

URBAN RIVER MANAGEMENT PLAN PRAYAGRAJ



PRAYAGRAJ NAGAR NIGAM

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Disclaimer

The interventions proposed in this URMP document (Version 1) are prepared in consultation with the working group city stakeholders. For its implementation, a Detailed Project Report (DPR) needs to be prepared.

Publication Year 2025





DG, NMCG's Message

Rivers form the living fabric of our cities. They shape landscapes, support ecosystems, and enrich our lives in countless ways. They provide space for biodiversity to thrive, connect people to culture and heritage, and play a quiet yet powerful role in moderating urban climate. As India's cities expand and transform, ensuring the health of these river systems has become an urgent priority.

National efforts such as the National Mission for Clean Ganga (NMCG) have been instrumental in bringing river conservation into the urban agenda. Building on this momentum, the Urban River Management Plan (URMP) Framework, developed by NMCG and the National Institute of Urban Affairs (NIUA), has been offering a comprehensive approach to managing rivers as integral parts of the city's social, ecological, and economic systems.

It is encouraging to see Prayagraj take this progressive step by adopting this framework and preparing its own URMP. The city, deeply intertwined with its rivers through faith and tradition, draws millions of people to it during the Maha Kumbh. Now, it is time that it also looks towards harnessing the rivers' potential to create economic opportunities and boost tourism, while also ensuring environmental vitality.

With this milestone, Prayagraj joins Kanpur, Moradabad, Bareilly, Ayodhya, and Chhatrapati Sambhajinagar as one of the pioneering cities to develop a URMP. This growing momentum is set to expand only further. NMCG, along with NIUA, have mobilised 60 cities along the Ganga river basin to likewise prepare their own plans in what is a collective national effort towards urban river conservation.

It is time to reimagine how cities engage with their rivers and move beyond viewing them as merely natural resources, and instead as partners in progress. NMCG is proud to lead this transformation in India, establishing a strong river-city connect that is reshaping the urban future of the country.





Director NIUA's Message

Rivers are living ecosystems that knit together rural, per-urban, and urban landscapes, sustaining both nature and life. At NIUA, we believe that re-imagining and re-establishing this connection between a river and its beneficiaries is key to creating resilient urban futures. Our efforts aim to integrate river systems into mainstream urban planning, ensuring that any development only strengthens, rather than strains, these natural lifelines.

The Urban River Management Plan Framework (URMP) was first conceptualised and co-developed by the National Institute of Urban Affairs (NIUA) with the National Mission for Clean Ganga, with an ambition to establish river-sensitive and river-centric development in India's cities. With the launch of Prayagraj's own URMP, we are one step closer to that goal.

Prayagraj's URMP reflects the city's target to harmonise urban growth with ecological prosperity while also enhancing the city's historical and cultural citizen relationship with the river. I extend my heartfelt appreciation to the Municipal Commissioner and the city team for their leadership and commitment towards entrenching sustainable urban transformation in the city. NIUA has been proud to support this initiative and remains steadfast in promoting long-term, systemic approaches to river-sensitive urban development.

Together, we can ensure that our rivers continue to flow with vibrance and health, and as integral to the life of our cities. For Prayagraj, this is certainly a defining moment that will transform the city into a hub of urban prosperity and opportunity.





Municipal Commissioner's Message

Yet to be approved

Seelam Sai Teja IAS





Ex- Municipal Commissioner's Message

Yet to be approved

Chandra Mohan Garg IAS



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ALPHABETICALLY

NIUA - National Institute of Urban Affairs
NMCG - National Mission for Clean Ganga
MoHUA - Ministry of Housing and Urban Affairs
URMP - Urban River Management Plans
PDA - Prayagraj Development Authority
UPSTDC - Uttar Pradesh State Tourism Development Corporation
SMCG - State Mission for Clean Ganga
CIFRI - Central Inland Fisheries Research Institute
MC - Municipal Commissioner
EO - Executive Officer
USC - URMP Steering Committee
PS - Principal Secretary
PD - Principal Director
SPMG - State Program Management Group
DG - Director General
STPO - State Town Planning Organisation
RBM - River Basin Management Plan
DGP - District Ganga Plans
IRS-LSS - Linear Imaging and Self-Scanning sensors
DTC - District Tourism Council
MLD - Million Liters per Day
NRW - Non Revenue Water
DPR - Detailed Project Report
OHTs - Overhead Tank
O&M - Operation and Maintenance
CDP - City Development Plan
STP - Sewage Treatment Plan
OSS - On-Site Sanitation
FSTP - Faecal Sludge Treatment Plant
HDPE - High-Density Polyethylene
FRP - Fibre-Reinforced Polymer
GPCU - Ganga Pollution Control Unit
BOD - Biochemical Oxygen Demand
COD - Chemical Oxygen Demand
I&D - Interception and Diversion
PNN - Prayagraj Nagar Nigam
IEC - Information, Education and Communication
SWM - Sewage Waste Mangement
OCCC - Operations and Command Control Centre



Executive Summary





Background & Context



Rivers are the lifelines of cities but rapid urbanization has severely degraded river ecosystems across India. To address this, the Government of India, through the National Mission for Clean Ganga (NMCG) and the National Institute of Urban Affairs (NIUA), developed the Urban River Management Plan (URMP) framework to integrate river sensitivity into urban development. The Prayagraj URMP builds on this framework to assess the city's river conditions and propose actionable strategies through collaboration among local institutions for sustainable river conservation.

1.1 Project Background



Rivers are lifelines of the cities, supporting economic activities, transportation, and daily sustenance. However, rapid urbanization and industrialization have led to severe pollution of rivers. Untreated sewage, industrial effluents, plastic waste, and encroachments have significantly degraded river ecosystems, including waterbodies, lakes, ponds, drains, etc. Many Indian cities developed historically along the riverbanks are contributing to their contamination through unregulated waste disposal and lack of proper river management. Ganga River basin is no different. With rapid urbanization and population growth in towns and cities along the Ganga river and its tributaries, the pollutant load in the holy Ganga is getting worse every day.

Recognizing this alarming situation, the Hon'ble Prime Minister of India has repeatedly emphasized the need for urgent river conservation efforts and the need for behaviour change amongst citizens to address aggravating pollution threats of the Ganga river. In response to this vision, the National Mission for Clean Ganga (NMCG) and the National Institute of Urban Affairs (NIUA) an extended arm of the Ministry of Housing and Urban Affairs (MoHUA) collaborated to develop the Urban River Management Plan (URMP) framework. This framework aims to guide cities in integrating river health into urban planning, fostering a more sustainable and resilient future for India's rivers. On the basis of this framework, five URMPs have already been prepared by NIUA, namely Ayodhya, Bareilly, Chatrapati Sambhaji Nagar (Aurangabad), Kanpur and Moradabad.



Picture 1 : People enjoying boat ride on river Yamuna



1.2 URMP Framework



Urban River Management Plan (URMP) is an integrated approach to manage the river and its associated elements in a city sustainably. The URMP framework is based on the three pillars of sustainable development: Environmental, Economic, and Social. Hence, it is envisaged that the activities carried out under a URMP will be:

Environmentally Responsible

Economically Beneficial

Socially Inclusive

URMP is a comprehensive and holistic plan that addresses key gap areas across the city and along the riverbanks/floodplain. It is also important to connect citizens with the river via deliberate efforts to develop a sense of respect and ownership for protecting it. For achieving objectives delineated in URMP, it is important to do an assessment of the current situation of the city, and identify key gap areas responsible for the poor state of the river. The following section provides the aim, objective, and key interest areas in order to prepare the baseline study to prepare the URMP of Prayagraj city. The assessment will support the preparation of a robust URMP.

The URMP framework at large involves certain elements, vision, and city-specific objectives that act as interconnected units to collectively contribute to the management of the river.

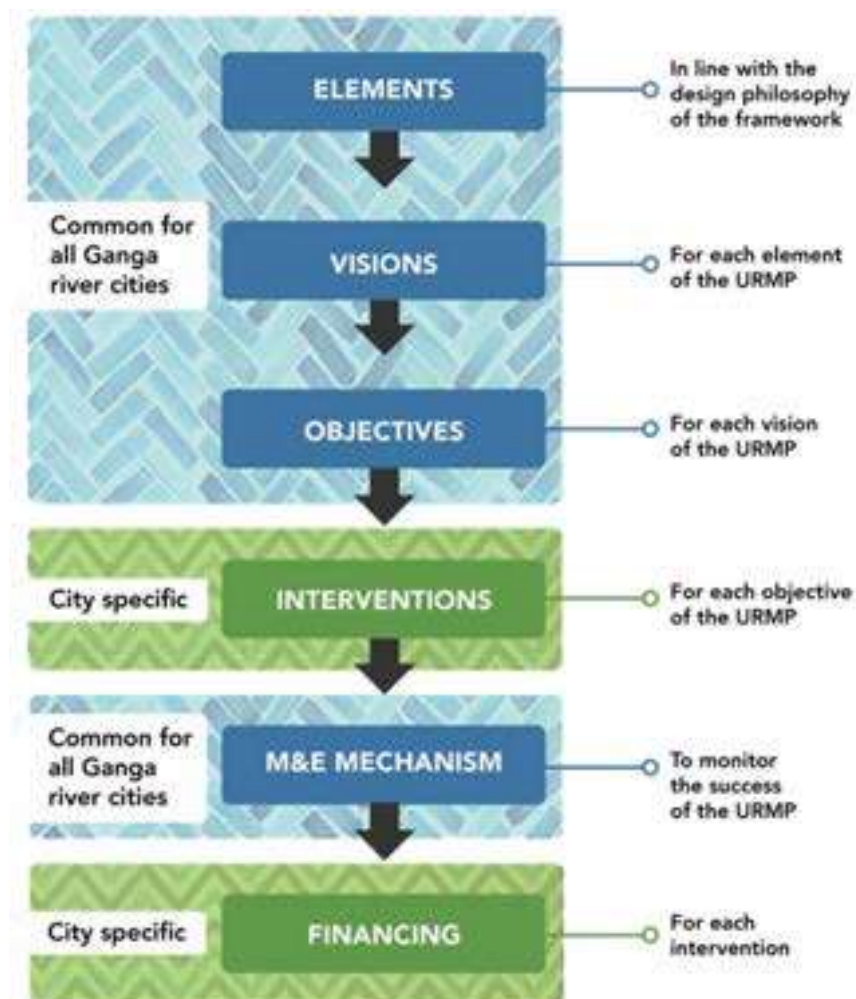
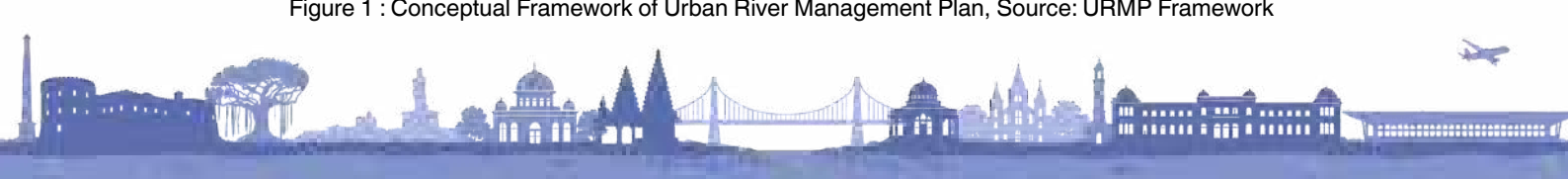


Figure 1 : Conceptual Framework of Urban River Management Plan, Source: URMP Framework





The plan is based on the three pillars of sustainable development, i.e. environment, economic and social. Each of these three elements corresponds with a vision statement which represents the envisaged outcomes of the plan in the long term (Figure 2).

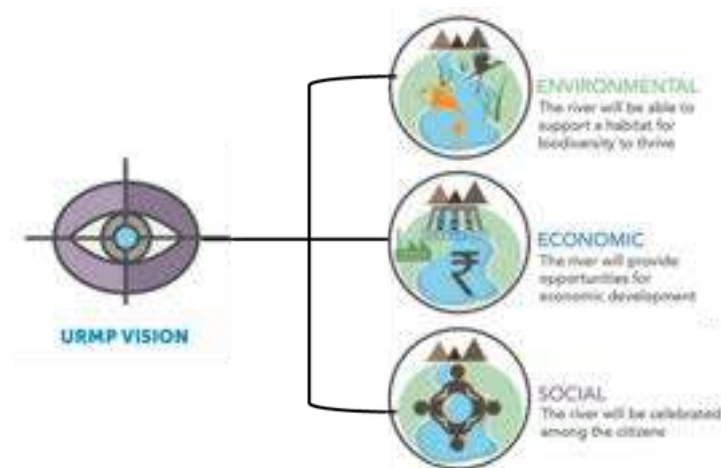


Figure 2 : Vision of URMP, Source : URMP Framework

The URMP's vision shall be achieved through a set of ten objectives (figure 3) for river cities to manage or improve the river stretch within the city's administrative boundary. Six of the objectives are for environmental, and two each for economic and social visions. Each objective is unique and addresses a niche aspect of urban river management. Most of the objectives have direct linkages with SDG 11.3 for making cities safe, climate resilient, sustainable, and inclusive. The URMP framework is used to assess Prayagraj city's status quo to identify key gap areas against each objective and prioritize actions. A dedicated indicator is assigned for each objective helps to assign overall URM Index in the scale of 1 to 5, wherein 1 indicates poor level urban river management and 5 as an ideal state.



Figure 3 : Ten Objectives of the URMP Framework, Source: NMCG-NIUA's URMP Framework





The figure 3 depicts 10 objectives that covers the planning for floodplain, abatement of pollution in rivers, rejuvenation of urban wetlands, enhancement of riparian buffers, wastewater reuse, and maximizing the return flow from cities to rivers; it also includes the eco-friendly aspects of riverfront development, leveraging river economy, and most importantly sensitizing and engaging citizens in urban river management.

In order to address each objective, specific interventions are identified based on city's needs / prioritization and URM_{index} designated to each objective. These suggested interventions are a mix of on-ground projects and planning reform/ regulatory actions. A clear stream of financing is also identified for each project based intervention, along with a project responsibility matrix. Prefunding sources may include municipal funding, funding from national urban missions, crowdfunding or other sources.

Finally, the plan establishes ten performance indicators, corresponding to the ten objectives. This monitoring and evaluation structure is used to measure the outcomes as a result of implementation of the plan.

It is important to note that the URMP is a living document that shall evolve over time as more knowledge and resources become available, and the URM indexing may upgrade as the city takes measures to maintain the river health.



Figure 4: Local boatmen and vendors finalizing construction of temporary jetties and ghats on the Ganga



1.3 Water as Leverage



Yet to be approved



1.4 Prayagraj WaL-URMP : Approach and Methodology



The main aim of the study is to know the status quo of the city from the river health, social cohesion, and economic viability perspective and suggest some implementable solutions and strategies to address the gap areas. The following are the key objectives to prepare the baseline for URMP:

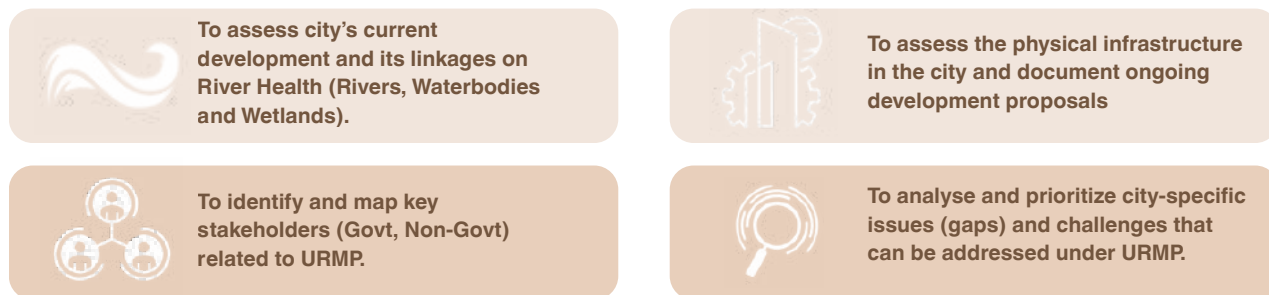


Figure 4 : Approach and Methodology of the study

In order to achieve the aforementioned objectives, it is also important to understand the urban planning framework of the city, provisions therein for river conservation, environmental status of the Rivers, waterbodies, green areas/forest cover, groundwater etc.

The methodology adopted for preparation of URMP for Prayagraj involves: (figure x).

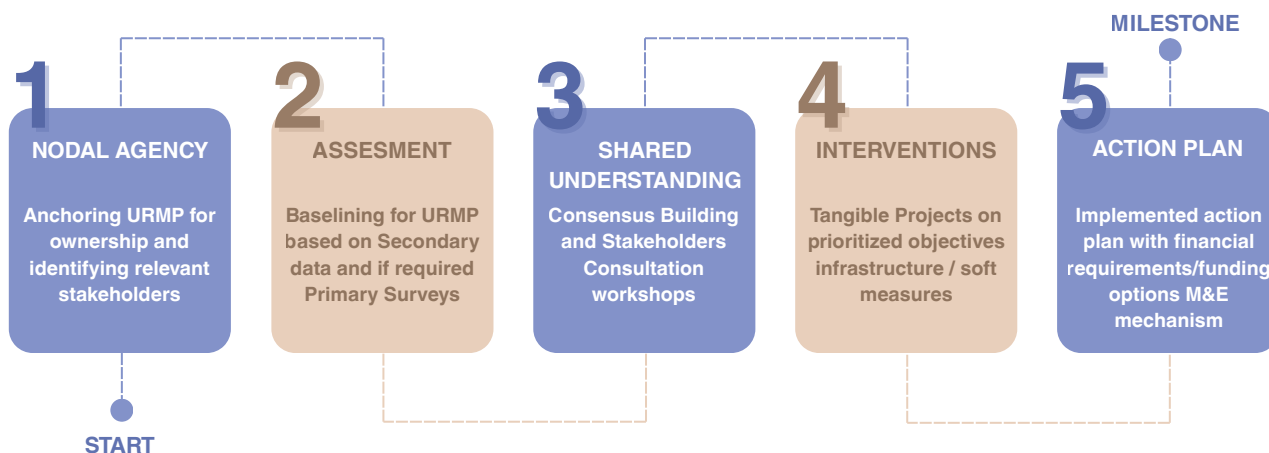


Figure 5: Process for Preparation of URMP Prayagraj

Step 1: Identifying a nodal agency to anchor the preparation of the URMP and setting up a core working group of relevant stakeholders from different organizations.

Step 2: Conducting a thorough baseline assessment of the relevant parameters in order to depict the current status.

Step 3: Organizing stakeholder workshops for developing a shared understanding of the URMP objectives and expected outcomes.

Step 4: Identifying tangible interventions for each objective of the URMP framework.

Step5: Preparation of an action plan for prioritized implementation of interventions and linking each intervention to probable financing options.





The preparation of Prayagraj URMP was led by Prayagraj Municipal Corporation with support from other relevant agencies in the city. NIUA and NMCG served as knowledge partners throughout the process of preparing the plan. As a first step, an in-person inception meeting of key stakeholders was conducted on 29th August, 2024, at the Prayagraj Municipal Corporation (figure 5). At this meeting, chaired by the Hon'ble Municipal Commissioner of Prayagraj, the city's river-related challenges were identified. The members were introduced to the URMP framework, and glimpses of experiences from the preparation of other URMPs were also presented. The members shared the insights of ongoing works related to MahaKumbh 2025 and the city's infrastructural upgrade to ensure a clean river. They also expressed their support and reflected on the model for the adoption of the URMP framework in Prayagraj. Subsequently, multiple site visits and individual meetings with various city officials were conducted to assess the on-the-ground situation and propose a plan for river management in the city. Site surveys and assessments along the holy Ganga and Yamuna involved not only physical verification of the assets and hotspots but also citizen engagement at various levels.

1.3.1 URMP Multi-Stakeholder Working Group (MSWG)

In order to facilitate the preparation of this plan in consultation with city stakeholders, a URMP working group was formed comprising of representatives from the Prayagraj Municipal Corporation, Smart City, Development Authority, Jal Nigam, and their associated line departments, regional offices of state level departments, and some city specific departments like the Mela Authority, Ganga Pollution Control Unit, Ganga Task Force, and academic institutes like MNNIT. Details of the members of the working group are placed in the table below.

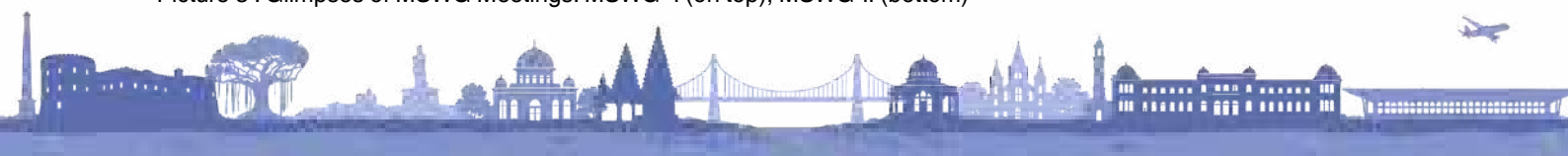
Table 1 : Composition of the URMP MSWG

S. No	Nominated Name And Designation	Department
1	Shri Chandra Mohan Garg, IAS, Municipal Commissioner (Chairperson)	Prayagraj Nagar Nigam
2	Sh. Uttam K. Verma, Environment Officer (NODAL officer)	Environment Wing, Prayagraj Nagar Nigam
3	Sh. Kiran Anand IAS, Mela Adhikari Ms. Vaishali, Nayab Tehsildaar	Prayagraj Mela Authority
4	Sh. Tej Pratap Singh, Chief Town Planner	Town Planning Wing, Prayagraj Development Authority (PDA)
5	Sh. Arvind Kumar, Executive Engineer (Horticulture)	Horticulture and Irrigation Wing, Prayagraj Development Authority (PDA)
6	Sh. Shivam Mishra, Executive Engineer (Civil)	Jal Kal, Prayagraj





Picture 3 : Glimpses of MSWG Meetings: MSWG -I (on top), MSWG-II (bottom)





S. No	Nominated Name And Designation	Department
7	Sh. Surendra Parmar Executive Engineer (Sewer)	Ganga Pollution Control Board/ Jal Nigam (Rural), Prayagraj Nagar Nigam
8	Sh. Amit Raj Executive Engineer (Water)	Jal Nigam (Urban), Prayagraj Nagar Nigam
9	Sh. Ashutosh Yadav Executive Engineer (Sewer)	Jal Nigam (Urban), Prayagraj Nagar Nigam
10	Ms. Sangeeta, Executive Engineer	Prayagraj Forest Department
11	Ms. Ayesha, District Project Officer, Namami Gange	District Ganga Committee, Prayagraj Forest Department
12	Sh. Manvendra Singh Assistant Engineer (Civil)	Prayagraj Cantonment Board
13	Ms. Aparajita, Regional Officer	UP State Tourism Development Corp. (UPSTDC)
14	Sh. Digvijay Shukla Executive Engineer	Flood Works, Irrigation and Flood Control, Prayagraj
15	Lt. Col. Saurabh Mehrotra	Ganga Task Force, Prayagraj Division
16	Sh.D.P. Singh, Boat Club Officer	Prayagraj Development Authority (PDA)
17	Sh. Deepak Disaster Specialist	Disaster Management Cell, Prayagraj
18	Sh. Sanjay Rath, Command Control Centre	Prayagraj Smart City
19	Prof. R.P. Tiwari	Motilal Nehru National Institute of Technology (MN-NIT), Prayagraj.
20	Mr. Joep Steinburch/ Ms. Nishi pant	WaL Team, Embassy of Netherlands
21	Sh. Abinash Sahoo, Senior Consultant, E&Y	PMC to Prayagraj Nagar Nigam
22	Ms. Vanshika, Consultant, E&Y	PMC to Prayagraj Nagar Nigam





S. No	Nominated Name And Designation	Department
23	Adm. Commandant Station Cell, (Representative)	Indian Army Cantonment, Prayagraj Division
24	Sh. Kaushal, Assistant Environment Engineer	UP Pollution Control Board
25	Sh. Hyder Raza, Assistant Manager	District Industries Centre, Prayagraj
26	Mr. Ravi Shankar, Ms. Archana Singh, Hydrologist	UP Ground Water Department
27	Sh. U.S. Kushwaha, Divisional Engineer	North Central Railways, Prayagraj
28	NIUA Project team	NIUA, Delhi
29	NMCG Representative	State Mission for Clean Ganga (SMCG-UP)



Picture 4 : Focused group discussions with key departments





In addition to the officials from Municipal Corporation and Development authority, this group also includes representatives from other city departments, like cantonment board, forest department, state tourism department, pollution control board, Ganga Task force, and academic inputs from MNNIT university. Additionally, other than MSWG members, other relevant stakeholders have been considered for consultations and focussed group discussions in the due course of the project. These are:

- a) **Mandir Flower Vendors (Phool mandi)**
- b) **Director, Central Inland Fisheries Research Institute (CIFRI) Prayagraj**
- c) **Boat Vendors from Naavik Samiti**
- d) **Baswar Landfill Contractor (waste to bricks)**
- e) **Residents living adjacent to Jhusi Pond and Sitakund**
- f) **Floating Restaurant Manager, Boat Club, UP Tourism**
- g) **Depot Manager, UPSRTC, Prayagraj Division**
- h) **Mansi Srishti, IEC Contractor, Prayagraj Nagar Nigam**



Picture 5 : Focused group discussions with different stakeholders





The purpose of this working group is to create a dedicated platform for these officials to brainstorm on various aspects of urban river management. This group supported the preparation of the URMP at all stages, which primarily involved conducting a baseline assessment and identifying relevant project interventions for the URMP. Additionally, the involvement of these officials ensures the ownership of the projects and helps in maintaining a responsibility matrix for each intervention identified. The primary responsibilities of the working group (MSWG) are:

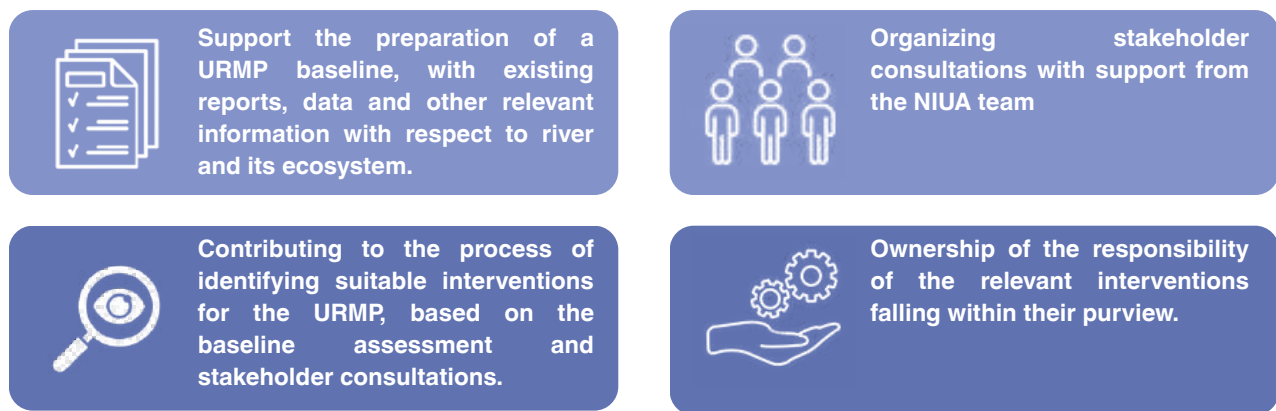


Figure 6: Responsibilities of the MSWG, Source: NIUA



A nighttime photograph of Prayagraj, India. In the foreground, a small boat with a yellow canopy and several people inside is on the water. The middle ground shows a wide river reflecting the city lights. In the background, a large temple with a prominent spire is visible, surrounded by trees and illuminated by streetlights. The sky is dark, and the overall atmosphere is serene.

Prayagraj: City Profile



Prayagraj, a historically and culturally significant city, is situated at the confluence of the Ganga and Yamuna rivers. The city's physical infrastructure plays a crucial role in determining the environmental health of these rivers. This chapter provides a detailed analysis of the city's water supply, sewerage system, wastewater reuse, and measures taken to control river pollution, particularly concerning the impact on the Ganga and Yamuna. Special attention is given to infrastructural improvements for managing the large gatherings during the Kumbh Mela.

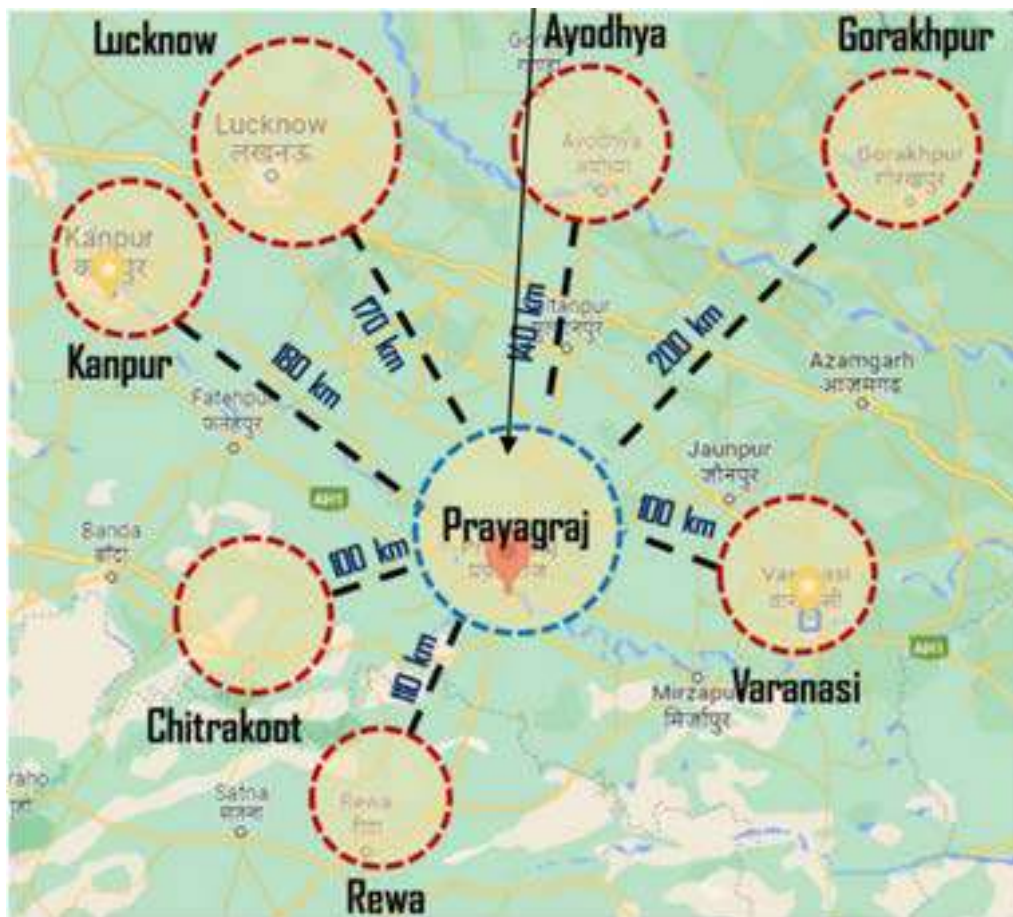


Figure 10: Regional Connectivity of Prayagraj, Source: Prayagraj CDP 2023

Prayagraj (formerly Allahabad) is a city located in the Indian state of Uttar Pradesh. It is strategically a very important city because of its religious significance at National and Global level. Prayagraj is one of the four cities in India that hosts Kumbh Mela every 6 years (Ardh Kumbh and Mahakumbh). The holy Triveni that is river Ganga, Yamuna and Saraswati confluence in the city of Prayagraj. Prayagraj is also known as an educational hub, and several Prime Ministers of India have studied at Allahabad University.

With a population of over 1.5 million people in 2021, the city is known for its cosmopolitan nature, drawing people from across the country, particularly for religious pilgrimages. The city's demographics reflect a rich cultural diversity, with various communities practicing Hinduism, Islam, Sikhism, and Christianity. The population is predominantly Hindu, which is evident from the religious practices, festivals, and the significance of the Kumbh Mela, an event held every 12 years that attracts millions of pilgrims to the city.

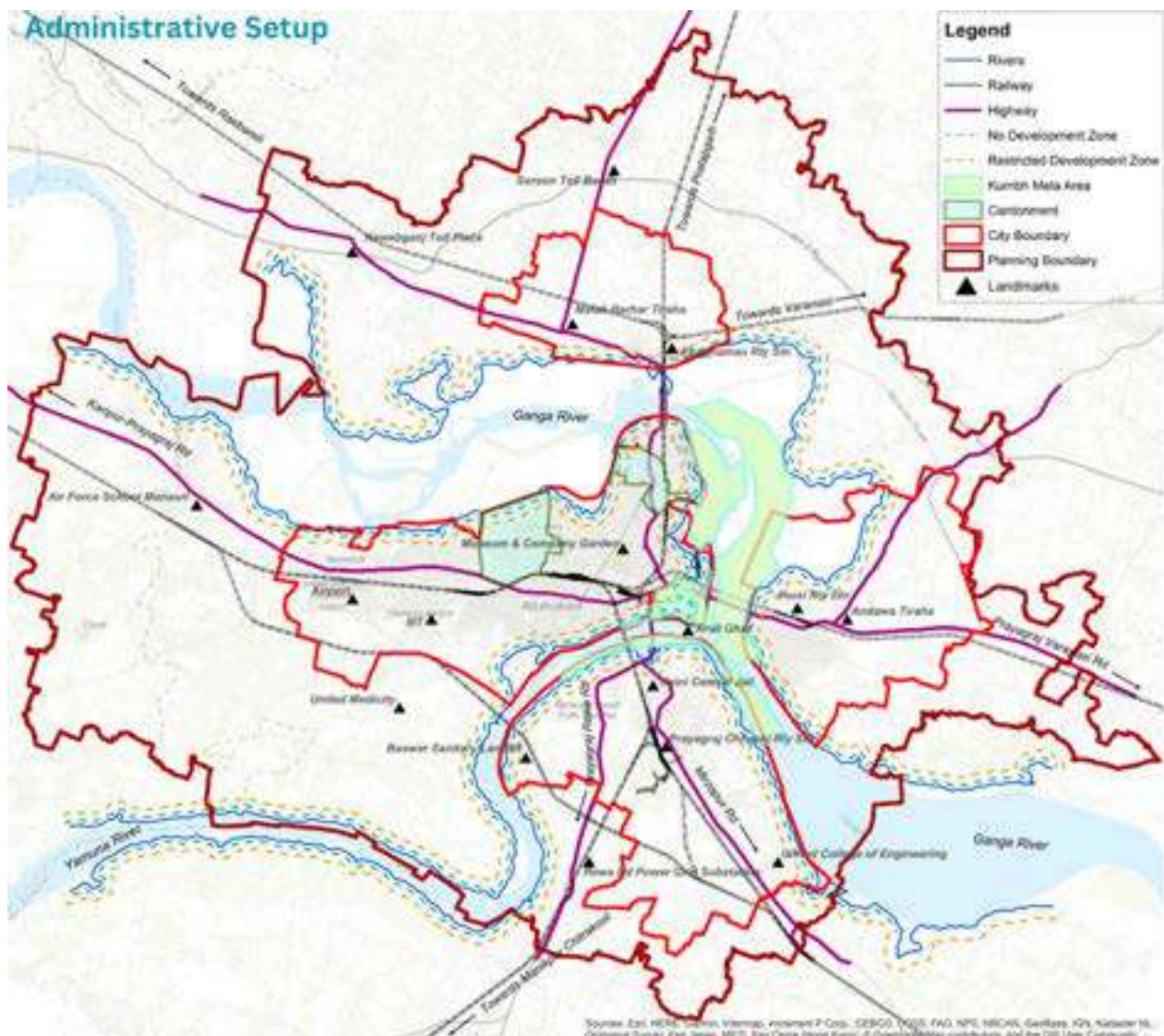
Prayagraj has good regional connectivity in all directions. To the west, it is linked to Kanpur and Lucknow through national highways, which also connect further to the main highway leading to Varanasi. In the north, the city is connected to important towns like Ayodhya and Gorakhpur, forming part of the larger religious circuit of Uttar Pradesh. Towards the south, Prayagraj is connected to cities in Madhya Pradesh, mainly through highways going to Chitrakoot and Rewa. This strong road network makes it easy to travel between Prayagraj and nearby major cities and religious destinations.



2.1 City Administrative Boundaries



Prayagraj Nagar Nigam (PNN) covers a total area of 296 square kilometers and includes 100 wards (increased from 80 wards after 2021). The current area under the Prayagraj Development Authority is 316 square kilometers, which is planned to expand to 1018 square kilometers as per the 2031 master plan. The city also includes a cantonment area, divided into four parts within the city limits.



Map 1 : Administrative Boundaries of Prayagraj city



2.2 Demography



Prayagraj is a major city in Uttar Pradesh with a growing and diverse population. In 2021, the population within the expanded Prayagraj Nagar Nigam area was about 18.4 lakh. The city is known for its strong educational and administrative presence, with many students, professionals, and government workers living here. In addition to its permanent residents, Prayagraj sees a large flock of floating population during religious events. The biggest of these is the Maha Kumbh Mela, held every 12 years, which brings in millions of pilgrims from across India and the world. Even the yearly Magh Mela attracts a huge number of visitors. These temporary increases in population create extra pressure on city services and infrastructure, making it important to plan well for both regular needs and special events.

