

**Report of the  
Working Group on**

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**RIVERS, LAKES AND  
AQUIFERS**

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**In Environment & Forests  
for the Eleventh Five Year Plan  
(2007-2012)**



सत्यमेव जयते

Government of India  
PLANNING COMMISSION  
New Delhi

(April, 2007)

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M-13033/1/2006-E&F  
**Planning Commission**  
(Environment & Forests Unit)

Yojana Bhavan, Sansad Marg,  
New Delhi, Dated 21<sup>st</sup> August, 2006

Subject: Constitution of the **Working Group on Working Group on Rivers, lakes, and aquifers** for the Environment & Forests Sector for the Eleventh Five-Year Plan (2007-2012).

It has been decided to set up a Working Group on Rivers, lakes, and aquifers for the Environment & Forests Sector for the Eleventh Five-Year Plan. The composition of the Working Group will be as under:

- |   |                  |
|---|------------------|
| 1. Special Secretary & Project Director, NRCD, MOEF                 | Chairman         |
| 2. Shri Chetan Pandit, Central Water Commission, New Delhi          | Member           |
| 3. Joint Secretary, Ministry of Urban Development, New Delhi        | Member           |
| 4. Joint Secretary, Ministry of Water Resources, New Delhi          | Member           |
| 5. Joint Secretary, NRCD, MoEF, New Delhi                           | Member           |
| 6. Adviser, NRCD, MoEF, New Delhi                                   | Member-Secretary |
| 7. Adviser (E & F), Planning Commission, New Delhi                  | Member           |
| 8. Chairman, CPCB, New Delhi  | Member           |
| 9. Ms. Sunita Narain, Director, Centre for Science & Environment    | Member           |
| 10. Prof. Brij Gopal, School of Environmental Science, JNU, Delhi   | Member           |
| 11. Shri Arun Kumar, Alternate Hydro Energy Centre, IIT, Roorkee    | Member           |
| 12. Prof. H. S. Shankar, Dept Chemical Eng. IIT Mumbai              | Member           |
| 13. Shri Veer Bhadra Mishra, Sankat Mochan Foundation, Varanasi     | Member           |
| 14. Dr. Sukumar Devotta, Director, NEERI, Nagpur                    | Member           |
| 15. Secretary (E&F), Govt. of Tamilnadu                             | Member           |
| 16. Chairman, U.P. Jal Nigam, Kanpur                                | Member           |
| 17. Secretary, Delhi Jal Board, New Delhi                           | Member           |
| 18. Commissioner, Municipal Corporation of Delhi, New Delhi         | Member           |
| 19. Secretary ( <i>Pey jal</i> ), Govt. of Uttranchal               | Member           |
| 20. Principal Secretary (UD), Govt. of West Bengal                  | Member           |
| 21. Ms Tanveer Jehan (VC) J&K Lakes & Waterways Dev. Authority      | Member           |
| 22. Engineer in Chief (Yamuna Action Plan), PHED, Govt. of Haryana  | Member           |
| 23. Chairman, Loktak Development Authority, Manipur                 | Member           |
| 24. Principal Secretary (UD), Govt. of Andhra Pradesh               | Member           |
| 25. Secretary (UD), Govt. of Jharkhand                              | Member           |
| 26. Joint Adviser, E&F, Planning Commission                         | Member-Convenor  |
| 27. Director, NRCD, MoEF  | Member           |
| 28. Prof. R.K.Sinha, Professor of Zoology, Patna Univeristy, Patna. | Member           |
| 29. Dr Shyam R Asolekar, Prof., Centre for Env. Sci.& Eng, Mumbai   | Member           |

30. Dr Dilip B Boralkar, Member Secretary, PCB, Maharashtra	Member
31. Prof. Soli Arceivala, Mumbai-400 005.	Member
32. Shri Paritosh Tyagi, NOIDA 201301	Member
33. Shri S.S.Gahalot, Sr Director, N.I.C. , Delhi	Member

Terms of Reference of the Working Group will be as follows:

1. To evaluate the impact of ongoing projects under National River Conservation Plan and National Lake Conservation Plan in improving the water quality of rivers and lakes respectively, the procedure of approval and implementation of schemes and funds flow to the state and local bodies and mechanism for timely implementation of projects.
2. Recommend improvisation in the scheme by involvement of Public Private Partnerships, adoption of effective technologies and practices etc.
3. Consider the status and possible options for addressing the problems of natural and anthropogenic contamination of groundwater resources of the country in context of handling of industrial effluents, use of pesticides/insecticides and resultant health hazard for the life forms.
4. Explore the possibility of integration of programmes under NRCP and NLCP with related schemes of other Ministries i.e. Urban Development, Water Resources etc. thereby providing for optimal utilization of resources.
5. Strategies for meeting O&M requirements of the installations created under NRCP/NLCP and making the operation of these projects self sustainable
6. Explore the sources of external funds and grants for the programmes.
7. Suggest additional infrastructure requirements, human resources etc. if necessary to make the programme more meaningful
8. Recommend criteria for selection of new rivers and lakes keeping in view the broader socio-economic objectives of the Eleventh Plan. Accordingly, recommend a portfolio of river and lake conservation projects in various states, corresponding physical targets, measurable objectives/outcomes and financial requirements.
9. To include any other issue, which the Working Group considers important
10. Official members of the Working Group will be paid TA/DA by their respective Departments as per the rules of entitlement applicable to them. The non-official members will be paid TA/DA by the Planning Commission as per SR 190 (a) for attending meetings of the Working Group.
11. The Working Group will submit its report to the Planning Commission by 31.10.2006.
12. Shri M. Ravindranath, Joint Adviser (E&F), Room No. 301, Yojana Bhavan ( Tel No. 23096536) will be the Nodal Officer for this Working Group for all further communications.

Dr S K Khanduri  
Director (Forestry)

Copy forwarded to: All Members of the Working Group.

## EXECUTIVE SUMMARY

### 1. PREAMBLE

The increasing population along with associated development has played havoc with inland water resources globally and India is no exception. The water quality of surface water sources is a cause of grave concern. There is thus an urgent need of maintaining good level of water quality of surface and ground water resources. This realization by the Govt. of India, resulted in the formulation and implementation of Ganga Action Plan, Yamuna Action Plan and National River Conservation Plan and the National River Lake Conservation Plan. The biggest polluter of our water resources is the municipal wastewater, which finds access to surface water.

### 2. NATIONAL RIVER CONSERVATION PROGRAMME

The objective is to consider the river holistically and restore its ecological health and to begin with, improve the water quality to the designated best use standard, which in most cases is bathing standard Class B. Cities and towns located near the banks of rivers were found to be the gross polluters and they were taken up for planning and implementing schemes to ensure that only treated waste water was discharged into the rivers.

The important works being undertaken under NRCP include:

#### Core Schemes

- i) Interception and diversion works to capture the raw sewage flowing into the river through open drains and divert them for treatment.
- ii) Sewage treatment plants for treating the diverted sewage.

#### Non Core Schemes

- i) Low cost sanitation works to prevent open defecation on river banks.
- ii) Electric and improved wood based crematoria to conserve the use of wood and help in ensuring proper cremation of bodies brought to the burning ghats.
- iii) River front development works such as improvement of bathing ghats etc.
- iv) Other minor miscellaneous works like plantation, public awareness etc.

An Overview of The National River Conservation Plan (NRCP)

#### **River conservation Highlight (upto 10<sup>th</sup> Plan)**

- |   |  |
|---|--|
| • Ganga Action plan Phase I (GAP I)       | completed in 2000  |
| • Ganga Action Plan Phase II (Gap II)     | Ongoing  |
| • Yamuna Action Plan Phase I (YAP I)      | Completed in 2003  |
| • Yamuna Action Plan Phase II (YAP II)    | Ongoing  |
| • National River Conservation Plan (NRCP) | Ongoing covers stretches of other rivers including rivers under GAP II |

### Ganga Action Plan Phase-I

Towns covered	25
(of UP, Bihar and West Bengal)	
Rivers covered	1
States covered	3
Approved cost	Rs. 462 crore
Funds released by GOI	Rs. 452 crore
Schemes Sanctioned	261
Schemes Completed	259
Pollution load to be tackled	882 MLD
Pollution load tackled	865 MLD

#### YAP Phase I (upto 10<sup>th</sup> Plan)

- Implemented during 1993-2003
- Sewage Treatment Capacity Created 750 mld
- Cost of completed schemes with Rs. 680 crores assistance from JBIC

#### YAP Phase II

- JBIC assisted projects sanctioned Rs. 624 crores
- Works commenced from Dec. 2004

#### Broad Coverage

Ganga Action Plan Phase-II (Main Stem)	:	59 Towns
Mahananda River Action Plan (GAP-II)	:	1 Towns
Yamuna Action Plan, Phase-I	:	21 Towns
Gomti & Damodar	:	15 Towns
Others	:	64 Towns
Rivers covered	:	34
States covered	:	20

#### Status of Pollution Load

Action Plan	Generation (mld)	Tackled	Uncovered (mld)
Ganga River	2538	901	876
Yamuna River	3500	750	1360
NRCP excluding Ganga and Yamuna	4000	992	3093
<b>Total load uncovered</b>			<b>5329</b>

### 3. NATIONAL LAKE CONSERVATION PLAN

It was realised soon after the River Conservation Programme was launched that the lakes were being subjected to forces of degradation by anthropogenic activities. Their surface area and volume were reducing rapidly because of silting and reclamation of land near their banks. Wetlands appurtenant to lakes were also being destroyed. Waste from cities located near them was causing pollution. Abstraction of water for irrigation, industry and drinking purposes was reducing the availability of water. The cumulative effect was that there was a serious deterioration in volume, area and quality of water of lake, which was becoming nutrient rich and affecting the aquatic life of the lake. In order to deal with these problems National Lake Conservation Plan (NLCP) was initiated in June, 2001 with approval of 3 lakes namely, Powai (Maharashtra), Ooty & Kodaikanal (Tamil Nadu). The scheme was approved as 100% Centrally Sponsored Scheme (CSS). The funding pattern under NLCP was, however, changed to 70:30 cost sharing between Central and State governments with effect from Feb 2002.

#### Objectives of NLCP were

- i) Prevention of pollution from point sources by intercepting, diverting and treating the pollution loads entering the lake.
- ii) *In situ* measures of lake cleaning such as desilting, dewatering, bioremediation, and constructed wetland approach etc. depending upon the site conditions.
- iii) Catchment area treatment and lake front Eco-development which may include bunding, fencing, shore line development, creation of facilities for public recreation and entertainment (children park, boating etc.) and public area.
- iv) Public awareness and, public participation.
- v) Other activities depending upon location specific conditions including the interface with human population.

The Ministry has till date approved 28 projects for conservation of 42 lakes at an estimated cost of about Rs. 508 crore. Against this a fund release of Rs. 157 crore has been made up to September, 2006.

#### Overview of Works Under NLCP

Works under National Lake Conservation Plan (NLCP)

➤ Lake covered	42
➤ States Covered	12
➤ Approved cost	Rs. 510.41 crore
➤ Funds released by GOI	Rs. 157.41 crore
Schemes Completed	10 (10 more lakes are likely to be completed during the current year)
➤ Funding Pattern	70:30 between GOI and State Govt.

## **4. NATIONAL WETLAND CONSERVATION PROGRAMME**

### **Background**

Realising the importance of water bodies for providing food, fodder, fuel and water for domestic, irrigation and industrial purposes; their role in supporting fisheries; number of rare and endangered species of flora and fauna; maintenance of natural biodiversity; helping in regulating hydrological regimes, flood control and recharging of aquifers etc; Govt of India operationalised wetland conservation programme in 1985-86 in close collaboration with concerned State Govts. These steps were taken mainly due to their degradation and shrinkage, encroachment, siltation, weed infestation, catchment erosion, surface runoff, carrying pesticides & fertilizers from agricultural fields and discharge of domestic sewage and effluents which resulted in deterioration of water quality, prolific weed growth, decline in biodiversity and other associated problems.

### **Objectives**

The scheme on conservation and management of wetlands was initiated in 1987 with the following broad objectives:-

- to lay down policy guidelines for implementing programs of conservation and management of wetlands, mangroves and coral reefs in the country.
- To identify priority wetlands for intensive conservation, management and research,
- To prepare an inventory of Indian wetlands, mangroves and coral reefs
- Conservation and protection of the wetlands, Mangrove Ecosystem from further degradation;
- Afforestation of degraded wetlands, Mangrove and coral areas;
- Restoration of degraded coral reef areas;
- Maintenance of genetic diversity especially of the threatened and endemic species;
- Creation of awareness among the people on importance of Wetlands, Mangrove / Coral Reef Ecosystem and the need for their conservation.

### **Overview of wetland conservation programme upto 10<sup>th</sup> plan.**

- 94 wetlands, 39 mangrove ecosystems, 4 coral reefs identified for management and conservation.
- Action Plans to include:
  - Protection afforestation, natural regeneration
  - Catchment area treatment
  - Pollution control
  - Weed control
  - Wild life conservation
- National Lake Conservation Programme carved out of wetland conservation programme in 1993

- During tenth plan management, plans prepared for 35 wetlands (2004-2005)
- 30 research project approved
- Guidelines prepared for management plans
- Rs. 30 crores allotted (2002-07) and expenditure incurred Rs. 28.37 crores
- 25 sites were designated as Ramsar sites

### **11<sup>th</sup> Plan approach**

The following activities would be promoted for effective conservation and management of wetlands under the schemes.

- (i) Survey and demarcation of the areas
- (ii) Restoration measures
- (iii) Catchment area treatment
- (iv) Protection measures
- (v) Biodiversity conservation
- (vi) Pollution control measures
- (vii) Education and awareness
- (viii) Siltation control
- (ix) Weed control
- (x) Research and Development

### **Activities to be approached during 11<sup>th</sup> Plan**

- Sanctioning of Management Action Plan (MAP) of identified wetlands (60-90 Nos.)
- Organizing training programme and workshop on wetlands conservation and management
- Sanctioning of research projects in the field of wetland conservation and management
- Convening of meetings of National Wetland committee, Research sub-Committee and Expert Group on Wetlands
- Implementation of multi-disciplinary research projects on wetlands
- Participation in the meetings of international organisations, such as Ramsar Convention, Wetland International etc.
- Finalization of guidelines for Wetland Conservation for the benefit of user agencies.
- Evaluation & monitoring of on-going Management Action plans.

**Budget outlay for 11<sup>th</sup> plan                      Rs. 90.00 crores**

## 5. STATUS AND TRENDS OF WATER QUALITY IN RIVER AND LAKES

Only four major river basins out of 23 are perennial while the remaining may go dry during summers leaving no water for dilution of waste water discharged in them. This problem has been compounded by many water regulating structures. The water quality monitoring programme of CPCB revealed that the organic (BOD) and bacterial contamination emanating from urban areas are critical in these water bodies.

The monitoring results (1994-2004) revealed that BOD values were less than 3.0 mg/l in 58-67% observations and between 3-6 mg/l in 19% and it exceeded 6.0 mg/l in 15% observations. There is a gradual decrease in number of observations having BOD between 3-6 mg/l. The coliform and faecal coliform conformation of < 500 MPN was in 40-67% observations where as it exceeded 5000 MPN in 9-35% cases.

The rivers in hilly regions of the country are not affected significantly by such pollution. The rivers Narmada, Mahanadi, Brahmini, Baitarni, Subarnrekha, Beas and Chambal maintained a DO level of 4.0 mg/l or above throughout the year. Ganga, Yamuna, Krishna, Sabarmati, Tapi, Sutlaj however, go as low as 0.3 mg/l DO. The critical stretch of Ganga in 1994 was from Kannauj to Varanasi which has now being restricted to Kannauj to Allahabad (2004) and while that of Yamuna, downstream of Delhi upto Udi.

The lake waters indicated that deterioration was not as much as in rivers but yet significant in the lakes of Andhra Pradesh, Tamil Nadu, Gujrat, Madhya Pradesh, Himachal

Pradesh. The nitrates were high in lakes of Andhra Pradesh, Karnataka, Kerala indicating eutrophic conditions.

The ground water quality also in many places exceeds limits of nitrates, fluorides and Arsenic. Traces of heavy metals, insecticides and pesticides have also been reported from sites near urban areas and Industrial estates.

Pollution by heavy polluting industries has been contained by and large, yet incidence of gross pollution have been recorded at some places in different states.

## 6. PROGRAMMES OF OTHER MINISTRIES

Ministry of Urban Development (MUD) have defined targets to achieve in the small, medium and large towns during 11<sup>th</sup> plan period

Urban Water Supply	:	100% population coverage
Urban Sewerage and Sanitation	:	100% population coverage (70% to be provided sewerage and sewage treatment and 30% by low cost sanitation.
Solid Waste Management	:	100% population coverage with appropriate management
Drainage	:	100% coverage to provide comprehensive drainage system

The strategy of MUD is in achieving the targets through State Govts., Urban Local Bodies under JNNURM and UIDSSMT schemes for large and medium urban towns. Mechanism and road maps have been identified including Public Private Partnership and resource generation.

MUD has conceptualized the “Whole Town Approach” as against “Basin Approach” followed and implemented by NRCD.

## **7. DOVETAILING OF MUD & NRCD PROJECTS AND SCHEMES**

The Ministry of Urban Development has programme for the renewal of urban infrastructure as a mandate and will have considerable funds which could be used for taking up schemes to create facilities to manage liquid and solid wastes. It is necessary to ensure that there is no overlap in the utilization of scarce resources and at the same time the objectives of conservation of rivers and lakes and of improving the infrastructure of the towns are achieved. The MoUD has conceptualized the ‘whole town approach’ whereas pollution abatement of rivers needs ‘river-centric approach’.

The NRCD (MoEF) may concentrate on having well integrated and cohesive river conservation plan and play the role of an effective coordinator for inter-sectoral issues on policy nature. Pollution abatement is one aspect of the River Conservation Programme which is implemented in its present scope of MoEF through coordination with the Ministry of Urban Development. MoEF has also an important role in undertaking more comprehensive approach to river conservation works by additionally emphasizing on catchment area treatment, addressing the biota component and maintenance of ecological properties of the river waters. Coordination is required with Ministry of Water Resources and other sectoral ministries namely, M/o. Rural Development, M/o. Agriculture etc.

Keeping in view, the historical genesis of the River Conservation Programme since 1985 and the merits of the river-centric approach, the present scope of MoEF’s work namely, funding and monitoring of I & D and STP works under GAP including the three tributaries of river Ganga viz., Yamuna, Gomti and Damodar may remain with the Ministry by way of legacy responsibility in respect of all such stretches which do not meet the specified norms as on April 1, 2007. In other towns, the infrastructure created by NRCD may be fully utilized by MoUD, if decision is taken in merging of the schemes and/or dovetailing with those of MoUD at the appropriate level of competence. Irrespective of the final decision in the matter, the present Working Group Report has given its comprehensive views, approaches and outlays for conservation of rivers, lakes and aquifers for the 11<sup>th</sup> Plan Period.

## **8.0 IMPACT OF RIVER ACTION PLANS**

Since the quality data of Ganga, Yamuna, Gomti was available in time series the impact of schemes is assessed and is given below:

### **8.1 Ganga River**

The data for the river is available for 19 years (1986-2005) at 16 sites as averaged values of DO and BOD. For sake of convenience, the stretch has been divided in three zones upper (Rishikesh – Garhmukteshwar) middle (Kannauj – Varanasi) lower (Patna – Uleberia). The upper zone meets the requirements of bathing waters (DO > 5.0, BOD < 3.0 mg/l) at all



## 9 APPROACH AND STRATEGY

The approach and strategy will be as follows:

- a) **RIVER GANGA AS A MODEL RIVER IN XI<sup>th</sup> PLAN** has been postulated and emphasis on these rivers on uncovered pollution, strict control of industrial pollution (zero discharge) has been conceptualised.
- b) The Basin approach will continue to be followed in the 11<sup>th</sup> Plan as earlier. However, concerns expressed in the National Environment Policy 2006, which relate to treating the river or the lake in a holistic manner and designing conservation programmes to take care of the activities in the basin of the river such as abstraction of water, land use that affects flow of sediment, flow of nutrients in to water bodies, retreat of glaciers in the Himalayas etc. should receive adequate attention in addition to the pollution abatement. In the case of lakes, the entire watershed that feeds the lake with water should be treated as a unit.
- c) The involvement and participation of the local people and the local body should extend from preparation of schemes to its execution, monitoring and evaluation. There should be a coordinating body at the State Level to coordinate the works receiving funds from a variety of sources and works which involve a number of agencies such as works for conservation of rivers and lakes.
- d) For every new work there should be a tri-partite agreement between the Central Government, State Government and the Local body clearly specifying the role of each.
- e) Manuals and guidelines should be prepared and the O&M should be carried out strictly in accordance with them. For this purpose necessary orders may be issued under the EPA.
- f) Capacity building and training at all levels should receive adequate attention.
- g) The presence of high levels of fecal coliforms in the effluent from the STPs is a problem, which has defied solution. Special attention should be paid to this aspect.
- h) The works for the 11th plan should be selected on criteria which have been mentioned in Chapter 8. An effective MIS should be developed on GIS platform.
- i) Provision for post project monitoring and evaluation should be inbuilt in the project cost.
- j) The by products of sewage treatment plants are not being optimally utilized, the recovery from their sale is low and in many cases negligible. In most of the UASB plants biogas (Methane) is being flared and not even being utilized for lighting the campus and running the pumps. The Methane should be used as a source for energy for aeration of the polishing pond thus improving further the BOD levels. The potential in many places to grow fish needs to be exploited.
- k) Models of public private partnership should be tried in various regions of the country and for this purpose financial support should be provided by the NRCD from R&D funds.
- l) The NRCP and the NLCP need to have strong backing of dedicated R&D involving private sector industry in addition to public R&D and academic institutions.
- m) In view of shortage of technically qualified personnel at various levels and promoting and undertaking R&D, there is need for setting up a Centre of Excellence in Aquatic Ecology.
- n) A GIS based data base of works undertaken under the NRAP and NLAP and of polluting industrial units needs to be built up. It will help in proper monitoring the progress of work.

- o) The CPCB will be requested to intensify the network for monitoring of ground water.. Monitoring sites should be located near grossly polluting industrial units, small-scale units and places of heavy abstraction of water. Strengthening the system also is recommended.
- p) In accordance with the prescription of the NEP 2006, the Ministry of Water Resources will be requested to take measures to conserve water. Some of the most important measures are indicated below
  - i) Take explicit account of impacts on groundwater levels, of electricity tariffs and pricing of diesel.
  - ii) Promote efficient water use techniques, such as sprinkler or drip irrigation, among farmers. Provide necessary pricing, inputs, and extension support to feasible and remunerative alternative crops, which may be raised by efficient water use.
  - iii) Ensure availability of ground water potential maps through a designated institution.
  - iv) Support practices of rainwater harvesting and artificial recharge and revival of traditional methods for enhancing groundwater recharge.
  - v) Prepare and implement a comprehensive strategy for regulating use of ground water by large industrial and commercial establishments on the basis of a careful evaluation of aquifer capacity and annual recharge.

## **10 SEWAGE TREATMENT TECHNOLOGY**

Technologies options in use including Aerobic (suspended growth, attached growth, combined) anaerobic (suspended, attached) and Pond processes have been listed. New Developments their application and advantages/ disadvantages have also been discussed. Conceptualisation of decentralized system has been made.

The technologies used under GAP/YAP/NRAP are:

- i. Activated Sludge Process
- ii. Waste Stabilisation ponds.
- iii. Oxidation ponds
- iv. Up-flow Anaerobic Sludge Blanket with polishing ponds one day/ two day detention.
- v. Degremont technology
- vi. Karnal technology (Root zone treatment).

The plants have given performance as expected but the performance has often suffered mainly at the front of operation and maintenance due to:

- (a) Paucity of funds
- (b) Untrained/lack of manpower.
- (c) Very large capacity plants are unmanageable
- (d) Frequent power failures coupled with low priority given to power supply to sewage treatment
- (e) Lack of awareness on the part of target group

- (f) Low priority given to waste management systems in civic amenities & budgetary provisions
- (g) No public involvement during conception, formulation and implementation stage.
- (h) The STP are not working under optimal conditions, most of the units are under loaded (both in terms of hydraulic as well as organic loading) and some are over loaded.
- (i) Due to reasons listed above the waste is often let off in the river untreated (bypassed) causing significant pollution.

The success of the treatment units depends on the selection of the method of the treatment to a great extent. The criteria of choice of technology has been listed.

Technology of Natural waste treatment involving Land treatment technology is to be preferred subject to land availability.

## **11 RESEARCH AREAS**

Besides water Pollution prevention and control programmes of rivers and lakes, the National Environment policy 2006 laid emphasis of some aspects as given below:

- a. Promote research in glaciology to evaluate the impacts of climate change on glaciers and river flows.
- b. Promote integrated approaches to management of river basins by the concerned river authorities, considering upstream and downstream inflows and withdrawals by season, interface between land and water, pollution loads and natural regeneration capacities, to ensure maintenance of adequate flows, in particular for maintenance of in-stream ecological values, and adherence to water quality standards throughout their course in all seasons.
- c. Consider and mitigate the impacts on river and estuarine flora and fauna, and the resulting change in the resource base for livelihoods, of multipurpose river valley projects, power plants, and industries.
- d. Consider mandating the installation of water saving closets and taps in the building bye-laws of urban centers, and other available regulatory mechanisms.
- e. Integrate conservation and wise use of wetlands into river basin management involving all relevant stakeholders, in particular local communities, to ensure maintenance of hydrological regimes and conservation of biodiversity.
- f. Incorporate a special component in afforestation programmes for afforestation on the banks and catchments of rivers and reservoirs to prevent soil erosion and improve green cover.

Most of these areas have been included in the conservation programmes and the research being addressed to in 11<sup>th</sup> plan proposals.

The Research in giaciology will, however, need extra efforts by institutes which are specially equipped to undertake the work. SASE, ISRO, IMD, DST are such agencies which are already doing pioneering work in the area and can be asked to width the scope to evaluate the impats of Climate Change (Global Warming) and river flows.

The R&D is being proposed in the following domains (A-E)

## 11.1

### 11.1.1 Monitoring of Water Resources

- (i) Monitoring of Rivers
  - a. To evaluate the impact of continuing schemes
  - b. To evaluate the quality as per Designated Best uses (DBU)
  - c. To establish nutrient budget and cycling of nutrients
  - d. To evaluate the impact of activities of catchment/ flood plains on the quality
  - e. To evaluate the changes in flora and fauna (defining biodiversity)
- (ii) Monitoring of Lakes and wetlands
  - a. To establish the quality and improvements following conservation measures
  - b. To evaluate the biodiversity
  - c. To evaluate the impact of catchment activities on the life cycle.
- (iii) Monitoring of Ground Water

The monitoring programme should add parameters to evaluate geogenic/ anthropogenic parameters. Special attention is required to determine recalcitrant compounds (insecticides / pesticides/ heavy metals)

11.1.2 a. Evaluate the capacity of STP vis-à-vis hydraulic and organic loading. Suggest methods of utilizing residual capacity.

- a) Studies on process evaluation and performance of existing STPs.
- b) Evaluation of new STP technologies through demonstration units.

11.1.3 Evaluate the impact of non point sources on the quality of receiving water.

11.1.4 Emphasis in containing coliform in effluents of STP.

11.1.5 There is a belief that the carrying capacity of water in our rivers is getting reduced by the accumulation of sediment. Data generation of deposited sediment vis-vis scouring during floods need evaluation.

11.1.6 Biomonitoring of rivers/ lakes to reflect changes in flora/ fauna and the over all ecology of the system.

### 11.2 Study of Sediments

- (i) River sediment flux – monitoring and modeling
- (ii) Ganga River – a large sediment dispersal system

- 11.3**
1. Development of small and compact units of waste treatment for small communities, medium communities and up coming colonies so that pollution load is not added to existing system. The treated waste could be recycled within the territory.
  2. Rain water harvesting and recycle of waste effluents.  
(A list of modern/ upcoming technology is provided in chapter – 6)
  3. Study of individual toilet system vis-à-vis conservation of water.

There is an urgent need to, select technology and construct Demonstration Units for public viewing and process evaluation.

#### **11.4 Development of land based systems**

1. Natural waste water systems including slow rate, rapid infiltration and land over flows.
2. Use of fallow/ user land for land treatment of waste waters.
3. Use of Natural and Constructed Wetlands for the growth of fiber and fodder.
4. Root zone treatment.
5. Sewage irrigation. Agriculture utilizes a very large quantity of water. The requirement of crops is low and most of applied effluent accumulate and gradually seeps leading to ground water pollution. Optimization of applied effluent vis-à-vis the crop need is required. Types of crops need to be evaluated.
6. Resource recovery also should form integral component of such system.

#### **11.5 Preparing a data base using Geographical Information System**

- (i) Spatial Information of Features With in The Towns where River/Lake Conservation Works have been Carried Out.
- (ii) Non-spatial information
- (iii) Establishment of Centre of Excellence

### **12 METHODOLOGY ADOPTED FOR PROPOSING NEW SCHEMES**

A document was prepared by AHEC, IIT, Roorkee on behalf of NRCD under “Review Of Proposals for Inclusion in NRCD Conservation Plan (10<sup>th</sup> and 11<sup>th</sup> plan)”. The methodology adopted short listing of towns on the basis of CPCB document of polluted stretches situated in the basins of major rivers, situated on the banks of river/ tributary, water quality of receiving body exceeds (BOD exceeding 3.0 mg/l). Provision for the towns is made at Sl. No. ix in the table below:

The assumptions made are discussed in the main document.

### **13 PROPOSALS FOR WORKS TO BE TAKEN UP IN THE ELEVENTH PLAN**

While proposals have been received from State Governments for new works under the NRCP, there are no new proposals under the NLCP. Of the lakes identified, there are 14 where works have not been sanctioned. There is need for initiating programme of monitoring of some

these lakes in consultation with the State Governments and depending on the results, project reports may be prepared and conservation programme sanctioned.

Under National Wetland Conservation programme survey and demarcation of areas, restoration measures, catchment area treatment and conservation activities (60-90) are planned.

Strengthening of monitoring programme, Research and Development including capacity building, education, institutional arrangements, and training are planned. The proposals also include setting up of a centre of excellence.

#### Summary of Financial Requirement under the Eleventh Plan

1.	Schemes under River Action Plan		
	a.	Continuing schemes under NRCP (approved cost Rs. 4735.0 crores less expenditure incurred (as on Dec. 2006) Rs. 2375.0 crores)	Amount in Rs. crores  : 1360.00
	b.	Works for uncovered pollution on Ganga, Yamuna and Gomti (Approved cost fo GAP II Rs. 653.00 crores Approved cost of YAP II Rs. 624.00 crores Expenditure incurred GAP II Rs. 264.00 crores Expenditure incurred GAP II Rs. 425.00 crores Rs. 588.00 crores Additional works on Ganga, Yamuna and Gomti	: 3094.10
2.	Continuing and new works under National Lake Conservation Programme	:	800.00
3.	Continuing and new works under National wetland programme	:	90.00
4.	Research and development including capacity building, education, training, strengthening of monitoring works and institutional arrangements	:	60.00
5.	Establishment of Centre of Excellence	:	25.00
6.	New Towns from 17 states	:	3764.078
	<b>Grand Total</b>	<b>:</b>	<b>9193.18</b>

#### 14. FINANCIAL ISSUES

The Ganga Action Plan started with hundred percent funding of the schemes by the Government of India.

When the Yamuna action plan was taken up the funding of the programme was shared between the Govt. of India and State Govt. on 50-50 basis. However, between 1997-2001, the

funding by the Government of India was again raised to 100%. This was again changed in 2001 when the contribution of the state Govt. was raised to 30%. This pattern may continue

In order to secure investment and participation of the people it is necessary not only to launch an intensive campaign to generate awareness about the value of natural resources but also to involve the citizens in surveying the state of the management of the waste, preparing plans for their efficient and effective disposal and in the implementation of the projects prepared in this behalf.

It can be accepted that entire cost of such facilities can not be borne by the citizens living in the town and that they would need financial support from the central and state Governments. There are mechanisms to raise funds. The municipal corporation should be encouraged to go to capital market or borrow from financial institutions. The Government of India and the State Governments can also invite private companies to install and run these facilities and give them grants to fill the viability gap.

There is need for tripartite agreement between the Govt. of India, State Govt. and the Local Body clearly specifying the obligations of each.

Foreign institutions are interested in financing environmental projects. However, they need a properly prepared DPR. There is need for the State Govt. to either recruit suitably technically qualified persons or send their own officers for training in such institutions. However, this may take time. In the mean time the State Governments may enter into arrangement with institutes of excellence in the relevant disciplines to seek guidance in preparing the reports. Another method is to engage consultants for this purpose.

The approach so far has been end- of- the- pipe treatment which necessarily involves laying of long lengths of the branch and trunks sewers which is capital intensive and the operation & maintenance is power intensive.

The sewage treatment plants with large capacities are complex and cost-intensive needing specially trained personnel for all activities relating to procurement, installation, operation and maintenance.

Our economy is capital scarce and so the approach to treatment of waste should be as localized as possible. The order of preference should be from individual treatment facilities to groups of houses to wards and then groups of wards. This approach will reduce the length of sewers and reduce the capital cost enormously and the energy requirement.

There is need to make the choice of technologies more rational. Life cycle cost is a well recognized method it should be applied more frequently.

# CHAPTER-1

## RIVERS AND LAKES – PROGRAMMES FOR CONSERVATION

### INTRODUCTION

The increasing population along with the associated developmental activity has played havoc with freshwater sources the world over and India is no exception. The estimated utilizable freshwater resources of the country - both surface and groundwater put together - are 1086 km<sup>3</sup> and are expected to be able to meet the demands up to the year 2050. The water quality of the surface water sources is, however a cause of grave concern as in most of the rivers and lakes it does not even meet the bathing quality standards let alone those for human consumption. This realisation by the Government of India resulted in the formulation and implementation of the Ganga Action Plan, followed by the Ganga Action Plan Phase II, the National River Action Plan and the National Lake Conservation Plan.

The aforesaid plans, however, covered the major rivers important lakes and concentrated on treating the municipal wastes finding their way from large towns, which may be considered as gross polluters. While these have resulted in reasonable improvement in the quality of the water, they have not been able to meet the aspirations of the people to the desired extent. A major reason for this is the fact that the population on the banks of the rivers and lakes is more concerned with the cleanliness and aesthetics of its surroundings-issues, which were not addressed in these plans to the extent of being visible. Further, it must be appreciated that conservation of rivers and lakes implies much more than treating municipal wastes alone. Projects dealing with river/lake conservation have therefore to address wider issues of environment. This calls for taking a **holistic view of the conservation and formulation of integrated projects.**

### 1.1 INDIA'S WATER SCENARIO

#### Surface water

The National Commission for Integrated Water Resources Development has made an assessment of the total freshwater resources of the country. The entire country has been divided into 24 major river basins and the water resource including the utilisable water has been estimated for each. The total catchment area is 3287260 km<sup>2</sup>, with 1952.87 km<sup>3</sup>/ yr water resource, and 690.32 km<sup>3</sup>/ yr utilizable surface water.

#### Groundwater

The Central Groundwater Board has estimated the dynamic fresh groundwater resources of the country as being 432 km<sup>3</sup> per year of which 396 km<sup>3</sup> is estimated to be utilizable.

The annual utilisable water from surface and ground resources are (690 km<sup>3</sup> and 396 km<sup>3</sup>) estimated to be 1086 km<sup>3</sup> as against a total annual availability of 1953 km<sup>3</sup>.

## 1.2 WATER REQUIREMENT

The National Commission for Integrated Water Resources Development has also made estimates of the water demand under two different scenarios, viz. the high demand and the low demand scenarios. According to these estimates the total water requirements of the country in different years would be as given in Table 1.1.

**Table 1.1: Water Requirement in Different Years**

<b>Year</b>	<b>2010</b>	<b>2025</b>	<b>2050</b>
Low Demand Scenario	694 km <sup>3</sup>	784 km <sup>3</sup>	973 km <sup>3</sup>
High Demand Scenario	710 km <sup>3</sup>	843 km <sup>3</sup>	1180 km <sup>3</sup>

It is thus clear that water should be used with utmost care and the water bodies should not be allowed to degrade and should be properly managed.

## 1.3 REGULATORY FRAMEWORK FOR PREVENTION OF POLLUTION

Even before India's independence in 1947, several environmental laws existed but the real impetus for bringing about a well-developed framework came only after the UN Conference on the Human Environment (Stockholm, 1972). After the Stockholm Conference, in 1976, environmental concerns were incorporated into the Directive Principles of State Policy and Fundamental Rights and Duties.

Since the 1970s an extensive network of environmental legislation has grown in the country. The MoEF and the pollution control boards (CPCB i.e. Central Pollution Control Board and SPCBs i.e. State Pollution Control Boards) together form the regulatory and administrative core of the sector.

To complement the legislative provisions and to develop and promote initiatives for the protection and improvement of the environment, The Policy Statement for Abatement of Pollution and the National Conservation Strategy and Policy Statement on Environment and Development were introduced in 1992. The EAP (Environmental Action Programme) was formulated in 1993 with the objective of improving environmental services and integrating environmental considerations in to development programmes.

Other measures have also been taken by the government to protect and preserve the environment. Water specific measures are briefly mentioned below.

### **Water**

Water quality standards especially those for drinking water are set by the Indian Council of Medical Research. The discharge of industrial effluents is regulated by the Indian Standard Codes and recently, water quality standards for coastal water marine outfalls have also been specified. In addition to the general standards, certain specific standards have been developed for effluent discharges from industries such as, iron and steel, aluminium, pulp and paper, oil refineries, petrochemicals and thermal power plants etc. Enactments to control water pollution are listed below.

## **Water (Prevention and Control of Pollution) Act, 1974**

The Act prohibits the discharge of pollutants into water bodies beyond a given standard, and lays down penalties for non-compliance. The Act was amended in 1988 to conform closely to the provisions of the EPA, 1986. It set up the CPCB (Central Pollution Control Board), which lays down standards for the prevention and control of water pollution. At the State level, the SPCBs (State Pollution Control Board) function under the direction of the CPCB and the state government.

## **Water (Prevention and Control of Pollution) Cess Act, 1977**

It aims at augmenting the resources of the central and state boards for prevention and control of water pollution. Following this Act, The Water (Prevention and Control of Pollution) Cess Rules were formulated in 1978 for defining standards and indications for the kind of and location of meters that every consumer of water is required to install.

Environmental Protection Act 1986 is an Act to provide for the protection and improvement of environment and for matters connected there with. "Environment" includes water air and land:

In 2004 the government made EIA mandatory under the EPA for construction projects. It applies to all Building/ Construction projects/Area development projects and Townships (Residential and Non-Residential). This provision implies that such projects will have to get environmental clearance which would ensure putting in place effective, efficient and sustainable arrangements for safe disposal of solid and liquid waste including sewage and will not create a liability for the Governments – local, State and Central - in future to make arrangements.

The latest measure for the protection of the environment is the declaration of the National Environment Policy 2006 (NEP). The objectives of the NEP include:

- Conservation of key environmental resources,
- Integration of environmental concerns in economic and social development.
- Efficiency in environmental resource use, Environmental governance and enhancement of resources for environmental concerns.

## **1.4 NATIONAL RIVER CONSERVATION PROGRAMME**

### **Objectives of National River Conservation Plan**

The objectives of the Ganga Action Plan which were later adopted in *National River Conservation Plan* are:

- i) To improve the water quality of rivers to the Designated Best Use (DBU) Standard, which in most cases will be bathing standard Class B
- ii) Undertake research in consonance with the above objectives.
- iii) Gain experience of taking up similar action plans in grossly polluted stretches of other rivers.

## **IMPORTANT WORKS**

The important works being undertaken under NRCP include:

- a) **Core Schemes**
  - i) **Interception and diversion works to capture the raw sewage flowing into the river through open drains and divert them for treatment.**
  - ii) **Sewage treatment plants for treating the diverted sewage.**
  
- b) **Non Core Schemes**
  - i) **Low cost sanitation works to prevent open defecation on river banks.**
  - ii) **Electric and improved wood based crematoria to conserve the use of wood and help in ensuring proper cremation of bodies brought to the burning ghats.**
  - iii) **River front development works such as improvement of bathing ghats etc.**
  - iv) **Other minor miscellaneous works like plantation, public awareness etc.**

The results of the monitoring programme of river water quality in India undertaken by Central Pollution Control Board, led the Govt. of India to launch the first river conservation programme by selecting the river Ganga. The programme called as **Ganga Action Plan (GAP)** was launched in April 1985. Twenty-five towns, with population exceeding 100,000 situated on the bank of the river Ganga were selected (Six in U.P., four in Bihar and fifteen in West Bengal).

The programme was extended to **GAP-II** by including some more towns on the bank of Ganga and the tributary of Ganga (Yamuna), Gomti & Damodar. Some schemes found deficient in GAP-Phase I were also included. It covered 33 towns in U.P., 22 in Bihar, 27 in West Bengal, 12 in Haryana and the union territory of Delhi. Thirty more towns were included in GAP-II as per Hon. Supreme Courts Order in August 1993.

Subsequently the programme was extended to other rivers and the total projects were included in **National River Conservation Plan** in December 1996. A comprehensive list of these schemes has been reported in MIS report of programmes under National River Conservation Plan Vol. II June 2003 brought out by Ministry of Environment & Forest G.O.I.

## An Overview of the National River Conservation Plan (NRCP)

### River conservation Highlight (upto 10<sup>th</sup> Plan)

- Ganga Action plan Phase I (GAP I) completed in 2000
- Ganga Action Plan Phase II (Gap II) Ongoing
- Yamuna Action Plan Phase I (YAP I) Completed in 2003
- Yamuna Action Plan Phase II (YAP II) Ongoing
- National River Conservation Plan (NRCP) Ongoing covers stretches of other rivers including rivers under GAP II

### Ganga Action Plan Phase-I

Towns covered (of UP, Bihar and West Bengal)	25
Rivers covered	1
States covered	3
Approved cost	Rs. 462 crore
Funds released by GOI	Rs. 452 crore
Schemes Sanctioned	261
Schemes Completed	259
Pollution load to be tackled	882 MLD
Pollution load tackled	865 MLD

### YAP Phase I (upto 10<sup>th</sup> Plan)

- Implemented during 1993-2003
- Sewage Treatment Capacity Created 750 mld
- Cost of completed schemes with Rs. 680 crores assistance from JBIC

### YAP Phase II

- JBIC assisted projects sanctioned Rs. 624 crores
- Works commenced from Dec. 2004

### River Conservation on Highlight (GAP II (Ganga, Yamuna, Gomti, Damodar))

• Approved Cost	Rs. 2286 crore
• Sanctioned Cost (on the basis of DrP)	Rs. 1664.02 crore
• Schemes Santioed	597
• Schemes completed	392
• Amount spent crores (Till December 2006)	Rs. 1015.76

### River conservation Highlight Schemes other than GAP II

Approved cost	Rs. 2319.0
Sanctioned Cost (On the basis DPR)	Rs. 1959.04
Schemes Santioned	344
Schemes Completed	202
Amount spent crores (Till Dec. 2006)	Rs. 1164.91

### Broad Coverage

Ganga Action Plan Phase-II (Main Stem)	: 59 Towns
Mahananda River Action Plan (GAP-II)	: 1 Towns
Yamuna Action Plan, Phase-I	: 21 Towns
Gomti & Damodar	: 15 Towns
Others	: 64 Towns

Status of Pollution Load				Financial Status (as on Dec. 2006)		
Action Plan	Generation (mld)	Tackled	Uncovered (mld)	Approved cost of GAPI	:	Rs. 462.0 crores
Ganga River	2538	901	876	Expenditure incurred in GAPI	:	Rs. 433.0 crores
Yamuna River	3500	750	1360	Approved cost of YAP I	:	Rs. 715.0 crores
NRCP excluding Ganga and Yamuna	4000	992	3093	Expenditure incurred in YAP I	:	Rs. 681.0 crores
<b>Total load</b>			<b>5329</b>	Approved cost of GAP II	:	Rs. 653.0 crores
				Expenditure incurred in GAP II	:	Rs. 264.0 crores
				Approved Cost of YAP II	:	Rs. 624.0 crore
				Expenditure incurred in YAP II	:	Rs. 425.0 crore
				Approved cost of NRCP	:	Rs. 4735 crore
				Expenditure incurred in NRCP	:	Rs. 2375.0 crore

## 1.5 NATIONAL LAKE CONSERVATION PLAN

The National Lake Conservation Plan (NLCP) was initiated in June, 2001 with approval of 3 lakes namely, Powai (Maharashtra), Ooty & Kodaikanal (Tamil Nadu). The scheme was approved as 100% Centrally Sponsored Scheme (CSS). The funding pattern under NLCP was, however, changed to 70:30 cost sharing between Central and State governments w.e.f. Feb 2002.

