laxmina-rayanbari and Durgabari	None sampled
23. Uttar Pradesh	Yamuna/ Ghaziabad	1. STP Cis Hindon Area 70 mld 2. STP trans Hindon Area 3. I&D 4. LCS	Mansi Ganga	Isha Nagar, Reoti , Bisrakh, Rajapur, Hilauli, and Kannauj
	Ganga/ Kanpur	5. Intermediate Pumping Station Munsi Purwa PIII 6. Intermediate Pumping Station at Rakhi Mandi PIV 7. Relieving sewer for Bakermandi to Rakhimandi 8. MPS and Campus development		

		9. SWM Part II 10. Tapping of Ganda Nala and Halwa Khanda Nala and dive		
	Gomti/ Lucknow	11. STP of 42 mld at Daulatganj 12. I&D of GH Canal Drain 13. STP USAB 14. MPS at Gwari Culvert		
24. Uttara-khand	Ganga/ Haridwar-Rishikesh	1. I&D and STP works at Lakhshman Jhula and Swarg Ashram 2. STP at Bhopatwala 3. Enhancement of capacity & replacement Gravity Main 4. Enhancement of STP at Jagieetpur at Harid	Nainital lake	Bhagwanpur, Purola, Bhimtal, Sahaspur, Rudrapur, and Syaldeh
	Ganga/ Srinagar	5. I&D Part I 6. STP 3.50 mld		
	Ganga/ Uttarkashi	7. STP Part I 8. I&D Part II 9. I&D Part II		
25. West Bengal	Ganga/ Barrakpore	1. RFD at Kolkata 2. Crematoria at Shantipur 3. MPS I 4. I&D 5. RFD at Kamarahati	Ravindra Sarovar, Mirik	Manikchak, Siuri-II, Haldia, Syaldeh, Falakata and Dantan-I
	Ganga/ Gayeshpur, Halilshar & Kancharapara	6. MPS 7. Lifting Station I Southern Side 8. Lifting Station I Southern Part		
	Mahananda/ Siliguri	9. I&D, MPS, STP, RFD and STP at Kolkata 10. RFD at Siliguri		

Annexure 2
Completed projects not utilised

Sl. No.	Name of the Project	Date of completion	Actual expenditure (₹ in crore)	Remarks
1.	STP Zone 1 on Godavari/ Ramagundam, **Andhra Pradesh**	June 2008	0.16	Though the STP capacity was 4 mld, only 1 mld was being treated and the rest 3 mld was flowing into Godavari. The pump sets were not working which hampered the operation of the STP.
2.	STP Zone 2 on Godavari/ Ramagundam, **Andhra Pradesh**	January 2005	0.82	Though the STP was constructed to treat 14 mld of sewage, it was treating only 3.5 mld and the rest 10.5 mld was flowing untreated into the Godavari. The pump sets were not working which hampered the operation of the STP.
3.	RFD, Barahiya on Ganga in **Bihar**	July 2002	0.28	The facility was handed over by the implementing agency to the local body for operation and maintenance. But, both the ghats (Vijaygharh ghat & Sojikipari) constructed, are not existing as the course of Ganga has shifted from the purported sites and both the ghats were completely destroyed and non existing due to erosion.
4.	RFD, Patna on Ganga in **Bihar**	April 2003	0.65	The River Ganga has shifted from Kurjee Ghat, Rajendra Ghat and Indira Ghat and these ghats are defunct. Collectorate Ghat and Narkat Ghat, where Ganga is flowing are not maintained by Patna Municipal Corporation and thus are in deplorable condition. Mahavir ghat, which was constructed under this project was also destroyed.
5.	RFD, Danapur on Ganga in **Bihar**	May 2007	0.29	RFD is now completely defunct. Electric poles have been uprooted and electric lamps are broken, stair cases have been buried under thick layer of sand/mud and change room was found in dire state, Also this project was not handed over to Danapur Cantonment Board (local body).
6.	STP, **Delhi**	March 2003	1.28	The plant is shut down since 2007 and all the sewage is passing to Yamuna through drain/nallah without treatment.
7.	LCS at **Delhi**	February 2003	1.65	Out of 1146 Nos. of Community Toilet Complexes (CTCs) to be constructed under the project, only 959 CTCs were constructed. Of which, status of only 471 CTCs are functional as of February 2011. Reasons are:- some LCS Units were encroached, some were lying abandoned and some were completely demolished.
8.	Disinfection plant at Sen Nursing Home STP, **Delhi**	March 2002	0.45	The plant is non-functional.