Table 2 : Municipal Area before and after expansion in 2021, Source: Prayagraj Nagar Nigam

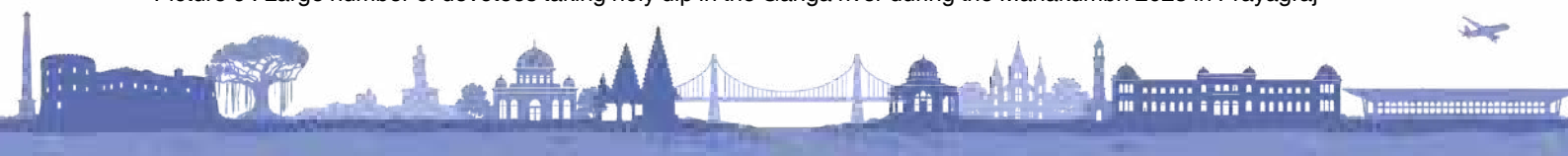
S. No	Description	Before Expansion	After Expansion
1	No of wards	80	97
2	No of ULBs	9	9
3	Municipal Area	80 Sqkm	367 Sqkm
4	Area of PDA		1015 Sqkm

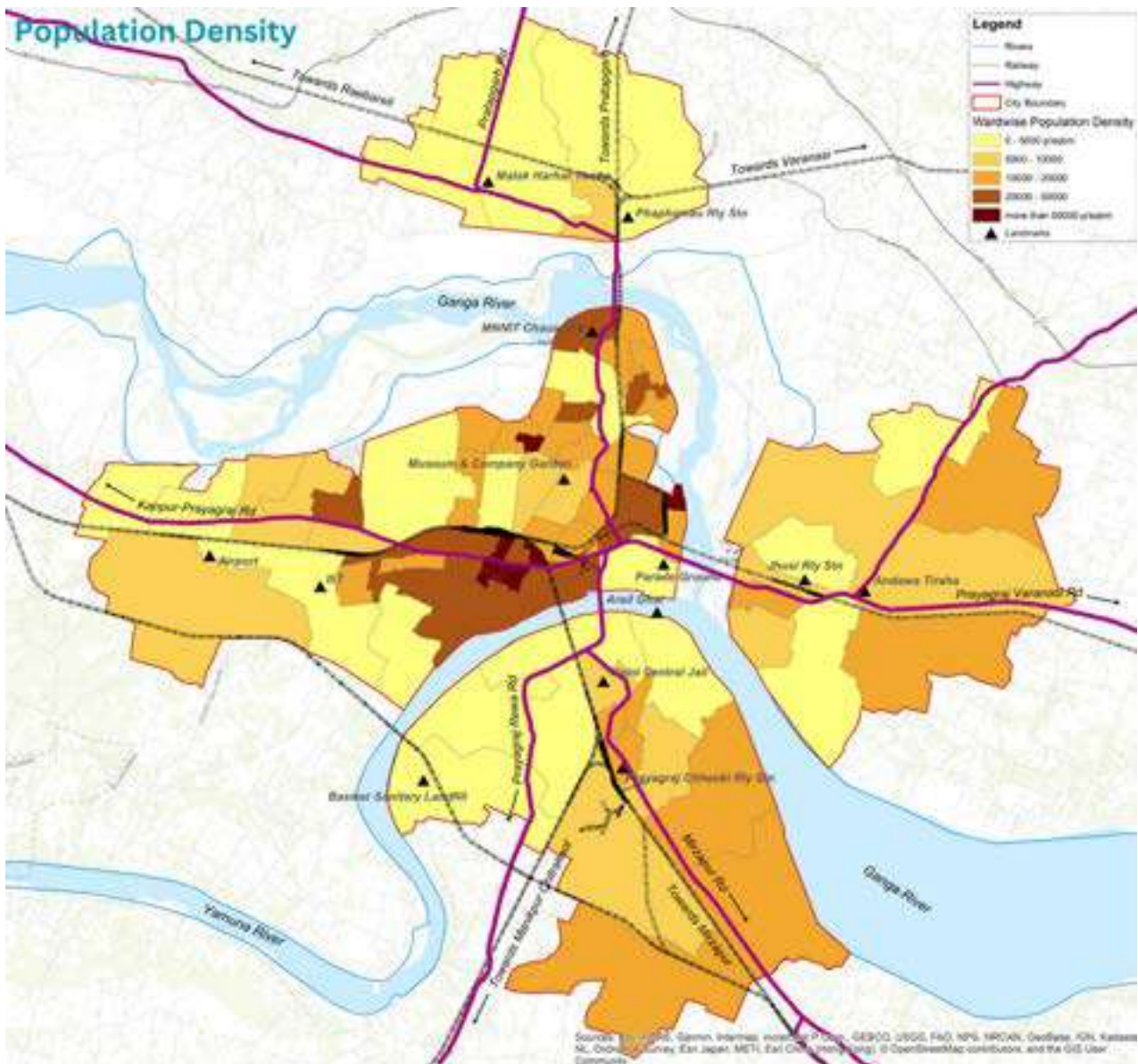
Table 3 : Projected population for Prayagraj city, Source: Prayagraj CDP 2023

S. No	Projected Year / Document	Population
1	2011 (Census)	11,68,385
2	2021 (Base Year -with expansion area)	18,43,822
3	2031 (Masterplan)	20,93,473
4	2071 (Integrated Infrastructure Plan 2023)	41,91,566



Picture 6 : Large number of devotees taking holy dip in the Ganga river during the Mahakumbh 2025 in Prayagraj





Map 2 : Population Density of Prayagraj. Source: NIUA, based on Census 2011



Picture 7: Boating on the Yamuna river in Prayagraj

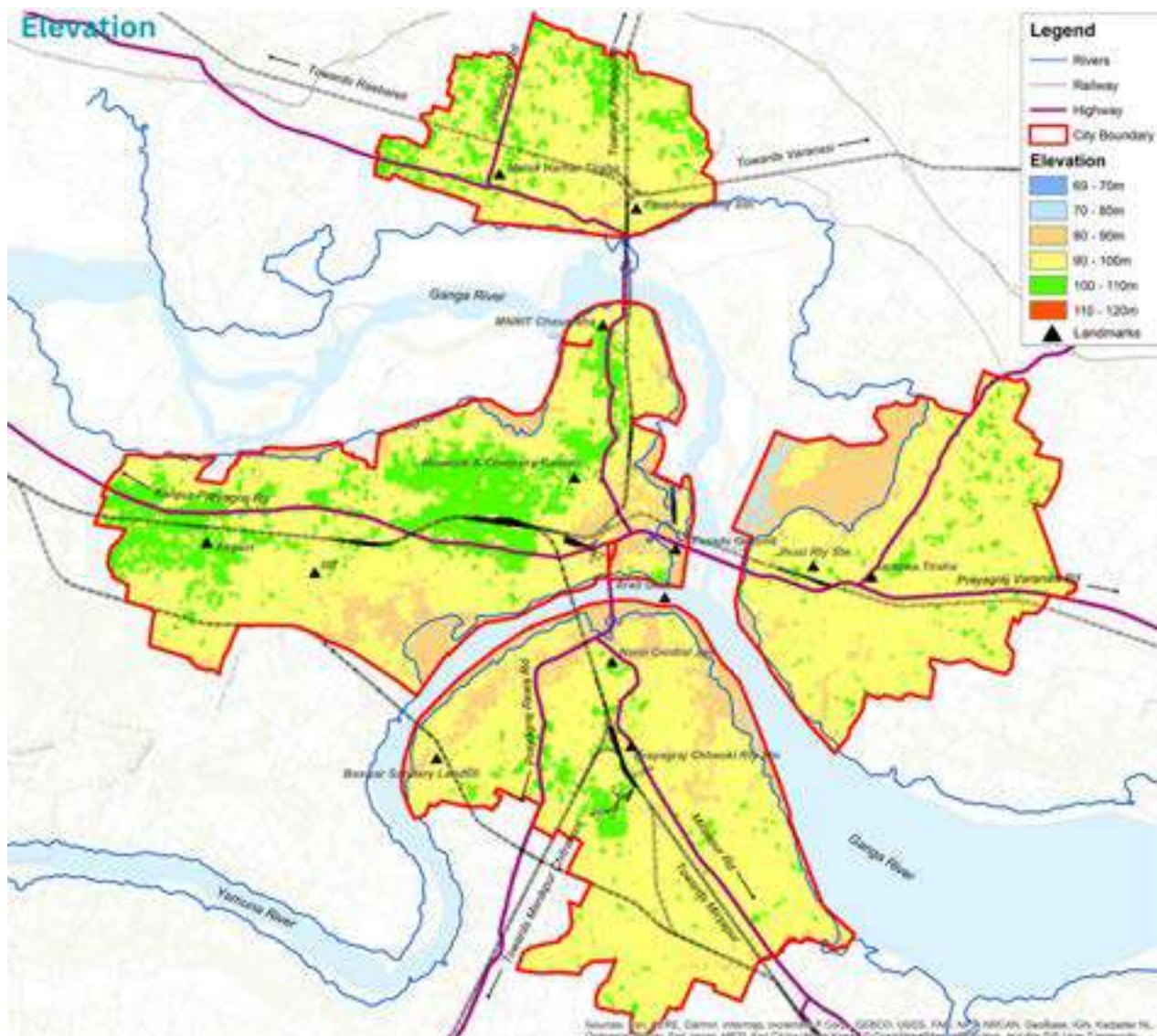


2.3 Physiographic Profile



2.3.1 Topography

Prayagraj is located in the southern part of Uttar Pradesh at an elevation of about 98 meters above sea level. The city's geography is shaped by its surrounding regions—Bagelkhand lies to the south and southeast, Purvanchal is to the east, Bundelkhand is to the southwest, and Awadh is to the north and northeast. Along with Kaushambi, Prayagraj is part of the Lower Doab region to the west, the land between the Ganga and Yamuna rivers. The terrain of Prayagraj is mostly flat, with elevations ranging between 70 and 110 meters. The land gradually slopes down towards the rivers. The highest point in the city is near Khusro Bagh and Prayagraj Junction railway station, with the ground gently sloping towards the Ganga and Yamuna rivers. In the Naini area, the land is highest near Naini Junction and slopes down towards the Yamuna in the north and the Ganga in the east. The overall drainage flow in the Ganga is from Phaphamau in the north to Naini in the south, and that for the Yamuna is from Baswar in the west to Naini in the south.



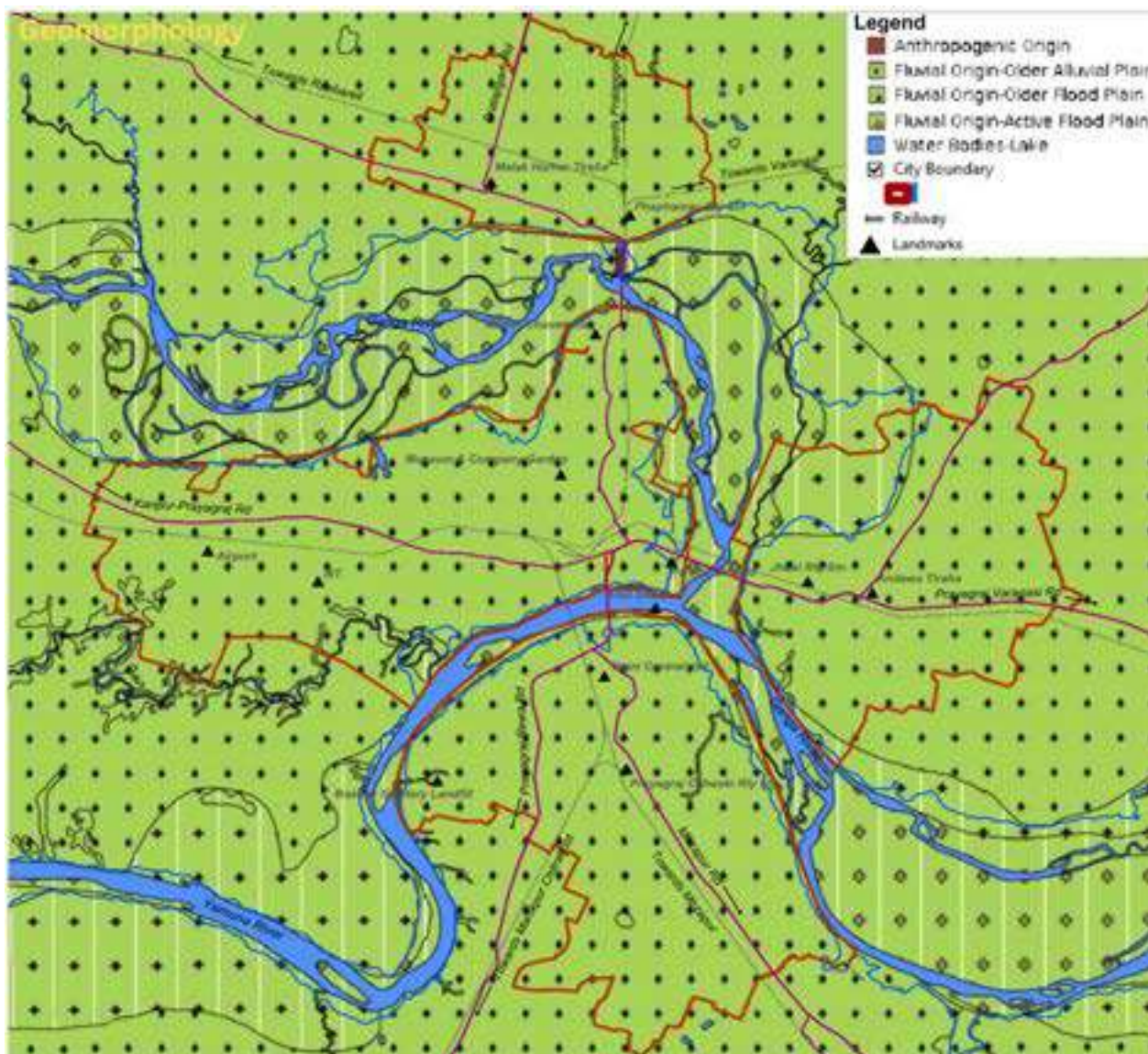
Map 3 : Elevation of Prayagraj, Source: NIUA





2.3.2 Geophysical Characteristic

Geologically, Prayagraj is part of the alluvial plain formed by the deposits of the Ganga and Yamuna rivers over millennia. The underlying geology consists of fine, silt-rich sediments that have resulted in the formation of fertile soil, making the region conducive to agriculture. The city's location on the floodplain of these two rivers means it is prone to occasional flooding, especially during periods of high rainfall or excessive river flow. This poses challenges for urban planning, river management, and flood control. From a geophysical standpoint, Prayagraj's river channels are dynamic, with the Ganga and Yamuna constantly shifting their courses due to sediment deposition, erosion, and changes in water flow. The management of these rivers involves addressing the complex processes of sediment transport, water flow regulation, and flood mitigation to prevent adverse effects on the city's infrastructure.



Map 4 : Geomorphology of Prayagraj, Source: NIUA





2.3.3 Climate

In terms of climate, Prayagraj experiences a humid subtropical climate, typical of North Indian cities with hot summers, cool winters, and a monsoon season. Summer temperatures often exceed 40°C, while winters are mild, with temperatures dropping to 4°C during the coldest months. Prayagraj never receives snow, but, experiences dense winter fog due to numerous wood fires, coal fires, and open burning of rubbish, resulting in substantial traffic and travel delays. The monsoon season brings heavy rainfall, contributing significantly to the rivers' flow from June to September. The highest monthly rainfall of 333 mm occurs in August.

Table 4 : Average weather pattern of Prayagraj

High Temp.	41°C	Precipitation	81.1mm	Wind	10 km/h
Low Temp.	10°C	Humidity	64%	Pressure	1007 mbar
Mean Temp.	26°C	Dew Point	18°C	Visibility	3km



Figure 13 : Annual average temperature and rainfall of Prayagraj, Source: Indian Meteorological Department (IMD)



2.4 Urban Sprawl



The growth of Prayagraj has always been closely connected to its rivers. In the early days, people began settling mainly along the banks of the Ganga River, especially near areas like Buxi Khurd. Similarly, on both sides of the Yamuna near the old Naini railway bridge, areas like Kydganj, Mutthi Ganj, and Hazrat Ganj started to develop, along with George Town and Tagore Town near Chandrasekhar Azad Park. Over time, the city expanded outward from these points. The urban sprawl is influenced by several factors:



The presence of railways and highways has facilitated the city's growth by improving connectivity and accessibility. This has led to the development of new residential and commercial areas along these transport corridors.



Changes in the river course, as shown in the map, have impacted the city's development. The city is not divided into four parcels of land connected by the river. Areas near the river may have restrictions due to flood risks; therefore, the city chose expansion as per land cognizance.



Due to no demarcation of no development zone and zoning regulations in floodplain, the city has densified along the floodplain in core areas.



The growth of commercial and industrial activities has attracted people to the city, leading to increased demand for infrastructure and housing, further leading to the expansion of the city boundaries. This is evident from the temporal changes in the city boundary from 1989 to 2024.

Figure 12 : Fctors influencing urban sprawl in Prayagraj

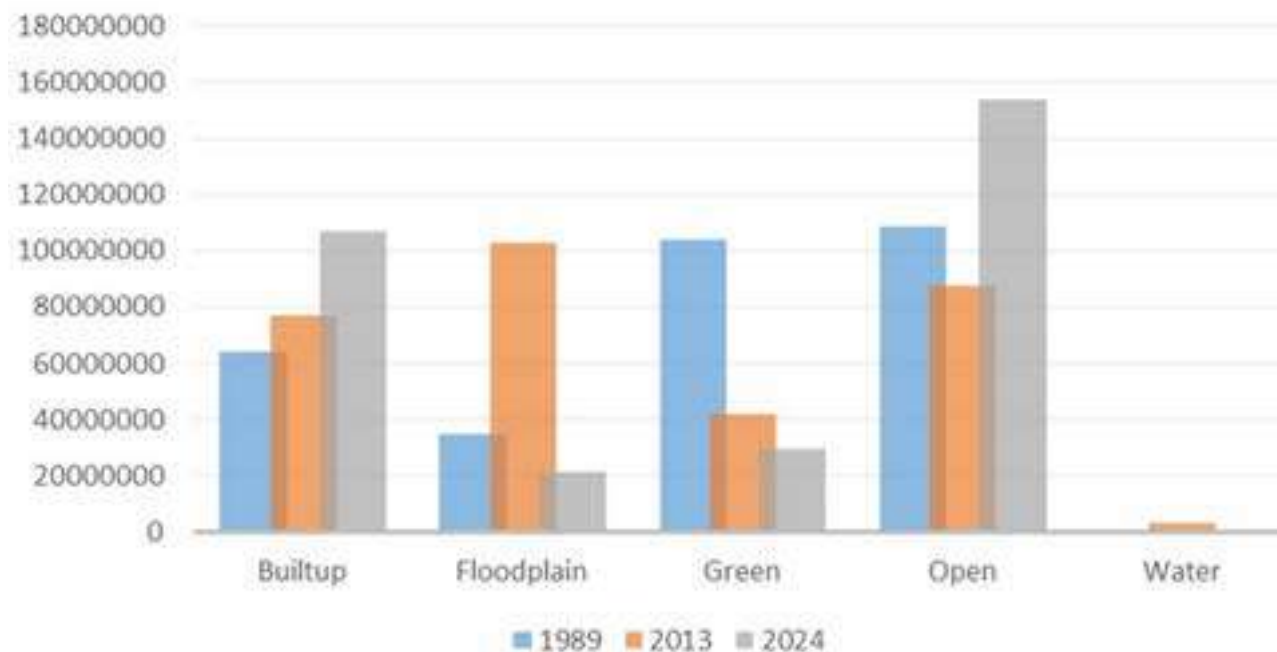


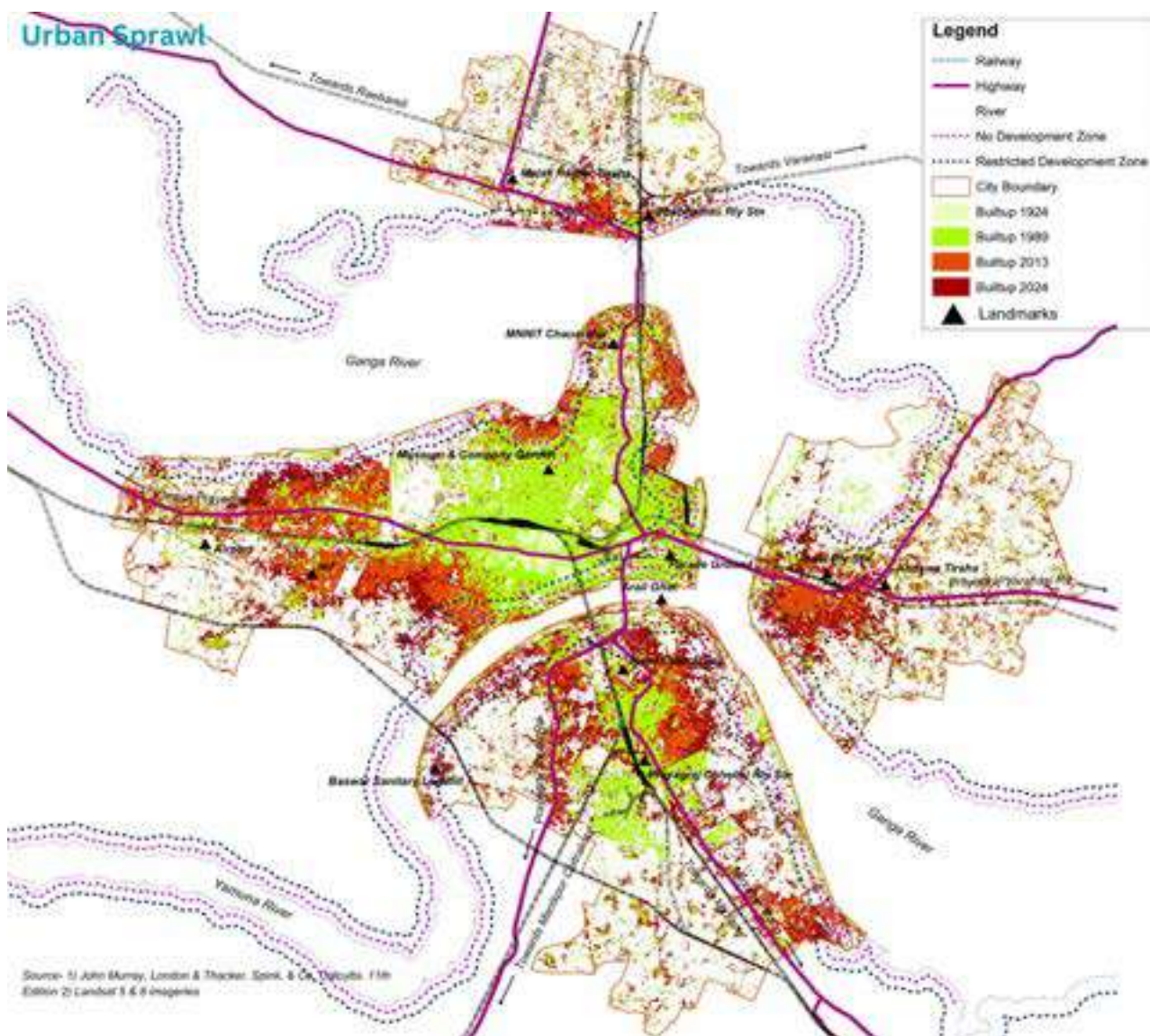
Figure 14 : Landcover Changes in Prayagraj over the past Decades, Source: NIUA





To understand the urban growth rate as well as pattern in Prayagraj city, landcover maps were prepared for 1924, 1989, 2013 and 2024 using IRS-LISS III satellite data accessed from the BHUVAN portal, and analysed using the QGIS software. The multi-date comparison clearly indicates significant decline in floodplain and green areas in the last two decades. Four major land-cover classes viz, built up, open/ barren land, green area and waterbody/wetland have been compared. The graph shows the changes in the area of these land cover classes for 1989,2013 and 2024.

However, the growth of the city hasn't been very uniform. The presence of two major rivers, along with railway lines and highways, has affected how the city has spread. In the outskirts, some ribbon-like development has happened along key roads and railway lines, like the road to Kanpur near the airport and the road to Rewa. Other parts of the city have grown in a more unplanned and scattered way.



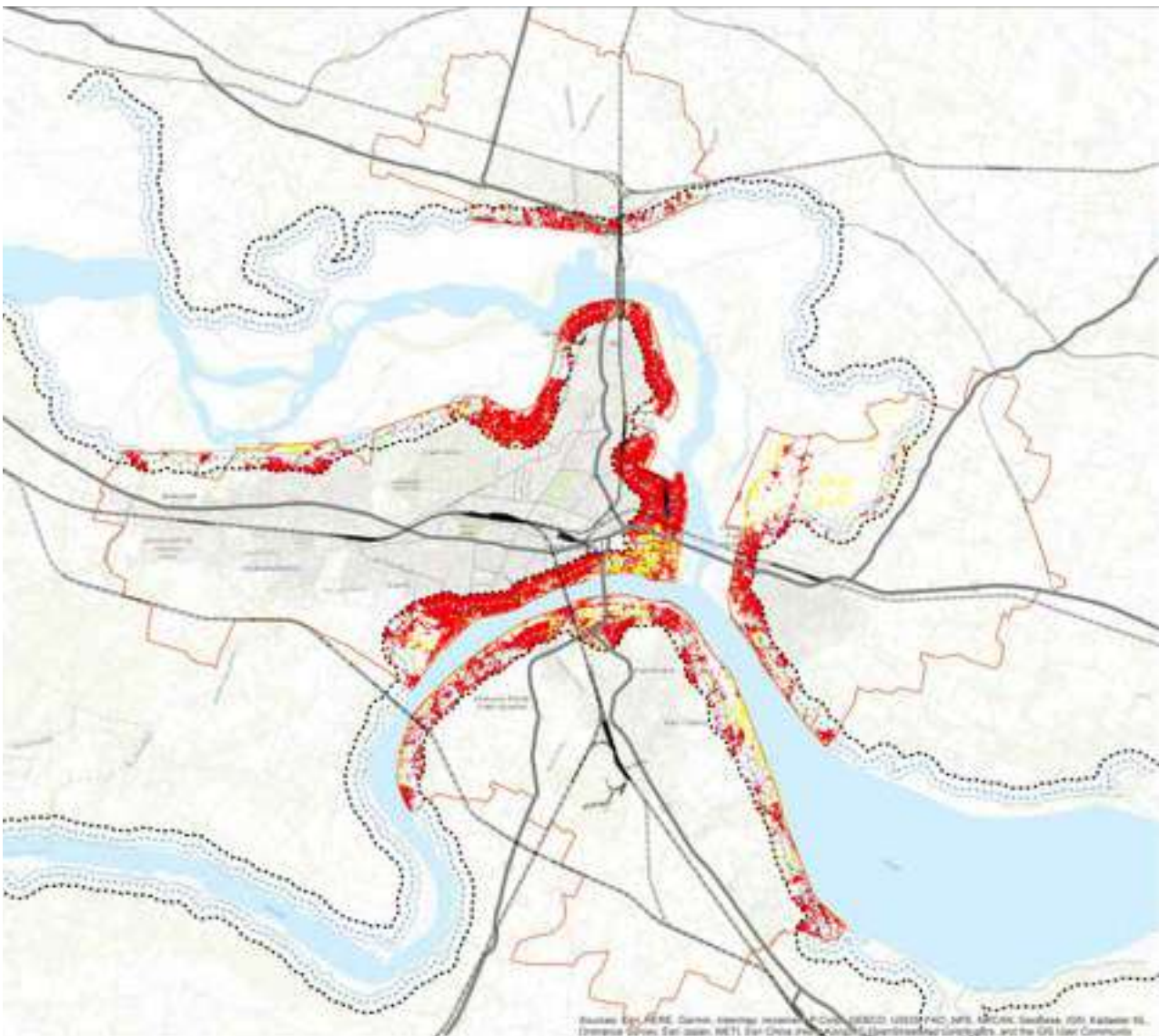
Map 5 : City Growth/ Urban Sprawl of Prayagraj, Source: NIUA





One of the key concerns highlighted in the urban sprawl analysis is the growing encroachment of development within the river zones, particularly the floodplains. These floodplain areas play a crucial role in accommodating excess water during periods of high river flow and must remain free from permanent construction to ensure the natural functioning of the river system. As per the Prayagraj Master Plan 2021, only temporary and regulated activities are permitted in these zones (refer to Annexure for the list of permitted activities).

Despite this, a significant amount of permanent development has been observed along the riverbanks—especially along the north bank of the Yamuna near the New Yamuna Bridge and the west bank of the Ganga in the older city areas. This pattern of encroachment poses serious challenges for managing the river ecosystems and complicates the process of future urban planning and flood risk mitigation in these sensitive areas.



2.5 History & Cultural Profile



Prayagraj, one of the largest and oldest cities in Uttar Pradesh, is located at the holy confluence of the Ganga, Yamuna, and the mythical Saraswati rivers—known as the Triveni Sangam. This sacred spot is one of the most important pilgrimage sites for Hindus, believed to cleanse sins and offer spiritual purification. Ancient texts like the Puranas, Ramayana, and Mahabharata mention Prayag (the city's original name), highlighting its deep mythological and spiritual significance. According to legends, Lord Brahma performed a sacred ritual here, making it the “Tirth Raj” or the king of pilgrimage sites. The beauty of the Sangam, where the greenish-blue Yamuna meets the pale-yellow Ganga, attracts not just pilgrims but also nature lovers.

The city is especially famous for hosting the Kumbh Mela, one of the largest religious gatherings in the world, held every 12 years at the Sangam. Millions of devotees come to take a holy dip during this event, believing it brings blessings and frees them from past sins. On special bathing days, called Shahi Snan, spiritual leaders and devotees participate in sacred rituals. A smaller version, the Magh Mela, is held every year in January, attracting thousands of pilgrims. These festivals not only showcase the city's religious importance but also celebrate India's rich cultural and spiritual traditions.

Historically, Prayagraj has been a center of learning and mythology. It is linked to ancient sages like Bhardwaj, who is said to have taught thousands of students around 5000 BC. The nearby Jhansi area was once ruled by King Pururava of the Lunar dynasty. The famous Ashoka Pillar, with inscriptions from the 3rd century BC, shows the city's ancient importance.

In 1575 AD, Emperor Akbar renamed the city “Illahabas,” which later became Allahabad. The city served as a provincial capital under the Mughals and later came under Maratha control. During British rule, it became an important administrative center and played a key role in India's independence movement. It was here in 1858, at Minto Park, that power was officially transferred from the East India Company to the British Crown after the 1857 rebellion.

Prayagraj became a legal hub with the establishment of the Allahabad High Court in 1868. British-era landmarks like All Saints Cathedral and the University of Allahabad (founded in 1887) added to its prominence. The city was also home to Anand Bhawan, the residence of the Nehru family and a center for freedom movement activities.

Today, Prayagraj remains a vital educational, administrative, and cultural center. It houses key institutions such as the High Court of Uttar Pradesh and prominent colleges. With its rich spiritual heritage and historical legacy, Prayagraj continues to be a vibrant and culturally significant city in India.



2.6 Tourism Profile



Prayagraj stands as a prominent tourist destination in India, boasting a rich historical legacy, strategic location, and excellent connectivity. Situated between Lucknow and Varanasi, the city is well-connected by air, rail, and road, making it easily accessible for both domestic and international tourists. As part of the regional Ramayan circuit, with Shringverpur located just 45 km from the city center, Prayagraj holds immense potential for religious and cultural tourism.

Air



Prayagraj is served by the Bamrauli Airport (IXD), located 12 km from the city center. The airport offers domestic flights to key cities like Delhi, Lucknow, Mumbai, and Varanasi, facilitating convenient travel for tourists.

Rail



The city is a major railway hub with four stations—Allahabad Junction (city center), Prayag Station, Prayag Ghat, and Naini Junction—catering to various routes and ensuring seamless connectivity.

Road



Prayagraj is well-connected via National Highway 19 (GT Road) to Delhi, Kanpur, and Kolkata. The UPSRTC operates regular bus services, and state highways like SH 330 (to Ayodhya), NH 19 (to Varanasi), SH 35 (to Mirzapur), and SH 30 (to Rewa) further enhance road connectivity.

Figure 15: Connectivity of Prayagraj, Source: Authors



Figure 16: Regional tourist circuits involving Prayagraj, Source: Prayagraj CDP 2023





Figure 17 : Historical Building of Allahabad High Court

The city holds historical legacy in its existence which is visible in the structures like Allahabad fort, Anand Bhawan, Khusro Bagh, Swaraj Bhawan, Allahabad high court, etc. These landmarks offer insights into the city's glorious past and architectural brilliance. Places like Khusaro bagh and Azad park provide services as picnic spots as well as recreational zones. There are multiple heritage walk/ tours through the city of Prayagraj organized by UPSTDC (Uttar Pradesh State Tourism Development Corporation) at regular intervals. The bookings are managed via Prayagraj tourism website. Additionally, there are many private heritage and food walk tours organized by individuals independently. The details are available on Prayagraj tourism website.

Prayagraj has witnessed significant tourist footfall over the years, with a notable surge during the 2019 Ardh Kumbh Mela, which attracted approximately 24 crore domestic and over 10 lakh international visitors. While the COVID-19 pandemic caused an 83% decline in 2020, the numbers have steadily recovered since 2021, showing an upward trend through 2023.

Table 5 : Tourist Footfall in Prayagraj

Year	Domestic	International	Total
2018	4,46,68,662	1,46,805	4,48,15,467
2019	28,40,57,014	11,71,696	28,52,28,710
2020	3,18,67,069	66,689	3,19,33,758
2021	1,12,13,307	189	1,12,13,496
2022	2,60,45,271	1,895	2,60,47,166
2023	5,39,30,466	4,853	5,39,35,319
2024			





When compared to Ayodhya and Varanasi—two other key religious and cultural hubs in Uttar Pradesh, Prayagraj has consistently attracted higher tourist numbers, except in 2022 and 2023. This indicates the city’s strong appeal as a tourist destination. However, the gap lies in leveraging its recreational and experiential tourism potential. While the city excels in religious and historical tourism, there is a need to enhance its recreational offerings, particularly along the riverfront. Additionally, the a stark incline in the footfall is observed during the large gathering of Kumbh in 2019 and 2025. In 2019 Ardh Kumbh nearly 24 crore devotees gathered for the holy dip and the number anticipated for Mahakumbh 2025 is nearly 40 crores.

Institutional Mechanism:

Kumbh: The proceedings and preparations of this unique large gathering is undertaken by a SPV called as Prayagraj Mela Authority, headed by Mela Adhikari (IAS) directly reporting to the Minister of State. The department carries out pre-preparations, activities, branding, analysis and studies for the large gathering , including enhancement in city infrastructure to hold huge population for the temporary time period of 40 days. This SPV has the power to bring all city departments on one table and govern the projects to be implemented within the city. For example: Mela authority pays for the creation of riverfront roads along Ganga and Yamuna, but the activity was carried by irrigation and water resources department of Prayagraj. Whereas some activities for city infrastructure improvement are carried by the Nagar Nigam departments independently and reported to Mela Authority.

Table 6 : Comparison of Tourist Footfall between Ayodhya, Varanasi and Prayagraj

Year	Ayodhya	Varanasi	Prayagraj
2018	1.92 million	6.44 million	44.81 million
2019	2.01 million	6.79 million	285.23 million
2020	0.60 million	0.98 million	3.19 million
2021	1.54 million	3.07 million	11.21 million
2022	2.39 million	7.17 million	26.04 million
2023	6.30 million	12.94 million	53.9 million
2024			





City Tourism: Regular activities for the promotion of tourism are carried out by UPSTDC, the UP state tourism department, where RTO, Prayagraj is responsible for activities within Prayagraj District. All projects proposed are taken to the District Tourism Council for approval, where the Regional Tourism Officer, District Magistrate, and District Forest Officer are members. The council approves the projects, and implementation is carried out by the respective agencies.

Despite its strengths, Prayagraj has untapped potential in recreational and experiential tourism. The city's riverfront, particularly the Sangam, the confluence of the Ganges, Yamuna, and Saraswati rivers, offers immense opportunities for development. A holistic approach to strengthening the river edges, creating recreational zones, and promoting water-based activities could significantly enhance the city's tourism appeal. Additionally, there is scope for improving infrastructure, promoting local cuisine, and organizing cultural festivals to attract a diverse range of tourists along the river. Prayagraj's rich heritage, strategic location, and strong connectivity make it a key player in Uttar Pradesh's tourism landscape. By addressing the gaps in recreational tourism and leveraging its riverfront potential, the city can further solidify its position as a premier tourist destination beyond Kumbh mela.



Picture 17 : Khusro Bagh



Picture 18 : Tents constructed on riverbank during Kumbh mela 2019, Source: Prayagraj Mela Authority





Prayagraj's significance extends beyond its role as a spiritual centre. The confluence of the Ganga and Yamuna rivers, shapes the city's identity, economy, and cultural practices. However, with rapid urbanization and climate change impacting the river systems, the city faces growing challenges in river management, environmental conservation, and flood prevention. Effective management of these rivers is not only crucial for the city's future but also for the millions of people who depend on them for their livelihoods, spiritual practices, and well-being. The strategies developed here must integrate all-time tourism potential beyond Kumbh with the deep cultural connections people have with these sacred waters.

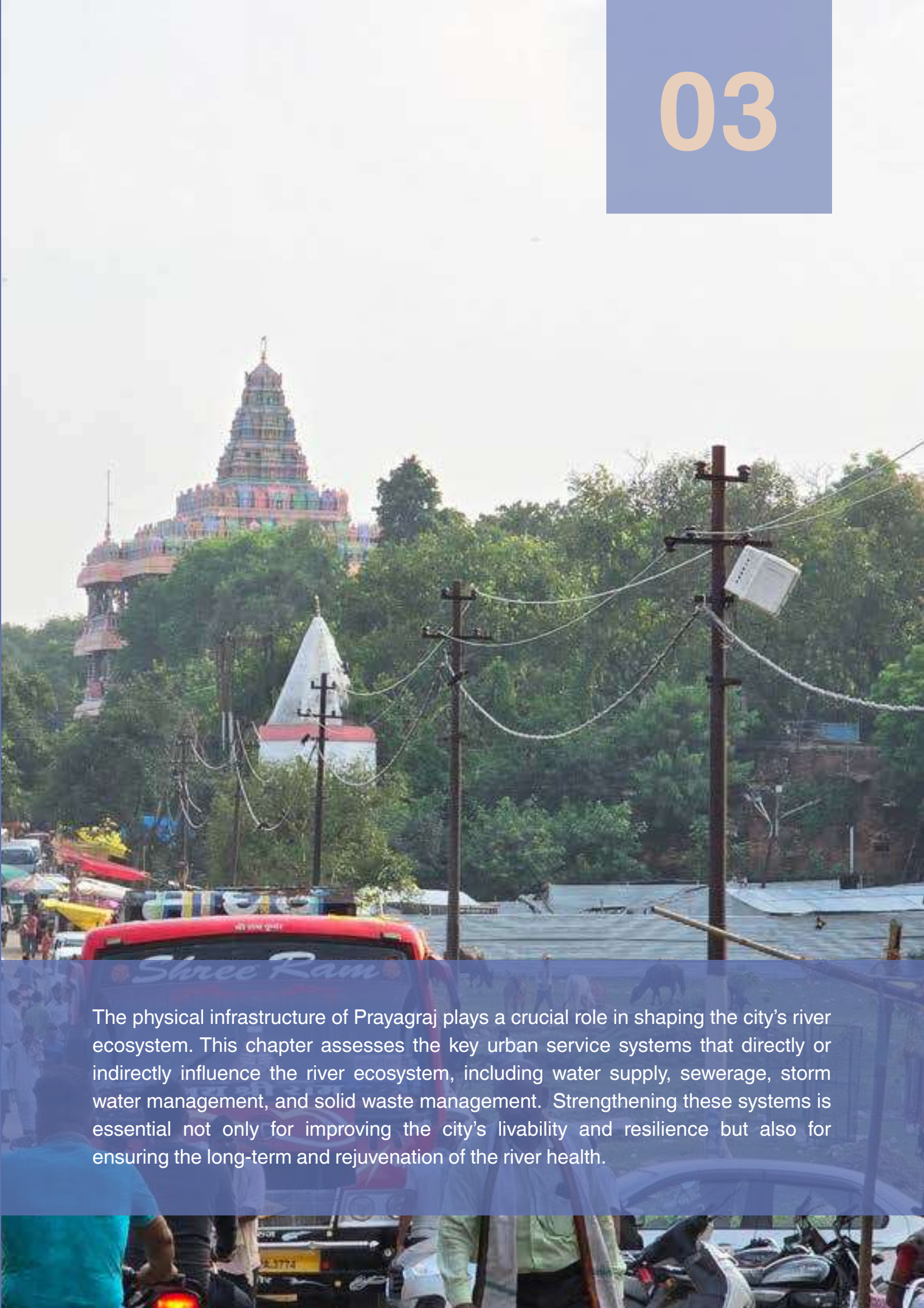


Picture 19 : Drone shot of Sangam Nose during Mahakumbh 2025, Source: Prayagraj Mela Authority





Physical Infrastructure



The physical infrastructure of Prayagraj plays a crucial role in shaping the city's river ecosystem. This chapter assesses the key urban service systems that directly or indirectly influence the river ecosystem, including water supply, sewerage, storm water management, and solid waste management. Strengthening these systems is essential not only for improving the city's livability and resilience but also for ensuring the long-term and rejuvenation of the river health.

