Overview of India’s Priorities and needs — River Ganga Rejuvenation

National Mission for Clean Ganga
Ministry of Water Resources, River Development & Ganga Rejuvenation
Ganga River Basin Fact Sheet

Total Length : 2525 km
Catchment Area : 8,61,404 km²
No of states in basin : 11
Along its main stem-
No of states : 5
No of Districts : 66
No of towns/cities : 118
No of village local bodies: 1657
River Ganga: National River of India

I am the wind among things of purification, and among warriors I am Rama, the hero supreme. Of the fishes in the sea I am Makara, the wonderful, and among all rivers the holy Ganges.
- Bhagavad Gita; Verse 31, Chapter 10

Special qualities
- An old study in US established that Ganga ‘Jal’ kills bacteria that spreads Cholera within 3 hours
- Did not putrefy even when kept in closed vessels for years
- High rate of oxygen retention
- Bacteriophages (viruses that kills bad bacteria) present in Ganga water

Key Features of river Ganga
- 20th longest river in Asia
- 41st longest in the world
- Sunderbans – world’s largest delta
- Decomposes organic wastes at a rate 15 to 25 times faster than any other river in the world
- Mobilizes a total of $729 \times 10^6$ tons of sediments annually – amongst the highest in the world
- Declared as National River by Government of India

Ganga is more than a river
River Ganga: Lifeline of Millions

- Covers 26% of India’s land mass
- Supports 43% of India’s population
- 25% of India’s water resources
- Other livelihood opportunities such as tourism, idol making, sand mining, fishing, etc.
- 13 million people directly get livelihood out of river in Ganga Basin
- More than 60% area is agriculture land; Gangetic alluvium very fertile
- Approximately 378 fish species
- Home to endangered species like Royal Bengal Tiger, Gangetic Dolphins, Ghariyals, etc.

All aspects of life are touched by Ganga
On the banks of Ganga & its tributaries

Cultural Heritage

Yamunotri

Kedarnath

Badrinath

Har-ki-Pauri: Ganga Dusshera

Devprayag

Triveni Sangam at Allahabad

Kumbh Mela - Allahabad

Ganga Aarti - Varanasi

Chhath Pooja - Patna

Ganga Sagar
On the banks of Ganga & its tributaries

Tourism

Boating on Ganga

Rafting on Ganga

Valley of Flowers

Yoga and Meditation

Taj Mahal

Jim Corbett National Park

Mangroves forest at Sunderbans
Biodiversity of River Ganga

Biodiversity

- Golden Mahaseer
- Turtles
- Otter
- Gangetic Dolphins
- Royal Bengal Tiger
- Trout
Ganga is no more the same...
and faces major challenge
Main challenges to Ganga & need for rejuvenation

A. Heavy Extraction

B. Excessive Pollution

1. Municipal sewage
2. Industrial Pollution
3. Solid Waste
144 Major drains located along Ganga mainstem discharge organic load of 1000 Tonnes every day in the river
Incomplete sewerage infrastructure

• 118 Priority Towns identified

• Only 21% of existing sewage is treated

• 30% of existing treatment plants non-functional

• Huge gap in sewage generation and available treatment capacity

• 100% sewerage infrastructure needs to be created in next 5 years- huge operational, financial and technological challenge
Industrial Pollution

764 Grossly Polluting Industries discharge toxic effluents

Pulp & Paper Mills discharge black liquor
Sugar & distilleries – second largest polluter
Tanneries – discharge highly toxic effluent
Solid Waste

Huge quantum of waste generated

Inappropriate disposal of solid waste

Ends up in drains and ghats and ultimately in river
More than 50% households do not have access to toilets and practice open defecation.

No treatment facilities available for sewage and solid waste management; ultimately drain into Ganga.

Pollution load from villages, though diffused in nature, but the combined quantum is huge.

More than 5000 such villages under 1657 local bodies need to be managed.
Sewage Conveyance Practices

• Branch sewerage network present only in core areas of some major towns like Kanpur, Allahabad, Varanasi, Kolkata etc.
• Sewage in most cases flows through storm water drains
• Industrial waste water, wherever generated, mixes with municipal sewage
• Under Ganga Action Plan, drains were intercepted and conveyed to STP location through laying of trunk sewer and / or rising main
• Integrated sewerage works (sewerage network and STP) approved for some towns recently under NGRBA
Sewage Treatment Practices : Treatment Technologies

• NGRBA programme – Technology Neutral; Selection Based on Lowest Life Cycle Cost

• Generally primary & secondary treatment; secondary treatment technologies being used include
  ✓ Aerated Lagoons
  ✓ Oxidation Ponds
  ✓ Waste Stabilization Ponds (WSP)
  ✓ Trickling Filters
  ✓ Up-flow Anaerobic Sludge Blanket (UASB)
  ✓ Rotating Biological Rope Contractor (RBRC)
  ✓ Conventional Activated Sludge Process (ASP)
  ✓ Sequential Batch Reactors (SBR)
  ✓ and combinations thereof

• Tertiary treatment includes disinfection using primarily Chlorination
Sewage Treatment Practices : Post Treatment Reuse

• Discharged into a stream, river, land
• Only a miniscule amount of treated water used for irrigation purposes
• Lack of availability of market instrument for reuse of treated wastewater
• Need of Risk Assessment in such reuse and develop appropriate business model

• **Key recommendations from GRBMP:**
  ✓ Zero Liquid Discharge, Tertiary level treatment
  ✓ Reuse of tertiary treated water for non-potable purpose (industrial, irrigation, horticultural, and non-contact/non-potable domestic use)
  ✓ Reuse of treated water can be priced at Rs 10 per cubic meters (unit cost of tertiary treatment)
  ✓ Price of use of fresh water should be at least 50% higher
Efforts to clean river Ganga