### Broad Objectives

The objective of the scheme is to restore and conserve the polluted and degraded lakes of the country. To begin with, NLCP proposed to cover urban lakes of tourist importance especially those not covered under the wetland program of the Ministry. The scope of work under NLCP has, however, been expanded during the X Plan to include rural water bodies also.

### Details of NLCP as a scheme and activities covered

The activities covered under NLCP include the following:

- i) Prevention of pollution from point sources by intercepting, diverting and treating the pollution loads entering the lake.
- ii) In situ measures of lake cleaning such as desilting, de-weeding, bioremediation, and constructed wetland approach etc. depending upon the site conditions.
- iii) Catchment area treatment and lake front Eco-development which may include bunding, fencing, shore line development, creation of facilities for public recreation and entertainment (children park, boating etc.) and public area.
- iv) Public awareness and, public participation.
- v) Other activities depending upon location specific conditions including the interface with human population.

The Ministry has till date approved 28 projects for conservation of 42 lakes at an estimated cost of about Rs. 508 crore. Against this expenditure of Rs. 158.59 crore has been made upto September, 2006.

Conservation works for 10 lakes have been completed and those for 10 more lakes are likely to be completed during the current year. Implementation in respect of Kodaikanal

(Tamil Nadu) and Rabindra Sarovar (West Bengal) had been delayed due to Court cases but are being taken up again. In case of Kodaikanal, the Implementing Agency has submitted a revised DPR for I&D and STP components after verification.

### **Target Beneficiaries**

The implementation of NLCP results in improvement of lake ecology and add to the aesthetic and tourism value. The beneficiaries of the scheme are the State Governments, local bodies and the local population.

### **Works under National Lake Conservation Plan (NLCP)**

➤ Programme initiated	June 2001
➤ Lake covered	42
➤ States Covered	12
➤ Approved cost	Rs. 508 crore
➤ Schemes Completed	10
➤ Funding Pattern	100 % upto Jan 2002 70:30 from Feb. 2002
➤ Outlay in IX plan	Rs. 25.0 crores
➤ Expenditure in IX Plan	Rs. 11.30
➤ Outlay in X Plan	Rs. 220 crore
➤ Expenditure in X Plan	Rs. 158.59 crore

## **1.6 NATIONAL WETLAND CONSERVATION PROGRAMME**

### **Background**

Realising the importance of water bodies for providing food, fodder, fuel and water for domestic, irrigation and industrial purposes; their role in supporting fisheries; number of rare and endangered species of flora and fauna; maintenance of natural biodiversity; helping in regulating hydrological regimes, flood control and recharging of aquifers etc; Govt of India operationalised wetland conservation programme in 1985-86 in close collaboration with concerned State Govts. These steps were taken mainly due to their degradation and shrinkage, encroachment, siltation, weed infestation, catchment erosion, surface runoff, carrying pesticides & fertilizers from agricultural fields and discharge of domestic sewage and effluents which resulted in deterioration of water quality, prolific weed growth, decline in biodiversity and other associated problems.

### **Objectives**

The scheme on conservation and management of wetlands was initiated in 1987 with the following broad objectives:-

- To lay down policy guidelines for implementing programs of conservation and management of wetlands, mangroves and coral reefs in the country.
- To identify priority wetlands for intensive conservation, management and research,
- To prepare an inventory of Indian wetlands, mangroves and coral reefs
- Conservation and protection of the wetlands, Mangrove Ecosystem from further degradation;

- Afforestation of degraded wetlands, Mangrove and coral areas;
- Restoration of degraded coral reef areas;
- Maintenance of genetic diversity especially of the threatened and endemic species;
- Creation of awareness among the people on importance of Wetlands, Mangrove / Coral Reef Ecosystem and the need for their conservation.

### **Overview of wetland conservation programme upto 10<sup>th</sup> plan.**

- 94 wetlands, 39 mangrove ecosystems, 4 coral reefs identified for management and conservation.
- Action Plans to include:
  - Protection afforestation, natural regeneration
  - Catchment area treatment
  - Pollution control
  - Weed control
  - Wild life conservation
- National Lake Conservation Programme carved out of wetland conservation programme in 1993
- During tenth plan management, plans prepared for 35 wetlands (2004-2005)
- 30 research project approved
- Guidelines prepared for management plans
- Rs. 30 crores allotted (2002-07) and expenditure incurred Rs. 28.37 crores
- 25 sites were designated as Ramsar sites

### **11<sup>th</sup> Plan approach**

The following activities would be promoted for effective conservation and management of wetlands under the schemes.

- (i) Survey and demarcation of the areas
- (ii) Restoration measures
- (iii) Catchment area treatment
- (iv) Protection measures
- (v) Biodiversity conservation
- (vi) Pollution control measures
- (vii) Education and awareness
- (viii) Siltation control
- (ix) Weed control
- (x) Research and Development

### **Activities to be approached during 11<sup>th</sup> Plan**

- Sanctioning of Management Action Plan (MAP) of identified wetlands (60-90 Nos.)
- Organizing training programme and workshop on wetlands conservation and management
- Sanctioning of research projects in the field of wetland conservation and management
- Convening of meetings of National Wetland committee, Research sub-Committee and Expert Group on Wetlands

- Implementation of multi-disciplinary research projects on wetlands
- Participation in the meetings of international organisations, such as Ramsar Convention, Wetland International etc.
- Finalization of guidelines for Wetland Conservation for the benefit of user agencies.
- Evaluation & monitoring of on-going Management Action plans.

### **Budget outlay for 11<sup>th</sup> plan**

						<b>Amount in crores</b>
<b>Year</b>	2007-08	2008-09	2009-10	2010-11	2011-12	<b>Total Amount</b>
<b>Amount</b>	10.00	15.00	20.00	25.00	20.00	<b>90.00*</b>

## **1.7 STATUS AND TRENDS OF WATER QUALITY IN INDIA**

Central Pollution Control Board (CPCB) and State Pollution Boards/ Pollution Control Committees (SPCBs/PCCs) have established a wide network of water quality monitoring.

### **Surface Water**

Only four of the thirteen major basin are areas of high rainfall, and are perennial (Brahmaputra, Ganga, Mahanadi and Brahmini), six basins (Krishna, Indus, Godavari, Narmada, Tapi and Subernrekha) occupy the area of medium rainfall, and the remaining four (Cauvery, Mahi, Sabarmati and Pennar) occupy the area of low rainfall. Thus, many of the major river basins also go dry during summer leaving no available water for dilution of wastewater discharged in them. Further because of many water regulating structures, dams, spillways and irrigational canals, even minimum flows are also not maintained to keep the fragile ecosystems viable. The High Powered Committee (Planning Commission Govt. of India) 2005 has recommended that 10 cumecs of minimum flow must be maintained in the perennial rivers.

### **Parameters observed**

The water samples are analysed for 9 core parameters and 19 general parameters. The major trends are on the basis of only core parameters, which are:

### **Core parameters**

PH  
 Temperature  
 Conductivity  
 Dissolved Oxygen  
 BOD  
 Nitrate- N  
 Nitrite – N  
 Fecal Coliform  
 Total Coliform

### **Water Quality Trend**

The water quality monitoring results obtained during 2004 indicate that the organic and bacterial contamination are critical in water bodies. This is mainly due to discharge of domestic wastewater mostly in untreated form from the urban centers of the country.

The water quality monitoring results were analysed with respect to BOD, Total coliform and Faecal coliform. The trends of % of observations obtained during 1994-2004 at different levels of pollution with respect to BOD & Total coliform and Fecal Coliform are given in Fig. 1.1 indicating different ranges of BOD and Coliform organisms. The data reveal that there is an increasing trend in percentage of observations having BOD below 3 mg/l, indicating that there is a gradual improvement in water quality with respect to organic pollution.

### **Biochemical Oxygen Demand (BOD)**

The number of observed BOD values less than 3 mg/l were between 58-67% during year 1994 to 2004. The maximum value of 67% was observed during 2003, which further declined to 66% in 2004. This shows that there is a gradual improvement in number of locations meeting the level of desired criteria.

The number of observed BOD values ranging from 3-6 mg/l was between 18-28% during year 1994 to 2004. It was observed that there was a gradual decrease in number of observations having BOD between 3-6 mg/l.

The number of observed BOD values  $> 6$  mg/l were between 15 and 19% during year 1994-2004 and the maximum value of 19% was observed in the year 1998. It was observed that there was a gradual decrease in number of observations having BOD  $> 6$  mg/l.

### **Total Coliform (TC)**

The number of observed TC values  $< 500$  MPN/100 ml were between 40-63% during 1994-2004, the values gradually increased to 63% in year 1999 which decreased to 44% in 2004.

The number of observed TC values ranging between 500-5000 were 28-37% during year 1994-2004 the maximum value of 37% was observed in 1994 and this gradually decreased to 34% in 2004.

The number of observed TC values  $> 5000$  MPN/ 100 ml were between 9-23% during year 1994-2004. The maximum value of 23% was observed in the year 1994 that gradually decreased to 9% in the year 1999 and again increased to 22% in 2004.

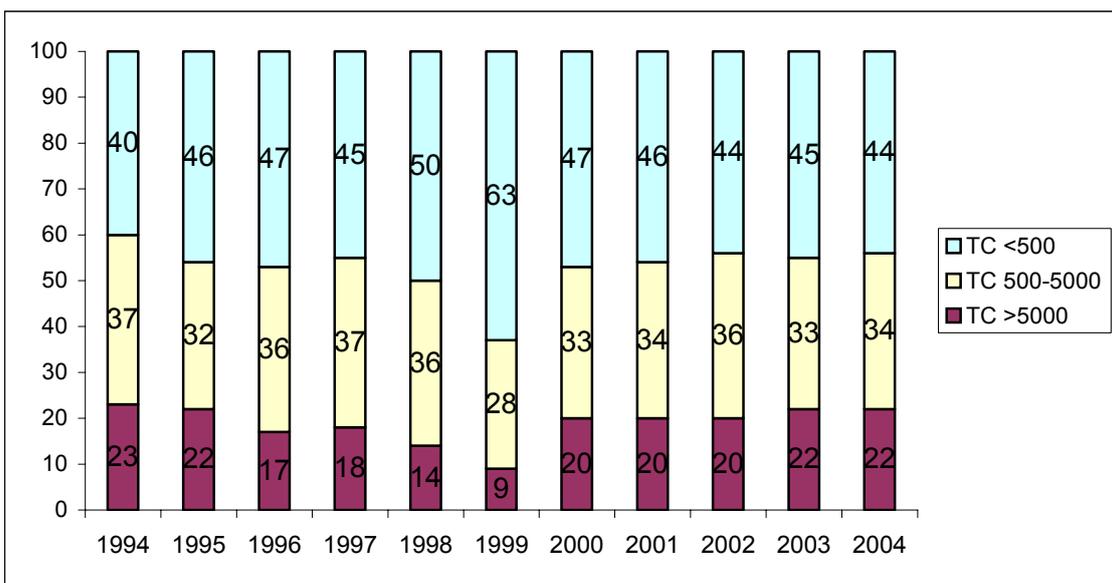
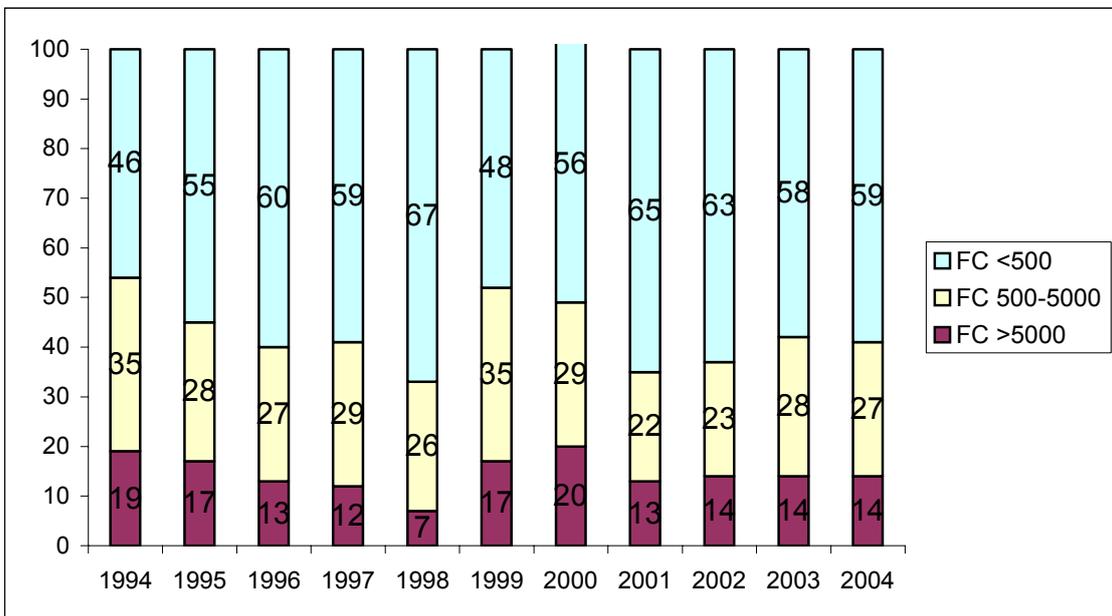
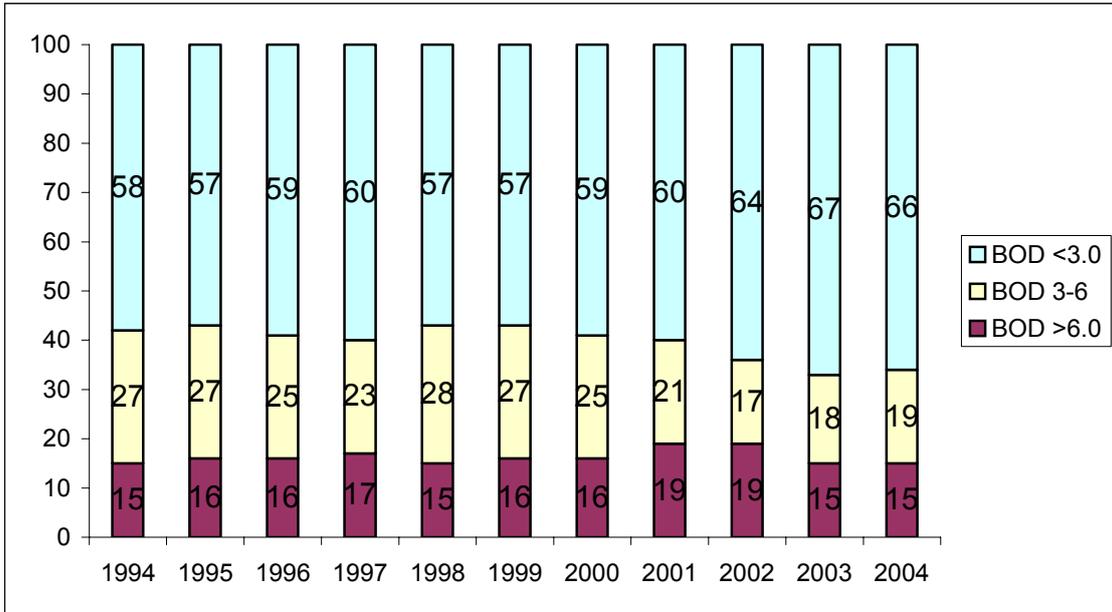
### **Faecal Coliform (FC)**

The number of observed FC values  $< 500$  MPN/ 100 ml were between 46-67% during year 1994-2004. The maximum value of 67% was observed in the year 1998 that gradually decreased to 48% in 1999 and increased to 59% in 2004.

The number of observed FC values in the range from 500-5000 MPN/ 100 ml was between 22-35% during year 1994 to 2004. The maximum value of 35% was observed in the year 1999, which decreased to 27% in the year 2004.

The number of observed FC values >5000 MPN/100 ml were between 7-19% during year 1994-2004. The maximum value of 19% was observed in 1994, which gradually decreased to 7% in 1998 and again increased to 14% in the year 2004.

**Fig. 1.1 Data as % of Observed Pollution**



## Water Quality of Rives at a Glance

### Observed Water Quality

The monitoring results obtained during 2004 under National Water Quality Monitoring programme reflect that organic matter & bacterial population of fecal origin continue to dominate the water pollution problem in India. The major water quality concerns are: Total Coliforms, Faecal Coliform & Biochemical Oxygen Demand.

### Organic and Pathogenic Pollution

The Organic pollution as measured through Biochemical Oxygen Demand (BOD) is considerably high; water bodies are saprobic followed by eutrophic near large urban centers due to the discharge of partly treated or untreated wastewater. This results in depletion of oxygen in these stretches of water bodies. The rivers in hilly part of the country are not affected significantly by such pollution, as there are no large urban centers. The pathogenic pollution is one of the major water pollutants in Indian water bodies the main cause for water borne diseases. The majority of surface water monitoring locations are found contaminated with high levels of faecal coliform bacteria, which are indicators of pathogenic pollution.

The water quality of major rivers varied widely with respect to DO, BOD, total Coliform and faecal Coliform. The level of DO is observed more than 4 mg/l in river Narmada, Mahanadi, Brahmini, Baitarni, Subarnrekha, Beas and Chambal throughout the year whereas, the lowest values (in mg/l) were observed in stretches as river Kali East (0.1), Ganga (0.3), Yamuna (0.3), Krishna (0.4), Amlakhedi (0.4), Sabarmati (0.7), Ghaggar (0.8), Brahmaputra (1.1), Tapi (1.2), Satluj (1.6), Godavari (2.4), Mahi (2.7), Kaveri (3.3), Pennar (2.3) and at few locations downstream of urban settlements due to discharge of untreated/partially treated municipal wastewater, which is responsible for high oxygen demand. Very high values of BOD were observed in rivers Amlakhedi (947 mg/l), Sabarmati (380 mg/l), Kali East (165 mg/l) followed by Satluj (64 mg/l), Yamuna (40mg/l), Tapi (36 mg/l), Ghaggar (28 mg/L), Chambal (24 mg/L), Godaari (15mg/L), Ganga (14.4 mg/L), Cauvery (9 mg/l), Krishna (9 mg/l) and Brahmani (7 mg/l). The relatively low values of BOD were measured in river(s) Mahi, Narmada, Brahmaputra, Pennar, Mahanadi, Baitarni and Beas.

In respect of total Coliform (MPN/100 ml) and faecal Coliform numbers (MPN/100 ml), river Yamuna is leading with highest count of  $1.1 \times 10^9$  and  $6.2 \times 10^7$  respectively followed by, Sabarmati ( $4.6 \times 10^5$  and  $2.4 \times 10^5$ ), Ganga ( $4.5 \times 10^6$  and  $7 \times 10^5$ ), Brahmaputra ( $2.4 \times 10^5$  and  $2.4 \times 10^5$ ), Cauvery ( $5 \times 10^4$  and  $1.7 \times 10^4$ ), Brahmani ( $2.8 \times 10^4$  and  $1.3 \times 10^4$ ), Satluj ( $2 \times 10^5$  and  $9 \times 10^4$ ), Krishana ( $1.24 \times 10^5$  and  $2.8 \times 10^3$ ), Mahanadi ( $9.2 \times 10^4$  and  $2.4 \times 10^4$ ), Baitarni ( $9.2 \times 10^4$  and  $3.5 \times 10^3$ ), Ghaggar ( $1.7 \times 10^5$  and  $9 \times 10^4$ ), Tapi ( $5 \times 10^5$ ), and Godavari ( $2.2 \times 10^5$  and  $5.5 \times 10^4$ ) at certain locations. The river Mahi, Subenarrekha, Pennar and Narmada are relatively clean rivers as the number of total Coliform and faecal Coliform count are relatively less than 2400 MPN/100 ml and 700 MPN/100 ml respectively.

### Other parameters

The pH values in the rives varied between 2.0 (Cauvery, 2002) and 10.0, (Yamuna, 2003) but in major rivers remained between 6.4-9.0. Lower values were noticed in rivers Tapi (3.1), Sabarmati, (2.9), Brahmaputra (5.2). Higher values of 9.2 (Mahi, Tapi, Cauvery), 9.8 (Yamuna), 8.8 (Sabarmati), 9.3 (Narmada), 9.5 (Krishna), 9.2 (Brahmaputra).

## 1.8 WATER QUALITY OF LAKES, TANKS AND PONDS

### Lentic Water Bodies

Lakes in India spread over an area of about 7.2 lakh hectares. There are very few lakes in India, and thm most of them are quite shallow and none of these is of considerable size. In the hilly regions, there is abundance of lakes. Lakes are an integral part of a drainage basin and landlocked body of water with a horizontal surface water level.

The Lakes being monitored are Hussainsagar, Saroornagar, Himayatsagar, Salaulim, Kankoria, Chandola, Ajwah, Sursagar, Brahamsarovar, Govindsagar, Pongdam, Renuka, Ulsoor, Hebbala Valley, Oruvathikotta, Sasthamcotta, Ashthamudi, Paravur , Vembanad, Periyar, Kodumgallor, Kayamkula, Pimmaadakayal, Pookotekayal, Upper Lake, Lower Lake, Multai Lake, , Umiam, Ward, Thadlaskena, Osteri, Bahour, Pichola, Udaisagar, Ramgarh-Rajasthan, Pushkar, Fatehsagar, Kalyana, Nakki, Udthagamadalam, Kodaikanal, Yercaud, Lakshminarayan Baridigh, Rudrasagar, Ramgarh-Uttar Pradesh, Naini, and Rabindrasarovar. The tanks and ponds being monitored are Dharamsagar, Bibinagar, Kistrapetreddy, Gandigudem, Goysagar and the ponds are Elangabeel System, and Lakshadweep Pond near Juma Masjid. The number of monitoring locations in each of the lake were one only, except in Harike (2 locations) and Loktak (4 locations).

A summary of important parameters measured in Lakes in different states is given in Table 1.2.

**Table 1.2: Water Quality of Lakes, Tanks and Ponds**

	pH	Range of values observed				
		Conductivity µm hos/cm	BOD	Nitrate	Total coliform	Faecal colifrom
Andhara Pradesh	6.6-8.9	310-5360	0.8-14.8	0.1-40.0	15-146X10 <sup>3</sup>	3-16X10 <sup>3</sup>
Karnataka	7.6-8.1	300-920	1.0-5.0	0.1-18.0	900-53X10 <sup>3</sup>	11-1000
Kerala	6.3-8.1	21-38000	0.4-4.8	0.02-0.8	20-34X10 <sup>3</sup>	5-12x10 <sup>3</sup>
Tamil Nadu	5.7-7.4	80-828	2.0-12.0	0.01-017	4 – 9000	2-1700
Lakshdweep	9.4-9.5	530	1.9-2.3	--	1100	1100
Gujrat	7.3-8.2	203-4800	0.5-43	--	7-11x10 <sup>3</sup>	4-2848
Madhya Pradesh	7.3-8.6	--	0.8-6.8	--	21 – 2400	--
Rajashtan	6.3-8.9	118-2100	0.5-7.9	0.02-0.3	7 – 2400	4-75
Haryana	7.8-8.1	241-264	1.9-2.7	-	-	-
Himanchal	6.8-8.5	204-1240	0.2-7.0	-	2-34	-
Punjab	7.6-7.7	360-404	0.6-7.2	-	500	70-110
Uttaranchal	3.0-8.6	568	3.0-4.4	-	920-1600	-
U.P.	8.0-8.6	406-470	5.2-6.1	-	100 - 240	80-110

## 1.9 ASSESSMENT OF GROUNDWATER QUALITY

### Water Quality Monitoring

The groundwater occurrence and availability is largely governed by geological formations encountered. In India a sizable proportion of population is dependant on ground water for drinking and other household utilities besides its extensive use in irrigation. Due to limited cost effective treatment options for polluted ground water, the affected resource is generally lost for drinking and other utilities.

Groundwater is used for many purposes such as for drinking, irrigation and industry. It has been observed that in many areas the water quality has deteriorated showing pollution of aquifers. The pollutants are nitrates, pesticides, heavy metals, apart from naturally occurring elements including Arsenic, Fluoride, Iron. Unplanned ground water abstraction has aggravated the problem. The surface and ground water interaction also results in deterioration of aquifers as the surface water seeps into add impurities in ground water.

### State wise Groundwater Quality Monitoring

CPCB with other functionaries have extended the network of groundwater quality monitoring to 218 locations. The ranges of water quality observed in groundwater with respect to pH, Conductivity, BOD, TC are presented as minimum, maximum value to assess the extent of water quality variation throughout the year.

A brief of quality parameters as observed in different states is given in Table 1.3.

**Table 1.3: Quality parameters of Ground Water**

States	Range of values				
	PH	Conductivity $\mu\text{m hos/cm}$	BOD mg/l	No3- N mg/l	Coliform MPN
Andhra Pradesh	6.1-8.4	194-4430	0.3-3.4	0.6-16.2	3-3000
Assam, Meghalya and Tripura	5.7-8.7	37-680	0.1-3.8	0.01-0.98	2300-11,000
Gujarat & Madhya Pradesh	6.6-8.3	1610-4070	0.8-2.0	-	2.0-280
Himachal Pradesh	7.1-8.3	317-1351	0.1-4.6	-	1.0-130
Kerala	4.2-7.8	83-730	0.2-8.0	0.026-12.7	10-1100
Lakshdweep and Tamil Nadu	6.7-7.7	870-1573	0.2-3.6	0.09	50
Orissa	5.1-8.0	154-2340	0.2-2.3	0.4-45.7	2.0-4.0
Rajasthan	7.8-9.5	480-2300	0.4-7.1	0.08-1.6	4.0-2400
Uttar Pradesh	5.5-8.0	115-3580	0.2-9.1	0.5-2.8	10-240
West Bengal	6.7-8.7	212-2580	0.1-10.0	0.07-4.9	2-3000

A summary of the Groundwater quality problems in eight metropolitan cities is given in Table 1.4.

**Table 1.4: Groundwater Quality problems in Metropolitan cities due to Anthropogenic activities**

Sl No	Name of the Metro city	Major Anthropogenic and Industrial Activities	Groundwater Quality Problem*
1.	Agra, U.P.	Un-collected domestic sewage (about 200 mld) either on open land or flowing through drains to receiving system. The municipal solid waste generation is about 654 T/D. The industrial activity includes Textiles, Hosiery items, Woolen, Jute, Footwear, Leather, Metal processing, Machinery parts, Marble, Food processing, Foundries and Handicrafts etc. Besides this Petroleum storages (IOCL, HPCL and BPCL) exist in the city.	High concentration of nitrate, fluoride, total hardness, chloride, TDS, calcium, Sulphate, potassium, magnesium, conductivity and Coliform organisms, whereas concentration of micro-pollutants such as toxic (heavy) metals Fe, Mn, Cu, Cd and Ni were exceeding the permissible limit for drinking water during pre and post-monsoon seasons and also pesticides such as $\alpha$ -BHC, Endosulphan and Methoxychlor were detected in some of the samples.
2.	Chennai, Tamil Nadu	Un-collected domestic sewage (about 268 mld) either on open land or flowing through drains to receiving system. The municipal solid waste generation is more than 3873 T/D. The industrial activity includes Hides & Skins, Tobacco, food grains, Iron and steels, Fertilizers, Paper, Chemicals, Sugar, Bone metals and Granites etc. Besides this Petroleum storages (IOCL, HPCL and BPCL) existing in the city.	High concentration of chloride, TDS, conductivity, Bicarbonate alkalinity, Sulphate, fluoride, calcium (pre-monsoon), total hardness and sodium, whereas concentration of micro-pollutants such as toxic (heavy) metals Fe, Pb, Mn, Cd and Ni were exceeding the permissible limit during both the seasons and also pesticides such as Aldrin, $\alpha$ -BHC, $\delta$ -BHC and Endosulphan were also detected in some of the samples.
3.	Coimbatore, Tamil Nadu	Un-collected domestic sewage (about 140 mld) either on open land or flowing through drains to receiving system. The municipal solid waste generation is about 800 T/D. The industrial activity includes Textile, Foundries, Motor Pumps, Water tanks, Steel furniture's, Electric and Electrical appliances, Automobile components, Washing machines, Wet grinders, General Engineering industries, Food processing units and Printing machineries etc. Besides this Petroleum storages (IOCL, HPCL and BPCL) existing in the city.	High concentration of TDS, chloride, Sulphate, nitrate, fluoride, calcium and total hardness, whereas the concentration of micro-pollutants such as toxic (heavy) metals Fe, Pb, Cr, Ni are exceeding permissible limit for drinking purposes and also pesticides such as $\alpha$ -BHC only was detected in some of the samples.
4	Madurai, Tamil Nadu	Un-collected domestic sewage (about 80 mld) either on open land or flowing through drains to receiving system. The municipal solid waste generation is more than 459 T/D. The industrial activity includes Textile, mills, Dyeing units, Power looms, Handlooms, Engineering and Mechanical Industries, Steel Rolling mills, Small Scale industries like Food products, Readymade Garments, Wooden industries, Printing, Molding industries etc. Besides this Petroleum storages (IOCL, HPCL and BPCL) existing in the city.	High electrical conductivity, TDS, chloride, Bicarbonate alkalinity, Sulphate and fluoride whereas concentration of micro-pollutants such as toxic (heavy) metals Pb, Cr, Cd, Ni and Fe at few locations were exceeding the permissible limit during both the seasons and also pesticides such as Aldrin, $\alpha$ -BHC, $\beta$ -BHC, $\gamma$ -BHC and $\delta$ -BHC were detected in some of the samples.

Sl No	Name of the Metro city	Major Anthropogenic and Industrial Activities	Groundwater Quality Problem*
5.	Meerut, U.P.	Un-collected domestic sewage (about 35 mld) either on open land or flowing through drains to receiving system. The municipal solid waste generation is about 490 T/D. The industrial activity includes Distillery, SSI units such as sports goods, chemicals, food processing, surgical goods, engineering works, petrochemicals, rubber, plastic, leather goods, flour mills and readymade garments Besides this, three petroleum storages (IOCL, HPCL and BPCL) existing in the city.	High concentration of TDS, nitrate, fluoride and alkalinity whereas the concentration of micro-pollutants such as toxic (heavy) metals Fe, Pb, Mn and Ni are exceeding permissible limit for drinking purposes and pesticides such as $\alpha$ -BHC only was detected in some of the samples.
6.	Lucknow, U.P.	Un-collected domestic sewage either on open land or flowing through drains to receiving system. The municipal solid waste generation is more than 475 T/D. The industrial activity includes Chemical, Petroleum storage, Pesticides, Electronic Manufacturing Units, and Breweries etc. Besides this, Petroleum storages (IOCL, HPCL and BPCL) existing in the city.	High TDS, conductivity, Potassium, Magnesium, Alkalinity, Total Hardness and Total Coliform.
7.	Ludhiana, Punjab	Un-collected domestic sewage either on open land or flowing through drains to receiving system. The municipal solid waste generation is more than 734 T/D. The industrial activity includes Woolen, Dye, Electroplating, Bicycle, and Textile etc. Besides this Petroleum storages (IOCL, HPCL and BPCL) existing in the city.	High electrical conductivity and high concentration of Potassium, Magnesium was detected in some of the samples.
8.	Vijaiwada, Andhra Pradesh	Un-collected domestic sewage (about 160 mld) either on open land or flowing through drains to receiving system. The municipal solid waste generation is about 550 T/D. The industrial activity includes Rice mills, Edible Oils, Beverages, Tobacco, Cotton, Paper, Food Processing, Utensils, Drugs, and Pharmaceuticals, Oil refineries, Motor Vehicle Parts, Wood and wood products, Ayurvedic medicines, Leather products, Rubber Products, Thermal Power plants and Milk and Milk Product processing etc. Besides this Petroleum storages (IOCL, HPCL and BPCL) existing in the city.	High electrical conductivity, TDS, Chloride, Bicarbonate alkalinity, Total Hardness, Potassium, Calcium, Magnesium and fluoride whereas concentration of micro-pollutants such as toxic (heavy) metals Fe, Mn, Pb and Cd were exceeding the permissible limit during both the seasons and also pesticides such as Aldrin, DDE, DDD, $\alpha$ -BHC, $\beta$ -BHC, $\gamma$ -BHC, Methoxychlor and Endosulphan were detected in some of the samples.

\*=Sampling of Groundwater for Pre & Post Monsoon seasons during 2002-2004

### Arsenic & Nitrate Pollution

In India, arsenic pollution in groundwater is mainly reported from West Bengal. Since its first reported case in early eighties, there are 1312 affected villages, 15 non-municipal and 9 municipalities in 8 districts in the State till date. On an approximation 34000 sq km area in the State is reported with high concentration of arsenic in drinking water abstracted from tubewells. Some of the most affected districts in the State are South 24 Pargana (conc. 0.06-3.20 ppm), North 24 Parganas (conc 0.06-1.28 ppm), Malda (conc 0.05-1.434 ppm), Nadia

(conc 0.05-1.0 ppm), Murshidabad (conc 0.05-0.90 ppm) and Bardhaman (conc 0.10-0.50 ppm), Howrah (conc 0.09 ppm) and Hooghly (conc 0.6 ppm). The pollution is mostly reported from the intermediate water depth of 20-80 meter below ground level. The arsenic anomaly in the State is associated with high Iron, Calcium, Magnesium and bicarbonates with low sulphate, Fluoride and Chloride. The problem of arsenic pollution has been reported to be due to the geological formations of the source material. Occurrence of arseno-pyrite and the change of geo-chemical environment due to over-exploitation of groundwater or excessive fluctuation of groundwater table is the reason of probable contamination. Besides this, the recent investigation carried out by Jadhavpur University, reported that the middle Gangetic plain starting from U. P. (Balua District) to Jharkhand State is now severely affected by skin lesions due to presence of high concentration of Arsenic in Groundwater.

### **Industrial Pollution**

The strategy has been to identify the grossly polluting units whose effluents reached the river and ask them either to install effluent treatment plants and ensure compliance to laid down standards or to close down. Efforts have also been made to intensify monitoring by State Pollution Control Boards and to make the monitoring data accessible.

Grossly polluting industrial units (BOD load > 100 kg/day each) whose effluents reached Ganga were identified and they numbered 1152. They were given notices to install effluent treatment facilities and conform to the prescribed standards. As a result 738 units installed ETPs and satisfied the prescribed norms. 113 have installed ETPs but their effluents do not fully satisfy the prescribed norms. 301 non-conforming units have been closed down.

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## CHAPTER-2

### PROGRAMMES OF MOUD THEIR INTEGRATION WITH PROGRAMMES OF NRCD

#### 2.1 INTRODUCTION

In the previous chapter various aspects related to water have been discussed. In order to understand and appreciate the role that the Ministries are playing in assisting the States in the matter of urban water supply and management of waste water and solid waste, it will be helpful to briefly take stock of the scenario of water supply, its disposal and management and then examine the issue of coordination of the work to be done by the concerned ministries.

Nearly 91% of urban population has got access to water supply and 63% to sewerage and sanitation facilities. However adequacy, equitable distribution and per capita provision may not be as per prescribed norms. Some cities only afford tens of litres of water per day where as others have hundreds of litre (350 litres per capita per day) per day. A sizeable quantity is wasted in leakages and poorly managed systems and does not reach the thirsty people. Due to poor quality also, in many towns, populace are consuming bottled water.

As per assessment made by the Central Pollution Control Board on Waste Water generation and treatment in class I and class II towns during 2003-04, 73% of waste generated still finds its way without treatment to receiving water bodies (Table 2.1).

**Table 2.1: Status of Water Supply, Waste Water generation and treatment in Class I/ Class II Towns (2003-04)**

Parameters	Class I cities	Class II Cities	Total
Number (as per class 2001 census)	423	498	921
Population in millions	187	37.5	224.5
Water Supply (mld)	29782	3035	32817
Water Supply (lpcd)	160	81	N.A.
Waste Water generated (mld)	23826	2428	26254
Wasted Water treated (mld)	6955 (29%)	89 (3.67%)	7044 (27%)
Waste Water Untreated (mld)	16871 (71%)	2339 (96.3%)	19210 (73%)

Source: Report of working Sub-Group II of MUD, (There are minor variations from the figures given in CPCB document, Status of Sewage Treatment in India, Feb 2006)

#### 2.2 PROGRAMMES OF NRCD (MOEF)

According to the Allocation of Business Rules, the Ministry of Environment and Forests is responsible for, among other things, the implementation of policies and programmes relating to conservation of the country's natural resources including lakes and rivers and improving their water quality, biodiversity and prevention and abatement of pollution. Accordingly, through its National River Conservation Directorate, it has been undertaking the conservation programmes of rivers named as National River Conservation Plan (NRCP) since 1985 and National Lake Conservation Programme since 2001. It will be pertinent to say that the Ganga Action Plan, later enlarged as National River Conservation Plan, was launched at the initiative of the then Prime Minister, Late Shri Rajiv Gandhi.

As rivers are dynamic systems and are influenced by many parameters, a holistic approach to river conservation is possible only if the river is treated as a single entity from its source to the outfall, and the conservation plan addresses all the issues arising along the course of the river. Therefore, apart from dealing with the gross pollution from cities, a holistic programme of restoration should seek to achieve the following objectives:-

- a) Assess and ensure minimum discharge in various stretches of the rivers, protection of natural flood plains, restoration of natural flood regimes and flood plains where ever possible and assess and conserve bio-diversity.
- b) Regulate activities in the upper reaches of the catchment so that the river is not adversely affected. These would include problems of deforestation, grazing, soil erosion and landslides resulting in excessive sediment production.
- c) Regulate land use and other activities in the flood plains of the river and prevent encroachments.
- d) Control pollution levels, both chemical and bacteriological, in different stretches. These may result from municipal wastes, industrial wastes, agricultural practices, mining or other human activities.
- e) Ensure proper solid waste management and disposal in towns and elsewhere in the catchment.
- f) Maintain diversity of the flora and fauna in the river as an indicator of the ecological health of the system in addition to other factors.
- g) Watch out interaction between the surface water and groundwater regimes both in terms of quantity and quality.

### **2.3 APPROACH ADOPTED UNDER NRCP AND NLCP**

The NRCD has adopted the approach for achieving above objectives in steps. The first step naturally has to be one which is manageable from the point of view of social and economic considerations in the country. Besides this, some of the above objectives are being achieved through the programmes being implemented by other sectoral ministries through inter-ministerial coordination.

There is a general impression that in the NRCD a centralized approach involving end of the pipeline treatment is followed. This impression is erroneous. Every effort is made to optimize not only the capital cost but also of operation and maintenance in these schemes. It must be realised that the cities and towns during the phase of their growth did not visualize the damage that their waste would cause to the water bodies and, therefore, did not make provision for treatment. In the localities, which are fully developed, localized treatment of waste is impractical. In addition, it must be said that in view of unprecedented migration from rural to the urban areas, there is tremendous pressure on land resources and the local bodies are, in many cases, reluctant to give away their land for such schemes. Because of these factors, technologies which can work very well on decentralised basis such as stabilization ponds, duck weed ponds, Karnal technology, and other land based systems have not become popular even though they have been tried in Ganga Action Plan Phase-I.

In addition, Bio-hydrology has been an important component of the programme and the health of the water is judged by the diversity of aquatic life. The question of minimum

flows is linked with competing needs of irrigation and water requirements of towns. The activity in the flood plains and in upper catchment is linked with the livelihood of the poor and is involved with emotions. With these constraints the feasibility of achieving all the objectives mentioned above is rather limited.

## **2.4 PROGRAMMES OF MINISTRY OF URBAN DEVELOPMENT**

Ministry of Urban Development (MUD) has the responsibility of broad policy formulation and monitoring programmes in the areas of urban development, water supply and sanitation. These are State subjects but the Ministry plays the role of coordination and monitoring and supports these programmes through Centrally Sponsored Programmes and projects on development of Urban towns and cities. Besides population growth, urban agglomerates are also growing due to migration of sizeable population for services, profession and business. This growing population has to be provided basic amenities guaranteed under the constitution. Of the 5161 urban agglomerates, 35 metropolitan cities contains 37% of the total urban population. The remaining urban population is equally inhabited between 388 large towns (population ranging from one – ten lacs) and 4738 other towns with population less than 1.0 lacs.

### **2.4.1 Targets**

The MUD in the eleventh plan has set the following targets (i.e. by the end of 11<sup>th</sup> plan).

Urban Water Supply	:	100% population coverage
Urban Sewerage and Sanitation	:	100% population coverage which includes 70% population to be provided sewerage and sewage treatment and 30% population with low cost sanitation
Solid Waste Management	:	100% population coverage with appropriate solid waste management facilities
Drainage	:	100% population coverage to provide comprehensive drainage system in towns wherever needed to help controlling flooding of urban centers due to rainfall and spread of sewage over streets.

### **2.4.2 Programmes of Support to strengthen urban infrastructure**

Under JNNURM all cities with a population exceeding 1 million, state capitals and heritage towns are proposed to be covered. UIDSSMT covers other towns. The objective is to provide basic amenities such as water supply, sewerage, sewage treatment, low cost sanitation, solid waste management, drainage and urban environment improvement

The State Governments and Urban local bodies (ULB) are required to formulate city specific development plans giving emphasis on water Supply, Sewerage, Sewage treatment , Low Cost Sanitation, Solid Waste Management and Drainage and send them to MOUD which considers them for funding.

## **2.5 CONVERGENCE AND DOVETAILING OF PROGRAMMES OF MINISSTRIES OF ENVIRONMENT AND FORESTS AND URBAN DEVELOPMENT**

### **2.5.1 Responsibility for works under NRCP and mechanism of dovetailing with MoUD**

The planning commission in their office memorandum no. M.13033/11/2006 -E&F dated Jan 15, 2007 have suggested that the core works namely, interception and diversion (I & D) and construction of Sewage Treatment Plants may be taken up under the two schemes namely, JNNURM and UIDSSMT of MoUD's with effect from 11<sup>th</sup> Plan. It is further suggested that MoEF may consider taking up such works only in towns and major cities not covered by the said schemes of MOUD. There is also a need for working out a mechanism to dovetail the efforts of MoUD and MoEF in this regard. The MoUD also expressed similar views.

Since the Ministry of Urban Development has programme for the renewal of urban infrastructure as a mandate and will have considerable funds which could be used for taking up schemes to create facilities to manage liquid and solid wastes, it is necessary to ensure that there is no overlap in the utilization of scarce resources and at the same time the objectives of conservation of rivers and lakes and of improving the infrastructure of the towns are achieved. Therefore, the MoUD by virtue of its interaction with the State Departments of UD may be in a better position to motivate the State Governments to undertake reforms at the level of urban local bodies for implementing such scheme.

Since MoEF is a regulatory and scientific agency, its role may largely comprise of maintaining the discharge standards and ambient standards and planning of river management. The NRCD (MoEF) may concentrate on having well integrated and cohesive river conservation plan and play the role of an effective coordinator for inter-sectoral issues on policy nature. Pollution abatement is one aspect of the River Conservation Programme which is implemented in its present scope of MoEF through coordination with the Ministry of Urban Development.. Further, MoEF may coordinate with Ministry of Water Resources (MoWR) for maintaining the minimum flow on the rivers and to maintain water quality within the permissible limits in all stretches during all periods. MoEF has also an important role in undertaking more comprehensive approach to river conservation works by additionally emphasizing on catchment area treatment, addressing the biota component and maintenance of ecological properties of the river waters. Coordination is also required with Ministry of Agriculture for management of non-point pollution source.

Presently, the coverage of NRCP scheme is in 160 towns on 34 rivers in 20 states. Out of 160 towns, 95 towns are along the river Ganga and its tributaries Yamuna, Gomti and Damodar covering eight states. The remaining 65 towns are in 30 river basins in 12 States. In the JNNURM Scheme, 63 cities have been proposed including Mega cities (7), Million plus cities (28) and 28 cities having population less than one million. All other small and medium towns/cities not included in JNNURM Scheme will be covered under the UIDSSMT Scheme. The NRCP Scheme of MoEF has already covered 28 JNNURM cities and additional 132 cities/towns beyond JNNURM Scheme. However, the pollution load covered varies from partial to full in these NRCP cities.

Keeping in view, the historical genesis of the River Conservation Programme since 1985 and the merits of the river-centric approach, the present scope of MoEF's work namely, funding and monitoring of I & D and STP works under GAP including the three tributaries of river Ganga viz., Yamuna, Gomti and Damodar may remain with the Ministry by way of

legacy responsibility in respect of all such stretches which do not meet the specified norms as on April 1, 2007. In other towns, the infrastructure created by NRCD may be fully utilized by MoUD, if decision is taken in merging of the schemes and/or dovetailing with those of MoUD at the appropriate level of competence. Irrespective of the final decision in the matter, the present Working Group Report has given its comprehensive views, approaches and outlays for conservation of rivers, lakes and aquifers for the 11<sup>th</sup> Plan Period.

### **2.5.2 National Lake Conservation Programme and Wetlands Programme**

It needs to be emphasized that the NLCP includes lakes and wetlands and may not require any dovetailing as it is assumed that it will continue to be looked after the MOEF.