3.1 Water Supply



The water supply system in Prayagraj primarily relies on two sources: groundwater drawn through tube wells and surface water from the Ganga and Yamuna rivers. The water is treated and distributed by Jal Kal, the main agency responsible for managing urban and suburban water supply

3.1.1 Water Demand and Supply

Prayagraj's water supply system includes one Water Treatment Plant (WTP) at Khusrobagh with a capacity of 135 MLD (million litres per day), and around 342 tube wells that together provide 322 MLD, mostly serving the old Allahabad area. Out of the WTP's total capacity, only 80 MLD is actually used, drawn from the Yamuna River at Karelabad. The anticipated demand for water supply is estimated at 332 MLD. According to the CDP 2023 by Prayagraj Development Authority, the water demand is expected to grow significantly in the coming decades. Here's a summary of projected demand and supply:

Table 7 : Water Demand Supply gap as per CDP 2023 of Prayagraj Development Authority, Extracted by NIUA

Year	Projected Population	Demand (MLD)	Availability/Supply (MLD)	Demand-Supply Gap (MLD)
2021	18.4 lakh	332	403	Surplus
2026	21.7 lakh	391	403	Balanced
2051	30.0 lakh	541	403	138 MLD short
2071	37.5 lakh	562	403	159 MLD short

Despite an existing surplus in 2021, the city is expected to face a water supply shortage in the future. To prepare for this, the CDP 2023 suggests improving groundwater recharge, promoting reuse of treated water, and reducing water loss due to leakages (Non-Revenue Water or NRW). These strategies are being planned under AMRUT 2.0 and other NRW reduction initiatives. Effective water management is crucial, particularly considering the impact of water abstraction on the flow of the Ganga and Yamuna. Over-extraction of groundwater is a concern, as it affects base flow to rivers, affecting their ecological balance. Refer to section 3.1.4 for groundwater details.



Picture 20 : Water Pumping Station on river Yamuna in Karelabadh





3.1.2 Ongoing and Proposed Projects

The standard per capita supply is considered to be 150 lpcd. However, water supply designs are based on 172 lpcd to account for 15% wastage. Water is generally supplied twice a day: 4:00 to 8:00 AM and 5:00 to 9:00 PM. However, actual usage of water per capita is reported as 235 lpcd by Jal Kal. Currently:

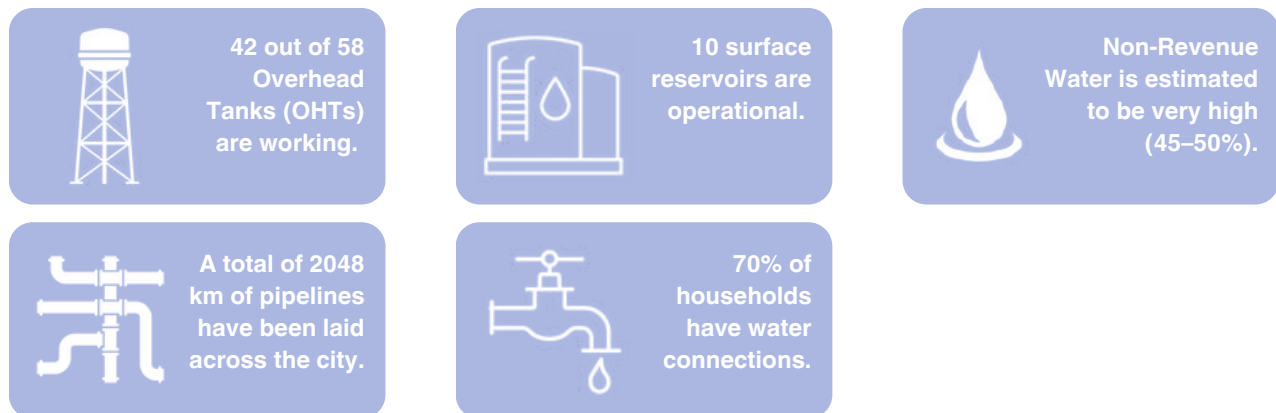


Figure 21 : Current Status of Water Supply in Prayagraj

Additionally, to promote sustainable practices, a 2 MW solar plant is being set up at Karelabagh and Khusrabagh for powering water supply infrastructure.

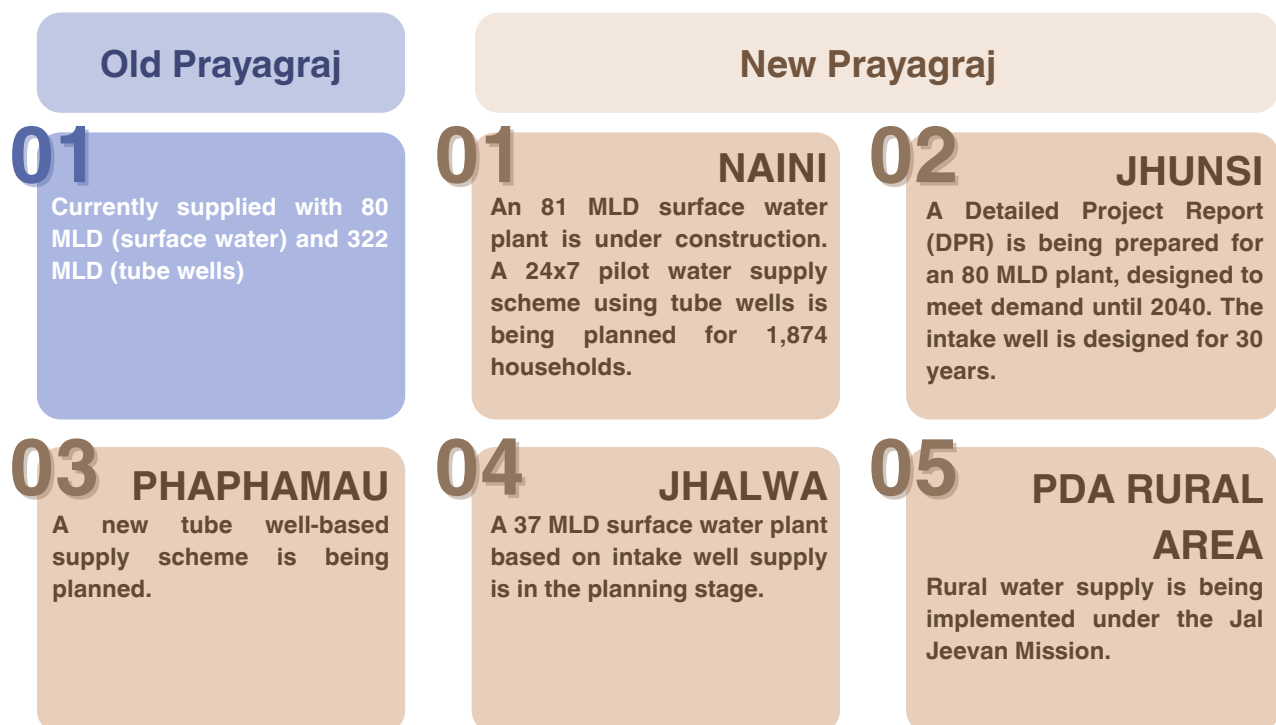
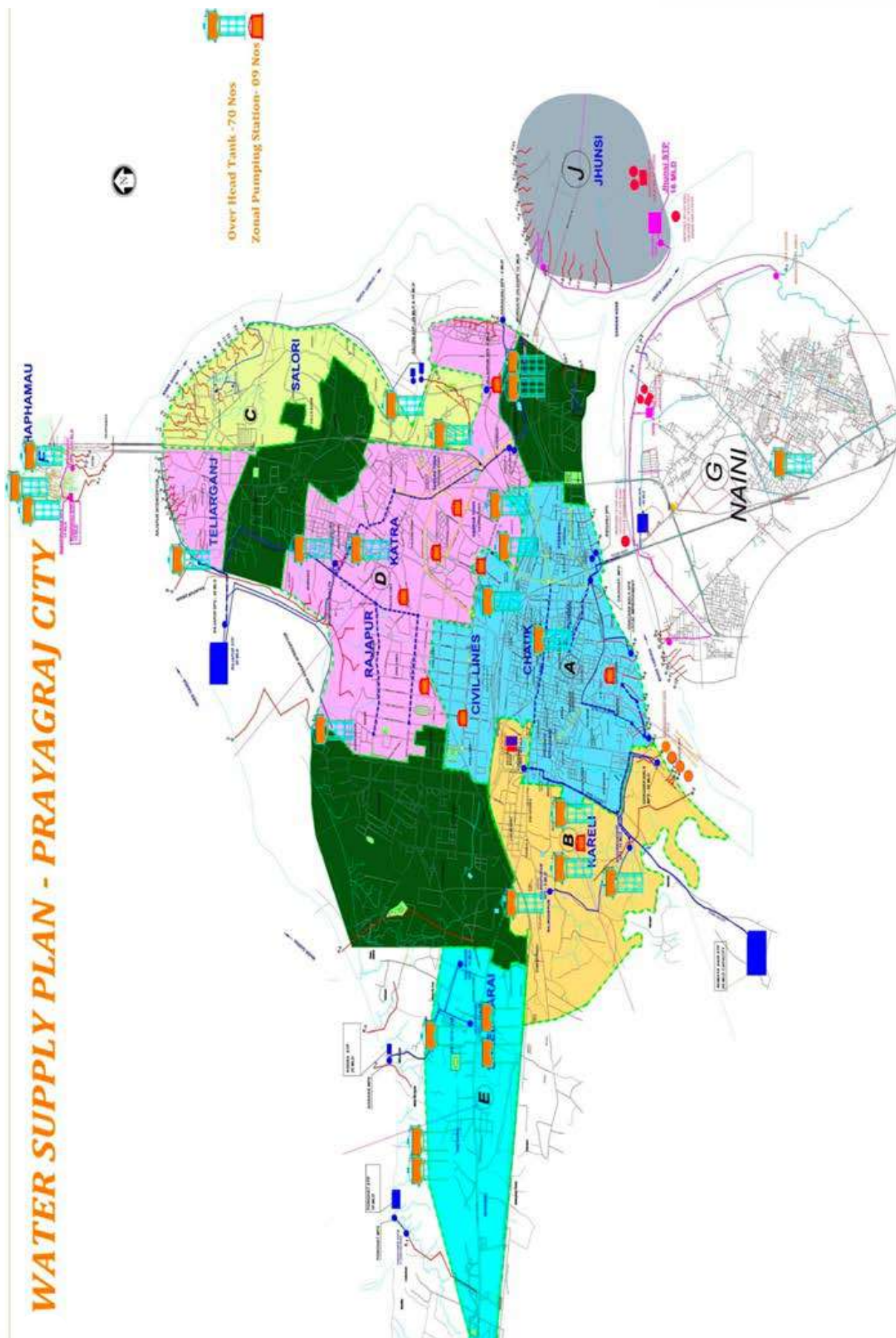


Figure 22 : Ongoing and Proposed Projects related to Water Supply in Prayagraj



WATER SUPPLY PLAN - PRAYAGRAJ CITY



Map 7: Zone-wise water supply map for Prayagraj, Source: Jal Nigam (Urban)





Kumbh Mela Area

A dedicated water supply infrastructure is laid in the Mela area, to ensure uninterrupted supply and overall hygiene during the incoming of millions of people at one time. 85 tubewells including operational and stand by tubewells were implemented for MahaKumbh 2025. Mela area is divided into 25 sectors with a network of DI and GI pipes laid. Approx. 56,500 water connections are provided in the Akhara parishads, Govt. camps, offices, police chowkis and Kalpvasi camps. Post mela, these connections are covered and closed, and rejuvenated before the next mela.

3.1.3 Water Quality

The river water quality is measured at three points in Prayagraj, i.e., Pratappur, Sahzadpur and Rajapur. This measurement is done every week manually by the UP Pollution Control Board.



Figure 21 : Physical, Chemical and Biological Parameters of Water Quality

The water quality reports from the past 10 years (2014-2024) were analysed, and it was found that the turbidity value varies from 1 NTU to 500 NTU. This could be linked to higher sediment load during monsoon season. pH values remain alkaline within the range with slight variations from 7.0 to 9.2. TDS values varied between 133 mg/L to 1622 mg/L. Higher TDS levels were observed during dry periods, indicating increased concentration of dissolved salts. Average BOD varies from 0.1 to 18.1 mg/L, with higher BOD levels during monsoon indicating increased organic pollution load. DO levels vary from 0mg/L to 17.8 mg/L, where DO was higher during cooler months and lower during warmer months. Faecal coliform levels vary from 170 MPN/100mL to 49,000 MPN/mL, where higher counts are observed during monsoon, indicating contamination from runoff.

Most parameters show clear seasonal trends, with higher values during monsoon due to increased runoff and lower values during dry seasons due to reduced dilution. Increasing trends in TDS, EC, nitrate, and phosphate suggest gradual deterioration in water quality, likely due to agricultural activities, urbanization, and reduced water flow. pH and major ions like calcium and sulphate remained relatively stable over the years, indicating no significant changes in the geological or chemical composition of the water source. Faecal coliform has presented consistently increasing levels, creating an alarming rate of contaminated discharge in the river via drains. Long-term monitoring and management strategies are essential to address these trends and ensure sustainable water quality.





3.1.4 Groundwater

Groundwater trend values as per the UP GW board report from 2022 to 2024 range significantly, with some wells showing declining water levels (indicating deeper groundwater) while others indicate relatively increased water tables. Generally, groundwater levels are observed to be declining in pre-monsoon months and rise during post-monsoon periods due to recharge.

In 2023, for instance, a tubewell recorded a pre-monsoon depth of 20.35m, which reduced to 20.5m post-monsoon, suggesting slight replenishment. Some wells have been abandoned or closed due to non-functionality. The graphical trend in groundwater level variations over the past years in Prayagraj is depicted in the figure below. Most wells show a clear seasonal fluctuation, with lower water levels pre-monsoon and slight replenishment post-monsoon.

However, certain wells exhibit a declining trend, indicating long-term depletion. The critical zones observed are:

Allahabad Municipal Corporation (old area) and Pipalgaon Town Area: multiple wells exceed 15 m depth in most years.

Sandwa Chandrika and Shivgarh Blocks in Pratapgarh district: several wells consistently show deep water levels above 20m.

These areas indicate a high risk of groundwater depletion, necessitating targeted conservation efforts like recharge structures, regulated extraction, and rainwater harvesting.



Picture 26 : Boats being used for transportation of materials





3.1.5 Institutional Mechanism

The water infrastructure projects are conceived and designed by Jal Nigam (Urban) with suggestions from Prayagraj Nagar Nigam. Further, they execute the projects and hand over to Jal Kal for regular running and maintenance up to operation and maintenance (O&M) period. The revenue from water billings is earned by Jal Kal. Jal Nigam earns revenue by keeping a percentage share in the DPR preparation as their design fee.

Since Jal Nigam is an autonomous body under the state, the reporting mechanism of Jal Nigam regional officer (Executive Engineer) in Prayagraj is to the Superintending Engineer of Jal Nigam (head office- Lucknow) as well as to the Municipal Commissioner, Prayagraj. The proposed projects need approval from the state office of Chief Engineer Jal Nigam, along with incorporation of suggestions from Municipal Commissioner, Prayagraj. The working boundary for Jal Nigam (Urban and Rural) is Prayagraj Development Authority boundary.

3.2 Sewerage System

3.2.1 Sewage Generation

Prayagraj generates around 472 million litres of sewage per day (MLD) as per UP Jal Nigam (sewer) department. Out of this, only 178 MLD (38%) is collected through the sewer network and treated at STPs. The remaining 294 MLD (62%) flows through open drains and ends up in the Ganga and Yamuna rivers, leading to pollution.

To manage this, the city has been divided into eight sewerage districts—A to G and Jhunsi. It currently operates:

- 10 Sewage Treatment Plants (STPs) with a total treatment capacity of 340 MLD
- 31 Sewage Pumping Stations (SPS)

However, the city's increasing wastewater generation necessitates the expansion of treatment capacity. Several projects are under implementation or proposed, including new STPs in Naini (50 MLD), Rajpur (90 MLD), and Salori (43 MLD). Currently, only about 60% of households are connected to the city's sewer network. Many unauthorized settlements release waste directly into drains, making the problem worse. To address this, the City Development Plan (CDP) 2023 outlines a plan for:

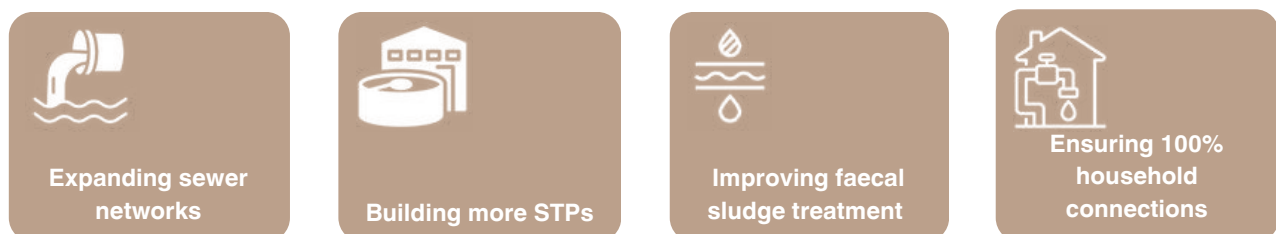
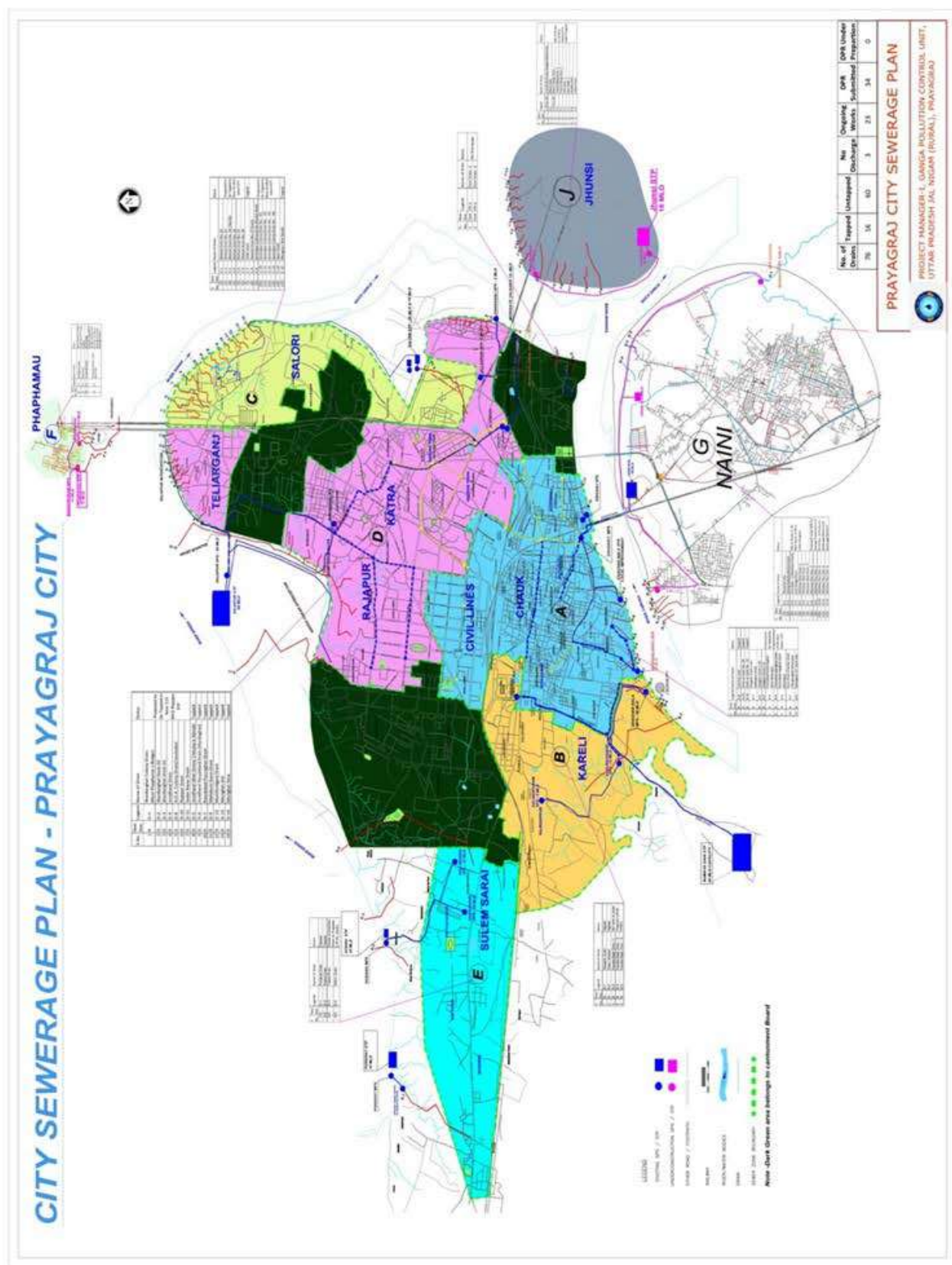


Figure 28: Proposed activities to address the current gap in wastewater management. Source: Prayagraj CDP 2023

The Prayagraj Cantonment area already has complete sewer coverage and can serve as a model for other parts of the city.





Map 8: Sewage districts in Prayagraj, Source: UP Jal Nigam (Sewerage)





3.2.1.1 Sewage Collection

Wastewater is currently managed in Prayagraj in three ways:

1. Connected to Sewer Network

- a. Sewage is collected and sent to STPs through underground pipelines and pumping stations.

2. On-Site Sanitation (OSS)

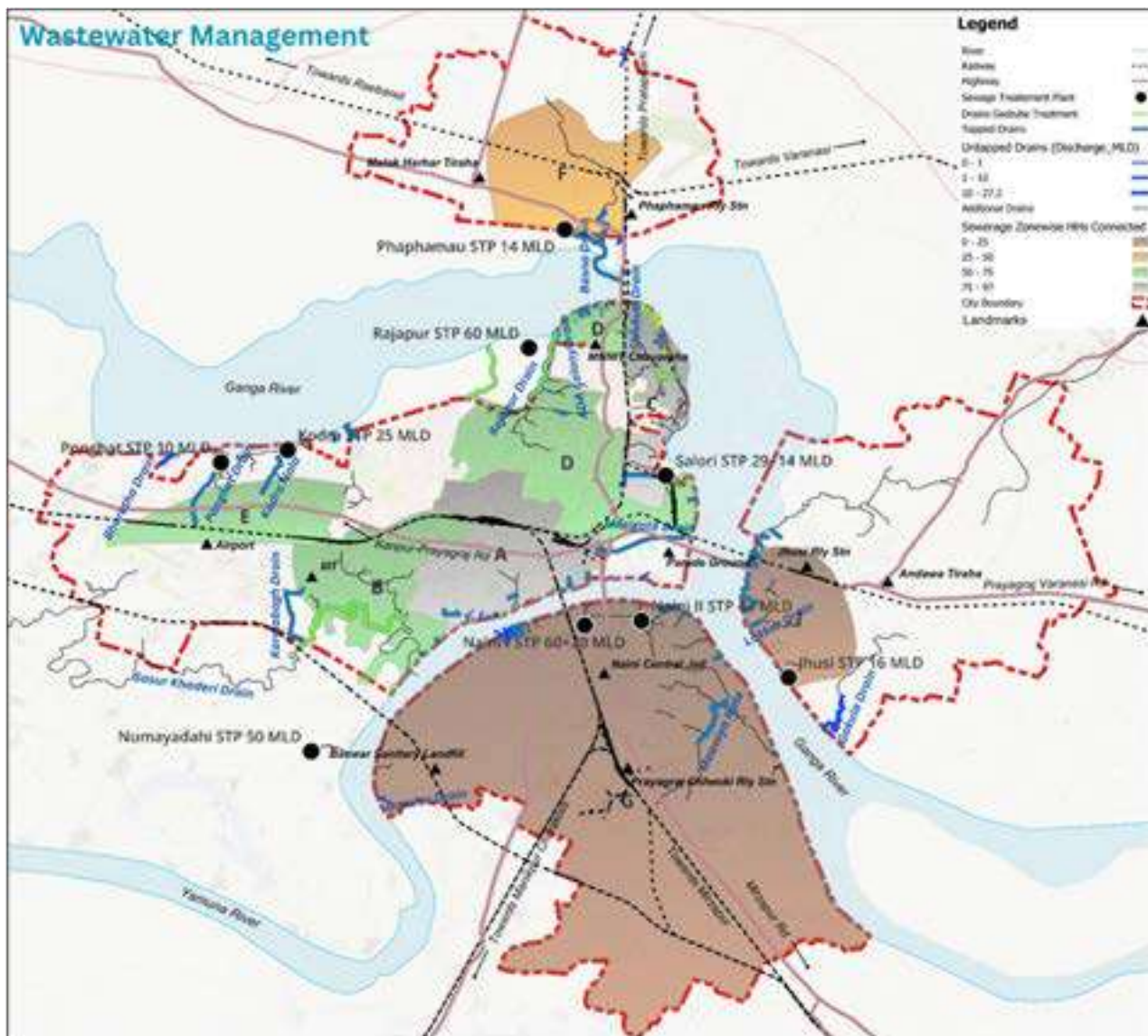
- a. Households have septic tanks, which are cleaned every 2–3 years.
 - Desludging vehicles (by Nagar Nigam or private vendors) removes waste.
 - Charges range from ₹800 (municipal) to ₹2000–2500 (private).
 - Currently, 65 desludging vehicles are registered.

3. Direct Drain Discharge

- a. In some areas, wastewater is released directly into nearby drains, increasing pollution levels.

In the Prayagraj Cantonment area, 100% of buildings are sewer-connected, and the network is managed by the Cantonment Board's engineering wing.





Map 9 : Wastewater Treatment Infrastructure, Source: UP Jal Nigam (Sewerage)

3.2.1.2 Sewage Treatment and Disposal

As of this date, Prayagraj has a total of 10 sewage treatment plants and 31 sewage pumping stations. The sanitation infrastructure is designed at 340 MLD capacity, but is currently handling 400 MLD sewage, pushing the system beyond capacity. Approximately 60% (215657 HH) of total households in the city are connected to the municipal sewer network.

The sewage from these households gets collected via a sewer network into the respective sewage treatment plants. These STPs are designed on various treatment types: SBR, FCR, ASP, etc. Details of sewage generation have been summarized in the table below. Post treatment, the remaining sludge is used as manure by the horticulture wing of Prayagraj Nagar Nigam or taken by local farmers for agriculture. Per day, approx. 3-4 trucks of manure are taken away from one 50KLD plant at Naini Co-treatment plant.





The faecal sludge collected from OSS via de-sludging is treated in three Faecal Sludge Treatment Plant (FSTPs): 100 KLD FSTP at Naini, 50 KLD FSTP at Salori and 50 KLD STP at Jhunsi. Some private vendors dispose of it in the garbage dumps at various locations spread across the city.

Table 8 : Sewerage infrastructure in Prayagraj city, Source: UP Jal Nigam (Sewerage)

Sr. No.	Sewage Facilities	Quantity
1	Sewage Treatment Plants	10 Nos (340 MLD)
2	Sewage Pumping Stations	31 Nos
3	Sewer Network	1479.9 Km
4	Sewer House Connections	211244 No.
5	FSTP	3 Nos (200 KLD)

The sewage in the Cantonment areas gets pumped to the four no. STPs in New Cantt area, namely:

Table 9 : STPs in New Cantonment area, Source: Ganga Task Force

Sr. No.	Location/ STP Name	Capacity
1	Triveni Vihar	1000 KLD
2	BI Line	250 KLD
3	VD Road	400 KLD
4	Nappier Line	1500 KLD

The treated water from STPs in the cantonment area is discharged into the nearby drains, further connected to McPherson Lake and the wetland.

To make Prayagraj 100% sewerage and control the untreated discharge flowing onto the rivers, gap analysis has been done sewage district-wise as per CDP 2023 for a projected population of 2071. By 2071, Prayagraj's sewage generation will reach 571 MLD. A district-wise gap analysis shows:



Figure 30 : Key Gaps regarding wastewater treatment infrastructure





Table 10 : Gap in treatment capacity and sewer connections in Prayagraj, Source: CDP 2023

S r. N o.	Name of Sewerage District	Population /Sewage (in MLD)				Existing STPs	Year 2022			Gap
		Year 2022		Year 2037		(MLD)	(Capacity in MLD)			as in year 2037
		Popula tion	Discharg e (MLD)	Popula tion	Discharge (MLD)		Under Cons.	Propos ed	Total	
1	District-A	2.74	119.17	3.32	145.54	80	-	50	130	No Gap
2	District-B	1.69	60.08	2.04	73.37	50	-	-	50	Gap
3	District-C	2.45	63.23	2.97	77.22	43	43	-	86	No Gap
4	District-D	3.35	121.51	4.07	148.40	60	-	90	150	No Gap
5	District-E	1.00	44.76	1.21	54.66	35	-	-	35	Gap
6	District-F	0.43	10.08	0.52	12.31	14	-	-	14	No Gap
7	District-G	2.17	37.60	2.64	45.92	42	-	-	42	No Gap
8	District-Jhunsu	0.16	11.21	0.19	13.69	16	-	-	16	No Gap
	Total	13.99	467.74	16.96	571.11	340	43	140	523 MLD	

Summarized analysis, with household size assumed at 6.5.





Table 11 : STPs in New Cantonment area, Source: Ganga Task Force

Year	Households	Existing Sewer Connections	Gap in Connections	Treatment Capacity (MLD)	Gap in Treatment (MLD)
2021	3,07,304	1,93,369	1,13,935	340	132
2024	3,50,335	3,07,304	43,031	523	48
2051	5,46,030	5,46,030	No Gap	-	-
2071	7,49,866	7,49,866	No Gap	-	-

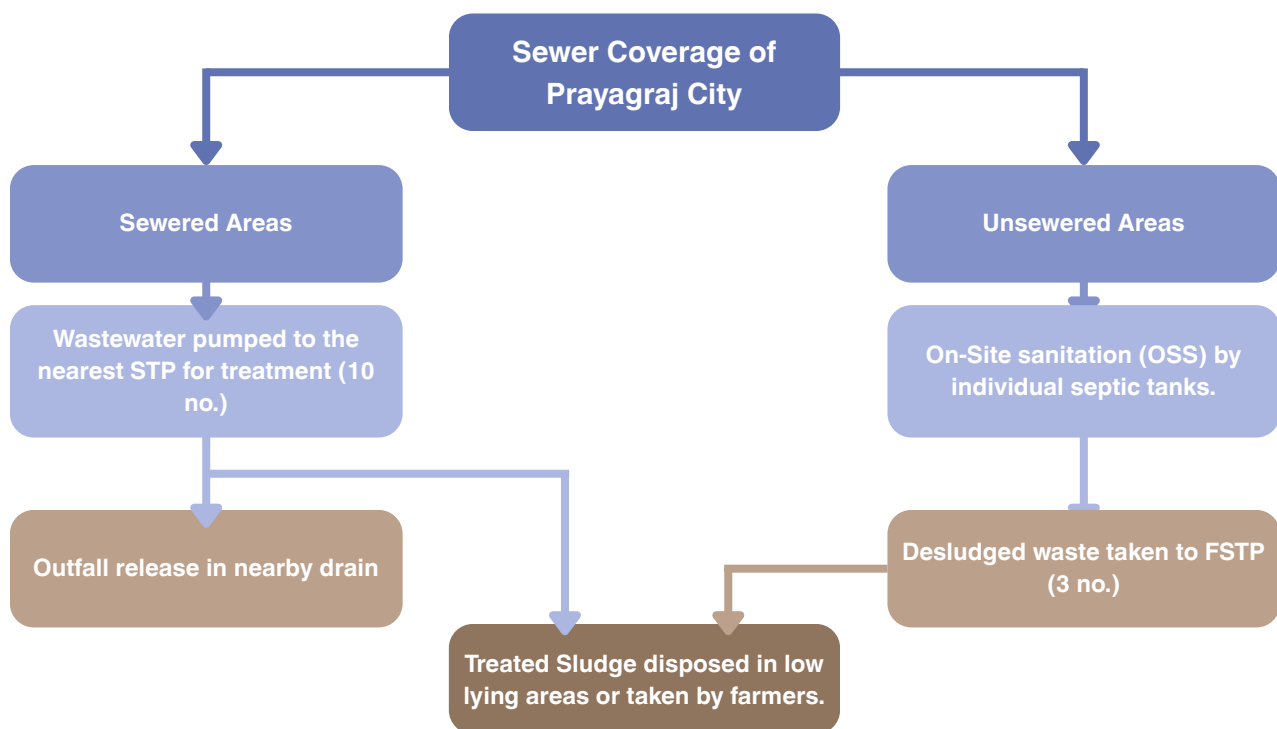


Figure 32 : Value Chain of sewage treatment in Prayagraj



SEWERAGE AND DRAIN STATUS IN PRAYAGRAJ

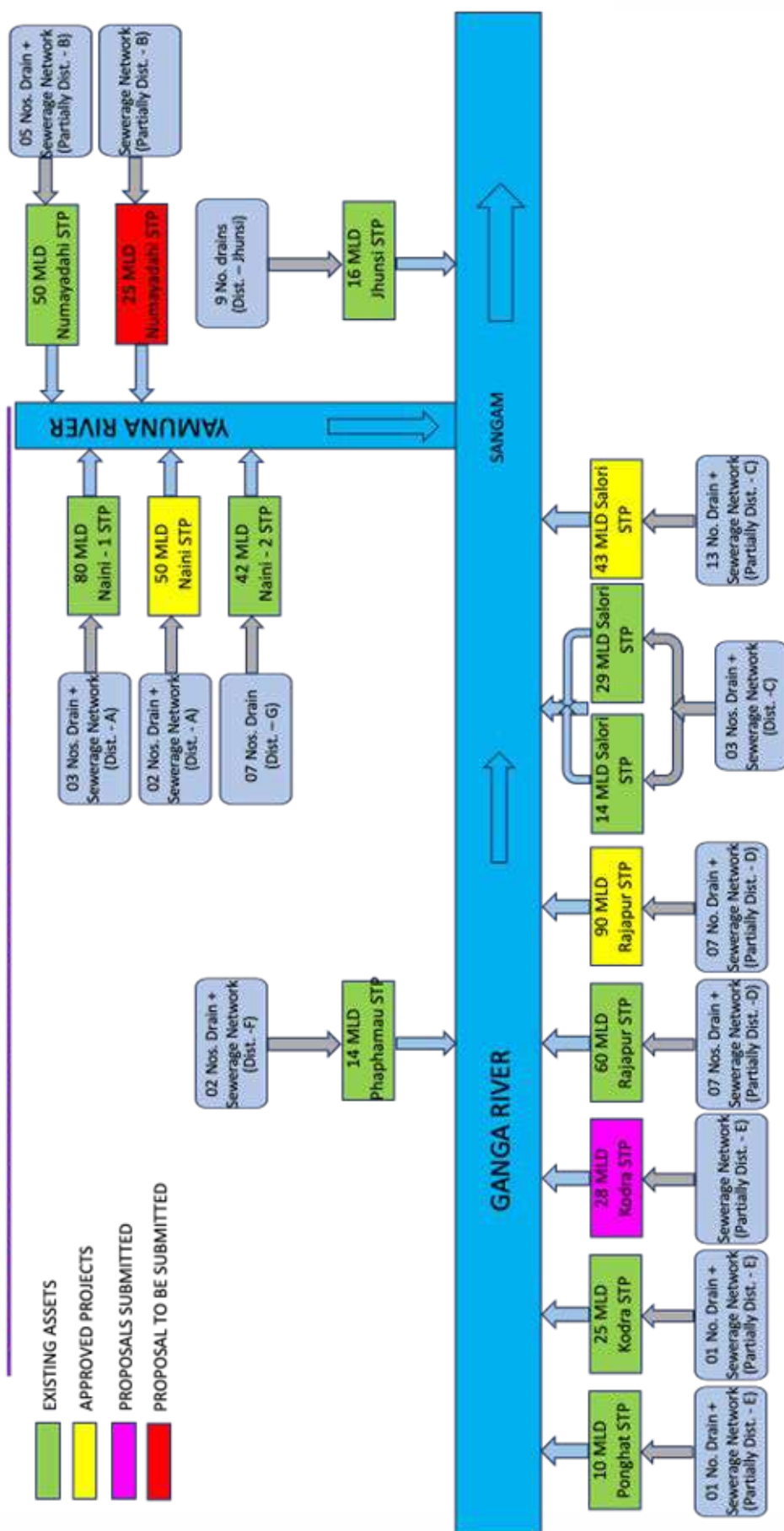


Figure 31 : Status of tapping of drains in Prayagraj, Source: UP Jal Nigam (Sewerage)



3.2.1.3 Ongoing and Proposed Projects

Prayagraj city is gradually improving in sanitation management. Considering the gap in existing treatment capacity, UP Jal Nigam (sewer) has planned to upgrade the treatment capacity. Refer to the table below.

