



*Celebrating 75 River Initiatives  
of the  
River Cities Alliance (RCA)*





## Title

Celebrating 75 River Initiatives of the River Cities Alliance (RCA)

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National Institute of Urban Affairs (NIUA), Ministry of Housing & Urban Affairs, GoI

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2022

## INTRODUCTION

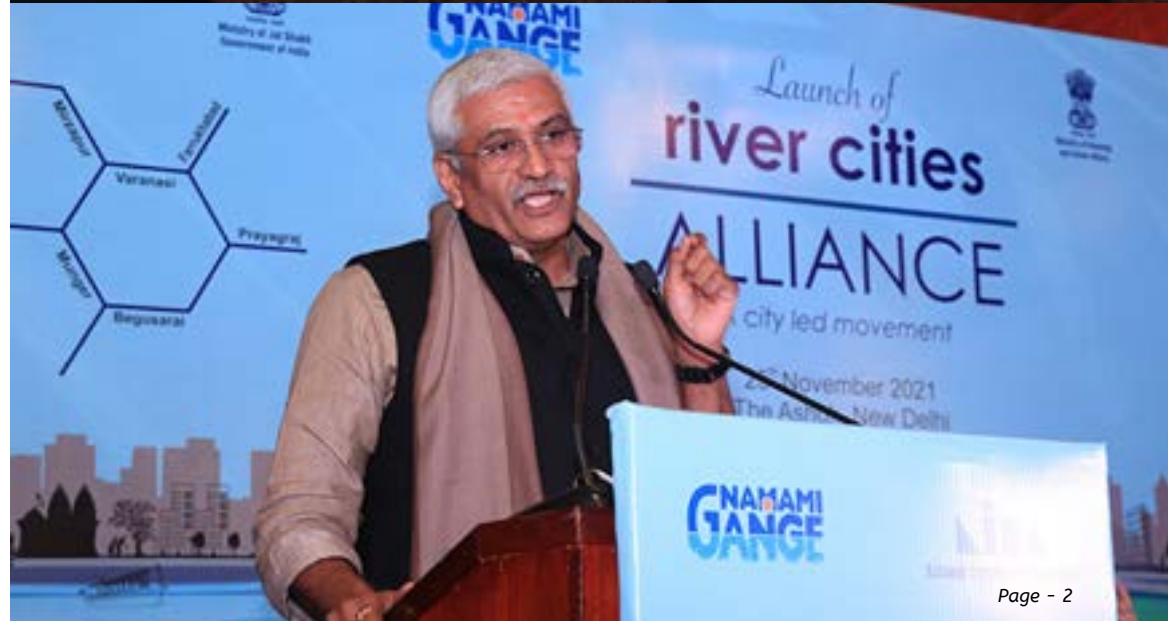
Managing urban rivers is an emerging paradigm in India. The National Mission for Clean Ganga (NMCG) and the National Institute of Urban Affairs (NIUA) along with other partners have pioneered the work in this regard and have created several enabling frameworks and guidance documents for proliferating river-sensitive development in our cities. The stage is now set for on-the-ground action. As cities start to implement the river-sensitive development agenda, there is a unique opportunity for them to learn from each other, while at the same time inspire others to take up progressive action on this front. The River Cities Alliance (RCA) has been conceptualised to serve as an avenue for precisely this purpose.

RCA has been envisaged as a city-led movement for promulgating river-sensitive planning and development. It provides an opportunity for city officials to have interactions with peers and exchange know-how on practical aspects of river urban management. Building the capacity of Alliance member cities on topics that are vital for the sustainable management of urban rivers is one of the core objectives of RCA.



The River Cities Alliance was formally launched on 25 November 2021, in the presence of Sh. Gajendra Singh Shekhawat, Hon'ble Minister for Jal Shakti; Sh. Durga Shanker Mishra, Hon'ble Secretary, Ministry of Housing and Urban Affairs; and Shri Pankaj Kumar, Secretary, Ministry of Jal Shakti, Government of India

Currently, the Alliance comprises of 30 cities across India that include Aurangabad, Ayodhya, Begusarai, Berhampore, Bhagalpur, Bhubaneswar, Bijnor, Chennai, Dehradun, Farrukhabad, Haridwar, Hooghly Chinsurah, Howrah, Hyderabad, Jangipur, Kanpur, Maheshtala, Mathura-Vrindavan, Mirzapur, Munger, Patna, Prayagraj, Pune, Rajmahal, Rishikesh, Sahibganj, Srinagar, Udaipur, Varanasi and Vijayawada. As these cities implement the river-sensitive development agenda, there is a unique opportunity to learn from their efforts.