- **June 1985**: Ganga Action Plan Phase I was launched
- **April 1993**: GAP-II started along with Yamuna, Damodar and Gomti
- **Dec 1995**: Ganga Action Plan Phase II was effective
- **Dec 1996**: GAP II merged with National River Conservation Programme
- **March 2000**: GAP-I declared closed
- **Feb 2009**: National Ganga River Basin Authority was launched
- **June 2014**: Namami Gange was announced

**Limited visible results and pollution levels continue to rise**
Lessons learnt from previous experience

• Comprehensive River Basin approach required instead of town-centric approach
• Innovative technical & financial models for ensuring sustainability of assets
• Involvement of public in the program implementation
• Strict enforcement on industries
• Need for credible data bases and monitoring tools, action research
• Adequate involvement of State and Urban Local Bodies in decision-making
Ganga River Basin Management Plan

Ganga River Basin Management Plan by IIT Consortium

Vision and implementation
- River must continuously flow
- River must have longitudinal and lateral connectivity
- River must have adequate space for its various functions
- River must function as an ecological entity
- River must not be seen as a carrier of waste loads

Nirmal Ganga: Priority projects
- Restoration of natural drains in class I and class II towns
- Sewage treatment in class I and class II towns with Public Private Partnership (PPP)
- Reuse and Recycle of treated sewage
- ZLD system for large and medium industries
Need for a new paradigm

- If the trend is to be reversed, rejuvenation measures have to be faster than pace of pollution & increase of population
  - Think Basin scale, Act local scale
  - Technology neutral PPP based implementation,
  - Prioritise carefully - Keep long term in sight, implement short term tight
  - Immediate necessity - pollution control
  - Centre takes over 100% funding – Central Sector Scheme
  - Provide for O&M of the assets for a minimum 10 year period
  - Hybrid Annuity based PPP implementation through Special Purpose Vehicle (SPV)
Namami Gange – A national initiative to rejuvenate Ganga

• “Namami Gange” an umbrella programme approved in May 2015 at a total cost of Rs 20,000 Crores (USD 3.5 Billions) for 5 years
• Four-fold increase over the expenditure in the past 30 years
• Includes ongoing works and new initiatives:
  - Solid waste management
  - Ecological sustainability
  - Comm. & public outreach
  - Sewerage and sanitation
  - Research & Development
  - Aviral Ganga
  - Industrial Pollution
  - River Front Management
  - Institutional development
• Immediate thrust is on pollution abatement
Priorities under Namami Gange

1. 100% sewerage treatment infrastructure for 118 Towns
2. Strict enforcement for Industrial pollution
3. Improved wood-based crematoria
4. River Front Development
5. Massive Afforestation Drive
6. Treatment of drains
7. River Surface Cleaning
Namami Gange – First steps

1) Entry-level activities
   a. River Surface Cleaning
   b. Rural Sanitation
   c. Crematoria modernization/renovation/new construction
   d. Ghat repair, modernization and new construction

2) Medium Term
   a. Municipal Sewage Management
   b. Industrial Effluents Management

3) Other Activities
   a. Biodiversity Conservation
   b. Afforestation
   c. Water Quality Monitoring

4) Long Term: Ensuring adequate flow of water
River Surface Cleaning: An immediate priority
Reed Bed Technology – for addressing rural challenge

Decentralized Wastewater System in Auroville

Reed Bed Technology of AMU
Industrial Pollution Abatement

- **Implementation of Zero Liquid Discharge (ZLD) by Grossly Polluting Industries (GPI)**
  - Reduction in discharge of black liquor from Pulp & paper
  - Reduction in discharge of spent wash from Distillery
  - Process improvement in Pulp & Paper, Distilleries & Sugar to reduce water consumption
  - ZLD based CETP for cluster of Textile & Tannery

- **Installation of Online Continuous Effluent Monitoring System (OCEMS) by Grossly Polluting Industries**

- **Real-time alerts and monitoring**
Improved databases and monitoring tools

- GIS based mapping of the basin through aerial photography, remote sensing and LIDAR survey, project to be initiated shortly
- Installation of real time online water quality monitoring stations at 113 stations initially and expanding the same
  - Bidding initiated for 36 stations on data purchase model
- Credible Decision Support System based on simulation and modelling techniques
Active International Collaborations

**World Bank:** through loan (USD 1 Billion) and support in overall program implementation

**Japan International Cooperative Agency (JICA):** Loan and support in program implementation at Varanasi and in Yamuna (existing USD 350 million, another under negotiation, **Kashi-Kyoto twin City programme**)

**Germany:** Technical Assistance (Ongoing) through GIZ (Euro 3 millions) and Financial Assistance (being developed) through KfW – focused for Uttarakhand State (Euro 120 millions)

**Australia:** Support in research activities like Pollution score card analysis through CSIRO
Potential areas of participation

- **Innovative Technology** - for quick results, sustained quality, low land requirement
- Developing market for recycle & reuse of treated water, efficient irrigation methods
- **Fast-track implementation through efficient project management**
- Experience Sharing of best practices, Capacity Building of institutions
- **Development of monitoring systems, basic data collection, GIS based mapping, Decision support systems**
The key institutions

• Ministry of Water Resources, River Development and Ganga Rejuvenation (www.mowr.nic.in)
• National Ganga River basin Authority (NGRBA): Chaired by the Prime Minister for overall policy making and prioritisation,
• National Mission for Clean Ganga (NMCG): implementation of work programme, funding, project sanction, monitoring and state coordination (www.nmcg.nic.in)
• Consortium of Indian Institute(s) of Technology
• Identified CPSUs and state organisations for individual projects
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