### **2.5.3 NRCD's Regulatory Role For Conservation of Water Bodies**

It will be necessary for the NRCD to prepare comprehensive river action plans based on holistic approach meeting all conservation goals with a view to improve ecology. This should be for new projects as well as ongoing projects. The Ministry has a fundamental regulatory role to strengthen and support conservation of water bodies, which no other organizations can look after since this responsibility has been given to Ministry of Environment and Forest under Water Act 1974 and EPA 1986 and the necessary expertise exists therein.

### **2.5.4 Categories of Towns Covered Under NRCP / NLCP in the 11<sup>th</sup> Plan Proposal:**

There are three categories of cities and towns covered under NRCP and NLCP of MoEF

- i) Cities / towns where pollution abatement schemes have been completed. In these towns the issues of getting evaluation conducted and ensuring proper O&M need attention.
- ii) Cities / towns where pollution abatement schemes have been completed only partially and the works will extend in to the 11<sup>th</sup> Plan. These works should continue to be handled in the Government of India by the MOEF.
- iii) Cities / towns in respect of which proposals for new works are pending in the MOEF. Depending on the decision that may be taken regarding such works, they will be dealt with by the appropriate Ministry.

In this report the new works that deserve to be taken up have been listed in the table given in paragraph 8.3 (Chapter 8) on the basis of review described in Volume-II. These works have been recommended by state governments and also by NRCD.

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## CHAPTER-3

### METHODOLOGY ADOPTED

#### 3.1 TERMS OF REFERENCE

The Planning Commission, Government of India has set up a Working Group on Rivers, Lakes and Aquifers vide its letter of August 21, 2006 and Oct. 11, 2006. To prepare a report that will be an input to the 11<sup>th</sup> Five Year Plan document.

The terms of reference are as given below:

- a. To evaluate the impact of ongoing projects under National River Conservation Plan and National Lake Conservation Plan in improving the water quality of rivers and lakes respectively, the procedure of approval and implementation of schemes and funds flow to the state and local bodies and mechanism for timely implementation of projects.
- b. Recommend improvisation in the scheme by involvement of Public Private Partnerships, adoption of effective technologies and practices etc.
- c. Consider the status and possible options for addressing the problems of natural and anthropogenic contamination of groundwater resources of the country in context of handling of industrial effluents, use of pesticides/insecticides and resultant health hazard for the life forms.
- d. Explore the possibility of integration of programmes under NRCP and NLCP with related schemes of other Ministries i.e. Urban Development, Water Resources etc. thereby providing for optimal utilization of resources.
- e. Strategies for meeting O&M requirements of the installations created under NRCP/NLCP and making the operation of these projects self sustainable
- f. Explore the sources of external funds and grants for the programmes.
- g. Suggest additional infrastructure requirements, human resources etc. if necessary to make the programme more meaningful
- h. Recommend criteria for selection of new rivers and lakes keeping in view the broader socio-economic objectives of the Eleventh Plan. Accordingly, recommend a portfolio of river and lake conservation projects in various states, corresponding physical targets, measurable objectives/outcomes and financial requirements.
- i. To include any other issue, which the Working Group considers important

#### 3.2 METHODOLOGY ADOPTED

In view of the shortage of time, only secondary data was used in making this report. This involves minutes of NRCA steering committee and material gathered from states, quarterly MIS reports, views of NRCD officials were helpful in formulating proposals. Other organisations who supplied the information were.

- Central Pollution Control Board (CPCB).
- Central Ground Water Board

- AHEC, IIT Roorkee through prepared reports
- Progress of JNNURM programme plan and implementation of the schemes from the Ministry of Urban Development
- Ground water pollution in aquifers in the different river basins, lentic bodies of water, of CPCB.
- Geogenic contamination of ground water – Central Ground Water Board.

Information of the progress of the progress of JNNURM the programme – plan and implementation of the schemes from the Ministry of Urban Development has been obtained with a view to examining how the programmes can be dovetailed.

Status of pollution of ground water pollution in aquifers in the different river basins lentic bodies of water of the country was obtained mainly from the CPCB. However, some information about geogenic contamination of ground water was also obtained from the Central Ground Water Board.

In 2004, IIT Roorkee had carried out a review of the proposals for inclusion in the 10<sup>th</sup> plan. At that time the States were asked to send their proposals and if the proposed towns satisfied the criteria of population, pollution of river caused by the town, they were included in the plan. The officers have now given supplementary inputs and new works have been added to the list of works prepared earlier. The costs estimated in the report of 2004 has been revised upward in view of the inflation by 15%.

The financial commitments of ongoing schemes spillovers, new schemes from other states and Union territories and R&D areas R&D have been detailed out in chapter 8. The portfolio of States are presented in volume-II.

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## CHAPTER-4

### IMPACT OF RIVER ACTION PLANS

The evaluation of Ganga Action Plan Phase I was done in the year 1994 and a cost benefit analysis of that programme was done soon after. An evaluation of Yamuna Action Plan was carried out in 2002. All these evaluations were positive about the results of GAP. However, the first two exercises were done more than a decade ago and may no longer be valid, specially when the population has increased substantially, the water supply and the waste generated are quantitatively much more.

The NRCD has a programme of monitoring the water quality of the rivers upstream and down streams of towns where schemes are sanctioned. The data is published in the MIS reports every quarter. On the basis of this data as published in MIS vol II 2006, the impact of programme has been evaluated as given hereafter.

#### 4.1 GANGA RIVER

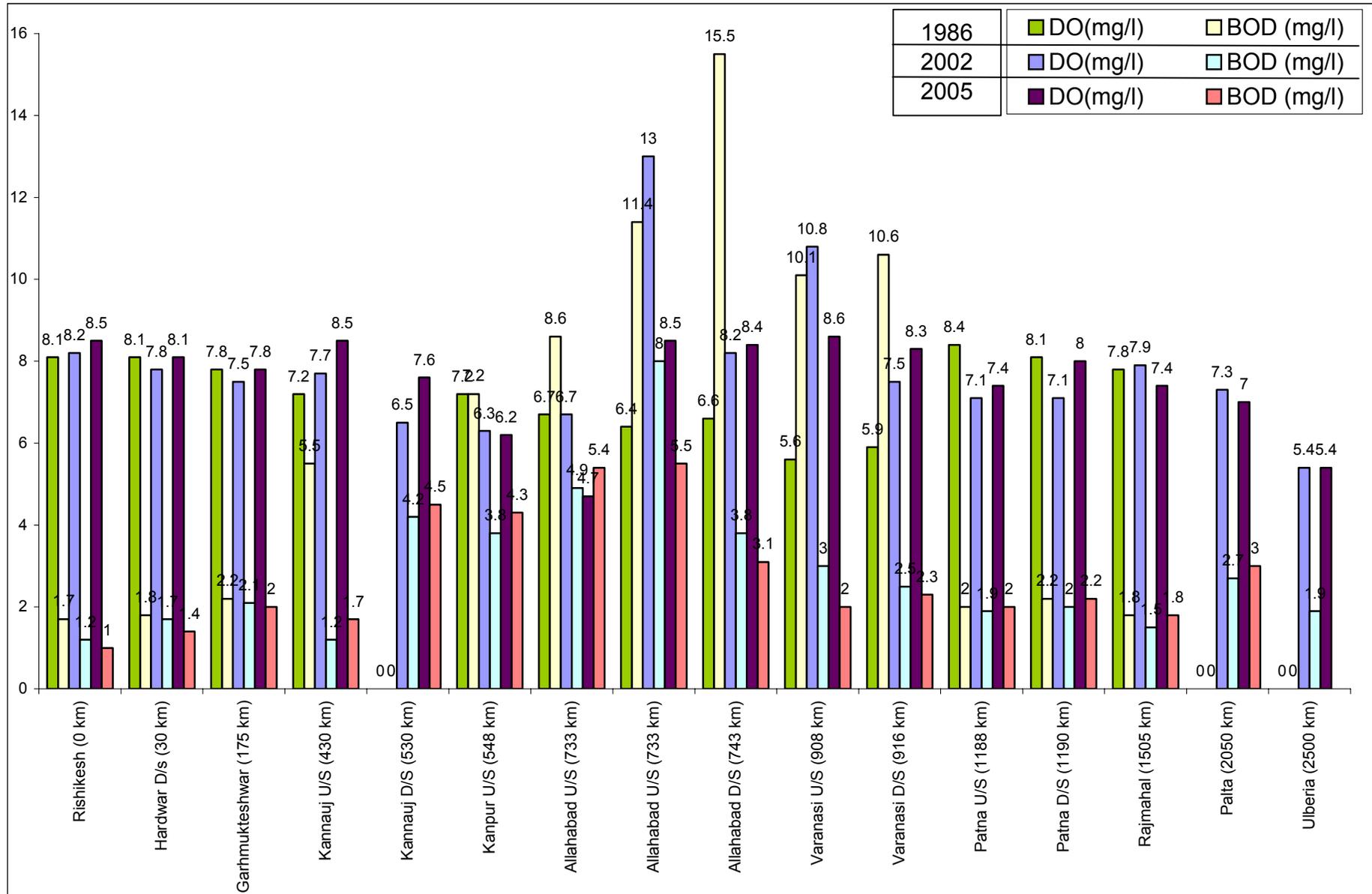
On the basis of data of 19 years (1986-2005) at 16 sites as averaged values of DO and BOD impact of river action plan has been evaluated. For sake of convenience, the stretch has been divided in three zones upper (Rishikesh – Garhmukteshwar) middle (Kannauj – Varanasi) lower (Patna – Uleberia). The maximum, minimum and average values are given below:

		Max.	Min.	Average		
				1986	1996	2005
Upper	DO	9.0 (Rishikesh 1993)	4.7 (Grahmukteshwar 1987)	8.0	8.3	8.1
	BOD	4.9 (Garhmukteshwar 1998)	0.5 (Rishikesh 2003)	1.9	1.2	1.5
Middle	DO	13.0 (Allahabad 2002)	4.4. (Kanpur 2003)	6.5	7.9	7.6
	BOD	6.58 (Kanpur 1991) 25.0 (Kanpur 1992) 24.5 (Kanpur 1993)	1.0 (Kannauj 1989)	9.8	2.9	3.6
Lower	DO	8.7 (Patna 1998)	5.1 (Uleberia 1997)	8.1	6.74	7.04
	BOD	3.2 (Uleberia 1994)	0.3 (Rajmahal 1990)	2.0	1.7	2.3

1. The perusal of data reveals that upper zone meets the requirements of bathing waters (DO > 5.0, BOD < 3.0 mg/l) at all time with respect to DO and BOD values. The values of 1986, 1996 and 2005 indicate that despite increase in pollution load, the quality was maintained at value prior to GAP schemes.
2. The critical middle zone was between Kannauj and Varanasi in 1986 with DO < 5.0 and BOD >3.0. With NRCD programme the critical middle zone was restricted between Kannauj and Allahabad (2002-2005) thus indicating improvement in Allahabad – Varanasi stretch.

The data in Fig. 4.1 amply demonstrates this observation.

**Fig. 4.1 Water Quality Data for River Ganga (Summer Average i.e. March-June)**



## 4.2 YAMUNA RIVER

Based on data of summer averages of 1996-2005 Table 4.2 the following inferences can be made.

1. The quality of Yamuna river water was maintained all through in Haryana with DO values above 5.0 mg/l and BOD values less than 3.0 mg/l with DO value marginally lower at Kalanaur (2003) and BOD values higher at Palla (1996) and Sonipat (2002). These variations were more as exception than rule.
2. The Yamuna water at Delhi was always poor with DO values <5.0 mg/l and BOD values > 3.0 mg/l.
3. The poor quality trend continued downstream also with values of DO fluctuating upto Majhawali. The content improved at Mathura and Agra u/s. The values were again lower d/s Agra. However, the values improved at Baleshwar upto Auraiya. The same trend was indicated by BOD values. The maximum, minimum and average values of Yamuna WQ variations are indicated below:

		Maximum	Minimum	Average	
Delhi	DO	4.0 (1998)	0.0 (97,99,2001 2003, 2004)	0.60	
	BOD	34.0 (1997)	5.0 (1998)	22.59	
Mathura	DO	11.7* (1999)	5.2 (1997)	7.63	
	BOD	13.3 (2003)	2.8 (1998)	8.33	
Agra u/s	DO	13.5* (2002)	4.7 (2003)	10.3*	*Eutrophic Status
	BOD	18.3 (2003)	4.5 (1996)	9.83	
Agra d/s	DO	8.4* (2004)	1.6 (1996)	4.65	
	BOD	29.5 (2003)	7.0 (1999)	16.70	

4. The Critical stretch of Yamuna in 2005 extended from Delhi to Udi as against Delhi to Mejhawali and again Agra d/s to Etawah in (1996). The reason for criticality seems to be that the population has increased and because of increasing demand for water in towns and cities on the banks, the flow in dry months has decreased further.

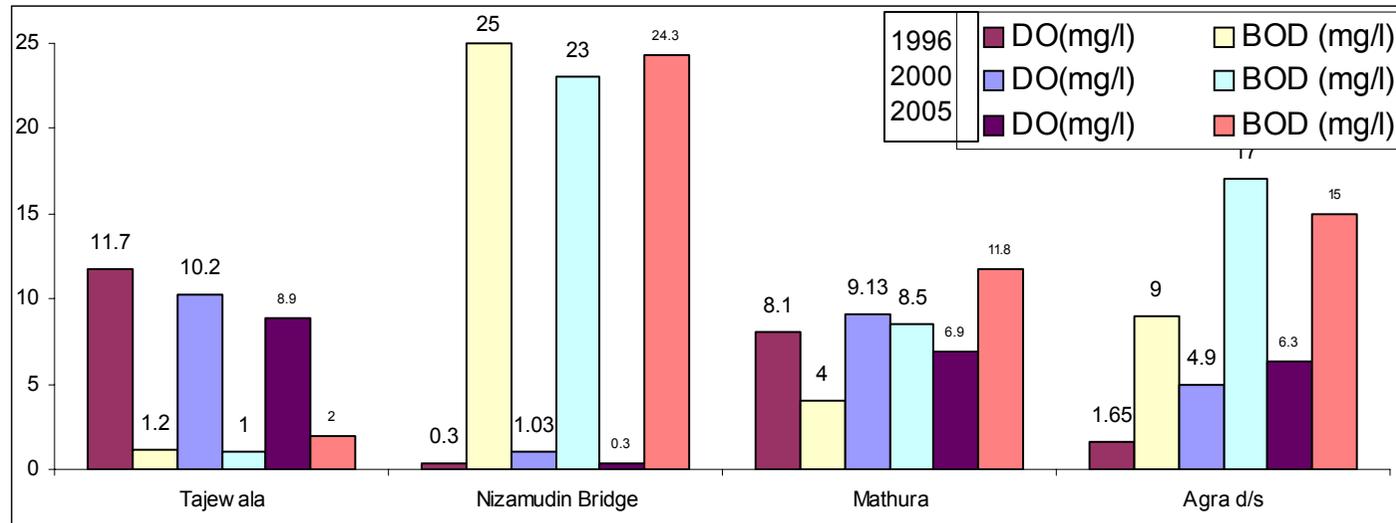
## 4.3 GOMTI

The comparison of data for 1994 and 2005 at different places on the river Gomti (Figure 4.3) reveals the following

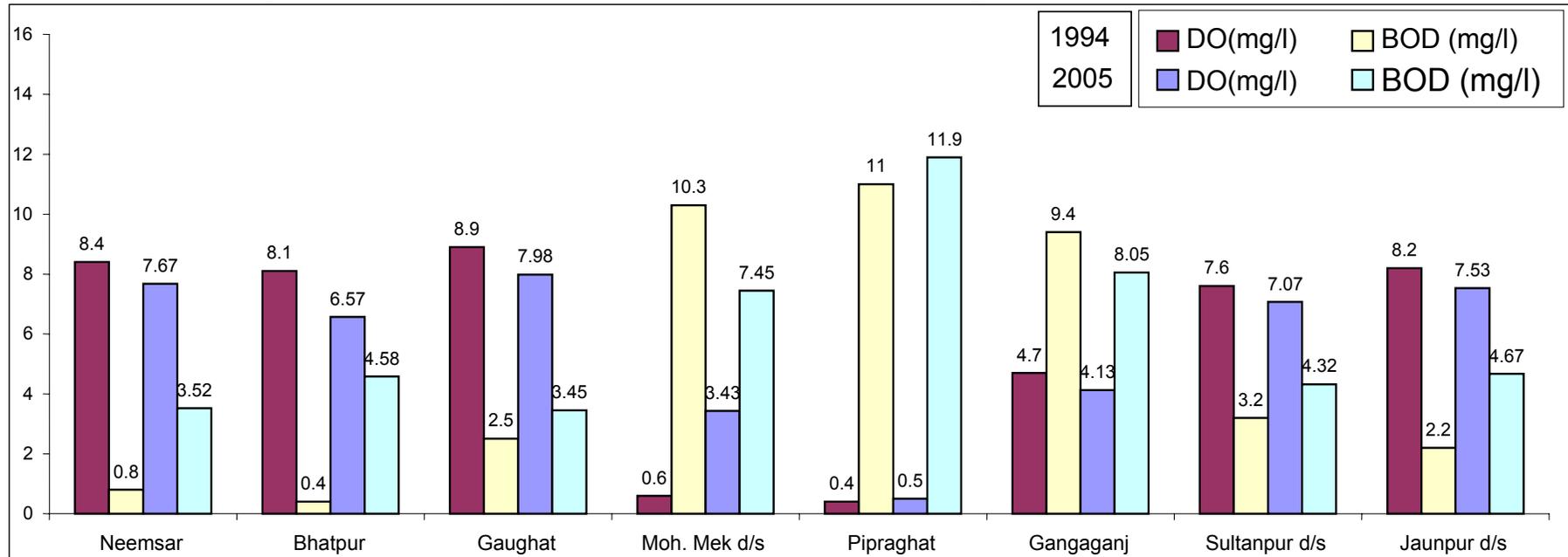
1. The water quality downstream of Mohan Meakens in river Gomti was below B quality DBU with DO values < 5.0 and BOD values > 3.0 upto Ganga ganj. The DO levels increased downstream at Sultanpur and Jaunpur however the BOD values remained suspect.
2. During 2005 the BOD values in the entire stretch remained above 3.0 mg/l indicating no improvement in water quality.

The projects on Gomti have not been completed so far. Therefore, it is not possible to evaluate the impact. But the pollution in the cities has been increasing. Therefore, worsening of the parameters is expected and is proved from the above figures.

**Fig. 4.2 Summer Average for Yamuna Action Plan**



**Fig. 4.3 - Water Quality Data for River Gomati Summer Average (March-June) 1994-2005 Data**



## **CONCLUSION**

On the basis of the above analysis it may be concluded that the Ganga Action Plan and the Yamuna Action Plan have produced positive results. The figures of water quality in Delhi are bad because under the Yamuna Action Plan only two drains were intercepted and STPs installed. The situation is worsening because of negligible river flow (below the minimum flow condition) to dilute and transport effluents. The Impact of Delhi is also indicated in downstream stretch.

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## CHAPTER-5

### APPROACH AND STRATEGY

#### 5.1 GENERAL

The National Environment Policy 2006 has drawn attention to the various factors, which are leading to the degradation of our fresh water resources. The retreat of glaciers in the Himalayas is a major concern as India's perennial river systems typically originate in its mountain eco-systems, and deliver the major part of their water resources to the populations in the plains.

Rivers are subject to siltation from sediment loads due to soil loss from land-use change, loss of forest and tree cover. On the one hand there is heavy withdrawal of water to meet the demands of agriculture, industry, and municipal use, on the other hand there is pollution from human and animal waste near cities and towns, agricultural run-offs, and industrial effluents. The existing pollution inflows in many cases substantially exceed natural capacities to render the pollution harmless.

Thus the river water quality in the vast majority of cases declines as one goes downstream. The results include loss of aquatic flora and fauna, leading to loss of livelihoods for river fisherfolk, significant impacts on human health from polluted water, increased drudgery for poor, loss of habitat for many bird species, and loss of inland navigation potential.

Some of the causes of river degradation can be related to policies and regulatory regimes. These result in overuse near the headworks' of irrigation systems, and drying up of irrigation systems at the tail-ends and in excessive cultivation of water intensive crops near the head works, which may lead to inefficient water use, water logging and soil salinity and alkalinity. The irrigation tariffs also do not yield resources for proper maintenance of irrigation systems, leading to loss in their potential. In particular, resources are generally not available for lining irrigation canals to prevent seepage loss. These factors result in reduced flows in the rivers. Pollution loads are similarly linked to inefficient use of agricultural chemicals, and municipal and industrial water use. Improper spatial planning of industries inhibit realization of scale economies in effluent treatment, resulting in relatively high costs of effluent treatment, and consequent increased incentives for non-compliance.

#### 5.2 National River Conservation Plan (NRCP):

##### 5.2.1 Approach Adopted

In the case of Ganga Action Plan, later on enlarged as the National River Conservation Plan, the main objective set was to improve the water quality of the rivers to bathing standards by treating the waste, mainly sewage and for that purpose lay networks of trunk sewers.

Hence the approach adopted was one of identifying, on the basis of water quality data of the CPCB, the polluted stretches of Ganga, Yamuna and other inter-state rivers and identify the towns that constituted the major sources of pollution. The States prepared DPRs of measures – Core Schemes that dealt with sewage and Non Core Schemes that dealt with

Non-point sources of pollution and mentioned in paragraph 1- for the selected towns with the objective that polluted water did not reach the river without due treatment and non.

Since it was believed that the river water quality would not be affected if the houses were not connected to the street sewers or the laterals and branches were not laid or if the solid waste was not managed in an environmentally safe manner, these aspects were not eligible for funding except in a limited way. Other aspects relating to the conservation of river basin and flood plains mentioned above received only marginal attention. Apart from the municipal waste from towns that was discharged in to the rivers, it was noticed that industrial units too discharged their effluent without adequate treatment. Hence action against non conforming units was initiated by the Pollution Control Boards.

However, other aspects relating to the basin mentioned in paragraph 5.1 could not receive the required attention. Land use and the activities in the watershed and in the flood plain, withdrawal of water from the river for use of irrigation, industry and municipal uses were not attended to. Thus it has not been possible to ensure the minimum flows in the rivers during the lean or dry months. The result is that adequate water for dilution of the effluent from the STPs is not available. Moreover, it has not been possible to achieve the required reduction in the concentration of fecal coliforms, an indicator of pathogens in the river water. Chemical treatment or other techniques for their reduction have not been possible for a variety of reasons.

### **5.2.2 Impact of NRCP**

Time series data of the river water quality of Ganga, Yamuna and Gomti are available and have been analysed in Chapter 4. Though in some segments of the rivers, water quality is below bathing standards and coliform count has not been, it is reasonable to conclude that the GAP has produced positive results.

### **5.2.3 Lessons Learnt from NRCP**

#### **a) Involvement of Stake Holders**

It was realised that for a river conservation programme to be successful the local people and the State Governments should be interested in and committed to the programme and should genuinely ask for it. The programme creates obligations for every section of population in the town/city and down stream including the local body and various organizations of the State Government responsible for water supply and creating and maintaining infrastructure such as the State electricity undertaking. The local body together with the State Government should ideally contribute to the capital cost of the works and after their completion need to deploy financial, material and manpower resources. They should be willing, at the least, to take responsibility for the operation and maintenance of the works. However, it seems safe to conclude that the citizens of the towns selected for conservation programme in the past need to be involved more deeply so that they would agree and commit to contribute to the capital cost and be financially and administratively responsible for the operation and maintenance of the assets that would be created under the GAP.

#### **b) Need For Effective O&M**

The STPs gave the expected results in operation; but deficient financial and infrastructural support such as lack of funds, erratic electric supply, and shortage of trained

manpower, improperly staffed laboratories attached to treatment plants, came in the way and had adverse impact on the river water quality.

#### **c) Need For Effective Coordination**

In most states there is no apex body to coordinate the activities of various organizations, which affect the programme during its execution phase and also after completion – Operation and Maintenance phase.

#### **d) Monitoring**

The performance of the assets created and the water quality of the river where pollution abatement works have been sanctioned should be done regularly.

#### **e) Training**

There is need to strengthen training which should be properly structured with carefully designed refresher training programmes.

#### **f) IEC**

There is need to strengthen awareness generation programmes various stakeholders, particularly the students of schools. So far they were not intensive enough to generate a willingness on the part of the municipal body and the citizen to accept responsibility for the pre and post-project obligations.

#### **g) Human Resource Development – Education and Training**

People with different skills are required to operate and maintain the assets created. Hence programmes of education and training were also included as a component in the conservation programmes.

#### **h) New Colonisation – Provision for Waste Management in the Colonisation Plan**

It was obvious that the NRCD could not be an indefinite programme and any future colonization had to incorporate sewage collection, treatment and disposal as an integral part of the project and not leave it to some other organisation to do it. Hence decision was taken that while under the existing areas future growth of population should be provided for in the systems planned for conveyance and treatment of sewage, any new colonization should have disposal of solid and liquid wastes as an integral part of colonization and those costs should not be transferred to the River Action Plans. But this is not uniformly followed every where.

#### **i) Industrial Effluents**

To protect rivers and lakes from industrial provision there are laws and regulations requiring the industry to treat their effluents to prescribed standards and provision for the pollution Control Boards to monitor the quality of the effluents. However, the results are not always satisfactory suggesting improvement in monitoring of the industrial effluents.

## **j) Flood Plains**

The maintenance of the flood plains is not what one would ideally desire. The flood plains are used for cultivation during the dry seasons and people construct their dwelling units on land lower than the high flood level. There is gradual reduction of the waterway available and the silting of the riverbed also takes place. All this is impacting the aquatic life that is unavoidably intertwined with the maintenance of a healthy regime of flow in rivers.

## **5.3 National Lake Conservation Plan**

### **a) About the Programme:**

Lakes are bodies of water surrounded by land. The majority of lakes are fresh water lakes. Lake ecosystem includes resilience mechanisms of connected wetlands and riparian forests. The wetlands help in nutrient retention and humic production and the riparian forests also help in nutrient retention and woody habitat production and food web structures that divert phosphorus to consumers rather than phytoplankton, and biogeochemical mechanisms that prevent phosphorus recycling from sediments.

The Indian lakes in general are getting degraded through encroachment, diversion of land use of wet lands and riparian forests, discharge of waste water and solid waste from the growing population on the land. Run off from agricultural areas in the catchment of the lakes too contributes to nutrients in the lakes. Most of such lakes are becoming or have become Eutrophic. Thus in such degraded lakes, these resilience mechanisms are replaced by new ones that connect lakes to larger, regional economic and social systems.

Changes in lake food webs and biogeochemistry channel phosphorus to blooms of nuisance algae. Degraded lakes are significantly less valuable than normal lakes. Because of this difference in value, there are economic benefits of restoring lakes.

Realising the importance of maintaining the lakes in their good ecological health, the National Lake Conservation Programme (NLCP) was started in 2001 with three lakes of Maharashtra and Tamil Nadu as centrally sponsored scheme.

The main objective of the programme was to restore and conserve polluted and degraded lakes in urban areas and tourist places. The activities covered included prevention of pollution, in situ lake cleaning, catchment area development, lake front eco-development. Public awareness and participation was also made a part of conservation programme.

The Ministry of Environment and Forests subsequently identified forty seven lakes in thirteen states as per details given in Table 5.1 with approved cost.

Identification of Lakes for Conservation and Restoration was also made by National Institute of Ecology, New Delhi, 2003. A list of lakes was also prioritised on the recommendations of different states and union territories. The list is appended in Table 5.2.

In the lakes, the activities in the catchment have a profound impact on them. Hence the approach is to study the catchment, identify the changes in the use of the land in the catchment, study the inflows of water and find out whether it has been diverted for irrigation, drinking or industry and study the impact on the lake. The pressure of population in the

catchment and around the lake results in the pressure on the land surrounding the lake as also on the wetlands which are parts of the lake system. Also, land hunger in some lakes has led to reclaiming the part of the lake under water to be encroached upon. The habitation around the lake results in the flow of waste water, cleaning of trucks, buses etc in the lake, solid waste being dumped etc. All these activities lead to unacceptable levels of nutrients in to the water and damaging the lake. The response of the lake to interventions can always not be predicted. Hence there is need for committee of experts to aid and advise the lake administrators about the manner in which the results of interventions in the lakes need to be monitored and the corrective measures that need to be taken.

## **b) Achievements**

The NLCP was started only in 2001 and the period is too short to correctly asses the impact of whatever measures have been implemented or are under implementation.

## **5.4 Wetland Action Plan**

### **a) Objectives**

The scheme on conservation and management of wetlands was initiated in 1997 with the following objectives:

- Lay down policy guidelines for implementing programs of conservation and management of wetlands, mangroves and coral reefs in the country.
- Identify priority wetlands for intensive conservation, management and research,
- Prepare an inventory of Indian wetlands, mangroves and coral reefs
- Conservation and protection of the wetlands, Mangrove Ecosystem from further degradation;
- Sfforestation of degraded wetlands, Mangrove and coral areas;
- Restoration of degraded coral reef areas;
- Maintenance of genetic diversity especially of the threatened and endemic species;

### **b) Components of Wetland Action Plan**

The components of the programme include the following activities:

- Protection afforestation, natural regeneration
- Catchment area treatment
- Pollution control
- Weed control
- Wild life conservation

### **c) Wetlands Covered**

The wetland conservation programme upto the 10<sup>th</sup> plan is given in Table 5.3. A list of wetlands of International Importance under Ramsar Convention in India is given in Table 5.4 at the end of the chapter.

## **5.5 APPROACH TO 11<sup>th</sup> PLAN**

The points emanating from the review of the River and lake Action Plans, the directions given in the National Environment Policy and the objective of environmental conservation of water bodies (rivers and lakes) will guide the approach in the 11<sup>th</sup> Plan.

### **5.5.1 Address Concerns Expressed in NEP**

As prescribed in the National Environment Policy 2006 the approach will be to incorporate the following elements in action plan for river systems and suitably in the Lake Conservation Programme:

- a) Promote research in glaciology to evaluate the impacts of climate change on glaciers and river flows.
- b) Promote integrated approaches to management of river basins by the concerned river authorities, considering upstream and downstream inflows and withdrawals by season, interface between land and water, pollution loads and natural regeneration capacities, to ensure maintenance of adequate flows, in particular for maintenance of in-stream ecological values, and adherence to water quality standards throughout their course in all seasons.
- c) Consider and mitigate the impacts on river and estuarine flora and fauna, and the resulting change in the resource base for livelihoods, of multipurpose river valley projects, power plants, and industries.
- d) Consider mandating the installation of water saving closets and taps in the building bye-laws of urban centres, and other available regulatory mechanisms.
- e) Integrate conservation and wise use of wetlands into river basin management involving all relevant stakeholders, in particular local communities, to ensure maintenance of hydrological regimes and conservation of biodiversity.
- f) Incorporate a special component, in afforestation programmes, for afforestation on the banks and catchments of rivers and reservoirs to prevent soil erosion and improve green cover.

### **5.5.2 Approach Proposed For the 11<sup>th</sup> Plan**

Based on the NEP and the experience gained, the recommendation of works for inclusion in the 11<sup>th</sup> Plan are based on the proposals received from the State Governments and those made by the NRCD and following criteria mentioned below:

#### **5.5.2.1 NRCP**

##### **1. Ganga & Yamuna**

Since Ganga was the first river for which this programme was taken up and river Yamuna followed closely after Ganga, relating to these two rivers, all works required will be taken up so that they can be cited as a model where water quality through out their length satisfies bathing standards and where the aquatic life is healthy. For this purpose:

- a) In the towns along Ganga and Yamuna, where sanctioned works have been completed are under implementation, the waste water that was left out will be covered,

- b) In other towns where the water quality is polluted beyond standards or is on the margin, will be covered.
- c) The flood plains of the rivers which are showing signs of stress will be included for preparing and implementing management plans. The watersheds feeding the river where the soil loss is heavy should be brought under watershed management.
- d) The Sewage Treatment Plants established will be provided with supplementary treatment to bring down the coliform count below the prescribed limits.

## **2. Other Rivers**

For towns on other rivers, works the following criteria will be adopted:

- a) Ongoing works i.e., works spilling over from the present plan.
- b) Items of work left over in the earlier completed / ongoing projects
- c) Deterioration in water quality and aquatic life of the river.
- d) Population of the town affecting the river water quality.
- e) Whether there is demand from the citizens of the town for taking up such works.
- f) Whether they are willing to share the cost of capital works and take responsibility to Operate and Maintain the works.

## **3. Review of Resources of National River Conservation Directorate (NRCD)**

NRCD was set up as Ganga Project Directorate when the programme was taken up only on Ganga involving 25 towns and cities. Now the programme has covered 160 towns and 34 rivers. In addition the new approach of taking up the holistic programme involving other aspects that have been largely ignored, will need extra resources. However, the work allocation between the NRCD and MOUD is under consideration. Depending on the work allocated to NRCD its manpower resources need to be reviewed.

## **4. System Design**

Adoption of de-centralised centralised system for sewage treatment as against a centralized system needs to be emphasized on the basis of life time analysis of costs.

## **5. Revenue Recovery from STPs:**

The States will be encouraged to exploit all potential sources of revenue such as Methane from Anaerobic Process Based Plants, effluents as irrigation water, fishery, sludge as compost etc will

## **6. Control of Fecal Coliform:**

The problem of very high presence of fecal coliforms in the STP effluent and consequently in the river water could not be tackled. The technologies that may be successful are costly both by way of capital cost as well as maintenance cost.

## **7. Monitoring of Water Quality**

In many towns where schemes have been sanctioned monitoring of water quality is not being done and should now be approved.

### **5.5.2.2 Lake Action Plan**

#### **1. Integrated Approach**

Lakes are integral biological systems and every activity in the basin affects them including abstraction & diversion of water and land use. Therefore, holistic approach to lake conservation will be adopted through implementation of lake basin management initiative. Cost of internal sewerage system of the lake basin should form a part of the lake conservation proposal. Solid wastes are an important contributor to lake degradation and should, therefore, be a part of the overall lake conservation project. Monitoring network including that for ground water should be intensified.

#### **2. Selection of Lakes For Sanctioning Works in the 11<sup>th</sup> Plan**

In consultation with the States programmes should be formulated for identified lakes

### **5.5.2.3 Ground Water Action Plan**

The following activities are proposed for Ground Water During the 11<sup>th</sup> Plan:

#### **a) Monitoring**

The CPCB will be requested to intensify the network for monitoring of ground water. Monitoring sites should be located near grossly polluting industrial units, small-scale units and places of heavy abstraction of water.

#### **b) Action To Be Taken By Ministry of Water Resources:**

In accordance with the prescription of the NEP 2006, the Ministry of Water Resources will be requested to:

- a) Take explicit account of impacts on groundwater tables of electricity tariffs and pricing of diesel.
- b) Promote efficient water use techniques, such as sprinkler or drip irrigation, among farmers. Provide necessary pricing, inputs, and extension support to feasible and remunerative alternative crops, which may be raised by efficient water use.
- c) Ensure availability of ground water potential maps through a designated institution.
- d) Support practices of rainwater harvesting and artificial recharge and revival of traditional methods for enhancing groundwater recharge.
- e) Mandate water harvesting and artificial recharge in all new constructions in relevant urban areas, as well as design techniques for road surfaces and infrastructure to enhance groundwater recharge. Promote capacity development of relevant stakeholders and provide web based information on water harvesting techniques.

- f) Prepare and implement a comprehensive strategy for regulating use of ground water by large industrial and commercial establishments on the basis of a careful evaluation of aquifer capacity and annual recharge.
- g) Support R&D in cost effective techniques suitable for rural drinking water projects for remedial measures and removal of arsenic fluoride, and other toxic substances and mainstream their adoption in rural drinking water schemes in relevant areas.
- h) Improve productivity per unit of water consumed in industrial processes, by making water assessments and water audits mandatory in identified industries and utilities.
- i) Suitable sites for dumping the toxic waste material may be identified and remedial measures may be taken to prevent the movement of the toxic waste in the ground water.
- j) Excessive use of fertilizers, pesticides and insecticides are the main non point source of the pollution. These pollutants contribute to the pollution of the ground water as well as surface water. The optional utilization of fertilizers, pesticides and insecticides should be encouraged for improving the water quality.

#### **5.5.2.4 Elements Common to NRCP & NLCP**

- a) There should be a tripartite agreement or MOU between the Government of India on the one hand and the State Governments and the concerned local body on the other, regarding the responsibility for proper O&M and raising the necessary resources for this purpose.
- b) Local bodies need to be involved right from the inception of the programme of the schemes through to implementation and post completion operation and maintenance.
- c) The setting up of an Apex Body in states to conceptualize, coordinate, implement and monitor the conservation Plans will be encouraged.
- d) Manuals for operation and maintenance of plants based on various technologies need to be prepared and provided to the concerned agencies. Their use could be made mandatory under the EPA and the responsibility to monitor may rest with the SPCB.
- e) Properly equipped laboratories with the trained staff will be provided at every STP.
- f) Generation of resources from financial institutions and of revenue from polluters, and beneficiaries is proposed to be made mandatory through modification of taxation process.
- g) Models of public private partnership should be tried in various regions of the country and for this purpose financial support should be provided by the NRCD from R&D funds.
- h) In view of shortage of technically qualified personnel at various levels and promoting and undertaking R&D, there is need for setting up a Centre of Excellence in Aquatic Ecology.
- i) A GIS based data base of works undertaken under the NRAP and NLAP and of polluting industrial units needs to be built up. It will help in proper monitoring the progress of work.

**Table 5.1: Details of Lake Conservation Projects approved under the NLCP**

S. No.	Lake	State	Date of sanction	Approved cost (in Rs. crore)
1.	<b>Lakes of Bangalore</b>			11.48
2.	Vengaihkere,	Karnataka	2002-03	
3.	Nagavara			
4.	Jarganahalli			
5.	Bellandur lake	Karnataka		5.54
6.	Kotekere lake, Belgaum	Karnataka	2002-03	5.64
7.	Bhishma lake, Gadag	-do-		2.50
8.	Lal Bagh, Bangalore	-do-		1.66
9.	Channapatna lake, Hasan	-do-	2004-05	4.97
10.	Sharanbhasveshwara lake, Gulbarga	-do-	-do-	4.89
11.	Akkamahadevi lake, Haveri	-do-	-do-	2.64
12.	Kundawada lake, Davangere	-do-	2006-07	3.41
13.	Kote Tavarekere lake, Chikmagalur	-do-	-do-	3.64
14.	Tripuranthkeshwar lake, Bidar	-do-	-do-	4.67
15.	Banjara lake, Hyderabad	Andhra Pradesh		2.75
16.	Powai lake, Mumbai	Maharashtra	2001-02	6.62
17.	9 lakes in Thane, Maharashtra	-do-	2002-03	2.53
18.	Rewale			
19.	Upwan			
20.	Jait			
21.	Makhamali			
22.	Naar			
23.	Khodakali			
24.	Kharegaon			
25.	Kausa			
26.	Kasarwadavli			
27.	Kachrali			
28.	Mahalaxmi lake, Vadagaon	-do-		1.85
29.	Rankala lake, Kolhapur	-do-	2006-07	8.65
30.	Varhala Devi lake, Bhiwandi	-do-	-do-	4.60
31.	Mansagar lake, Jaipur, Rajasthan	Rajasthan	2002-03	24.72
32.	Ooty lake	Tamilnadu	2001-02	1.95
33.	Kodaikanal lake, Dindigul	-do-	2001-02/2006-07	10.42
34.	3 lakes of Agartala	Tripura	2004-05	2.02
35.	4 lakes in Nainital	Uttranchal	2003-04	16.85
36.	Bhimtal			
	Naukuchiatal			

37.	Sattal			
38.	Khurpatal			
39.	Nainital lake, Nainital	-do-	-do-	47.97
40.	Rabindra Sarovar	West Bengal	2002-03	6.96
41.	Mirik lake, Darjeeling	-do-	2004-05	4.01
42.	Dal lake, Sri Nagar, J&K	J&K	2005-06	297.00
43.	Veli Akkulum lake, Thiruvananthpuram	Kerala	-do-	24.56
44.	Bindu sagar lake, Bhubaneshwar	Orissa	2005-06	3.50
45.	Rani talab, Rewa	Madhya Pradesh	2006-07	3.31
46.	Sagar lake, Sagar	-do-	2006-07	21.33
47.	Mansi Ganga lake, Govardhan, Mathura	Uttar Pradesh	2006-07	22.71
	<b>Total</b>			<b>565.35</b>

- (i) Total No. of lakes covered under NLCP so far - 46  
(i) No. of lakes for which financial assistance provided under NLCP during 2006-07 - 15  
(iii) No. of new lakes covered during the year 2006-07 – 9

**Source:**

- i. Identifications of lakes for conservation and distribution, restoration, National Institute of Ecology, New Delhi, Nov. 2003

**Table 5.2: Lakes Prioritization Status (conveyed by the States/UTs)**

S. No.	State	Lake, common in both the lists (identified by NIE and prioritized by the state)			Remaining lake out of the identified ones by NIE			Lakes prioritized by the State (other than the common one)
			Area (ha)	Depth (m)		Area (ha)	Depth (m)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	Chhattisgarh	Vivekananda (Burra talao)	34	-				Khamhardih, Raipur Telibandha pond, Raipur Maharajbandh pond, Raipur Tikarapara pond, Raipur
2.	Karnataka	Sharana Basaveshwara*	275	2.4	Kamakshipalya tank Madivala, Bangalore Yediur lake Manchanbelle reservoir	1.0 115 4.0 329	- - - 24.4	Chennapatna lake, Hassan* Akkamahadevi lake, Haveri* Kundawada lake, Davangere Tirupuranthakeshwar, Bidar Kote Tavarekere, Chickmagalur Bellakki tank, Shimoga Yelahanka Doddakere, Bangalore Doddanekundi, Bangalore
3.	Maharashtra	Rankala lake, Kolhapur	105	-	Shambu lake Kalamba tank, Kolhapur Mahalakshmi, Kolhapur	16.2 30 63	 1.5 10	Yeshwant lake, Nandurbar Varala Devi lake, Thane Sidheshwar lake, Solapur Venna lake, Mahabaleshwar, Satara

S. No.	State	Lake, common in both the lists (identified by NIE and prioritized by the state)			Remaining lake out of the identified ones by NIE			Lakes prioritized by the State (other than the common one)
			Area (ha)	Depth (m)		Area (ha)	Depth (m)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
								Lakes from Pen city (Motiram, Kasar, Kumhar & Kavanda) Hanuman lake, Katol, Nagpur
4.	Uttar Pradesh	Ramgarh lake, Gorakhpur	800	4	MacPherson lake, Allahabad Suraha tal, Ballia	120 3000	4.5 3.15	Mansi Ganga, Govardhan, Mathura  Laxmi Tal, Jhansi Madan Sagar Tal, Mahoba
5.	Tamilnadu	Pulicat lake	77700	6				Ooty, Uthagamandalam Kodaikanal, Dindigul Kolavoy lake, Kancheepuram Yercaud lake, Salem Velachery lake, Chennai Chitlapakkam lake, Kancheepuram Thiruneermalai lake, Kancheepuram Vandiyur kanmai lake, Madurai Coimbatore big tank, Coimbatore
6.	Orissa	Bindusagar lake	8.0	4				Bindusagar lake, Bhubaneshwar*
7.	Madhya Pradesh	Sagar lake	82.0	5.5	Chandapatta	-	-	Rani talab, Rewa Shivpuri lakes, Shivpuri Mahendra Sagar, Tikamgarh Parashuram talab, Narsinghgarh Narsinghgarh tal, Narsinghgarh Amritsagar, Ratlam

S. No.	State	Lake, common in both the lists (identified by NIE and prioritized by the state)			Remaining lake out of the identified ones by NIE			Lakes prioritized by the State (other than the common one)
			Area (ha)	Depth (m)		Area (ha)	Depth (m)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
								Purena talab, damoh Tighra reservoir, Gwalior
8.	Rajasthan	Annasagar, Ajmer Nakki, Mt. Abu Pushkar, Ajmer Fatehsagar lake Jaitsagar lake Pichola lake Swaroop sagar Jaisamund, Udaipur	40.0 4.0 2.0 400 19.5 696 25.2 7200	8 3-7 3-4 13.4 3 10.5 7 32				
9.	Andhra Pradesh	Mir Alam, Hyderabad	170	13.4	Osman sagar, Hyderabad	2200	32	Banjara lake*
10.	Himachal Pradesh	Khajjiar lake Renuka Sagar, Rewalsar lake	0.24 670 0.37	8.9 13 6				
11.	Bihar							Motijheel, Motihari Baraila chaur, Vaishali Manjheel, Muzaffarpur
12.	Delhi	Najafgarh jheel	300	4				Bhalsawa
13.	Andaman & Nicobar							Eight reservoirs