# Synopsis of the Compendium on *Celebrating 75 River Initiatives*

The compendium presents seventy-five examples of river-related initiatives undertaken by alliance member cities. The budgets for these interventions are mostly from the ULB own funds, national missions like SBM, AMRUT, NMCG. Several interventions are funded through CSR contributions.



**Dedicated plans  
for urban rivers**



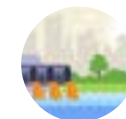
**Revival/rejuvenation  
of the main stem of  
the river**



**Riverfront  
development**



**Rejuvenating  
lakes and ponds**



**Setting up  
infrastructure for  
pollution control**



**Water budgeting**



**Reuse of treated  
wastewater**



**Bioremediation**



**Citizen engagement**



**Developing eco-parks  
and urban forests**



**Rainwater  
harvesting**



**Groundwater  
augmentation**



**Enhancing river-  
related economy**

# 75 Initiatives Contributing to Sustainable Development Goals

## SDG 15 - Life on Land

- Target 15.1
- Target 15.3
- Target 15.5
- Target 15.b
- Target 15.6

## SDG 3 - Good Health and Well Being

- Target 3.9

## SDG 13 - Climate Action

- Target 13.1

## SDG 11 - Sustainable Cities and Communities

- Target 11.4
- Target 11.6
- Target 11.7



## SDG 6 - Clean Water and Sanitation

- Target 6.2
- Target 6.3
- Target 6.4
- Target 6.5
- Target 6.a
- Target 6.b

## SDG 9 - Industry, Innovation and Infrastructure

- Target 9.4

## SDG 8 - Decent Work and Economic Growth

- Target 8.3
- Target 8.9



City officials at RCA launch



# 1. RIVER CITIES ALLIANCE

## 30 ALLIANCE CITIES

### Nature of the Intervention



*A platform for river cities to come together taking forward the river-sensitive urban development agenda*

### Location of the Intervention



30 Cities

### Implementation Agency



*National Institute of Urban Affairs and National Mission for Clean Ganga*

### Finance



NMCG

### Brief description of the Intervention

Managing urban rivers is an emerging paradigm in India. The National Mission for Clean Ganga (NMCG) and the National Institute of Urban Affairs (NIUA) along with other partners have pioneered the work in this regard and have created several enabling frameworks and guidance documents for proliferating river-sensitive development in our cities. The stage is now set for on-the-ground action.

As cities start to implement the river-sensitive development agenda, there is a unique opportunity for them to learn from each other, while at the same time inspire others to take up progressive action on this front. The River Cities Alliance (RCA) has been conceptualised to serve as an avenue with the core objective of providing member cities with a platform to discuss and exchange information on aspects that are vital for sustainable urban river management. RCA was formally launched on 25 November 2021, in the presence of Sh. Gajendra Singh Shekhawat, Hon'ble Minister for Jal Shakti; Sh. Durga Shanker Mishra, Hon'ble Secretary, Ministry of Housing and Urban Affairs; and Shri Pankaj Kumar, Secretary, Ministry of Jal Shakti. Currently, the Alliance comprises of 30 cities across India that include Aurangabad, Ayodhya, Begusarai, Berhampore, Bhagalpur, Bhubaneswar, Bijnor, Chennai, Dehradun, Farrukhabad, Haridwar, Hooghly Chinsurah, Howrah, Hyderabad, Jangipur, Kanpur, Maheshtala, Mathura-Vrindavan, Mirzapur, Munger, Patna, Prayagraj, Pune, Rajmahal, Rishikesh, Sahibganj, Srinagar, Udaipur, Varanasi, Vijayawada.