9.	Pilot Plant of 20 mld STP Zone 1, Yamuna/ **Faridabad, Haryana**	Commissioned in March 2002 and stabilized in March 2003	1.04	It was scheduled to be completed in March 2002 and commissioned in March 2002. However, it could be stabilized only in March 2003. Even though the STP was to treat 20 mld of sewage, it was treating only 14 mld and the rest 6 mld was flowing into the river.
10.	STPs based on WSP, Devanagare, **Karnataka**	November 2005	1.86	STP of capacity 19.45 mld was constructed but it is not functioning at all due to non-maintenance by CC, Devanagare.
11.	STP , Khan, Indore, **Madhya Pradesh**	April 2008	26.82	STP capacity created under the project was 90 mld but it was observed that 50 mld of untreated sewage was flowing into the river Khan.
12.	STP, Nanded, **Maharashtra**	June 2006	2.44	STP was commissioned in June 2006. However, it was not taken over by Municipal Corporation and made operational. Moreover, the STP including stabilisation pond, inlet outlet arrangement, canal work were demolished and dismantled by the Municipal Corporation for a new STP at the same site with the fund from JNNURM.
13.	I&D, Nanded, **Maharashtra**	June 2006	9.92	The STP at Nanded was dismantled and demolished and hence, the I&D work is not put to use for its intended purpose.
14.	LCS at Ahmedabad, **Gujarat**	September 2001	0.73	34 LCS Units were constructed under NRCP. However, only 28 LCS Units are actually functioning now.
15.	100 mld STP at Pholriwal (Jalandhar), **Punjab**	March 2008	29.14	STP was treating only 82 mld of sewage against created capacity of 100 mld despite the fact that the MPS received sewage 125 mld and the balance was discharged into the drain without any treatment.
16.	I&D Part I, Madurai, **Tamil Nadu**	July 2005	46.65	The work of STP Phase III was dropped under NRCD due to non identification of huge land for STP and was taken up by the Corporation under JNNURM. As a result, the infrastructure created for I&D projects (I&D Phase Part I and Part II) under NRCD at a cost of ₹116.89 crore were being kept idle for want of completion and commissioning of STP.
17.	I&D Part II, Vagai/Madurai, **Tamil Nadu**	February 2010	70.24	
18.	STP part-I (Bhagirathi), Uttarkashi on Ganga in **Uttarakhand**	March 2010	0.88	STP of capacity 0.25 was constructed. However, it was not functional due to sewer line not being connected.
19.	I&D Part-I (Bhagirathi), Uttarkashi on Ganga in **Uttarakhand**	September 2009	4.98	The asset (of capacity 4000 lpm) created is not being used due to non-completion of STP-II in the town for which tender process was completed only in December 2010.
20.	I&D Part-II (Bhagirathi), Uttarkashi on	December 2009	1.85	The asset (of capacity 2400 lpm) created is not being used due to non-completion of STP-II in the town for which tender process was completed

