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Pragyambu

cGanga
Centre for Ganga River Basin Management and Studies

The purpose of this quarterly digest brought out by the Centre for Ganga River Basin Management and Studies (cGanga) led by the Indian Institute of Technology Kanpur is to disseminate valuable traditional and scientific knowledge assimilated from national and international sources on various aspects of management of water and river restoration and conservation among concerned institutions and citizens.

URBAN RIVER MANAGEMENT PLAN: PROPER UNDERSTANDING IS KEY TO BETTER PLANNING

Rivers have always held a position of immense importance in the development of civilisation. While global trade hubs emerged along coastlines, culture found its cradle by the rivers—born, nurtured, and woven into the fabric of generations. Over time, however, the natural dynamics of these riverine systems have been severely disrupted. Today, the imbalance in these systems has reached such an extent that smaller rivers flowing through major cities are on the verge of extinction. Large rivers that pass through metropolitan and urban areas are grievously polluted along their urban stretches. Consider, for instance, the Yamuna in Delhi and Agra, the Ganga in Kanpur and Kolkata, the Musi in Hyderabad, the Hooghly in Kolkata, the Mithi in Mumbai, and the Mutha-Mula in Pune—these are a few examples, with their urban stretches choked by pollution. The story is no different in other cities—each reveals a similar pattern of degradation. As our cities expanded, the suffering of our rivers grew in parallel. Several smaller rivers have been reduced to mere sewers. In cities like Indore, Nagpur, Jodhpur, and Sambhajinagar (formerly Aurangabad), rivers that once sustained communities have either been converted into drains or now appear only during the monsoon as seasonal flows.

Rivers are creations of nature, but their paths are profoundly influenced by several factors—ranging from rainfall patterns and human interventions to cultural traditions, modern lifestyles, governance, urban development, and society's awareness of river ecosystems. If we wish to restore health of our rivers, each of these dimensions must be examined. We must understand how each element influences the river, and if any detrimental impacts are discovered, we must investigate both the root cause and potential solutions. Ignoring even a single aspect can have far-reaching consequences. In this issue of Pragyambu, we seek to explore urban factors that influence rivers and the streams that flow through cities, along with ways to manage these challenges effectively.

Let us begin with the nature and pace of urban development. Many of our cities are currently undergoing transformations to become "smart cities". In this pursuit of modernization, the rivers—which often served as the foundation of these settlements—are overlooked. Recently, the apex court commented in a case related to Ajmer: "How can a city become smart without safeguarding its water bodies and wetlands?" This observation holds relevance for many other urban centres. Simultaneously, there is a growing trend to replicate riverfront developments modeled after cities like London and Paris, under the banner of beautification and progress. While the river conservation efforts in these cities are indeed commendable, replicating them in totality is akin to applying cosmetics on an ailing person to make him appear healthy and attractive. The geographical, environmental, and socio-economic realities of Indian cities differ significantly from those of European cities. Moreover, such international approaches are often both cost-prohibitive and energy-intensive, making them unsuitable for widespread application in India. Our foremost objective should be to rejuvenate rivers by restoring

their natural flow, function, and ecological integrity.

From the standpoint of a city administrator, a river enters the urban landscape like an esteemed guest, bearing the precious gift of water. We gladly accept this gift, but in return, burden the river with our filth, which it must carry downstream to the next community. This dynamic must change. Our responsibility is not merely to receive, but to give back. A river should leave the city with the same quality or healthier than it arrived—supporting vibrant aquatic biodiversity, including species that once were their natural habitat. The river must retain a regime of flow that is necessary to sustain indigenous flora and fauna. Ensuring this should be both our priority and an enduring commitment.

