

Living Ganga Programme



AN INTRODUCTION TO ENVIRONMENTAL FLOW COMPONENT OF LIVING GANGA PROGRAMME

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Living Ganga Programme

Aim: To establish a framework for sustainable **energy** and **water resources** management, in a **critical stretch** and **key sites** in the Ganga basin

Objectives

1. Sustainable Water Management
2. Climate Adaptation
3. Pollution Abatement
4. Water – Energy Co-management
5. Sustainable Hydropower
6. Communications & Business Engagement

1. Sustainable Water Management

Objective for Environmental Flow Component

Develop and promote sustainable water management approaches, including environmental flows, which conserve biodiversity and support livelihoods taking into account climate change

Planned Interventions

- Develop a **methodology** for estimating environmental flows in the Indian context
- Enhance **understanding** of climate change scenarios and impacts on water flows in the Upper Ganga Basin (UGB)
- Integrate climate change scenarios and flow models to develop water **allocation recommendations**
- Promote the **sustainable water management** approaches among key decision makers

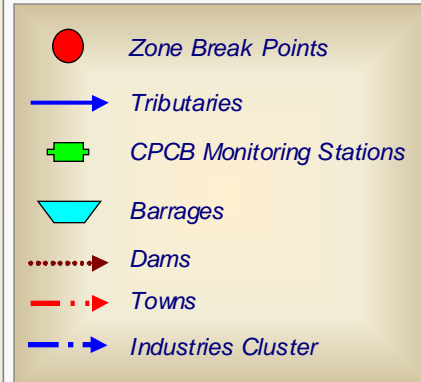
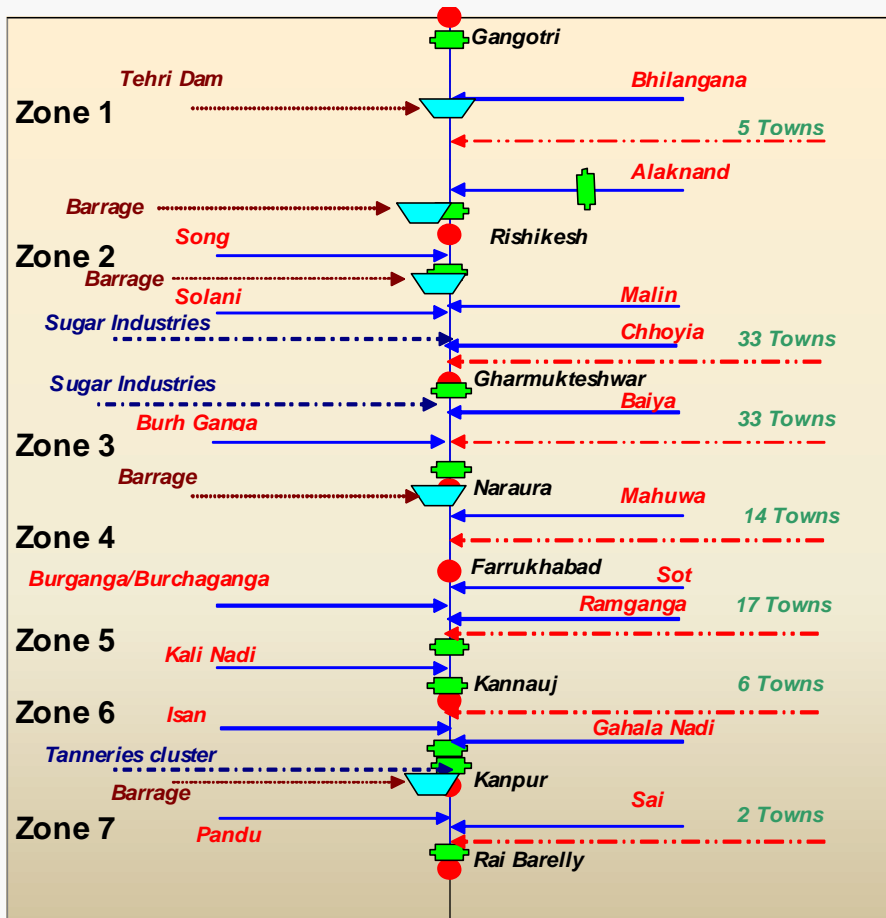
Target Groups

- **Governmental agencies** who evaluate, design and implement water resources development projects and investment programs
- State and district level **water resources management agencies** e.g., department of irrigation, dam/barrage operation agencies
- **Conservation groups** in India that seek to establish environmentally sustainable water resources planning and management
- **Farmers' and fishermen communities** that may be affected by climate change and water management decisions in the basin

Study Area – Upper Ganga Basin (UGB)



The River Ganga Homogeneous Zoning



Zone 1: Gangotri to Rishikesh
 Zone 2: Rishikesh - Haridwar to Garmukteshwar
 Zone 3: Garmukteshwar to Naraura
 Zone 4: Naraura to Farrukhabad
 Zone 5: Farrukhabad to Kannauj
 Zone 6: Kannauj to Kanpur
 Zone 7: Below Kanpur

Methodology Development for E-flow

- Hydrological Approach including Climate Change (CC) Scenarios
- Technical Partner- International Water Management Institute (IWMI), Sri Lanka
 - Prof. Vladimir Smakhtin, Principal Researcher
- Simulation of flow regimes under future CC scenarios (HadCM3 RCM; SRES 'A2' and 'B2')

Methodology Development for E-flow

- Ecological Approach – **Building Block Methodology**
- Technical Guidance – Prof. Jay O’Keeffe, UNESCO-IHE, Delft and IWMI, Sri Lanka
- National Specialists Groups
 - Hydrology, Hydraulics and Geomorphology
 - Water Quality
 - Biodiversity (indicator species: dolphin, turtle, fish, and macro invertebrates)
 - Socio-economic (socio, cultural and religious)

Expected Outputs

- Comprehensive and publicly available hydrological time series database for the UGB
- Downscaled CC scenarios for the UGB which can be used by other parties and in other projects
- EF method(s) commensurate with the level of data, information and expertise available
- The documented protocols for application of this (these) method(s) in Indian river basins
- Significant enhancement of the Indian national capacity to implement and further develop EFA methods in the national context
- Research papers and reports; Policy briefs
- Enhanced software for quick setting of EFs

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