Table 12 : Proposed sewerage projects in Prayagraj, Source: UP Jal Nigam (Sewerage)

S. No.	STP Name	Sewer District	Capacity	Project Status
1	Naini STP (New)	District A	50 MLD	Approved
2	Rajpur STP (New)	District D	90 MLD	Approved
3	Salori STP (New)	District C	43 MLD	Approved
4	Kodra STP (New)	District E	28 MLD	Submitted
5	Numayadahi STP (New)	District B	25 MLD	DPR Under Preparation





Picture 33 : Sewage Pumping Station over Basna Nala in Shantipuram, Phaphamau. Source: NIUA



Picture 34 : Sewage and Faecal Sludge Treatment Plant in Salori, Bakshi Bandh. Source; NIUA



Picture 35 : Farmers' truck filling in treated sludge from FSTP to be used as manure in fields, Source: NIUA





3.2.1.4 Kumbh Infrastructure

Considering the large gathering of Kumbh, some permanent and some temporary waste treatment facilities have been created in the Mela area. 03 temporary STPs of 0.5 MLD each at Salori, Jhunsi and Naini have been installed. All 25 sectors have been connected to an STP via HDPE pipes, which transfer the waste via suction vehicle. The faecal sludge generated in the Mela Area from toilets is transported through cesspool vehicles and treated at existing permanent STPs in the city and temporary STPs usually constructed in the Mela area. In sectors where a sewerage network is available in the nearby vicinity, grey water is discharged into sewers.

- **Sector 1,2,3,4 are connected to Rajapur STP**
- **Sector 6,7,8 in Salori STP**
- **Sector 9, 10 in Temporary STP (o.5 MLD, pre-fab)**
- **Sector 11,12,13 in Temporary STP (o.5 MLD, pre-fab)**
- **Sector 14,15,16 in Temporary STP (o.5 MLD, pre-fab)**
- **Sector 5,18,19,20,21,22 are connected to Jhunsi FSTP**
- **Sector 23,24,25 connected to Naini FSTP**

Multiple clusters of bio toilets and mobile toilets are installed temporarily for Kumbh. Not only bio toilets, but also mobile toilets, FRP toilets, special toilets, etc. A total of 1,45,000 toilets are installed. The grey wastewater (BOD Less than 100) generated from washing hands, kitchen, etc., having very low BOD, is collected in various ponds (Approx 75 Nos, Average 03 Nos in each sector) constructed in the Mela area. The treatment is done using the bioremediation method to make the Mela vicinity odour-free. This pondage was created has STP liner to prevent waste from seeping into the ground. Approximately 200 km of drainage lines are proposed to be laid in all 25 sectors of the entire mela region. Each toilet costs Rs.1500 for maintenance per day.

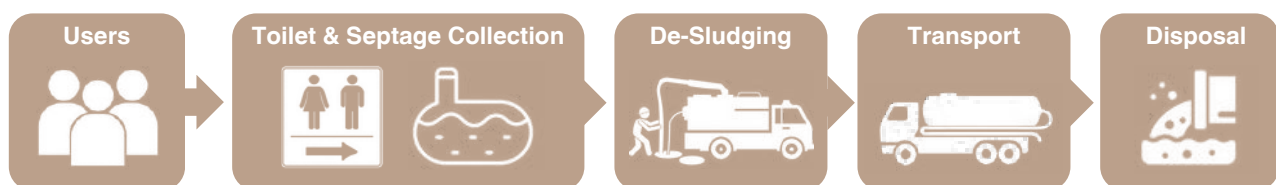


Figure 35 : Value Chain for Toilets operational Flow



Picture 36: Bio toilets installed during Mahakumbh 2025





3.2.1.5 Reuse of Treated Waste Water

The reuse of treated wastewater in Prayagraj is currently limited and not widely practiced in a systematic manner. Most of the treated effluent is simply discharged into nearby drains, where it helps to dilute the existing wastewater flow. Only a small portion of the treated water is reused, primarily for horticultural and irrigation purposes. Current Reuse Practices include:

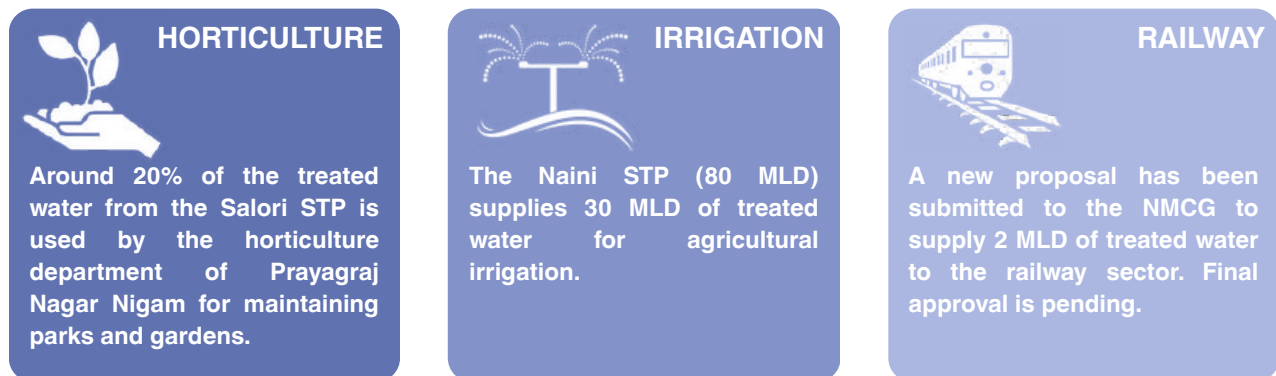


Figure 37 : Current practices of reusing treated wastewater

During field visits and assessments, several **potential uses** for treated wastewater were identified:

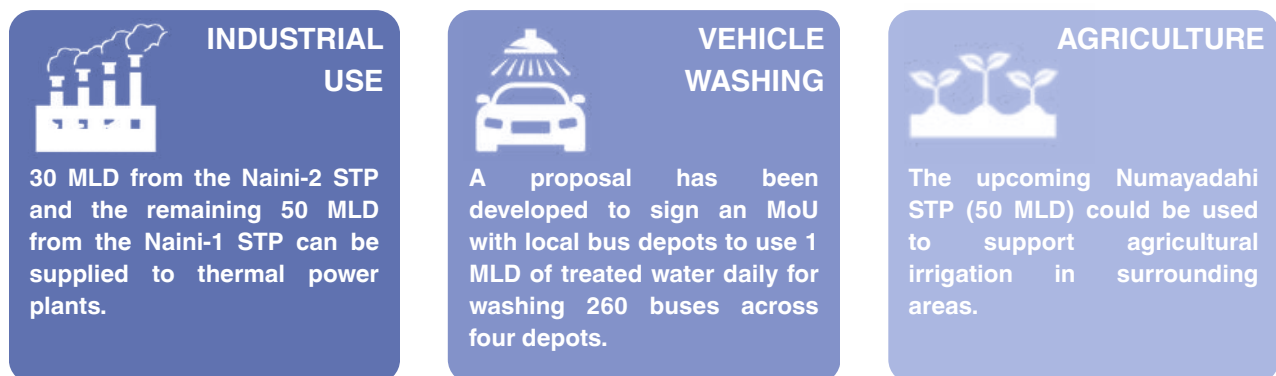


Figure 38 : Potential uses of treated wastewater

Despite these efforts and proposals, a significant volume of treated wastewater in Prayagraj still remains underutilized. To make better use of this valuable resource, a comprehensive strategy is needed. This strategy should focus on increasing reuse across different sectors such as industry, agriculture, institutions, and public services. It should also include the development of infrastructure for transporting treated water, involvement of private players through partnerships, and awareness campaigns to encourage acceptance and usage of reclaimed water. Improving wastewater reuse will not only help in addressing water scarcity but will also contribute to better environmental management and sustainable urban development in Prayagraj.





3.2.1.6 Institutional Mechanism

The sewage management falls under the purview of UP Jal Nigam (Urban and Rural) division of the Municipal corporation, where, the department develops the infrastructure within Nagar Nigam boundary limits. The maintenance is carried by the respective agencies for the O&M period and then handed over to Prayagraj Nagar Nigam. UP Jal Nigam (Urban) looks after sewage infrastructure in urban areas of Prayagraj, whereas UP Jal Nigam (Rural) not only caters to the sewage infrastructure in rural areas but also functions as Ganga Pollution Control Unit (GPCU) that is responsible for intercepting and diverting the polluted water in drains from entering the rivers.

3.3 Storm Water Management/ Drains

Prayagraj's drainage network plays a crucial role in determining the health of the Ganga and Yamuna rivers. However, the city lacks a comprehensive and updated mapping of its drains, which leads to inefficiencies in their management and treatment. Currently, 81 major drains have been identified, discharging varying levels of wastewater into the rivers. Among these, some have been fully tapped and diverted to Sewage Treatment Plants (STPs), others are partially treated, while several continue to discharge untreated sewage directly into the rivers.

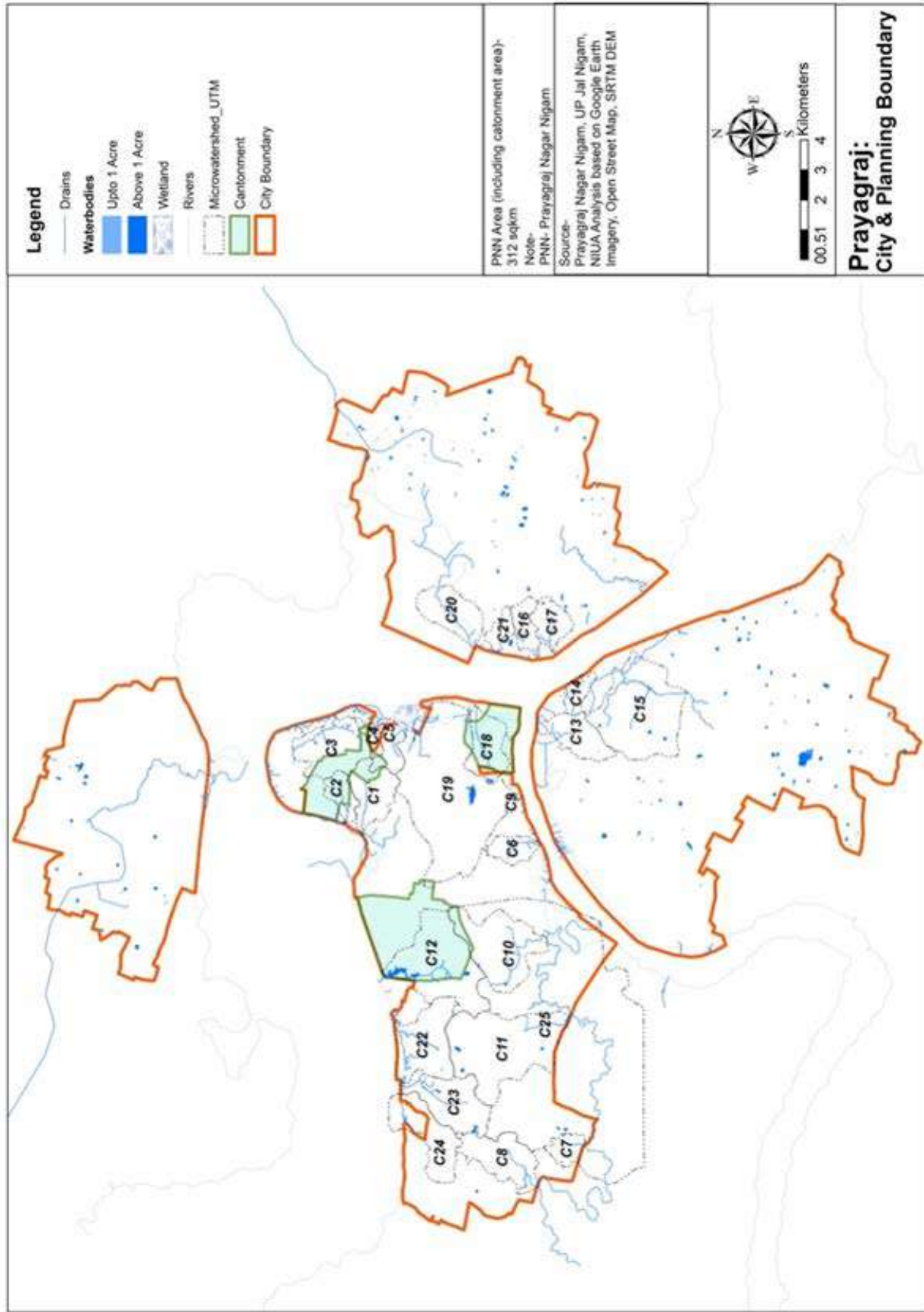
The lack of a structured drainage network means that even stormwater drains often carry a mix of domestic sewage and other industrial effluents. This unregulated flow has significantly contributed to the deterioration of water quality, increasing the Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) levels in the Ganga and Yamuna. Moreover, unauthorized settlements and encroachments along the drainage pathways have further complicated the issue of direct discharge into open drains.

Several initiatives undertaken under programs like Namami Gange, AMRUT, and Mahakumbh 2025 include:

- Interception and Diversion (I&D) Projects: 37 drains have already been intercepted before they reach the rivers, and their sewage is diverted to STPs. Large drains, including those in Naini, Salori, and Rajapur, have been brought under this approach.
- Geotubes: Out of 39 untreated drains, 22 drains are proposed to be treated under NMCG funding using the Advanced Oxidation process and geosynthetic bags and pumping into Bargadgaht SPS through pumps. This multi-staged advanced oxidation-based ozonization process improves water quality efficiently.
- 17 drains under the Mahakumbh 2025 funding are being treated using in-situ bioremediation techniques, where microbial cultures and aeration processes help in breaking down pollutants before the wastewater reaches the river.
- 3 drains (Fort drains 1 and 2 and Baswar drain) are active only during the monsoon and carry no sewage, and the remaining 2 drains (Gokula and Co-operative drain) carry a minor BOD load, and therefore, on-site dosing is carried out in them.

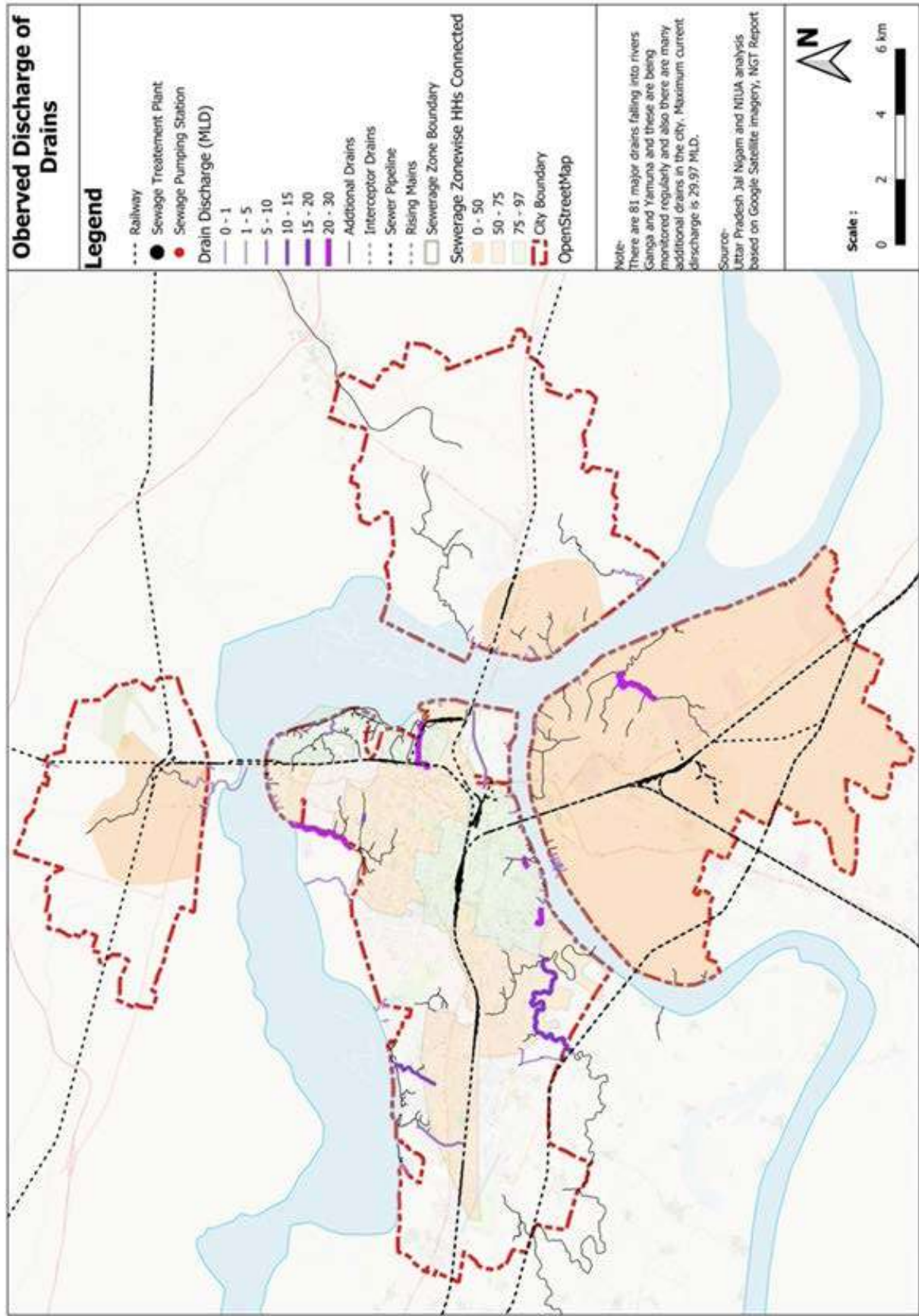
These efforts have shown some positive results, with a decline in direct sewage discharge into the rivers at key locations. However, a substantial portion of wastewater is still entering the rivers untreated due to incomplete sewer networks and lack of drainage integration.



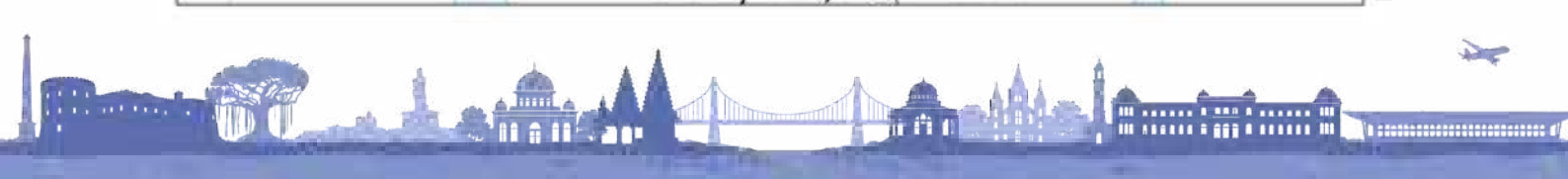


Map 10: Drainage network and microwatersheds in Prayagraj





Map 11: Discharge of drains, Source: NIUA





3.3.1 Key Issues/Gaps

Despite ongoing interventions, several critical gaps remain in the city's drain management system. Some of the major challenges include:

UNMAPPED DRAINAGE NETWORK

The absence of a comprehensive GIS-based mapping system of the entire drain network prevents effective planning and integration of treatment.

ILLEGAL DISCHARGES & UNREGULATED SETTLEMENTS

Many unauthorized colonies and unsewered areas continue to release untreated wastewater directly into stormwater drains, increasing the organic parameters of the water.

LIMITED TREATMENT CAPACITY

While new STPs have been sanctioned, their actual capacity utilization is often below potential, leading to excess untreated sewage being discharged into rivers. Additionally, not all sewered areas have households connected to the sewer network, which is clearly visible in additional pollution load in a few drains of already sewered areas.

LACK OF EFFECTIVE MONITORING & MAINTENANCE

Many treatment plants and bioremediation setups face irregular maintenance, reducing their long-term effectiveness.

UNDERUTILIZATION OF TREATED WASTEWATER

A large volume of treated effluent is still being discharged into drains rather than being reused for agriculture, industrial purposes, or groundwater recharge.

Figure 39: Key issues regarding drainage and stormwater management in Prayagraj



Picture 40: Nutrient dosing in drains (left), Pollutant load before I&D in drain (right)



Picture 41: Untreated discharge in drain (left), Stormwater drains carrying wastewater from residential area (right)





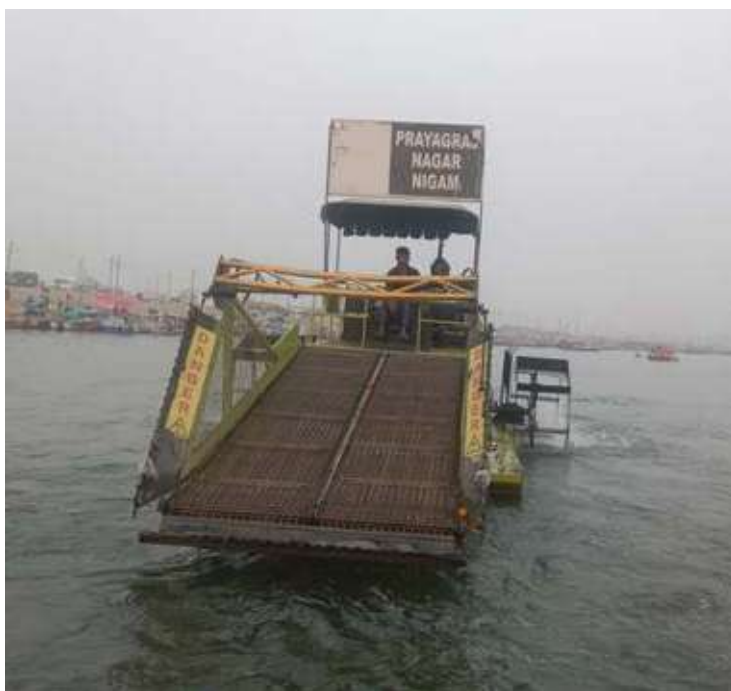
3.3.2 Institutional Mechanism

The responsibility for managing the cleaning and upkeep of drains in Prayagraj lies with the Prayagraj Nagar Nigam (PNN), which oversees this critical function under the jurisdiction of its drainage department. Infrastructure-related interventions on drains, including the construction of culverts, interception, and diversion projects, are undertaken by Jal Nigam (Rural) and the Ganga Pollution Control Unit (GPCU). Upon completion, these projects are transferred to PNN for regular maintenance and operation. The stormwater drains are constructed by the respective authorities, i.e., PWD or PDA, but maintenance lies under the purview of PNN. All drains have screens to prevent solid waste from entering, ideally.

The cleaning of drains is carried out through three primary methods:

- **Manual Cleaning**—By sweeping, staff applied to smaller drains or areas that are inaccessible to machinery.
- **Mechanical Cleaning** – Using JCB, ensuring regular and efficient upkeep.
- **Open tender basis** – LOI quotation invitation for vendors in case of an emergency, like post-monsoon.

One of the most significant drain-cleaning activities occurs pre- and post-monsoon. Before the monsoon, drains are cleared of accumulated solid waste to prevent blockages and waterlogging. After the monsoon, the focus shifts to removing silt and debris carried by rainwater. To facilitate efficient cleaning, PNN operates two skimmers designed to extract solid waste from major drains and rivers. The sludge and debris collected from these cleaning operations are processed at Baswari plant and further sent to a landfill site for final disposal.



Picture 42: Trash skimmers removing floating solid waste from river



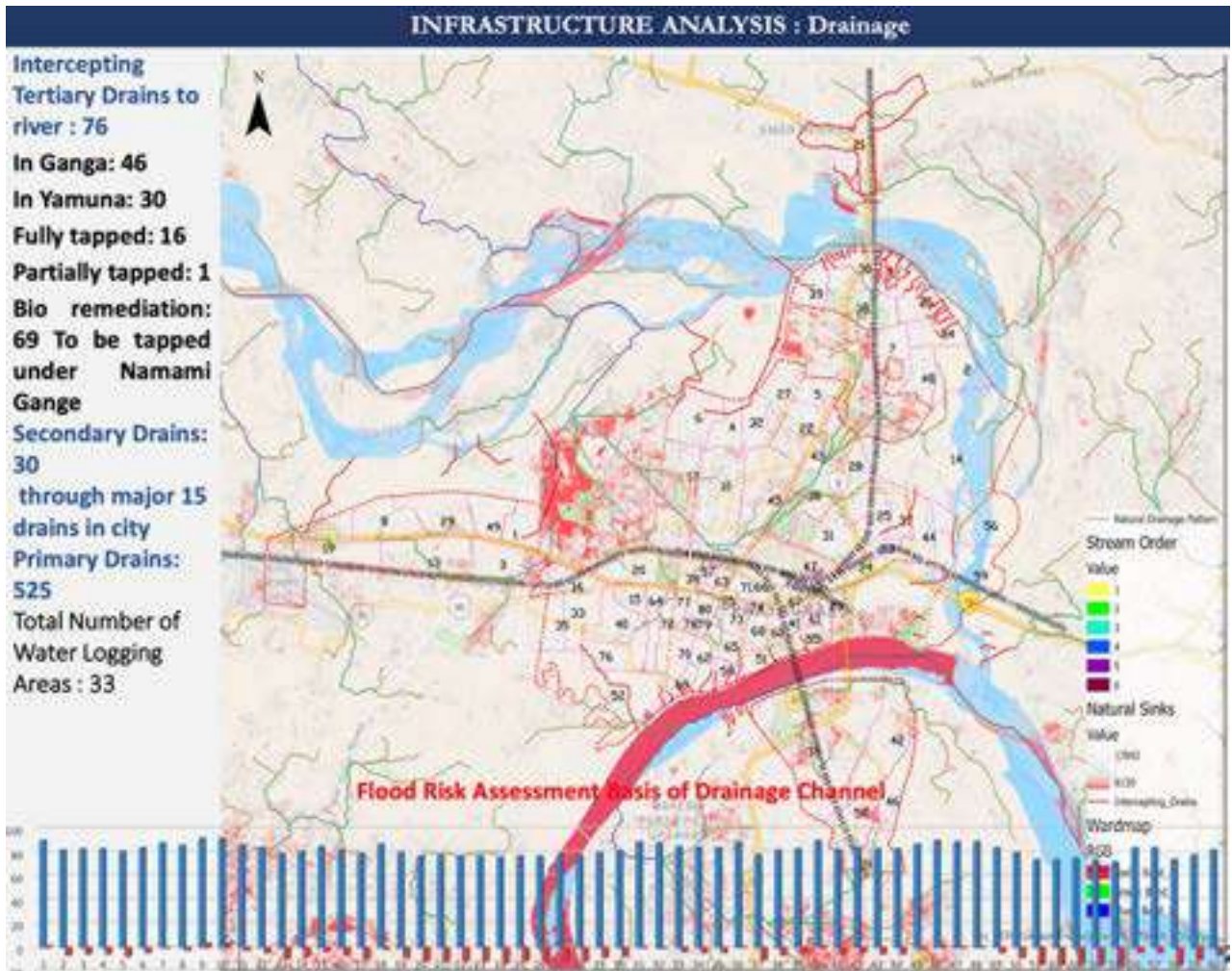


Figure 43: Drains and low-lying areas, Source: CDP 2023

3.4 Solid Waste Management

Prayagraj Nagar Nigam (PNN) has undertaken various initiatives to enhance sanitation and solid waste management within the city. The citywide programs focus on door-to-door waste collection, garbage-free initiatives, information, education, and communication (IEC) activities, solid waste management (SWM) processing facilities, and comprehensive monitoring mechanisms.



Picture 44: Drains filled with solid waste





3.4.1 Residential Waste

Door-to-door collection and garbage-free city initiatives are taken:

- PNN covers all 100 wards through two dedicated door-to-door collection agencies and municipal services for extended areas.
- Vehicles are equipped with GPS trackers for real-time monitoring via the Operations and Command Control Centre (OCCC).
- Waste collection is monitored based on parameters such as vehicle start times, route adherence, and the number of trips completed.
- IEC personnel accompany collection vehicles to promote waste segregation awareness.
- Over 5,200 sanitation workers are deployed across the city, with dedicated teams for ghat cleaning.
- A GIS-based system is being developed for monitoring door-to-door collection and street sweeping.
- Additional dustbins are being installed to enhance waste disposal accessibility.
- Programs such as "Har Dukan Dastak Abhiyan" and "Swachh Vatavaran Samiti" encourage public participation.
- Use of media influencers, FM radio jingles, and social media campaigns to enhance public engagement.
- Specialized campaigns such as "Plastic Ban Campaign 3.0" and "Swachh Maha Kumbh Initiative" aim to address specific waste-related challenges.

3.4.2 Waste Processing Facilities

The city generates approximately 700 TPD of waste, with an expected increase of 300 TPD during the Mahakumbh. Existing and upcoming facilities include:

- Legacy waste clearance in Baswar Landfill before Mahakumbh 2025. 2nd city in India after Surat to crush the 21.5 lakh tonne legacy waste.
- Fresh waste processing plants (400-600 TPD capacity).
- Bio-CNG plants (100-300 TPD capacity, operational by November 2024).
- Material Recovery Facilities (MRF) to enhance segregation and recycling efforts.
- Construction and Demolition (C&D) waste processing plants (150 TPD capacity).
- The Integrated Command and Control Centre (ICCC) oversees sanitation activities, while SWM control rooms ensure daily oversight.



Picture 45: Solid Waste Processing at Baswar (left & middle) and IEC Activities near fort area (right), Source; NIUA





The solid waste from residential areas, STP screens, and drain, and river cleaning is all transported to the port station, where the waste is compacted and sent to the Baswari plant. Here, the refuse is weighed and sent for primary screening. Approx. 40% of the waste is organic components, 30% is RDF, 7% is CND and plastic, 7% is coconuts, 5% is plastic, and 2% is metals. After primary screening, all waste +100 is directly sent to RDF, and -100 is put aside for drying. After one month, it is sent for processing to secondary screening, where RDF gets filtered in a 35 mm screen, inert material gets filtered in 25-15 mm screens, and final compost is filtered through a 6 mm screen. RDF is sent to waste-to-energy plants and cement factories after ballistic treatment. CND is disposed of in low-lying areas, and plastic is sold to vendors.

Here are a total of 15 pickup points for the CND waste plant and 2 hotspots in Prayagraj city. The 200 TPD CND plant in Prayagraj has been running on an EPC model since 2021. Multiple products are created from CND waste, and the terms of the contract include:

- 40% material buyback by PNN as per tender, rest for private selling
- PNN pays for processing, collection, and transport to the CND plant.
- M15 CC brick tile is sold at Rs 7 with GST
- M30 zig-zag tile is sold at Rs 16.5 with GST



Picture 46: C&D Waste Processing at Baswar, Source: NIUA



Picture 47: Paver tiles and bricks created from C&D waste, Source: NIUA





3.4.3 Religious Waste

Religious waste includes pooja flowers, leaves, agarbatti, ashes, candles, and sometimes food items. Prayagraj has a huge footfall of religious tourism, where people come to Sangam for a holy dip. Flowers used for this purpose come from the flower market under Old Naini Bridge. It is an association of 500 vendors, who sell approximately. 1000 flowers per day per vendor. The flower waste at the vendors' end is taken back by the supplier cart and sold to the Sweet factories. The flower waste from religious offerings inside the temples is collected by a tipper and sent for disposal, which is not known to the public. The flower waste in the rivers gets mixed with other solid waste and is disposed of at the Baswari plant. No reuse or recycling practice is known to be followed as of this date.



Picture 48: Religious waste management





3.4.4 Kumbh Waste Management

Waste management in Kumbh was planned by installing dustbins at regular intervals, and tippers picking up the waste 3-4 times a day. 120 tipper-hoppers of 1.2 tonne capacity each were deployed to collect waste and transport it to the nearby 40 compactors installed (2 in each sector). Each compactor has the capacity of 7-9 tonnes. One garbage transfer station was created in each sector, from where the waste is transported to Baswar SWM plant.

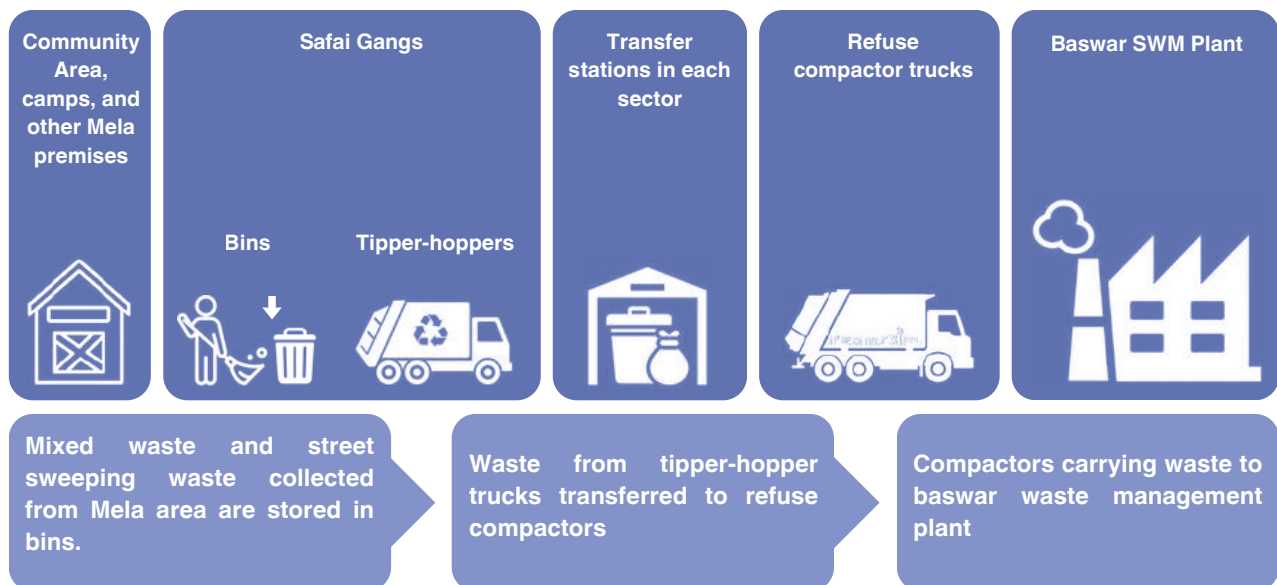


Figure 49: Value Chain for Toilets operational Flow



Picture 50 : Boats lined up near Sangam





Picture 51: Aerial view capturing a spectacular sight of spiritual fervor as millions of devotees take a ceremonial dip in the sacred waters of the Triveni Sangam



Picture 52: Temporary ghats and barriers created for Mahakumbh





River Ecosystem & Blue-Green Resources



The blue-green infrastructure represents the city's interconnected network of natural systems that sustain its hydrological and ecological. This chapter explores the dynamic relationship between the city's rivers, wetlands, green spaces, and biodiversity, which together form the backbone of urban ecological resilience. It covers detailed assessments of river morphology, flow characteristics, water quality, and the spectrum of human activities along riverbanks and ghats.

4.1 River Ecosystem



Prayagraj is situated at the confluence of two rivers: Ganga and Yamuna. Both rivers carry completely different characteristics.

GANGA:

The River Ganga flows through Prayagraj, is wide and expansive, with a width ranging from 800 meters to up to 2 kilometres at certain locations, depending on the season and water levels. Its depth can vary, typically ranging from 5-10 feet, though it may become deeper in certain stretches, and during the monsoon season. The average flow of the Ganga during the lean period is 5,000 cu/secs, which reaches 20,000 cu/secs during monsoons.

Being a meandering river, the Ganga changes its course frequently, leaving numerous silt deposits along its edges. The Ganga water, while historically considered pure and sacred, face challenges due to pollution from various sources, including domestic waste and industrial effluents along the 36 kms stretch it traverses through the Prayagraj city boundary. The significant water level rise during the monsoon season leads to potential flooding in surrounding areas.

YAMUNA:

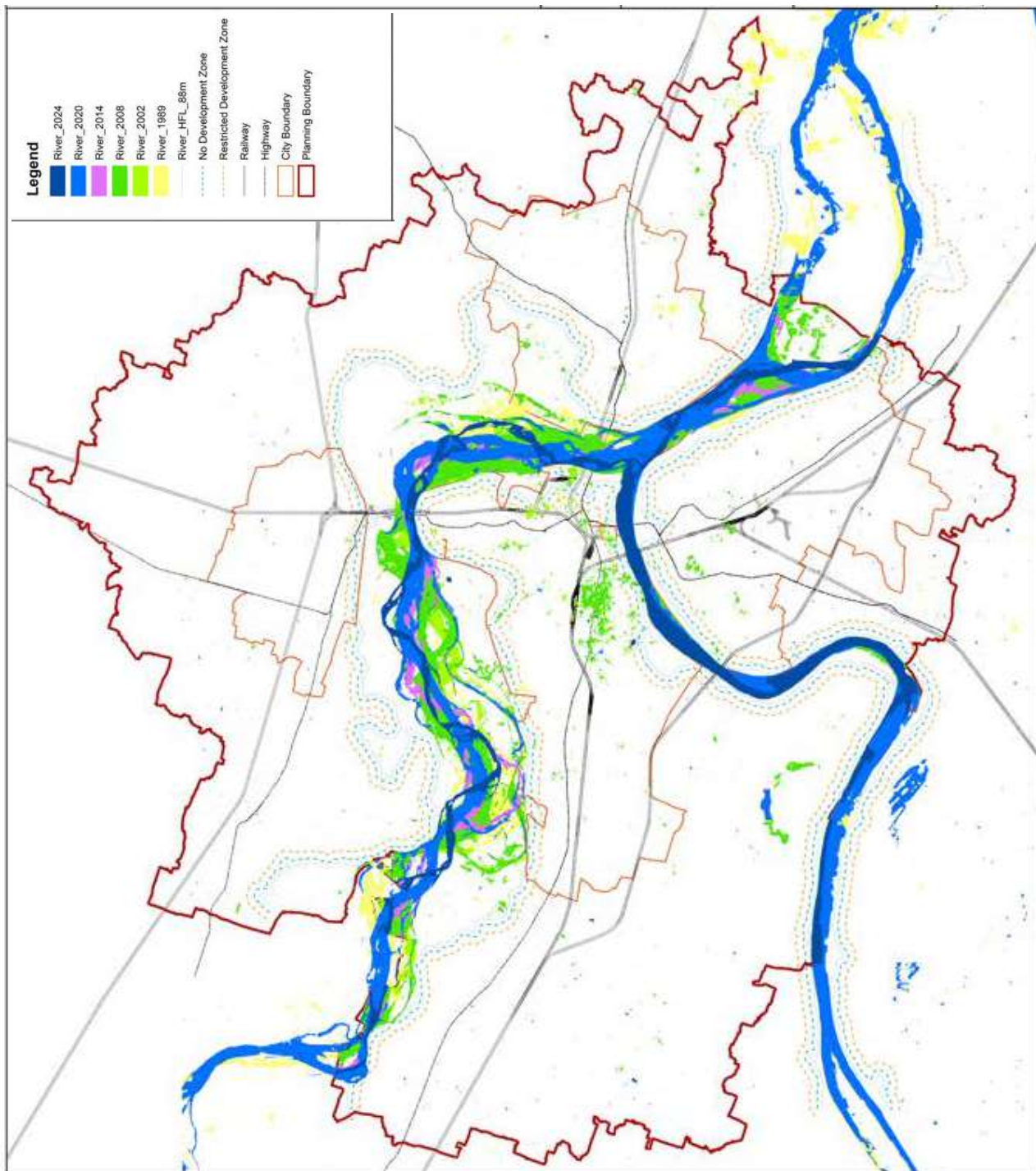
River Yamuna is the largest tributary of the Ganges and one of the most significant rivers in northern India. It is a relatively stable river with a huge carrying capacity, where the width is approximately 600 -700 m wide and the depth varies from 30 - 45 feet. The depth varies with the season, rainfall, and water flow conditions. However, during the monsoon season, the water level rises significantly due to heavy rainfall, sometimes exceeding 20 meters (66 feet), and an average volume of 6300 cu/secs, leading to flooding in low-lying areas.

