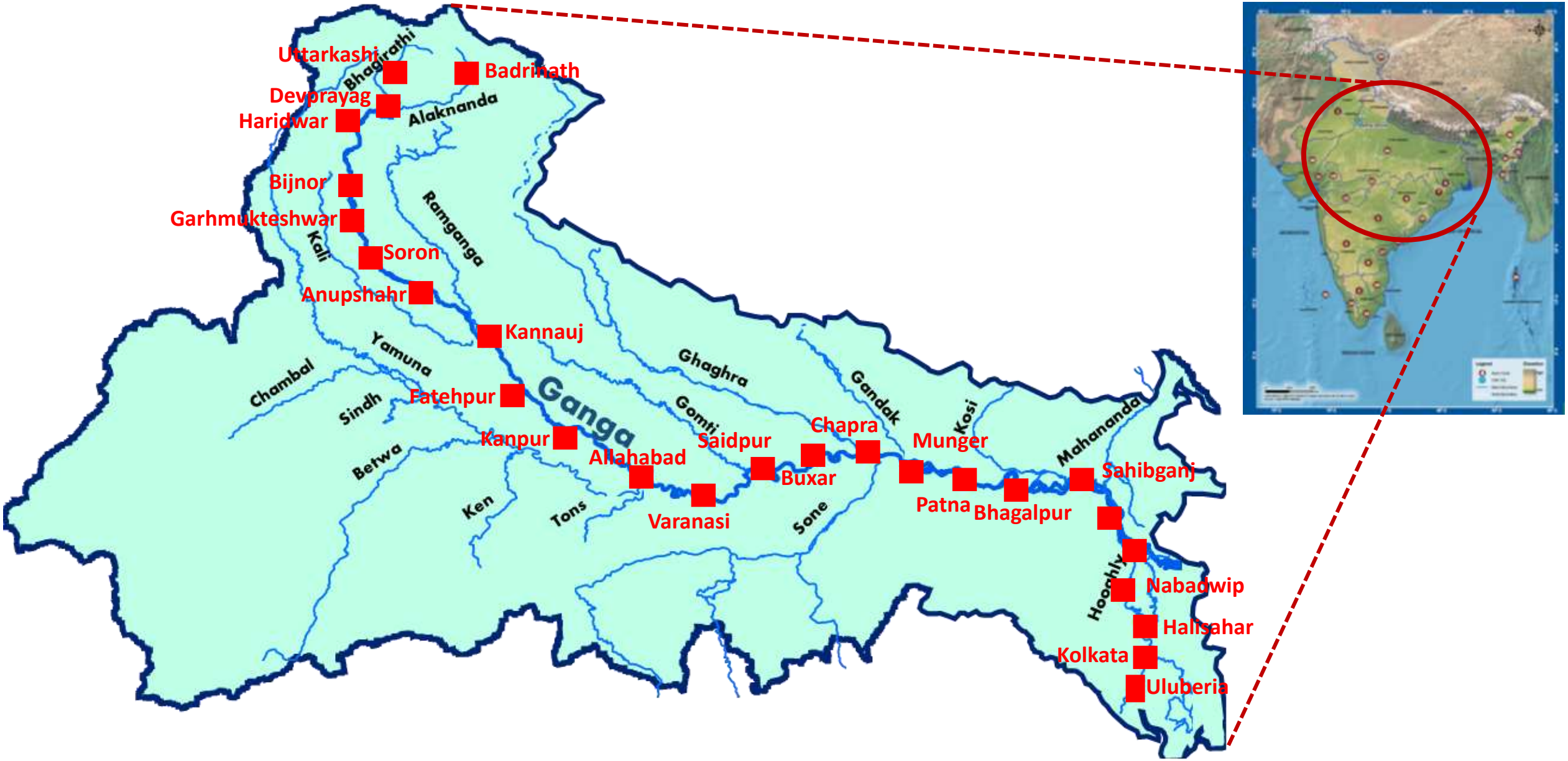
# Overview of India's Priorities and needs
# –
# River Ganga Rejuvenation