	Ganga in **Uttarakhand**			only in December 2010.
21.	STP Cis Hindon Area, Yamuna/ Ghaziabad, **UP**	November 2002	18.63	The STP was not functioning as per prescribed standards of SPCB as a result of which the entire untreated sewage was directly discharged into river Yamuna/Hindon. Further, it was envisaged in the DPR that electricity would be generated from biogas from the STP. However, this was also not happening due to non-functioning of gas holder, gas scrubbing system and power generation units of the plant.
22.	STP Trans Hindon Area, Yamuna/ Ghaziabad, **UP**	November 2002	15.12	The STP was not functioning as per prescribed standards of SPCB as a result of which the entire untreated sewage was directly discharged into river Yamuna/Hindon. Further, it was envisaged in the DPR that electricity would be generated from biogas from the STP. However, this was also not happening due to non-functioning of gas holder, gas scrubbing system and power generation units of the plant.
23.	MPS-I at Barrackpore, **West Bengal**	August 2009	1.64	The MPS-I was completed August 2009 at a cost of ₹ 1.64 crore but could not be utilized due to non completion of the related interlinked works.
24.	MPS- II, Halisahar on Ganga in **West Bengal**	June 2009	3.12	The construction of the project was completed in June 2009 but was yet to be commissioned and handed over to the concerned municipality.
25.	Lifting Station –I Southern part, Halisahar on Ganga in **West Bengal**	April 2009	1.83	The construction of the project was completed in April 2009 but was yet to be commissioned and handed over to the concerned municipality.
26.	Lifting Station –I (I&D sewer) Southern side, Halisahar on Ganga in **West Bengal**	March 2004	1.52	The construction of the project was completed in 2009 but was yet to be commissioned and handed over to the concerned municipality.
27.	RFD at Kamarhati, **West Bengal**	September 2009	2.46	The work was completed in September 2009. As per Administrative Approval, O&M was the responsibility of the implementing agency i.e., Kolkata Metropolitan Development Authority (KMDA) and cost of annual O&M (₹ 4.33 lakh) was to be borne by Dakhineswar Kali Temple and Debottar Trust. The created asset has been handed over to the Dakshineswar Kali Temple Trust. However, the Trust did not release any fund for O&M and in absence of required fund, Kolkata Metropolitan Development Authority did not maintained the created assets.
28.	RFD, Kolkata, **West Bengal**	November 2009	4.81	Under Kolkata RFD project, 1 ladies and 1 gents toilet blocks were to be constructed in each of the 7 ghats. As per sanction letter of the project, annual O&M cost was estimated to ₹11.09 lakh.

				Of which, an amount of ₹ 7.56 lakh was to be generated from usage of toilets to be constructed under the project and rest was to be borne by State Government. Though the project was completed in November 2009, operation and maintenance of the created assets was not started on the plea (of KMDA) that the project was not commissioned yet. During joint inspection in February 2011, it was found that none of those toilets were being utilized as source of resource generation by way of making provision for "Pay and Use", though people were found to be using the same.
		Total actual expenditure	**251.27**	