The river edges are more defined and streamlined. This makes Yamuna more feasible for water sports and activities too. The total length of the Yamuna when it enters the Prayagraj Nigam boundary is 13.5 km before it merges with the river Ganga at Sangam. At Triveni Sangam, the confluence of the Ganga, the Yamuna, and the mythical Saraswati, the Yamuna appears deeper and has a distinct greenish colour compared to Ganga's muddy appearance. The river's depth and flow in Prayagraj are monitored regularly, especially during the Kumbh Mela, when millions of pilgrims gather for a holy dip.

The river course change map depicts the versatility of Ganga and Yamuna. Over the past 35 years, Yamuna observes minor changes in its course from 1989 up to 2024. However, Ganga is a meandering river and changes its course very frequently. From 1989 up to 2007, the river shifted almost 1.8 km to the other side near Phaphamau, and from 2007 to 2024 near Jhunsi.

The course change not only impacts the adjoining agricultural fields but also leaves behind much silt. It is the non-useable island deposits of silt. This study is directly linked to the flood disasters and floodplain mapping.

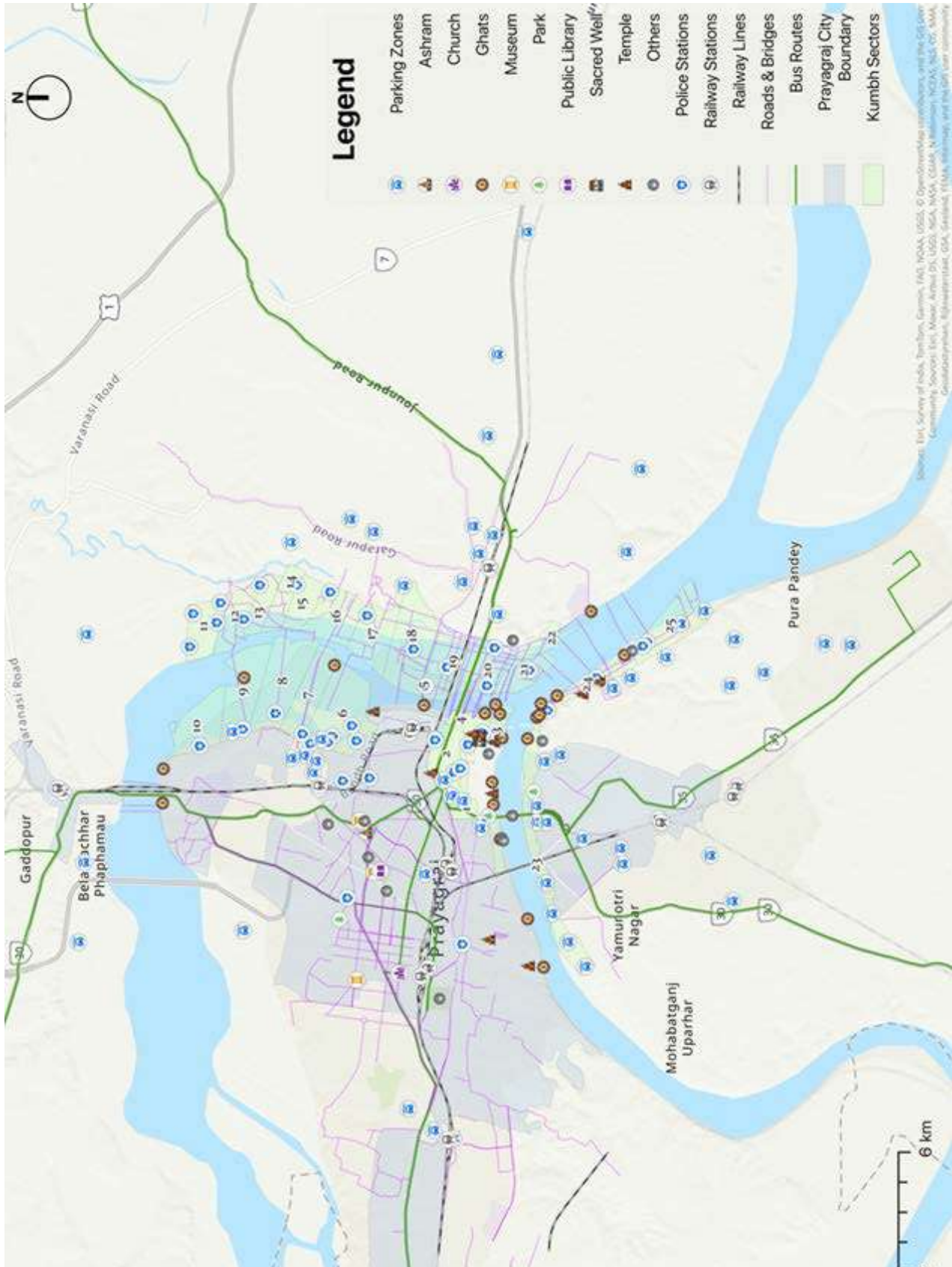




Map 112: Change of course of rivers Ganga and Yamuna, Source: NIUA



4.2 Activity Mapping Along Rivers





Picture 53: North (left) and South (right) banks of river Yamuna, Source: NIUA



Picture 54: Preparations for the Mahakumbh 2025- Construction of pontoon bridge (left) & construction of tents (right)



Picture 55: Riverfront road and bank protection works for Mahakumbh 2025, Source: NIUA



Picture 56: Floating Restaurants on river Yamuna near Boat Club, Source: NIUA





Picture 57: Construction of riverfront (left) & boating activities (right) near Boat Club on river Yamuna, Source: NIUA



Picture 58: Serene banks of river Ganga

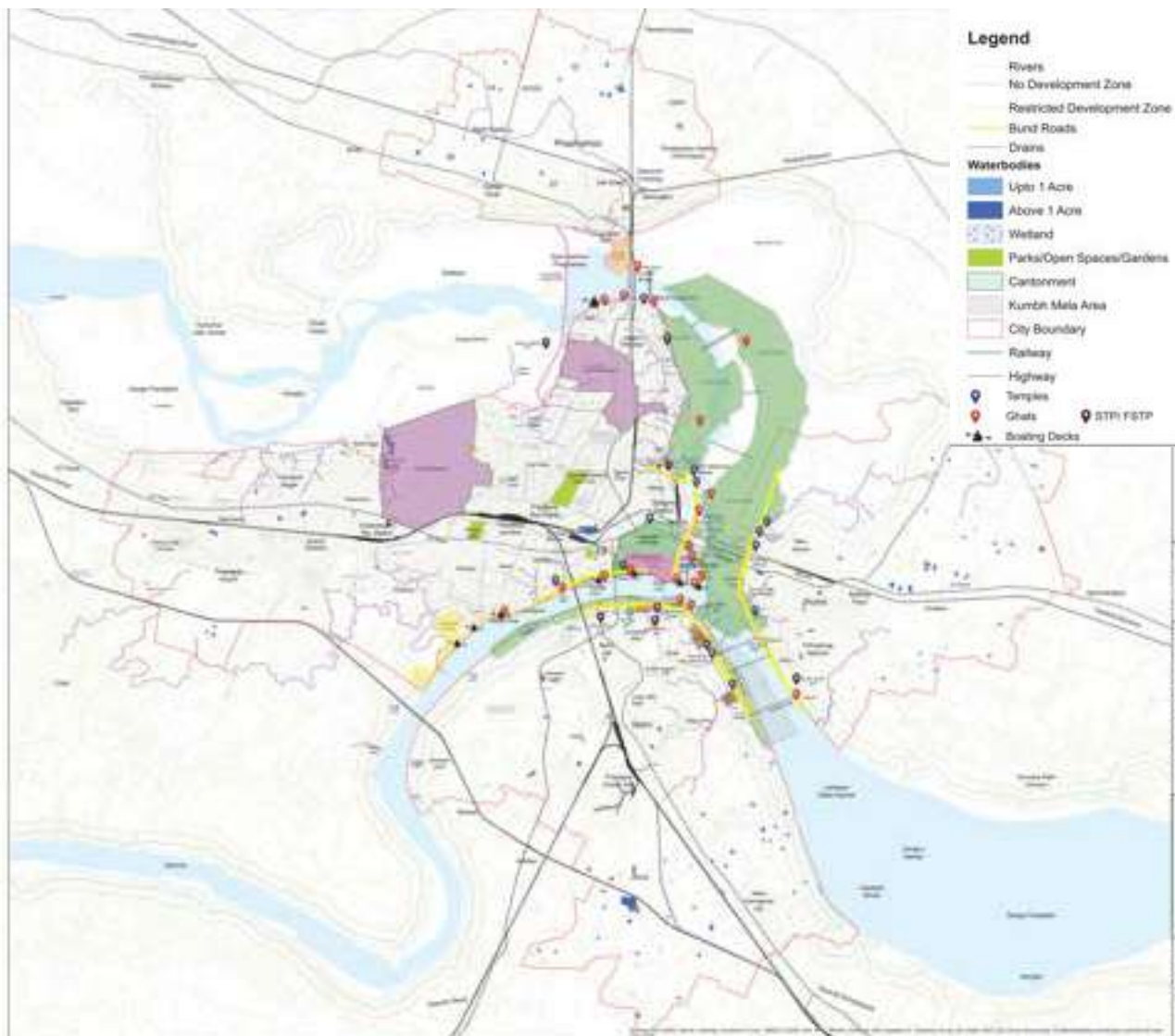


Picture 59: Floodplains of river Ganga (left) and Flood Protection Works (right) along river Ganga, Source: NIUA



Picture 60: Informal fishing activities in river Ganga, Source: NIUA





Map 15: Activity mapping along the floodplains of rivers Ganga and Yamuna, Source: NIUA



Picture 61: Open cremation (left) and informal vending (right) (near Shastri Bridge) along river Ganga, Source: NIUA





Picture 62: Tents being constructed on bed (left) as well as bank (right) of river Yamuna for Mahakumbh 2025, Source: NIUA



Picture 63: Cattle sheds (left) and urban farming (right) along floodplain, Source: NIUA



Picture 64: Drains discharging into rivers, Source: NIUA



Picture 65: Boats along Gaughat on Yamuna (left) & temple and crematoria on bank of Ganga near Phaphamau bridge (middle & right), Source: NIUA





Map 16: Activity mapping in the Kumbh Area



Picture 66: Temporary ghats created for Mahakumbh



Picture 67: Ganga Aarti at Arail Ghat



Picture 67: Devotee offering pranam to the holy waters



Picture 68: Millions of devotees gathered at the Sangam nose for a holy dip during Mahakumbh, Source: Prayagraj Mela Authority





4.2.1 Riverfronts and Ghats

The river Ganga and Yamuna have in total 17 projects developed recently under the preparation of MahaKumbh 2025. Earlier, these ghats were floodplains, with no interventions except at Sangam nose, where sandbags were used to prevent sand erosion and secondly at Arail Ghat, where a stepped ghat and a selfie point were created in 2019 to facilitate tourists. The land of the floodplain is shared under the ownership of the irrigation and Mela authority. Out of the 17 recently developed ghats, 8 were constructed by the Irrigation Department, another 8 as riverfront projects by the same department with funding from the Mela Authority, and 1 ghat near the Boat Club by the Tourism Department. These riverfront projects include the creation of an interlocking road, protection of edges by stone pitching and development of facilities (toilets and lighting) along the stretch. These stretches mostly cover the Mela area on both sides of the Ganga and Yamuna floodplain. Bund roads and riverfront roads have also been constructed at several stretches (total lengths of these stretches along Yamuna are almost 4km and along Ganga are almost 20km). The total length of the riverfront road along Yamuna (Naini side) is approx. 3.5 km, and 3.5 km long along the Ganga near the Curzon Bridge.



Picture 69: A large drain discharging into river Ganga near Phaphamau, Source: NIUA



Picture 70: People enjoying boating





Picture 71: Seven ghats proposed for development before MahaKumbh 2025 by the irrigation department, Source: State Irrigation Dept.





Picture 72 : Qila Ghat (left), Arail Ghat (right)



Picture 73 : Saraswati Ghat developed by the Cantonment Board (left), Boat club ghat by the Tourism Department (right)



Picture 74: Arail Ghat (left), Kali ghat (right). Source: NIUA



Picture 75: Saraswati Ghat (left) & Arail Ghat (right). Source: NIUA





The city's vibrant markets, vending zones along the riverfront areas, especially the Sangam nose area, are a delight for shoppers and create an ethnic vibe for tourists.

Before this activity, there was no river-people connection observed where people could come and spend time with family. Even the locals communicated the need for the development of the riverfront where they can spend time with family. Recreational tourism along the river and the religious landmarks seems insufficient to attract more tourists.

4.2.2 Boat Club

Prayagraj also offers recreational activities along the banks of the rivers, such as boating, sunset cruises, and riverfront walks. Currently, there is one boat club run by UPSTDC and one boat club run by PDA. The list of activities and charges is as follows:

Table 13: List of activities by UP tourism boat club

S. No.	Activity	Details	Users	Charges
1	Floating restaurant	11am-9pm	100 per day avg.	As per bill
2	Cruise	Full booking Per pax booking	30 pax capacity	8400 +GST per hour 250 +GST per hour
3	Speed Boat	6 pax max.	60-80 ppl daily avg.	315 +GST per pax 6300 +GST per boat
4	Package Cruise to Sujavan Dev Temple	26km upstream to and fro charges	3-4 times per month	21000 per cruise
5	Speed Boat to Sujavan Dev Temple		Rarely booked 6 pax capacity	10,000 +GST per ride

All boats and equipment are owned by UP tourism department. Other than these, the tourism department also has 2 rescue boats and 6 trained boatmen for the same. The revenue from Nov 2023 to Nov 2024 was estimated at INR 28,54,000, which holds a lot more potential.



Picture 76: Tourism Dept Boat Club (left), PDA Boat Club (right) Source: NIUA





PDA Boat Club is run and managed by Boat Club Samiti, chaired by the DG, UP Tourism and Vice Chairman of PDA as vice chairman of the committee. The Samiti was formulated in 1971 to run the boat club constructed by the Development Authority, and funded by UP Tourism. The other members of this Samiti include the DM of Prayagraj, the Secretary of the PDA, Secretary - UD, RTO - UP tourism, and PDA finance controller as the treasurer. The boat club officer manages the administrative activities of the PDA boat club and keeps Boat club samiti in the loop for all kinds of approvals. Major activities currently done by PDA boat club include:

Table 14: List of activities by PDA boat club

S. No.	Activity	Details	Users	Charges
1	AC Boat	25 pax capacity	2-3 times in a month	5000 +GST per hour
2	Motor Boats	7 available 4 functional	25 pax	
3	Paddle Boat	17 available 7 functional	4 pax	
4	Kayaking/ Canoeing	37 kayaks	On membership only. 50-55 memberships cunning as on Nov.2024	300 +GST per month (general) 100 + GST per month (students)
5	Marriages/ Functions	Booking charges		2,05,000 per booking

4.2.3 Existing / Proposed Projects

Some activities have been carried out by the Tourism and Mela Authority in the past 2 years, considering Maha Kumbh 2025 and some activities are proposed for the future. These include:

Hanuman Corridor, Akshay Vat Corridor, and Bhardwaj Ashram Corridor, the first two funded by Mela Authority and the latter one under the Smart Cities Mission.

The drone show and laser water show created under Maha Kumbh 2025 have been functional since January 2025.

Proposals for capacity building of the boat association and tourist guide association and spatial development of the Sujavan Dev Temple area

CDP 2071 has proposed the stretch from Saraswati Ghat up to Ballua Ghat for riverfront development, considering the steady course of the Yamuna.

Development of the riverfront from Boat Club to Gau Ghat under the Swadesh Darshan 2.0 scheme is proposed but yet to be approved.

Development of the riverfront from Dashashwamedh Ghat to Nagvasuki Mandir is proposed under CDP 2071.

Figure 50 : Existing and Proposed Projects of Tourism Dept and Mela Authority





4.2.4 Institutional Mechanism

Tourism activities in Prayagraj happen through two different channels:

- During regular times, UPSTDC organizes and steers the events for each district via the regional tourist officer in the respective district. They maintain tourism properties and organize IEC activities like quizzes, exhibitions, nukkad naatak, etc. Branding activities are also carried out by UPSTDC. Recent activities include short film production, heritage walk video release, event sponsorships, and promotional events. Specifically for riverfront projects, land is owned either by the irrigation department or the Mela authority (for the Kumbh Mela zone), maintenance of the riverfront is done by Prayagraj Nagar Nigam, and spatial development strategy is undertaken by the Tourism Department. A committee has been created to approve the activities along riverfronts/ghats, i.e., the District Tourism Cultural Council (DTCC).
- During Kumbh, UPSTDC and the Mela Authority work in association to manage the unique large gathering. The special activities of branding and spatial development specific to Kumbh are sponsored by the Mela Authority but developed by the Tourism Department.

4.2.5 Key Issues/Gaps

A critical challenge for Prayagraj's tourism sector is the lack of a cohesive branding and management strategy. Unlike international destinations such as Vietnam or parts of Europe, where tourism is immersive and storytelling-based, Prayagraj lacks a structured approach to visitor engagement. Enhancing tourism experiences through structured capacity-building programs for boatmen, tourist guides, and civil defense personnel can significantly improve service quality.

In terms of infrastructure development, 15 ghats have already been established along the Ganga and Yamuna under the Kumbh initiatives. However, there exists a significant opportunity to integrate smaller parcels of riverfront land into a continuous stretch, particularly from Bakshi Bandh to the Boat Club on the river Ganga and up to the ISKCON Temple along the river Yamuna. The feasibility of such a project is high since a bund road is already in place, mitigating concerns related to flooding. One of the key locations with development potential is the Chatnaag area, which could be utilized for privatized recreational ventures, such as resorts developed under the Public-Private Partnership (PPP) model. Such initiatives would not only attract wedding tourism but also contribute to the city's tourism revenue. Thematic experiences such as heritage walks, food trails, and guided Sangam tours should be introduced to maximize the city's tourism potential.



Picture 77: Ongoing ghat development works





Prayagraj is highly susceptible to both fluvial (riverine) and pluvial (rainfall-induced) flooding. The detailed analysis of flood risks, hazards, and observed impacts in the city was done by populating the data points on GIS and creating a composite flood hazard and flood risk analysis. The yearly variation in water levels from the past 10 years at three monitoring locations in Prayagraj illustrates that the water level has crossed the HFL (high flood level from 1978) mark of 89 m in 2016, then in 2019, followed by 2021 and 2022. These marks of maximum water level have been duly considered in the disaster management booklet released every year, too. As per the Disaster Management Committee, every monsoon season, alerts are generated in the regular low-lying and flood-prone areas. Once the water level reaches 79 m, yellow alerts are created in primary impact areas, and once it crosses the 82 m mark, all regular impact areas (orange zone) are alerted. The water level mark reaching 84 m means red alert, as it has the highest impact in the zone. DDMA prepared itself with the creation of flood chowkis, flood shelters, and capacity-building drives in 22 villages that are impacted every year. Refer to the flood hazard list of DDMA Prayagraj.

The irrigation department plays an important role in preventing the floodplain. The major activities carried out include:



Figure 51: Activities carried out by Irrigation dept for fluvial flood management

A few strategies for protection of edge erosion during Kumbh include stone pitching along riverfront projects, sand-bag lining of the edges near Sangam Nose, Vetriever grass plantation by Ganga Task Force in Cantonment areas, which holds the sand with its 3 m deep roots, preventing the erosion.



Picture 78: People engaged in leisurely activities on the bank of river Ganga

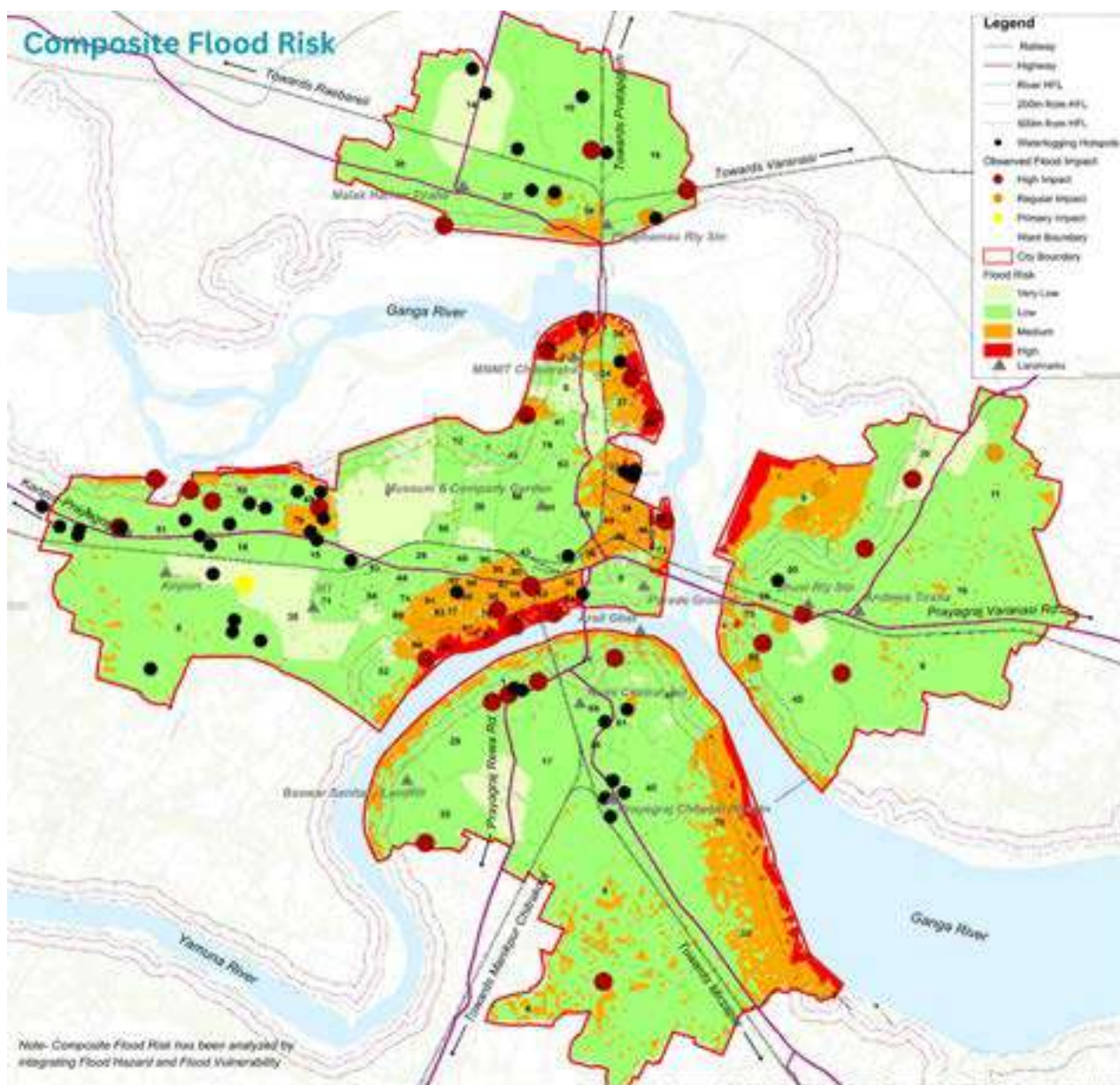




4.3.1 Fluvial Flood Risk

Fluvial flooding occurs when rivers overflow due to excessive rainfall, snowmelt, or upstream water release. Prayagraj's location at the confluence of the Ganga and Yamuna makes it particularly vulnerable to fluvial flooding. The elevation of Prayagraj ranges from 69 m to 120 m, with lower-lying areas near the rivers being more prone to flooding.

Areas with elevations between 69 m and 80 m are at the highest risk of fluvial flooding, as they are closest to the riverbanks. The flood risk is categorized by the Disaster Management Department as Very Low, Low, Medium, and High, with high-risk zones concentrated near the riverbanks. In the composite flood risk map, the areas within 200 m and 500 m of the Highest Flood Level (HFL) are classified as high-risk zones, with restricted development proposed in these areas as per the Draft Master Plan 2031.



Map17 : Composite flood risk for Prayagraj city





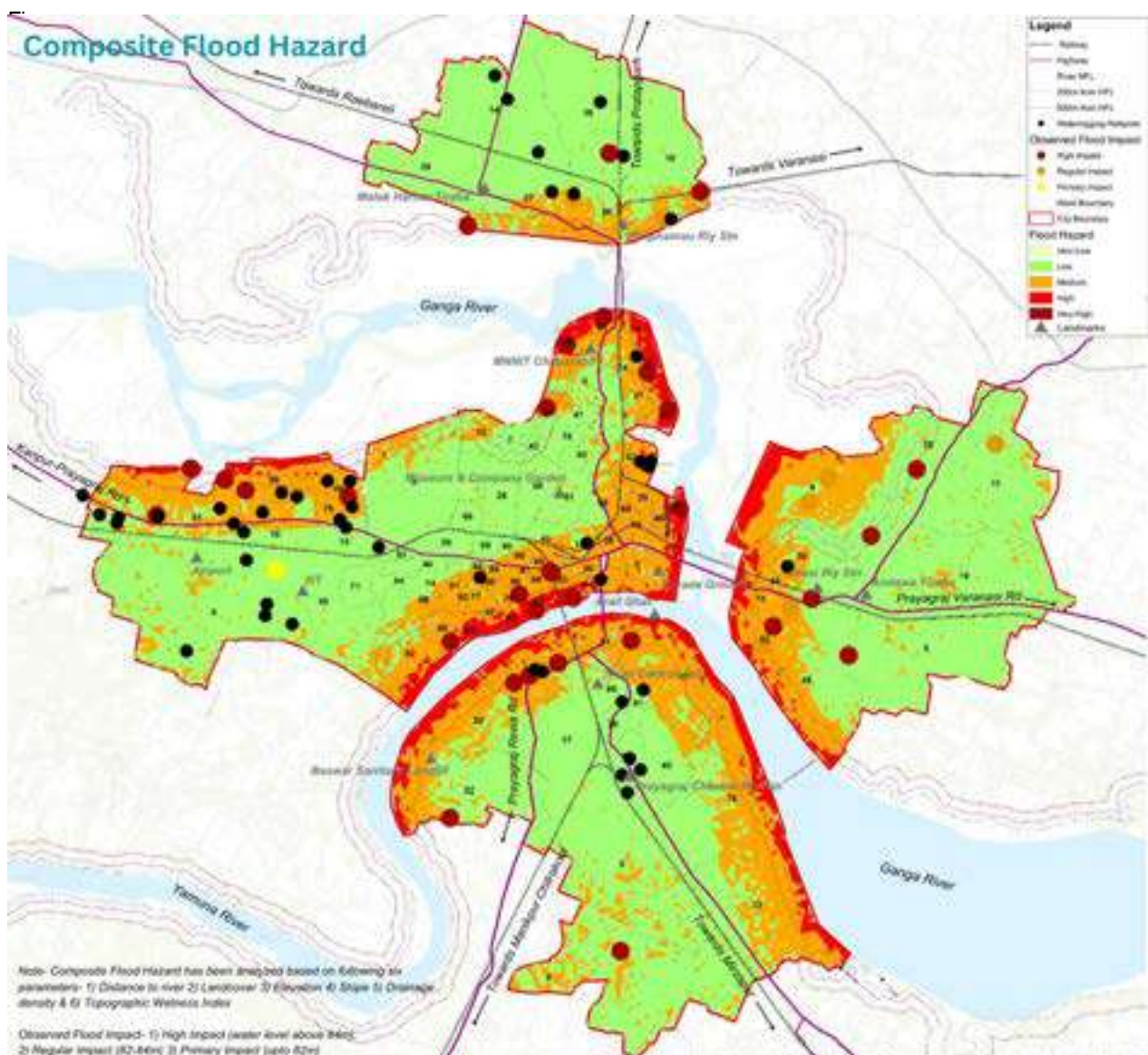
Flood hazard is analysed based on six parameters: distance from the river, land cover, elevation, slope, drainage density, and topographic wetness index. The hazard levels range from Very Low to Very High, with areas near the rivers and low-lying zones showing very high hazard levels. The Disaster Management Plan prepared by the Disaster Management Cell of Prayagraj, headed by the DM (F/R) categorizes flood impacts in the city into high impact, primary impact, and regular impact. Areas with observed flood levels above 84 m are classified as high-impact zones, indicating severe flooding during peak river discharge. The major factors contributing to fluvial flood hazard are:

Proximity to rivers: Areas within 500 m of the Ganga and Yamuna rivers are at the highest risk.

Low elevation: Low-lying areas near the riverbanks are more susceptible to inundation.

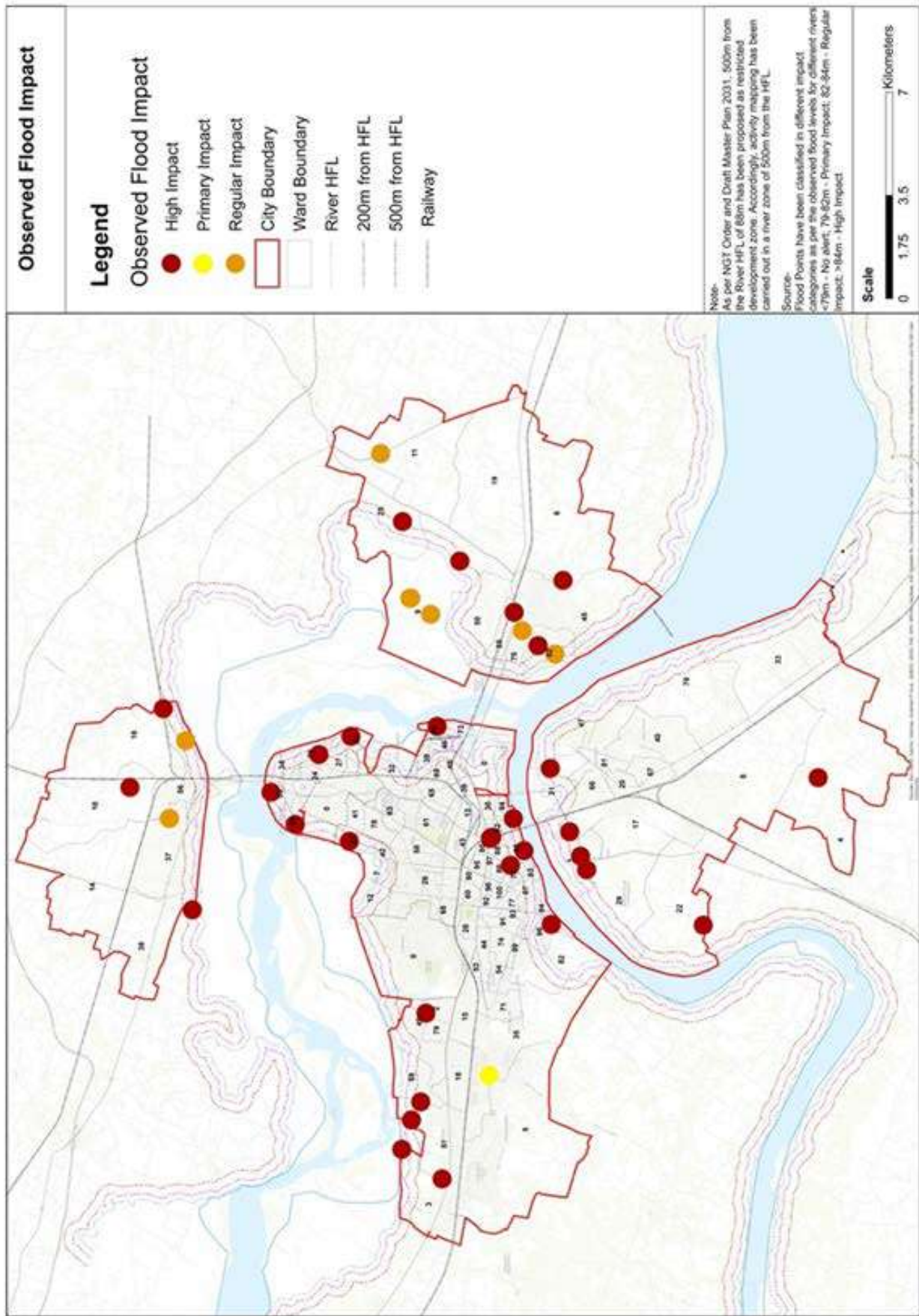
River discharge: High water levels in the Ganga and Yamuna, especially during the monsoon season, exacerbate flooding.

Figure 52: Key drivers of flood hazard



Map 18: Composite flood hazard for Prayagraj city





Map 19 : Observed flood impact for Prayagraj city





More impact is observed along the Ganga in comparison to the Yamuna, due to the well-defined course of movement for the Yamuna, and the protection by bund roads created by the Irrigation Department. Ganga, however, has a greater span in the floodplain, which also built old colonies, that get flooded up to 5m every year.



Picture 79: Areas inundated by flood in Prayagraj





4.3.2 Pluvial Flood Risk

Pluvial flooding occurs due to heavy rainfall overwhelming the city's drainage systems, leading to waterlogging and urban flooding. Areas with poor drainage density and impermeable surfaces (e.g., urbanized zones) and zones with high topographic wetness index (indicating poor water drainage) are more likely to experience pluvial flooding. The maps identify waterlogging hotspots, which are areas prone to pluvial flooding due to inadequate drainage infrastructure. Source: Prayagraj Nagar Nigam.



Figure 52: Major causes of pluvial flooding in Prayagraj



Picture 80 : Encroachment activities along the Ganga floodplain from Nagvasuki towards Curzon Bridge. Source: NIUA





4.3.3 Institutional Mechanism

The disaster management cell is chaired by the District Magistrate (DM), who is also a DDMA member, and Addl. District Magistrate (F/R) is the nodal officer for carrying out all activities. Other members of this cell include: PWD, Police Department, Revenue, Health, Jal Nigam, Irrigation and the Commissioner, Nagar Nigam. The Irrigation Department is responsible for the creation of flood shelters and chowkis, which report to DDMA every 4 hours. State relief officer released alerts to SDMA received from DDMA. The funding for the disaster is released from the relief section of the Revenue Department. Two mobile apps have been created for public access, “Damini” by SDMA and “Sachet” by NDMA, to release handy alerts and notifications during the situation of disasters, like floods. A medical helpline, 1077, has also been created to help people in need. The assistance from the Army and the Air Force is available in cases of emergency. Regularly, Apda Mitra and Civil Defence lend their hands for manpower and support every year in situations of floods.

Other than floods, the disaster management cell has reported cases of snake bites, vold waves, drowning, lightning and heat waves. Heat waves in Prayagraj are the hottest in Uttar Pradesh. Capacity building programs and trainings are carried out in schools, chaupaals in villages and other affected areas. Integrated Command Control Centre(ICCC) created under the Smart Cities Mission has integrated information of water levels and other key parameters in situations of emergencies.

Specifically for Kumbh, a separate command control centre has been created for crowd management. Mock drill training of civil defence and other officers was done to ensure the protection and safety of the visitors.

Therefore, Prayagraj's unique geographical location at the confluence of two major rivers makes it highly vulnerable to both fluvial and pluvial flooding. The GIS maps highlight the need for targeted mitigation strategies, including restricted development in high-risk zones, improved drainage infrastructure, and sustainable urban planning. As per the Draft Master Plan 2031, a 500m buffer zone from the river HFL has been proposed as a restricted development zone to mitigate flood risks. This buffer zone aims to reduce the impact of both fluvial and pluvial flooding by limiting construction in high-risk areas. Some mitigation strategies may include:

- Strengthening river embankments and flood control infrastructure
- Improving urban drainage systems to handle heavy rainfall
- Nature-based/sustainable planning regulations to prevent encroachment on floodplains and natural drains

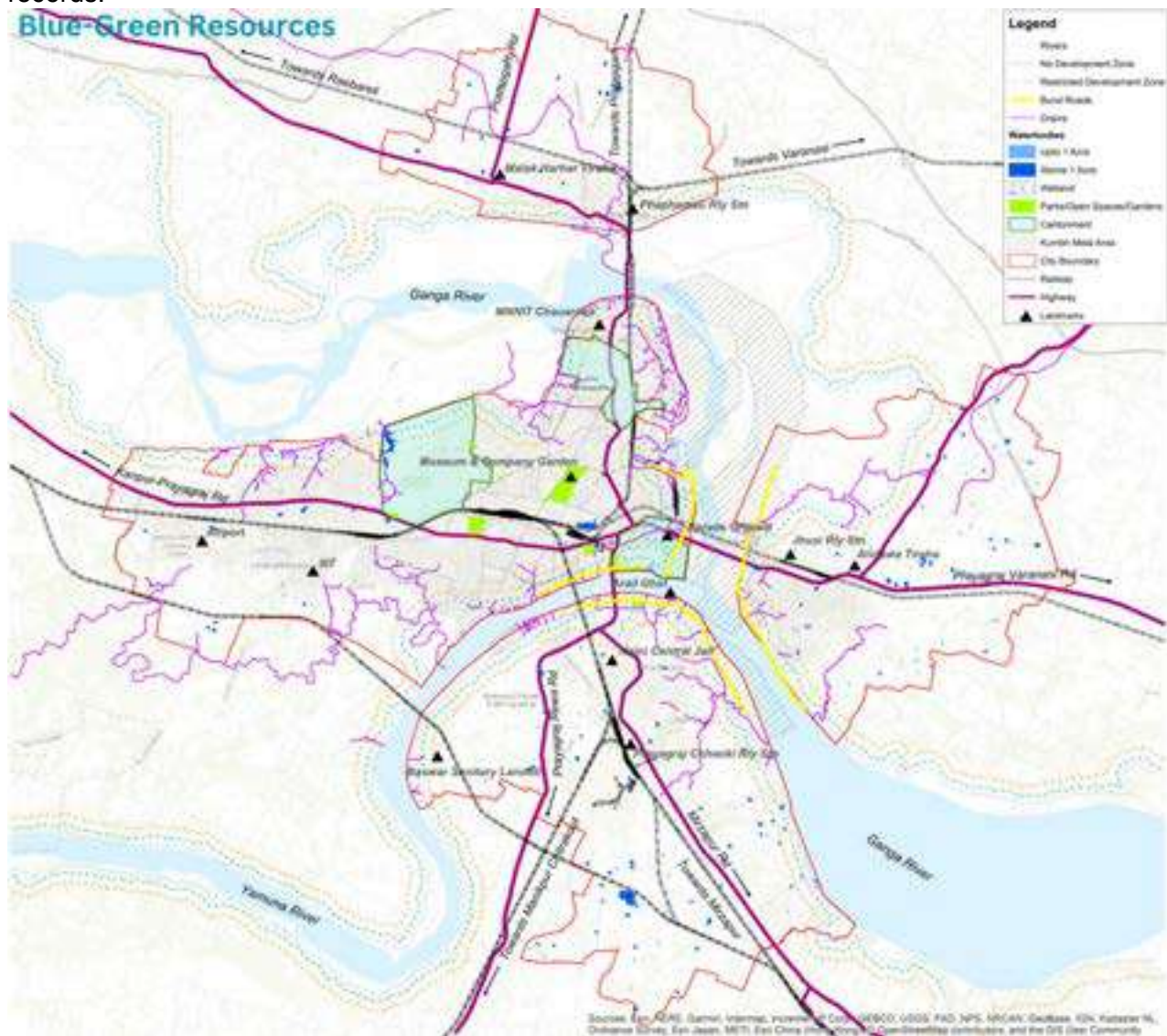
Disaster Management Cell holds regular training and capacity-building drills for schools, Chaupaal, and other affected areas to ensure awareness amongst people. Integrated long-term solutions may be required to fill the gap of curing at war footing, when the permanent infrastructure creation can prevent the gravity of the disasters.