**Unique/Key feature of the Intervention**

First ever platform created for the River cities to ideate, discuss and exchange information for sustainable management of urban rivers

Target 6.5





Environment is no one's property to destroy; it's everyone's responsibility to protect.  
On This Environment Day  
Join With LM

## CLEANLINESS DRIVE AT KHAM ECO-PARK

ENVIRONMENT DAY

Location: KHAM ECO-PARK (LOKHANDIPUL)

5TH JUNE 2022, SUNDAY  
TIME: 8:15AM-9:30AM

(For any Query call on below contact)  
CONTACT: 8856858643 ; 8796586597

Citizens engaging in river cleaning activities (Source - Aurangabad Municipal Corporation)

# 2. ENGAGING CITIZENS FOR RIVER REJUVENATION

## AURANGABAD

### Nature of the Intervention



*Strengthening river-citizen connect by engaging communities in rejuvenating rivers*

### Location of the Intervention



*Along Kham River*

### Implementation Agency



*Aurangabad Municipal Corp (AMC), Aurangabad Smart Cities, Varroc Industries, Ecosattva Env Solutions, Cantonment Board*

### Finance



*AMC and CSR funds*

### Brief description of the Intervention

As part of a residents survey carried out at the start of the Kham river rejuvenation project in Aurangabad city, 40% of respondents reported not being aware of the presence of a river in their city. To improve this unsettling statistic, citizen engagement has been taken up as an important pillar of the Kham River Restoration Mission. The aim of this intervention is to increase awareness about the river, its socio-ecological as well as heritage value; and ultimately build ownership among citizens to ingrain sustainability within the current restoration efforts.

Since 2021, a number of events have been organised at the Kham Eco-park for engaging citizens. These events engage key resource people to celebrate notable days and generate awareness around various relevant topics. Saturday civic engagements have been the center-piece of this movement, calling citizens to volunteer for river-cleanup and plantation drives. Citizens and volunteer groups also plant saplings along the river banks and nalas. Other interesting activities hosted under this initiative include webinars, painting competitions and the Kham song competition. This program is truly a partnership between the residents, administration and all other stakeholders. These efforts have led to behavioural change in the resident population.

### Unique/Key feature of the Intervention

Every Saturday, key municipal officials and citizens volunteer for river rejuvenation activities.

More than 500,000 citizens have been involved in the campaign till date.





Glimpse of riverfront eco-park (Source - Aurangabad Municipal Corporation)

# 3. RIVERFRONT ECO-PARK DEVELOPMENT AURANGABAD

## Nature of the Intervention



*Creating eco-friendly and vibrant river front spaces for enhancing river-citizen connect*

## Location of the Intervention



*Along Kham River from LokhandiPul to Garam Pani*

## Implementation Agency



*Aurangabad Municipal Corporation (AMC), Varroc Industries, Ecosattva Environmental Solutions, CII, Cantonment Board, VSTF, Social Forestry - Govt of Maharashtra*

## Finance



*AMC, CSR, VSTF, Govt of Maharashtra funds*

## Brief description of the Intervention

The ambitious and visionary Kham River Restoration Project is an expression of Aurangabad city's commitment to its natural heritage and water resources.

The riverfront area is being developed with an aim to build a blue-green space to enhance the citizen connect with the river. Built along a stretch of 1.5km along river, this area is marked with grasses, butterfly and dragonfly garden, miyawaki forest, amphitheatre made from waste tyres, fresh-water pond, wetland, and is covered with around 50,000 native species of plants and trees. In addition to providing an ecological recreational space for citizens, the eco-park also reinvigorates the lost flora and fauna. Defining the river bank for eco-park also prevents any further encroachment.

So far, around 1250 m of porous pathways have been created; 6 kms of the river has been cleaned, dredged and widened; 3 kms of the river has been pitched with stones on both banks for stabilisation and 10 ecological riverfront spaces have been created. Repurposed waste material is used wherever possible across the entire park and electrification is done using re-used poles and solar lighting.

## Unique/Key feature of the Intervention

Most of the project is driven by harnessing existing municipal resources, public participation and effective partnerships, thus putting no pressure on public budgets.





Awareness creation and waste management, two pronged approach (Source - Aurangabad Municipal Corporation)

# 4. WASTE MANAGEMENT TO PREVENT RIVER POLLUTION

## AURANGABAD

### Nature of the Intervention



*Comprehensive Solid Waste Management Strategy for pollution abatement in rivers*

### Location of the Intervention



*City-wide*

### Implementation Agency



*Aurangabad Municipal Corporation (AMC), Varroc Industries, Ecosattva Environmental Solutions, Cantonment Board*

### Finance



*AMC and CSR funds*

### Brief description of the Intervention

To prevent waste from surrounding catchment areas from entering Kham river, a dedicated solid waste management initiative has been undertaken since 2021. It includes special interventions, like door to door awareness for segregation and proper disposal, and specially organised events for citizen engagement. These efforts have led to an increase in waste collection and decrease in open dumping, thus effectively reducing the solid-waste reaching into the river. The ultimate goal is to make Kham river free from solid and liquid waste.