S. No.	State	Lake, common in both the lists (identified by NIE and prioritized by the state)			Remaining lake out of the identified ones by NIE			Lakes prioritized by the State (other than the common one)
			Area (ha)	Depth (m)		Area (ha)	Depth (m)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
14.	Manipur							Lamphelpat lake
15.	J & K				Sheshnag Surinsar, Patnitop, Mirgund lake, Srinagar Mansar lake, Jammu	51 20.4 300 329	13 22.7 0.5	
16.	Tripura				Jagannath lake, Udaipur Amarsagar, Udaipur Mahadev Dighi, Udaipur	15 20 8	>4 >4 >4	
17.	West Bengal				Bandardaha beel Kalyani lake, Nadia Subhash Sarovar, Kolkata Sanchal, Darjeeling	440 33.3 5.8 4	12.6 4 - -	
18.	Assam	Dhir beel, Dubri Saeswar beel, Dubri	685 1700	3.6 4	Bhoispuri, Dubri Dighali beel	24 250	3.55 4	Morikolang beel Maguri beel  Diplai beel Hakma beel Sivasagar Joy sagar

S. No.	State	Lake, common in both the lists (identified by NIE and prioritized by the state)			Remaining lake out of the identified ones by NIE			Lakes prioritized by the State (other than the common one)
			Area (ha)	Depth (m)		Area (ha)	Depth (m)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
19.	Goa				Mayem, Bicholim taluka Batim Carambolin, Near Konkan Railway Chimbel, Near Panjim Bondwal lake	6.5 - 30 5.6 29	3-7 - - - -	
20.	Gujarat				Nal sarovar Ajwa reservoir, Baroda Faizar reservoir	1840 0 300 410	- - 3 6	
21.	Haryana				Brahma Sarovar	45	4-5	
22.	Jharkhand				Ranchi lake	100	10	
23.	Kerala				Veli lake Vellyani lake	54.6 278	- 3	
24.	Nagaland				Kyrdemkulai reservoir	80	-	
25.	Meghalaya				Umiam (Barapani), Shillong Ward lake	400 2.4	- -	
26.	Sikkim				Chhangu	50	-	

**Table 5.3: List of Wetlands Identified Under National Wetland Conservation Programme**

<b>S.No.</b>	<b>Name of Wetlands</b>	<b>State/UT</b>
1.	Wullar	J&K
2.	Tso Morari	J&K
3.	Tisgul Tso	J&K
4.	Renuka	Himachal Pradesh
5.	Pong Dam	Himachal Pradesh
6.	Chandratal	Himachal Pradesh
7.	Harike	Punjab
8.	Ropar	Punjab
9.	Kanjli	Punjab
10.	Chilka	Orissa
11.	Kabar	Bihar
12.	Sambhar	Rajasthan
13.	Kolleru	Andhra Pradesh
14.	Loktak	Manipur
15.	Ashtamudi	Kerala
16.	Sasthamkotta	Kerala
17.	Ujni	Maharashtra
18.	Nalsarovar	Gujarat
19.	Deepar Beel	Assam
20.	Rudrasagar	Tripura
21.	Hokersar	J&K
22.	Mansar-Surinsar	J&K
23.	Pangong Tsar	J&K (Ladakh)
24.	East Calcutta	West Bengal
25.	Sunderbans	West Bengal
26.	Point Calimer	Tamil Nadu
27.	Kottuli	Kerala
28.	Palak	Mizoram
29.	Tamdil	Mizoram
30.	Barilla	Bihar
31.	Kusheshwar Asthan	Bihar
32.	Ban Ganga Jhilmil Tal	Uttaranchal
33.	Rewalsar	H.P.
34.	Ahiron Beel	W. Bengal
35.	Rasik Beel	W. Bengal
36.	Nawabganj	U.P.
37.	Sandi	U.P.
38.	Lakh Bahoshi	U.P.
39.	Samaspur	U.P.
40.	Sultanpur	Haryana
41.	Bhindawas	Haryana

42.	Magadhi	Karnataka
43.	Gudavi Bird Sanctuary	Karnataka
44.	Bonal	Karnataka
45.	Hidkal & Ghataprabha	Karnataka
46.	Kaliveli	T.N.
47.	Pallaikarni	T.N.
48.	Great Rann of Kachh	Gujarat
49.	Thol Bird Sanctuary	Gujarat
50.	Khijadiya Bird Sanctuary	Gujarat
51.	Little Rann of Kachh	Gujarat
52.	Pariej	Gujarat
53.	Wadhvana	Gujarat
54.	Nanikakrad	Gujarat
55.	Barna	M.P.
56.	Yashwant Sagar	M.P.
57.	Wetland of Ken River	M.P.
58.	National Chambal Sanct.	M.P.
59.	Ghatigaon	M.P.
60.	Ratapani	M.P.
61.	Denwa Tawa wetland	M.P.
62.	Kanha Tiger Reserve	M.P.
63.	Pench Tiger Reserve	M.P.
64.	Sakhyasagar	M.P.
65.	Dihaila	M.P.
66.	Ranjitsagar	J&K
67.	Govindsagar	M.P.
68.	Udhwa	Jharkhand
69.	Santragachi	W. Bengal
70.	Kadulandi	Kerala
71.	Vemnad Kol	Kerala
72.	Sukhna	Chandigarh
73.	Alwara Wetland	U.P.
74.	Semarai Lake-Nagaria lake Complex	-do-
75.	Keetham Lake	-do-
76.	Shekha wetland	-do-
77.	Saman Bird Sanctuary & Sarsai Nawar Complex	-do-
78.	Kuanria wetland	Orissa
79.	Kanjia wetland	-do-
80.	Daha wetland	-do-
81.	Khajjiar Lake	H.P.
82.	Khechuperi Holy Lake	Sikkim
83.	Tamze Wetland	-do-

84.	Tembao Wetland Complex	-do-
85.	Phendang Wetland Complex	-do-
86.	Gurudokmar Wetland	-do-
87.	Tsongo wetland	-do-
88.	Jayakawadi	Maharashtra
89.	Nalganga wetland	-do-
90.	Tilaiya Dam	Jharkhand
91.	Heggeri	Karnataka
92.	Ranganthittu	-do-
93.	K.G. Koppa wetland	-do-
94.	Urpada Beel	Assam

**Table 5.4: List of Wetlands of International Importance under Ramsar Convention**

S. No.	Name of Wetland	Date of declaration	State	area
1	Ashtamudi Wetland	19/08/02	Kerala	61,400 ha
2	Bhitarkanika Mangroves	19/08/02	Orissa	65,000 ha
3	Bhoj Wetland	19/08/02	Madhya Pradesh	3,201 ha
4	Chilika Lake	01/10/81	Orissa	116,500 ha
5	Deepor Beel	19/08/02	Assam	4,000 ha
6	East Calcutta Wetlands	19/08/02	West Bengal	12,500 ha
7	Hariker Lake	23/03/90	Punjab	4,100 ha
8	Kanjli	22/01/02	Punjab	183 ha
9	Keoladeo National Park <i>MR</i>	01/10/81	Rajasthan	2,873 ha
10	Kolleru Lake	19/08/02	Andhra Pradesh	90,100 ha
11	Loktak Lake <i>MR</i>	23/03/90	Manipur	26,600 ha
12	Point Calimere Wildlife and Bird Sanctuary	19/08/02	Tamil Nadu	38,500 ha
13	Pong Dam Lake	19/08/02	Himachal Pradesh	15,662 ha
14	Ropar	22/01/02	Punjab	1,365 ha
15	Sambhar Lake	23/03/90	Rajasthan	24,000 ha
16	Sasthamkotta Lake	19/08/02	Kerala	373 ha
17	Tsomoriri	19/08/02	Jammu & Kashmir	12,000 ha
18	Vembanad-Kol Wetland	19/08/02	Kerala	151,250 ha

19	Wular Lake	23/03/90	Jammu & Kashmir	18,900 ha
20	Chandratal	8/11/05	H.P	49 ha
21	Renuka	8/11/05	Do	20 ha
22	Rudrasagar	8/11/05	Tripura	240ha
23	Uppar Ganga	8/11/06	U.P.	26590ha
24	Hokarsar (Hokera)	8/11/05	J&K	1375ha
25	Surinsar & Mansar (Complex)	8/11/05	-do-	350ha
<b>Total Area = 677131 ha</b>				

**EXTRACTS OF THE MINUTES OF THE 3<sup>RD</sup> MEETING TO  
REVIEW NRCD TAKEN BY SECRETARY E&F**

**Systemic Problem**

**(1) Operation & Maintenance of assets**

The assets being created under NRCP and NLCP are not being operated and maintained by the State Governments/IAs due to lack of capacity/shortage of resources. The issue of generating resources was discussed as under:-

- On the issue of levying of user charges, it was felt that some flexibility shall have to be given to the State Governments because different States have different legislations. As per the 73<sup>rd</sup> Constitutional Amendment Act, linkages between State Govt. & Local Body (LB) regarding delegation of financial and administrative powers are defined, Secretary (E&F) suggested that State Governments should delegate the necessary powers to the LBs so that levy of user charges can be passed through resolution and collected effectively.
- For operation & maintenance of assets, responsibility rests with the local body. It was decided that Models can be developed to be put in place for proper O&M by States. Whichever instrument the LB proposes to employ, whether through property tax, user charges etc., it must be demonstrated in the proposal to the Ministry at the time of submission of project, so that the capacity of LB/Implementing Agencies as to how they will operate the assets after the completion of works can be assessed.
- Secretary(E&F) stressed for strengthening the institutional capacity of LBs for having adequate arrangements for O&M. It was stated that financing requirements must be matched with time and scale to outflows.

AS&PD mentioned that State Governments/LBs need to develop the possible instruments for collection of the user charges. The following instruments were proposed and discussed for generating resources.

- Possible instruments available at LB level to generate resources
  - (i) User charges (service charge)
    - Based on volume of water used
    - Based on volume of sewage generated (Domestic wastewater disposal surcharge)
    - Based on normative value of sewage generated (as a surcharge on property tax)
    - Based on revenue from sale of sludge/ power/gas

The tax also will have equity considerations. This user charge recovery can be entrusted to resident welfare associations (RWAs) also.

- (ii) Taxes
  - Flat rate surcharge on property tax
  - Stamp duty surcharge (Buoyant but unpredictable & one time)
  - Connection charges

These instruments are the augmentation of resources and not the only source for resources. This aspect should be looked into at the time of approval of project by NRCD.

Secretary(E&F) mentioned that Central Government, State Government and Local Bodies should enter into MoU before sanction of DPR in order to check the capacity of the local body as well as other aspects of the project. The following points on MoU were discussed:-

- **Signing of MOU with States**

- i) MOU should be tripartite (rather than bilateral) between Centre, State & LB. Decision on employing any implementing agency (IA) for executing the works will be the internal arrangement of the State Govt.

- ii) Pre-requisites for signing of MoUs

The following milestones are considered pre-requisites for signing MoUs:

- a. State's share of capital cost and O&M cost to be deposited (physically) in the project account
- or
- States to negotiate bridge financing with the Financial Institutions.
- b. Delegation of financial & administrative powers to the LB concerned w.r.t. its responsibilities in respect of a project.
- c. Identification of the IA, evaluation of its capacity and MoU with proper legal entity.

All the above mentioned three items from (a) to (c) relate to the pre-requisites for State Government. The following items from (d) to (f) relate to the pre-requisites for the LB:-

- d. Comprehensive project plan to be submitted by LB through State Govt.
- e. Appropriate resolutions for raising the resources w.r.t. all its financial responsibilities regarding project.
- f. Commitment to take over the assets of the project on certification of project completion by NRCD (on recommendation of consultant).
- iii) Evaluation by NRCD (through Consultant) of capacity building needs of LB.
- iv) Signing of trilateral MoUs.

- v) Submission of DPR by LB through State Government (LB is the project proponent).
- vi) Appraisal of DPRs by NRCD through consultants.
- vii) Necessary capacity building activity of LB.
- viii) Project approval

(End of pre-construction activities)

MoU to be signed should contain the following components:

**1) Responsibilities of NRCD.**

Appraisal of DPRs and sanction of NRCD funding.

- a) Funding responsibilities pertaining to specified components with timeframe.
- b) Setting up a mechanism for concurrent evaluation & monitoring of the project.
- c) Release of NRCD funding in a timeframe to be specified in MoU.
- d) Certification of project completion of the works.
- e) Capacity building of LB to be specified in the MoU.

**2) Responsibilities of State Government**

- a) Special assistance & facilitation to IA
- b) Special assistance & facilitation to NRCD consultants.

**3) Responsibilities of LB.**

The discussion could not get completed when a suggestion was made as to when the tedious process of acquiring of land for the project should be taken up, i.e. beforehand, being a pre-requisite or before undertaking the above mentioned activities or after the sanction of DPR by the NRCD.

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## CHAPTER-6

### SEWAGE TREATMENT TECHNOLOGY ISSUES

#### 6.1 TREATMENT TECHNOLOGY

Wastewater treatment is aimed at transforming dissolved and particulate biodegradable constituents into acceptable end products, capturing and incorporating suspended and non-settle able colloidal solids into a biological floc or biofilm, removing nutrients, such as nitrogen and phosphorus and specific trace organic constituents and compounds.

This can be achieved by the use of various processes incorporated in various waste treatment technologies.

The conventional technologies developed and used recently are listed in Table 6.1.

**Table 6.1: The available technology options for wastewater treatment**

**(A) Technologies in use presently.**

Technology Type	Common Name	Advantages/disadvantages
<b>Aerobic process:</b> Suspended growth	Activated Sludge process  Complete Mix Sequencing Batch Reactor Contact Stabilization Extended Aeration Suspended growth Nitrification Aerated lagoon Aerobic Digestion	The technologies are in use since a long time. Requires energy for aeration Sludge produced needs to be treated. Sensitive to shock loading.
Attached Growth:	Trickling filters Low Rate High Rate Roughing Filters	Trickling filters are in use since a long time. If maintenance is not proper many troubles like odour, flies etc. are observed.
Combined suspended and attached growth	Rotating Biological Contactors	RBC have been tried for small treatment facilities.

Technology Type	Common Name	Advantages/disadvantages
process	Packed Bed Reactor Activated biofilter process, trickling filter solids contact process, biofilter activated sludge process, series trickling filter activated sludge process  FBR	Systems in series have been tried.  Are in use in few cities like Delhi and Lucknow. Require less space than ASP, more stable and less quantity of sludge is produced .
<b>Anoxic process:</b> Suspended growth	Suspended growth denitrification	Used for polishing of secondary effluent
Attached growth	Fixed film denitrification	
<b>Anaerobic process:</b> Suspended growth	Anaerobic digestion Standard rate, single stage high rate, single stage, two stage Anaerobic contact process Up flow anaerobic sludge blanket (UASB)	. Are in use for high BOD wastes.  Have been tried and established under Ganga/ Yamuna/NRCP But suffer from improper working of succeeding Aerobic system. Not in use in India
Attached growth	Anaerobic filter process	
Combined suspended & attached growth	Single or multi stage processes, various proprietary processes  Single or multi stage process	
Pond processes:	Aerobic ponds Maturation ponds Facultative ponds Anaerobic ponds	Efficient in treatment, Maintenance free. But require more land

**(B) New developments:**

Technology & Description	Application	Advantage/ Disadvantage
<b>Aerobic systems</b> Oxidation Ditch Mechanical surface aerators are used which keep the	Can be applied for small community Good to remove BOD and	Requires less space as compared to oxidation ponds and lagoon.

<b>Technology &amp; Description</b>	<b>Application</b>	<b>Advantage/ Disadvantage</b>
solids in suspension and well aerated.	Nutrients.	
<p><b>ASP Biofilm</b> System incorporates the use of suspended as well as attached growth system and can be used as a complete system</p> <p>Some of the commercially applied names are: Bio-2 sludge process Linpor ® process Floating biological bed, Floating biofilm carrier Hybrid biological reactor FBR</p> <p>Powdered activated carbon-ASP Commercially also known as PACT® Powdered activated carbon is continuously added to the aeration tank.</p>	<p>Can be used for all type of population and high or low BOD waste. Augmentation of the existing ASPs</p> <p>It is good for removal of volatile solids and high flows.</p>	<p>It has good resistance to hydraulic shock wave and BOD loading. The quantity of sludge produced is less than ASP</p> <p>Very stable to toxic organics and high BOD shocks. It removes oil, greases. Better sludge is produced.</p>
<p><b>Membrane processes</b></p> <p>Membrane creates a selective barrier for passage of certain constituents</p> <p>Reverse osmosis:</p> <p>Microfiltration and Ultrafiltration:</p>	<p>Used for disinfection of the waste, can remove dissolved constituents, suited for pretreated waste water effluent.</p> <p>Can be applied where reuse of water is aimed at.</p>	<p>Can also remove natural organic and inorganic matter. Remote bacterial.</p> <p>Can remove protozoan cyst and helminthes ova and other organic solids. Less space and low labour requirement. Uses more electricity and need pretreatment, membrane replacement cost is high.</p>

<b>Technology &amp; Description</b>	<b>Application</b>	<b>Advantage/ Disadvantage</b>
<b>Ozone treatment</b>	Effective disinfectant for reuse of water	Generation possible at site only. But It is energy intensive, corrosive and toxic. O & M sensitive.
<b>UV treatment</b>	Disinfection of waste for reuse of water	Improved safety compared to chemical disinfectant, requires less space. But energy intensive, hydraulic design is difficult.

These systems are end of pipe line treatment systems, requiring collection of sewage and transportation for long distances. They are energy intensive, do not conserve nutrients and interact with ground water (infiltrating and exfiltrating). The effluent also require disposal on land or water. The individuals have no concern about conserving water. Hence to conserve the water and the pollution of river the need of today is to develop and use Decentralised/ Small treatment systems/ on site treatment systems.

## **6.2 DECENTRALIZED WASTE WATER SYSTEM**

The systems involve the collection, treatment, disposal, and/or reuse of wastewater from individual homes, clusters of home, isolated community and commercial facilities at or near the point of generation.

The significant change that has occurred in the past 15 years in the implementation of the decentralized waste water system is the development of the new technology and reapplication of old technology.

**Application:** This system is useful where:

- Improvement of existing onsite system is required
- Onsite system are not working and conventional waste water systems are unaffordable
- The water can be reused in the locality.
- The community to be served is remote with respect to existing municipal sewers.
- Insufficient fresh water supply.
- The expansion of existing waste water collection and treatment facilities will unnecessarily disrupts the community.



**MPS AT 25.0 MLD STP AT YAMUNA NAGAR**



**25.0 MLD UASB PLANT AT YAMUNA NAGAR**



**MPS 8.0 MLD KARNAL**



**MPS 40.0 MLD KARNAL**



**IPS POINT SAHARANPUR**



**PRELIMINARY TREATMENT AT STP, SAHARANPUR**



**WASTE STABILIZATION POND, MUZAFFARNAGAR**



**WASTE STABILISATION POND, MUZAFARNAGAR**



**STP AT KOLKATA**



**DIVERSION FOR SEWAGE**



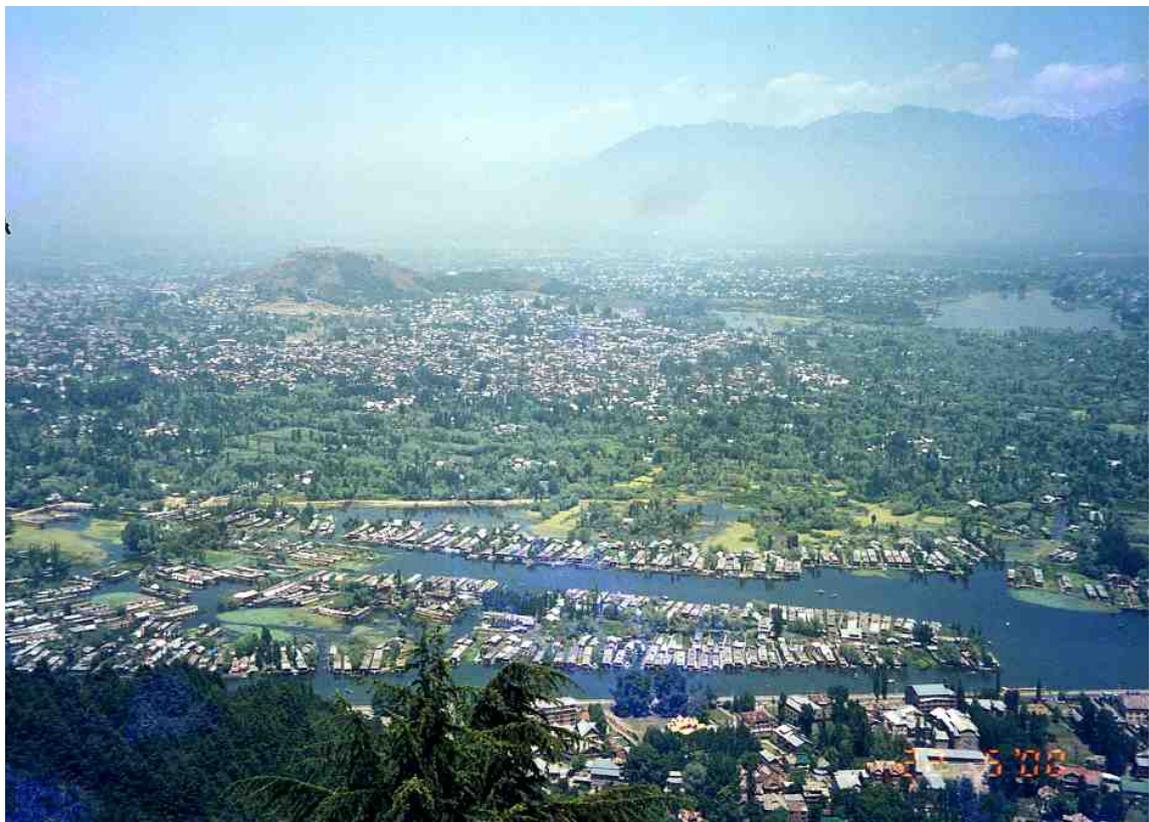
**FAB AT PUNE**



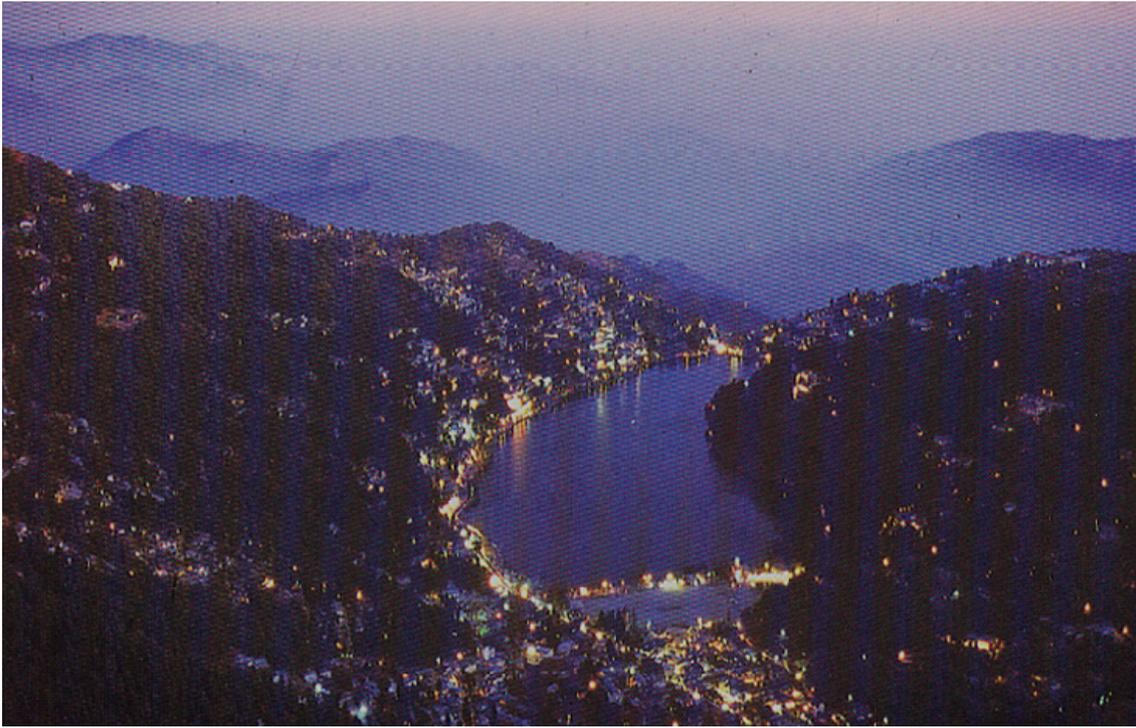
**POWAI LAKE**



**WSP AT UJJAIN**



**DAL LAKE**



**NAINITAL LAKE**

The decentralized system can be individual or community based systems as detailed out in Table 6.2:

**Table 6.2: Decentralised Waste Treatment Technology for Various Locations**

<b>Source of wastewater</b>	<b>Waste water treatment</b>	<b>Wastewater disposal</b>
Individual residences, Cluster of homes Public facilities	<b>Primary treatment</b> <ul style="list-style-type: none"> <li>· Combined wastewater Septic tank</li> <li>· Imhoff tank</li> </ul>	Subsurface soil disposal Leach fields Conventional soakage pits Shallow trench Shallow sand-filled
Commercial Establishments	<b>Advanced primary treatment</b> <ul style="list-style-type: none"> <li>· Septic tank with attached growth reactor elements</li> </ul>	Seepage beds Drip application Mound systems
Small communities	<b>Secondary/tertiary treatment</b> <ul style="list-style-type: none"> <li>· Aerobic units</li> <li>· Aerobic/anaerobic units</li> <li>· Absorbent biofilter</li> <li>· Intermittent sand filter</li> <li>· Recirculating granular medium filter (sand, crushed glass)</li> </ul>	Evapotranspiration/percolation beds Evaporation systems Evapotranspiration bed Evaporation pond Constructed wetlands (marsh) Land disposal: Surface application Drip application
	<b>Recycle treatment systems</b> <ul style="list-style-type: none"> <li>· Toilet and urinal flushing</li> <li>· Landscape watering and toilet and urinal flushing</li> </ul>	Discharge to water bodies

Source of wastewater	Waste water treatment	Wastewater disposal
	<b>Onsite containment</b> <ul style="list-style-type: none"> <li>· Holding tank</li> <li>· Privy</li> </ul>	Combinations of the above
	<b>Natural Treatment systems:</b> These systems work on nature's principle hence eco friendly. The details are given in para 6.2.1.  <b>Land Treatment Systems</b> <ul style="list-style-type: none"> <li>· Slow rate</li> <li>· Rapid Infiltration</li> <li>· Overflow</li> </ul> <b>Aquatic system</b> <ul style="list-style-type: none"> <li>· Natural Wetlands</li> <li>· Constructed wetlands</li> <li>· FAP systems</li> </ul> Lagoons-Ponds	

Where the community system is used, the wastewater is to be collected from the residences. This may be done by the use of small diameter variable slope sewer or vacuum sewers are provided.

The Table 6.3 gives description of the technology options based on combination of the old and new technology for the decentralized wastewater treatment

**Table 6.3: Recent technologies for decentralized waste water treatment.**

Technology	Application	Advantage / Disadvantage
<b>Intermittent sand filter:</b> The treated water is collected through under drainage system for disposal or reuse.  <b>Recirculating granular medium filter:</b> here filtered sewage is pumped 2-3 times per hour.	Where soil cover is shallow, percolation rate is not suitable for septic tank, high ground water table (GWT) and other conditions unsuitable for septic tank.	Water can be reused or recycled  Water can be reused due to higher BOD, bacteria and ammonia removal. But is costlier than the previous system.
<b>Complete recycle treatment systems:</b> it involves solids in the waste water to be treated	When water is to be reused in non potable uses	The water is reused for non potable uses but the cost is very high hence can be used

Technology	Application	Advantage / Disadvantage
anaerobically. The effluent from the biological treatment unit is passed through ultra filtration step and this effluent is then passed through activated carbon column.		by the private colonizer.
<b>Continuous flow suspended growth aerobic systems (CFSGAS):</b> This is activated sludge process introduced between septic tank and subsurface waste water infiltration system. This system consists of an aeration tank, an oxygen source, aeration equipment and a clarifier.	It can be applied where onsite system can be managed. For surface water discharge, disinfection of the effluent may be carried out.	They have greater stability in handling highly variable loadings. But it is to be designed carefully to protect ground water.

Based on the experience and the general economic situation, it can be concluded that it will not be possible to provide conventional sewerage facilities for a large part of population in the foreseeable future hence the individual or community level decentralized systems are required to be provided.

### 6.2.1 Natural wastewater treatment systems per se include the following

- a. Land treatment systems
  - i. Slow rate systems
  - ii. Rapid infiltration systems
  - iii. Overland flow systems
- b. Aquatic treatment systems
  - i. Wetlands (Natural and constructed)
  - ii. Floating aquatic plant system

The systems are capable of removing all major and minor constituents as listed below:

Suspended Solids	:	Sedimentation enhanced by low velocities and shallow depth filtration through soil, living vegetation.
Organic matter	:	Microbial degradation (both soluble and particulate) Aerobic/ anaerobic/ facultative associated with soil, vegetation and litter as slimes
Nitrogen	:	Nitrogen Cycle, Nitrification, denitrification, Nitrogen fixation

Phosphorus	:	Chemical precipitation (with Ca in soil) adsorption (capacity of soil is infinite).
Trace elements	:	Through sorption, plant uptake (e.g. Eichornia), Capacity of soil is immense.
Microbes	:	Die off, straining, sedimentation, entrapment, predation, desiccation and adsorption. Virus-adsorption followed by die off.
Trace organics	:	Volatilisation and adsorption, followed by biological/photochemical breakdown > 99.9%

The characteristics, objective/s, design features and expected effluent characteristics are presented in table 6.4 & 6.5.

**Table 6.4: Objective of various natural systems of waste treatment**

Sl. No.	Type	Objective
1.	Slow Rate Systems a. Type I  b. Type II	Waste Water Treatment hence limiting design parameter is soil permeability Water reuse through crop production or landscape irrigation also known as waste water irrigation or crop irrigation or crop irrigation system.
2.	Rapid Infiltration system	1. Treatment followed by GW recharge to augment water supply or to prevent salt-water intrusion. 2. Treatment followed by recovery using under drains or pumped withdrawals 3. Treatment followed by GW flow and recharge.
3.	Overland Flow system	Pretreated wastewater is allowed to flow on graded vegetated slopes and runoff is collected at the bottom of slopes
4.	Wetlands For waste treatment	Natural wetlands – for polishing of secondary effluent Constructed wetlands – For waste water treatment
5.	FAP	To treat Waste Stabilization Pond effluent

**Table 6.5: Comparison of Various Natural Systems, Requirements**

<b>(A) Comparison of site characteristics</b>						
Characteristics	<b>Slow –rate</b>		<b>Rapid infiltration</b>	<b>Overland-flow</b>	<b>Wetland application</b>	<b>Floating aquatic plants</b>
Climatic conditions	Storage often needed for cold weather and during precipitation		None (Possibly modify operation in cold weather)	Storage often needed for cold weather and during precipitation	Storage may be needed for cold weather	Storage may be needed for cold weather
Depth of groundwater	0.6 to 0.9 m		3 m, lesser depths are acceptable where under drainage is provided	Not critical	Not critical	Not critical
Slope	Less than 15% on cultivated land; less than 40% on forested land		Not critical; excessive slopes require much earthwork	Finish slopes 1-8%	Usually less than 5%	Usually less than 5%
Soil permeability	Moderately slow to moderately rapid (5-50 mm/hr)		Rapid (sands, loamy sands)	Slow (clays, silts and soils with impermeable barriers)	Slow to moderate	Slow to moderate
<b>(B) Comparison of design features</b>						
Feature	<b>Slow rate</b> (type 1)                      (type 2)		<b>Rapid infiltration</b>	<b>Overland flow</b>	<b>Wetland application</b>	<b>Floating aquatic plant</b>
Application techniques	Sprinkler or surface (furrow and graded boulder)	Sprinkler or surface	Usually surface	Sprinkler, spray & surface spread	Sprinkler or surface	Surface
Annual hydraulic-loading rate, m/year	1.8-6.0	0.6-4.2	6-90	7.0-56	5.520	5.5-20
Area required, ha/10 <sup>3</sup> m <sup>3</sup> /day	6-20	17-60	0.4-5.6	0.6-5	2-6.6	2-6.6
Minimum preapplication treatment provided	Primary sedimentation	Primary sedimentation	Primary sedimentation	Screening	Primary sedimentation	Primary sedimentation
Disposition of applied waste water	Evapo-transpiration and percolation	Evapo-transpiration and percolation	Mainly percolation	Surface runoff and evaporation with some percolation	Evapo-transpiration, percolation, and runoff	Some evapo-transpiration
Need for vegetation	Required	Required	Optional	Required	Required	Required (Floating vegetation)
<b>(C) Expected effluent quality of treated water</b>						
	<b>Slow-rate</b> Assuming Percolation through 1.5 m soil		<b>Rapid Infiltration</b> Assuming Percolation through 4.5 m		<b>Overland-flow</b> Assuming Over approximately 45 m of slope	

Constituent (mg/l)					length	
	Average	Maximum	Average	Maximum	Average	Maximum
BOD	<2	<5	2	<5	10	<15
Suspended solids	<1	<5	2	<5	15	<25
Ammonia nitrogen as N	<0.5	<2	0.5	<2	1	<3
Total nitrogen as N	3	<8	10	<20	5	<8
Total phosphorus as P	<0.1	<0.3	1	<5	4	<6

### 6.3 SUCCESS AND FAILURES OF THE SYSTEMS PROVIDED UNDER VARIOUS PLANS

The technologies used under GAP/YAP/NRAP have been

- i. Activated Sludge Process
- ii. Waste Stabilisation ponds.
- iii. Oxidation ponds
- iv. Up-flow Anaerobic Sludge Blanket with polishing ponds one stage/ two stage.
- v. Degremont technology
- vi. Karnal technology (Root zone treatment).

The schemes have suffered mainly at the front of operation and maintenance due to:

- (a) Paucity of funds
- (b) Untrained/ lack of manpower.
- (c) Very large capacity plants are unmanageable
- (d) Frequent power failures coupled with low priority given to power supply to sewage treatment
- (e) Lack of awareness on the part of target group
- (f) Low priority given to waste management systems in civic amenities & budgetary provisions
- (g) No public involvement during conception, formulation and implementation stage.
- (h) The STPs are not working under optimal conditions. Most of the units are under loaded (both in terms of hydraulic as well as organic loading) and some are over loaded.
- (i) Due to reasons listed above the waste is often let off in the river untreated (bypassed).

### 6.4 TECHNOLOGY SELECTION

The success of the treatment depends on the selection of the method of the treatment to a great extent. The choice should be made considering the following aspects:

- (1) The scale of the treatment.
- (2) The operation and maintenance requirement.
- (3) The financial, technical knowledge, land and the other resource requirement and availability.
- (4) The time span for implementation and the evaluation.
- (5) The need of the target group.
- (6) The end use of the product of the waste treatment (Effluent, sludge etc.)
- (7) Need of public participation to maintain the facility
- (8) Revenue generation
- (9) Management requirements of the facility.

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## CHAPTER-7

### RESEARCH AND DEVELOPMENT

#### 7.1 RESEARCH AREAS

Research constitutes an integral component of any Development Project. This was also defined in the objectives of Ganga Action Plan and later in National River Conservation Programmes. Unfortunately R&D was not given legitimate emphasis in projects and schemes during on going plans, though monitoring of rivers and lakes to evaluate the impact of conservation, schemes was continued.

Besides water Pollution prevention and control programmes of rivers and lakes, the National Environment policy 2006 laid emphasis of some aspects as given below:

- a. Promote research in glaciology to evaluate the impacts of climate change on glaciers and river flows.
- b. Promote integrated approaches to management of river basins by the concerned river authorities, considering upstream and downstream inflows and withdrawals by season, interface between land and water, pollution loads and natural regeneration capacities, to ensure maintenance of adequate flows, in particular for maintenance of in-stream ecological values, and adherence to water quality standards throughout their course in all seasons.
- c. Consider and mitigate the impacts on river and estuarine flora and fauna, and the resulting change in the resource base for livelihoods, of multipurpose river valley projects, power plants, and industries.
- d. Consider mandating the installation of water saving closets and taps in the building bye-laws of urban centers, and other available regulatory mechanisms.
- e. Integrate conservation and wise use of wetlands into river basin management involving all relevant stakeholders, in particular local communities, to ensure maintenance of hydrological regimes and conservation of biodiversity.
- f. Incorporate a special component in afforestation programmes for afforestation on the banks and catchments of rivers and reservoirs to prevent soil erosion and improve green cover.

Most of these areas have been included in the conservation programmes and the research being addressed to in 11<sup>th</sup> plan proposals.

The Research in glaciology will, however, need extra efforts by institutes which are specially equipped to undertake the work. SASE, ISRO, IMD, DST are such agencies which are already doing pioneering work in the area and can be asked to widen the scope to evaluate the impacts of Climate Change (Global Warming) and river flows.

The scope of water conservation till now was restricted to interception of waste water collection, transport and treatment of domestic sewage along with non core schemes of low

cost sanitation, improvement in crematoria, river front development and dhobi ghats etc. These schemes require land for collection and pumping stations and terminal treatment units. Such lands are normally not available in the urban metropolitan towns thereby trunk sewers of many kilometers are laid to peripheral lands at high costs and disruption of civic amenities (though temporarily).

The choice of suitable technology for the treatment was also limited. Aerobic systems (ASP, Oxidation ditch, aerobic lagoons) which are power intensive were abandoned and the choice of upflow Anaerobic sludge Blanket (UASB) process was made. The effluent from these units is anaerobic and require aeration through single or double stage polishing ponds. The technology also is deficient in coliform removal but is positive in producing methane a fuel resource. In situations where land was available waste stabilization ponds of various combinations were tried (Anaerobic + facultative + aerobic). Experience has shown that these ponds produced effluents of acceptable standards.

The scope of water conservation schemes is being widened to include wetlands and ground water also. Conservation schemes will now include

#### Core schemes

- Interception and Diversion
- Sewage Treatment
- Monitoring of the System, upstream and down stream including biomonitoring (establishing biodiversity of the region)
- Management of catchment and flood plains

#### Non core schemes

- Low cost sanitation, mandating the installation of water saving closets.
- River Front Development including aesthetics of the stretch of the river/ lake/ wetland in towns and vicinity
- Preservation riparian vegetation and afforestation on banks/ catchment and around installations.
- Public participation and social awareness Electric and improved wood based crematoria.

The R&D is being proposed in the following domains (A-E)

### **A. 1. Monitoring of Water Resources**

- (i) Monitoring of Rivers
  - a. To evaluate the impact of continuing schemes
  - b. To evaluate the quality as per Designated Best uses (DBU)
  - c. To establish nutrient budget and cycling of nutrients
  - d. To evaluate the impact of activities of catchment/ flood plains on the quality
  - e. To evaluate the changes in flora and fauna (defining biodiversity)

- (ii) Monitoring of Lakes and wetlands
  - a. To establish the quality and improvements following conservation measures
  - b. To evaluate the biodiversity
  - c. To evaluate the impact of catchment activities on the life cycle.

(iii) Monitoring of Ground Water

Ground water Board and Control Pollution Control Board and State Boards and Monitoring quality of ground water at many places. Their facilities need to be strengthened to include morfe sites near urban area/s industrial areas. The monitoring programme should add parameters toevaluate geogenic/ anthropogenic parameters. Special attention is required to determine recalcitrant compounds (insecticides / pesticides/ heavy metals)

2.
  - a. Evaluate the capacity of STP vis-à-vis hydraulic and organic loading. Suggest methods of utilizing residual capacity.
  - b. Studies on process evaluation and performance of existing STPs.
  - c. Evaluation of new STP technologies through demonstration units.
3. Evaluate the impact of non point sources on the quality of receiving water.
4. Emphasis in containing coliform in effluents of STP. The continued increase of coliform in rivers and lakes due to point and non point sources needs comprehensive monitoring and research. The age old method of disinfection/ sterilization by chlorination should be looked into vis-à-vis the formation of organic halides and the threat of carcinogenic properties. Generation of O<sub>3</sub> etc. application deserves a second look after it has been shown that UV & infrared radiations have not shown positive results.
5. There is a belief that the carrying capacity of water in our rivers is getting reduced by the accumulation of sediment. Data generation of deposited sediment vis-vis scouring during floods need evaluation.
6. Biomonitoring of rivers/ lakes to reflect changes in flora/ fauna and the over all ecology of the system.

**B. Study of Sediments**

- (i) River sediment flux – monitoring and modeling
- (ii) Ganga River – a large sediment dispersal system

- C**
1. Development of small and compact units of waste treatment for small communities, medium communities and up coming colonies so that pollution load is not added to existing system. The treated waste could be recycled within the territory.
  2. Rain water harvesting and recycle of waste effluents.  
(A list of modern/ upcoming technology is provided in chapter – 6)
  3. Study of individual toilet system vis-à-vis conservation of water.

There is an urgent need to, select technology and construct Demonstration Units for public viewing and process evaluation.

**D. Development of land based systems**

1. Natural waste water systems including slow rate, rapid infiltration and land over flows.
2. Use of fallow/ user land for land treatment of waste waters.
3. Use of Natural and Constructed Wetlands for the growth of fiber and fodder.
4. Root zone treatment.
5. Sewage irrigation. Agriculture utilizes a very large quantity of water. The requirement of crops is low and most of applied effluent accumulate and gradually seeps leading to ground water pollution. Optimization of applied effluent vis-à-vis the crop need is required. Types of crops need to be evaluated.
6. Resource recovery also should form integral component of such system.

**E. Preparing a data base using Geographical Information System**

Preparing a database using Geographical Information System and integrating textual, quantitative and spatial data related to physical, financial, scientific and technical aspects of projects already implemented, under implementation or deserving of support under NRCP and NLCP. It will also include available data related to water bodies, which are threatened and need to be conserved. It will be useful to the MoEF and the NRCD at all levels, State Governments and its agencies, voluntary organisations, citizens, academic and R&D institutions. Such a database may also include parliamentary and legal proceedings on the subject. This database shall become a base and an important reference point for developing a dynamic Management Information system. Institutional mechanism to maintain, develop and enhance the facilities can be developed through:

- (i) Spatial Information of Features With in The Towns where River/Lake Conservation Works have been Carried Out.
  - a. Catchments of the river / lake at its downstream end.
  - b. Roads, Storm Water Drains, Sewers - Under Ground and Surface,
  - c. Water supply Facilities like Water supply source, Over head water tanks, Distribution lines laid, Offices of authorities responsible for supplying water, sewage disposal, solid waste management, sanitation, in short sectors where NRCD makes intervention for conserving water bodies.
  - d. Location of points from where samples are drawn for environmental monitoring particularly for assessing the environmental condition of water bodies.
  - e. Location of structures/features in which activities are carried out that cause degradation of water bodies such as - colonies, hotels, markets, agricultural market yards, slaughter houses, offices, pumping stations, industrial estates, hospitals and nursing homes that give rise to bio-medical waste.
  - f. Location of structures/features built to deal with polluting/degrading activities such as – sewers along with pumping stations, sewage treatment plants,

solid waste management systems including collecting bins, land fill sites, low-cost sanitation schemes including community toilets, crematoria, bathing ghats, and sources of non-point pollution.

- g. Locations of schemes supported by NRDC under the National River Conservation Plan (NRCP) and the National Lake Conservation Plan NLCP).

(ii) Non-spatial information

It would relate to relevant factual – qualitative and quantitative - details of river/lake, basin, towns and cities which influence ecological health of the water bodies, Information of parameters which indicate the ecological health status of the water bodies, the measures in use to protect them, any schemes supported by the NRDC for the conservation of the water bodies, any schemes planned for intimation, result of environmental data collected over the years. It may include the following categories:

- a. Environmental – Status of, water bodies and soil.
- b. The quantity and quality of waste viz., effluents, sewage and domestic wastewater, solid waste – industrial, bio-medical and domestic.
- c. Demographic details of the town ward-wise including houses, commercial –business-office complexes and such other details as are available from the municipal and other records.
- d. Meteorological data.
- e. Information of Socio-economic activities that cause degradation of water bodies.
- f. Water supplies
- g. Waste water generated and discharged: discharged through surface drains, discharged through sewers.
- h. Financial, physical and performance details of schemes / facilities created to protect the water bodies without NRCD assistance.
- i. Financial (Capital cost, O&M), physical, performance & management details of schemes for which the support of the NRCD has been obtained or is sought under the NRCP / NLCP. Planned and implemented or under implementation
- j. Organisational: Names of organisations and directory of key officials of the organisations associated with the various activities connected with the project.

## 7.2 ESTABLISHMENT OF CENTRE OF EXCELLENCE

In order to promote and conduct research, coordinate activities of different organizations, provide training to all levels of workers, it is proposed to set up a **center of excellence** in Aquatic Ecology. The justification of the same is as under.

In recent years studies on various aspects of aquatic ecology have assumed great importance because of rapidly diminishing freshwater resources. In India, pollution of aquatic ecosystems such as lakes, wetlands, ponds, streams, rivers etc., have reached alarming proportions and if immediate steps for their restoration are not taken we are bound to face acute water shortage in the coming days. Already conflicts have started between various states on the problem of sharing of fresh water resources.