4.4 Waterbodies and Wetlands:



Prayagraj is home to numerous waterbodies of varying sizes, both within the city limits and in its surrounding areas. However, discrepancies exist regarding the exact number of waterbodies in the city. While the Prayagraj Nagar Nigam (PNN) reports a total of 42 waterbodies, the Prayagraj Development Authority (PDA) identifies 162 such waterbodies within its jurisdiction. Records retrieved from India WRIS portal shows 106 waterbodies and wetlands. Also, in an effort to validate these numbers, the National Institute of Urban Affairs (NIUA) utilized Google Earth imagery from December 2024 and historical satellite images to develop a geo-spatial database of the city's ponds and waterbodies. Through this mapping exercise, 207 distinct waterbodies and wetlands were identified within Nagar Nigam area., though these not be verified on ground w.r.t the official records.



Map 20 : Blue-green resources in Prayagraj city

The ownership of these waterbodies is a mix of government and private holdings. Regular maintenance, including the removal of water hyacinths and other aquatic weeds, is carried out by PNN's cleaning machinery twice a year, particularly before the monsoon season. To facilitate conservation efforts, these waterbodies have been categorized based on their geographical area using GIS technology. However, it is acknowledged that the actual extent of these waterbodies may vary according to land records maintained by the PDA. Therefore, an officially verified and updated list of waterbodies needs to be prepared.

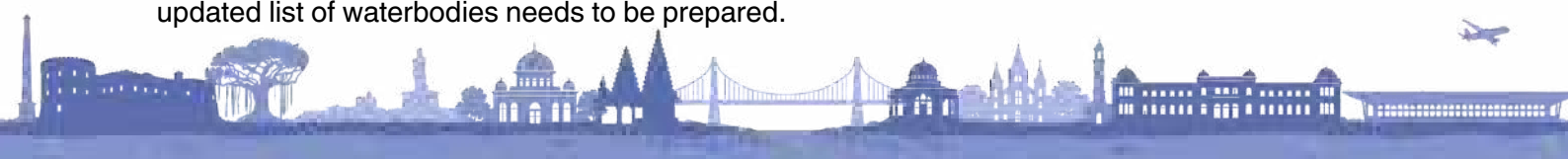




Table 15: Waterbodies and wetlands within Prayagraj Nagar Nigam area

S.No.	Area of Waterbody/ Pond	No. of lakes
1	Up to 1 acre	100
2	Above 1 acre	107
3	Wetlands (Macpherson lake)	01

Several critical issues affecting the waterbodies in Prayagraj have been identified. Primary surveys and discussions with local residents have confirmed these issues, emphasizing the need for urgent intervention to protect these natural resources.

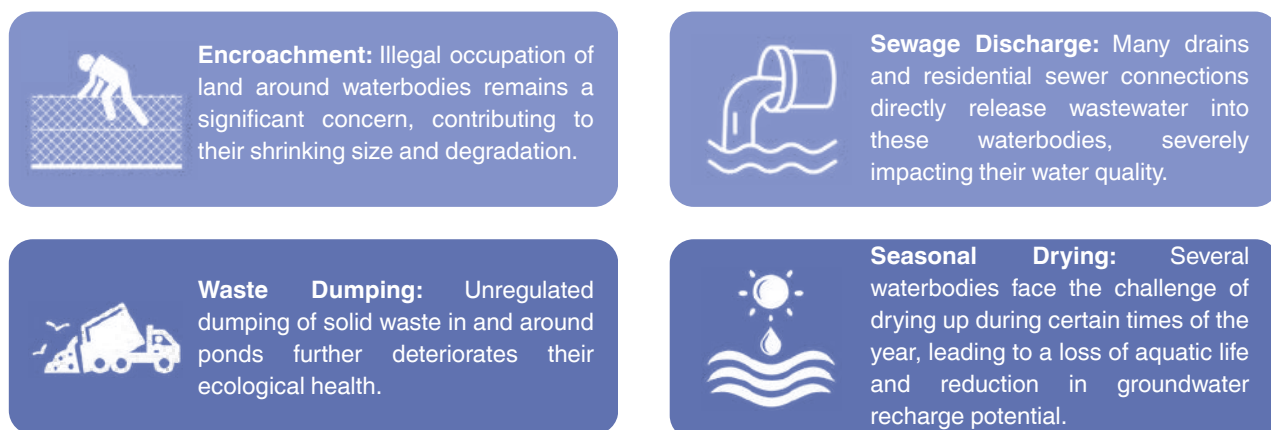


Figure 53: Key concerns regarding waterbodies in Prayagraj



Picture 81: Bamrauli pond (left), Jhunsi pond (right), Source: NIUA

Among the reported waterbodies, only one significant wetland has been identified within Prayagraj city, located above Nagvasuki Temple. However, according to state records, the Prayagraj district is home to over 800 wetlands. These wetlands play a crucial role in maintaining the ecological balance, impacting the health of the Ganga and Yamuna rivers and vice versa.

Recognizing their importance, the city requires a robust and reliable database of its waterbodies and wetlands to ensure their systematic conservation and management.





4.4.1.1 Existing/ Ongoing/ Proposed Projects

Efforts to restore and rejuvenate some of the key ponds in Prayagraj have been undertaken, with four significant projects currently in progress:

- **Dubey ka Talab Rejuvenation - 1.48 acres**
- **Andhawa Pond Rejuvenation - 4.63 acres**
- **Chak Naunia Pond Rejuvenation - 2.64 acres**
- **Macpherson Lake project (MoU b/w the army and Vyakti Vikas Kendra India (VVKI))**

There is a need for a systematic and well-maintained database of the city's waterbodies and wetlands. The conservation of these water resources should be prioritized to enhance groundwater recharge, improve urban biodiversity, and prevent further encroachments and pollution.



Picture 82: Mcpherson lake rejuvenation by Ganga Task Force, Source: NIUA

4.5 Greens and Parks, Forest Lands, Riparian Buffer Analysis

Prayagraj district might have some forest areas, but the development authority boundary does not encompass any deemed or reserved forest within its limits. There are a total of 386 municipal parks of various sizes in Prayagraj city. A stretch of 30 km along the banks of the river Ganga, which is demarcated as a protected zone (Protected wildlife area) as per the Masterplan of Prayagraj 2021.

The activity of maintaining the greens in the city lies with the horticulture wing of PDA, which follows a list of native plantation species and is responsible for creating new projects for the city. The forest department does not carry out any major activity with regards to maintaining greens in the city. The roles and responsibilities are more focused on protection and conservation of biodiversity in the region.





Map 21 : Green infrastructure map as per CDP 2023

4.5 Biodiversity

The most common birds found in the city are doves, peacocks, junglefowl, black partridges, house sparrows, songbirds, blue jays, parakeets, quails, bulbuls, and comb ducks. A large number of deer are found in the Trans Yamuna area of Prayagraj. India's first conservation reserve for blackbuck is being created in Prayagraj's Mela Forest Division. Other animals in the state include reptiles such as lizards, cobras, kraits, and gharials. During winter, large numbers of Siberian birds are reported in the Sangam and nearby wetlands.



Picture 83: Birds in the rivers of Prayagraj (left) & Turtle conservatory project by Ganga Task Force (right)





4.6.1.1 Existing/ Ongoing/ Proposed Projects

- A dolphin-centered ecotourism circuit proposal is under preparation by the forest department.
- Habitat conservation and restoration of the turtle hatchery at two locations, one in Badohi and the other in Praygarraj.
- 65-acre district park project on Andawa Jheel Road—submitted, but approval awaited.
- Recently completed projects for Mahakumbh 2025:
 - 3 km stretch from Laprosi Chairaha to Lajju Bhaiya Chauraha
 - 8 km stretch from Andawa to Sarsaul chauraha
 - 5m wide and 5km long stretch along the Arail bund road along the Yamuna
 - 2 km long stretch on slope from New Bridge to Boat Club
 - Phaphamau to Rana Pratap Chauraha
 - 1000 sqm river park at Yamuna bank
 - Miyawaki plantation has been done by PNN at 11 locations within PNN limits



Picture 84: Birds along the rivers of Prayagraj, Source: NIUA





Social and Economic Profile



The social landscape of Prayagraj plays a vital role in shaping the city's relationship with the river ecosystem. This chapter examines the demographic composition, livelihood patterns, and socio-economic dynamics that influence urban growth and environmental management. By understanding the social fabric and economic drivers of the city, this section aims to foster collaborative, community-led stewardship for the long-term sustainability of Prayagraj's urban and river systems.

5.1 IEC and Social Engagement



The Information, Education, and Communication (IEC) activities in Prayagraj encompass awareness campaigns, community meetings, and social media outreach, all aimed at promoting responsible waste management and disposal practices. Additionally, live demonstrations on waste segregation are conducted to provide residents with hands-on experience in effective waste management.

Near the ghats of Prayagraj, various IEC initiatives have been implemented to foster cleanliness and environmental awareness. These include:



Cleanliness Drives: Regular cleanliness drives are organized at the Ganga Ghats, with active participation from volunteers. For instance, a large-scale drive at Arail Ghat successfully collected 6 kg of dry waste and 35 kg of wet waste.



Awareness Campaigns: The IEC team conducts public awareness campaigns focusing on the adverse effects of single-use plastics. The 'Har Dukan Dastak' campaign, for example, involved visits to 500 shops to promote responsible waste disposal practices.



Community Engagement: Community participation is integral to these initiatives. This was evident in the Swachhata Rally for a Plastic-Free Kavad Yatra, where 354 individuals, including pilgrims, took part to promote cleanliness around the ghats.



Pledge Ceremonies: Swachhata pledge ceremonies are organized to encourage residents to commit to keeping their surroundings clean and segregating waste at the source, fostering a sense of collective responsibility.



Cultural Activities: To enhance engagement, street plays and other cultural performances are conducted, encouraging devotees to avoid single-use plastics and reinforcing the message of cleanliness in an accessible and relatable manner.

Figure 54: IEC activities conducted by Prayagraj Nagar Nigam for maintaining cleanliness of ghats



Picture 85: Large crowd heading towards Sangam



5.2 Communication channels



The IEC activities near the ghats in Prayagraj utilize multiple communication channels to maximize outreach and effectiveness. These include community meetings, social media campaigns, public awareness drives, pledge ceremonies, and cultural activities.

5.3 Campaign partners

IEC initiatives in Prayagraj are supported by a network of organizations and local stakeholders. The Nagar Nigam Prayagraj plays a pivotal role in coordinating these efforts, collaborating with community organizations such as the Swachhata Saraswati Samajik Seva Sansthan to conduct large-scale cleanliness drives at locations like Arail Ghat.

Additionally, local councillors and representatives from the IEC team contribute to the planning and execution of these campaigns, ensuring active community participation.

Educational institutions also serve as key partners, with the Swachh Mohalla Samiti engaging community representatives to address local sanitation concerns. Religious leaders have also played a crucial role in appealing to pilgrims to uphold cleanliness standards, thereby strengthening the collective effort towards maintaining a cleaner riverfront environment.

5.4 Public Participation

Public participation has been a defining aspect of IEC activities along the riverfront. Notable examples include:



LARGE-SCALE CLEANLINESS DRIVE

A large-scale cleanliness drive at Arail Ghat, conducted in collaboration with the Swachhata Saraswati Samajik Seva Sansthan and the Prayagraj Municipal Corporation.



SWACHHATA RALLY

The Swachhata Rally for a Plastic-Free Kavadi Yatra, which witnessed active engagement from 354 individuals, including Kavadi Yatri and residents, to promote cleanliness and discourage plastic use along the riverbanks.



PLASTIC GHOST GANG

The 'Plastic Ghost Gang' awareness drive, reaching 108 shops, aims to emphasize the importance of proper waste management.



STUDENT INVOLVEMENT

The involvement of students through the Swachh Sarthi Club, mobilizing participation from 250 schools, further strengthening community engagement in sustainable waste practices.

Figure 55: Different types of IEC activities by various stakeholders





5.5 Frequency

- **Recurring Events:** Cleanliness drives at the Ganga Ghats and famous temples are conducted bi-monthly, specifically on the second and fourth Sundays of each month. This initiative helped to remove waste from riverbanks and promote a polythene-free worship environment.
- **Seasonal & Festival-Linked Events:** Special drives are organized during religious gatherings such as the Kavad Yatra and Mahakumbh 2025, with a focus on reducing plastic waste and ensuring riverbank cleanliness.

5.6 Funding and Approvals

The IEC initiatives are financed through a combination of state allocations, corporate social responsibility (CSR) contributions, and technical assistance from various organizations. The coordination of CSR activities is managed by consultants working in the city, ensuring alignment with project objectives. Final approval for all plans is granted by the Commissioner following a detailed review process.

5.7 Role and responsibility

The implementation of IEC activities near the ghats is led by the Prayagraj Municipal Corporation in collaboration with local organizations and community members. For instance, the Swachhata Saraswati Samajik Seva Sansthan has partnered with the Municipal Corporation to conduct large-scale cleanliness drives at Arail Ghat, reinforcing the significance of preserving the sanctity of the Ganga.

Additionally, the IEC team, comprising volunteers and local leaders, plays a crucial role in raising awareness and mobilizing community engagement. The initiatives are further supported by local councillors and organizations such as the Swachh Bharat Mission, which assists in recruiting participants for these activities.

5.8 Challenges

- Governance of river management is divided among three entities: the Municipality, the Prayagraj Development Authority (PDA), and the Mela Authority. This division results in inefficiencies and coordination gaps.
- IEC and Public Relations (PR) approvals are time-consuming, which delays the execution of awareness programs.
- Waste management monitoring systems and dashboards remain in nascent stages, requiring further development and adoption.





Picture 86: Awareness campaign for wetland conservation & green Mahakumbh in Prayagraj on World Wetlands Day 2023

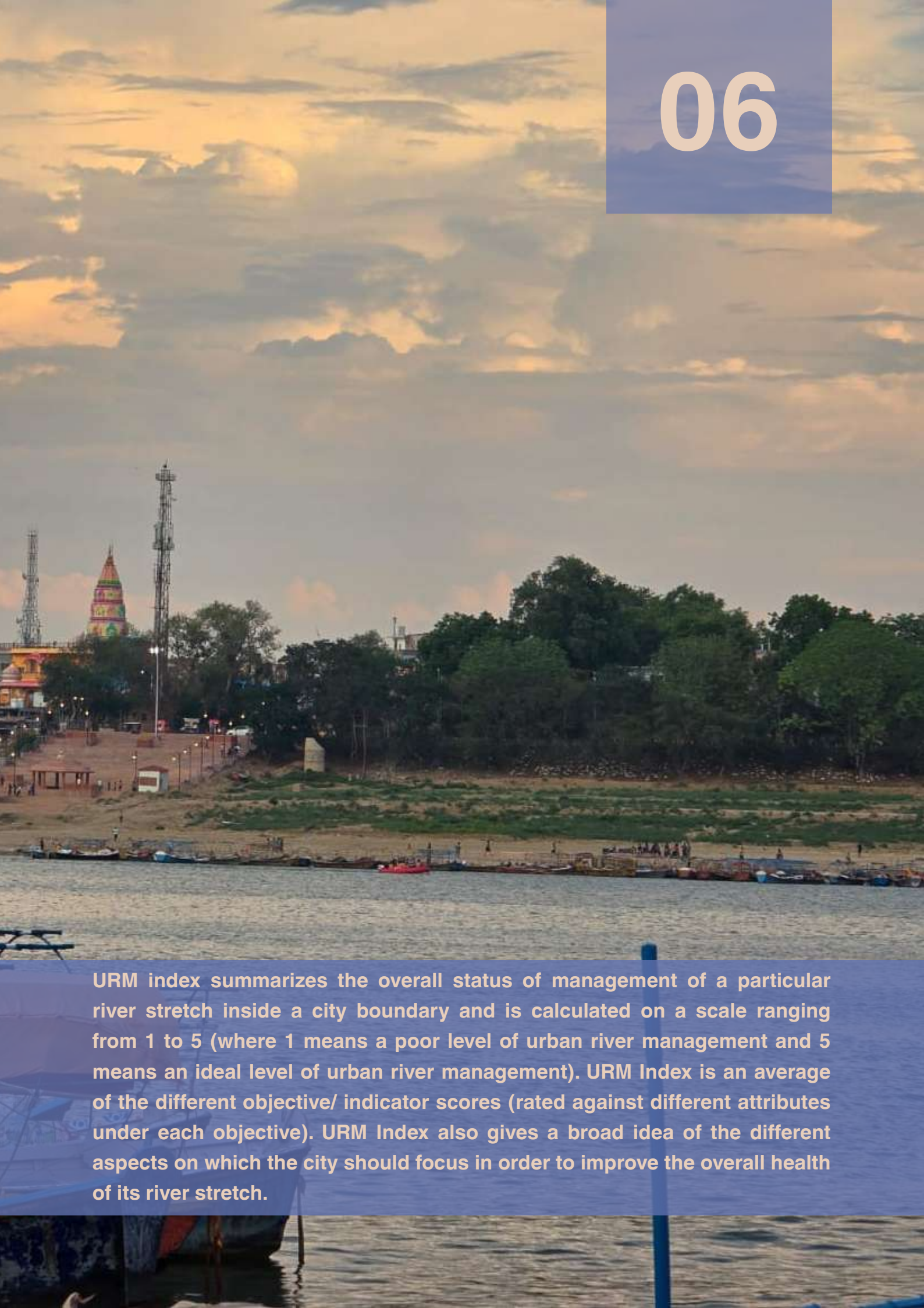


Picture 87: Procurement of boats supported by different organisations through CSR funds



A scenic view of a river at sunset. In the foreground, a boat with a blue canopy and orange poles is partially visible. A large orange flag flies from a pole on the boat. The river is calm, reflecting the sky. In the background, a sandy bank is populated with people and small structures. A tall communication tower and a colorful temple with a dome are visible on the right. The sky is filled with large, dramatic clouds illuminated by the setting sun.

Objective-Wise URM Indexing



URM index summarizes the overall status of management of a particular river stretch inside a city boundary and is calculated on a scale ranging from 1 to 5 (where 1 means a poor level of urban river management and 5 means an ideal level of urban river management). URM Index is an average of the different objective/ indicator scores (rated against different attributes under each objective). URM Index also gives a broad idea of the different aspects on which the city should focus in order to improve the overall health of its river stretch.

6.1 Objective 1 - Regulation of Activities in the Floodplain

Prayagraj has two major rivers Ganga and Yamuna, which have quite distinct characteristics. City has almost 50km (more than 100 km including both edges) of the length of the river Ganga and almost 18 km (more than 35 km including both edges) passing through it (PDA limits). Ganga is quite shallow and meandering in nature, and causes flooding in adjacent areas and also carries a lot of silt, while Yamuna has relatively more depth and its course is quite stable.

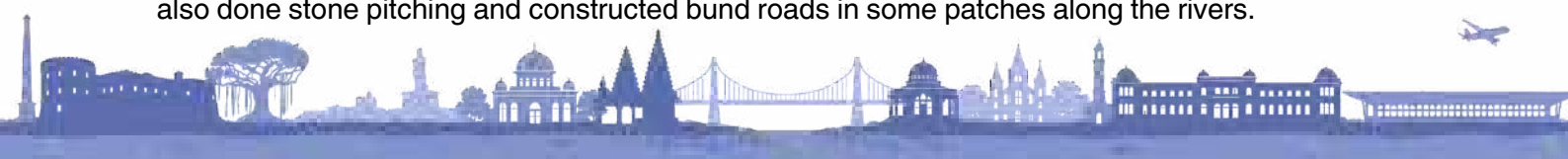
Areas adjacent to the Ganga area are relatively less dense, while development is quite prominent in areas adjacent to the Yamuna. Prayagraj Development Authority, with the help of the Irrigation and Flood Control Department, has demarcated High Flood Level (HFL) for the Ganga and Yamuna rivers. PDA currently has Master Plan 2021 in place and has also prepared the draft Master Plan 2031 (which is yet to be notified).



Picture 88: Waterlogging in Kumbh Mela area due to swelling of river Ganga, Source: NIUA

The Master Plan has made a few provisions for the protection of the floodplains of the river Ganga and Yamuna. 200m from the bank of the river has been proposed as a No Development Zone, and 300m further, a Restricted Development Zone has been proposed. Construction of temples/dharamshalas etc (primarily due to the religious sentiments attached to these) with restriction in FAR and ground coverage (Maximum FAR 1.5 and ground coverage 35% and plan showing enough provision ensuring no direct disposal of wastewater into rivers) has been permitted in No Development Zone and developments related to religious and cultural tourism has been permitted under special permission (with maximum ground coverage 10%) in Restricted Development zone.

The Master Plan has demarcated use zones (within the 'Recreational' Landuse category) such as Riverfront Development-P6 and Kumbh Mela Area-P5, and has also mentioned activities permitted as well as prohibited in those zones. It has also mentioned 'Floodprone Area' as a use-zone under the landuse category 'Others'. The Irrigation and Flood Control department, as well as PDA, have also done stone pitching and constructed bund roads in some patches along the rivers.





6.2.1 SWOT Analysis



STRENGTH

- The high floodline for the Ganga and Yamuna rivers has been demarcated
- Bund roads have been constructed in some stretches along both the Ganga and Yamuna rivers.
- Stone pitching works have been done in some patches
- Master Plan 2021 has proposed a green belt along the major part of the river stretches. Master Plan 2031 has also proposed open spaces and green belts along both rivers.
- The Disaster Management Cell under the district administration has a response mechanism in place in case of flood events.
- No development zone along rivers has been defined
- Zoning regulations have been proposed for P-5 and P-6 zones



WEAKNESS

- Low- and medium-density residential developments, village settlements, etc., have been proposed in many areas along both rivers, which are part of the floodplain
- No such provision (buffers/no development zones/zoning regulations, etc.) has been made for the drains and waterbodies
- No strict monitoring is in place to comply with the development norms and to protect the floodplain from encroachment. Even built-up areas in the floodplain have increased over the years.
- Hotels and resorts have been conditionally permitted in the riverfront development zone P6.



OPPORTUNITY

- Many stretches, particularly along the river Ganga, are open, which provide a good opportunity for developing riparian areas or green belts
- Prayagraj has a few good educational and research institutes whose expertise can also be leveraged for forming policy measures focusing on the protection of the floodplain



THREAT

- The edges of the river Yamuna are heavily built up
- Ganga river course is quite dynamic, and occasionally, many areas along the Ganga suffer from the riverine flooding problem





Table 16: Floodplain management score for the river Ganga

Obj 1	Floodplain Management	Max Points	Points Scored	Remarks
1	Floodplain boundaries demarcated	15	11	Irrigation and Flood Control Department has defined High Flood Level. But this has not been done scientifically for different return periods.
2	Floodplain boundaries protected through embankments roads, or other means	5	1	Embankments and bund roads have been constructed along more than 20% of the river stretches.
3	Demarcation of no development zone adjacent to the river in the active floodplain	5	3	Master Plan has demarcated no development zone and made zoning regulations, but certain non-conforming activities (e.g. low and medium density residential) have also been included in the use zones in floodplain area
4	Strict enforcement in no development zone	10	3	Strict enforcement is not in place
5	Updated database of existing land use in floodplain available	10	8	Master Plan 2021 and Draft Master Plan 2031 has highlighted updated database of all land use categories, though few of these do not match with the ground scenario (e.g. green belt along rivers)
6	The master plan has indicated permissible and non-permissible activities in the floodplain/river zone	15	12	Activities permitted, non-permitted, conditionally permitted and permitted under special permission in the river zone P-5 and P-6 have been mentioned.
7	All regulations in the Master Plan are enforced (10 points if at least 50% of the regulations are enforced)	15	10	Strict enforcement is not there
8	Presence of river-friendly landscaping (e.g. constructed wetlands, bioswales, etc.).	5	2.5	Green belt along rivers are present and provision for the same has also been given in the Master Plans.
9	Strict monitoring mechanism in place	5	1	Strict monitoring mechanism is not in place.
10	No solid waste dumping on river banks	10	5	Solid waste dumps were observed on few stretches during the site visits. Though Nagar Nigam collects waste from the dumps and send these to the landfill site.
11	Only organic farming practiced in river zone	5	2.5	Farming is practiced in small patches in the floodplain (along the banks as well as the active river channel during dry seasons). Some of these farmers might be using organic fertilisers.
TOTAL		100	59	

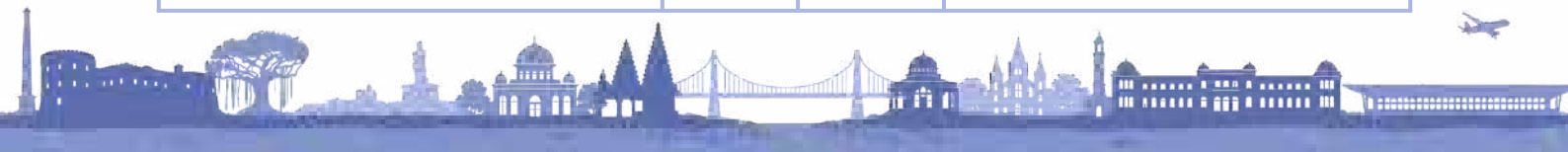




Table 17: Floodplain management score for the river Yamuna

Obj 1	Floodplain Management	Max Points	Points Scored	Remarks
1	Floodplain boundaries demarcated	15	11	Irrigation and Flood Control Department has defined High Flood Level. But this has not been done scientifically for different return periods.
2	Floodplain boundaries protected through embankments roads, or other means	5	0.5	Embankments and bund roads have been constructed along more than 9% of the river stretches
3	Demarcation of no development zone adjacent to the river in the active floodplain	5	3	The master plan has demarcated no-development zone and made zoning regulations, but certain non-conforming activities have also been included in the use zones in floodplain area
4	Strict enforcement in no development zone	10	3	Strict enforcement is not in place
5	Updated database of existing land use in floodplain available	10	8	Master Plan 2021 and Draft Master Plan 2031 has highlighted updated database of all land use categories, though few of these do not match with the ground scenario
6	The master plan has indicated permissible and non-permissible activities in the floodplain/river zone	15	12	Activities permitted, non-permitted, conditionally permitted and permitted under special permission in the river zone P-5 and P-6 have been mentioned.
7	All regulations in the Master Plan are enforced (10 points if at least 50% of the regulations are enforced)	15	10	Strict enforcement is not there
8	Presence of river-friendly landscaping (e.g. constructed wetlands, bioswales, etc.).	5	2.5	Green belt along rivers are present and provision for the same has also been given in the Master Plans.
9	Strict monitoring mechanism in place	5	1	Strict monitoring mechanism is not in place.
10	No solid waste dumping on river banks	10	5	Solid waste dumps were observed on few stretches during the site visits. Though Nagar Nigam collects waste from the dumps and send these to the landfill site.
11	Only organic farming practiced in river zone	5	2.5	Farming is practiced in small patches in the floodplain. Some of these farmers might be using organic fertilizers.
TOTAL		100	58.5	

As the Floodplain Management point is 59 for the Ganga and 58.5 for the Yamuna (i.e. 50-69), therefore, the Floodplain Management Scores for both the rivers are 3, which means an average level of Floodplain Management. Almost similar kinds and intensity of efforts are there for managing floodplains of both these rivers.



6.2 Objective 2 - Pollution-Free River

Prayagraj generates approximately 472 MLD of sewage, of which only 178 MLD (38%) reaches the sewer network, while 293 MLD (62%) flows through open drains, ultimately entering the Ganga and Yamuna. Currently, there are 10 STPs with a combined capacity of 340 MLD, along with 31 sewage pumping stations. Prayagraj Nagar Nigam is working on improving sewer connectivity, as only 60% of households are currently connected to the municipal sewer network.

Faecal sludge collected from the onsite sanitation systems is treated at three FSTPs (of capacities 100 KLD at Naini, 50 KLD at Salori and 50 KLD at Jhunsi). City monitors 81 drains discharging into the Ganga and Yamuna (37 of these have already been tapped, 22 are being treated through Geotube technology, and 17 are still untapped). But there are many other drains inside the city, which are neither in the record nor monitored. The water quality of the rivers Ganga and Yamuna is measured by the UP State Pollution Control Board at six locations (4 for Ganga and 2 for Yamuna).



Picture 89: Bioremediation (left) and Interception & Diversion of drains (right)



Picture 90: Flow regulation in drains (left) and desludging vehicles of Prayagraj Nagar Nigam (right), Source: NIUA





6.3.1 SWOT Analysis



STRENGTH

- City has adequate treatment infrastructure in place (e.g. adequate capacity of STPs and landfill sites)
- Co-treatment is also happening to treat the faecal sludge
- Sufficient funding is available from various sources (ULB revenue as well as central and state government funding)
- The city has a dedicated institution (Ganga Pollution Control Unit) which takes care of the drains falling into the rivers Ganga and Yamuna. This department also works in close coordination with the National Mission for Clean Ganga.
- Regular monitoring of drains is conducted by the State Pollution Control Board as well as the Master Plan 2021 has proposed parks and green belts along major parts of the river stretches.
- The Disaster Management Cell under the district administration has a response mechanism in place in case of flood events.
- The Master Plan has demarcated use zones such as Riverfront Development-P6 and Kumbh Mela Area-P5, and put in place zoning regulations.



WEAKNESS

- The city does not have a proper database of all the drains.
- Provision of a development zone along the drains is not there.
- Dumping of solid waste is quite common along the drains, which causes choking of the drains
- Many drains are still untapped, and these are discharging wastewater directly into the rivers
- Frequency of drain cleaning is less (usually conducted 2 times a year, during pre- and post-monsoon times)
- The percentage of HHs connected to the sewerage system is not very high in a few sewerage zones (e.g. F, G, J).



OPPORTUNITY

- Placemaking around drains may be explored
- Treatment of drains through bioremediation or nature-based solutions (e.g., constructed wetlands) may help in maximizing good-quality return flow into the rivers
- A lot of high-focus infrastructure development works take place due to the Kumbh Mela
- Prayagraj is also in focus due to its tourism potential because of the Sangam and its proximity to cities like Varanasi, Lucknow, and Ayodhya



THREAT

- The city is rapidly expanding (the current area of the Nagar Nigam is around 300 sq km, while the planning area is around 1000 sq km), and a major part of the city is still not connected to the sewerage system.
- High floating population (especially during Kumbh Mela and Magh Mela).





Table 18: Net DO score for the river Ganga

DO Inlet (upstream near Fatehpur Ghat)	8.86	Average of during January 2025 from NGT report
DO outlet (downstream near Chhatnag Ghat)	8.8	
Net DO	-0.67	Net DO score 3

Table 19: Net DO score for the river Yamuna

DO Inlet (upstream near Raw water intake point Karelabagh)	9.08	Average of during January 2025 from NGT report
DO outlet (downstream near Saraswati Ghat)	8.98	
Net DO	-1.11	Net DO score 3

The Net DO (Dissolved Oxygen) scores for both the Ganga and Yamuna indicate a slight drop in oxygen levels from upstream to downstream points, suggesting moderate organic pollution. Despite this decline, the Net DO score remains within acceptable range (Score 3), based on the NGT January 2025 report.



Picture 91: Sewer Jetting cum Suction machine of Prayagraj Nagar Nigam, Source: NIUA



6.3 Objective 3 - Rejuvenating Waterbodies and Wetlands

Waterbodies and wetlands are important hydrological units that are ultimately connected to the rivers through their base flow. They help in flood attenuation, groundwater recharge, recycle micro-nutrients, control micro-climate, etc. Besides the rivers Ganga and Yamuna, Prayagraj city is also blessed with many waterbodies and wetlands. But unfortunately, the city does not have an updated database of these.



Picture 92: Macpherson lake in cantonment area

As per the records available with the Prayagraj Nagar Nigam, there are 42 waterbodies. But, as per the analysis done by NIUA (based on Google Earth imagery), almost 207 waterbodies (out of which around 100 are of area up to 1 acre and the rest above 1 acre) and wetlands have been identified (which required ground verification in terms of its status as per the revenue records, land ownership etc.). The Master Plan has not classified any land use class regarding waterbodies. The following key issues were identified regarding waterbodies in Prayagraj: a) encroachment, b) discharge of untreated wastewater and subsequently being filled with water hyacinths, c) dumping of solid waste in and around the waterbodies, d) seasonal drying.

Prayagraj Nagar Nigam carries out regular desilting, deweeding and cleaning of several water bodies. Also, rejuvenation of four waterbodies (Dubey ka Talav, Andahawa Pond, Chak Naunia and Macpherson Lake) is in process

Though ground-truthing and detailed assessment of all waterbodies were not possible, a rapid assessment of three waterbodies was done based on reconnaissance survey and using Google Earth imagery.





Table 20: Existing situation analysis for Jhusi Pond

Jhusi Pond	
Condition of waterbody	Remarks
No presence of solid waste in or around the water body	Solid wastes were present at a few places in the buffer area, though solid waste in the water body could not be verified, as it could not be accessed.
No discharge of untreated wastewater into the water body	2-3 drains are directly discharging their wastewater into the waterbody
Presence of a boundary protection around a water body	No
No visible eutrophication in the water body	Eutrophication is there, and the water body is also filled with water hyacinth
Minimum DO of 4 mg/l	DO could not be measured
No reduction in volume of water from the previous year	The water level fluctuates

Table 21: Existing situation analysis for Macpherson lake

Macpherson Lake	
Condition of waterbody	Remarks
No presence of solid waste in or around the water body	Very limited to no presence of solid waste
No discharge of untreated wastewater into the water body	One major drain discharges into the waterbody
Presence of a boundary protection around a water body	Although no proper fencing is present, protection through riparian plantation is there at a few places
No visible eutrophication in the water body	Very limited to no eutrophication
Minimum DO of 4 mg/l	DO could not be measured
No reduction in volume of water from the previous year	Water level fluctuates



Picture 92: Waterbody near Civil Lines Bus Depot and Jhusi Bus Workshop





Table 22: Existing situation analysis for Bamrauli Pond

Bamrauli Pond	
Condition of waterbody	Remarks
No presence of solid waste in or around the water body	Solid waste was found in some parts of the water body and especially in the buffer area
No discharge of untreated wastewater into the water body	Wastewater from nearby colonies get discharged into the waterbody
Presence of a boundary protection around a water body	Absence of any boundary protection. Also, the water body hardly had any buffer around it
No visible eutrophication in the water body	Waterbody had eutrophication and was completely filled with water hyacinth
Minimum DO of 4 mg/l	water quality was visibly very poor
No reduction in volume of water from the previous year	The water level fluctuates

Table 23: Existing situation analysis for Numaya Dahi Jheel-Kheduva Taal

Numaiya Dahi Jheel - Kheduva Taal	
Condition of waterbody	Remarks
No presence of solid waste in or around the water body	Solid wastes were found in some parts of the water body and in the buffer area
No discharge of untreated wastewater into the water body	Untreated wastewater from the nearby colony is discharged directly through an open drain
Presence of a boundary protection around a water body	No boundary protection
No visible eutrophication in the water body	Eutrophication is clearly visible
Minimum DO of 4 mg/l	DO could not be measured
No reduction in volume of water from the previous year	Water level fluctuates

The NMCG has sanctioned a project to conserve Numaiya Dahi Jheel-Kheduva Taal, a key Yamuna floodplain wetland used for agriculture, fisheries, and recreation.

A wetland health scorecard for 282 wetlands in UP (including five in PDA) found most in poor condition, though the Ganga Task Force has aided revival efforts through desilting, aeration, de-weeding, and constructed wetlands. While some data and rejuvenation work exists, including efforts by local authorities, a citywide integrated waterbody management and monitoring approach is still lacking, leading to a low **score of 1.5 for the city of Prayagraj** under this objective.





Picture 93: Macpherson Lake in Cantonment area



Picture 94: Jhansi Pond



Picture 95: Waterbodies analysed (left) and INumayadahi Jheel/Kheduva Taal (right)





6.4.1 SWOT Analysis



STRENGTH

- The city has a database of 42 waterbodies to build upon
- Sufficient funding is available from various sources
- There are many large-sized waterbodies in the city (larger waterbodies are comparatively easier to conserve)



WEAKNESS

- The database of waterbodies is not updated
- Many of the waterbodies are encroached on
- Regular maintenance of waterbodies (desilting, dewatering, etc.) is not happening for all waterbodies
- Wastewater network coverage is less in some sewage zones. In those areas, smaller drains from nearby colonies directly discharge wastewater from the HHs into the waterbodies.
- The Master Plan has not identified waterbodies, and there is no development control norm for the waterbodies in the Master Plan or the Building Bye-law.
- Many waterbodies occasionally get dried up.