Till date, around 17 bridges over the Kham river and adjoining nalas have been barricaded to prevent littering into the river; 6 plastic traps have been installed in nalas and drains; approx 6 kms of Kham river has been cleaned and dredged; 150 garbage vulnerable points around Kham have been removed; around 22 km of nalas have been cleaned; approx. 22 acres of area has been reclaimed after cleaning of legacy waste and invasive species; and sewage diversion work has been completed upto Panchakki area connecting 40 houses to the Bhoomigat system.

### Unique/Key feature of the Intervention

BOTRAM process has been implemented for solid waste management along Kham river and Naala wards.

- **BASELINE ASSESSMENT**
- **ON-BOARDING & ORIENTATION**
- **TRAINING & ROUTE MAPPING**
- **RESOURCE RECOVERY**
- **AWARENESS CAMPAIGN**
- **MONITORING & MAINTENANCE**





Slurry treatment plant (Source - Aurangabad Municipal Corporation)



# 5. SLURRY TREATMENT PLANT

## AURANGABAD

### Nature of the Intervention



*Nature based solutions for treatment of animal waste*

### Location of the Intervention



*Along Kham River*

### Implementation Agency



*Aurangabad Municipal Corporation (AMC), Varroc Industries, Ecosattva Environmental Solutions, Cantonment Board*

### Finance



*AMC and CSR funds*

### Brief description of the Intervention

In Aurangabad, a number of cattle sheds are present along the river. These sheds, known as 'Tabela', used to pollute the Kham river due to discharge of slurry - a mixture of dung, urine and pieces of chopped fodder. An analysis of the quality for this discharge showed BOD, COD and TDS around 825 mg/l, 2530 mg/l, 248 mg/l, as against the permissible limits of 30 mg/l, 100 mg/l and 50 mg/l respectively.

In order to treat this, a treatment plant of 6 KLD capacity was installed as a pilot, based on rootzone technology. The treatment plant consists of a Solid Liquid Separator, Sedimentation Pond, Planted Gravel Filter (PGF) and Treated Water storage.

Right at the start, an iron mesh is used to filter out the solid particles coming with the slurry water. The sedimentation pond then stabilises the slurry water, resulting in settling of suspended solids. The bacterial culture used in sedimentation pond reduces the BOD, COD, nitrate and phosphate load of the slurry. The PGF filters the slurry water, using flowering plants like Canna lily which purifies water. Treated water is then stored in a cement mortar tank for reuse. Upon adequate treatment of water, it can readily be used for irrigation, civil construction purposes.

### Unique/Key feature of the Intervention

This eco-sensitive technology uses plants as a means of treatment, without any requirement for electricity.





# 6. URBAN RIVER MANAGEMENT PLAN

## AURANGABAD

### Nature of the Intervention



*Adopting Urban River Management Plan (URMP) Framework for maintaining healthy urban river stretches*

### Location of the Intervention



*City-wide*

### Implementation Agency



*Aurangabad Municipal Corporation, Ecosattva, National Institute of Urban Affairs and National Mission for Clean Ganga*

### Finance



*AMC and NMCG*

### Brief description of the Intervention

The National Institute of Urban Affairs (NIUA) and the National Mission for Clean Ganga (NMCG) have set-up a first-of-its-kind alliance of 30 river cities across India, called the 'River Cities Alliance' (RCA). Aurangabad being one of the member cities of the River Cities Alliance, has been actively involved in planning and implementation of interventions for river sensitive development within the city.

The Municipal Corporation of Aurangabad has already been actively involved in the Kham River Restoration Mission. It is now looking to extend these efforts towards a holistic planning and management of the river ecosystem. In this regard, the Municipal Corporation of Aurangabad in partnership with NIUA and EcoSattva are preparing the Urban River Management Plan (URMP) for Aurangabad. This initiative will expand the scope of the urban river planning and management narrative, with a view to target practical on-the-ground transformative action. The URMP will help the city in systematically planning for interventions to revive and maintain Kham and Sukhna river stretches and other water bodies within its limits, in a sustainable manner.