Rapid growth of human population, increase in industrial activity and higher demands for water have put tremendous pressure on water bodies, most of which are now grossly polluted.

Water is a basic and essential component of life and therefore not only managing it wisely but also safeguarding aquatic resources from further abuse is absolutely essential for their sustainable use.

In our country there are numerous national level institutes and centres of excellence dealing with. Himalayan Ecology, Tropical Ecology, Environment Education, Forest Ecology, Fish Ecology, Grassland Ecology etc., but we don't have any institute or centre of excellence, which deals exclusively with the problems of aquatic ecosystems. It hardly needs to be emphasized that India is endowed with great array of aquatic habitats that include man-made reservoirs, natural lakes, wetlands, ponds, rivers, high altitude freshwater and saline lakes etc. The importance of establishing a national institute of ecology/centre of excellence in aquatic ecology. Thus it is strongly recommended that a Center of Excellence in Aquatic Ecology be established.

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## CHAPTER-8

### METHODOLOGY AND RECOMMENDED PROJECTS AND SCHEMES

#### 8.1 METHODOLOGY ADOPTED

A document was prepared by AHEC, IIT, Roorkee on behalf of NRCD under “Review Of Proposals For Inclusion in NRCD Conservation Plan (10<sup>th</sup> and 11<sup>th</sup> plan)”. The methodology adopted short listing of towns on the basis of CPCB document of polluted stretches situated in the basins of major rivers, situated on the banks of river/ tributary, water quality of receiving body exceeds BOD 3.0 mg/L. The short list was discussed with NRCD officials and State Govts Visits were also made to some state capitals. The proponents were asked to submit proposals as per format (Appendix-1).

The short listing was done on the basis of criteria defined and assumption made as below:

The following assumptions were made in working out the cost estimates:

- The population as reported in Census 2001 formed the basis.
- The sewer design would be for population projected 30 years later and the Sewage Treatment Plant for population projected 10 years later.
- Water supply for domestic consumption was taken as 180 lpcd for mega towns (exceeding 10.0 lacs population) and 135 lpcd for other towns. Some towns reported much higher supply; but in view of the general shortage of water, by the time of the design period the water supply norm is likely to achieve this level.
- The existing habitations of the towns have limited potential to absorb additional population which equals the gap between saturation level of population and the present population. New colonization will have to cater for additional growth. It is assumed that the potential of present habitations of the towns is to absorb additional population of only 50% of their 2001 population. Hence the design population is 1.5 times the 2001 population for the purpose of sewers and STPs.
- The arrangements to collect, convey, treat and discharge waste water of new colonies according to the standards laid down will be made by the colonizers for which the expenses required will be included in the development charges. No funds for these colonies need to be provided in the NRCP.
- Exceptions apart, the towns are either partially served by internal sewers or there are no internal sewers. The interception factor i.e., the ratio of water intercepted for treatment to the water supplied depends on the coverage of the town by internal sewers and the nature of soil, it is assumed that at the end of design period substantial proportions of the towns would have been covered by internal sewers. Hence Interception Factor of 0.7 has been assumed. Thus waste water to be managed (Conveyed in sewers and treated in the STPs) at the end of design period is assumed to be  $135 \times 0.7 = 94$  lpcd.
- On the basis of the projects approved so far, the maximum cost of Rs. 40 lac per mld of sewage is assumed for I&D works and the same maximum cost for STPs. The

maximum cost of non core scheme is assumed to be 25% of the aggregate cost of I&D and STP.

- Since the costs were on the basis of 2004, 15% inflation has been added for the 11<sup>th</sup> Plan. (Schemes including costs intimated by state Govt.).
- In order to determine the priority that should be assigned to a town included in the NRCP a ranking system has been developed. Marks are awarded to the towns on the basis of eight factors viz., population, location, water quality of the body receiving waste water, existing sewerage and sewage treatment, Funding in the past for such works, state of preparedness for undertaking such works i.e., preparation of PFR/DPR, collection of relevant data, effectiveness of controlling pollution by industrial effluent and finally whether resources for O&M are inbuilt in the cost estimates. The details are given in Annexure 3.
- While planning abatement of pollution of rivers from the waste waters of towns, an integrated approach needs to be adopted and the river treated as a single entity from its source to the outfall, and the conservation plan should address all the issues. This calls for a complementary effort from all agencies at the levels of the Central, State and Local Governments. However, it is not feasible for the NRCD to provide the funds for all measures single handed. Hence a view needs to be taken about the activities that will be funded by the NRCD. The approach adopted so far of funding the trunk sewers, STPs, and non-core schemes may be continued and the same has been incorporated.
- The lists of towns state wise with all details and Recommended Costs are given in Chapter 10. Summary Statement is presented here under para 8.2.

## **8.2 RECOMMENDATIONS**

Continuing schemes under NRCP have been included as the first item. Works for uncovered pollution and additional works on Ganga, Yamuna and Gomti, continuing and new works under national lake conservation programme, continuing and new works under national wetland programme, research and development including capacity building, education, training, strengthening of monitoring and institutional arrangements are also part of the plan proposals. Establishment of centre of excellence, and towns where works have not been completed or works could not be sanctioned in 10<sup>th</sup> plan also has been included.

103 new towns from 17 States and union territories were selected for inclusion in the 11<sup>th</sup> plan, on the basis of review done as mentioned above as per details in Chapter 10.

## 1. New Towns

Sl. No.	State	Town	Points Acquired	Costs Recommended Rs. in Crores
I.	Chhattisgarh P.3-7 (Vol-II)	Raipur●	64	50.922
		Bilaspur◆	52	28.704
		Durg●	52	23.897
			<b>Sub Total</b>	<b>103.523</b>
II.	Gujarat P. 8-15 (Vol-II)	Ahmedabad●	84	284.92
		Jamnagar◆	85	35.075
		Vadodara●	76	34.50
		Rajkot●	75	113.505
		Junagarh●	68	9.775
		Surat●	64	23.00
			<b>Sub Total</b>	<b>500.775</b>
III.	Haryana P. 16-20 (Vol-II)	Ambala◆	70	40.02
		Sirsa●	64	26.10
		Kaithal◆	52	19.09
			<b>Sub Total</b>	<b>85.21</b>
IV.	Himachal Pradesh P. 21-26 (Vol-II)	Paonta Shahib*	-	3.013
		Kulu*	-	5.12
		Mandi*	-	4.404
		Manali (left bank)	-	2.093
			<b>Sub Total</b>	<b>14.63</b>
V.	Karnataka P. 26-32 (Vol-II)	Hubli Dharwad●	71	128.110
		Gokak◆	62	10.649
		Gangavathi◆	60	15.2375
		Bagalkot◆	62	14.927
			<b>Sub Total</b>	<b>168.93</b>
VI.	Kerala P. 89 (Vol-II)	Small Towns		360.00
			<b>Sub Total</b>	<b>360.00</b>
VII.	Maharashtra P. 33-46 (Vol-II)	Kolhapur●	63	52.90
		Nagpur●	61	52.90
		Sholapur●	64	53.705
		Pune●	69	457.987
		Chandrapur●	54	13.69
		Ichalkaranje●	58	16.422
		Wardha*	56	5.232
		Pimpri◆	64	13.24
		Bhusawal	68	9.80
		Pandarpur*	<b>52</b>	17.342
			<b>Sub Total</b>	<b>693.216</b>
VIII.	Orissa	Puri*	No ranking	5.75
		Bhubaneswar●	79	107.18
		Cuttack●	77	49.22

Sl. No.	State	Town	Points Acquired	Costs Recommended Rs. in Crores
	P. 47-54 (Vol-II)	Rourkela●	64	32.545
		Greater ●Sambalpur	64	36.80
		Berhampur●	60	52.16
			<b>Sub Total</b>	<b>283.655</b>
IX.	Punjab P. 55-57 (Vol-II)	Patiala●	56	46.52
			<b>Sub Total</b>	<b>46.52</b>
X.	U.P.	Bareilly◆	74	114.08
		Moradabad◆	74	104.52
		Meerut◆	71	222.36
		Firozabad**	71	44.43
		Aligarh◆	71	108.80
		Sitapur◆	62	24.73
		Gorakhpur◆	58	101.78
		Lakheempur◆	58	19.75
		Pilibhit◆	58	20.25
		Gangaghat** Unnao	54	11.50
		Ayodhaya*	54	8.07
		Chitrakot*	54	7.95
	P. 58-75 (Vol-II)	Raibareilly●	50	26.55
			<b>Sub Total</b>	<b>814.77</b>
XI.	Jammu & Kashmir	Anantnag		24.166
		Baramulla		22.783
		Sopore		27.96
	P. 79-87 (Vol-II)	Srinagar		163.30
			<b>Sub Total</b>	<b>238.209</b>
XII.	Madhya Pradesh	Hosahangabad and other towns including Nepa nagar, Chitrakoot, Shabdol, Maheshwar, Sehore Parvati, Ganjbasoda, Rajgarh, Mandsaur		157.98
	P. 100 (Vol-II)			
			<b>Sub Total</b>	<b>157.98</b>
XIII.	Tamil Nadu P. 101 (Vol-II)	Vaniyambadi, Rameshwaram		50.00 17.00
			<b>Sub Total</b>	<b>67.00</b>
XIV.	North Eastern States			
	Sikkim	Gangtok		
	P. 102 (Vol-II)	Ranipoo		

Sl. No.	State	Town	Points Acquired	Costs Recommended Rs. in Crores
		Singtam		
		Melli		
		Norethan,		
		Namchi and		
		Rangpoo		
		Sub Total		17.25
	Tripura	Agartala		2.30
	Nagaland	Dimapur		28.75
			<b>Sub Total</b>	<b>48.30</b>
XV	Goa P. 88 (Vol-II)	Panajin City (Phase-II)		13.38
		Margaon City		24.67
			<b>Sub Total</b>	<b>38.05</b>
XVII.	Rajasthan P. 90 (Vol-II)	Kota		<b>69.00</b>
			<b>Sub Total</b>	<b>69.00</b>
XVI	Uttaranchal  P. 91-99 (Vol-II)	Gantotri		5.90
		Bhalwari		5.85
		Matli		2.60
		Dunda		5.05
		Chinali Saur		3.60
		Gaucher		10.00
		Srikot		6.50
		Uphalda		4.50
		Chauras		4.50
		Kirtinagar		4.50
		Ghat		5.00
		Dewal		3.50
		Tharali		6.50
		Kedarnath		6.50
		Gaurikund		6.50
		Guptakasi		4.50
		Ukhimath		5.50
		Vijaynagar		3.50
		Tilwara		4.50
			<b>Sub total</b>	<b>74.31</b>
			<b>Total</b>	<b>3764.078</b>
				<b>Say 3765.00 crores</b>

**2. List of Towns Included on the Recommendations of NRCD for uncovered pollution (page 103, Chapter 10)**

a.	Ganga and Gomti Towns		Amount Recommended
	Allahabad	:	Rs. 305.0 crores
	Varanasi	:	Rs. 230.0 crores
	Kanpur	:	Rs. 425.0 crores
	Saidpur	:	Rs. 5.75 crores

	Ghazipur	:	Rs. 17.50 crores
	Mughal Sarai	:	Rs. 2.30 crores
	Chunar	:	Rs. 3.45 crores
	Jaunpur	:	Rs. 19.55 crores
	Sultanpur	:	Rs. 9.20 crores
	Lucknow	:	Rs. 375.0 crores
	<b>Total</b>	<b>:</b>	<b>Rs. 1392.75 crores</b>
b.	Yamuna Action Plan towns		Amount Recommended
	Delhi (Chapter 10)	:	Rs. 707.25 crores
	Saharanpur	:	Rs. 36.80 crores
	Muzaffarnagar	:	Rs. 24.15 crores
	Ghaziabad	:	Rs. 69.00 crores
	Vrindavan	:	Rs. 31.05 crores
	Mathura	:	Rs. 149.50 crores
	Agra	:	Rs. 54.05 crores
	Etawah	:	Rs. 19.55 crores
	Noida	:	Rs. 23.00 crores
	<b>Total</b>	<b>:</b>	<b>Rs. 1113.35 crores</b>

### 8.3 OTHER ASSUMPTIONS

- If the estimated cost of the State Govt. is lower than computed by AHEC, the same has been excepted and included. Where the cost of State Govt. is higher than computed by AHEC, the recommendation of AHEC have been included.
- The arrangements to collect, convey, treat and discharge waste water of new colonies according to the standards laid down will be made by the colonizers for which the expenses required will be included in the development charges. No funds for these colonies have been provided in the plan.
- While sanctioning projects, commitment may be obtained form the state governments that these four items will be taken care of at their own expense.
  1. Internal sewers
  2. Branches and lateral sources
  3. Solid waste management.
  4. Non point sources of pollutions.
- The State Govt. have only indicated that the O&M costs will be borne by them. They have given no plan as to how the resources would be mobilised. Many schemes in the past have suffered because of a well spelled out O&M plan. The State Govt. must provide the plan to mobilise sufficient O&M costs.

### 8.4 SUMMARY OF FINANCIAL REQUIREMENT UNDER THE ELEVENTH PLAN

1.	Schemes under River Action Plan		
a.	Continuing schemes under NRCP (approved cost Rs. 4735.0 crores less expenditure incurred (as on Dec. 2006) Rs. 2375.0 crores)		Amount in Rs. crores
		:	1360.00

b.	Works for uncovered pollution on Ganga, Yamuna and Gomti (Approved cost fo GAP II Rs. 653.00 crores Approved cost of YAP II Rs. 624.00 crores Expenditure incurred GAP II Rs. 264.00 crores Expenditure incurred GAP II Rs. 425.00 crores Rs. 588.00 crores Additional works on Ganga, Yamuna and Gomti	:	3094.1
2.	Continuing and new works under National Lake Conservation Programme	:	800.00
3.	Continuing and new works under National wetland programme	:	90.00
4.	Research and development including capacity building, education, training, strengthening of monitoring works and institutional arrangements	:	60.00
5.	Establishment of Centre of Excellence	:	25.00
6.	New Towns from 17 states	:	3764.078
	<b>Grand Total</b>	<b>:</b>	<b>9193.18</b>

Thus the total outlay XI National River and Lake Conservation Plan recommended is Rs. 9193.18 Crores.

Portfolios of Recommended Projects and Schemes are included in Chapter 10.

**Format of Basic Information of Towns**

The following information is required town wise from respective State Govts/Agencies for each scheme.

1. Description of town
  - Name of the basin in which situated
  - Name of river in which waste water is disposed of
  - Population as per 2001 census
  - Map of town with proposed land for proposed STPs and IPs showing level
2. Designated best use of river (dbu) and the existing quality level.
3. Present Status of Water Supply
  - Source : River, Canal, Ground, Lake/Pond
  - Per Capita Water Supply – at Present & Proposed in future in lpcd
  - Total Water Supply in million litres per day (mld)
4. Status of Sewerage System
  - Amount of Sewage generated/day in million litres per day
  - Existing Sewerage System
    - Area Sewered in Sq.kms. and as a percentage of total area of the city
    - Amount of Sewage collected
  - Status of Existing I&D Sewage Treatment Plants
    - BOD/Total Solids in raw sewage
    - Number of STPs and the quantity of sewage treated by each STP
    - Technology used
    - Disposal method of treated sewage
    - I&D existing
5. If the sewage finds its way in drains and needs interception  
If Yes then
  - Number of such drains and quantity of sewage flowing in each drain in mld
  - Approximate No. of Sewage Pumping Stations
  - Sewer Length proposed for I.D. of Sewage
6. The proposed Sewage Treatment Plant/Plants
  - Sewage to be treated (mld)

- Is sufficient land available for STP (if yes indicate land area)
  - Proposed No. and capacity of STPs along with type of treatment proposed.
  - Proposed disposal method of treated sewage i.e., in river, on land for irrigation
7. Other identified sources of pollution of the river
  8. Identified Non Point Sources
  9. Name of Agency responsible for Operation and Maintenance of
    - a. Existing
    - b. Proposed Facilities
  10. Indicate willingness of State Govt. and Municipal body for the proposed funding pattern (70% Central, 30% State including 10% by the Municipal Body).
  11. Non Core Schemes Proposed
    - Number of Community toilets
    - No. of Electric or Improved Wood based Crematoria
    - Any river front development
  12. Estimated (approximate) Cost of each Scheme
    - I&D (as per 5)
    - STP (as per 6)
    - Non Core Schemes (as per 11)
  13. A copy of PFR/DPR available with the State may be attached.
- Note: If information in respect of any of the above items is:  
 Not Available – please indicate “Not available”, or  
 If it is Nil – please indicate “Nil”.

## System of ranking of towns for inclusion under NRCP

- 1. Population (marks 20, 12, 8)**
  - 1.1. Exceeds 5 lakh or the town is a capital of a State.
  - 1.2. between 3 – 5 lakh
  - 1.3. between 1-3 lakh
  
- 2. Location (marks 20, 12, 8)**
  - 2.1. Major river
  - 2.2. Tributary
  - 2.3. Drain
  
- 3. Average water quality of receiving water body (marks 15, 9, 6)**
  - 3.1. >12 mg/l
  - 3.2. > 6 mg/l;
  - 3.3. between 3-6 mg/l
  
- 4. Existing sewerage and sewage treatment (marks 10, 6, 4)**
  - 4.1. No organized system exists
  - 4.2. Sewage flows in drains and I&D is deficient and STPs are deficient.
  - 4.3. Internal sewers exist and STPs are deficient
  
- 5. Funding (marks 5, 3, 2)**
  - 5.1. Towns not covered under NRCP or have not any other funding.
  - 5.2. Towns partially covered.
  - 5.3. Towns covered but need augmentation of facilities because of growth.
  
- 6. State of Preparedness (marks 10, 6, 4)**
  - 6.1. DPR/PFR is ready
  - 6.2. Survey and Investigation done
  - 6.3. No data has been collected.
  
- 7. Industrial Effluent: (marks 5, 3, 2)**
  - 7.1. State Pollution Control Boards are ensuring the fulfillment of standards prescribed for industrial effluents.
  - 7.2. State pollution Control Board is active but not fully effective.
  - 7.3. Industrial pollution control is by and large not being monitored by the SPCB.
  
- 8. O&M: (marks 15, 9, 6)**
  - 8.1. Scheme is prepared to raise the funds required for O&M
  - 8.2. Dedicated funds are reserved.
  - 8.3. Only commitment is made for ensuring O&M

Major river shall mean an interstate river or a coastal river

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## CHAPTER-9

### FINANCIAL ISSUES

The Ganga Action Plan started with hundred percent funding of the schemes by the Government of India. The initiative for taking up Ganga Action Plan came from the Central Government and the Government of UP agreed. The experience has been that the funds for O&M are not provided by the local bodies and the state Govt. is required to provide all the needed funds. The State Governments have generally found it difficult to do so in time.

When the Yamuna action plan was taken up the funding of the programme was shared between the Govt. of India and State Govt. on 50-50 basis. However, between 1997-2001, the funding by the Government of India was again raised to 100%. This was again changed in 2001 when the contribution of the state Govt. was raised to 30%.

The *generation of awareness* of the value of conserving our water bodies particularly lakes and rivers has not spread deep enough to convince the people who cause the pollution of these natural resources that they must pay for the operation and maintenance of facilities apart from sharing the capital cost. The consequence, therefore, has been that those State Governments, which are financially weak, are unable to provide funds in time. The lack of resources has also resulted in deficient training of the staff.

The creation of facilities for managing the liquid and solid waste in cities can not be funded exclusively by any Govt. The citizens have to come forward to participate firstly in demanding that the facilities for proper disposal of wastes be created in the cities, secondly in agreeing to sharing the cost of setting up the facilities and finally to bear the expenses for the their operation and maintenance.

To achieve this, it is necessary not only to launch an intensive campaign to generate awareness about the value of natural resources but also to involve the citizens in surveying the state of the management of the waste, preparing plans for their efficient and effective disposal and in the implementation of the projects prepared in their behalf.

It can be accepted that entire cost of such facilities can not be borne by the citizens living in the town and that they would need financial support from the central and state Governments. There are mechanisms to raise funds. The municipal corporation can go to capital market or borrow from financial institutions. The Government of India and the State Governments can also invite private companies to install and run these facilities and give them grants to fill the viability gap.

There is need for tripartite agreement between the Govt. of India, State Govt. and the Local Body clearly specifying the obligations of each.

Foreign institutions are interested in financing environmental projects. However, they need a properly prepared DPR. In many cases the project reports are either not ready or are deficient in quality. Some institutions have started M.Tech programmes in various relevant disciplines. There is need for the State Govt. to either recruit suitably technically qualified persons or send their own officers for training in such institutions. However, this may take time. In the mean time the State Governments may enter into arrangement with institutes of

excellence in the relevant disciplines to seek guidance in preparing the reports. Another method is to engage consultants for this purpose.

Generation of resources from financial institutions and revenue from polluters and beneficiaries is proposed to be made mandatory.

The approach so far has been end- of- the- pipe treatment which necessarily involves laying of long lengths of the branch and trunks sewers which is capital intensive and the operation & maintenance is power intensive.

The sewage treatment plants with large capacities are complex and cost-intensive needing specially trained personnel for all activities relating to procurement, installation, operation and maintenance.

Our economy is capital scarce and so the approach to treatment of waste should be as localized as possible. The order of preference should be from individual treatment facilities to groups of houses towards and then groups of wards. This approach will reduce the length of sewers and reduce the capital cost enormously.

There is need to make the choice of technologies more rational. Life cycle cost is a well recognized method. It should be applied more frequently.

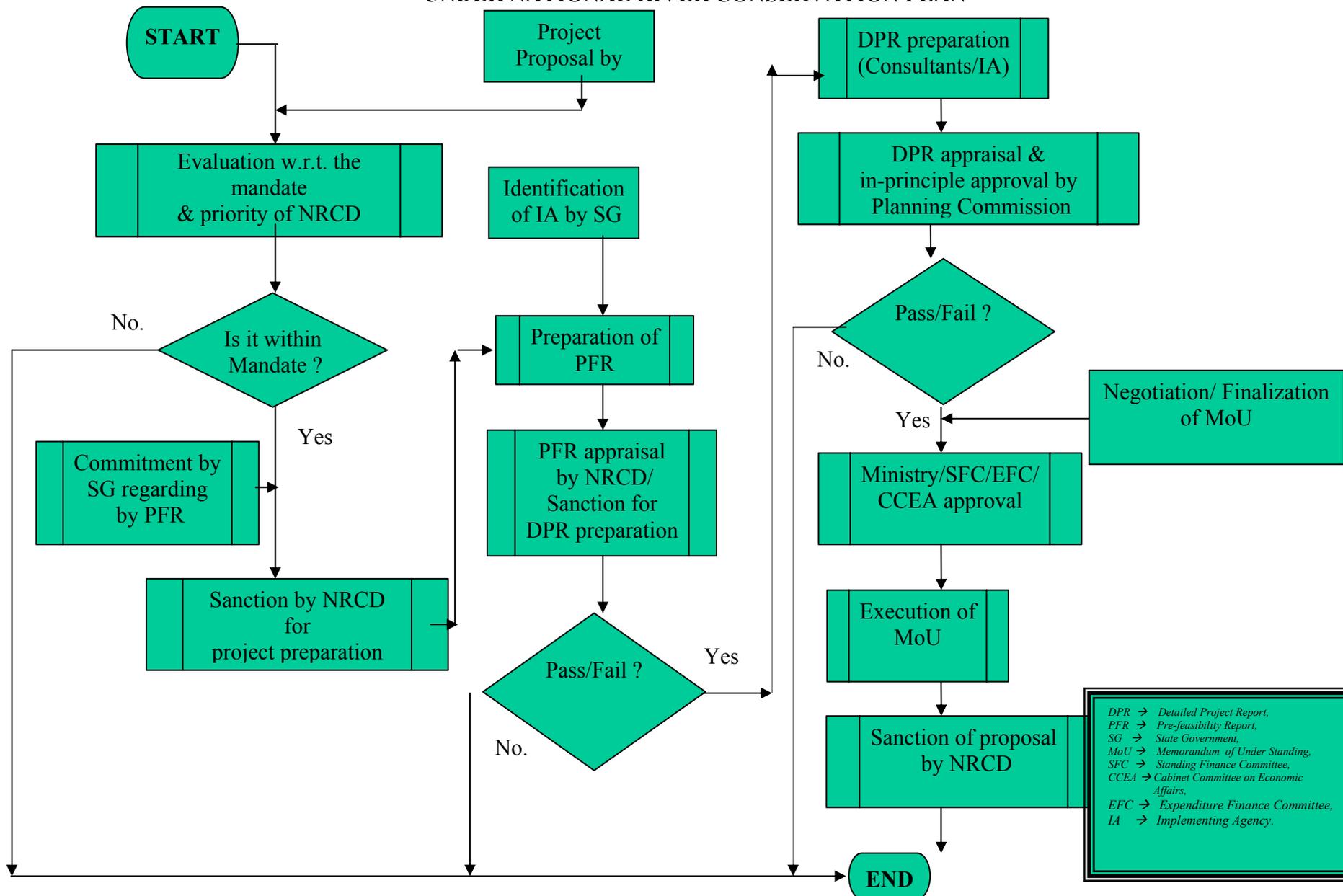
As the chapter on technology for treatment shows there are technologies available for different sizes of plants. If this approach could be followed the expense from 1.15 crore/ mld could drastically reduce. Waste handling by the individual or a group of houses may obviate the need to provide public funds as the people may be required to make their own investment.

There is need to demonstrate various models and technologies to convince the people that the idea is implementable.

All this can be feasible provided a network of institutions working in this field can be set up. A proposal for an institution of excellence in aquatic ecology has already been made in Chapter 8. The state Governments could be requested to nominate one or more institutions to this network.

Some important decisions taken by MoEF NRCDD relating to project approval procedure and short term and systematic problems are given in the **Appendix** at the end of this chapter.

**FLOW CHART INDICATING PROJECT APPROVAL PROCEDURE  
UNDER NATIONAL RIVER CONSERVATION PLAN**



**EXTRACTS OF THE MEETING TO REVIEW OF THE NRCD TAKEN BY  
SECRETARY E&F ON 15.10.2004**

**Systemic Problems:**

**A. Financial resources and flow of funds to the State:**

i) Provision of State's share in State's Plan Budget:

It was mentioned that there is no prioritization/policy under the Annual Plan by Planning Commission to reflect State's share for implementation of NRCD schemes. It was decided that the Planning Commission should be requested to enforce/advise the State Governments for allocation of funds as State share in their budgetary provisions for execution of the works under NRCP and NLCP as also for Operation & Maintenance of the assets created under these Plans. For this purpose, while giving our Annual Plan requirements State-wise, we should do project-wise analysis of funds for the year in question so that requirement of Central and State Governments' share during the year are clearly known. Planning Commission should be advised about the State's share required for the execution of schemes during the year under NRCP and NLCP so that it can make necessary provision in the State's Plan for this purpose.

ii) Cost to be built in external development costs:

In respect of cost to be built in external development works, Secretary(E&F) desired to know about types of pollution abatement works which come under the purview of NRCP/NLCP. After detailed discussions, the following works were identified as the components for creation of sewerage infrastructure in any existing/new settlement.

**Components of a Sewerage Infrastructure**

1. House toilets
2. Sewage conveyance system from house to colony boundary
3. Sewage conveyance system from colony boundary to trunk sewer
4. Sewage conveyance from trunk sewer to Sewage Treatment Plant (STP)
5. Construction of STP
6. Disposal of treated effluent and its utilisation

Out of these components, works under NRCP cover the development works pertaining to components 4 to 6 mentioned above. For complete external development, different types of models are generally dealt for funding by NRCD for abatement of pollution of rivers. The following table gives the types of settlements, the Project Definition for creation of sewerage infrastructure and the corresponding components funded by NRCD under Centrally Sponsored Scheme of NRCP.

<b>S. No.</b>	<b>Model</b>	<b>Project Definition</b>	<b>Central Funding under NRCP</b>
1	New Settlements *	Components 1 – 6	Components 4, 5, 6

S. No.	Model	Project Definition	Central Funding under NRCP
2	Traditional Towns ( No sewerage system )	Components 4 – 6	Components 4, 5, 6
3	Hybrid ( New & Traditional Towns)	Components 4 – 6... traditional Areas Components 1 – 6...New Areas	Components 4, 5, 6
4	Retro fitment of sewage in Traditional Towns	Components 1 – 3 ... New Areas Components 4 – 6 ... Augmentation works	Augmentation of Components 4, 5, 6

\*New settlement - means setting up of new colonies/regularization of existing unauthorized settlements.

Generally, the cost for components other than 4 to 6 mentioned above should come from external development and the State Governments should devise/develop their own means for raising the resources for the capital works relating to these components and NRCD should undertake funding for the components 4 to 6 only.

For the above models, following mode of funding can generally be adopted for development works under capital and O&M expenditure.

#### **Mode of Financing for different Models**

S. No.	Component	Model 1	Model 2	Model 3	Model 4
1.	<ul style="list-style-type: none"> <li>● Cap. cost</li> <li>● O &amp; M</li> </ul>	House owner House owner	House owner House owner	House owner House owner	It follows mode of finance as mentioned in model 3 depending upon the type of settlement
2	<ul style="list-style-type: none"> <li>● Cap. cost</li> <li>● O &amp; M</li> </ul>	Developer LB*	NA NA	House owner/LB LB*	
3	<ul style="list-style-type: none"> <li>● Cap. cost</li> <li>● O &amp; M</li> </ul>	UDB/LB/ Developer/FI** LB*	GoI/SG LB*	UDB/LB LB*	
4	<ul style="list-style-type: none"> <li>● Cap. cost</li> <li>● O &amp; M</li> </ul>	UDB/LB/ Developer/FI LB*	GoI/SG LB*	GoI/SG LB*	
5	<ul style="list-style-type: none"> <li>● Cap. cost</li> <li>● O &amp; M</li> </ul>	UDB/LB/ Developer/FI LB*	GoI/SG LB*	GoI/SG LB*	
6	<ul style="list-style-type: none"> <li>● Cap. cost</li> <li>● O &amp; M</li> </ul>	UDB/LB/ Developer/FI LB*	GoI/SG Resource recovery/LB*	GoI/SG Resource recovery/LB*	
	Enforcement process	EIA is required for any new settlement	How to enforce resource from the State Government & LB*	How to enforce resource from the State Government & LB*	

\* LB - Local Bodies recover the cost through tariff/House tax/FIs.

● UDB- Urban Development bodies

\*\* FI – Financial institutions

Secretary (E&F) desired that even though we may be funding components 4 to 6 only, any DPR submitted by the State Government should cover all the six components mentioned above and mention about the funding aspect for these components both for capital and O&M costs. Without these details, we should not process for sanction of the DPRs.

It should also be ensured that the external development works as stated above are completed by the State Government before releasing the funds for construction of STPs.

iii) Release of funds directly to Implementing Agencies:

AS(ND)&PD mentioned that based upon our past experience and in order to ensure speedy implementation of works, funds are now being released directly to the Implementing Agencies but still some of the IAs still do not use them for the purpose for which they are meant. Secretary(E&F) desired that a mechanism should be devised to ensure that the funds under these Plans are kept in a separate bank account and are released only when the demand draft/cheque is signed jointly by a representative of IA and a representative of agency who is independent of them and oversees the work of IAs. This independent agency could be a Consultant or any other organisation authorized by MoEF to do so. In order to ensure full utilization of funds by the State Government allocated for the NRCP schemes and proper monitoring of implementation of schemes, it was agreed to have a system of consultants for all the schemes sanctioned by NRCD.

There was a discussion at length to explore of possibilities of source of funding for appointment of such consultants. Secretary(E&F) desired to know about the centage charges associated while sanctioning the projects at present. It was mentioned that presently centage charges @ 8% are being paid to the State Government as follows:

a)	Project preparation fee (PPF)	3%
b)	Contingencies	3%
c)	Vehicle, tools & plants	1%
d)	Audit & accounts	<u>1%</u>
	Total	<u>8%</u>

As adequate manpower is not at all available in NRCD to monitor the implementation of projects on a regular basis and which is one of the weakest areas identified at all forums, it was agreed that 5% charges can be separately earmarked for Consultant in all the future projects and should be built in the cost of the project as a component of centage charge which would now become 13%. The State Government should agree to bear 30% cost of the overall project cost which should include centage @ 13%. Consultant will ensure (i) DPR appraisal (ii) continuous monitoring of implementation of projects (Physical and Financial) (iii) quality control (iv) Review of tender documents (iv) legal documents etc. of the Project and advise NRCD of the corrective action to be taken from time to time. Whether the PMCs should be State-wise or project-wise would be discussed further in the subsequent meeting including the mechanism for release of payment from the separate bank account.

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## Chapter -10

### FINANCIAL REQUIREMENTS AND PROPOSALS FROM STATES

#### 10.1 SUMMARY OF FINANCIAL REQUIREMENT UNDER THE ELEVENTH PLAN

1.	Schemes under River Action Plan	
a.	Continuing schemes under NRCP (approved cost Rs. 4735.0 crores less expenditure incurred (as on Dec. 2006) Rs. 2375.0 crores)	Amount in Rs. crores : 1360.00
b.	Works for uncovered pollution on Ganga, Yamuna and Gomti (Approved cost fo GAP II Rs. 653.00 crores Approved cost of YAP II Rs. 624.00 crores Expenditure incurred GAP II Rs. 264.00 crores Expenditure incurred GAP II Rs. 425.00 crores Rs. 588.00 crores Additional works on Ganga, Yamuna and Gomti	: 3094.1
2.	Continuing and new works under National Lake Conservation Programme	: 800.00
3.	Continuing and new works under National wetland programme	: 90.00
4.	Research and development including capacity building, education, training, strengthening of monitoring works and institutional arrangements	: 60.00
5.	Establishment of Centre of Excellence	: 25.00
6.	New Towns from 17 states	: 3764.078
	<b>Grand Total</b>	<b>: 9193.18</b>

Thus the total outlay XI National River and Lake Conservation Plan recommended is Rs. 9193.18 Crores.

## **10.2 PORTFOLIO OF RECOMMENDED PROJECTS / SCHEMES FROM 17 STATES**

This volume includes the proposals received from State Govt., basic information, ranking and specific recommendations.

The NRCD has made specific recommendations on the inclusion of continuing schemes under Ganga Action Plan, Gomti Action Plan and Yamuna Action Plan. As such costs indicated by them have been included.

General recommendations for Jammu & Kashmir are based on the abstract costs intimated by NRCD.

## CHHATTISGARH

Chhattisgarh a new State carved out of Madhya Pradesh has an area of 1,35,000 sq.km. and a population of 20,790,000. The state comprises of 16 districts. The State is predominantly rural. The state is irrigated by Mahanadi, Shivnath, Indravati, Hasdo and Kharun rivers The State abounds in hilly region and has large tribal population (1/3<sup>rd</sup>).

No river conservation scheme was sanctioned by National River Conservation Directorate. The State Govt. has recommended the inclusion of three towns on the rivers, Karoon, Arpa and Shivnath. The details are as below:

<b>Town</b>	<b>Proforma No</b>
Raipur	Chh. (i)
Bilaspur	Chh. (ii)
Durg	Chh. (iii)

The ranking proforma for three towns is included in proforma Chh. (iv).

## Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Raipur, Chhattisgarh
2.	Category	
	2.1 Basin	Mahanadi
	2.2 River	River Mahanadi
	2.3 Located on tributary/stream	Kharoon
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	5,72,000
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Kharoon
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	Not confirming Class B
5.	Status of Water Supply	
	5.1 Source	Bore wells, Kharoon river
	5.2 Quantity (mld)	79
	5.3 Per capita water supply (lpcd)	135.0
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	80 Ha.
	6.2 Interception factor	--
	6.3 Quantity of sewage generated	64.1 mld
	6.4 Raw Sewage Quality	(BOD) 88 mg/l TS 310 mg/L
	6.5 Existing I&D (mld)	
	6.6 Existing STP	
	6.6.1 Technology	2 Nos. Oxidation ponds, Nonfunctional
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	21 drains
	7.2 No. of Sewage Pumping Stations	4 Nos.
	7.3 Lengths of Intercepting Sewers	62 kms.
	7.4 Quantity of Sewage to be treated	64.0 mld
	7.5 Availability of land for STP	Existing ponds
	7.6 Treatment Technology Proposed	Stabilisation ponds
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. in Crores)	
	8.1 Core Schemes	43.60
	8.2 Non Core Schemes	0.68
	8.3 Total	44.28+6.642 = 50.922

### 9. Remarks

**The town is partially sewerred. Since ponds exist they can be made functional instead of new system to be organized.**

	<b>Recommendations</b>	
9.1	<b>Design population</b>	<b>8,58,000</b>
9.2	<b>Water supply @ 135 lpcd</b>	<b>115.83 mld</b>
9.3	<b>Total Sewage generated</b>	<b>81.1 mld</b>
9.4	<b>Cost Estimates (Rs. in Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>32.44 + 4.866 = 37.306</b>
	<b>STP</b>	<b>32.44 + 4.866 = 37.306</b>
	<b>Non core schemes</b>	<b>16.22 + 2.433 = 18.653</b>
	<b>Total</b>	<b>93.265</b>

**The cost indicated by State Govt. is Rs. 50.922 crores which is less than computed by AHEC, hence recommended.**

10. Willingness of State Governments to make financial contribution:  
Yes, State Governments commitment to meet 30% cost is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Bilaspur, Chhattisgarh
2.	Category	
	2.1 Basin	Mahanadi
	2.2 River	River Mahanadi
	2.3 Located on tributary/stream	Arpa
	2.4 Other Importance (Religious/Tourism/Other)	
3.	Population	2,75,000
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Arpa river
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	Not confirming Class B
5.	Status of Water Supply	
	5.1 Source	Ground water
	5.2 Quantity (mld)	53
	5.3 Per capita water supply (lpcd)	75
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial, 2 km length of sewer laid (10%)
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	29.64 mld
	6.4 Raw Sewage Quality	BOD 100 mg/l, TSS 197 mg/l
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Oxidation ponds (Non functional)
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	15 drains
	7.2 No. of Sewage Pumping Stations	5 Nos.
	7.3 Lengths of Intercepting Sewers	14.3 kms.
	7.4 Quantity of Sewage to be treated	55 mld
	7.5 Availability of land for STP	Yet to be finalised
	7.6 Treatment Technology Proposed	Stabilisation ponds
	7.7 Disposal After Treatment	Drain
8.	Cost Estimates (Rs. in Crores)	
	8.1 Core Schemes	23.19
	8.2 Non Core Schemes	0.77
	8.3 Total	24.96 + 3.744 = 28.704
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>4,12,500</b>
	<b>9.2 Water supply @ 135 lpcd</b>	<b>55.7 mld</b>
	<b>9.3 Total Sewage generated</b>	<b>38.9 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>15.56 + 2.334 = 17.895</b>
	<b>STP</b>	<b>15.56 + 2.334 = 17.894</b>
	<b>Non core schemes</b>	<b>7.78 + 1.167 = 8.947</b>
	<b>Total</b>	<b>44.735</b>

**The cost indicated by State Govt. is less than computed by AHEC, hence amount Rs. 28.704 Crores recommended.**

10. Willingness of State Governments To Make Financial Contribution:  
Yes, State Governments commitment to meet 30% cost is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Durg, Chhattisgarh
2.	Category	
	2.1 Basin	Mahanadi
	2.2 River	Mahanadi
	2.3 Located on tributary/stream	Sheonath
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	2,31,000
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Sheonath
	4.2 BOD	> 3.0 mg/L
	4.3 Existing Water Quality (A,B,C,D or E)	
5.	Status of Water Supply	
	5.1 Source	River and Bore holes
	5.2 Quantity (mld)	31.7
	5.3 Per capita water supply (lpcd)	120
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	Nil
	6.3 Quantity of sewage generated	23.47 mld
	6.4 Raw Sewage Quality	BOD 86 mg/L, SS 235 mg/L.
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	6 drains
	7.2 No. of Sewage Pumping Stations	4 Nos.
	7.3 Lengths of Intercepting Sewers	14.45 kms.
	7.4 Quantity of Sewage to be treated	46 mld
	7.5 Availability of land for STP	Yet to be finalised
	7.6 Treatment Technology Proposed	Stabilisation ponds
	7.7 Disposal After Treatment	Irrigation canal
8.	Cost Estimates (Rs. in Crores)	
	8.1 Core Schemes	20.40
	8.2 Non Core Schemes	0.38
	8.3 Total	20.78 + 3.117 = 23.897

#### 9. Remarks

	<b>Recommendations</b>	
9.1	<b>Design population</b>	<b>3,46,000</b>
9.2	<b>Water supply @ 135 lpcd</b>	<b>46.7 mld</b>
9.3	<b>Total Sewage generated</b>	<b>32.7 mld</b>
9.4	<b>Cost Estimates (Rs. in Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>13.10 + 1.965 = 15.065</b>
	<b>STP</b>	<b>13.10 + 1.965 = 15.065</b>
	<b>Non core schemes</b>	<b>6.56 + 0.9825 = 7.533</b>
	<b>Total</b>	<b>37.663</b>

**The cost indicated by State Govt. is less than computed by AHEC, hence cost of Rs. 23.897 Crores recommended.**

10. Willingness of State Governments To Make Financial Contribution:  
Yes, State Governments commitment to meet 30% cost is indicated.

### Ranking Table

Name of State : Chhattisgarh

S.No	Town	Criteria								Total Points
		1	2	3	4	5	6	7	8	
1.	Raipur	20	12	6	6	5	6	3	6	64
2.	Bilaspur	8	12	6	6	5	6	3	6	52
3.	Durg	8	12	6	6	5	6	3	6	52

### Recommendations

Sl. No.	Towns Recommended	Points Scored	Recommended Cost Rs. Crores
1.	Raipur	64	50.922
2.	Bilaspur	52	28.704
3.	Durg	52	23.897
		<b>Total</b>	<b>103. 523</b>

## GUJARAT

The state stretches over 179,320 km<sup>2</sup> with a total population of 50.59 million (as per 2001 census). Based on climate the state has been divided into five regions.

The State falls in the major river basins of Narmada, Sabarmati, Mahi and Tapi. The water quality monitoring results indicate the pollution of these major rivers.

The various towns considered are: Ahmedabad, Vadodara, Billimora, Kheda, Rajkot, Junagarh, Jamnagar, Ankleshwar & Surat.

Out of the towns under consideration Vadodara is a metropolitan as well as industrial city. Part of untreated wastewater is discharged in Vishwamitri river with treated effluent, which is extremely polluted.

Ahmedabad is situated on the river Sabarmati and is also discharging a large quantity of industrial waste as well as part of untreated municipal waste in addition to effluent from municipal wastewater treatment plant. **Ahmedabad was sanctioned funds in Phase-I of Sabarmati cleaning project.**

In Tapi basin, town considered is Surat.

The various town considered under this report (population > 1 lakh) are Ahmedabad, Vadodara, Rajkot, Jamnagar, Junagarh and Surat.

Out of these all except Ahmedabad are new to the list for funding. The details are given in proforma below:

Town	Proforma No.
Jamnagar	Gu (i)
Ahmedabad	Gu (ii)
Vadodara	Gu(iii)
Rajkot	Gu (iv)
Junagarh	Gu(v)
Surat	Gu (vi)

Ranking table is enclosed as proforma no. Gu (vii).

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> and 11<sup>th</sup> Plan**

1.	Name of Town & State	Jamnagar, Gujarat
2.	Category	
2.1	Basin	Rangmati River
2.2	River	Rangmati River
2.3	Located on Tributary/Stream	
2.4	Other Importance (Religious/Tourism/Other)	Production of salt (1/3 <sup>rd</sup> of India)
3.	Population	5.75 lac
4.	Name of body receiving wastewater and quality	
4.1	Name	Rangmati
4.2	BOD	80-100 mg/l
4.3	Existing water quality (A,B,C, D, or E) :	
5.	Status of Water Supply :	
5.1	Source	Various reservoirs and Narmada canal (through pipe line)
5.2	Quantity (mld)	155 (on alternate days)
5.3	Per capita water supply (lpcd)	135
6.	Status of Sewerage System	
6.1	Area sewered (%)	15 sq.km (58%)
6.2	Interception factor	
6.3	Quantity of sewage generated	65 mld
6.4	Raw sewage quality	BOD - 225 mg/l SS – 550 mg/l
6.5	Existing I&D (mld)	40
6.6	Existing STP	Nil
6.6.1	Technology	Nil
6.6.2	Treatment capacity	Nil
7.	Proposed Schemes	
7.1	No. of drains for interception	Six
7.2	No. of sewage pumping stations	One
7.3	Lengths of intercepting sewers	7 km
7.4	Quantity of sewage to be treated	50 mld Ist Stage
7.5	Availability of land for STP	24 Ha
7.6	Treatment technology proposed	UASB + Aerated Lagoons
7.7	Disposal after treatment	Partially used for irrigation & industry and part on coastal land
8.	Cost Estimates (Rs. in Crore)	
8.1	Core schemes	
8.1.1	I&D	13.00
8.1.2	STP	17.50
8.2	Non core	Nil
8.3	Total	30.50 + 4.575 = 35.075
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
9.1	<b>Design population</b>	<b>8.62 lac</b>
9.2	<b>Water supply</b>	<b>116.40 mld</b>
9.3	<b>Total Sewage generated</b>	<b>81.40 mld</b>
9.4	<b>Cost Estimates (Rs. in Crores)</b>	
	<b>Core schemes</b>	
	<b>I&amp;D Schemes</b>	<b>32.56 + 4.884 = 37.444</b>
	<b>STP</b>	<b>32.56 + 4.884 = 37.444</b>
	<b>Non core schemes</b>	<b>16.28 + 2.442 = 18.722</b>
	<b>Total Cost</b>	<b>81.40</b>
		<b>93.61</b>

Since the state government recommended costs are lower than computed by AHEC. The state cost of Rs. 35.075 Crores is recommended.