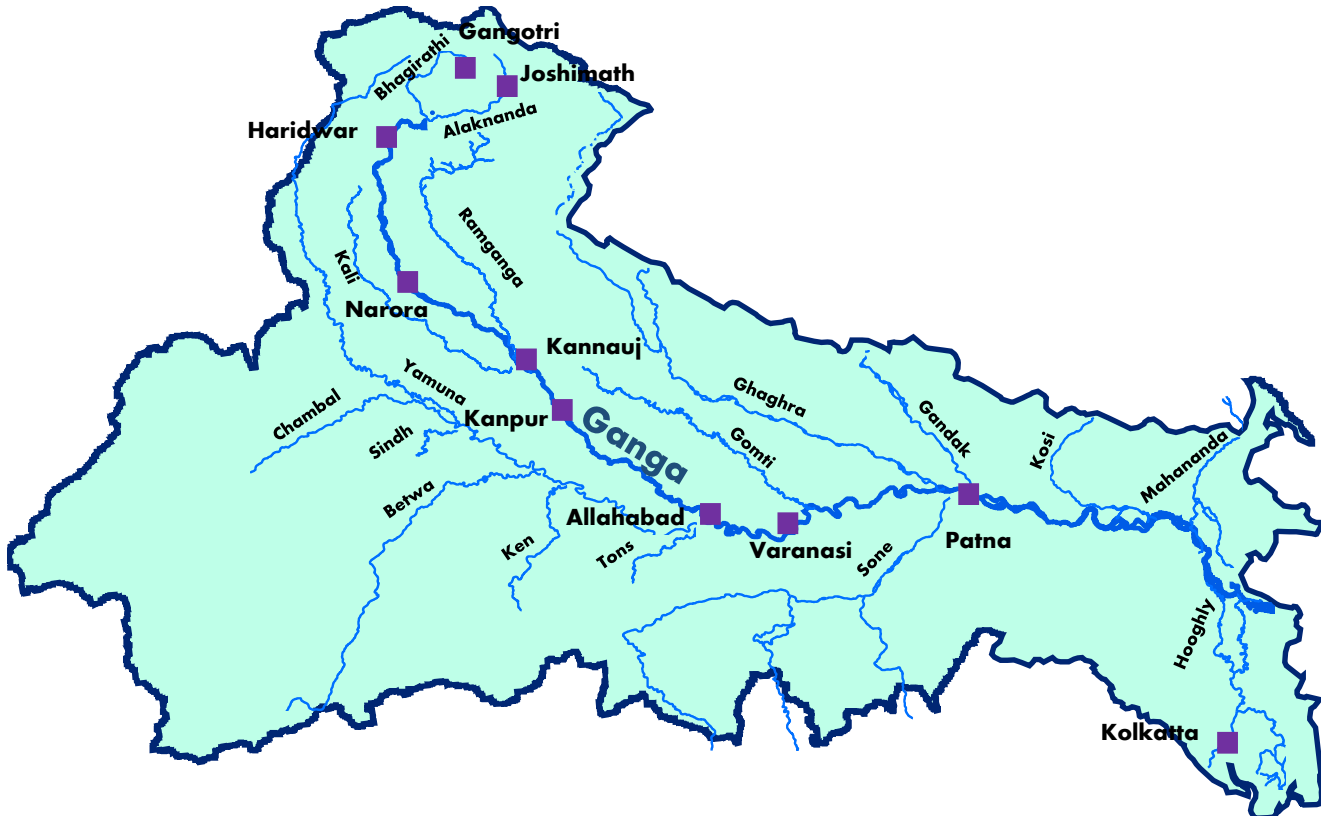
**National Mission for Clean Ganga**

**Ministry of Water Resources, River Development & Ganga Rejuvenation**

# Ganga River Basin



# Ganga River Basin Fact Sheet




**Total Length : 2525 km**

**Catchment Area : 8,61,404 km$^2$**

**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
- 41$^{st}$ 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 × $10^6$ 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