### Unique/Key feature of the Intervention

This initiative is the first step towards building a holistic understanding of the river system and its associated elements in the city.

The URMP Aurangabad will be the first for a non-perennial river ecosystem.





Developed Miyawaki forest (Source - Aurangabad Municipal Corporation)

# 7. URBAN NATIVE DENSE FOREST BY MIYAWAKI METHOD

## AURANGABAD

### Nature of the Intervention



*Innovative plantation strategy for enhancing local biodiversity and ecology*

### Location of the Intervention



*Kham Riverfront Eco Park*

### Implementation Agency



*Aurangabad Municipal Corporation (AMC), Varroc Industries, Ecosattva Environmental Solutions, Cantonment Board*

### Finance



*AMC and CSR funds*

### Brief description of the Intervention

Mimicking a dense forest in which trees crowd together to form a thick canopy that shelters vegetation beneath it, the Miyawaki technique involves the planting of a number of different types of trees (top canopy, mid canopy, shrubbery and ground cover) close together to create and sustain a healthy co-existence. This methodology has showed positive results in various geographies and temperatures. Plant growth is accelerated manyfold and the land required is much lesser than in traditional plantation.

Around 1500 saplings of 45 native species have been planted to create a dense forest on 5,000 sqft. area within the Eco Park along the Kham. These native species support the biodiversity and the local ecology of the area. The complete process included selection of an appropriate area, preparation of soil, establishing a multilayer arrangement for plantation, sapling plantation, mulching and watering, and finally growth of the forest. A wealthy ecosystem of snakes, freshwater turtles, crabs, fish and butterflies is also found in this area.

### Unique/Key feature of the Intervention

This technique creates a 100 year equivalent indigenous forest within 10 years, which is 30 times more dense compared to conventional plantation, has 30 times better water retention and CO2 absorption, attracts a wider diversity of fauna due to its diverse flora, easy to maintain and requires lesser water.





# 8. URBAN RIVER MANAGEMENT PLAN

## AYODHYA

### Nature of the Intervention



*Adopting Urban River Management Plan (URMP) Framework for maintaining healthy urban river stretches*

### Location of the Intervention



*City-wide*

### Implementation Agency



*Ayodhya Municipal Corporation, National Institute of Urban Affairs and National Mission for Clean Ganga*

### Finance



*NMCG*

### Brief description of the Intervention

Ayodhya Municipal Corporation (AMC) is working towards revival and rejuvenation of Sarayu river, nexus of waterbodies including ponds, lakes and kunds through means of Urban River Management Plan (URMP) for the Ayodhya city in partnership with NIUA. The work for the same is in progress.

This initiative will expand the scope of the urban river planning and management narrative, with a view to target practical on the ground transformative action. The URMP will help the city in systematically planning for interventions to revive and maintain the Sarayu river stretches and other water bodies within its limits, in a sustainable manner. Issues revolving around the drifting of the Sarayu River, effective management of floodplains, increased river - people connect etc. is to be addressed through means of this URMP.

### Unique/Key feature of the Intervention

This initiative is the first step towards building a holistic understanding of the river system and its associated elements in the city.







# 9. RIVER SENSITIVE MASTER PLAN

## AYODHYA

### Nature of the Intervention



*Leveraging master plan as key planning instrument to ensure river sensitive urban development*

### Location of the Intervention



Pan City

### Implementation Agency



Ayodhya Development Authority (ADA)

### Finance



Department of Housing and Urban Planning

### Brief description of the Intervention

Ayodhya, located on the bank of Saryu River is the religious tourism city of Uttar-Pradesh state. Ayodhya did not possess the Master Plan till 1980. The First Master plan of Ayodhya was prepared in 1983. The Master Plan 1983-2001 was the only Master plan prepared for the ADA so far and till date it's almost two decades since the Mater plan period has lapsed, thus the revision of Master plan had become necessary. The area of ADA has extended its regulated area from 133.67 Sq.km to 873 Sq.km by addition of 343 villages and two towns in the year 2020.