Annexure 3
List of projects where there was cost overrun

Name of State	Name of river/ town	Name of project	Sanctioned cost (in ₹ crore)	Expenditure (in ₹ crore)	Cost overrun (in ₹ crore)
1. Delhi	Yamuna/ Delhi	Electric Crematoria	1.45 revised to 1.78	1.78	0.33
2. Delhi	Yamuna/ Delhi	STP 3 mld FAB technology	1.78	1.83	0.05
3. Delhi	Yamuna/ Delhi	STP 3 mld SAFF technology	1.86	1.93	0.07
4. Delhi	Yamuna/ Delhi	LCS	1.49	1.65	0.16
5. Delhi	Yamuna/ Delhi	2 mld disinfection plant at Sen Nursing Home	0.42	0.45	0.03
6. Delhi	Yamuna/ Delhi	STP 135 mld	65.03	79.54	14.51
7. Goa	Mandovi/ Panaji	I& D	14.10	14.47	0.37
8. Goa	Mandovi/ Panaji	STP Plan 12.50 mld			
9. Goa	Mandovi/ Panaji	STP renovation & remodelling			
10. Goa	Mandovi/ Panaji	LCS			
11. Gujarat	Sabarmati/ Ahmedabad	I&D WTS Zone V Part I	1.68	1.85	0.17
12. Gujarat	Sabarmati/ Ahmedabad	Western Trunk Sewer Zone 5 Part II	12.91	14.82	1.91
13. Haryana	Yamuna/ Faridabad	Sewer Lines Phase—II/ Stage II	8.33	9.29	0.96
14. Haryana	Yamuna at Panipat	I&D	1.43	1.44	0.01
15. Karnataka	Bhadra/ Bhadravati	I&D	1.30 revised to 1.91	2.29	0.99
16. Karnataka	Pennar/ Bangalore	I&D Environmental Action Plan	46.27	47.20	0.93
17. Kerala	Pamba / Sabarimala	Public participation	0.25	0.27	0.02
18. Kerala	Pamba & Sabarimala	RFD	0.43	1.39	0.96
19. Madhya Pradesh	Khan/ Indore	MPS	4.33	4.69	0.36
20. Madhya Pradesh	Khan/ Indore	I&D Part II	2.53	2.84	0.31
21. Madhya Pradesh	Kshipra/ Ujjain	STP	2.78	2.87	0.09
22. Madhya Pradesh	Kshipra/ Ujjain	I&D Part II	4.8	5.06	0.26
23. Maharashtra	Krishna/ Karad	STP	0.55	0.86	0.31
24. Maharashtra	Godavari/ Nashik	STP 78 mld at Tapovan	20.82	20.90	0.08
25. Maharashtra	Krishna/ Sangli	STP	2.96 revised to 4.49	4.23	1.27
26. Maharashtra	Godavari/ Nanded	I&D	6.50 revised to 9.95	9.92	3.42
27. Odisha	Mahanadi/ Cuttack	I&D Part II	1.20	1.40	0.20
28. Odisha	Mahanadi/ Cuttack	STP	3.51	3.65	0.14
29. Odisha	Mahanadi/ Cuttack	LCS	0.13	0.18	0.05
30. Punjab	Sutlej/ Jallandhar	100 mld STP at Pholriwal (Jalandhar)	22.84	29.14	6.30
31. Punjab	Satluj/ Ludhiana	111 mld STP at Bhattian	34.85	37.59	2.74

32. Punjab	Satluj/ Ludhiana	MPS Baloke	14.92	15.27	0.35
33. Punjab	Satluj/ Ludhiana	152 mld STP at Balloke (Ludhiana)	34.79	42.67	7.88
34. Punjab	Satluj/ Ludhiana	48 mld STP at Jamalpur	13.46	14.56	1.10
35. Rajasthan	Chambal/ Kota	RFD	0.07	0.13	0.06
36. Sikkim	Rani-Chu/ Gangtok	Sewerage and STP	15.81 revised to 17.17	17.12	1.31
37. Tamil Nadu	Adyar & Cooum/ Chennai	STP at Kodungaiyur 110 mld	41.56	45.96	4.40
38. Tamil Nadu	Vaigai/ Madurai	I&D Part I	42.53	46.65	4.12
39. Tamil Nadu	Vaigai/ Madurai	I&D Phase IV	7.32	9.66	2.34
40. Uttarakhand	Ganga/ Haridwar-Rishikesh	Enhancement of capacity & replacement Gravity Main	11.70	11.73	0.03
41. Uttarakhand	Ganga/ Srinagar	STP 3.50 mld (Alaknanda)	1.61	3.5	1.89
42. Uttarakhand	Ganga/ Uttarkashi	I&D Part I (Bhagirathi)	3.67	4.98	1.31
43. Uttarakhand	Ganga/ Uttarkashi	I&D Part II (Bhagirathi)	1.18	1.85	0.67
44. Uttar Pradesh	Yamuna/ Ghaziabad	STP Cis Hindon Area	16.60 revised to 17.78	18.63	2.03
45. Uttar Pradesh	Yamuna at Ghaziabad	STP trans Hindon Area	15.11	15.12	0.01
46. Uttar Pradesh	Ganga at Kanpur	Intermediate Pumping Station Munsi Punwa P-III	7.96 revised to 12.71	9.15	1.19
47. Uttar Pradesh	Ganga at Kanpur	Intermediate Pumping Station at Rakhimandi	9.38 revised to 18.74	15.19	5.81
48. Uttar Pradesh	Ganga/ Kanpur	Relieving sewer for Bakermandi to Rakhimandi	5.90 revised to 10.81	14.85	8.95
49. Uttar Pradesh	Ganga/ Kanpur	I&D of Ganda Nala and Halwa Khanda at Pandu Ganga	10.50 revised to 15.21	13.89	3.39
50. Uttar Pradesh	Gomti/ Lucknow	STP at Daulatgang	14.05	14.60	0.55
51. Uttar Pradesh	Gomti/ Lucknow	STP USAB	104.22 revised to 169.71	138.81	34.59
52. Uttar Pradesh	Gomti/ Lucknow	MPS at Gwari Culvert	30.10 revised to 53.10	39.98	9.88
53. West Bengal	Ganga/ Barrakpore	Crematoria at Shantipur	0.83	1.15	0.32
54. West Bengal	Ganga/ Gayeshpur, Halilshar & Kancharapara	Lifting Station I Southern Part, Halishar,Kanchrapara,Gayeshpur	1.82	1.83	0.01
		Total	**671.62**	**800.81**	**129.19**