To ensure the health and resilience of urban rivers, city administrations must earnestly implement a comprehensive Urban River Management Plan (URMP). However, before implementation begins, a well-informed and context-specific plan must be formulated—a process that is both intricate and multidisciplinary. Crafting an effective URMP demands insights from geography to engineering, and from science to folklore. To develop a comprehensive Urban River Management Plan, planning agencies must first gather and analyze a broad spectrum of data, including:

- A complete inventory of water sources within the city and its adjoining villages and towns, along with clarity on how many of these sources directly discharge into the river.
- Detailed data on the river's length, width, depth, number of bridges, extent of embankments, and extent of encroachments.
- Accurate information on the river's origin, along with proper demarcation and documentation.
- Updated topographical maps and high-resolution digital elevation model (DEM) that depict the city's natural terrain and modified landscapes.
- Contour maps to assist in understanding runoff and water flow patterns during extreme rainfall or flood events.
- Maps and descriptions of infrastructure related to rainwater harvesting, water supply, wastewater collection, and treatment systems.
- Comprehensive details on how domestic wastewater and solid waste affect local water bodies, including streams, wetlands, and drains—information that should be shared transparently with authorities and the public.
- Data on the number and area of wetlands, industrial zones, religious and cultural sites located near the river.
- Current and proposed land use patterns to guide sustainable urban growth and river conservation.