10. Willingness of State Governments To Make Financial Contribution:  
Yes, State Governments commitment to meet 30% cost is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Ahemdabad, Gujarat
2.	Category	
	2.1 Basin	Sabarmati Basin
	2.2 River	Sabarmati
	2.3 Located on tributary/stream	
	2.4 Other Importance (Religious/Tourism/Other)	
3.	Population	35.15 lac
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Sabarmati
	4.2 BOD	> 12
	4.3 Existing Water Quality (A,B,C,D or E)	
5.	Status of Water Supply	
	5.1 Source	River, canal, ground & private
	5.2 Quantity (mld)	630 mld
	5.3 Per capita water supply (lpcd)	160
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	114 sq.km (75%)
	6.2 Interception factor	
	6.3 Quantity of sewage generated	580
	6.4 Raw Sewage Quality	BOD > 300 mg/l
	6.5 Existing I&D (mld)	359
	6.6 Existing STP	Nil
	6.6.1 Technology	UASB & lagoons
	6.6.2 Treatment Capacity	400 mld
7.	Proposed Schemes	
	7.1 No. of drains for interception	36
	7.2 No. of Sewage Pumping Stations	5 existing to be renovated + 2 new
	7.3 Lengths of Intercepting Sewers	25.35 km
	7.4 Quantity of Sewage to be treated	355 additional
	7.5 Availability of land for STP	Available
	7.6 Treatment Technology Proposed	UASB + Aerated lagoon
	7.7 Disposal After Treatment	River & canal
8.	Cost Estimates (Rs. in Crores)	
	8.1 Core Schemes	
	8.1.1 I&D	84.56
	8.1.2 STP	80.40 + 25.6 (modifications)
	8.2 Non core	2.0
	8.3 Total	247.75 + 37.1625 = 284.9125
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>52.72 lac</b>
	<b>9.2 Water Supply @ 180 lpcd</b>	<b>949 mld</b>
	<b>9.3 Sewage</b>	<b>664 mld</b>
	<b>9.4 Sewage already treated</b>	<b>400 mld</b>
	<b>9.5 Additional sewage to be treated</b>	<b>264 mld</b>
	<b>Estimated Cost (Rs. in Crore )</b>	
	<b>Core schemes</b>	
	<b>I&amp;D Schemes</b>	<b>105.6 + 15.84 = 121.44</b>
	<b>STP</b>	<b>105.6 + 15.84 = 121.44</b>
	<b>Non core schemes</b>	<b>52.8 + 7.92 = 60.72</b>
	<b>Total Cost</b>	<b><u>303.60</u></b>

**Since the cost recommended by State Govt. is lower hence the cost of Rs. 284.92 recommended.**

10. Willingness of State Governments To Make Financial Contribution:  
Yes, State Governments commitment to meet 30% cost is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Vadodara, Gujarat
2.	Category	
	2.1 Basin	Mahi River Basin
	2.2 River	Vishwamitri
	2.3 Located on tributary/stream	Nil
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	13.0 lac
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Vishwamitri & Jambuva
	4.2 BOD	190 mg/l
	4.3 Existing Water Quality (A,B,C,D or E)	
5.	Status of Water Supply	
	5.1 Source	River, ground & lake
	5.2 Quantity (mld)	240
	5.3 Per capita water supply (lpcd)	180 (135 for domestic & 45 for industry)
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	75 sq.km (50%)
	6.2 Interception factor	NA
	6.3 Quantity of sewage generated	215 mld
	6.4 Raw Sewage Quality	300-450 mg/l
	6.5 Existing I&D (mld)	40
	6.6 Existing STP	5
	6.6.1 Technology	TF, UASB, ASP
	6.6.2 Treatment Capacity	215
7.	Proposed Schemes	
	7.1 No. of drains for interception	7
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	70 km & 150 km network
	7.4 Quantity of Sewage to be treated	Additional 135 mld
	7.5 Availability of land for STP	Available
	7.6 Treatment Technology Proposed	UASB
	7.7 Disposal After Treatment	In river and partly land application
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	66.82
	8.1.2 STP	44.00
	8.2 Non core	2.0
	8.3 Total	148.62 + 22.293 = 170.91
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>19.5 lac</b>
	<b>9.2 Water Supply @ 180 lpcd</b>	<b>351 mld</b>
	<b>9.3 Sewage</b>	<b>245.7 mld</b>
	<b>9.4 Existing Capacity</b>	<b>215.00 mld</b>
	<b>9.5 Additional capacity required</b>	<b>30 mld</b>
	<b>9.6 Estimated cost (Rs. Crores)</b>	
	<b>Core schemes</b>	
	<b>I&amp;D Schemes</b>	<b>12.0 + 1.8 = 13.80</b>
	<b>STP</b>	<b>12.0 + 1.8 = 13.80</b>
	<b>Non core schemes</b>	<b>6.0 + 0.9 = 6.90</b>
	<b>Total Cost</b>	<b>34.50</b>
10.	Willingness of State Governments To Make Financial Contribution: The commitment of State Govt. to meet 30% cost is indicated	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Rajkot, Gujarat
2.	Category	
	2.1 Basin	Aji
	2.2 River	Aji-II
	2.3 Located on tributary/stream	Nil
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	10.02 lac
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Aji
	4.2 BOD	
	4.3 Existing Water Quality (A,B,C,D or E)	E required
5.	Status of Water Supply	
	5.1 Source	Canal, GW, Lake & Pond river Bhadra Aji Nyari
	5.2 Quantity (mld)	10
	5.3 Per capita water supply (lpcd)	100
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	60 sq.km (40%)
	6.2 Interception factor	
	6.3 Quantity of sewage generated	75 mld
	6.4 Raw Sewage Quality	BOD-30 ppm
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	1
	6.6.1 Technology	Aerated lagoon
	6.6.2 Treatment Capacity	44.5
7.	Proposed Schemes	
	7.1 No. of drains for interception	36
	7.2 No. of Sewage Pumping Stations	
	7.3 Lengths of Intercepting Sewers	12 km
	7.4 Quantity of Sewage to be treated	65 mld
	7.5 Availability of land for STP	30 acres
	7.6 Treatment Technology Proposed	UASB
	7.7 Disposal After Treatment	On land for irrigation
8.	Cost Estimates (Rs. in crore)	
	8.1 Core Schemes	
	8.1.1 I&D	45.00
	8.1.2 STP	20.00
	8.2 Non core	33.7
	8.3 Total	98.7 + 14.805 = 113.505
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	9.1 Design population	15.03 lac
	9.2 Quantity of water @ 180 lpcd	270.5 mld
	9.3 Sewage	189.4 mld
	9.4 Treatment facility exist	44.5 mld
	9.5 Additional facility required	145 mld
	9.6 Estimated costs (Rs. in Crores)	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	58.0 + 8.7 = 66.7
	<b>STP</b>	58.0 + 8.7 = 66.7
	<b>Non Core Schemes</b>	29.0 + 4.35 = 33.35
	<b>Total</b>	<u>166.75</u>

**Since the cost of State Govt. is lower hence remmended cost is Rs. 113. 505 crores.**

10. Willingness of State Governments To Make Financial Contribution:  
Yes, State Governments commitment to meet 30% cost is indicated.

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Junagarh, Gujarat
2.	Category	
	2.1 Basin	Sabarmati River Basin
	2.2 River	
	2.3 Located on tributary/stream	Karva
	2.4 Other Importance (Religious/Tourism/Other)	is a base town to Somnath & Gir Forest
3.	Population	1,68,686
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Ozat River through Karwa
	4.2 BOD	
	4.3 Existing Water Quality (A,B,C,D or E)	
5.	Status of Water Supply	
	5.1 Source	Narmada River etc.+Wells etc. (Private)
	5.2 Quantity (mld)	15
	5.3 Per capita water supply (lpcd)	100
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	13.47 sq.km. (60%)
	6.2 Interception factor	
	6.3 Quantity of sewage generated	11 (assumed)
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	Nil
	6.6.1 Technology	
	6.6.2 Treatment Capacity	
7.	Proposed Schemes	
	7.1 No. of drains for interception	Trunk sewers to be laid
	7.2 No. of Sewage Pumping Stations	Nil
	7.3 Lengths of Intercepting Sewers	--
	7.4 Quantity of Sewage to be treated	20 mld
	7.5 Availability of land for STP	Yes
	7.6 Treatment Technology Proposed	UASB
	7.7 Disposal After Treatment	Irrigation
8.	Cost Estimates (Rs. in Crores)	
	8.1 Core Schemes	
	8.1.1 I&D	5.00
	8.1.2 STP	3.50
	8.2 Total	8.50 + 1.275 = 9.775
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>2.5305 lac</b>
	<b>9.2 Quantity of water @ 135 lpcd</b>	<b>34.2 mld</b>
	<b>9.3 Sewage</b>	<b>24.0 mld</b>
	<b>9.4 Cost (Rs. in Crores)</b>	
	<b>Core schemes</b>	
	<b>I&amp;D Schemes</b>	<b>9.6 + 1.44 = 11.04</b>
	<b>STP</b>	<b>9.6 + 1.44 = 11.04</b>
	<b>Non core schemes</b>	<b>4.8 + 0.72 = 5.52</b>
	<b>Total Cost</b>	<b><u>27.60</u></b>

Since the cost recommended by state is lower than the cost estimated by AHEC the state costs of Rs. 9.775 Crores are recommended.

10. Willingness of State Governments To Make Financial Contribution:  
Yes, State Governments commitment to meet 30% cost is indicated.

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Surat, Gujarat
2.	Category	
	2.1 Basin	Tapi River
	2.2 River	Tapi
	2.3 Located on tributary/stream	
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	24.33 lac
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	River Tapi
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	
5.	Status of Water Supply	
	5.1 Source	River Tapi
	5.2 Quantity (mld)	510
	5.3 Per capita water supply (lpcd)	192
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	101.658 sq.km. (90.54%)
	6.2 Interception factor	
	6.3 Quantity of sewage generated	410
	6.4 Raw Sewage Quality	BOD – 250, SS - 350
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	6
	6.6.1 Technology	1 (UASB)
	6.6.2 Treatment Capacity	562.5
7.	Proposed Schemes	
	7.1 No. of drains for interception	14
	7.2 No. of Sewage Pumping Stations	30
	7.3 Lengths of Intercepting Sewers	10.5
	7.4 Quantity of Sewage to be treated	736-562 = 174 mld new + 230 to be augmented
	7.5 Availability of land for STP	Availabe
	7.6 Treatment Technology Proposed	Augmentation of the existing plants
	7.7 Disposal After Treatment	To River Tapi for agricultural & industrial use.
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	45.00
	8.1.2 STP	10.00
	8.2 Total	55.00 + 8.25 = 63.25
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>36.49 lacs</b>
	<b>9.2 Quantity of water @ 180 lpcd</b>	<b>656.9 mld</b>
	<b>9.3 Sewage</b>	<b>459.9 mld</b>
	<b>9.4 Existing capacity is greater than the computed value. No funding is recommended for core schemes. However as a special case a sum of Rs. 23.00 Crores for River Front Development is Recommended.</b>	
10.	Willingness of State Governments To Make Financial Contribution:	
	Yes, State Governments commitment to meet 30% cost is indicated.	

**Ranking Table****Name of State : Gujarat**

S.No	Town	Criteria								Total points
		1	2	3	4	5	6	7	8	
1.	Jamnagar	20	12	15	6	5	10	2	15	85
2.	Ahmedabad	20	20	15	6	2	10	2	9	84
3.	Vadodara	20	12	15	6	5	10	2	6	76
4.	Rajkot	20	20	6	6	5	10	2	6	75
5.	Junagarh	8	12	15	10	5	4	5	9	68
6.	Surat	8	12	15	6	5	10	2	6	64

**Recommendations**

Sl. No.	Towns Recommended	Points Scored	Recommended Cost Rs. Crores
1.	Jamnagar	85	35.075
2.	Ahmedabad	84	284.92
3.	Vadodara	76	34.50
4.	Rajkot	75	113.505
5.	Junagarh	68	9.775
6.	Surat	64	23.00
		<b>Total</b>	<b>500.775</b>

## HARYANA

Haryana is a small but very important state. Major rivers are Yamuna and Saraswati. The population of the state is 21.08 million as per 2001 Census. It is an agricultural state. The state has many industrial towns. Number of towns have been considered for funding under YAP I and II. Ambala, Sirsa and Kaithal are proposed to be considered under Ghaggar Action Plan.

Town	Proforma No.
Ambala	Hry (i)
Sirsa	Hry (ii)
Kaithal	Hry (iii)

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Ambala City + Ambala Sadar, Haryana
2.	Category	
	2.1 Basin	Indus
	2.2 River	Ghaggar
	2.3 Located on tributary/stream	Ghaggar
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	2.456 lac
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Ghaggar
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	Ground water & canal
	5.2 Quantity (mld)	33
	5.3 Per capita water supply (lpcd)	110
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	2.55 sq. km (15%) + 3.58 sq.km (55%)
	6.2 Interception factor	
	6.3 Quantity of sewage generated	24.75 mld
	6.4 Raw Sewage Quality	BOD 185 mg/L, SS 480 mg/L.
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	1+25
	7.2 No. of Sewage Pumping Stations	Nil
	7.3 Lengths of Intercepting Sewers	17.47 + 12.5 km
	7.4 Quantity of Sewage to be treated	29+22
	7.5 Availability of land for STP	Available
	7.6 Treatment Technology Proposed	UASB + Aerobic ponds
	7.7 Disposal After Treatment	Ghaggar river
8.	Cost Estimates (Rs. in Crores)	
	8.1 Core Schemes	
	8.1.1 I&D	49.98
	8.1.2 STP	39.23
	8.2 Non core	3.32
	8.3 Total	92.53 + 13.88 = 106.41
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>3.684 lacs</b>
	<b>9.2 Water supply @ 135 mld</b>	<b>49.7 mld</b>
	<b>9.3 Total Sewage generated</b>	<b>34.8 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crores)</b>	
	<b>Core schemes</b>	
	<b>I&amp;D</b>	<b>13.92 + 2.088 = 16.008</b>
	<b>STP</b>	<b>13.92 + 2.088 = 16.008</b>
	<b>Non core schemes</b>	<b>6.96 + 1.044 = 8.004</b>
	<b>Total</b>	<b>40.020 Recommended</b>
10.	Willingness of State Governments To Make Financial Contribution: Willingness of State Government to meet 30% cost is indicated.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Sirsa, Haryana
2.	Category	
	2.1 Basin	Indus
	2.2 River	Ghaggar
	2.3 Located on tributary/stream	Ghaggar
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	1,60,129
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Ghaggar
	4.2 BOD	8.50 mg/l
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	Ground water & canal
	5.2 Quantity (mld)	16.81
	5.3 Per capita water supply (lpcd)	110
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	8.75 sq.km (70%)
	6.2 Interception factor	
	6.3 Quantity of sewage generated	11.77 mld
	6.4 Raw Sewage Quality	BOD 145 mg/L, SS 776 mg/L.
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	26 mld
	7.5 Availability of land for STP	Available
	7.6 Treatment Technology Proposed	UASB + Aerobic treatment
	7.7 Disposal After Treatment	River & land
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	18.01 + 2.70 = 20.71
	8.1.2 STP	19.35 + 2.90 = 22.25
	8.2 Non core	1.41 + 0.21 = 1.62
	8.3 Total	----- 44.58 -----
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>2.40193 lacs</b>
	<b>9.2 Water Supply @ 135 lpcd</b>	<b>32.43 mld</b>
	<b>9.3 Total Sewage generated</b>	<b>22.7 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core schemes</b>	
	<b>I&amp;D</b>	<b>9.08 + 1.362 = 10.442</b>
	<b>STP</b>	<b>9.08 + 1.362 = 10.442</b>
	<b>Non core schemes</b>	<b>4.54 + 0.681 = 5.221</b>
	<b>Total</b>	----- <b>26.105 Recmmended</b> -----
10.	Willingness of State Governments To Make Financial Contribution:	
	Willingness of State Government to meet 30% cost is indicated.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Kaithal, Haryana
2.	Category	
	2.1 Basin	Indus
	2.2 River	Ghaggar
	2.3 Located on tributary/stream	Ghaggar
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	1,17,226
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Ghaggar
	4.2 BOD	45 mg/l
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	Ground water & canal
	5.2 Quantity (mld)	12
	5.3 Per capita water supply (lpcd)	110
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	16.2 sq.km. (60%)
	6.2 Interception factor	
	6.3 Quantity of sewage generated	9 mld. Collected 8.5
	6.4 Raw Sewage Quality	BOD 146 mg/L, TSS 330 mg/L.
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	3
	7.2 No. of Sewage Pumping Stations	4
	7.3 Lengths of Intercepting Sewers	6.0 km
	7.4 Quantity of Sewage to be treated	8.5 mld
	7.5 Availability of land for STP	Available
	7.6 Treatment Technology Proposed	UASB + Aerobic treatment
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. in Crores)	
	8.1 Core Schemes	
	8.1.1 I&D	16.35
	8.1.2 STP	16.66
	8.2 Non core	14.50
	8.3 Total	37.51 + 5.6265 = 43.1365
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>1.7584 lacs</b>
	<b>9.2 Water Supply @ 135 lpcd</b>	<b>23.74 mld</b>
	<b>9.3 Total Sewage generated</b>	<b>16.6 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core schemes</b>	
	<b>I&amp;D</b>	<b>6.65 + 0.9975 = 7.6475</b>
	<b>STP</b>	<b>6.65 + 0.9975 = 7.6475</b>
	<b>Non core schemes</b>	<b>3.30 + 0.495 = 3.7950</b>
	<b>Total</b>	<b>19.0900 Recommended</b>
10.	Willingness of State Governments To Make Financial Contribution:	
	Willingness of State Government to meet 30% cost is indicated.	

**Ranking Table****Name of State : Haryana**

S.No	Town	Criteria								Total Points
		1	2	3	4	5	6	7	8	
1.	Ambala	20	12	9	6	5	10	2	6	70
2.	Sirsa	20	12	9	6	5	4	2	6	64
3.	Kaithal	8	12	9	6	5	4	2	6	52

**Recommendations**

Sl. No.	Towns Recommended	Points Scored	Recommended Cost Rs. Crores
1.	Ambala	70	40.02
2.	Sirsa	64	26.10
3.	Kaithal	52	19.09
		<b>Total</b>	<b>85.21</b>

## HIMACHAL PRADESH

Himachal Pradesh is a small hill state created in 1948 by putting together hills of Shimla state and Punjab hill states. The state of Himachal Pradesh (became full fledged state in 1970) have an area of 55,673 Sq.km. and is drained by five river system viz the Chenab system (river Chandra, Bhaga, Chenab & Tributaries), the Ravi system, the Beas system (river Beas & its major tributaries of Parbati, Sainj, Tirthan, Bakhli, Uni, Uhl, Rana, Bakes, Chhunch), the Satluj system (river Satluj and its tributaries of Spiti, Kashming, Baspa, Bhaba, Nogi, Korpar, Nauti, Sholding, Seer, Bharari, Ali, Baunbhar and Swai) and the Yamuna system (river Yamuna and its tributaries of Giri, Parbar, Tons, Bata & Markanda). Fig 3.4.1.

The total catchment area is spread on an area of 5799 Sq.km. The population density (93 Sq.km.) and urban areas are low. It has twelve districts and seventy one tehsils and a population of 60,77,248. The state in general has large tourist potential.

The streams are fast flowing with good aeration capability. The pollution potential is low. The towns are dispersed. (The BOD values in the rivers is <3.0 mg/L except in river Markanda).

The entire state because of its physiography and environmental status, has been excluded from National River Conservation Plans. The normal criteria of selection of towns under NRCD are not feasible.

The Himachal State Govt. has recommended the following towns for inclusion in the X, XI plans of NRCD.

Kullu-Manikaran, Kullu Bhunter, Mandi-Nerchowk Sunder Nagar, Joginder Nagar, Nadaun, Sujampur Kangra, Nurpur-Jassur, Dehra, Paonta Sahib, Solan, Parwanoo, Baddi Barotiwala & Mehtapur.

**The selection criteria for NRCD towns presently followed also will not justify inclusion of any town. However, considering the tourist potential and the pristine environment the following four towns have been recommended to be included under Type III (towns having tourist and religious potential).**

Sl. No	Town	Proforma No.
1.	Paonta Sahib	HP-(I)
2.	Kulu (Manikaran & Bhunter)	HP-(II)
3.	Mandi	HP-(III)
4.	Manali (Left Bank)	HP-(IV)

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Paonta Sahib
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Yamuna
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	Important tourist and religious town
3.	Population	19,087
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Yamuna
	4.2 BOD	-
	4.3 Existing Water Quality (A,B,C,D or E)	D
5.	Status of Water Supply	
	5.1 Source	River/Ground water
	5.2 Quantity (mld)	2.0
	5.3 Per capita water supply (lpcd)	-
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	NA
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	NA
	6.4 Raw Sewage Quality	BOD 350 mg/L
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	NA
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	4.0 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	ASP + disinfection
	7.7 Disposal After Treatment	
8.	Cost Estimates (Rs. in Crore)	2.62 + 0.393 = 3.013
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>It is an important tourist and religious town.</b>	
	<b>9.1 Design population</b>	<b>28,630</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>3.9 mld</b>
	<b>9.3 Sewage generated</b>	<b>2.7 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>1.08 + 0.162 = 1.242</b>
	<b>STP</b>	<b>1.08 + 0.162 = 1.242</b>
	<b>Non Core Schemes</b>	<b>0.54 + 0.081 = 0.621</b>
	<b>Total</b>	<b>3.105</b>
		-----
		-----
	<b>Recommended due to religious and tourist importance.</b>	
	<b>The cost estimate of State Government Rs. 3.013 Crore is recommended.</b>	
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Kulu, Himachal
2.	Category	
	2.1 Basin	Indus
	2.2 River	Beas
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	Important tourist and religious town
3.	Population	40,000
4.	Name of body receiving Waste Water & Quality:	Beas
	4.1 Name	
	4.2 BOD	1.0
	4.3 Existing Water Quality (A,B,C,D or E)	A
5.	Status of Water Supply	
	5.1 Source	River/Springs
	5.2 Quantity (mld)	4.86
	5.3 Per capita water supply (lpcd)	120
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	NA
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	NA
	6.4 Raw Sewage Quality	350 mg/L
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	NA
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	1.20 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	ASP + disinfection
	7.7 Disposal After Treatment	River Beas
8.	Cost Estimates (Rs. in Crore)	$4.45 + 0.665 = 5.1175 = 5.12$
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>It is an important tourist and religious town</b>	
	<b>9.1 Design population</b>	<b>60,000</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>8.1 mld</b>
	<b>9.3 Sewage generated</b>	<b>5.67 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b><math>2.27 + 0.3405 = 2.6105</math></b>
	<b>STP</b>	<b><math>2.27 + 0.3405 = 2.6105</math></b>
	<b>Non Core Schemes</b>	<b><math>1.13 + 0.1695 = 1.2995</math></b>
	<b>Total</b>	<b>6.5205</b>
		-----
		-----
	<b>Since the requirement of state govt. is lower than computed, the estimates of state govt. Rs. 5.12 crores is recommended.</b>	
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Mandi, Himachal Pradesh
2.	Category	
	2.1 Basin	Indus
	2.2 River	
	2.3 Located on tributary/stream	Suketi Khud - Beas
	2.4 Other Importance (Religious/Tourism/Other)	Important tourist town
3.	Population	26,660
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Suketi Khud
	4.2 BOD	-
	4.3 Existing Water Quality (A,B,C,D or E)	C
5.	Status of Water Supply	
	5.1 Source	-
	5.2 Quantity (mld)	5.40
	5.3 Per capita water supply (lpcd)	135
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	NA
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	NA
	6.4 Raw Sewage Quality	350 mg/l
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	NA
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	1.0 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	ASP + disinfection
	7.7 Disposal After Treatment	Suketi-Beas
8.	Cost Estimates (Rs. in Crore)	4.17 + 0.6255 = 4.7955
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>It is a small tourist town.</b>	
	<b>9.1 Design population</b>	<b>40, 000</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>5.4 mld</b>
	<b>9.3 Sewage generated</b>	<b>3.78 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>1.51 + 0.2265 = 1.7365</b>
	<b>STP</b>	<b>1.51 + 0.2265 = 1.7365</b>
	<b>Non Core Schemes</b>	<b>0.76 + 0.114 = 0.874</b>
	<b>Total</b>	<b>4.404 Recommended</b>
	<b>Being a small tourist town recommended.</b>	
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Manali (Left Bank) Himachal Pradesh)
2.	Category	
	2.1 Basin	Indus
	2.2 River	Beas
	2.3 Located on tributary/stream	Beas
	2.4 Other Importance (Religious/Tourism/Other)	Important tourist and religious town
3.	Population	12,788
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Beas
	4.2 BOD	<3.0
	4.3 Existing Water Quality (A,B,C,D or E)	B
5.	Status of Water Supply	
	5.1 Source	River/Spring
	5.2 Quantity (mld)	1.73 mld
	5.3 Per capita water supply (lpcd)	70 lpcd
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	NA
	6.2 Interception factor	NA
	6.3 Quantity of sewage generated	3.19 mld
	6.4 Raw Sewage Quality	250 mg/L BOD, 600 mg/L TSS
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	Nil
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	Four (decentralised)
	7.3 Lengths of Intercepting Sewers	3.06 km
	7.4 Quantity of Sewage to be treated	3.19 mld
	7.5 Availability of land for STP	9362 Sqm.
	7.6 Treatment Technology Proposed	Extended Aeration
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. in Crore)	12.12 + 1.818 = 13.938
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>It is an important tourist and religious town.</b>	
	<b>9.1 Design population</b>	<b>19182</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>2.6 mld</b>
	<b>9.3 Sewage generated</b>	<b>1.82 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>0.73 + 0.1095 = 0.8395</b>
	<b>STP</b>	<b>0.73 + 0.1095 = 0.8395</b>
	<b>Non Core Schemes</b>	<b>0.36 + 0.054 = 0.414</b>
	<b>Total</b>	<b>2.093 Recommended</b>
	<b>Recommended due to religious and tourist importance.</b>	
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

Ranking of these towns has been done. As the towns have very small population and the quality of receiving water is better lower points have been assigned.

S.No	Town	Criteria								Total Points
		1	2	3	4	5	6	7	8	
1.	Paonta Sahib	5	20	4	10	5	6	5	6	61
2.	Kulu	5	20	4	10	5	6	5	6	61
3.	Mandi	5	20	4	10	5	6	5	6	61
4.	Manali (LeftBank)	5	20	4	10	5	6	5	6	61

#### Recommendations

Sl. No.	Towns Recommended	Points Scored	Recommended Cost Rs. Crores
1.	Poanta Sahib	61	3.013
2.	Kulu (Manikaran & Bhunter)	61	5.12
3.	Mandi	61	4.404
4.	Manali (Left Bank)	61	2.093
		<b>Total</b>	<b>14.63</b>

## KARNATAKA

Karnataka is famous for its natural beauty, architectural splendour, abundant natural resources, a good industrial base. It has become a leading State in the Information Technology Sector. There are 12 cities located in the Krishna basin. Of these towns, Hubli-Dharwad is a town with the largest population of 648298.

Cauvery is another river which passes through this State. It has three towns in the Cauvery basin in Karnataka but their population is close to fifty thousand each. The river from Talakaveri to Mysore border, Yagachi, D/S of Krishnaraja Sagar Dam to Hoggenkkal have been identified as polluted.

Pollution abatement schemes of the following towns have already been sanctioned.

S. No.	Town	Cost in Rs. Lacs	
	Name of Town	CCEA Approved	Sanctioned
1.	Shimoga	709	374
2.	Harihara	250	237
3.	Bhadravati	459	186
4.	Davanagare	645	404
5.	Krnagar	80	42
6.	Kollegal	71	56
7.	Nanjangud	175	126
8.	Sri Rangapatna	194	139
9.	Bangalore	4627	4627
	<b>Total</b>	<b>7200</b>	<b>6191</b>

The State Government has already approved the schemes of Mangalore and Mysore. It has now proposed the schemes for Hubli-Dharwad, Bagalkot, Gokak, Yadgir and Gangavathi. Except for Hubli-Dharwad, the other towns have a population of less than one lac each. Regarding Bagalkot, it has been stated that the old town came under submergence under the backwaters of Alamatty dam. This town is close to the heritage city of Badami. Gangavathi and Gokak are tourist towns. Hence under special category we may take the towns of Bagalkot, Gokak and Gangavathi may be taken under special category.

The information regarding these towns and the consolidated ranking details are provided in the two proforma.

### Information of Towns For In NRCP 10<sup>th</sup> and 11<sup>th</sup> Plans

1.	Name of Town & State	Hubli – Dharwad, Karnataka
2.	Category	
	2.1. Basin town	River Malaprabha
	2.2. Town on polluted stretch of a river	River Malaprabha
	2.3. Cultural, tourism etc importance	Second largest city in Karnataka. Educational & business centre
3.	Population	7,86,016
4.	Name of body receiving Waste Water and Quality:	
	4.1. Name	Hubli-Unkal Lake, Kerkeri halla to Hirehalla Dharwad-Kelegero pond.
	4.2. BOD:	NA
	4.3. Existing Water Quality (A, B, C, D, E)	NA
5.	Status of Water Supply	
	5.1. Source:	NA
	5.2. Quantity (mld)	57
	5.3. Per capita water supply (lpcd)	72.5
6.	Status of Sewerage System:	
	6.1. Area sewerred (%):	Partly
	6.2. Interception Factor:	NA
	6.3. Quantity of sewage generated	45 mld
	6.4. Raw sewage water quality	
	6.5. Existing I&D (mld)	34.85
	6.6. Existing STP	No STP
	6.6.1. Technology	NA
	6.6.2. Treatment Capacity	NA
	6.7. Internal sewers	
	6.8. Trunk sewers	NA
	6.9. Treatment Facilities	NA
7.	Proposed Schemes:	Underground drainage system
	7.1.No of drains for interception:	NA
	7.2.No of sewage pumping stations	NA
	7.3.Lengths of Intercepting Sewers	NA
	7.4.Quantity of sewage to be treated	NA
	7.5.Availability of land for STP	NA
	7.6.Treatment Technology Proposed	NA
	7.7.Disposal After Treatment	
8.	Cost Estimates (Rs. in Crore)	
	8.1. Core Schemes:	211.00
	8.1.1. I&D	
	8.1.2. STP	
	8.2. Non Core Schemes:	19.00
	8.3 Total:	230.00 + 34.5 = 264.50
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>11.79 lacs</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>159.2 mld</b>
	<b>9.3 Sewage generated</b>	<b>111.4 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>44.56 + 6.684 = 51.244</b>
	<b>STP</b>	<b>44.56 + 6.684 = 51.244</b>
	<b>Non Core Schemes</b>	<b>22.28 + 3.342 = 25.622</b>
	<b>Total</b>	<b>128.110</b>
	<b>Recommended amount of Rs. 128.110 Crores for I&amp;D and STP and not for internal sewers, as indicated by State Govt.</b>	
10.	Willingness of the State Government to make Financial Contribution:	
	Willingness of State Government is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Gokak, Karnataka
2.	Category	
	2.1 Basin	Krishna
	2.2 River	--
	2.3 Located on tributary/stream	Ghataprabha tributary
	2.4 Other Importance (Religious/Tourism/Other)	Tourism
3.	Population	65,166
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Ghataprabha river
	4.2 BOD	1.0 to 5.6 mg/l
	4.3 Existing Water Quality (A,B,C,D or E)	C
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	NA
	5.3 Per capita water supply (lpcd)	NA
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	NA
	6.3 Quantity of sewage generated	8.0 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	Nil
	6.6.1 Technology	
	6.6.2 Treatment Capacity	
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	NA
	7.5 Availability of land for STP	Yes
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	NA
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	10.15
	8.1.2 STP	1.78
	8.2 Non core	2.301
	8.3 Total	14.50 + 2.175 = 16.675
9.	<b>Remarks</b>	
	<b>City is of tourist importance.</b>	
	<b>9.1 Design population</b>	<b>97,749</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>13.23 mld</b>
	<b>9.3 Sewage generated</b>	<b>9.26 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>3.70 + 0.555 = 4.255</b>
	<b>STP</b>	<b>3.70 + 0.555 = 4.255</b>
	<b>Non Core Schemes</b>	<b>1.86 + 0.279 = 2.139</b>
	<b>Total</b>	<b>10.649 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment to meet 30% cost is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Gangavathi, Karnataka
2.	Category	
	2.1 Basin	Krishna
	2.2 River	Tungabbadra
	2.3 Located on tributary/stream	Tungabbadra
	2.4 Other Importance (Religious/Tourism/Other)	Near Anergundi and Hampi. Tourist stay here.
3.	Population	93,299
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Dargamma nala which joins Tungabbadra
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	
5.	Status of Water Supply	
	5.1 Source	Tungabbadra
	5.2 Quantity (mld)	NA
	5.3 Per capita water supply (lpcd)	NA
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	NA
	6.3 Quantity of sewage generated	7.2 mld
	6.4 Raw Sewage Quality	BOD-250 mg/l
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	No STPs.
	6.6.1 Technology	Individual septic tanks and soak pits.
	6.6.2 Treatment Capacity	
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	7.2 mld
	7.5 Availability of land for STP	Yes
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	NA
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	14.33
	8.1.2 STP	--
	8.2 Non core	3.17
	8.3 Total	21.00 including above + 3.15 =
24.15		costs + escalation + centage.
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	9.1 Design population	1.40 lacs
	9.2 Water supply @135 lpcd	18.89 mld
	9.3 Sewage generated	13.22 mld
	9.4 Cost Estimates (Rs. in Crore)	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>5.3 + 0.795 = 6.095</b>
	<b>STP</b>	<b>5.3 + 0.795 = 6.095</b>
	<b>Non Core Schemes</b>	<b>2.62 + 0.395 = 3.0475</b>
	<b>Total</b>	<b>15.2375 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Governments commitment to meet 30% cost is indicated.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Bagalkot City, Karnataka
2.	Category	
	2.1 Basin	Krishna
	2.2 River	--
	2.3 Located on tributary/stream	Ghataprabha
	2.4 Other Importance (Religious/Tourism/Other)	Heritage town Badaini at 20 km.
3.	Population	91,596
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	
	4.2 BOD	1.0 to 5.6 mg/l
	4.3 Existing Water Quality (A,B,C,D or E)	'C'
5.	Status of Water Supply	
	5.1 Source	
	5.2 Quantity (mld)	
	5.3 Per capita water supply (lpcd)	
6.	Status of Sewage System:	No underground drainage and sewerage
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	
	6.3 Quantity of sewage generated	7 mld
	6.4 Raw Sewage Quality	
	6.5 Existing I&D (mld)	7
	6.6 Existing STP	Nil
	6.6.1 Technology	
	6.6.2 Treatment Capacity	
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	NA
	7.5 Availability of land for STP	Yes
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	NA
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	8.21
	8.1.2 SPS	1.97
	8.1.3 STP	4.26
	8.2 Non core	14.68
	8.3 Total	29.12 + 4.368 = 33.488
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>1.374 lacs</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>18.55 mld</b>
	<b>9.3 Sewage generated</b>	<b>12.98 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>5.19 + 0.7785 = 5.9685</b>
	<b>STP</b>	<b>5.19 + 0.7785 = 5.9685</b>
	<b>Non Core Schemes</b>	<b>2.60 + 0.39 = 2.99</b>
	<b>Total</b>	<b>14.927 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Governments commitment to meet 30% cost is indicated.	

### Ranking Table

Name of State : Karnataka

S.No.	Town	Criteria								Total Points
		1	2	3	4	5	6	7	8	
1	Hubli Dharwad	20	12	9	10	5	4	5	6	71
2	Bagalkot	8	12	6	10	5	10	5	6	62
3	Gokak	8	12	6	10	5	10	5	6	62
4	Gangavathi	8	12	4	10	5	10	5	6	60

### Recommendations

Sl. No.	Towns Recommended	Points Scored	Recommended Cost Rs. Crores
1.	Hubli Dharwad	71	128.110
2.	Gokak	62	10.649
3.	Gangavathi	62	15.2375
4.	Bagalkot	60	14.927
		<b>Total</b>	<b>168.92</b>

## MAHARASHTRA

Maharashtra State is one of the most developed states of India. It is large both in terms of area and population (96.75 million). It has a leading position in industrial development and is regarded as the financial capital of the country. It receives significant amount of rainfall during the monsoon and is served by a number of rivers such as Godavari, Bhima and Krishna. Because of its high population and development, the rivers and tributaries are steadily under growing threat of pollution and other degradation. It is necessary to plan and implement conservation measures.

The Godavari basin has 13 Class I towns in the State and 15 towns whose population is less than one lac. The river from downstream of Nashik to Nanded and Nanded City limits in Maharashtra and upstream of Bhadrachalam at Mancheral and Ramagundam in AP have been identified as polluted. The major sources of pollution are domestic and industrial waste water from Nashik and Nanded cities.

Krishna basin covers large areas in the States of Maharashtra, Karnataka and Andhra Pradesh. All the major tributaries fall in to the river in the upper two-thirds of its length. The river has two large tributaries Bhima and Tungabhadra and four smaller tributaries. There are five towns in the basin in Maharashtra each with a population of less than 1.0 lac. The polluted stretches include Karad to Sangli, Dhom Dam to Narasarobadi in Maharashtra and on river Nira, a tributary in Maharashtra.

Under the National River Conservation Plan schemes of pollution abatement of five towns have been sanctioned as in the following table:

Town	Cost in Rs. Lacs	
	Approved by CCEA	Sanctioned
Karad	1331	318
Sangli	1484	295
Nasik	6889	6201
Nanded	1449	1293
Trimbakeshwar	1164	1164
Total	12317	9274

The State Government has sent new proposals for abatement of pollution in respect of 13 towns. In addition proposals in respect of three towns have been received from the municipal bodies directly. Of the 13 towns, proposals proposed by the State Government, Prakasha, Navapur, and Wai have very small population being 9500, 29974 and 31090 respectively. The proposals received in respect of the three towns of khopoli, Nandanbur and Paithan whose population is very small are also likely to yield negligible quantity of waste water. These towns are not likely to have internal sewers also. Hence the waste water flowing to the receiving body is likely to be negligible. The proposals for pollution abatement in respect of towns with population less than one lac are therefore not being included in the proposals.

The proposals have been summarized in separate proforma as below:

<b>S. No.</b>	<b>Name of Town</b>	<b>Proforma No.</b>
1.	Kolhapur	Mha (i)
2.	Nagpur	Mha (ii)
3.	Sholapur	Mha (iii)
4.	Pune	Mha (iv)
5.	Chandrapur	Mha (v)
6.	Ichalkaranji	Mha (vi)
7.	Wardha	Mha (vii)
8.	Pimpri	Mha (viii)
9.	Bhusawal	Mha (ix)
10.	Pandarpur	Mha (x)

The consolidated ranking details are provided on proforma Mha (xi).

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Kolhapur, Maharashtra
2.	Category	
	2.1 Basin	Krishna
	2.2 River	Krishna
	2.3 Located on tributary/stream	Panchganga
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	4,84,101
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Panchganga
	4.2 BOD	--
	4.3 Existing Water Quality (A,B,C,D or E)	--
5.	Status of Water Supply	
	5.1 Source	Panchganga & Bhagwati rivers, Kalamba Lake
	5.2 Quantity (mld)	99
	5.3 Per capita water supply (lpcd)	140
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	30% or 20.04 sq.kms.
	6.2 Interception factor	0.65
	6.3 Quantity of sewage generated	65 mld
	6.4 Raw Sewage Quality	140 mg/l (BOD)
	6.5 Existing I&D (mld)	2+4 kms sewerage mains
	6.6 Existing STP	
	6.6.1 Technology	Primary Treatment through Settling tank
	6.6.2 Treatment Capacity	43.5 mld
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	75 mld
	7.5 Availability of land for STP	30 Acres
	7.6 Treatment Technology Proposed	UASB
	7.7 Disposal After Treatment	on land
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	16.00
	8.1.2 STP	30.00
	8.2 Non Core Schemes	
	8.3 Total	46.00 + 6.9 = 52.9
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>7.26 lac</b>
	<b>9.2 Water supplied @ 135 lpcd</b>	<b>98 mld</b>
	<b>9.3 Sewage generated</b>	<b>68.6 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>27.44 + 4.116 = 31.556</b>
	<b>STP</b>	<b>27.44 + 4.116 = 31.556</b>
	<b>Non Core Scheme</b>	<b>13.72 + 2.058 = 15.778</b>
	<b>Total</b>	<b>78.890</b>

**Since the cost estimates of State Government Rs. 52.9Crore is lower than computed it is recommended.**

10. Willingness of State Governments To Make Financial Contribution:

Yes, Willingness of State Governments is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Nagpur, Maharashtra
2.	Category	
	2.1 Basin	Wardha
	2.2 River	--
	2.3 Located on tributary/stream	Wardha
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	27,00,000
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Wardha
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	--
5.	Status of Water Supply	
	5.1 Source	
	5.2 Quantity (mld)	470
	5.3 Per capita water supply (lpcd)	NA
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	NA
	6.2 Interception factor	
	6.3 Quantity of sewage generated	400
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	Conventional
	6.6.2 Treatment Capacity	100 mld
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	
	7.4 Quantity of Sewage to be treated	300 mld
	7.5 Availability of land for STP	Yes
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	NA
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	Nil
	8.1.2 STP	46.00 + 6.9 = 52.9
	8.2 Total	
9.	Remarks	
	<b>Recommendations</b>	
	<b>9.1 Projected population</b>	<b>40.5 lacs</b>
	<b>9.2 Water supplied @ 180 lpcd</b>	<b>729.0 mld</b>
	<b>9.3 Sewage generated</b>	<b>510.3 mld</b>
	<b>9.4 Existing STP capacity</b>	<b>100 mld</b>
	<b>9.5 Extra Capacity Required</b>	<b>410.3 mld</b>
	<b>9.6 Cost Estimates (Rs. in Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>164.1 + 24.615 = 188.715</b>
	<b>STP</b>	<b>164.1 + 24.615 = 188.715</b>
	<b>Non Core Scheme</b>	<b>82.1 + 12.315 = 94.415</b>
	<b>Total</b>	<b>471.840</b>

**The amount estimated by State Govt. is lower hence Rs. 52.9 crores are recommended.**

10. Willingness of State Governments To Make Financial Contribution:  
Yes, The willingness of State Government is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Sholapur, Maharashtra
2.	Category	
	2.1 Basin	River Krishna Basin
	2.2 River	Bhima
	2.3 Located on tributary/stream	Bhima
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	8,73,000
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Land will be used for irrigation
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	Towns – Hippage & Yashwant; River Bhima
	5.2 Quantity (mld)	183
	5.3 Per capita water supply (lpcd)	115
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	
	6.2 Interception factor	
	6.3 Quantity of sewage generated	114 mld
	6.4 Raw Sewage Quality	336 mg/l
	6.5 Existing I&D (mld)	54
	6.6 Existing STP	1 No.
	6.6.1 Technology	Conventional (ASP – assumed)
	6.6.2 Treatment Capacity	54 mld
7.	Proposed Schemes	
	7.1 No. of drains for interception	1
	7.2 No. of Sewage Pumping Stations	4
	7.3 Lengths of Intercepting Sewers	35 kms
	7.4 Quantity of Sewage to be treated	60 mld
	7.5 Availability of land for STP	50 Ha.
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	Irrigation
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	25.46
	8.1.2 STP	18.76
	8.2 Non Core Schemes	2.48
	8.3 Total	46.70 + 7.005 = 53.705
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>13.095 lac</b>
	<b>9.2 Water supply @ 135 lpcd</b>	<b>176.71 mld</b>
	<b>9.3 Sewage generated</b>	<b>123.7 mld</b>
	<b>9.4 Existing Treatment Capacity</b>	<b>54 mld</b>
	<b>9.5 Additional Treatment Capacity required</b>	<b>69.7 mld</b>
	<b>9.6 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>27.88 + 4.182 = 32.062</b>
	<b>STP</b>	<b>27.88 + 4.182 = 32.062</b>
	<b>Non Core Scheme</b>	<b>13.94 + 2.091 = 16.031</b>
	<b>Total</b>	<b>80.155</b>

Since the cost estimates of Government is 53.705 lower than computed it is recommended.