Annexure 4
Project-wise break-up of monitoring of rivers and lakes by different agencies in test checked projects

State	Number of river projects test checked	Review of progress by Chief Executive of nodal agency	Review of progress by DPMC**	Review of progress by State Steering Committee	Review of progress by High-Powered Committee under Chairman-ship of CM	Number of lake projects test checked	Review of progress by Inter-Departmental Coordination Committee	Review of progress by Steering Committee at district level	Review of progress by Lake-specific Monitoring Committee	Water quality monitoring plan prepared by State Govt.	Pesticides monitoring by Lake-specific Monitoring Committee	Conservation plan by Lake-specific Monitoring Committee
		Required for river projects under NRCP					Required for lakes projects under NLCP					
		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Andhra Pradesh	6	1 out of 6	1 out of 6	0 out of 6	0 out of 6	1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	1 out of 1
Bihar	6	5 out of 6	0 out of 6	0 out of 6	0 out of 6	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*
Delhi	10	No information for all 10 projects	No information for all 10 projects	No information for all 10 projects	No information for all 10 projects	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*
Goa	4	1 out of 4	0 out of 4	0 out of 4	0 out of 4	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*
Gujarat	9	9 out of 9	0 out of 9 Projects	0 out of 9 Projects	0 out of 9 Projects	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*
Haryana	10	No information for all 10 projects	No information for all 10 projects	0 out of 10	0 out of 10	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*
Jammu and Kashmir	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1
Jharkhand	4	0 out of 4	0 out of 4	0 out of 4	0 out of 4	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*
Karnataka	3	2 out of 3	0 out of 3	0 out of 3	0 out of 3	3	0 out of 3	0 out of 3	0 out of 3	0 out of 3	0 out of 3	0 out of 3
Kerala	6	0 out of 6	0 out of 6	0 out of 6	0 out of 6	1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1
Madhya Pradesh	8	8 out of 8	8 out of 8	8 out of 8	8 out of 8	1	1 out of 1	1 out of 1	1 out of 1	1 out of 1	0 out of 1	0 out of 1
Maharashtra	9	0 out of 9	0 out of 9	0 out of 9	0 out of 9	2	0 out of 2	1 out of 2	2 out of 2	0 out of 2	0 out of 2	0 out of 2
Nagaland	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1
Odisha	7	0 out of 7	0 out of 7	0 out of 7	3 out of 7	1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1
Punjab	8	0 out of 8	0 out of 8	8 out of 8	8 out of 8	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*
Rajasthan	4	1 out of 4	0 out of 4	1 out of 4	0 out of 4	3	3 out of 3	3 out of 3	3 out of 3	0 out of 3	0 out of 3	0 out of 3
Sikkim	2	2 out of 2	0 out of 2	2 out of 2	0 out of 2	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*
Tamil Nadu	11	11 out of 11	1 out of 11	0 out of 11	0 out of 11	1	0 out of 1	0 out of 1	0 out of 1	1 out of 1	0 out of 1	0 out of 1
Tripura	Nil	Not Applicable*	Not Applicable*	Not Applicable*	Not Applicable*	3	1 out of 3	0 out of 3	0 out of 3	0 out of 3	0 out of 3	0 out of 3
Uttar Pradesh	14	0 out of 14	0 out of 14	0 out of 14	0 out of 14	1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1	0 out of 1
Uttarakhand	9	8 out of 9	8 out of 9	8 out of 9	0 out of 9	1	1 out of 1	1 out of 1	1 out of 1	1 out of 1	0 out of 1	1 out of 1
West Bengal	10	8 out of 10	0 out of 10	0 out of 10	0 out of 10	2	2 out of 2	0 out of 2	1 out of 2	0 out of 2	0 out of 2	0 out of 2