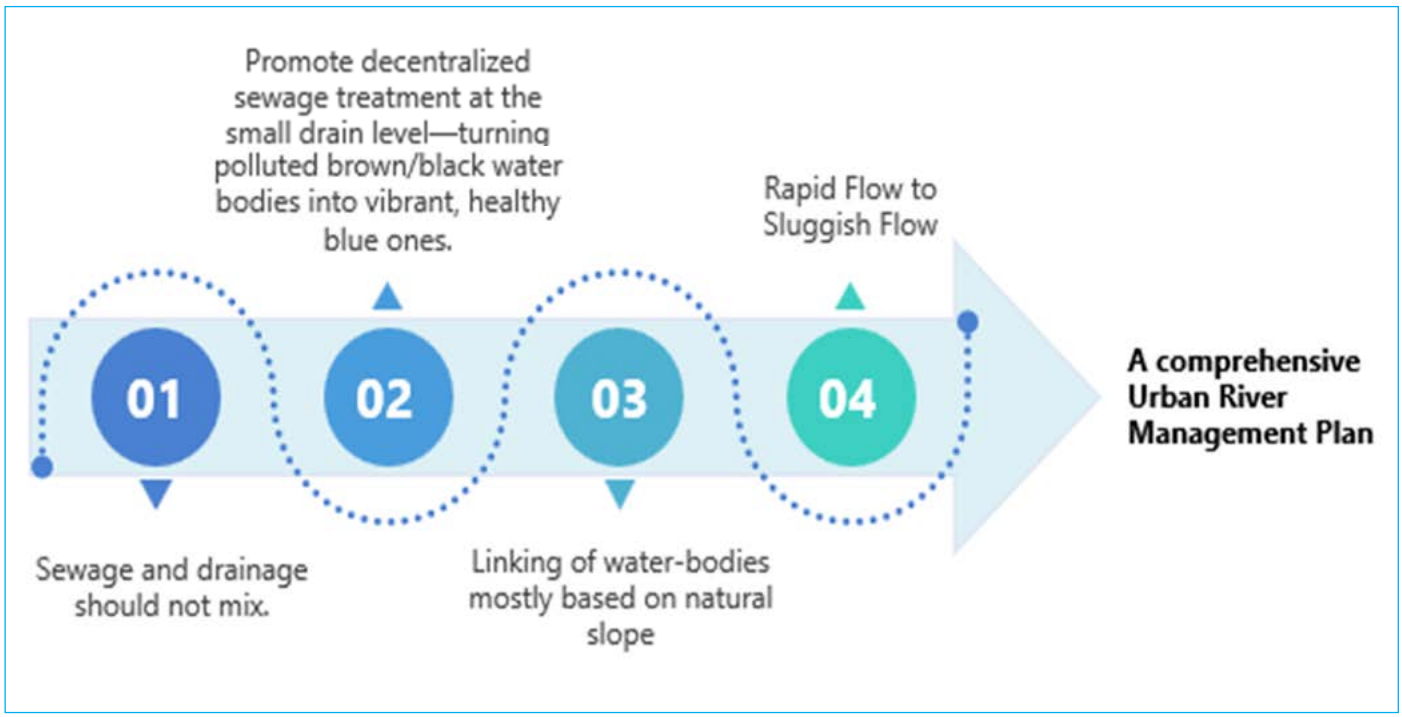

Fig 1: Road to prepare a comprehensive Urban River Management Plan

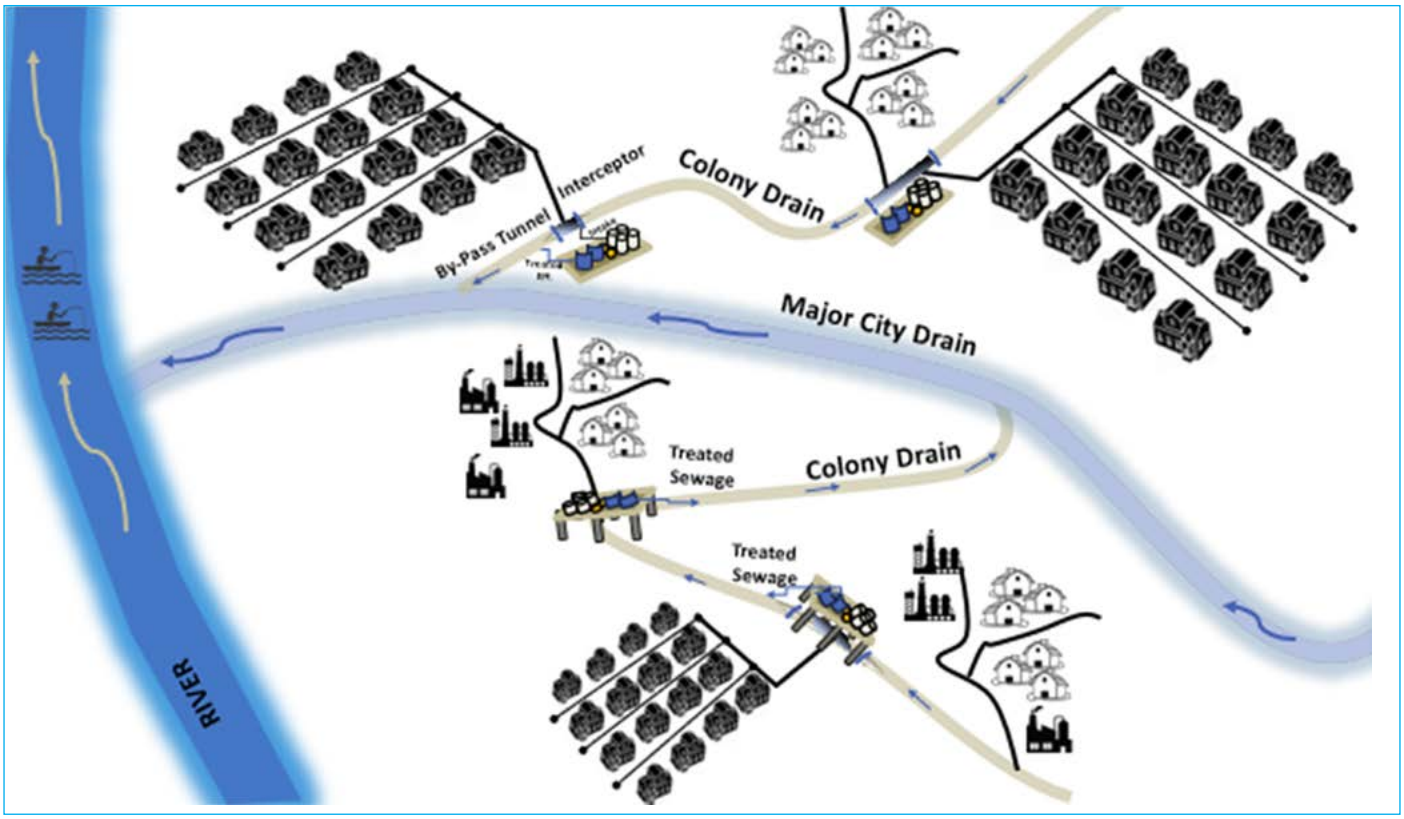

Fig 2: Roadmap for interception, diversion and decentralised treatment to convert wastewater drains into blue water bodies

- Information on the river's silt load and sedimentation characterstics.
- Information related to geography, environment, chemistry, and biology related to the city's river, including that is historically available with academicians, NGOs, citizans, etc., which should be made available to relevant agencies.
- Historical and current data on the river's morphology, flowcharacterstics, and flood behavior.
- Understanding of local traditions and beliefs associated with the river.
- Comprehensive floodplain mapping, essential for formulation of river management strategies and enhancing urban flood resilience.