10. Willingness of State Governments To Make Financial Contribution:

Yes, The willingness of State Government is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Pune, Maharashtra
2.	Category	
	2.1 Basin	Krishna
	2.2 River	
	2.3 Located on tributary/stream	Mula Mutha
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	27,00,000
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Mula – Mutha rivers
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	Domestic supply = 365 mld. Gross supply =608 mld. Average 456 mld
	5.3 Per capita water supply (lpcd)	140 for domestic and 130 for non domestic. Average 169 lpcd.
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	NA
	6.2 Interception factor	0.8
	6.3 Quantity of sewage generated	292 mld – domestic and 486 mld gross. Average 365 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	85 mld
	6.6 Existing STP	Bahiroba – 32 mld; IDH – 80 mld
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	112 mld
7.	Proposed Schemes	
	7.1 No. of drains for interception	Remaining 3 zones will be covered
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	80.8 kms
	7.4 Quantity of Sewage to be treated	215 mld – planned. Reqd. 339 mld
	7.5 Availability of land for STP	Yes
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	(NA – presumably Mula – Mutha rivers)
8.	Cost Estimates (Rs. in Crore)	Not provided
	8.1 Core Schemes	
	8.1.1 I&D	
	8.1.2 STP	
	8.2 Non Core Schemes	
	8.3 Total	
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>40.5 lacs</b>
	<b>9.2 Water supply @ 180 lpcd</b>	<b>729.0 mld</b>
	<b>9.3 Sewage generated</b>	<b>510.3 mld</b>
	<b>9.4 Existing Treatment Capacity</b>	<b>112.0 mld</b>
	<b>9.5 Additional Treatment Capacity of STP required</b>	<b>398.3 mld</b>
	<b>9.6 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>159.3 + 23.895 = 183.195</b>
	<b>STP</b>	<b>159.3 + 23.895 = 183.195</b>
	<b>Non Core Scheme</b>	<b>79.65 + 11.947 = 91.597</b>
	<b>Total</b>	<b>475.987 Recommended</b>
10.	Willingness of State Governments To Make Financial Contribution:	
	Yes, The willingness of State Government is indicated.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Chandrapur, Maharashtra
2.	Category	
	2.1 Basin	
	2.2 River	
	2.3 Located on tributary/stream	Wainganga
	2.4 Other Importance (Religious/Tourism/Other)	
3.	Population	2,97,612
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Irai and Zarpat rivers
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	NA
	5.3 Per capita water supply (lpcd)	NA
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Not Covered
	6.2 Interception factor	Not A
	6.3 Quantity of sewage generated	3 drains with 10 mld each. Total 30 mld.
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	3
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	3.0 km
	7.4 Quantity of Sewage to be treated	30 mld
	7.5 Availability of land for STP	Yes 30,000 sq.meters
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	NA
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	2.55
	8.1.2 STP	6.00
	8.2 Non Core Schemes	
	8.2.1 LCS 22 community toilets	1.76
	8.2.2 Crematoria 1 No.	0.30
	8.2.3 RFD	0.81
	8.2.4 Other (plantation)	0.80
	8.3 Total	11.91 + 1.7865 = 13.6965
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>4.455 lac</b>
	<b>9.2 Water supply @ 180 lpcd</b>	<b>60.14 mld</b>
	<b>9.3 Sewage generated</b>	<b>42.10 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>16.84 + 2.526</b>
	<b>STP</b>	<b>16.84 + 2.526 = 19.366</b>
	<b>Non Core Scheme</b>	<b>8.42 + 1.263 = 9.683</b>
	<b>Total</b>	<b>48.415</b>
	<b>Govt. recommended cost of Rs. 13.69 crore is lower hence it is recommended.</b>	
10.	Willingness of State Governments To Make Financial Contribution:	
	Yes, willingness of State Govt. is indicated.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Ichalkaranji, Maharashtra
2.	Category	
2.1	Basin	Krishna
2.2	River	
2.3	Located on tributary/stream	Panchganga (Tributary)
2.4	Other Importance (Religious/Tourism/Other)	
3.	Population	2,57,600
4.	Name of body receiving Waste Water & Quality:	
4.1	Name	Panchganga
4.2	BOD	NA
4.3	Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
5.1	Source	Panchganga
5.2	Quantity (mld)	74
5.3	Per capita water supply (lpcd)	130
6.	Status of Sewage System:	
6.1	Area Sewered (%)	50%
6.2	Interception factor	0.5
6.3	Quantity of sewage generated	37 mld
6.7	Raw Sewage Quality	NA
6.8	Existing I&D (mld)	20
6.9	Existing STP	
6.6.1	Technology	NA
6.6.2	Treatment Capacity	20 mld
7.	Proposed Schemes	
7.1	No. of drains for interception	NA
7.2	No. of Sewage Pumping Stations	NA
7.3	Lengths of Intercepting Sewers	4680 m
7.4	Quantity of Sewage to be treated	20 mld
7.5	Availability of land for STP	Yes
7.6	Treatment Technology Proposed	Oxidation Pond
7.7	Disposal After Treatment	River/Irrigation
8.	Cost Estimates (Rs. in Crore)	
8.1	Core Schemes	
8.1.1	I&D	6.46
8.1.2	STP	5.10
8.2	Non Core Schemes	2.72
8.3	Total	14.28 + 2.142 = 16.422
9.	Remarks	
	<b>Recommendations</b>	
9.1	<b>Design population</b>	<b>3.855 lac</b>
9.2	<b>Water supply @ 135 lpcd</b>	<b>52.0 mld</b>
9.3	<b>Sewage generated</b>	<b>36.43 mld</b>
9.4	<b>Existing STP Capacity</b>	<b>20.00 mld</b>
9.5	<b>Additional Capacity of STP required</b>	<b>16.43 mld</b>
9.6	<b>Cost estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>6.57 + 0.9855 = 7.5555</b>
	<b>STP</b>	<b>6.57 + 0.9855 = 7.5555</b>
	<b>Non Core Scheme</b>	<b>3.29 + 0.4935 = 3.7836</b>
	<b>Total</b>	<b>18.8946</b>

Since the government estimate 16.422 crores is lower it is recommended.

10. Willingness of State Governments To Make Financial Contribution:  
Yes, Willingness of State Government is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Wardha, Maharashtra
2.	Category	
	2.1 Basin	Godavari
	2.2 River	Wardha
	2.3 Located on tributary/stream	Wardha
	2.4 Other Importance (Religious/Tourism/Other)	Heritage Town
3.	Population	31,800
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Wardha
	4.2 BOD	6-8 at Nasik (DS of Wardha)
	4.3 Existing Water Quality (A,B,C,D or E)	
5.	Status of Water Supply	
	5.1 Source	Wardha
	5.2 Quantity (mld)	4.2
	5.3 Per capita water supply (lpcd)	70
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	267 Ha
	6.2 Interception factor	--
	6.3 Quantity of sewage generated	2.52 mld
	6.10 Raw Sewage Quality	NA
	6.11 Existing I&D (mld)	Nil
	6.12 Existing STP	Nil
	6.6.1 Technology	
	6.6.2 Treatment Capacity	
7.	Proposed Schemes	
	7.1 No. of drains for interception	
	7.2 No. of Sewage Pumping Stations	
	7.3 Lengths of Intercepting Sewers	
	7.4 Quantity of Sewage to be treated	2.52 mld
	7.5 Availability of land for STP	Yes
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	Nil
	8.1.2 STP	10.53 + 1.5795 = 12.1095
	8.2 Non Core Schemes	
	8.3 Total	
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>48000</b>
	<b>9.2 Water supply @ 135 lpcd</b>	<b>6.48 mld</b>
	<b>9.3 Sewage generated</b>	<b>4.54 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>1.82 + 0.273 = 2.093</b>
	<b>STP</b>	<b>1.82 + 0.273 = 2.093</b>
	<b>Non core schemes</b>	<b>0.90 + 0.136 = 1.046</b>
	<b>Total</b>	<b>5.232 Recommended</b>
10.	Willingness of State Governments To Make Financial Contribution: Yes, Willingness of State Government is indicated.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Pimpri Maharashtra
2.	Category	
	2.1 Basin	Krishna
	2.2 River	Pawana
	2.3 Located on tributary/stream	Pawana
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	10,00,000
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Pawana River
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	River
	5.2 Quantity (mld)	200
	5.3 Per capita water supply (lpcd)	135
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	60
	6.2 Interception factor	-
	6.3 Quantity of sewage generated	90 mld
	6.4 Raw Sewage Quality	150-250 mg/l
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	
	6.6.1 Technology	ASP
	6.6.2 Treatment Capacity	152 in 6 STPs
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	NA
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	NA
8.	Cost Estimates (Rs. in Crore)	11.51
	8.1 Core Schemes	$11.51 + 1.7265 = 13.2365 \cong 13.24$
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>15.0 lacs</b>
	<b>9.2 Water supply @ 180 lpcd</b>	<b>270.0 mld</b>
	<b>9.3 Sewage generated</b>	<b>189.0 mld</b>
	<b>9.4 Existing sewage treatment capacity</b>	<b>152.0 mld</b>
	<b>9.5 Additional STP Capacity required</b>	<b>37.0 mld</b>
	<b>9.6 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b><math>14.8 + 2.22 = 17.02</math></b>
	<b>STP</b>	<b><math>14.8 + 2.22 = 17.02</math></b>
	<b>Non core schemes</b>	<b><math>7.4 + 1.11 = 8.51</math></b>
	<b>Total</b>	<b>42.55</b>

**Since government estimate of Rs. 13.24 crore is lower hence is recommended.**

10. Willingness of State Governments To Make Financial Contribution:  
Yes, Willingness of State Governments is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Bhusawal, Maharashtra
2.	Category	
	2.1 Basin	Tapi
	2.2 River	Tapi
	2.3 Located on tributary/stream	--
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	1,72,366
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Tapi
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	Tube well and Tapi river
	5.2 Quantity (mld)	40 mld (22 to m.c. BSL and 18 mld to Central Railway)
	5.3 Per capita water supply (lpcd)	
6.	Status of Sewage System:	Open gutter
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	
	6.3 Quantity of sewage generated	40 mld
	6.4 Raw Sewage Quality	450 mg/l
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	
	6.6.2 Treatment Capacity	
7.	Proposed Schemes	
	7.1 No. of drains for interception	4
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	6 kms
	7.4 Quantity of Sewage to be treated	40 mld in one STP
	7.5 Availability of land for STP	Yes
	7.6 Treatment Technology Proposed	1 STP – oxidation pond
	7.7 Disposal After Treatment	Discharge in river
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	0.50
	8.1.2 STP	8.00
	8.2 Non Core Schemes	
	8.2.1 LCS	649 community toilets
	8.2.2 Crematoria	5
	8.2.3 RFD/Plantation	Nil
	8.3 Total	$8.50 + 1.275 = 9.775 \approx 9.8$
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>2,60,000</b>
	<b>9.2 Water supply @ 135 lpcd</b>	<b>35.1 mld</b>
	<b>9.3 Sewage generated</b>	<b>24.57 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b><math>9.83 + 1.4745 = 11.3045</math></b>
	<b>STP</b>	<b><math>9.83 + 1.4745 = 11.3045</math></b>
	<b>Non core schemes</b>	<b><math>4.91 + 0.7365 = 5.6465</math></b>
	<b>Total</b>	<b>28.2555</b>

**Since the government estimate of Rs. 9.8 crore is lower it is recommended.**

10. Willingness of State Governments To Make Financial Contribution:  
Willingness of State Government is indicated.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Pandharpur, Maharashtra
2.	Category	
	2.1 Basin	Krishna
	2.2 River	Bhima
	2.3 Located on tributary/stream	--
	2.4 Other Importance (Religious/Tourism/Other)	Religious town
3.	Population	1,06,381.10
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Bhima
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	
5.	Status of Water Supply	
	5.1 Source	River
	5.2 Quantity (mld)	16.0
	5.3 Per capita water supply (lpcd)	135
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	4.0 km (25.0)
	6.2 Interception factor	--
	6.3 Quantity of sewage generated	135 mld
	6.4 Raw Sewage Quality	BOD 300-350 mg/l
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	--
	6.6.1 Technology	4.5 mld
	6.6.2 Treatment Capacity	
7.	Proposed Schemes	
	7.8 No. of drains for interception	3
	7.9 No. of Sewage Pumping Stations	2
	7.10 Lengths of Intercepting Sewers	5.345 km
	7.11 Quantity of Sewage to be treated	7.0
	7.12 Availability of land for STP	20 Ha.
	7.13 Treatment Technology Proposed	--
	7.14 Disposal After Treatment	Irrigation
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	7.43
	8.1.2 STP	1.85
	8.2 Non Core Schemes	15.09
	8.3 Total	23.37 + 3.5055 = 26.8755
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>1,59,571</b>
	<b>9.2 Water supply @ 135 lpcd</b>	<b>21.5 mld</b>
	<b>9.3 Sewage produced</b>	<b>15.08 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>6.03 + 0.9045 = 6.9345</b>
	<b>STP</b>	<b>6.03 + 0.9045 = 6.9345</b>
	<b>Non core schemes</b>	<b>3.02 + 0.453 = 3.473</b>
	<b>Total</b>	<b>17.342 Recommended</b>
10.	Willingness of State Governments To Make Financial Contribution: Yes	
	Willingness of State Government is indicated.	

**Ranking Table****Name of State : Maharashtra**

S.No	Town	Criteria								Total
		1	2	3	4	5	6	7	8	
1.	Kolhapur	12	12	9	6	5	10	3	6	63
2.	Nagpur	20	12	9	6	5	4	3	6	61
3.	Sholapur	20	12	6	6	5	10	3	6	64
4.	Pune	20	12	9	6	5	10	5	6	69
5.	Chandapur	8	12	6	10	5	6	5	6	54
6.	Ichalkaranji	8	12	6	6	5	10	5	6	58
7.	Wardhra	8	12	6	10	5	4	5	6	56
8.	Pimpri	20	12	6	6	5	4	5	6	64
9.	Bhusawal	8	20	6	10	5	10	3	6	68
10.	Pandarpur	8	12	6	6	5	6	3	6	52

### Recommendations

Sl. No.	Towns Recommended	Points Scored	Recommended Cost Rs. Crores
1.	Kolhapur	63	52.90
2.	Nagpur	61	52.90
3.	Sholapur	64	53.705
4.	Pune	69	457.987
5.	Chandapur	54	13.69
6.	Ichalkaranji	58	16.422
7.	Wardhra	56	5.232
8.	Pimpri	64	13.24
9.	Bhusawal	68	9.80
10.	Pandarpur	52	17.342
		<b>Total</b>	<b>693.216</b>

## ORISSA

Orissa is predominantly a rural and riverine state of great Hindu and Jain Temples. It is located along the eastern coast of peninsula. The area of Orissa is 155,707 sq.km. Three major rivers Mahanadi, Brahmani & Baitarni and many small costal rivers Swarnamukhi, Nagavali, Vamsadhara, Ong, Rushikulya, Patma, Bahuda, Dhanai, Rukhikulya and other minor rivers constitute the riverine resources. The state has 27 districts. The state has rich mineral resources. Fig. 3.8.1.

The Orissa state, under National River Conservation Plan was sanctioned schemes in five towns of Chandbali, Cuttack, Dharamshala, Talcher & Puri as per details below:

Town	Cost in Rs. Lacs	
	Approved by CCEA	Sanctioned
Chandrabali	97.36	00.0
Cuttack	1404.00	684.40
Dharamshala	220.32	00.0
Talcher	676.62	00.0
Puri	4829.00	4829.00

The sanctions of Cuttack included only part of the town. In the new schemes, the towns of Cuttack and Puri have been included. Other towns of Chandrabali, Dharamshala and Talcher have not been included since the proposals are with the NRCD.

The religious town of Puri was sanctioned waste water collection-system and sewage treatment plant. No proposal of community toilets, crematoria and river front development were included in the states submission and accordingly not sanctioned. The town is famous for Lord Jaganath's temple where thousands of devotees visit temple every day. The tourists from all over the country visit the town specially during Rath Yatra. **For a town of such importance, non core schemes including public awareness and public participation are of immense importance.** The town also has a good solid waste collection system and a mechanised composting plant which processes 30 tons of solid wastes per day. A system of drains also exists but they are choked due to silting and solid wastes. They require maintenance on a regular and sustained basis.

The proposals have been grouped in ongoing and New schemes.

### I. Ongoing Schemes

Sl. No.	Name of town	Proforma No.
1.	Puri	Ori(i)

### II. New Schemes

1.	Bhubaneswar	Ori(ii)
2.	Cuttack	Ori(iii)
3.	Rourkela	Ori(iii)
4.	Greater Sambalpur	Ori(iv)
5.	Berhampur	Ori(vi)

The consolidated ranking details are provided on proforma Ori (vii).

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1. Name of town and state Puri, Orissa
2. Category
  - 2.1 Basin
  - 2.2 River
  - 2.3 Located on tributary/stream
  - 2.4 Other Importance (Religious/Tourism/Other)
3. Population
4. Name of body receiving Waste Water & Quality:
  - 4.1 Name
  - 4.2 BOD
  - 4.3 Existing Water Quality (A,B,C,D or E)
5. Status of Water Supply
  - 5.1 Source
  - 5.2 Quantity (mld)
  - 5.3 Per capita water supply (lpcd)
6. Status of Sewage System:
  - 6.1 Area Sewered (%)
  - 6.2 Interception factor
  - 6.3 Quantity of sewage generated
  - 6.4 Raw Sewage Quality
  - 6.5 Existing I&D (mld)
  - 6.6 Existing STP
    - 6.6.1 Technology
    - 6.6.2 Treatment Capacity

**The town has recently been approved schemes for**

- |   |                           |
|---|---------------------------|
| <b>a) Waste water collection system</b> | <b>Rs. 35.22</b>          |
| <b>b) Sewage Treatment</b>              | <b>Rs. 9.32</b>           |
|   | <b>Rs. 44.54</b>          |
|   | <b>Centage Rs. 3.56</b>   |
|   | <b>Land cost Rs. 0.19</b> |
|   | <b>Rs. 48.29</b>          |

**9. Remarks****Recommendations**

**The proposal includes a lumpsum grant Rs. 5.75 crores for crematoria/LCS/public awareness. The non core component was not included in the sanctioned schemes.**

**10. Willingness of State Governments to Make Financial Contribution:**

Yes, State Government Commitment is available.

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Bhubaneswar, Orissa
2.	Category	
	2.1 Basin	Mahanadi
	2.2 River	Kuakhai & Daya
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	6,57,477
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Kuakhai & Daya
	4.2 BOD	≈ 6.0 mg/L
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	Ground water & river
	5.2 Quantity (mld)	206
	5.3 Per capita water supply (lpcd)	313
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	27.34 k <sup>2</sup> , (27.4%)
	6.2 Interception factor	0.6
	6.3 Quantity of sewage generated	160 mld
	6.4 Raw Sewage Quality	BOD, 235.0 TS:1600 mg/L
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	10 Nos.
	7.2 No. of sewages pumping stations	7 Nos.
	7.3 Lengths of Intercepting Sewers	50 km
	7.4 Quantity of Sewage to be treated	160 mld
	7.5 Availability of land for STP	Yes, 47, Ha for seven units
	7.6 Treatment Technology Proposed	FAB
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. in Crore)	
	Core Schemes	235.0
	Non core schemes	30.0
	Total	265.00 + 39.75 = 304.75
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>9,86,215</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>133 mld</b>
	<b>9.3 Sewage generated</b>	<b>93.2 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>37.28 + 5.592 = 42.872</b>
	<b>STP</b>	<b>37.28 + 5.592 = 42.872</b>
	<b>Non Core Schemes</b>	<b>18.64 + 2.796 = 21.436</b>
	<b>Total</b>	<b>107.180 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution: Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Cuttack, Orissa
2.	Category	
	2.1 Basin	Mahanadi
	2.2 River	Mahanadi & Kathojori
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	5,35,139
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Mahanadi & Kathojori
	4.2 BOD	~ 6.0 mg/L
	4.3 Existing Water Quality (A,B,C,D or E)	D
5.	Status of Water Supply	
	5.1 Source	Wells
	5.2 Quantity (mld)	121
	5.3 Per capita water supply (lpcd)	221
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	1.50 Sq.km. (10%)
	6.2 Interception factor	0.6
	6.3 Quantity of sewage generated	72.6 mld
	6.4 Raw Sewage Quality	BOD, 150 mg/L 235.0 TS:1600 mg/L
	6.5 Existing I&D (mld)	Nil, six under construction
	6.6 Existing STP	
	6.6.1 Technology	Waste stabilization ponds
	6.6.2 Treatment Capacity	33 mld under construction
7.	Proposed Schemes	
	7.1 No. of drains for interception	At least 4
	7.2 No. of sewages pumping stations	At least 4
	7.3 Lengths of Intercepting Sewers	-
	7.4 Quantity of Sewage to be treated	40 mld
	7.5 Availability of land for STP	8.0 Ha and 3.3 Ha for maturation ponds
	7.6 Treatment Technology Proposed	FAB
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. in Crore)	
	Core Schemes	165.00
	Non Core Schemes	17.00
	Total	182.00
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>8,02,708</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>108.4 mld</b>
	<b>9.3 Sewage generated</b>	<b>75.8 mld</b>
	<b>9.4 Already sanctioned</b>	<b>33.0 mld</b>
	<b>9.5 Additional proposal</b>	<b>42.8 mld</b>
	<b>9.6 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>17.12 + 2.568 = 19.688</b>
	<b>STP</b>	<b>17.12 + 2.568 = 19.688</b>
	<b>Non Core Schemes</b>	<b>8.56 + 1.284 = 9.844</b>
	<b>Total</b>	<b>49.220 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Rourkela (Panposh), Orissa
2.	Category	
	2.1 Basin	Brahmani river
	2.2 River	Brahmani
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	200,000
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Brahmani
	4.2 BOD	> 3.0 mg/L
	4.3 Existing Water Quality (A,B,C,D or E)	D
5.	Status of Water Supply	
	5.1 Source	Brahmani & Koel
	5.2 Quantity (mld)	19.75
	5.3 Per capita water supply (lpcd)	94.0
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	-
	6.3 Quantity of sewage generated	15 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	-
	6.6.2 Treatment Capacity	-
7.	Proposed Schemes	
	7.1 No. of drains for interception	Five drains
	7.2 No. of sewages pumping stations	Five
	7.3 Lengths of Intercepting Sewers	30 Km
	7.4 Quantity of Sewage to be treated	18.0 mld
	7.5 Availability of land for STP	9 Ha
	7.6 Treatment Technology Proposed	FAB
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. in Crore)	
	Core Schemes	72.0
	Non Core Schemes	8.00
	Total	80.00 + + 12.0 = 92.0
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>300,000</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>40.5 mld</b>
	<b>9.3 Sewage generated</b>	<b>28.3 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>11.32 + 1.698 = 13.018</b>
	<b>STP</b>	<b>11.32 + 1.698 = 13.018</b>
	<b>Non Core Schemes</b>	<b>5.66 + 0.849 = 6.509</b>
	<b>Total</b>	<b>32.545 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution: Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Greater Sambalpur, Orissa
2.	Category	
	2.1 Basin	Mahanadi
	2.2 River	Mahanadi
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	2,25,730
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Mahanadi
	4.2 BOD	≈ 5.0 mg/L
	4.3 Existing Water Quality (A,B,C,D or E)	D
5.	Status of Water Supply	
	5.1 Source	Hirakund reservoir & Manahadi river
	5.2 Quantity (mld)	44.5
	5.3 Per capita water supply (lpcd)	197
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	-
	6.3 Quantity of sewage generated	35.6 mld
	6.4 Raw Sewage Quality	Nil
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	5 (Sambalpur 3, Burla Hirakund 2)
	7.2 No. of sewages pumping stations	5
	7.3 Lengths of Intercepting Sewers	38 Km
	7.4 Quantity of Sewage to be treated	35.6 mld
	7.5 Availability of land for STP	11 Ha (Sambalpur 3, Burla 2 & Hirakund 2)
	7.6 Treatment Technology Proposed	FAB
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. in Crore)	
	Core Schemes	85.00
	Non Core Schemes	7.00
	Total	92.00 + 13.8 = 105.8
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>The town of Sambalpur, Hirakund &amp; Burla are contiguous and hence considered together. The sewage generated is 35.6 mld. (suggested by State Govt.).</b>	
	<b>9.1 Design population</b>	<b>338595</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>45.7 mld</b>
	<b>9.3 Sewage generated</b>	<b>32.0 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>12.8 + 1.92 = 14.72</b>
	<b>STP</b>	<b>12.8 + 1.92 = 14.72</b>
	<b>Non Core Schemes</b>	<b>6.4 + 0.96 = 7.36</b>
	<b>Total</b>	<b>36.80 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution: Yes, State Government Commitment is available.	

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Berhampur, Orissa
2.	Category	
	2.1 Basin	Rushikulya-Vansdhara-Nagabali
	2.2 River	Nil
	2.3 Located on tributary/stream	Rushikulya
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	3,20,00
4.	Name of body receiving Waste Water & Quality:	In a pond
	4.1 Name	-
	4.2 BOD	-
	4.3 Existing Water Quality (A,B,C,D or E)	D
5.	Status of Water Supply	
	5.1 Source	Rushikulya
	5.2 Quantity (mld)	33
	5.3 Per capita water supply (lpcd)	100
6.	Status of Sewage System:	-
	6.1 Area Sewered (%)	NA
	6.2 Interception factor	-
	6.3 Quantity of sewage generated	26 mld
	6.4 Raw Sewage Quality	Nil
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	2 (Sapua Nalla & Bahana Nalla)
	7.2 No. of sewages pumping stations	4
	7.3 Lengths of Intercepting Sewers	10 Km Trunk sewer 5 km
	7.4 Quantity of Sewage to be treated	26 mld
	7.5 Availability of land for STP	20 Ha
	7.6 Treatment Technology Proposed	Oxidation Ponds
	7.7 Disposal After Treatment	Pisciculture-Irrigation
8.	Cost Estimates (Rs. in Crore)	
	Core Schemes	117.00
	Non Core Schemes	13.00
	Total	130.00 + 19.50 = 149.50
9.	<b>Remarks</b>	
	<b>9.1 Design population</b>	<b>4,80,000</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>64.7 mld</b>
	<b>9.3 Sewage generated</b>	<b>45.36 mld</b>
	<b>9.4 Cost Estimates (Rs. in Crore)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>18.15 + 2.72 = 20.87</b>
	<b>STP</b>	<b>18.15 + 2.72 = 20.87</b>
	<b>Non Core Schemes</b>	<b>9.06 + 1.36 = 10.42</b>
	<b>Total</b>	<b>52.16 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution: Yes/No	
	Yes, State Government Commitment is available.	

**Ranking Table****Name of State Orissa**

Sl. No.	Town	Criteria								Total Points
		1	2	3	4	5	6	7	8	
1	Bhubneshwar	20	20	9	6	5	10	3	6	79
2	Cuttack	20	20	9	6	3	10	3	6	77
3	Rourkela	08	20	6	10	5	6	3	6	64
4	Sambalpur	08	20	6	10	5	6	3	6	64
5	Berhampur	12	12	6	10	5	6	3	6	60

**Recommendations**

Sl. No.	Towns Recommended	Points Scored	Recommended Cost Rs. Crores
1.	Puri	-	5.75
2.	Bhubneshwar	79	107.18
3.	Cuttack	77	49.22
4.	Rourkela	64	32.545
5.	Sambalpur	64	36.80
6.	Berhampur	60	52.16
		<b>Total</b>	<b>283.655</b>

## PUNJAB

The population of Punjab is 24.28 million as per 2001 census. In Punjab there are high and low mountains and is drained by Ravi, Beas, Sutlej and Ghaggar rivers. Many of the towns have been covered earlier in NRCP. The towns of Punjab which were considered are Patiala, Rajpura, Zirakpur, Dera Bassi, Mukerian and Samana. Out of which only Patiala qualifies for funding. Patiala is discharging waste into river Ghaggar.

Proforma No.	Town
Pun(i)	Patiala

Ranking table is given in proforma Pun(ii).

\* Augmentation of STP capacity in Ludhiana & Jalandhar (towns already covered under ongoing NRCP) as well as works in towns of Rajpura, Dera Bassi & Zirakpur could be considered for which detailed information is awaited.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Patiala, Punjab
2.	Category	
	2.1 Basin	Indus River
	2.2 River	Ghaggar
	2.3 Located on tributary/stream	--
	2.4 Other Importance (Religious/Tourism/Other)	--
3.	Population	3.23309 lacs
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Ghaggar
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	D
5.	Status of Water Supply	
	5.1 Source	Ground
	5.2 Quantity (mld)	50.77 mld
	5.3 Per capita water supply (lpcd)	135
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	25 sq.km (42%)
	6.2 Interception factor	
	6.3 Quantity of sewage generated	45.40 mld
	6.4 Raw Sewage Quality	BOD 290 mg/L, TSS 382 mg/L.
	6.5 Existing I&D (mld)	38.64
	6.6 Existing STP	Nil
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	Nil
	7.2 No. of Sewage Pumping Stations	Nil
	7.3 Lengths of Intercepting Sewers	26.25 km
	7.4 Quantity of Sewage to be treated	59.38
	7.5 Availability of land for STP	NA, to be acquired
	7.6 Treatment Technology Proposed	UASB (1)
	7.7 Disposal After Treatment	Broad irrigation/river
8.	Cost Estimates (Rs. in Crore)	
	8.1 Core Schemes	
	8.1.1 I&D	16.995
	8.1.2 STP	22.89
	8.2 Non core	0.56
	8.3 Total	40.45 + 6.0675 = 46.52
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>484963</b>
	<b>9.2 Water Supply @ 135 lpcd</b>	<b>65.5 mld</b>
	<b>9.3 Total Sewage generated</b>	<b>45.85 mld</b>
	<b>9.3 Cost Estimates (Rs. in Crore)</b>	
	<b>Core schemes</b>	
	<b>I&amp;D</b>	<b>18.34 + 2.75 = 21.09</b>
	<b>STP</b>	<b>18.34 + 2.75 = 21.09</b>
	<b>Non core schemes</b>	<b>9.17 + 1.375 = 10.54</b>
	<b>Total</b>	<b>52.72</b>

**The state recommended cost is less than estimated cost by AHEC hence the state cost of Rs. 46.52 Crores is recommended.**

10. Willingness of State Governments To Make Financial Contribution:  
Yes, State Government Commitment is available.

**Ranking Table**

Name of State : Punjab

S.No	Town	Criteria								Total Rs. crores
		1	2	3	4	5	6	7	8	
1.	Patiala	12	12	9	6	5	4	2	6	56

**Recommendations**

Sl. No.	Towns Recommended	Points Scored	Recommended Cost Rs. Crores
1.	Patiala	56	46.52
		<b>Total</b>	<b>46.52</b>

## UTTAR PRADESH

- A. The state of Uttar Pradesh with a geographical area of 236,286 sq.km. accounts for 9% of India's land area. The state has 70 districts and a population of 166,052,859 inhabitants approximately 17% of national population. The riverine system is vast and includes thirteen major and medium rivers.

Ganga, Yamuna, Gomti, Ghagra, Ram Ganga, Sai, Rapti, Saryu, Hindon, Kali east, Kali-west, Rihand & Sharda. The state has 624 towns as per details below:

Class 1 towns	41
Class 2 towns	45
Other small towns	538

All the major towns have piped water supply system. The sewage generated in ample quantities has led to the pollution of rivers. The constant increase of population and industries has put great burden on the water resources of the states.

Under Ganga Action Plan Phase I, the Ganga Action Plan Phase II and Gomti Action Plan, the following towns were sanctioned, the conservation programme of rivers and successfully implemented.

### Ganga Action Plan Phase I

Sl. No.	Town	Sanctioned Cost Appo. CCEA (lacs)	Population 2001	Sewage produced mld
1.	Allahabad	6608.95	9,90,298	210.00
2.	Farukhabad-Fatehgarh	253.98	2,27,876	9.00
3.	Haridwar-Rishikesh	Under Uttaranchal Government		
4.	Kanpur	15749.51	2532138	371.0
5.	Mirzapur	2448.71	2,05,264	23.00
6.	Varanasi	9517.68	1100748	250.00

### Ganga Action Plan Phase II, Yamuna Action Plan & Gomti Action Plan

Sl. No.	Town	Sanctioned Cost Appo. CCEA (lacs)	Population 2001	Sewage produced mld
7.	Anupshahr	575.78	23,676	3.0
8.	Bijnore	744.98	79,368	15.0
9.	Chunar	493.50	33,919	3.0
10.	Garhmukteshwar	162.45	33,432	3.0
11.	Ghazipur	811.80	95,243	14.0
12.	Mughalsarai	421.40	88,386	10.5
13.	Agra	7752.05	1,25,9979	212.0
14.	Etawah	979.91	2,11,460	17.0
15.	Ghaziabad	9496.59	9,68,521	150.0
16.	Mathura	2912.72	2,98,827	30.0
17.	Muzaffarnagar	1323.64	3,16,452	50.0
18.	Noida	2939.79	3,25,000	70.0
19.	Saharanpur	2660.59	4,52,925	55.0
20.	Vrindavan	988.66	56,618	12.50
21.	Jaunpur	581.00	1,59,996	14.00
22.	Lucknow	31333.00	22,07,340	345.0
23.	Sultanpur	491.00	10,0085	7.0

## B. Proposals of State Government

The following towns have been recommended for inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> plans. The proposed costs on present basis and on the basis of holistic approach are listed below:

### Priority I towns

Sl. No.	Towns	Cost on the present basis in Rs. Crores	Costs on the holistic basis in Rs. Crores
1.	Aligarh	108.80	380.61
2.	Meerut	222.36	612.31
3.	Bareilly	114.08	398.91
4.	Gorakhpur	101.78	356.00

*Other priority I towns include Gangaghat Unnao and Firozabad. Both the towns are small but are directly located on the banks of river Ganga and Yamuna respectively.*

5.	Gangaghat Unnao	11.50	40.37
6.	Firozabad	144.43	158.92

Two towns of Ayodhya & Chitrakoot have small population but the requirement on religious ground have mandated their inclusion.

7.	Ayodhya	8.07	28.27
8.	Chitrakoot	7.95	27.85

### Priority II towns

Some important towns on tributaries of Ganga, Yamuna & other towns not covered in Gomti Action plan have been recommended for funding under NRCD as priority II towns.

Sl. No.	Towns	Cost in present basis in Rs. Crores	Holistic basis in Rs. crores
1.	Moradabad	104.52	365.51
2.	Raibareilly	26.55	96.49
3.	Kannauj*	12.88	40.77
4.	Partapgarh	12.93	40.95
5.	Hapur	37.81	119.74
6.	Bulandshar	31.73	100.47
7.	Hathras	22.18	702.5.0
8.	Loni	21.72	68.78
9.	Modinagar	20.33	64.36
10.	Banda*	24.27	76.85
11.	Sitapur*	24.73	86.54
12.	Lakheempur	24.73	68.72
13.	Pilibhit	19.75	70.73
14.	Barabanki*	13.52	42.80

Further, it is felt that Ayodhya & Chitrakoot may be considered on holistic pattern since they are religious places.

Full sewerage facilities alongwith solid waste disposal is recommended. Public awareness and public participation is also required specially during melas and the congregations.

### **C Recommended Schemes**

The schemes recommended for inclusion in NRCD plans are as follows:

i) **On going schemes under Ganga Action Plan and Gomti Action Plan provision has been made as below:**

Allahabad	Rs. 305.0 Crores
Varanasi	Rs. 230.0 Crores
Kanpur	Rs. 425.0 Crores
Saidpur	Rs. 5.75 Crores
Ghaziipur	Rs. 17.50 Crores
Mugal Sarai	Rs. 2.30 Crores
Chunar	Rs. 3.45 Crores
Jaunpur	Rs. 19.55 Crores
Sultanpur	Rs. 9.2 Crores
Lucknow	Rs. 375.0
<b>Total</b>	<b>Rs. 1395.72 Crores</b>

The lumpsum figures have been indicated by NRCD.

ii) **On going schemes under Yamuna Action Plan**

The balance works in UP for Rs. 354 crore under YAP-III as per break-up given below has also been included as recommended by NRCD.

Saharanpur	Rs. 36.80 Crores
Muzaffarnagar	Rs. 24.15 Crores
Ghaziabad	Rs. 69.00 Crores
Vrindavan	Rs. 31.05 Crores
Mathura	Rs. 149.50 Crores
Agra	Rs. 54.05 Crores
Etawah	Rs. 19.55 Crores
Noida	Rs. 23.00 Crores
<b>Total</b>	<b>Rs. 407.1 Crores</b>

**iii) New schemes (on priority basis)**

<b>Sl. No.</b>	<b>Name of Town</b>	<b>Proforma No.</b>
1.	Bareilly	U.P. (i)
2.	Moradabad	U.P. (ii)
3.	Meerut	U.P. (iii)
4.	Firozabad	U.P. (iv)
5.	Aligarh	U.P. (v)
6.	Sitapur	U.P. (vi)
7.	Gorakhpur	U.P. (vii)
8.	Lakheempur	U.P. (viii)
9.	Pilibhit	U.P. (ix)
10.	Ganga Ghat Unnao	U.P. (x)
11.	Ayodhya	U.P. (xi)
12.	Chitrakoot	U.P. (xii)
13.	Raibareilly	U.P. (xiii)

The ranking is given on U.P. (xiv) proforma.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Bareilly, U.P.
2.	Category	
	2.1 Basin	Ganga Basin
	2.2 River	Ram Ganga
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	6,99,839
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Ram Ganga
	4.2 BOD	-
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	119.0
	5.3 Per capita water supply (lpcd)	170.0
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	83.3 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	83.3 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	Ram Ganga
8.	Cost Estimates (Rs. Cores)	125.97 + 18.89 = 144.865
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>10,49,758</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>141.7 mld</b>
	<b>9.3 Sewage generated</b>	<b>99.2 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core schemes</b>	
	<b>I &amp; D</b>	<b>39.68 + 5.95 = 45.63</b>
	<b>STP</b>	<b>39.68 + 5.95 = 45.63</b>
	<b>Non Core Schemes</b>	<b>19.84 + 2.98 = 28.82</b>
	<b>Total Recommended</b>	<b>114.08 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Moradabad, U.P.
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Ram Ganga
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	6,41,240
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Ram Ganga
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	51.98
	5.3 Per capita water supply (lpcd)	80
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	36.39 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	NA
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of Sewage Pumping Stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	40.0 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	115.42 + 17.31 = 132.73
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>9,61,860</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>130 mld</b>
	<b>9.3 Sewage generated</b>	<b>90.8 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>36.32 + 5.49 = 41.81</b>
	<b>STP</b>	<b>36.32 + 5.49 = 41.81</b>
	<b>Non Core Schemes</b>	<b>18.16 + 2.74 = 20.90</b>
	<b>Total</b>	<b>104.52 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Meerut, U.P.
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Kali West-Yamuna
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	10,74,229
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Kali-West
	4.2 BOD	> 12.0 mg/L
	4.3 Existing Water Quality (A,B,C,D or E)	E
5.	Status of Water Supply	
	5.1 Source	Ground Water
	5.2 Quantity (mld)	250.25
	5.3 Per capita water supply (lpcd)	232
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	175.18 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	Nil
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewage pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	175 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	Kali West
8.	Cost Estimates (Rs. Crores)	193.36 + 29.0 = 222.36
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>16,11,343</b>
	<b>9.2 Water supply @130 lpcd</b>	<b>290 mld</b>
	<b>9.3 Sewage generated</b>	<b>203 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>81.2 + 12.18 = 93.18</b>
	<b>STP</b>	<b>81.2 + 12.18 = 93.18</b>
	<b>Non Core Schemes</b>	<b>40.6 + 6.09 = 46.69</b>
	<b>Total</b>	<b>233.05</b>

**Since the cost proposed by the State Govt. is lower than computed by AHEC. Hence Rs. 222.36 crore is recommended.**

10. Willingness of State Governments to Make Financial Contribution:

Yes, State Government Commitment is available.