The Ayodhya Master Plan 2031 has provided different provision for river sensitive development along the Sarayu river and other waterbodies, some of these provisions are

- To secure the quality of urban natural water resources, Ayodhya Master Plan 2031 has proposed to provide a riparian buffer along the sides of water bodies.
- A restriction of development within a margin of 30 m from the river boundary. Eco parks and Riverfront development are to be provided as recreational areas for the citizens.
- Waterbodies are required to be protected from encroachment and for their conservation, it is proposed to have 9 m belt from water bodies as restricted zone.
- Mentioned about the Rainwater harvesting stating that all public building must provide a rainwater harvesting system in new buildings. For development more than 5000 sq. m, one rain water system is required to be provided.

### Unique/Key feature of the Intervention

Ayodhya has become one of the very few cities who has adopted river sensitive approach for preparation of Master Plan





# 10. REJUVENATION OF SAMDA LAKE

## AYODHYA

### Nature of the Intervention



*Leveraging master plan as key planning instrument to ensure river sensitive urban development*

### Location of the Intervention



*Samda Lake*

### Implementation Agency



*Ayodhya Development Authority (ADA)*

### Finance



*Department of Housing and Urban Planning*

### Brief description of the Intervention

Samda Lake is one of largest lake located in Sohawal tehsil in Ayodhya Development Authority jurisdiction well known for its bio-diversity and bird sighting. The total area of the lake is around 67 ha. with the depth of around 3m. This lake provides habitation to almost 26 indigenous bird species in different time of the year, but the existing condition of the lake has been deteriorated due to intrusion of wastewater from surrounding area and encroachment. There is extensive eutrophication in the lake and proliferation of water hyacinth is very evident. Lack of defined edge has led to the encroachments and choking of aquifers due to waste accumulation

Ayodhya Development Authority in partnership with Mr. Anand Malligavad, who is known for reviving more than 20 lakes in the Bangalore city is working towards rejuvenation of the Samda lake at the cost of ₹ 5.61 Cr. using natural technique of using microorganism in the water and harvesting the fresh rainwater falling in the lake and its catchment area. The lake is being developed as Northern Uttar Pradesh's largest Bird Sanctuary. It will protect and create awareness about biodiversity, natural ecosystem, local flora and fauna, migratory and indigenous breeds of birds and reptiles. Wetland around it will serve as an effective carbon sink and moderate the micro climate.

### Unique/Key feature of the Intervention

The neglected lake is being developed as eco-tourism hot spot.

Seldom visits by UP State bird 'Saras Crane' is recently discovered. It is the habitat of 26 indigenous bird species.



# 11. REJUVENATION OF WATERBODIES

## AYODHYA

### Nature of the Intervention



*Leveraging waterbodies as avenues for ecotourism*

### Location of the Intervention



8 waterbodies

### Implementation Agency



*Ayodhya Development Authority (ADA)*

### Finance



*Namami Gange*

### Brief description of the Intervention

The Ayodhya Development Authority had given a proposal for the restoration of 108 Kunds to the government. The authority has prepared a plan for the rejuvenation of 8 kunds in the first phase. These are- Lal Diggi (5.15 acres), Vidya Kund (1.47 acres), Dasharatha Kund (2.3 acres), Brahma Kund (9.88 acres), Sita Kund (1.55 acres), Agni Kund (0.304 acres), Kshir Sagar Kund (0.9 acres), Khajua Kund (0.69 acres). The Ayodhya Development Authority has included Anand Malligavad, popularly known as Lake Man, in this scheme for this work.

Rejuvenation work is being carried out naturally by simply adopting processes: Removal of impurities like silt and weeds, establishing a natural system for segregating and treating the waste water coming to the kunds and storing rainwater. Each kund is being developed with a dedicated rejuvenation plan which also includes community engagement initiatives to involve local people and give a sense of relatability. This project re-establishes natural opulence, by restoring, rejuvenating and re-energizing the aura of the identified waterbodies in the city.

### Unique/Key feature of the Intervention

Total of 108 waterbodies in Ayodhya are to be rejuvenated in similar manner which additionally will also serve as tourist spots, community engagement spots, ecological study spots etc





Creating awareness through Jal Jeevan Hariyali Campaign (Source - Begusarai Municipal Corporation)

# 12. JAL JEEVAN HARIYALI CAMPAIGN

## BEGUSARAI

### Nature of the Intervention



*Enhancing public participation for ensuring cleanliness in city and river*

### Location of the Intervention



City-wide

### Implementation Agency



Begusarai Municipal Corporation

### Brief description of the Intervention

In response to the state government's efforts towards environment conservation, a human chain was formed and awareness drives were organized in Begusarai to show support for 'Jal-Jeevan-Hariyali' campaign, which seeks to protect the flora and fauna with a special emphasis on forests and natural resources.