OPPORTUNITY

- Place-making options around the waterbodies may be explored.
- The city is heavily dependent on groundwater. Therefore, rejuvenating waterbodies may help reduce stress on groundwater by improving groundwater levels.



THREAT

- The city is expanding rapidly, which may increase the threat of the waterbodies being encroached on
- The Master Plan has not identified waterbodies, and there is no development control norm for the waterbodies in the Master Plan or the Building Bye-law.
- Solid waste dumping in and around many waterbodies is also happening, which increases the risk of the waterbodies being encroached on eventually.



6.4 Objective 4 - Enhancing Riparian Buffer

A riparian buffer is a linear vegetation strip, either natural or planted, along rivers/natural drains. It acts as a shock absorber for the river and its aquatic ecosystem from detrimental developmental activities. Its function is to protect rivers or drains from erosion, and naturally filter pollutants washed away during surface runoff.



Under the URMP framework, cities are promoted to develop riparian buffers/ biodiversity parks along rivers to address not only critical issues like pollution or bank erosion but also prevent encroachment in floodplain areas. The riparian buffer is normally considered a continuous strip of vegetation of width generally varying from 15 to 30 m (depending on the width of the river/drain). Here, riparian vegetation has been considered within a 30 m buffer from the river edges.

The edges of both the rivers Ganga and Yamuna are under urban influence and are quite built up to the edges in nature, except for the Ganga River's Phaphamau side and in stretches from Cantonment to Rasoolpur, Kashipur Kachhar on the main city side.

As both the rivers pass through the city, the city faces more than 100 km of the river Ganga (including both edges) and almost 50 km of the river Yamuna (including both edges). Total length of riparian buffer along Ganga is around 17 km against a total river length of almost 105 km (including both edges) and total length of the riparian buffer along Yamuna is around 6.5 km against total river length of almost 48 km (including both edges).

Mostly smaller patches of riparian vegetation exist along both rivers within the Nagar Nigam limit, mainly due to the limited availability of land and the urban influence. But larger riparian pockets exist beyond the Nagar Nigam limits (especially along the Ganga).

Table 24: Riparian buffer factor for the river Yamuna

Total length of riparian buffer	17 km
Total length of river stretch	105 km
Riarian buffer factor	16.5%
Total length of riparian buffer	6.5 km
Total length of river stretch	48 km
Riarian buffer factor	13.5%





The riparian buffer score for both rivers is 1 (as the buffer factor is <30%).

PDA has put green buffers along both the rivers Ganga and Yamuna, but these were not fully correlated with the on-ground scenario (existing riparian patches identified from Google Earth Imagery. Though it's worth mentioning that the Horticultural department under PDA has been carrying out plantation works.

Also, provision of riparian buffer might be crucial in virgin stretches along the Ganga river as these areas face flooding problems (particularly areas on the western limit of the city along Ganga, areas towards South of Myorabad and Patrakar Colony and in areas along Sonauti, Badra and Rasulpur Kachhar, Bankarabad etc.).

Also, as mentioned earlier, the Master Plan does not have any provision for a buffer zone/ riparian vegetation/ green belt along the drains. But areas adjacent to Sasur Khaderi nalla (which flows through the southern and south-western parts of the main city area and eventually meets the Yamuna river) are under a lot of developmental pressures. This nalla needs to be protected (from encroachment as well as pollution), though the Ganga Pollution Control Unit has tapped this nalla. This nalla has good riparian stretches, which can be further developed to create continuous riparian buffers. Also, areas (Virampur, Karelabagh, etc.) along this nalla near its confluence with the river Yamuna are prone to flooding.

Add one riparian buffer photo





6.6.1 SWOT Analysis



STRENGTH

- The city has a strong institutional mechanism for horticulture and plantation activities (presence of the Horticulture Department under PDA, the Forest Department).
- There are quite a few riparian stretches existing within the city.
- The Master Plan has made provisions for a No Development Zone along rivers.
- Green Belt has also been proposed in the Master Plan.
- Manure is also being produced from dried sludge at the FSTPs, which may be used for plantation purposes.



WEAKNESS

- Limited land availability within the Nagar Nigam limits (particularly along the Yamuna).
- Absence of a strict monitoring mechanism



OPPORTUNITY

- Vast stretches of land are available along Sasur Khaderi Nalla and along the Ganga and Yamuna rivers beyond the Nagar Nigam area.
- Creating riparian buffers may also help in carbon sequestration and help earn carbon credits.
- Riparian buffers may also be explored with placemaking options (riverfront parks/biodiversity parks/nature interpretation centres, etc.)



THREAT

- The city is growing rapidly, which may exacerbate the risk of encroachment, further reducing the availability of land for developing riparian buffers



6.5 Objective 5 - Adopt Increased Reuse of Treated Wastewater

Reuse of treated wastewater is an excellent avenue in Prayagraj to reduce the burden on the groundwater used in the city. RCUES, Lucknow, has prepared a state policy on the reuse of treated wastewater in 2019 for ULBs of UP state.

Prayagraj generates approximately 472 MLD of sewage.

Almost 33 MLD of treated wastewater is being reused by the city for different purposes (30 MLD from 80 MLD Naini STP for irrigation and approximately 3 MLD from 14 MLD Salori STP for horticulture purposes).

Table 25: Wastewater reuse score

Wastewater generated	472 MLD
Wastewater reused	33 MLD
Wastewater reuse factor	7%

Therefore, wastewater reuse score for Prayagraj is 1 (reuse factor < 20%)



Picture 97: Reuse of treated wastewater for railway coach (left) and bus (right) washing, Source: Anushka Khare & NIUA





6.6.1 SWOT Analysis



STRENGTH

- City has adequate treatment infrastructure in place (e.g. adequate capacity of STPs), which ensure sufficient availability of treated wastewater



WEAKNESS

- Lack of proper infrastructure for transporting treated wastewater to the sites where reuse may happen.
- Lack of potential buyers/users (it is difficult to convince the potential users to use treated wastewater to buy treated wastewater)
- Less return on investment



OPPORTUNITY

- City is heavily dependent on groundwater. Using treated wastewater for non-potable purposes may reduce the demand of freshwater and thus may reduce the stress on groundwater.
- There are many parks in the city where treated wastewater may be used for horticultural purposes.



THREAT

- Unless the quality of treated wastewater is strictly maintained, it may cause health hazards.



6.6 Objective 6 - Ensure Maximum Good Quality Return Flow

The objective of quality return flow is quite unique and, at the same time, a bit tricky to decide for the river city. The idea here is to promote river cities to discharge treated water of good quality into rivers as a responsible gesture, especially when the cities extract freshwater from upstream for meeting various demands.

This will ensure that the outgoing water from the city doesn't burden the downstream cities to spend a high cost to treat the water, and also the ecological flow maintains the biodiversity in the river. There is no definitive guideline for how much a city should give back to the river, as this depends on site-specific factors. Currently, the city has not committed any return flow to the rivers. But, in order to maintain good quality return flow, the mechanism of cleaning of drains needs to be strengthened.

As per the present scenario, 20% of the city's water demand comes from the river Yamuna, and the city does not extract any water from the river Ganga. Currently, Ponghat, Kodra, rajapur, Phaphamau, Jhusi and Salori STPs discharge treated wastewater into the Ganga (almost 168 MLD) while Numayadahi and Naini I & II STPs discharge into the Yamuna (almost 142 MLD).

In this scenario, **the return flow score for Ganga is 5 and for Yamuna is 4.5.**

However, in the long term, strengthening groundwater recharge should be a key priority, considering that the city relies predominantly on groundwater for its water supply.



Picture 98: Drainage channel carrying treated wastewater from Salori STP to river Ganga, Source: NIUA





6.7.1 SWOT Analysis



STRENGTH

- Both the rivers Ganga and Yamuna have adequate flow
- City has a robust wastewater treatment infrastructure in place
- Availability of sufficient funding from various sources.
- Nagar Nigam conducts drain cleaning operations



WEAKNESS

- City has not decided any return flow
- More than 17 drains are still untapped, which are disposing untreated wastewater directly into the rivers



OPPORTUNITY

- Possibility of using nature based solutions may be explored for treatment of untapped drains



THREAT

- Quality of treated wastewater needs to be ensured



6.7 Objective 7 - Developing Ecofriendly Riverfront Projects

The riverfront is an interface between river and land. It has multiple socio-economic benefits. Key to this objective is ensuring access to the river edge. Riverfronts are also a potential avenue of revenue generation for formal and informal vendors as well as the Nagar Nigam.

Ganga has almost 105 km and Yamuna has 48 km of their total lengths passing through the city (i.e. PDA limits, including both edges). But the interaction of the city with its rivers is limited to certain stretches. Prayagraj, in inspite of having two huge rivers, has not been able to capitalise their potentials.

There are many ghats along both the Ganga and Yamuna, but most of these ghats are being developed recently, and these only have some steps. Some of the ghats are not even constructed. These are mostly used for rituals and in some cases for boating. Footfall as well as economic activity at most of these ghats are limited. In recent times, 17 ghats are being developed jointly by the Irrigation and Tourism departments. The majority of the ghats are being developed on the Yamuna (possibly due to the course of the Yamuna being relatively stable), and there are few ghats on the Ganga.



Picture 99: Saraswati Ghat (top left and right), Source: Google Photos (Uday and Shantam Ojha)
Ecofriendly riverbank and floating ghat near boat club (bottom left and right), Source: NIUA





Ecofriendly riverfront score can be assessed in two ways- one is by assessing built to open ratio along the total river frontage and the other by assessment of few ghats (based on certain parameters- this is the preferred method).

Table 26: Ecofriendly riverfront score for rivers Ganga and Yamuna (as per built to open edge ratio)

Total length of river Ganga	105 km
Total length of ghats, embankments, bund roads (built-edges)	22 km
Ecofriendly riverfront (natural riverbank) score for Ganga	79%
Total length of river Yamuna	48 km
Total length of ghats, embankments, bund roads (built-edges)	4 km
Ecofriendly riverfront score for Ganga	92%

Table 27: Ecofriendly riverfront score for rivers Ganga and Yamuna (as per assessment of riverfronts/ghats)

Sl. No.	Desirable Features	Max Points	Ganga			Yamuna		
			Arail Ghat	Qila Ghat	Dashas wamedh Ghat	Sarswati Ghat	Boat Club	Kali Ghat
1	The riverfront project is a source of revenue for the ULB	15	8	6	6	6	12	5
2	The riverfront project supports commercial activities like shops, stalls, etc.	15	8	6	7	7	12	5
3	The riverfront project has a footfall of more than 100 people/day	10	10	10	10	10	10	8
4	The riverfront project is listed as an attraction spot on travel related websites	15	8	7	7	7	8	8
5	The riverfront project has good waste management facilities	15	10	12	8	10	8	8
6	The riverfront project is made up of predominantly natural materials	10	5	5	4	4	5	4
7	The riverfront project has soft landscaping elements	10	4	4	6	6	5	4
8	The riverfront project does not block the natural path of the river	10	10	10	10	10	10	10
Total Score		100	62	59	58	60	70	52
Ecofriendly Riverfront Score			4	3	3	4	4	3
Average Ecofriendly Riverfront Score			3.3			3.7		





6.8.1 SWOT Analysis



STRENGTH

- Large frontage to both rivers.
- Availability of sufficient funding from various sources.
- Prayagraj has quite high tourism potential due to Sangam of Ganga and Yamuna rivers as well as its close proximity to major tourist destinations like Ayodhya, Varanasi, Lucknow etc.



WEAKNESS

- Meandering nature of river Ganga.
- Absence of eco-friendly materials and high built-to-open ratio. Most of the riverfronts are being developed in the form of concrete ghats.
- Many of these ghats do not experience enough footfall due to a lack of amenities such as toilets, seating spaces, changing rooms, proper lights, etc.
- Regular cleaning and proper maintenance of these ghats is a challenge for the city authorities.
- Heavy silt is deposited on the ghats during high floods (especially on those along the river Ganga), which increases the cost of maintenance.
- Absence of proper branding and promotional activities



OPPORTUNITY

- If properly developed, these riverfronts may attract economic activities and may be potential sources of revenue
- Accompanying activities such as light and sound shows, etc., on different themes may be incorporated.
- School students may be engaged in ghat cleaning activities.
- Possibility of organising Yoga camps, competitions on riverfronts may be explored.
- CSR funding avenues may be explored.
- Lack of incorporation of inclusive design principles (such as ramps, handrails, etc.)



THREAT

- Damage during high floods
- At present, some of the ghats are not safe



6.8 Objective 8 - Leveraging the Economic Potential of the River

Cities must begin to realize that a river has tremendous economic value through the ecosystem services it provides and the livelihoods it can support. Already, cities across the globe have boosted their economies through river-centric activities. Rivers can help cities progress up the economic ladder, which every city aspires to.

Needless to say, the scale and extent of such activities must account for the carrying capacity of the river.

Though fishing from the river is not officially permitted within the city limits, it is practised on a tiny scale. Currently, both the rivers Ganga and Yamuna are used for boating, religious and cultural tourism (formal and informal commercial activities related to these also happen in some areas, particularly along the Ganga at the Sangam area and at a few ghats like Kila Ghat, Kali Ghat, Arail Ghat, etc.). Additionally, the Boat Club and Tourism department operate two floating restaurants, kayaking activities (for members registered with the Boat Club), and an alser show, among other services. The boat club and tourism department also operate cruise services to the Sujawandev temple. But, economic uses of river Yamuna was observed to be more than Ganga



Picture 100: Tents being constructed for Mahakumbh 2025





6.9.1 SWOT Analysis



STRENGTH

- Presence of proper institutional mechanisms (under the boat club of PDA and the Tourism department) as well as infrastructure (availability of jetty, cruises, speedboats, etc.).
- The availability of the required depth in case of the river of Yamuna supports the operation of cruises.
- Tourist footfall in Prayagraj is quite high due to Sangam, Kumbh mela, etc and its proximity to Varanasi, Lucknow, Ayodhya, Chunar etc.
- Availability of adequate funding



WEAKNESS

- Peak season for tourism activities is limited from October to March. Activities are stopped during monsoon/high flood.
- Lack of proper branding strategies.
- Lack of adequate tourism infrastructure (e.g. hotels, hop-on-hop off buses, properly developed ghats, etc.)



OPPORTUNITY

- Prayagraj is already part of the Ramayan tourist circuit (planned by Uttar Pradesh Tourism Department and IRCTC also runs special tourism runs for this)
- There are many places of religious and cultural importance in Prayagraj (such as Akbar Fort and Bade Hanuman Ji Temple & Akshay Vat, Mankameshwar Mahadev Temple, Samudra Koop, All Saint's Cathedral, Khusro Bagh, Allahad Museum etc.)
- There are many tourism destinations in close proximity to Prayagraj (e.g. Shringverpur, Lavayan kala Island, Garhwa Fort, buddhist tourism site Kaushambi etc.)



THREAT

-

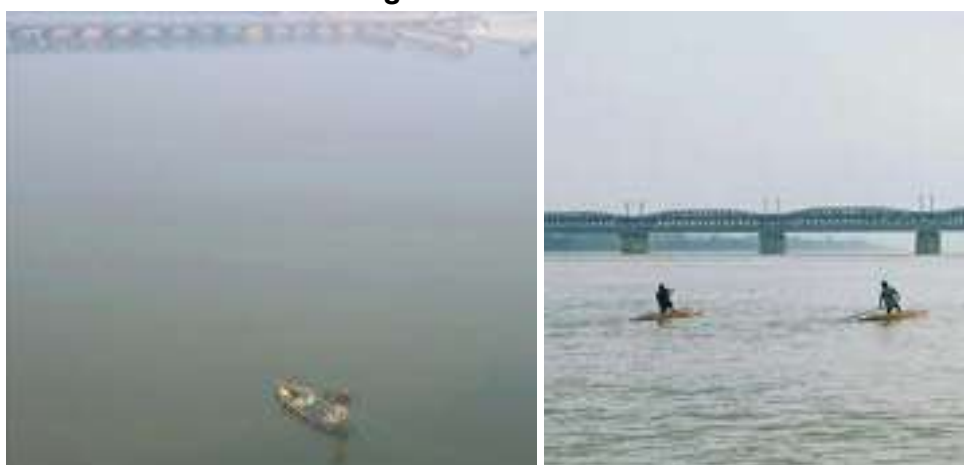




Table 26: River economy score for Ganga and Yamuna

S.no.	Economic Activities Indicators	Remarks
1	The river is used for navigation (inland or inter-city) or cruises	Yes, - Currently, speedboats and mini cruises are operated from Boat club to Sujawan Dev Temple on river Yamuna - Boating on the Ganga and Yamuna rivers—especially along the stretch up to the Sangam—is a popular tourist activity Not Yet, - A proposal for running a cruise from Varanasi to Prayagraj on river Ganga is being discussed with the Inland Waterways Authority of India (IWAI).
2	The river is used for water sport activities	Yes, - Kayaking for professionals only - Boating (manual and speedboats) - Day-Cruise - Holds a potential for scaling up.
3	The river supports livelihoods of fisher folk	Yes, Informal fishing activities, but no official data available.
4	The river support livelihoods of farmer	Yes, Farming is practiced at a few stretches along the riverbanks as well as on floodplains.
5	The river supports religious and/or cultural tourism	Yes, - Sangam Nose - Magh Mela - Religious Circuit - Heritage Walks - Kumbh Mela is a large gathering that supports numerous vendors selling products related to religious activities, food stalls, etc. Also, formal and informal commercial activities are happening on various ghats (e.g. Arail Ghat, Kila ghat etc.)
6	Any other economic use that can be verified	

As both the Ganga and Yamuna rivers support more than three economic uses, the **river economy score for each river is assigned as 5.**



Picture 101: Fishing and surfing on Yamuna in Prayagraj, Source: NIUA



6.9 Objective 9 - Sensitising Citizens on River-Related

Objective 10 - Engaging Citizens in River Management

Activities: Aspects

No plan can be a success without engaging communities and beneficiaries. Awareness amongst the citizens is one of the strongest tools of sustainable development. First of all, it increases the acceptance of any project among the citizens. More importantly, it increases the possibility of sustaining the project on longer terms as well as eases the operation & maintenance of the project, probably also helping in a reduction in overall cost.

Different departments in Prayagraj are conducting citizen sensitisation activities on different urban and environmental aspects (e.g. campaigns for reducing plastic pollution, cleanup walks- swachhta yatra, etc), targeting different user groups (e.g. shokeepers, students, pilgrims-kavar yatris, etc.).

Notably, the city had taken some interesting initiatives during Kumbh Mela, like the creation of sand artworks, rangolis, etc, near the Sangam and Dasashwamedh Ghat. The city has planned to develop a dedicated website and integrate it with ICCC, but it is still in the nascent stage. Also, during the Mahakubh 2025, the Ministry of Jal Shakti, Gol, had set up a pavilion where they presented an informative exhibition focused on the Namami Gange Program. This initiative integrated technology, community engagement, and sustainability to conserve and rejuvenate the Ganga River. The pavilion highlighted the program's efforts in preserving a critical ecosystem while promoting the economic development of local communities.



Picture 102: Ghat cleaning and sensitisation of school children by Ganga Task Force and other citizen groups, Source: NMCG





Table 27: Parameters and scoring for river-related sensitisation and citizen engagement related to river management

S.no.	Desirable Feature	Citizen Sensitization Total Points	Points given	Remarks
1	Dedicated Information, Education and Communication (IEC) programme for the river-related aspects	20	16	- Public awareness campaigns (e.g., Prabhat Ferry; Har Dukan Dastak, Swachh Kavad Yatra, Plastic Free Kumbh; One Plate, One Bag) etc. are conducted with an aim to aimed at reduce the use of single-use plastics in order to protect the river ecosystem. - Wildlife Institute of India, in collaboration with NMCG and the District Ganga Committee, Prayagraj, sensitised the devotees about the importance of wetlands and their conservation at Sangam, Prayagraj on 2 nd February 2025.
2	River related sensitization is part of existing citizen awareness raising programmes	15	9	-Ganga Task Force (137 CETF Battalion of the Indian Army) regularly conduct interactive sessions with students at schools, colleges and institutes on aspects such as economic, environmental, spiritual and cultural significance of River Ganga. they organise gatherings at the ghats and on the banks of the rivers to spread public awareness. Even Ganga Praharis and Ganga Vichar Manch also conduct awareness campaigns. Ganga Task Force, in collaboration with Northern Central Railway, Prayagraj, organized a Public Awareness Campaign cum Cleanliness Drive at Sangam on 2 nd June 2025. -ICAR-CIFRI also conducts awareness programs related to river conservation and ranching.
3	Presence of a dedicated website for river-related aspects	5	3	Prayagraj Mela Authority developed an website for Mahakumbh 2025
4	Use of traditional sensitization media (e.g. hoardings, murals, competitions, radio)	10	7	Mural paintings and beautification have been done on various ghats (e.g. Saraswati Ghat, Kila Ghat, Arail Ghat etc.) as well as at many other places in Prayagraj city focusing particularly on cultural aspects and targeting at citizen sensitisation.
5	Use of social media for river-related sensitization	10	2	Some privately operated social media pages exist, but only few of them occasionally posts river related works. Their focus is not primarily dedicated towards creating environmental or river related aspects.
6	A dedicated river day for the city	10	0	Though, Ganga Utsav is celebrated at various scales across the district, there is no dedicated river day for the city
7	Earmarked budget for citizen sensitization	15	2	Centrally sponsored schemes (e.g. SBM Urban 2.0) have dedicated budgets for IEC activities, though they do not primarily focus on river-related aspects as such.
8	Sensitization of school children through special events	10	4	Message of clean Mahakumbh through human chain: More than 100 students from Lala Manmohan Das Intermediate College spread awareness about cleanliness by forming a human chain after conducting a cleanliness campaign in Sector 18 of Kumbh Mela area on 4 th March 2025. Ganga Task Force in association with Ganga Vichar Manch, Ganga Praharis, NMCG etc conducted sensitiisation campaigns for school children
Total			43	





Picture 103:

Citizen sensitization score for Prayagraj is 3 (as citizen sensitisation points are 43, i.e. between 30-49).

This is important to make a shift from ‘citizens as spectators’ to ‘citizens as actors’. This also sends out the message that river management cannot be the government’s mandate alone. Residents will need to step up and share the onus of responsibility. Most progressive societies have some or another form of this governance model. In the long run, it will help create a transformation in the mindset of people towards the ecological assets of the city. Citizen engagement in river management means direct engagement of citizens in river-related works (e.g. assessing its health may be through water quality monitoring, cleanup activities, involving citizens in river-related decision making through creation of citizen groups like Friends of the River groups, etc.). This kind of engagement of citizens in managing rivers in some capacity somehow helps them build personal connections with the river and also creates a sense of ownership. At present, in Prayagraj, the following are the modes of citizen engagement in river management-

Participation of citizens in river cleanup activities—GTF regularly conducts cleanliness drives involving citizens and school children

Presence of citizen groups for river conservation- Presence of groups such as Ganga Praharis, Ganga Mitras, Bal Ganga Mitras, etc

CSR funds invested in river-related projects- some organisations (e.g. IIFL Foundation, Hindustan Unilever Limited, SBI, CAMPA, etc.) have sponsored boats for boatmen as well as the River Police.

Figure 56: Present modes of citizen engagement in river management in Prayagraj

Citizen Engagement Score for Prayagraj is 5 (as there are at least 3 modes of citizen engagement in river management).





6.10.1 SWOT Analysis



STRENGTH

- Presence of dedicated departments like GTF, Kumbh Mela Authority, etc.
- A lot of developments have taken place due to Mahakumbh, particularly city beautification through mural arts, paintings, sand arts, etc.
- GTF has created a living lab where they have created different models (e.g. nature-based solutions for drain rejuvenation)
- Availability of adequate funding
- Ganga aarti is conducted by the city near Sangam
- Dedicated website has been developed on Kumbh Mela



WEAKNESS

- Regulating human behaviour
- Absence of many dedicated social media platforms targeting citizen awareness, particularly on environmental and river-related aspects.



OPPORTUNITY

- The city had been conducting a laser show at Kali Ghat near the boat club on the banks of the Yamuna. These kinds of events may be regularised and stories targeted at educating people about the cultural significance/spiritual connection between people and the rivers.



THREAT

- Seasonal influx in population of floating nature due to Magh Mela or Kumbh Mela
- Presence of various religious and political groups



6.11.1 URM Indexing for Prayagraj



The URM index, which summarizes the overall status of the management of rivers Ganga and Yamuna based on an assessment of 10 URMP objectives.

Table 28: URM Index for Ganga

S.no.	Objective	Score
1	Floodplain regulation	3
2	Ensuring pollution free river	3
3	Rejuvenating waterbodies and wetlands	1.5
4	Enhancing riparian Buffer	1
5	Adopting increased reuse of treated wastewater	1
6	Ensuring maximum good quality return flow from the city into the river	5
7	Developing ecofriendly riverfront projects	3.3
8	Leveraging on the economic potential of the river	5
9	Inculcating river-sensitive behaviour among citizens	3
10	Engaging citizens in river management activities	5
URM Index		3.08





The URM index, which summarizes the overall status of the management of rivers Ganga and Yamuna based on an assessment of 10 URMP objectives.

Table 28: URM Index for Yamuna

S.no.	Objective	Score
1	Floodplain regulation	3
2	Ensuring pollution free river	3
3	Rejuvenating waterbodies and wetlands	1.5
4	Enhancing riparian Buffer	1
5	Adopting increased reuse of treated wastewater	1
6	Ensuring maximum good quality return flow from the city into the river	4.5
7	Developing ecofriendly riverfront projects	3.7
8	Leveraging on the economic potential of the river	5
9	Inculcating river-sensitive behaviour among citizens	3
10	Engaging citizens in river management activities	5
URM Index		3.07



The URM Index for the Rivers Ganga and Yamuna in Prayagraj are 3.08 and 3.07 respectively, indicating a comparable and moderate level of urban river management. The near-identical scores suggest similar management efforts for both rivers, despite their differing geomorphic characteristics—Ganga being wider and more meandering, and Yamuna being relatively confined and stable.

While progress has been made in pollution abatement, riverfront development, and management of cultural and socio-economic interfaces, river governance remains largely scheme-driven with limited integration of ecological restoration, floodplain management, and river-specific planning.

The Urban River Management Plan aims to build on existing initiatives to transition towards an integrated, resilient, and adaptive urban river management framework that balances ecological and socio-economic objectives.



Community Insights



As a citizen in this city, i expect full time good quality water supply, which we get via boring. The garbage collection car comes every morning, but we still see huge dumps along naalahs. I hope you do something for uplifting the city beyond Kumbh.



Naavik Sangh hmse har chakkr ka paisa leta hai. Aakhir mein bohat kum bachta hai hmare liye. Agar sarkari kuch system ho jaye to hmare hakk mein ho, tab to thik hai.

Boatman at Sangam



Hmare yahan paani borewell se hi acha mil jaata hai. So, park mein boring k paani se hi udyaan karm kr lete hain. Seenchaayi achi ho jaati hai.

Gardener in Local Park



DTDC approves our license for running boat-club, every year.

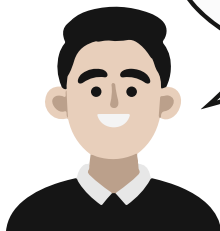
DTDC approves our license for running boat-club, every year.

Tourism Boat Club Owner



Our officers cleaned the Mcpherson lake without any machinery. Now, we need city to inverene and help us maintain it.

Lt. Col. Cantonment



Saraswati Ghat banne se ab bohat se shradhaalu evam parivar riverfront ka laaabh utha paa re hain.

Councillor



We have 7 motor boats and 17 paddle boats. Kayaking is permitted only to sportsmen on membership basis @300 rs. per month. Boat club by PDA runs on salary basis. Booking for parties is @ Rs. 2.05 lakh per booking.



500 phool vale hain. Din ka average 1000 phool bik jaata hai sabka. Zyadatar log mandir mein chadaane k liye le jaate hain. Shaadi biyaah ka special order pehle book krna padta hai. Har roz 5am supply ka gaadi aata hai Mirzapur se.

Flower Vendor at Arail ghat



Integrating the small parcels from Bakshi Baandh upto Boat Club would be the best for citizens using vehicles, wanting to walk along the riverfront. It will bring river to the foreground

Young Professional in the City





URMP

Interventions



This chapter consolidates all the strategic interventions proposed under the Urban River Management Plan (URMP) for Prayagraj, aimed at fostering a resilient urban–river interface. Each intervention is designed to address identified gaps, enhance river health, and strengthen the city’s adaptive capacity to environmental and socio-economic challenges. The proposed projects emphasize convergence between urban development and river conservation efforts.

List of Interventions



Objective	Intervention	Agency to be made Responsible	Timeline (Short- 6 to 9 months Medium- 9 to 18 months Long term- more than 18)
1- Regulation of activities in the floodplain	Scientific delineation of floodplain based on different return periods (e.g. 25, 50 or 100 years)	PDA Irrigation & Flood Control Dept	Medium Term
	Construction of bund roads/embankments for flood protection		Long Term
	Mapping of major drains, wetlands, and water bodies in the Master Plan	PDA, Prayagraj Nagar Nigam, Uttar Pradesh State Remote Sensing Centre	Short term
	Proposing only low density developments in flood prone areas adjacent to rivers Ganga and Yamuna	PDA	
	Providing no-development zones/buffer areas along waterbodies (depending on size/area of waterbody) and drains (primary/secondary/tertiary) in the Master Plan (based in line with the recommendations of some of the progressive Master Plans (e.g. Bareilly, Hyderabad, Bangalore, Kanpur, etc.). The buffer distance may be based on area of waterbodies and order drains (primary, secondary, tertiary) and may be contextualized		





2- Keeping rivers free from pollution	Treatment of untapped drains through nature based solutions (RENEU technology- Restoration of nalla with ecological units for smaller drains having discharge upto 1 MLD (e.g. Mahewa drain, Shankarghat colony drain, Sadiapur drain, Ghaghar drain, Baswar drain etc. and may be constructed wetland systems/TADOX technology (if discharge also carries industrial pollution) for medium drains having discharge upto 10 MLD (e.g. Kashipur drain, Gokula drain, Jai Gurudev Ashram drain, Dariyabad Jogighat drain etc.).	UP Jal Nigam and Ganga Pollution Control Unit, Prayagraj Nagar Nigam	Long Term
	FSSM for uncovered areas- a) Creating an OSS database (HHs having septic tanks, soak pits) of the uncovered households through household survey. b) Procurement of de-sludgers c) Geotagging of de-sludgers with GPS	Prayagraj Nagar Nigam	Short Term
	Integrating river water quality information into the Smart City Command and Control Centre ICC	UP State Pollution Control Board, Smart City Cell of Prayagraj Nagar Nigam	
	Developing Waste ATMs/ Community Green Stations/community garbage stations for solid waste management	Prayagraj Nagar Nigam	
	Installations to prevent solid waste dumping along rivers.		



List of Interventions



3- Rejuvenating waterbodies and wetlands	Creating an updated GIS-based database of all waterbodies and wetlands in line with the UWD toolkit developed by NIUA. This database may contain attributes such as name, location, ward no., area- upto 1 acre and above 1 acre, ownership, surrounding landuse, predominant use, average of depth, water sources, water quality parameters (pH, DO, BOD, Faecal coliform etc.) etc.	Prayagraj Nagar Nigam/PDA	Short Term
	Rejuvenation of waterbodies and wetlands- 1) Jhusi pond 2) Badhanpur Wetland 3) Shantipuram Wetland 4) Bhita vala Talav 5) Balapur Pond Involving activities like preliminary investigation (boundary demarcation, catchment area delineation, existing biodiversity assessment), site preparation (bund protection, identification of inflow channel and putting silt traps); desilting, de-weeding and dewatering; water quality improvement through filter beds around the periphery, aeration, floating wetlands/DEWATS (if pollution load is high), fencing and riparian plantation around the waterbody.		Short Term



List of Interventions



4- Enhancing riparian buffer along riverbanks	Developing riparian buffers along the rivers Ganga and Yamuna (of 30m width) and along Sasur Khaderi nalla (of 9m width) with local species. Site selection for riparian plantation may be done with an aim to minimizing pollution (areas adjacent to outfalls of drains), maintaining continuity, preventing encroachment and erosion. Following stretches may be prioritized- a) Chhatnaag Ghat to Guru Maharak Kuti Ganga Ghat and beyond till the boundary of PDA on the Waster bank of river Ganga b) Stretch at downstream of United College of Engineering till the boundary of PDA on the West Bank c) Streches on both side of the outfall of Sasur Khaderi nalla along the North Bank of river Yamuna d) Stretches on both sides of DFCCIL railway bridge along South bank of river Yamuna e) Stretch from new Naini bridge to Yamuna ghat on the North bank of Yamuna.	Forest Department, Horticulture department of PDA	Long Term
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List of Interventions



5- Adopting increased reuse of treated wastewater	a) Industrial Reuse: Utilizing 30 MLD from Naini-2 STP and the remaining 50 MLD from Naini-1 STP for thermal power plant operations. b) Vehicle Washing: Establishing a formal agreement (MoU) with bus depots to supply reclaimed wastewater for cleaning 260 buses across four depots, with an estimated requirement of 1 MLD per day. c) Agricultural Irrigation: Repurposing 50 MLD of treated effluent from Numayadahi STP to support agricultural activities. d) Horticulture: Supplying treated wastewater to parks within 3km radius of STPs.	Prayagraj Nagar Nigam, UP Jal Nigam, UPSRTC, Horticulture department of PDA	Short Term
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List of Interventions



6- Maximizing Good quality return flow	Installing boom barriers on major drains (e.g. Sasur Khaderi nalla, Morigate drain, Baswar drain, Rajapur drain etc.) for managing solid waste and regular cleaning of drains	Prayagraj Nagar Nigam	Short Term
	Constructing groundwater recharge structures in large parks and open spaces.	UP State Groundwater Department	Long Term
	Strict adherence to the provision of mandatory construction of rainwater harvesting structures in group housing schemes and all other buildings of area above 300 sqm (in line with the UP State Building Bye-laws).	PDA	Short Term



List of Interventions



7-Developin g Eco- friendly riverfront s	Developing ecofriendly riverfronts at- a) Nageshwar Ghat b) Gyan Ganga Ghat c) Chhatnag Ghat (also an electric crematorium may be developed near Chhatnag ghat) d) Riverfront park including riparian plantation in area between Jhusi Ashram and Maharshi Sadafaldeo Ashram (detailed feasibility needs to be checked). e) Regional riverfront park/biodiversity park (incorporating WSUD elements such as bioswales, rain gardens etc.) in Virampur area (nearby the outfall point of Sasur Khaderi Nalla). This area has already been demarcated as regional park in the Master Plan 2031 (detailed feasibility needs to be checked). This area also gets frequently inundated by Yamuna as well Sasur Khaderi nalla. Biodiversity park with wsud elements will incarese the water retention capacity of the area and will act as a flood proofing mechanism. f) Ramchaura Ghat & Sandhya Ghat Shringverpur	PDA, Tourism Department	Long
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List of Interventions



8- Leveragin g on economic potential of the river	Ecotourism- (a) Developing Lavayan Kala Island as 'Ganga Dweep'- an ecotourism site (with dolphin viewing points, eateries and boating jetties, yoga & meditation centre etc.). As per reports, Tourism department has already received few proposals regrading this. Investor Tanmay Kishore Agarwal has already made a proposal to invest Rs 75 Cr for this project during the Uttar Pradesh Global Investors Summit 2023. (b) Developing boating circuits from Lavayan Kala Island to Shringverpur Dham (combining ecotourism and cultural tourism potential of Prayagraj). This may also be integrated with the Ganga Dolphin Jalaj Sa Ganga Dolphin Jalaj Safari	PDA, Tourism Department, Irrigation Department	Long Term
	Continuing light and sound show at Kali Ghat near boat club throughout the year.	Tourism Department	Short Term
	Conducting adventure sports activities (speed boat, kayaking, day & night cruise etc.) on river Yamuna.		Short Term
	Creating a single window system under the Tourism department for managing boating as well as eco-cultural tourism activities. This single window system may help managing ticketing system for boating activities, collaborating with tourism agencies and online platforms such as Make My Trip, Golbibo etc. for creating customized tourist packages (e.g. a day tour package involving local transfers, sightseeing, boating etc.)		Short Term



List of Interventions



8- Leveraging on economic potential of the river	MV Ganga Vilas cruise service from Dibrugarh to Varanasi (via Kolkata) may be extended till Prayagraj. Detailed techno-economic feasibility (particularly regarding the availability of required depth in river Ganga) of this needs to be checked. Tourism department has already been discussing with the Inland Waterways Authority of India (IWAI) regarding this.	Tourism Department	Long Term
	Ghat pe Haat- Developing formalized vending zones/river markets nearby ghats especially Saraswati Ghat, Arail Ghat and Chhatnag Ghat and Mahewa Ghat. Specific stalls may also be established under Jalal initiative of NMCG, where ecofriendly products may be sold.	DUDA, Prayagraj Nagar Nigam, PDA	Long Term



List of Interventions



9- Inculcating river sensitive behavior among citizens	Developing a <i>Jal Shakti Kendra cum Ganga Knowledge Centre</i> (nearby Sangam and Fort area or Aaril Ghat) (similar to the one developed at Atal Ghat in Haridwar)	NMCG, SMCG	Short Term
	Celebrating Ganga Utsav annually		
	Conducting regular sensitization programmes for different target groups (e.g. school children, college students etc.) at least once every month. On these occasion, different activities may be conducted keeping river as a central theme (e.g. painting competition, yoga sessions, nukkad natak etc.).	SMCG, Prayagraj Nagar Nigam	
	Conducting River Walks		
	Arranging cultural programmes (e.g. live music, standup comedy, drama etc.) (at Kali Ghat near Boat Club after the light and sound show or Kila Ghat Sangam after the Ganga aarti)		
	Placing Hoardings and digital displays for displaying various rive related facts and information (e.g. cultural significance, biodiversity, river water quality) at specific locations (may be at some ghats).		
10- Engaging Citizens in river managemen t activities	Conducting regular clean up drives along river banks and ghats		
	Engaging school and college students in river water quality monitoring		



7.2 Intervention 1 - Integrating

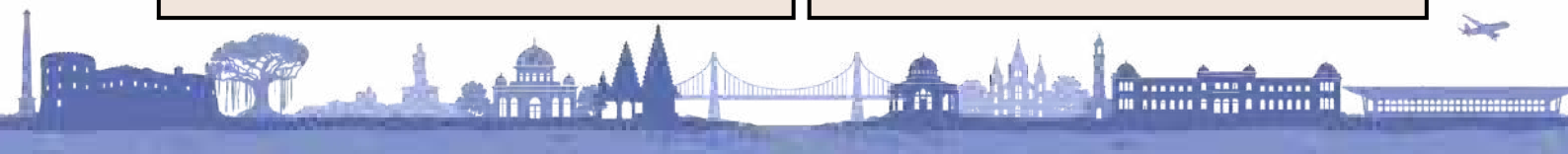
River Sensitive Provisions into Statutory Plans



Objective 1 recommends strengthening of planning regulations and provisions in masterplan, which has direct impact on the conservation and management of rivers, drains and waterbodies. Prayagraj has recently notified the masterplan 2031.