* Not Applicable as no project were test checked in audit

Annexure 5
Comparison of amount sanctioned, released and spent on select NRCP projects

₹ in crore

Sl. No	Name of the State	Number of Project		Cost of Project Sanctioned		Total funds released by NRCD	Expenditure incurred by State (including State share)	
		Total	Project test checked	Total	Project test checked		Total	Sampled
1.	Andhra Pradesh	25	6[38]	367.51	351.54	259.80	342.48	294.91
2.	Bihar	18	6	3.95	2.17	3.15	2.98*	1.47
3.	Delhi	23	10	650.00	89.77	335.48	271.65*	101.42
4.	Goa	5	4	14.10	14.10	9.26	13.50	14.47
5.	Gujarat	13	9	101.96	96.15	89.66	95.08	88.89
6.	Haryana	127	10	305.63	24.73	227.61	304.50	24.89
7.	Jharkhand	15	4	4.38	2.20	4.45	1.59*	0.74
8.	Karnataka	42	3	66.25	50.54	46.87	53.59	51.35
9.	Kerala	6	6	18.45	18.45	2.78	1.47*	3.26
10.	Madhya Pradesh	69	8	115.38	52.32	79.00	75.14*	52.32
11.	Maharashtra	31	9	192.60	100.74	111.90	106.93*	96.22
12.	Nagaland	6	0	31.75	0	4.50	0.00*	0
13.	Odisha	22	7	92.74	81.01	56.41	51.23*	56.35
14.	Punjab	60	8	215.68	141.52	183.05	295.91	158.75
15.	Rajasthan	8	4	150.95	150.23	21.12	0.77*	25.94
16.	Sikkim	6	2	114.31	25.16	33.32	28.38*	23.05
17.	Tamil Nadu	83	11	915.93	408.01	623.65	867.86	389.51
18.	Uttar Pradesh	257	14	914.66	404.08	679.11	854.81	331.56
19.	Uttarakhand	44	9	70.62	48.34	31.38	50.66	44.82
20.	West Bengal	219	10	377.39	56.60	239.41	249.02	45.55
	Total	1079	**140**	4724.24	2117.66	3041.91	3667.55	1805.47

[38] 5 projects on Godavari rivers and 1 project on Musi river which contain 30 indiavidual sub-projects.

Annexure 6
Comparison of amount sanctioned, released and spent on select NLCP projects

(₹ in crore)

Sl. No.	Name of State	Projects for number of lakes		Cost of projects sanctioned		Total Funds released under NLCP	Expenditure incurred by State (including State share)
		Total	Test-checked	Total	Test-checked		
1.	**Andhra Pradesh**	1	1	4.30	4.30	0.82	0.18
2.	**Jammu & Kashmir**	1	1	298.76	298.76	143.55	154.18
3.	**Karnataka**	16	3	69.14	16.07	33.09	11.85
4.	**Kerala**	1	1	24.56	24.56	4.30	Not available
5.	**Madhya Pradesh**	4	1	76.64	51.99	14.13	1.79
6.	**Maharashtra**	14	2	28.57	15.27	15.02	6.71
7.	**Nagaland**	1	1	25.83	25.83	5.81	6.46
8.	**Odisha**	1	1	3.36	3.36	2.21	1.21
9.	**Rajasthan**	5	3	214.97	157.83	46.60	55.70
10.	**Tamil Nadu**	2	1	12.37	10.42	3.73	2.22
11.	**Tripura**	3	3	2.02	2.02	0.50	0.43
12.	**Uttarakhand**	5	1	64.82	47.97	39.62	47.97
13.	**Uttar Pradesh**	1	1	22.71	22.71	9.22	16.37
14.	**West Bengal**	3	2	35.91	10.97	9.11	4.46
	Total	58	**22**	883.96	**692.06**	327.71	**309.53**