If river floodplains are kept vacant and preserved ahead of the monsoon, floods in most cities could be experienced not as disasters, but as natural events. This would give rivers the space to carry out their natural functions.

A key challenge with urban rivers is the obstruction and diversion of natural runoff and the disconnection from surface water bodies. The Urban River Management Plan should focus on restoring these links through natural gradients. Treated wastewater could be used to revive dead or dying water bodies. It is essential to separate stormwater from sewage and manage monsoon flows efficiently. These interventions should aim to minimize energy consumption—otherwise, the sustainability of such interventions could itself become a challenge. Additionally, rising operational costs could place a financial strain on both municipalities and citizens.

Urban construction has altered natural slopes and disrupted the connections between rivers and other water sources. While going back to preurbanization and industrialization era or demolishing existing structures to return to a past landscape is impractical, it is worth answering questions such as: Can we improve river health without halting urban development? Can we bring rivers closer to their natural state? Can we ensure their survival for future generations?

The answer is 'yes'. Around the world, from England to Israel, there are success stories of once-dead rivers being revived. India too has seen similar examples, acknowledged even by the Prime Minister in his Mann

ki Baat programme. Revival is possible, but it requires coordinated, inter and intra-departmental collaboration and long-term commitment.

Imagine a grand, fully equipped house left locked for years. Even if it is renovated, but then again locked up, it soon gathers dust. The same holds true for rivers: without restoring their ecological flow and habitats, they degrade into little more than storage tanks or swimming pools. Though many cities have taken initial steps to rejuvenate rivers, these falter due to lack of continuity and ecological restoration.

Cities often address river issues by focusing solely on building Sewage Treatment Plants (STPs). While these facilities are essential, their effectiveness depends on proper operation and maintenance. Future strategies should also prioritize decentralized STPs and efficient sludge management. However, STPs alone cannot revive rivers—we must restore natural water pathways. As cities develop new Master Plans, rivers must be placed at the heart of urban planning.

Before making any changes to an urban setup, understanding the local water cycle is paramount. Just as cities prepare financial budgets, they should also develop water budgets—based on ecological settings akin to local flora and fauna, projected population, and future demands. A framework for developing Urban River Management Plans, as mentioned in the 2015 Ganga River Basin Management Plan by the IIT consortium, has been jointly prepared by the National Institute of Urban Affairs and the National Mission for Clean Ganga.

According to this framework, an Urban River Management Plan must lay its base on three pillars:

1. Environmental Responsibility
2. Economic Viability
3. Social Inclusiveness

The city's municipal body or development authority must appoint an appropriate agency to conduct a baseline survey and compile data before preparing the Urban River Management Plan. This task can be carried out by an external agency or by the municipal corporation itself. The baseline survey should include detailed information on the city's topography, demographics, spatial planning, environmental assets, social and economic data, and proposed or ongoing development projects. Based on these, and with guidance from NMCG's framework, a city-specific plan can be developed.

This framework must also include guidelines on funding and post-implementation monitoring. It is important to realize that no city can replicate exactly any other city's plan, as every river—and even different stretches of the same river—has unique characteristics. For example, a plan developed for a city in Uttarakhand in the context of the Ganga River may not be applicable to a city in Bihar through which the same river Ganga also flows, as the river behaves differently in each location.

A GRAND OPPORTUNITY

As the world braces for an impending water crisis and is making efforts to avoid it, India—blessed with rivers and backed by a government committed to urban river management—has a unique opportunity. Administrative officers can set a global example by formulating and implementing sustainable river management plans.

Many rivers flow through multiple cities, and actions in one city can clearly impact the river in the other. Therefore, before developing and implementing a river-focused plan, it is essential to establish coordination among multiple cities and their administrations to ensure comprehensive action in the river's interest. To encourage public participation, a competition can be held under the Swachh Bharat Abhiyan 2.0, ranking cities based on the health of the river flowing through them—similar to how cities were ranked on cleanliness during the first phase of the mission. This approach would not only motivate local administrations to act but also enhance public involvement and help reestablish the connection between rivers and city residents.

Urban river rejuvenation has several practical and innovative possibilities. Discussions on these aspects shall continue in the next issue of *Pragyambu*.

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