Since Prayagraj's Master Plan 2031 has already been notified recently, and the City Development Plan (CDP) 2023 is in place, the suggestions are mentioned as actions for enforcement, immediate application, and future amendments rather than pre-notification inclusions.

Provisions in Masterplan 2031	Recommendations for the Revised Masterplan and City Development Plan
Demarcation of high flood Level (HFL) and subsequent demarcation of floodplain in compliance with the River Ganga Rejuvenation order of 2016. Masterplan proposed 200m green buffer along the river to protect it from pollution and illegal construction. However, Allahabad high court order of 2011 prohibits construction within 500m from HFL of the Ganga.	Statutory Demarcation and Zoning: Mandate immediate ground-level demarcation of all natural drains, rivers, and waterbodies, including their original floodplains and flow paths, as "No-Development Zones (NDZ)" within the Master Plan's zoning regulations. This buffer varies for river, waterbodies and drains and is crucial for preventing further encroachment and securing hydrological connectivity.
Protect and demarcate all natural water channels and waterbodies.	Strict Buffer Enforcement: Ensure the mandatory buffer regulations (e.g. River Regulation Zone/Blue-Green Network as incorporated) are strictly and uniformly enforced by the Town Planning Department across all new and ongoing construction projects. Any variance or relaxation must be prohibited. The buffer distance may be based on area of waterbodies and order drains (primary, secondary, tertiary) and may be contextualised based on local conditions.
Tapping of all 81 drains joining Ganga and Yamuna river.	Rejuvenation of all direct and indirect drains falling in to the river ecosystem.



7.2 Intervention 1 - Integrating

River Sensitive Provisions into Statutory Plans



Provisions in Masterplan 2031	Recommendations for the Revised Masterplan and/or City Development Plan
Promote green infrastructure and water sensitive urban design.	Mandatory Water Sensitive Urban Design (WSUD): Introduce a Master Plan clause or appendix requiring all new development projects (of a specified minimum plot size) to incorporate Water Sensitive Urban Design (WSUD) principles, including mandatory provisions for rainwater harvesting, retention ponds, bio-swales, and permeable paving to minimize surface runoff and recharge groundwater.
Separate stormwater from the sewage system.	Policy for Drainage Segregation: Establish a time-bound policy objective within the Master Plan and CDP to progressively and systematically segregate the sewage network from the stormwater drainage network. Prioritize the immediate separation of outfalls near waterbodies to eliminate direct discharge of untreated sewage.
Include an inventory of waterbodies.	Digital Asset Register: Direct the Town Planning Department to create and maintain a geo-tagged, public Digital Inventory of all Water Assets (rivers, drains, and waterbodies) as a permanent annexure to the Master Plan. This register must track their current status, extent of encroachment, and mandated buffer zones.

By reframing the suggestions this way, the focus shifts from inclusion (which is complete) to implementation and legal enforceability within the existing statutory documents.

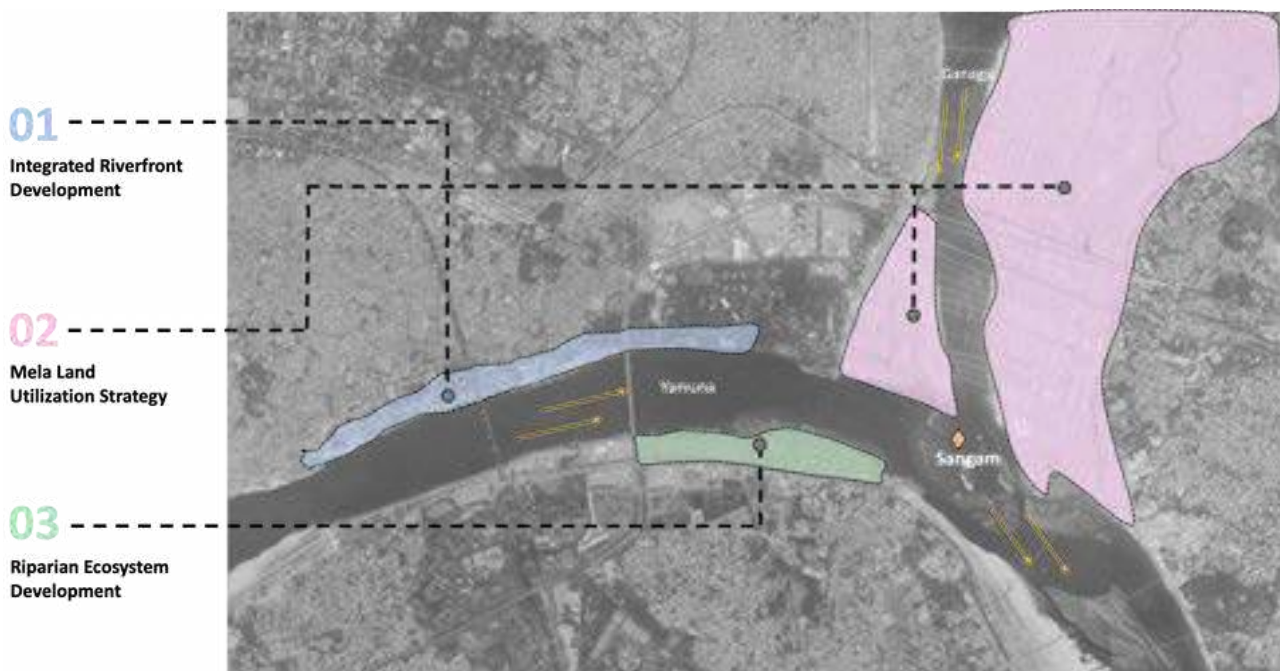


7.2 Intervention 2 - Developing Holistic Riverfront for the City



The city of Prayagraj, blessed by the confluence of the Ganga, Yamuna, and the mythical Saraswati at the sacred Triveni Sangam, possesses a profound spiritual, cultural, and ecological identity inextricably linked to its rivers. Past development efforts, while focused on beautification and tourism (especially for events like the Maha Kumbh), have often treated the riverfront in isolation, leading to ecological strain, vulnerability to flooding, and a disconnect between the city and its perennial lifelines.

This Holistic Riverfront Development Proposal moves beyond mere construction and cosmetic upgradation to an integrated and river-sensitive approach. It is the essential next step to ensure the long-term ecological health of the rivers, while leveraging their spiritual and cultural value for sustainable urban growth, as envisioned by the Master Plan 2031 and the Integrated Infrastructure Plan 2071.



The proposal provides the necessary framework to treat the river not just as an asset to be seen, but as a living ecosystem to be protected. The rationale centers on mandating 100% interception and diversion of sewage and untreated waste currently entering the river and its tributaries. Core aim is to restore and conserve the natural floodplains as Blue-Green infrastructure, allowing the rivers to breathe, recharge groundwater, and naturally manage high-flow events.

While ensuring environmental protection, the proposal will strategically develop ecological parks, cultural ghats, and non-motorized transport (NMT) corridors along the river edge. This will transform currently degraded or inaccessible stretches into year-round public spaces that facilitate the spiritual, recreational, and cultural reconnection of citizens with the Ganga and Yamuna.



7.2 Intervention 2 - Developing Holistic Riverfront for the City



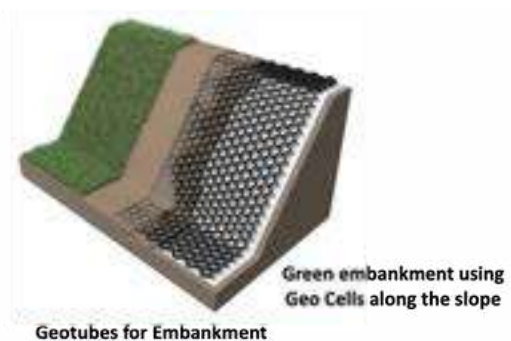
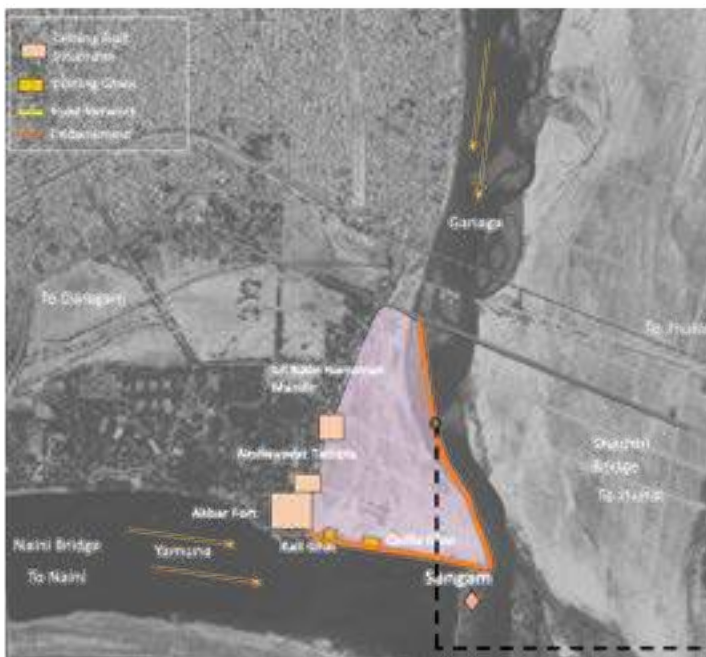
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Objectives

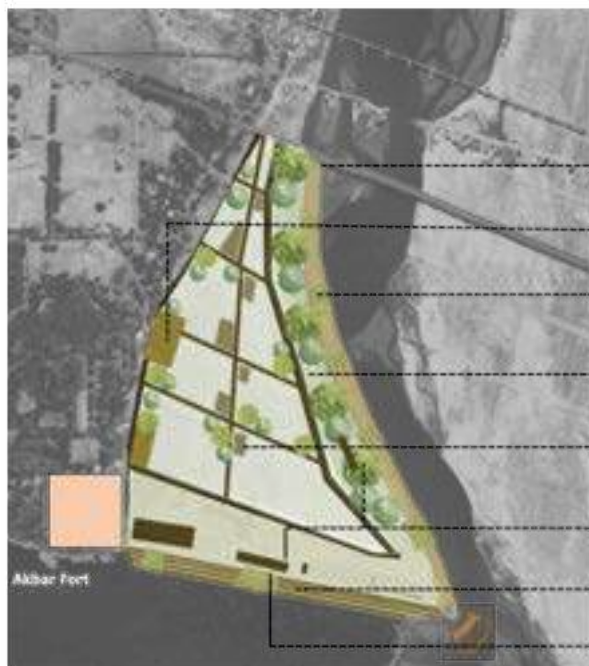
Green Ghat at Sangam Nose



Geotubes for Embankment



7.2 Intervention 2 - Developing Holistic Riverfront for the City



- Embankment
- Jal Shakti Kendra
Ganga Knowledge
Centre
- Stepped access
to the river
- Pathways
- Kumbh Museum
- Changing stations
- Floating Deck for
Ganga Arti
- Existing Ghats



The proposed intervention enhances tourism and cultural engagement at the Sangam through floating decks designed for the Sangam Aarti. These modular, buoyant platforms adapt to both high and low water levels, ensuring year-round functionality and safety. Boat-based viewing areas are also planned to offer visitors a unique riverine experience. To mitigate siltation and promote ecological balance, green ghats are introduced along the river edge, serving as natural buffers and landscaped public spaces. The project combines sustainability, cultural vibrancy, and tourism promotion, setting a model for resilient riverfront development.



7.2 Intervention 3 - Rejuvenating the Major Drains of the City

Rejuvenating the drains in the city is a holistic proposal that needs to be carried for all small and big drains, including the lost tributaries within the city boundary. For kickstarting the initiative, this study has proposed the rejuvenation of Sasur Khaderi Drain and Kallipuram drain as the two pilots that can be replicated to all other drains. The proposal includes cleaning of legacy waste, interjection of treated used water from nearby STP and developing the adjacent available lands as the sponge areas to hold water during monsoon season. This will not only create public spaces in the dense parts of the city, but also, acts as groundwater recharge zone in the water critical zones of the city.



- **Pre-Treatment Zone:**
Solid waste trap to be placed at the entry of drain
- **Treatment Zone:**
Option 1: Adosing chamber is placed @100m downstream of trap (for in-situ treatment).
Option 2: Geobag is placed parallel to drain @100m downstream of trap (for ex-situ treatment).
- **Settlement Zone:**
4 Weirs @100m distance each to slow down the flow and act as settlement zone for organic waste treatment.
- **Aeration Zone:**
This zone has a 2 Hp Solar aerator with fountain and floating wetlands alternating across 600m stretch.
- **Drain as Public Space**
This recreational zone has clean and treated water running, with 2 pedestrian bridges connecting the walkways/ cycle tracks running on both sides of the drain. (refer section here)
• **Sponge park** is a retention pond for holding excessive flow during monsoon. (refer images on next slide)
• **Linear Park** is the green setback along the walkways
- **Treatment and Aeration Zone**
Dosing is done to cater to additional outfalls in the drain. Aerator with fountain and floating wetland do not only maintain the DO in the water but also help in keeping the water clean without foul smell.



Pocket Parks & Green Spaces: Create small parks and green spaces at strategic locations along the drain for community gathering and recreation.



Walking Trail : use of permeable pavements, green roofs, and porous materials in areas adjacent to the drain to reduce stormwater runoff and promote groundwater recharge.



7.2 Intervention 3 - Rejuvenating the Major Drains of the City



3 Metre Wide
Bicycle Lane and
Pedestrian Walkway

Access Stairs for
Drain Maintenance

0.75 Metre tall
Toe Wall



Native Plant
Species
.....
Floating Wetland
Matrix
.....

.....
ing Spaces along the
Bicycle Lane
.....

Sloped Green Edges
Replacing Concrete
Walls
.....

.....
loating Wetlands for
Treatment in low-
water flow area
.....

Bridges for Pedestrians to Cross
the Drain

Stone weirs creating small
cascades to slow water flow
and Allow Sedimentation of
Impurities

Layered Rain Garden Planting
on both sides of the Stream
using Native Species, Replacing
Concrete Walls

.....
Natural Water Treatment using
Rounded boulders and Pebbles



Sloped, green
embankments
replacing
concrete walls
.....

The project, located in a dense neighbourhood, will include the analysis and modelling of the immediate watershed, the connected actors and land-uses. The proposed project will focus on restoring the system to health, enabling local management and use, ground water management and climate resilience.



7.4 Intervention 4 - Riverfront

Development - Yamuna

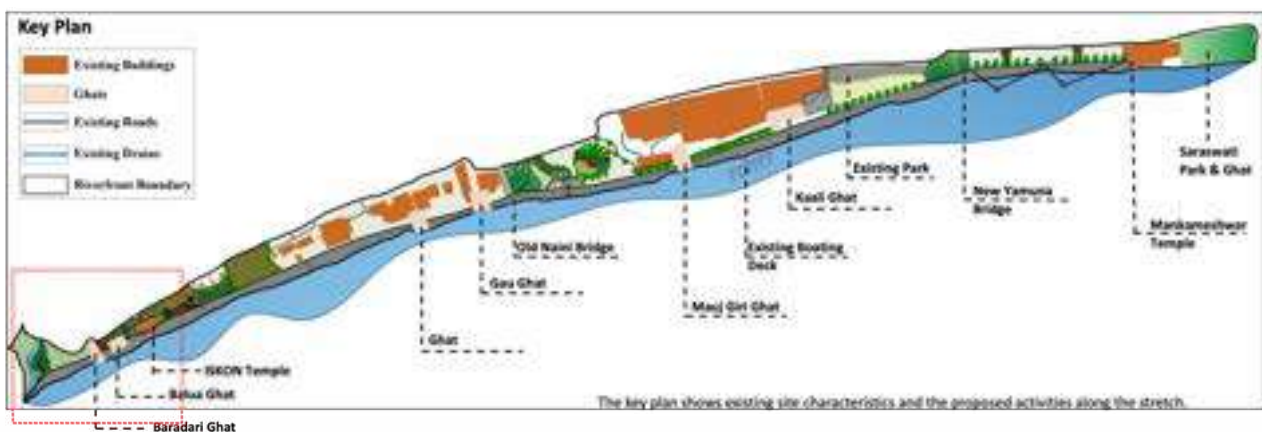
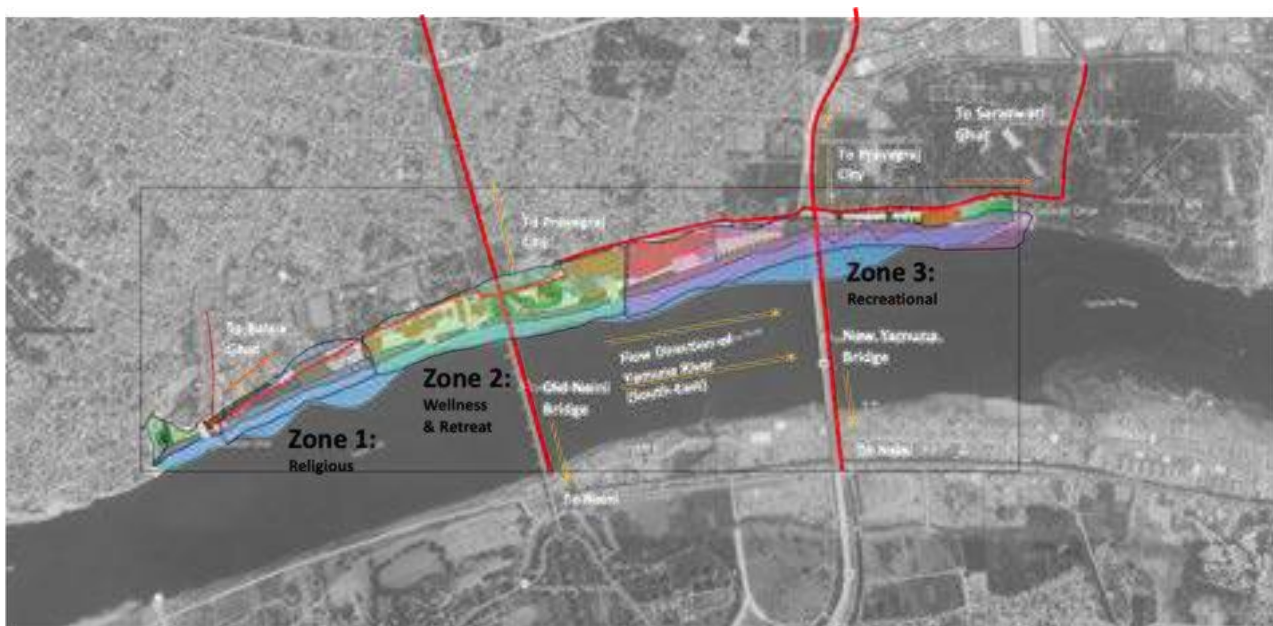
The proposed Yamuna Riverfront Development aims to create a resilient, eco-sensitive, and engaging public space along the river. It integrates riparian buffers and eco-friendly zones to restore natural habitats, prevent erosion, and improve water quality. The design also introduces tourism and community zones with promenades, event spaces, and cultural areas to encourage public interaction while preserving ecological balance. By combining ecological restoration, cultural vibrancy, and sustainable design, the project redefines the Yamuna as a living landscape that connects people with the river.



Riverfront Zone pre-monsoon



Riverfront Zone during-monsoon (Inundated Area)



The key plan shows existing site characteristics and the proposed activities along the stretch.



7.4 Intervention 4 - Riverfront Development - Yamuna



Contour Planting



Hedges



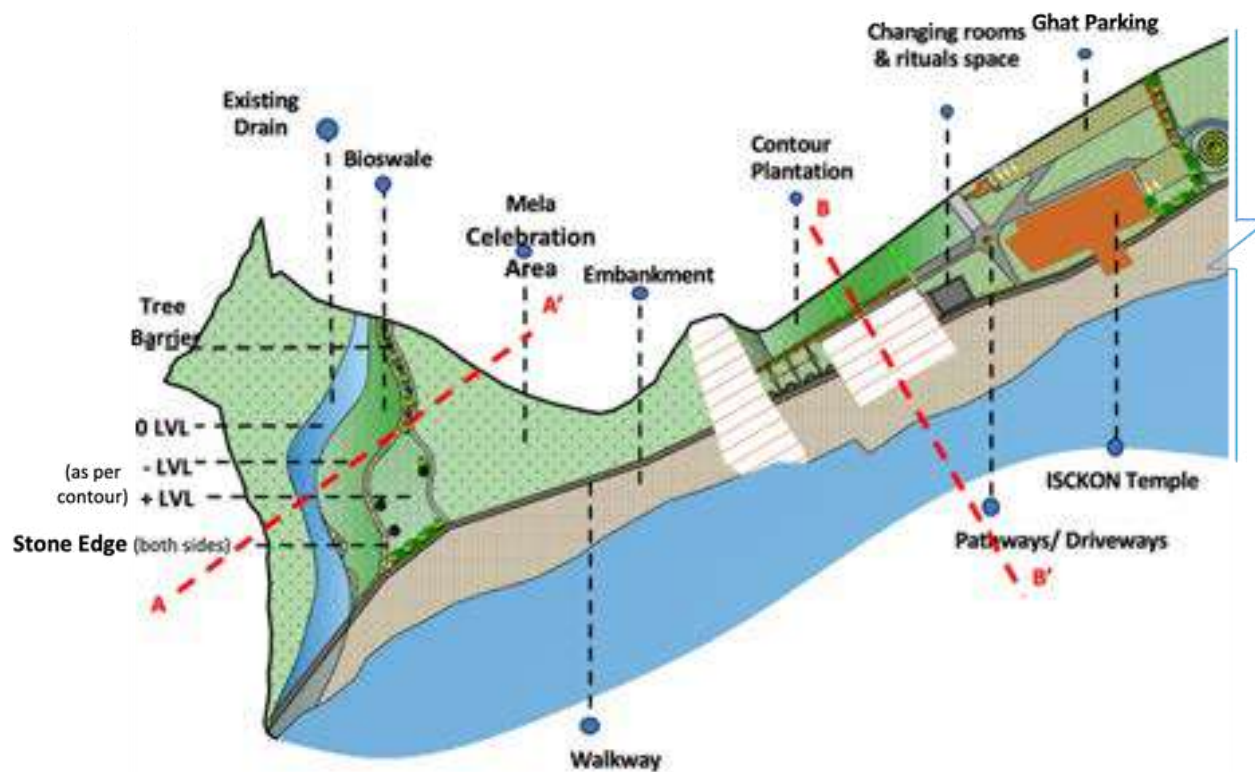
Landscape seats



Bioswale

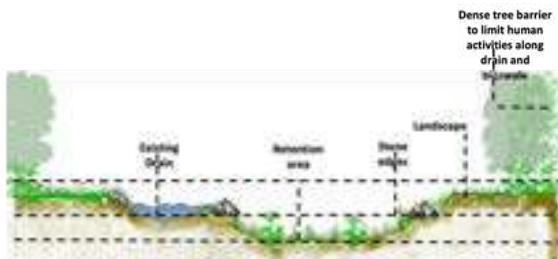


Gazebo

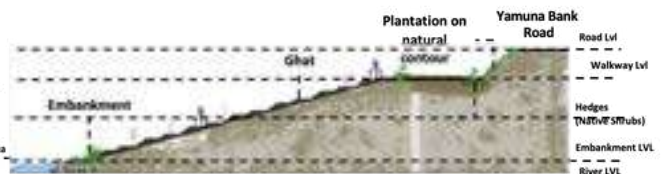


7.4 Intervention 4 - Riverfront

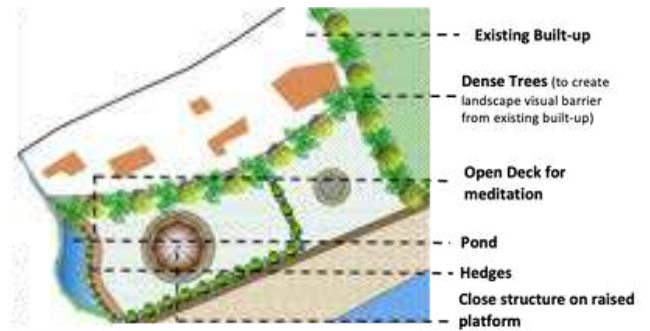
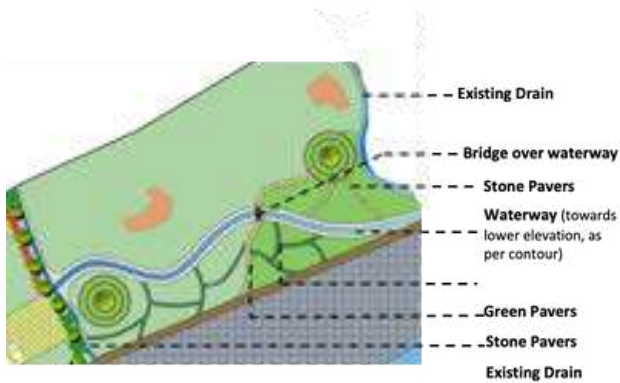
Development - Yamuna



Section AA'



Section BB'



Mounds



Pond with stone edging & grass cover



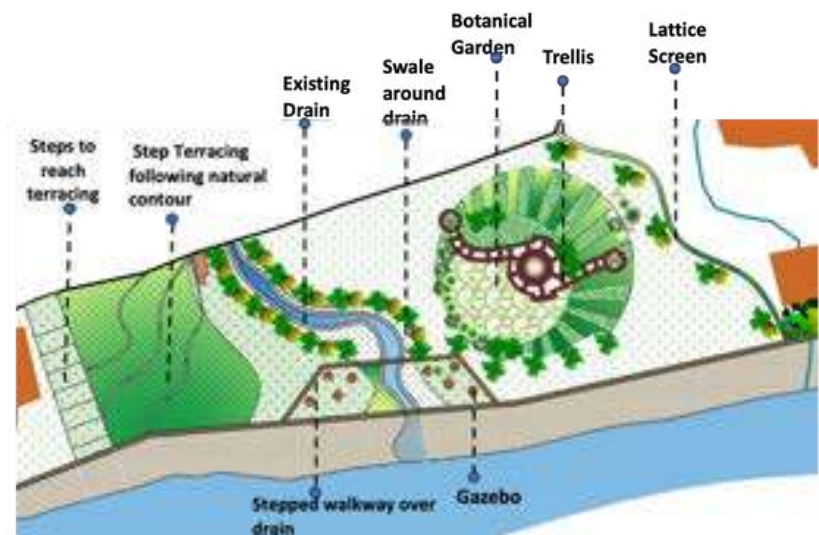
Waterway Park



Modular Tent



Bamboo Pavilions



Swale around drain



Step terracing ideas



Trellis along pathway



Steps on contour to reach terracing



Lattice screen

7.4 Intervention 4 - Riverfront Development - Yamuna



Sabarmati riverfront flea market



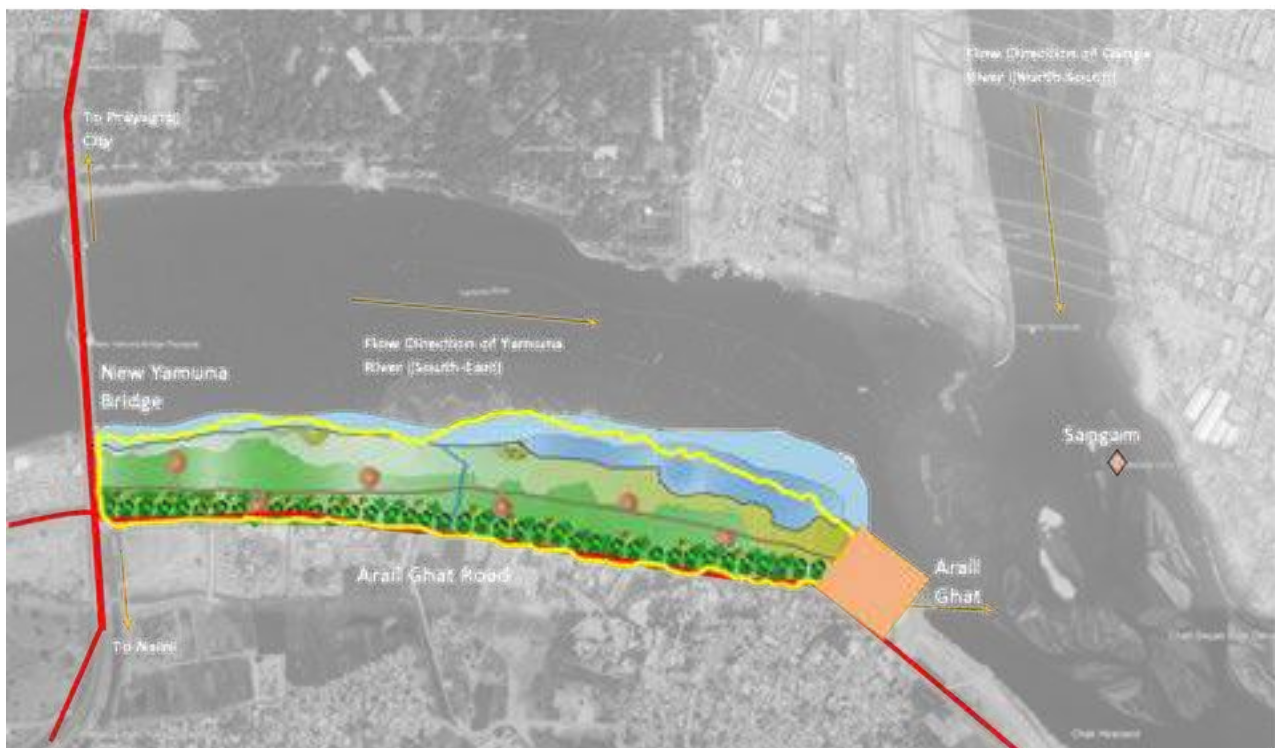
Food carts/ food trucks



Floating trail



Maze Garden



7.2 Intervention 5 - Reusing the Treated Used Water



The city level treated water reuse strategy needs to be developed. Currently, only one proposal exists on paper for reusing the treated water from Naini STP partially. However, considering the depleting groundwater in the city in dense areas, and with the fact that more than 70% of the city is dependent on groundwater for regular supply. The city needs to plan now for the treated water reuse strategy. It can be clubbed with the Shallow Aquifer Management project of MOHUA for detailed scientific studies and implementation finances.



Use	MLD	STP
Agriculture	50	Numayadahi
Bus Washing @50-100L/day/bus (2 Bus depots in vicinity of STPs)	0.02-0.03	Naini/Rajapur/Saloni
Horticulture (Irrigating Parks & Gardens)- 70-22 Ha area of parks within 3km radius around STPs	2 (@25000 l/Ha)	Saloni/Rajapur/Naini/Jhusi/Ponghat/Kodra
Railway	2 (proposal submitted) 5 l/sqm (platform washing) 25l/passenger on railway station 6000 l/rake for 22-coach rake Sanganj/Durgam/Jhusi/Rambag/Subedarganj/Phapnagar Railway Stations	Naini/Jhusi/Saloni
Construction		
Revising Waterbodies		

Potential Uses of Treated Water



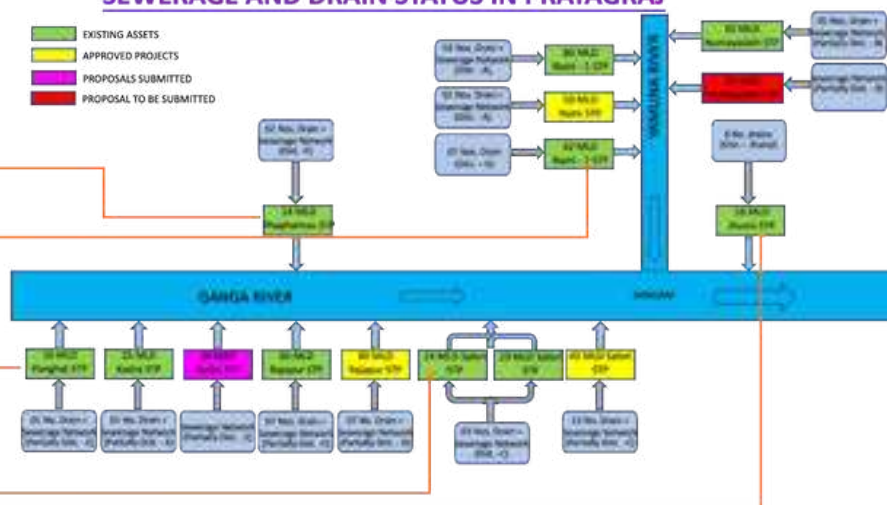
Prayagraj Bus Station



Prayagraj Railway Station

SEWERAGE AND DRAIN STATUS IN PRAYAGRAJ

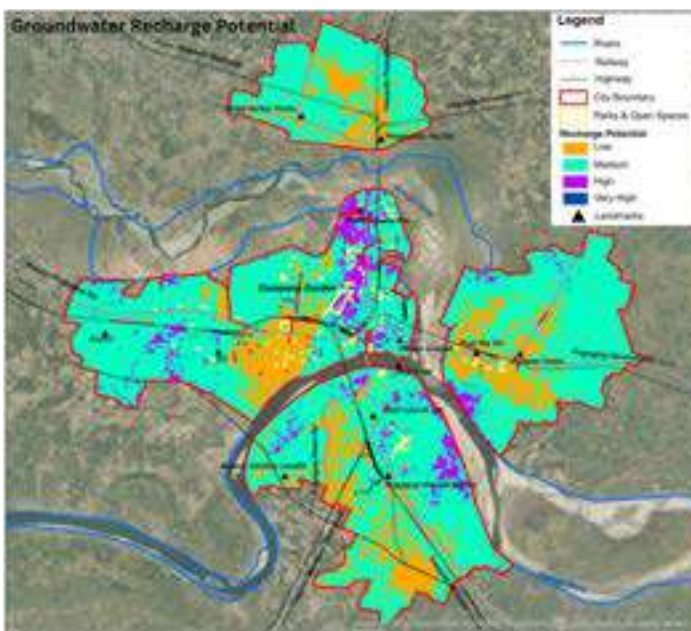
- EXISTING ASSETS
- APPROVED PROJECTS
- PROPOSALS SUBMITTED
- PROPOSAL TO BE SUBMITTED



7.2 Intervention 6 - Flood

Resilience via Recharging

Based on the assessment, four site-specific models for water-sensitive urban growth will be defined in each of the designated zones. Positive water cycles will be integrated with appropriate urban form and water governance models. The project will proactively integrate the sustainability of water sources (ground, surface, re-used water) into the urban growth model. Buildings will be supplied with multiple water qualities for different uses. Streets will incorporate urban nature-based solutions, and the management of water will be designed proactively.

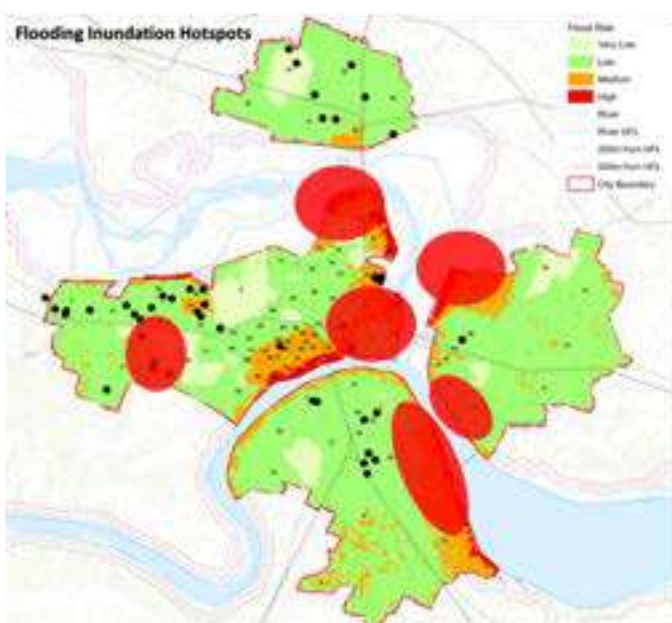


Designing water-sensitive models for urban growth in Prayagraj, Naini, Jhusi and Phaphamau

- Positive water cycles will be integrated with appropriate urban form and water governance models.
- The project will proactively integrate the sustainability of water sources (ground, surface, re-used water) into the urban growth model.
- Streets will incorporate urban nature-based solutions, and the management of water will be designed proactively. (Suggested by Deltares)

Recharge Potential Areas Identified

Chandrasekhar Azad Park
Bai Ka Bagh
Saraswati Park
Tiranga Park
Roxberg Botanical Garden



Designing water-sensitive models for urban growth in Prayagraj, Naini, Jhusi and Phaphamau

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Recharge Potential Areas Identified

Chandrasekhar Azad Park
Bai Ka Bagh
Saraswati Park
Tiranga Park
Roxberg Botanical Garden



7.2 Intervention 7 - Tourism and Capacity Building Strategy

For connecting citizens to river ALL YEAR ROUND:

- For creating awareness
- Giving information about the events and activities along the river (in River front)
- Booking Ganga Aarti, Kumbh tents, etc.
- Booking boat and cruise rides to temple circuit.
- Booking for water sports
- Booking for heritage walks
- Engaging the citizens with River festivals via various contests



Indicator Score - 3



Indicator Score – 5



BOATING & RIDERS



UP Tourism Prayagraj
PACKAGES

- Religious Spots**
1. Triveni Sangam Ghat
 2. Sri Laxmi Narayan Ghat
 3. Arail Ghat
 4. Kali Ghat
 5. Saraswati Ghat
 6. Gau Ghat
 7. Baradari Ghat
 8. Bargad Ghat
 9. Navkalyan Ghat
 10. Maheva Ghat
 11. Gyan Ganga Ghat
 12. Nageshwar Ghat
 13. Mahavir Puri Ghat
 14. Rasoolabad Ghat
 15. Dhashaswmedh Ghat
 16. Quila Ghat

- Nature Spots**
- A. Triveni Sangam
 - B. Riparian Zone
 - C. Prayagraj Fort
 - D. Saraswati Ghat and Park
 - E. Boat Club-Water Sports
 - F. Riverfront Development
 - G. Drain Rejuvenation
 - H. Riparian Zone
 - I. Wetland-Recreation
 - J. Eco-Resort
 - K. Bela Kachar Pond

- Boating Trail
● Boating Stations