# On the banks of Ganga & its tributaries

## Tourism

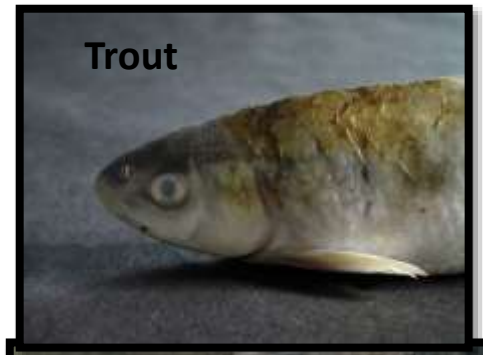






# Biodiversity of River Ganga

## Biodiversity







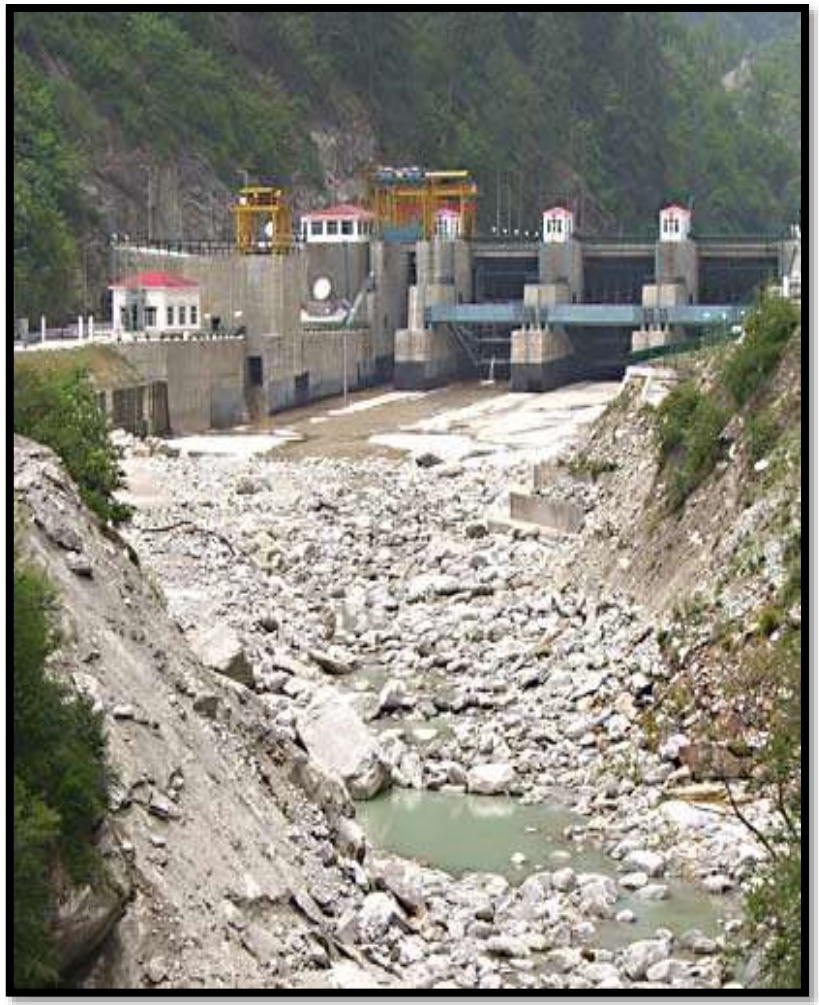


# Ganga is no more the same…

# and faces major challenge

# Main challenges to Ganga & need for rejuvenation

## A. Heavy Extraction



## B. Excessive Pollution

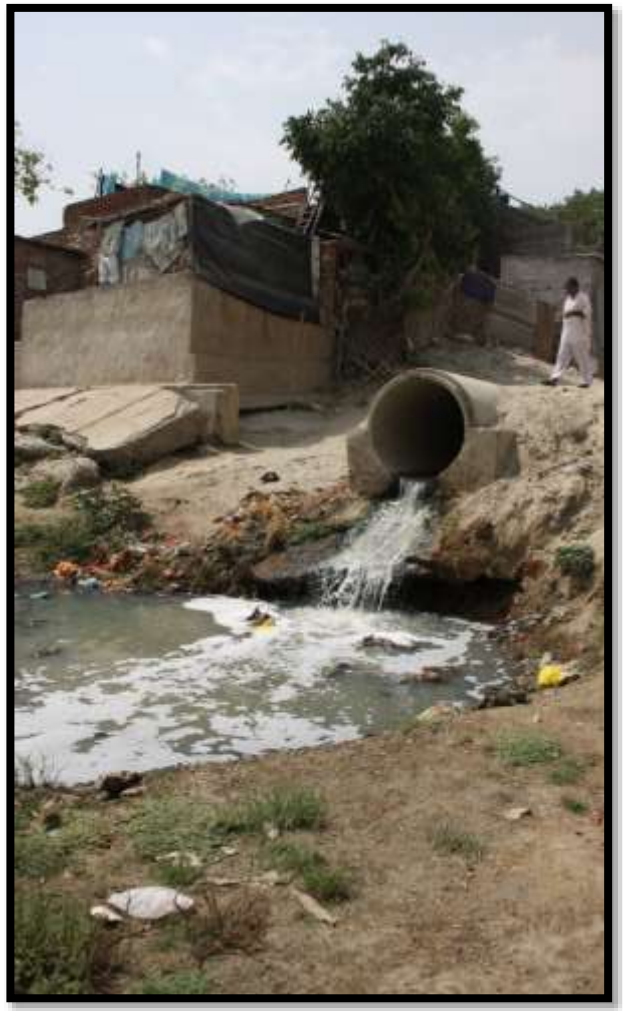
### 1. Municipal sewage

### 2. Industrial Pollution

### 3. Solid Waste

# Municipal Sewage

**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**

# Pollution from Rural areas


**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

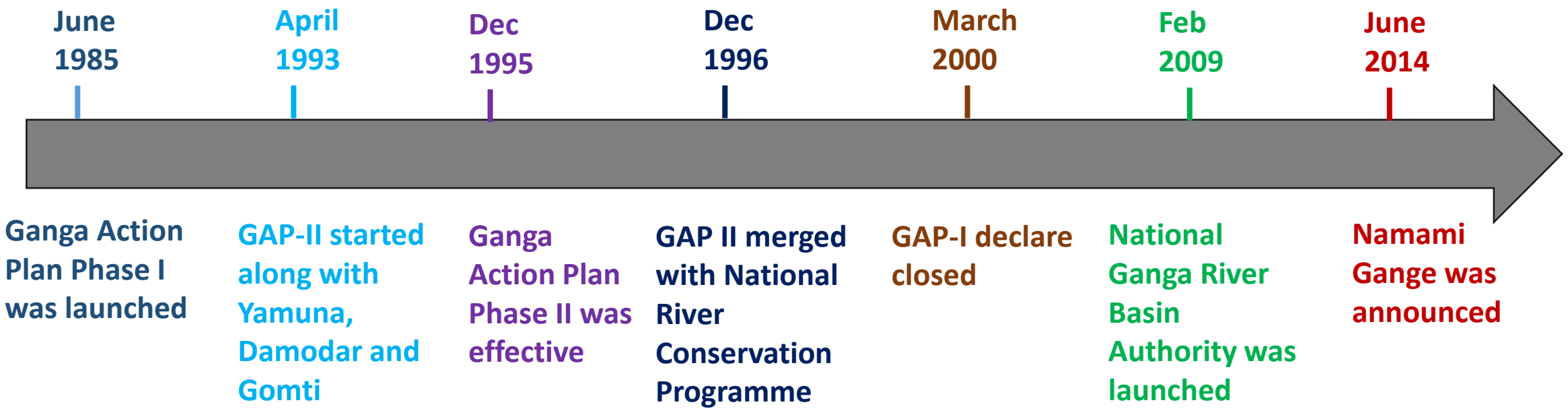
# Sewage Treatment Practices : Treatment Technologies

- 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