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Firozabad, U.P.
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Yamuna
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	2,78,801
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Yamuna
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	E
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	20.0
	5.3 Per capita water supply (lpcd)	70.0
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	20.0 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	14.0 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	50.18 + 7.53 = 57.71
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>4,18,201</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>56.46 mld</b>
	<b>9.3 Sewage generated</b>	<b>39.5 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>15.8 + 2.37 = 18.71</b>
	<b>STP</b>	<b>15.8 + 2.37 = 18.71</b>
	<b>Non Core Schemes</b>	<b>7.9 + 1.19 = 8.09</b>
	<b>Total</b>	<b>44.43 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Aligarh, U.P.
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Karwan - Yamuna
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	6,67,732
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Karwan
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	75.36
	5.3 Per capita water supply (lpcd)	110
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	52.75 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	NA
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	53.0 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	120.19 + 18.03 = 138.22
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>10,01,598</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>135.2 mld</b>
	<b>9.3 Sewage generated</b>	<b>94.6 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>37.84 + 5.68 = 43.52</b>
	<b>STP</b>	<b>37.84 + 5.68 = 43.52</b>
	<b>Non Core Schemes</b>	<b>18.92 + 2.84 = 21.76</b>
	<b>Total</b>	<b>108.80 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Sitapur, U.P.
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Gomti
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	1,51,527
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Gomti
	4.2 BOD	>3.0
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	Ground Water
	5.2 Quantity (mld)	12.0
	5.3 Per capita water supply (lpcd)	79.0
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Unsewered
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	8.4 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	8.4 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	Gomti River
8.	Cost Estimates (Rs. Crores)	27.33 + 4.10 = 31.43
9.	<b>Remarks</b>	
	<b>The town is recommended on the basis of SC order</b>	
	<b>9.1 Design population</b>	<b>2,27,740</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>30.7 mld</b>
	<b>9.3 Sewage generated</b>	<b>21.5 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>8.6 + 1.29 = 9.89</b>
	<b>STP</b>	<b>8.6 + 1.29 = 9.89</b>
	<b>Non Core Schemes</b>	<b>4.3 + 0.645 = 4.95</b>
	<b>Total</b>	<b>24.73 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Gorakhpur, U.P.
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Rapti
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	6,24,570
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Rapti
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	78.5
	5.3 Per capita water supply (lpcd)	125
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	54.9 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	54.9 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	112.42 + 16.86 = 129.28
9.	<b>Remarks</b>	
	<b>9.1 Design population</b>	<b>9,36,855</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>126.5 mld</b>
	<b>9.3 Sewage generated</b>	<b>88.5 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>35.40 + 5.31 = 40.71</b>
	<b>STP</b>	<b>35.40 + 5.31 = 40.71</b>
	<b>Non Core Schemes</b>	<b>17.70 + 2.66 = 20.36</b>
	<b>Total</b>	<b>101.78 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Lakheempur, U.P.
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Gomti
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	1,20,566
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Gomti
	4.2 BOD	-
	4.3 Existing Water Quality (A,B,C,D or E)	-
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	11.52
	5.3 Per capita water supply (lpcd)	95
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	9.0 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	9.0 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	Gomti River
8.	Cost Estimates (Rs. Crores)	21.70 + 3.26 = 24.96
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>The town is recommended on the basis of SC order</b>	
	<b>9.1 Design population</b>	<b>1,80,849</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>24.4 mld</b>
	<b>9.3 Sewage generated</b>	<b>17.1 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>6.84 + 1.07 = 7.91</b>
	<b>STP</b>	<b>6.84 + 1.07 = 7.91</b>
	<b>Non Core Schemes</b>	<b>3.42 + 0.51 = 3.93</b>
	<b>Total</b>	<b>19.75 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Pilibhit, U.P.
2.	Category	
	2.1 Basin	Gomti
	2.2 River	Yamuna
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	1,24,082
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Gomti
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	12.86
	5.3 Per capita water supply (lpcd)	103
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	9.0 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	9.0 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	NA
8.	Cost Estimates (Rs. Crores)	22.30 + 3.35 = 25.65
9.	<b>Remarks</b>	
	<b>The town is recommended on the basis of SC order</b>	
	<b>9.1 Design population</b>	<b>1,86,123</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>25.13 mld</b>
	<b>9.3 Sewage generated</b>	<b>17.59 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>7.04 + 1.06 = 8.10</b>
	<b>STP</b>	<b>7.04 + 1.06 = 8.10</b>
	<b>Non Core Schemes</b>	<b>3.51 + 0.53 = 4.05</b>
	<b>Total</b>	<b>20.25 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Ganga Ghat Unnao, U.P.
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Ganga
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	70,817
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Ganga
	4.2 BOD	>3.0 mg/L
	4.3 Existing Water Quality (A,B,C,D or E)	D
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	3.65
	5.3 Per capita water supply (lpcd)	50
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	Nil
	6.3 Quantity of sewage generated	2.56 mld
	6.4 Raw Sewage Quality	Nil
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	2.56 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	12.75 + 1.91 = 14.66
9.	<b>Remarks</b>	
	<b>The town is recommended on the basis of SC order. It is located on the bank of river Ganga.</b>	
	<b>9.1 Design population</b>	<b>1,06,225</b>
	<b>9.2 Water supply @130 lpcd</b>	<b>14.34 mld</b>
	<b>9.3 Sewage generated</b>	<b>10.0 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>4.0 + 0.6 = 4.6</b>
	<b>STP</b>	<b>4.0 + 0.6 = 4.6</b>
	<b>Non Core Schemes</b>	<b>2.0 + 0.3 = 2.3</b>
	<b>Total</b>	<b>11.5 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Ayodhya, U.P.
2.	Category	
	2.1 Basin	Ganga
	2.2 River	Saru
	2.3 Located on tributary/stream	Saru
	2.4 Other Importance (Religious/Tourism/Other)	An important religious town
3.	Population	49,593
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Saru
	4.2 BOD	NA
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	6.48
	5.3 Per capita water supply (lpcd)	130
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Unsewered
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	4.54 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	0.54 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	8.93 + 1.34 = 10.27
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>74,389</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>10.04 mld</b>
	<b>9.3 Sewage generated</b>	<b>7.02 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>2.80 + 0.42 = 3.22</b>
	<b>STP</b>	<b>2.80 + 0.42 = 3.22</b>
	<b>Non Core Schemes</b>	<b>1.42 + 0.21 = 1.63</b>
	<b>Total</b>	<b>8.07 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Chitrakoot, U.P.
2.	Category	
	2.1 Basin	
	2.2 River	Mandakini
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	Very important religious town
3.	Population	48,859
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Mandakini River
	4.2 BOD	-
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	3.5
	5.3 Per capita water supply (lpcd)	75
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Unsewered
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	4.54 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	
	6.6.1 Technology	Nil
	6.6.2 Treatment Capacity	Nil
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	0.54 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	8.79 + 1.34 = 10.27
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>73,288</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>9.9 mld</b>
	<b>9.3 Sewage generated</b>	<b>6.9 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>2.76 + 0.42 = 3.18</b>
	<b>STP</b>	<b>2.76 + 0.42 = 3.18</b>
	<b>Non Core Schemes</b>	<b>1.38 + 0.21 = 1.59</b>
	<b>Total</b>	<b>7.95 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

1.	Name of town and state	Raibareilly, U.P.
2.	Category	
	2.1 Basin	-
	2.2 River	-
	2.3 Located on tributary/stream	Sai-Ganga
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	1,69,285
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Sai
	4.2 BOD	3.0
	4.3 Existing Water Quality (A,B,C,D or E)	NA
5.	Status of Water Supply	
	5.1 Source	NA
	5.2 Quantity (mld)	18.4
	5.3 Per capita water supply (lpcd)	108
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Partial
	6.2 Interception factor	0.7
	6.3 Quantity of sewage generated	12.88 mld
	6.4 Raw Sewage Quality	NA
	6.5 Existing I&D (mld)	NA
	6.6 Existing STP	
	6.6.1 Technology	NA
	6.6.2 Treatment Capacity	NA
7.	Proposed Schemes	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	A
	7.3 Lengths of Intercepting Sewers	NA
	7.4 Quantity of Sewage to be treated	2.88 mld
	7.5 Availability of land for STP	NA
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	30.47 + 5.5705 = 35.04
9.	<b>Remarks</b>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>2,25,927</b>
	<b>9.2 Water supply @135 lpcd</b>	<b>30.5 mld</b>
	<b>9.3 Sewage generated</b>	<b>21.35 mld</b>
	<b>9.4 Cost Estimates (Rs. Crores)</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>8.54 + 1.28 = 10.82</b>
	<b>STP</b>	<b>8.54 + 1.28 = 10.82</b>
	<b>Non Core Schemes</b>	<b>4.27 + 0.64 = 4.91</b>
	<b>Total</b>	<b>26.55 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

## Ranking Table

## Name of State U.P.

Sl. No.	Town	Criteria								Total
		1	2	3	4	5	6	7	8	
1	Bareilly	20	20	6	10	5	4	3	6	74
2	Moradabad	20	20	6	10	5	4	3	6	74
3	Meerut	20	12	15	6	5	4	3	6	71
4*	Firozabad	8	20	15	10	5	4	3	6	71
5	Aligarh	20	12	6	6	5	4	3	6	62
6•	Sitapur	8	20	6	10	5	4	3	6	62
7	Gorakhpur	20	8	6	6	5	4	3	6	58
8•	Lakheempur	8	20	6	6	5	4	3	6	58
•9•	Pilibhit	8	8	6	6	5	4	3	6	58
10*	Ganga Ghat	8	8	6	10	5	4	3	6	54
11**	Ayodhya	8	8	6	10	5	4	3	6	54
12**	Chitrakoot	8	8	6	10	5	4	3	6	54
13	Raibareilly	8	8	6	6	5	4	3	6	50

## Recommendations

A

Sl. No.	Towns Recommended	Points Scored	Recommended Cost Rs. Crores
1	Bareilly	74	114.08
2	Moradabad	70	104.52
3	Meerut	71	222.36
4*	Firozabad	71	44.43
5	Aligarh	62	108.80
6•	Sitapur	62	24.73
7	Gorakhpur	58	101.78
8•	Lakheempur	58	19.75
•9•	Pilibhit	58	20.25
10*	Ganga Ghat	54	11.50
11**	Ayodhya	54	8.07
12**	Chitrakoot	54	7.95
13	Raibareilly	50	26.55
		<b>Sub total</b>	<b>814.77</b>

B. On going schemes of Ganga &amp; Gomti Action Plan Rs.

C. On going schemes under Yamuna Action Plan Rs.

## DELHI

1. Delhi, the capital of India, is situated on the banks of the river Yamuna, surrounded in the North, West and South by the state of Haryana and in the East by the state of Uttar Pradesh. Delhi with a geographical area of 1484 sq. km. has a population of 14 million inhabitants approximately. It is situated at longitude 77°13'16.08" E & latitude 28°37'58.55" N and altitude of 220m above MSL. The Yamuna, which bisects Delhi, was its perennial source of water in the initial time.

New Delhi was planned as the capital of India in year 1912, taking into account the fact that Delhi was located between the Ridge-a green lung that also acted as a buffer against the dry winds from the Western dessert and the Yamuna, which provided a good flow of clean water.

The topography created a drainage system that carried rain and storm water from the higher elevations of the West to the Yamuna, providing a natural drainage. While this was the situation, on the West of the Yamuna, the Eastern, low-lying side was originally a part of the flood plain of the river and considered un-inhabitable due to frequent floods. However, settlements in this area also known as the Trans Yamuna area houses about 20% of the total population of Delhi.

Delhi is the most important city from the angle of pollution of River Yamuna. It requires the maximum coverage of work.

### **Works done under YAP-I:**

Components	Details
Sewage Treatment Plants	2 nos. BIOFOR (10 mld each) 4 nos./ 10 mld (Mini) 10 nos./ 150 cum/day (Micro)
Community Toilet Complex (CTC)	956 nos./27000 seats
Electric Crematorium	2 nos.
Demo. Disinfection Plants	2 MLD Ultra-Violet

### **Works to be implemented under YAP-II:**

Components	Details
Sewage Treatment Plants	1. Okhla STP: New construction, Capacity 135 MLD 2. Keshopur STP Rehabilitation. Three STPs with a total capacity 324 MLD (54+90+180)
Sewer System	1. Bela Road Sewer Line: New construction, Length 4 km, Size 500 & 600 mm 2. Wazirabad Sewer Line: New Construction (a) Length 10.75 km, Size 450 to 1200 mm (b) Length 3.925 km, Size 850 to 2000 mm 3. Ring Road Sewer Line: Rehabilitation, Length 23 km, includes Topographic Survey, Desilting, Joint Strengthening, Settlement and Lining

**Works should be carried out under YAP-III:**

<b>Sl. No.</b>	<b>Name of Trunk Sewer</b>	<b>Length of Trunk Sewer (Kms.)</b>
1.	Trunk Sewer from Harsh Vihar to Haiderpuri SPS	3.70
2.	University Trunk Sewer from Nangia Park Shakti Nagar to Nehru Vihar	5.15
3.	North Trunk Sewer from Bharat Nagar bridge to Patel Chest bridge	5.33
4.	West Delhi Trunk Sewer Moti Nagar to Keshopur STP (Najafgarh Trunk Sewer)	7.00
5.	Relieving Trunk Sewer Vishal Cinema to Keshopur STP	5.00
6.	Jail Road Trunk Sewer from Lajwanti Chowk to Keshopur STP	7.50
7.	Punjabi Bagh Trunk Sewer Rohtak road to Keshopur STP	8.00
8.	Trunk Sewer from Geeta Col. to Preet Vihar SPS	2.50
9.	Trunk Sewer no. 5 from Behari Col. to Preet Vihar SPS	3.20
10.	Trunk Sewer from Jhilmil Colony to Jagriti SPS	3.30
11.	Trunk Sewer no1 from Kailash Nagar to Geeta Col SPS	2.18
12.	Sewer from Ganesh Nagar to Preet Vihar SPS	4.15
13.	Trunk Sewer Coming to Dilshad Garden SPS	1.00
14.	Outfall Sewer from Q point to Kilokari SPS Reach under DJB (2.40 Km) Reach under NDMC	2.05
15.	Cross Connection No.2 at Bhagwan Dass Road	1.50
16.	Cross Connection No. 3 at Zoo Park (Cornwallis Road) Reach under DJB	0.50
17.	Cross Connection No.4 near Nizamuddin (Barapulla Nalla) Jangpura	2.20
18.	Sewer along Arbindo Marg	4.70
19.	Karol Bagh Sewer from block 65 Rohtak Road to Gurudwara Kishan Ganj	4.00
20.	Revival & rehabilitation of Indian Express Sewer	1.84
21.	Sita Ram Bazar EGG shape Sewer	0.84
<b>Total Length of Sewers</b>		<b>75.64</b>

## Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Delhi
2.	Category	
	2.1 Basin	Ganga Basin
	2.2 River	Yamuna
	2.3 Located on tributary/stream	-
	2.4 Other Importance (Religious/Tourism/Other)	Capital City
3.	Population	14.0 million (as per 2001 census)
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	River Yamuna
	4.2 BOD	28-33 mg/l (June, 03)
	4.3 Existing Water Quality (A,B,C,D or E)	E
5.	Status of Water Supply	
	5.1 Source	River Yamuna, Ground Water
	5.2 Quantity (mld)	3292 mld + 4.54 mld = 3750 mld (only DJB supply)
	5.3 Per capita water supply (lpcd)	267 lpcd
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	55%
	6.2 Interception factor	-
	6.3 Quantity of sewage generated	3087 mld (680 MGD)
	6.4 Raw Sewage Quality	BOD (175 mg/l)
	6.5 Existing I&D trunks sewers	150 kms.
	6.6 Existing STP	
	6.6.1 Technology	Activate Sludge, BIOFOR
	6.6.2 Treatment Capacity	2324 mld (17 STPs)
7.	Proposed Schemes (YAP-III)	
	7.1 No. of drains for interception	NA
	7.2 No. of sewages pumping stations	NA
	7.3 Lengths of Intercepting Sewers	75.64 kms.
	7.4 Quantity of Sewage to be treated	1294 mld
	7.5 Availability of land for STP	To be acquired
	7.6 Treatment Technology Proposed	NA
	7.7 Disposal After Treatment	NA
8.	Cost Estimates (Rs. Crores)	Rs. 822.30 + 123.35 = 945.65
9.	<b>Remarks</b>	
	<i>The above information was given in this proforma by NRCD</i>	
	<b>Recommendations</b>	
	<b>9.1 Design population</b>	<b>21 million</b>
	<b>9.2 Water supply @ 200 mpcd</b>	<b>4200 mld</b>
	<b>9.3 Sewage generated</b>	<b>2940 mld (interception factor 0.7)</b>
	<b>9.4 STP capacity available</b>	<b>2324 mld</b>
	<b>9.5 Additional capacity</b>	<b>615 mld cost estimates</b>
	<b>9.6 Cost estimates</b>	
	<b>Core Schemes</b>	
	<b>I&amp;D</b>	<b>246.0 crores + 36.9 = Rs. 282.9 crores</b>
	<b>STP</b>	<b>246.0 crores + 36.9 = Rs. 282.9 crores</b>
	<b>Non Core Schemes</b>	<b>123.0 crores + 18.45 = Rs. 141.45 crores</b>
	<b>Total</b>	<b>707.25 Recommended</b>
10.	Willingness of State Governments to Make Financial Contribution:	
	Yes, State Government Commitment is available.	

## JAMMU & KASHMIR

The J&K state is in extreme north and is bound north by China, east by Tibet, south by Himachal Pradesh and Punjab and west by Pakistan. The population of the state is 10.07 million.

The state has two Central Public Sector and thirty medium scale industries. The main traditional handicraft industries are silk spinning, wood carving, papier-mache and carpet weaving. The mineral resources includes coal, bauxite and gypsum. The main crops are rice, wheat and maize. The state has beautiful lakes and serene environment.

Under Jhelum Action Plan State Govt. has proposed four important towns. This excludes lake conservation programmes.

The data supplied by NRCD and abstract of costs are included in proformas given below:

Anantnag	JK (i) a & JK (i) b
Baramulla	JK (ii) a & JK (ii) b
Sopore	JK (iii) a & JK (iii) b
Srinagar	JK (iv) a & JK (iv) b

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Anantnag, J&K
2.	Category	
	2.1 Basin	Indus River Basin
	2.2 River	Jhelum
	2.3 Located on tributary/stream	Town located on the bank of river
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	50,494 (1998 population)
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Jhelum River
	4.2 BOD	5.25 mg/l (Upstream)
	4.3 Existing Water Quality (A,B,C,D or E)	6.5 mg/l (Downstream)
5.	Status of Water Supply	
	5.1 Source	Lidder river (a tributary of Jhelum)
	5.2 Quantity (mld)	10 mld
	5.3 Per capita water supply (lpcd)	200 lpcd
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	-
	6.2 Interception factor	0.8
	6.3 Quantity of sewage generated	8.0 mld
	6.4 Raw Sewage Quality	BOD (225-275 mg/l)
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	-
	6.6.2 Treatment Capacity	-
7.	Proposed Schemes (YAP-III)	
	7.1 No. of drains for interception	-
	7.2 No. of sewages pumping stations	4 nos. (including one MPS)
	7.3 Lengths of Intercepting Sewers	-
	7.4 Quantity of Sewage to be treated	10 mld (flow of year 2008)
	7.5 Availability of land for STP	10 Acre (to cater to flows upto 2028)
	7.6 Treatment Technology Proposed	ASP
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	
	Core schemes	
	I&D	16.26
	STP (including land cost)	7.52
	Non core schemes	4.87
	<b>Total</b>	<b>28.65 + 4.30 = 32.95</b>

#### 9. Remarks

**The recommendations are based on costs indicated by NRCD (proforma JK (i) b for core and non core schemes. Land costs, centages and O&M have not been included.**

#### Core Schemes

<b>I&amp;D</b>	<b>14.17 + 2.13 = 16.30</b>
<b>STP</b>	<b>5.60 + 0.84 = 6.44</b>
<b>Non Core Schemes</b>	<b>1.24 + 0.186 = 2.06</b>
<b>Total</b>	<b>24.166 Recommended</b>

#### 10. Willingness of State Governments to Make Financial Contribution:

Yes, State Government Commitment is available.

**General Abstract of Costs for Anantnag**

<b>Sl. No.</b>	<b>Description</b>	<b>Total Capital Cost (Rs. Lacs)</b>	<b>Total Land Cost (Rs. Lacs)</b>	<b>Total Annual O&amp;M Cost (Rs. Lacs)</b>
A	Interception and Diverion System	1,41,6.83	9.20	107.95
B	Sewage Treartment System	560.00	100.00	61.50
C	Low Cost Sanitation System	96.21	16.75	0.96
D	Solid Waste Management	146.19	126.00	18.65
E	Crematoria	1.50		0.02
F	Afforestation	6.00		
G	Community Pariticpaiton	20.00		
H	Biomonitoring and Water Quality Monitoring	25.00		
I	Insitutional Development and Ttraining	20.00		
	<b>Total cost</b>	<b>2,291.72</b>	<b>251.95</b>	<b>189.18</b>
	Centages@14%	320.84		
	<b>Total</b>	<b>2,612.57</b>	<b>251.95</b>	<b>189.18</b>

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Baramulla, J&K
2.	Category	
	2.1 Basin	Indus River Basin
	2.2 River	Jhelum
	2.3 Located on tributary/stream	Town located on the bank of river
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	54,158 (1998 population)
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Jhelum River
	4.2 BOD	5.50 mg/l (Upstream)
	4.3 Existing Water Quality (A,B,C,D or E)	6.35 mg/l (Downstream)
5.	Status of Water Supply	
	5.1 Source	Mostly from river Jhelum + tubewells
	5.2 Quantity (mld)	8.7 mld
	5.3 Per capita water supply (lpcd)	160 lpcd
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	0.70
	6.3 Quantity of sewage generated	6.07 mld
	6.4 Raw Sewage Quality	BOD (225-275 mg/l)
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	-
	6.6.2 Treatment Capacity	-
7.	Proposed Schemes (YAP-III)	
	7.1 No. of drains for interception	-
	7.2 No. of sewages pumping stations	3 nos. (including one MPS)
	7.3 Lengths of Intercepting Sewers	-
	7.4 Quantity of Sewage to be treated	10 mld (flow of year 2008)
	7.5 Availability of land for STP	7.5 Acre (to cater to flows upto 2028)
	7.6 Treatment Technology Proposed	ASP
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	
	Core schemes	
	I&D	12.96
	STP (including land cost)	7.24
	Non core schemes	5.22
	<b>Total</b>	<b>25.42</b>

#### 9. Remarks

**The recommendations are based on costs indicated by NRCD (proforma JK (ii) b for core and non core schemes. Land costs, centages and O&M have not been included.**

#### Core Schemes

<b>I&amp;D</b>	<b>11.29 + 1.694 = 15.10</b>
<b>STP</b>	<b>5.60 + 0.84 = 6.44</b>
<b>Non Core Schemes</b>	<b>1.18 + 0.18 = 1.36</b>
<b>Total</b>	<b>22.7835 Recommended</b>

#### 10. Willingness of State Governments to Make Financial Contribution:

Yes, State Government Commitment is available.

**General Abstract of Costs for Baramula**

<b>Sl. No.</b>	<b>Description</b>	<b>Total Capital Cost (Rs. Lacs)</b>	<b>Total Land Cost (Rs. Lacs)</b>	<b>Total Annual O&amp;M Cost (Rs. Lacs)</b>
A	Interception and Diverion System	1,129.45	7.17	39.22
B	Sewage Treartment System	560.00	75.00	61.60
C	Low Cost Sanitation System	92.04	-	0.92
D	Solid Waste Management	174.37	150.00	22.00
E	Crematoria	1.00	-	0.01
F	Bathing Ghats	0.72	-	
G	Afforestation	4.00	-	
H	Community Pariticpaiton	20.00	-	
I	Biomonitoring and Water Quality Monitoring	25.00	-	
J	Insitutional Development and Ttraining	20.00	-	
	<b>Total cost</b>	<b>2,026.58</b>	<b>232.17</b>	<b>123.75</b>
	Centages@14%	283.72		
	<b>Total</b>	<b>2,310.30</b>	<b>232.17</b>	<b>123.75</b>

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Sopore, J&K
2.	Category	
	2.1 Basin	Indus River Basin
	2.2 River	Jhelum
	2.3 Located on tributary/stream	Town located on the bank of river
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	54,658 (1998 population)
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Jhelum River
	4.2 BOD	5.48 mg/l (Upstream)
	4.3 Existing Water Quality (A,B,C,D or E)	8.50 mg/l (Downstream)
5.	Status of Water Supply	
	5.1 Source	Ningali Nalla + tubewells
	5.2 Quantity (mld)	9.56 mld
	5.3 Per capita water supply (lpcd)	175 lpcd
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	Nil
	6.2 Interception factor	0.70
	6.3 Quantity of sewage generated	6.70 mld
	6.4 Raw Sewage Quality	BOD (225-275 mg/l)
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	-
	6.6.2 Treatment Capacity	-
7.	Proposed Schemes (YAP-III)	
	7.1 No. of drains for interception	-
	7.2 No. of sewages pumping stations	5 nos. (including one MPS)
	7.3 Lengths of Intercepting Sewers	-
	7.4 Quantity of Sewage to be treated	11 mld (flow of year 2008)
	7.5 Availability of land for STP	10 Acre (to cater to flows upto 2028)
	7.6 Treatment Technology Proposed	ASP
	7.7 Disposal After Treatment	River
8.	Cost Estimates (Rs. Crores)	
	Core schemes	
	I&D	19.45
	STP (including land cost)	9.30
	Non core schemes	4.00
	<b>Total</b>	<b>32.75 + 4.91 = 37.66</b>

#### 9. Remarks

**The recommendations are based on costs indicated by NRCD (proforma JK (iii) b for core and non core schemes. Land costs, centages and O&M have not been included.**

#### Core Schemes

<b>I&amp;D</b>	<b>16.86 + 2.53 = 19.39</b>
<b>STP</b>	<b>6.15 + 0.92 = 7.07</b>
<b>Non Core Schemes</b>	<b>1.39 + 0.21 = 1.50</b>
<b>Total</b>	<b>27.96 Recommended</b>

#### 10. Willingness of State Governments to Make Financial Contribution:

Yes, State Government Commitment is available.

**General Abstract of Costs for Sopore**

<b>Sl. No.</b>	<b>Description</b>	<b>Total Capital Cost (Rs. Lacs)</b>	<b>Total Land Cost (Rs. Lacs)</b>	<b>Total Annual O&amp;M Cost (Rs. Lacs)</b>
A	Interception and Diverion System	1685.89	20.06	67.30
B	Sewage Treartment System	616.00	200.00	67.76
C	Low Cost Sanitation System	113.82	13.94	1.14
D	Solid Waste Management	181.69	-	23.00
E	Crematoria	1.50	-	0.02
F	Bathing Ghats	1.04	-	-
G	Afforestation	2.30	-	-
H	Community Pariticpaiton	20.00	-	-
I	Biomonitoring and Water Quality Monitoring	25.00	-	-
J	Insitutional Development and Ttraining	20.00	-	-
	<b>Total cost</b>	<b>2,667.23</b>	<b>234.00</b>	<b>159.22</b>
	Centages@14%	373.41		
	<b>Total</b>	<b>3040.65</b>	<b>234.00</b>	<b>159.22</b>

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

1.	Name of town and state	Srinagar, J&K
2.	Category	
	2.1 Basin	Indus River Basin
	2.2 River	Jhelum
	2.3 Located on tributary/stream	Town located on the bank of river
	2.4 Other Importance (Religious/Tourism/Other)	-
3.	Population	7,22,127 (1998 population)
4.	Name of body receiving Waste Water & Quality:	
	4.1 Name	Jhelum River
	4.2 BOD	3.98 mg/l (Upstream)
	4.3 Existing Water Quality (A,B,C,D or E)	8.61 mg/l (Downstream)
5.	Status of Water Supply	
	5.1 Source	Dachigam nalla, Sindh nalla & Dood Ganga
	5.2 Quantity (mld)	145 mld
	5.3 Per capita water supply (lpcd)	200 lpcd
6.	Status of Sewage System:	
	6.1 Area Sewered (%)	-
	6.2 Interception factor	0.70
	6.3 Quantity of sewage generated	101 mld
	6.4 Raw Sewage Quality	BOD (225-275 mg/l)
	6.5 Existing I&D (mld)	Nil
	6.6 Existing STP	Nil
	6.6.1 Technology	-
	6.6.2 Treatment Capacity	-

**The proposed scheme under NRCP exclude the area of population of Srinagar covered under the Dal Lake Conservation Plan.**

7.	Proposed Schemes (YAP-III)	
	7.1 No. of drains for interception	-
	7.2 No. of sewages pumping stations	8 nos. (including one MPS)
	7.3 Lengths of Intercepting Sewers	-
	7.4 Quantity of Sewage to be treated	131 mld (flow of year 2008)
	7.5 Availability of land for STP	65.5 Acre
	7.6 Treatment Technology Proposed	ASP
	7.7 Disposal After Treatment	River

8.	Cost Estimates (Rs. Crores)	
	Core schemes	
	I&D	74.52
	STP (including land cost)	101.55
	Non core schemes	21.53
	<b>Total</b>	<b>197.60 + 29.64 = 227.24</b>

**9. Remarks**  
**The recommendations are based on costs indicated by NRCD for core and non core schemes. Land costs, centages and O&M have not been included.**

<b>Core Schemes</b>	
<b>I&amp;D</b>	<b>64.92 + 9.74 = 74.66</b>
<b>STP</b>	<b>73.36 + 11.00 = 84.36</b>
<b>Non Core Schemes</b>	<b>3.72 + 0.56 = 4.28</b>
<b>Total</b>	<b>163.30 Recommended</b>

10. Willingness of State Governments to Make Financial Contribution:

Yes, State Government Commitment is available.

**General Abstract of Costs for Srinagar**

<b>Sl. No.</b>	<b>Description</b>	<b>Total Capital Cost (Rs. Lacs)</b>	<b>Total Land Cost (Rs. Lacs)</b>	<b>Total Annual O&amp;M Cost (Rs. Lacs)</b>
A	Interception and Diverion System	6492.72	44.30	285.00
B	Sewage Treartment System	7336.00	1572.00	926.61
C	Low Cost Sanitation System	344.17	104.35	3.44
D	Solid Waste Management	315.00	1440.00	43.00
E	Crematoria	3.00		0.03
F	Bathing Ghats	1.24		
G	Afforestation	4.00		
H	Community Pariticpaiton	20.00		
I	Biomonitoring and Water Quality Monitoring	25.00		
J	Insitutional Development and Ttraining	20.0		
	<b>Total cost</b>	<b>1456.13</b>	<b>3160.65</b>	<b>1158.09</b>
	Centages@14%	2038.58		
	<b>Total</b>	<b>16599.69</b>	<b>3160.65</b>	<b>1158.09</b>

## GOA

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

Sl. No.	CITY	RIVER	ESTIMATED COST (RS. IN CRORES)
1.	PANAJIN CITY (PHASE-II)	MANDOVI	13.38
2.	MARGAON CITY	JHARI	24.67
	<b>TOTAL</b>		<b>38.05</b>

## KERALA

### Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

SL. No.	CITY	RIVER	ESTIMATED COST (RS. IN CRORES)
1.	SMALL TOWNS	PAMBA	360.00

**RAJASTHAN**

**Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan**

Kota : Rs. 69.00 crores

UTTARANCHAL

Information of Towns for Inclusion in NRCP 10<sup>th</sup> & 11<sup>th</sup> Plan

SL. No.	CITY	RIVER	EXPECTED SEWAGE GENERATION (IN MLD)	TOTAL
1.	GANTOTRI	RIVER BHAIRATHI	1.6	5.90
2.	BHALWARI	RIVER BHAIRATHI	2.0	5.85
3.	MATLI	RIVER BHAIRATHI	0.5	2.60
4.	DUNDA	RIVER BHAIRATHI	1.3	5.05
5.	CHINALI SAUR	RIVER BHAIRATHI	1.6	3.60
		<b>SUB TOTAL</b>		<b>3.31</b>
6.	GAUCHER	ALAKNANDA	2.5	10.00
7.	SRIKOT	ALAKNANDA	1.0	6.50
8.	UPHALDA	ALAKNANDA	0.5	4.50
9.	CHAURAS	ALAKNANDA	1.0	4.50
10.	KIRTINAGAR	ALAKNANDA	1.0	4.50
		<b>SUB TOTAL</b>		<b>30.00</b>
11.	GHAT	NANDAKINI	0.5	5.00
		<b>SUB TOTAL</b>		<b>5.00</b>
12.	DEWAL	PINDER	1	3.50
13.	THARALI	PINDER	1	6.50
		<b>SUB TOTAL</b>		<b>10.00</b>
14.	KEDARNATH	MANDAKINI	1	6.50
15.	GAURIKUND	MANDAKINI	1	6.50
16.	GUPTAKASI	MANDAKINI	1	4.50
17.	UKHIMATH	MANDAKINI	1	5.50
18.	VIJAYNAGAR	MANDAKINI	1	3.50
19.	TILWARA	MANDAKINI	1	4.50
		<b>SUB TOTAL</b>		<b>31.00</b>
		<b>TOTAL</b>		<b>74.31</b>

**INFORMATION OF TOWNS FOR INCLUSION IN NRC D 10TH & 11TH PLAN (YAMUNA ACTION PLAN)**

	<b>Name of town and State:</b>	<b>Yamnotri/ Uttarakhand</b>	<b>Barkot/ Uttarakhand</b>	<b>Naugaon/ Uttarakhand</b>	<b>Vikas Nagar/ Uttarakhand</b>	<b>Harburtpur/ Uttarakhand</b>
2	<b>Category:</b>					
2.1	<b>Basin</b>	Yamuna	Yamuna	Yamuna	Yamuna	Yamuna
2.2	<b>River</b>	Yamuna	Yamuna	Yamuna	Yamuna	Yamuna
2.3	<b>Located on tributary/stream</b>	-	Local Gadhera	Local Gadhera	Local Gadhera	Local Gadhera
2.4	<b>Other Importance (Religious/Tourism/Other)</b>	Religious				
3	<b>Population</b>	500 floating	Town 6098	Town 1514	Town 12485	Town 9242
4	<b>Name of body receiving Waste Water &amp; Quality:</b>					
4.1	<b>Name</b>	River Yamuna	River Yamuna	River Yamuna	River Yamuna	River Yamuna
4.2	<b>BOD</b>	Not known	Not known	Not known	Not known	Not known
4.3	<b>Existing Water Quality (A,B,C,D or E)</b>	NIL	NIL	NIL	NIL	NIL
5	<b>Status of Water:</b>					
5.1	<b>Source</b>	River Yamuna	Local Gadhera	Local Gadhera	Local Gadhera	Local Gadhera
5.2	<b>Quantity (mld)</b>		0.95	0.25	1.94	1.43
5.3	<b>Per capita water supply (lpcd)</b>		135	135	135	135
6	<b>Status of Sewage System:</b>					
6.1	<b>Area Sewered (%)</b>	0	0	0	25	0
6.2	<b>Interception factor</b>	0.70	0.70	0.70	0.70	0.70
6.3	<b>Quantity of sewage generated</b>	0	3.5 mld	1 mld	4.50 mld	3.0 mld
6.4	<b>Raw sewage Quality</b>		Domestic	Domestic	Domestic	Domestic
6.5	<b>Existing I&amp;D (mld)</b>	NIL	No	No	No	No
6.6	<b>Existing STP</b>	NIL	No	No	No	No

	Name of town and State:	Yamnotri/ Uttarakhand	Barkot/ Uttarakhand	Naugaon/ Uttarakhand	Vikas Nagar/ Uttarakhand	Harburtpur/ Uttarakhand
6.6.1	<b>Technology</b>					
6.6.2	<b>Treatment Capacity</b>	NIL	NIL	NIL	NIL	NIL
7	<b>Proposed Schemes (YAP-III)</b>					
7.1	<b>No. of drains for interception</b>	NIL	4	5	10	6
7.2	<b>No. of sewages pumping stations</b>	NIL	1	1	1	1
7.3	<b>Lengths of Intercepting Sewers</b>	600 m	2000 m	3000 m	20000 m	35000 m
7.4	<b>Quantity of sewage to be treated</b>	-	3.5 mld	1 mld	4.5 mld	3.0 mld
7.5	<b>Availability of land for STP</b>	Yes	Yes	Yes	Yes	Yes
7.6	<b>Treatment Technology Proposed</b>	Septic tank with up flow filter	FAB unit	FAB unit	FAB unit	FAB unit
7.7	<b>Disposal After Treatment</b>	River Yamuna	River Yamuna	River Yamuna	River Yamuna	River Yamuna
8	<b>Cost Estimates (Rs. Crores)</b>					
	<b>Core schemes</b>					
	<b>I&amp;D</b>	1.00	7.00	35.00	3.50	10.50
	<b>STP(including land cost)</b>	1.00	6.00	1.50	7.00	4.50
	<b>Non crore schemes</b>					
	<b>Total</b>	<b>2.00</b>	<b>13.00</b>	<b>36.50</b>	<b>10.50</b>	<b>15.00</b>
9	<b>Remarks:</b>					
	<b>The recommendations are based on costs indicated by NRCD for core and non core schemes, land costs, cent ages and O&amp;M have not been included.</b>					
	<b>Core schemes</b>					
	<b>I&amp;D</b>	1.00	7.00	35.00	3.50	10.50
	<b>STP</b>	1.00	6.00	1.50	7.00	4.50

	<b>Name of town and State:</b>	<b>Yamnotri/ Uttarakhand</b>	<b>Barkot/ Uttarakhand</b>	<b>Naugaon/ Uttarakhand</b>	<b>Vikas Nagar/ Uttarakhand</b>	<b>Harburtpur/ Uttarakhand</b>
	<b>Non crore schemes</b>					
	<b>Total</b>	<b>2.00</b>	<b>13.00</b>	<b>36.50</b>	<b>10.50</b>	<b>15.00</b>
10	willingness of State Governemnts to make Financial Contribution Yes, State Government Commitment is available					

Note: There are about 8 polluting points in River Yamuna for which about Rs. 23 crores will be required for pollution abatement works.

**(A) INFORMATION OF TOWNS INCLUDED IN GAP-II OF NRCD 10TH & 11TH PLAN**

	<b>Name of town and State:</b>	<b>Ranipur B.H.E.L., Hardwar/ Uttarakhand</b>	<b>Hardwar- Rishikesh/ Uttarakhand</b>	<b>Uttarkashi/ Uttarakhand</b>	<b>Badrinath/ Uttarakhand</b>	<b>Joshimath/ Uttarakhand</b>	<b>Gopewar/ Uttarakhand</b>	<b>Karnprayag/ Uttarakhand</b>	<b>Rudraprayag/ Uttarakhand</b>	<b>Devprayag/ Uttarakhand</b>	<b>Srinagar/ Uttarakhand</b>
2	<b>Category:</b>										
2.1	<b>Basin</b>	Ganga	Ganga	Ganga	Ganga	Ganga	Ganga	Ganga	Ganga	Ganga	Ganga
2.2	<b>River</b>	Ganga	Ganga	River Bhagirathi	River Alaknanda	River Alaknanda	River Alaknanda	River Alaknanda/ Pinder	River Alaknanda/ Mandakni	River Bhagirathi/ Alaknanda	River Alaknanda
2.3	<b>Located on tributary/stream</b>	Ganga	Ganga	River Bhagirathi	River Alaknanda	River Alaknanda	River Alaknanda	River Alaknanda/ Pinder	River Alaknanda/ Mandakni	River Bhagirathi/ Alaknanda	River Alaknanda
2.4	<b>Other Importance (Religious/Tourism/Other)</b>	Religious	Religious	Religious	Town	Town	Town	Religious	Town	Religious	Town
3	<b>Population</b>	43252	234681	16220	12485	9242	19855	6977	2250	2175	19658
4	<b>Name of body receiving Waste Water &amp; Quality:</b>										
4.1	<b>Name</b>	River Ganga	River Ganga	River Bhagirathi	River Alaknanda	River Alaknanda	River Alaknanda	River Alaknanda/ Pinder	River Alaknanda/ Mandakni	River Bhagirathi/ Alaknanda	River Alaknanda
4.2	<b>BOD</b>	8.1 PPM	8.1 PPM	Not known	Not known	Not known	Not known	Not known	Not known	Not known	Not known
4.3	<b>Existing Water Quality (A,B,C,D or E)</b>	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

5	<b>Status of Water:</b>										
5.1	<b>Source</b>	River Ganga & Tubewells	River Ganga & Tubewells	Local Gadhera							
5.2	<b>Quantity (mld)</b>	6.71	36.37	2.52	1.94	1.43	3.08	1.08	0.35	0.34	3.05
5.3	<b>Per capita water supply (lpcd)</b>	135	135	135	135	135	135	135	135	135	135
6	<b>Status of Sewage System:</b>										
6.1	<b>Area Sewered (%)</b>										
6.2	<b>Interception factor</b>	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
6.3	<b>Quantity of sewage generated</b>	7.27 mld	39.48 mld	2.73 mld	4.5 mld	3.0 mld	3.33 mld	1.17 mld	0.38 mld	0.37 mld	3.3 mld
6.4	<b>Raw sewage Quality</b>	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic
6.5	<b>Existing I&amp;D (mld)</b>	-	-	-	No						
6.6	<b>Existing STP</b>	4 mld	24.32 mld	NIL	No						
6.6.1	<b>Technology</b>	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
6.6.2	<b>Treatment Capacity</b>	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
7	<b>Proposed Schemes (GAP-III)</b>										
7.1	<b>No. of drains for interception</b>	-	-	-	-	-	-	-	-	-	-
7.2	<b>No. of sewages pumping stations</b>	-	-	-	-	-	-	-	-	-	-
7.3	<b>Lengths of Intercepting Sewers</b>	-	-	-	-	-	-	-	-	-	-
7.4	<b>Quantity of sewage to be treated</b>	-	-	-	-	-	-	-	-	-	-
7.5	<b>Availability of land for STP</b>	-	-	-	-	-	-	-	-	-	-
7.6	<b>Treatment Technology Proposed</b>	-	-	-	-	-	-	-	-	-	-
7.7	<b>Disposal After Treatment</b>	-	-	-	-	-	-	-	-	-	-
8	<b>Cost Estimates (Rs. Crores)</b>										
	<b>Core schemes</b>										
	<b>I&amp;D</b>	-	-	-	-	-	-	-	-	-	-

9	<b>STP(including land cost)</b>	-	-	-	-	-	-	-	-	-	-
	<b>Non crore schemes</b>										
	<b>Total</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
	<b>Remarks:</b>	<b>The recommendations are based on costs indicated by NRCD for core and non core schemes, land costs, cent ages and O&amp;M have not been included.</b>									
	<b>Core schemes</b>										
<b>I&amp;D</b>	-	-	-	-	-	-	-	-	-	-	-
<b>STP</b>	-	-	-	-	-	-	-	-	-	-	-
<b>Non crore schemes</b>											
	<b>Total</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
10	willingness of State Governemnts to make Financial Contribution Yes, State Government Commitment is available										

Note: All information as per 2001 census

**(B) Information of Towns to be included in NRCD 10th & 11th Plan**

<b>Name of town and State:</b>	<b>Gangotri/ Uttarakhand</b>	<b>Kadearnath/ Uttarakhand</b>	<b>Gauchar/ Uttarakhand</b>	<b>Nandprayag/ Uttarakhand</b>
<b>Category:</b>				
<b>Basin</b>	Ganga	Ganga	Ganga	Ganga
<b>River</b>	River Bhagirathi	River Mandakni	River Alaknanda	River Alaknanda
<b>Located on tributary/stream</b>	River Bhagirathi	River Mandakni	River Alaknanda	River Alaknanda
<b>Other Importance (Religious/Tourism/Other)</b>	Religious	Religious	Town	Religious
<b>Population</b>	606	482	7278	1704
<b>Name of body receiving Waste Water &amp; Quality:</b>				
<b>Name</b>	River Bhagirathi	River Mandakni	River Alaknanda	River Alaknanda
<b>BOD</b>	Not known	Not known	Not known	Not known
<b>Existing Water Quality (A,B,C,D or E)</b>	NIL	NIL	NIL	NIL
<b>Status of Water:</b>				
<b>Source</b>	River Bhagirathi & Tubewells	Local Gadhera	Local Gadhera	Local Gadhera
<b>Quantity (mld)</b>	0.1	0.08	1.13	0.26
<b>Per capita water supply (lpcd)</b>	135	135	135	135
<b>Status of Sewage System:</b>				
<b>Area Sewered (%)</b>	-	-	-	-
<b>Interception factor</b>	-	-	-	-
<b>Quantity of sewage generated</b>	-	-	-	-
<b>Raw sewage Quality</b>	Domestic	Domestic	Domestic	Domestic
<b>Existing I&amp;D (mld)</b>	-	-	-	-
<b>Existing STP</b>	-	NIL	-	NIL
<b>Technology</b>	-	-	-	-
<b>Treatment Capacity</b>	-	-	-	-
<b>Proposed Schemes (GAP-III)</b>				
<b>No. of drains for interception</b>	-	3	4	4
<b>No. of sewages pumping stations</b>	-	NIL	2	NIL
<b>Lengths of Intercepting Sewers</b>	-	4000 m	15000 m + 1000 RM	6000 m
<b>Quantity of sewage to be treated</b>	-	1.0 mld	2.5 mld	0.3 mld
<b>Availability of land for STP</b>	-	Yes	Yes	Yes
<b>Treatment Technology Proposed</b>	-	FAB	FAB	Septic tank with a flow filter chlorine contact
<b>Disposal After Treatment</b>	-	River Mandakni	River Alaknanda	River Alaknanda
<b>Cost Estimates (Rs. Crores)</b>				
<b>Core schemes</b>				

<b>Name of town and State:</b>	<b>Gangotri/ Uttarakhand</b>	<b>Kadearnath/ Uttarakhand</b>	<b>Gauchar/ Uttarakhand</b>	<b>Nandprayag/ Uttarakhand</b>
<b>I&amp;D</b>	-	5.00	6.00	2.00
<b>STP(including land cost)</b>	-	1.50	4.00	1.00
<b>Non core schemes</b>				
<b>Total</b>	<b>0.00</b>	<b>6.50</b>	<b>10.00</b>	<b>3.00</b>
<b>Remarks:</b>				
The recommendations are based on costs indicated by NRCD for core and non core schemes, land costs, cent ages and O&M have not been included.				
<b>Core schemes</b>				
<b>I&amp;D</b>	-	5.00	6.00	2.00
<b>STP</b>	-	1.50	4.00	1.00
<b>Non core schemes</b>				
<b>Total</b>	<b>0.00</b>	<b>6.50</b>	<b>10.00</b>	<b>3.00</b>
willingness of State Governemnts to make Financial Contribution Yes, State Government Commitment is available				

Note: There are many pollution points in the Ganga and its tributories for which pollution controll and abtements projects are to be framed for which about Rs.105 crores shall be required.

**INFORMATION OF TOWNS INCLUDED IN GAP-II OF NRCD 10TH & 11TH PLAN**

**MADHYA PRADESH**

57-65 Hosahangabad and other towns including Nepa nagar, Chitrakoot, Shahdol, Maheshwar, Sehore Parvati, Ganjbasoda, Rajgarh, Mandsaur 157.98

**INFORMATION OF TOWNS INCLUDED IN GAP-II OF NRCD 10TH & 11TH PLAN**

**TAMIL NADU**

66 Vaniyambadi, 67 Rameshwaram 67.00

**INFORMATION OF TOWNS INCLUDED IN GAP-II OF NRCD 10TH & 11TH PLAN**

**NORTH EASTERN STATES**

North States	Eastern		
Sikkim	78Gangtok		
	79 Ranipoo		
	80Singtam		
	81 Melli		
	82 Norethan,		
	83 Namchi and		
	84 Rangpoo		
	Sub Total		17.25
Tripura	83Agartala		2.30
Nagaland	84Dimapur		28.75
	Sub Total		<b>48.30</b>

**2. List of towns included on the recommendations of NRC D for uncovered pollution**

a.	Ganga and Gomti Towns		Amount Recommended
	Allahabad	:	Rs. 305.0 crores
	Varanasi	:	Rs. 230.0 crores
	Kanpur	:	Rs. 425.0 crores
	Saidpur	:	Rs. 5.75 crores
	Ghazipur	:	Rs. 17.50 crores
	Mughal Sarai	:	Rs. 2.30 crores
	Chunar	:	Rs. 3.45 crores
	Jaunpur	:	Rs. 19.55 crores
	Sultanpur	:	Rs. 9.20 crores
	Lucknow	:	Rs. 375.0 crores
	<b>Total</b>	<b>:</b>	<b>Rs. 1392.75 crores</b>
b.	Yamuna Action Plan towns		Amount Recommended
	Delhi	:	Rs. 707.25 crores
	Saharanpur	:	Rs. 36.80 crores
	Muzaffarnagar	:	Rs. 24.15 crores
	Ghaziabad	:	Rs. 69.00 crores
	Vrindavan	:	Rs. 31.05 crores
	Mathura	:	Rs. 149.50 crores
	Agra	:	Rs. 54.05 crores
	Etawah	:	Rs. 19.55 crores
	Noida	:	Rs. 23.00 crores
	<b>Total</b>	<b>:</b>	<b>Rs. 1113.35 crores</b>