Glossary	
Acronyms and technical terms	Expansion of acronyms and Definition of technical terms
CGWB	Central Ground Water Board
CPCB	Central Pollution Control Board
Cr.	Crematoria
DPR	Detailed Project Report
FAB	Fluidized Aerated Bed
I&D	Interception and Diversion
JNNURM	Jawaharlal Nehru National Urban Renewable Mission
LCS	Low Cost Sanitation
mld	Million liters per day (a measure of water quantity).
MoEF	Ministry of Environment and Forests
MoUD	Ministry of Urban Development
MoWR	Ministry of Water Resources
MPS	Main Pumping Station
NGRBA	National Ganga River Basin Authority
NLCP	National Lake Conservation Plan
NRCD	National River Conservation Directorate
NRCP	National River Conservation Plan
O&M	Operation and Maintenance
RFD	River Front Development
SPCB	State Pollution Control Board
STP	Sewage Treatment Plant
SWM	Solid Waste Management
UIDSSMT	Urban Infrastructure Development Scheme for small and Medium Towns
UNEP	United Nations Environment Programme
WQAA	Water quality Assessment Authority
WQRC	Water Quality Review Committee
Baseline stations	An essential part of water quality monitoring systems, baseline stations are established in areas away from human influence, these give data for comparison purposes.
Basin approach	River and lake basins are dynamic over space and time and any single management intervention has implications for the system as a whole. Increasingly, human activities are impacting the ecological integrity of lakes. Basin approach is a way of thinking that assists Basin managers and stakeholders in achieving sustainable management of rivers and lakes and their basins. It takes into account that rivers and lakes have a great variety of resource values whose sustainable development and use require special management considerations for their static water properties.

BOD	BOD is a chemical procedure for determining the uptake rate of dissolved oxygen by the biological organisms in a body of water and is widely used as an indication of the quality of water.
Bio-indicators	Biological monitoring goes beyond the conventional measures of water quality to address questions of ecosystem function and integrity. It involves the measurement of species or a group of species like invertebrates whose population is used to determine environmental integrity
DDFU	Domestic Deflouridation Unit
DO	DO is a relative measure of the amount of oxygen that is dissolved or carried in the water body. Adequate dissolved oxygen is needed and necessary for good water quality.
Flux/Impact stations	An essential part of water quality monitoring systems , flux stations determine fluctuations of critical pollutants from river basin to ocean or regional sea.
Keystone species	A keystone species is a species so critical to an ecosystem that its removal could potentially destroy the entire system. The concept of keystone species has become an important issue in conservation today as the loss or decline of keystone species may have far-reaching consequences for the structure and functioning of the eco-systems in which they live
MINARS	Monitoring of Indian National Aquatic Resources (MINARs) programme established by CPCB
Non-Point source pollution	It occurs when pollutants are delivered indirectly through transport or environmental change. Non-point sources are much more difficult to monitor and control. Today they account for the majority of contaminants in ground water, streams and lakes.
Point source pollution	It occurs when harmful substances are emitted directly into a body of water. Point source pollution is easier to monitor and regulate.
TC	Total Coliform which is an indicator of presence of fecal matter in water.
Trend stations	An essential part of water quality monitoring systems, the purpose of trend stations is to test for long-term changes in water quality and identify trends of pollution.
UASB	Upflow Anaerobic Sludge Blanket, a technology for treatment of effluents from sewage treatment plants.