## 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

# 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
  - Technlogy 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

100% sewerage treatment infrastructure for 118 Towns

Strict enforcement for Industrial pollution

Improved wood-based crematoria


River Surface Cleaning

River Front Development

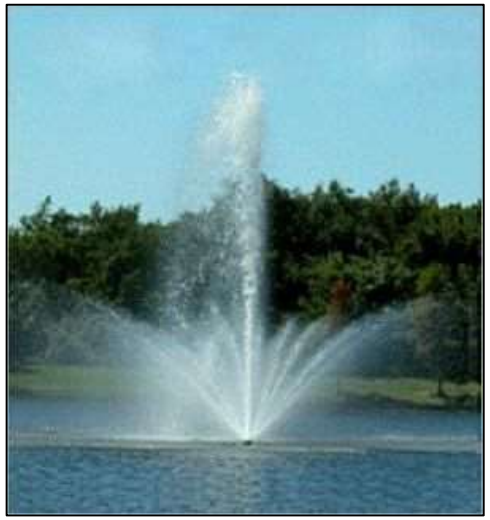
Massive Afforestation Drive

Treatment of drains

# 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 USD350 million, another under negotiation, **Kashi-Kyoto twin City programme**

**Germany:** Technical Assistance (Ongoing) through GIZ ( Euro 3 millions) and Finanacial 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**

# Opportunities - Technology

# 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

# Thanks

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