The people led movement had stellar examples of public participation and education and awareness drives. The movement showed enormous participation from youth and women in different communities across the city.

The campaign garnered a lot of support and enthusiasm from the people. School children raised slogans in support of water life, greenery and against eradication of social evils.

### Unique/Key feature of the Intervention

In the state of Bihar, over 5 Crore people formed human chain and pledged to save environment



# URBAN WETLAND/WATER BODIES MANAGEMENT GUIDELINES

APPLICATION OF TOOLKIT IN BHAGALPUR CITY



January 2021  
Volume II

**GNAMAMI  
GANGE**

NATIONAL MISSION FOR CLEAN GANGA



SCHOOL OF PLANNING &  
ARCHITECTURE, NEW DELHI





# 13. URBAN WATERBODY/ WETLAND MANAGEMENT TOOLKIT

## BHAGALPUR

### Nature of the Intervention



*River rejuvenation through catchment improvement approach*

### Location of the Intervention



*Pan City*

### Implementation Agency



*School of Planning and Architecture, Delhi*

### Finance



*Namami Gange*

### Brief description of the Intervention

The city of Bhagalpur a.k.a. the Silk City of Bihar is bounded by river Ganga on the north, Champa River on the west and railway line on the southwest. Bhagalpur city is spotted with numerous waterbodies and wetlands but due to increased urbanisation they are getting polluted and encroached upon.

To address this issue, Bhagalpur Municipal Corporation (BMC) in support with School of Planning and Architecture, New Delhi has prepared an urban waterbodies/ wetland management toolkit in line with the urban waterbodies/ wetland management guidelines developed under the project sanctioned by Namami Gange mission.

The toolkit is targeted at providing a set of practical and policy-relevant methods for information collection and decision making which can be used by personnel involved in waterbodies/ wetland conservation and development planning.

### Unique/Key feature of the Intervention

Bhagalpur is first city to prepare a management toolkit for the urban waterbodies and wetlands





Gangetic Dolphin (Source - Namami Gange)

# 14. VIKRAMSHILA GANGETIC DOLPHIN SANCTUARY

## BHAGALPUR

### Nature of the Intervention



*Creating awareness on ecosystem services and biodiversity support provided by river*

### Location of the Intervention



*Sultanganj - Bhagalpur - Kahalgaon*

### Implementation Agency



*Environment and Forest Department, Govt. of Bihar*

### Finance



*Environment and Forest Department, Govt. of Bihar*

### Brief description of the Intervention

Vikramshila Gangetic Dolphin Sanctuary is located in Bhagalpur District of Bihar, India. The sanctuary is a 60 kilometers stretch of the Ganges River from Sultanganj to Kahalgaon in Bhagalpur district. It was notified as Vikramshila Gangetic Dolphin Sanctuary in 1991 under the provisions of Wildlife (Protection), Act 1972 and is one of the official protected areas for the endangered Gangetic dolphins a.k.a national aquatic animal of India in Asia. Once found in abundance, only a few hundred remain, of which half are found here. The sanctuary also contains rich diversity of other threatened aquatic wildlife, including the Indian smooth-coated otter, gharials, 135 species of waterfowls, a variety of freshwater turtles, fishes and birds.

The key view points are notably at Barari Ghat, where the Vikramshila Setu starts and the Manik Srakar ghat in monsoon season from July to mid-September; latter being one of the best sighting spots. There are various conservation works going on the sanctuary area; some notable ones being Dolphin Conservation Programme by WWF India etc.

### Unique/Key feature of the Intervention

India's first and only Gangetic Dolphin Eco Park in India and entire of South East Asia at present that is aimed towards Gangetic Dolphins solely.



# 15. GANGETIC DOLPHIN OBSERVATORY

## BHAGALPUR

### Nature of the Intervention



*Bio-diversity conservation for socio-economic benefits*

### Location of the Intervention



*Sultanganj - Aguawani Ghat Bridge over Ganga*

### Implementation Agency



*Bihar Government*

### Finance



*Bihar Government*

### Brief description of the Intervention

The Bihar government is on route to set up India's first observatory for the Gangetic Dolphins within the Vikramshila Gangetic Dolphin Sanctuary (VGDS) in Bhagalpur district. The structural design of the observatory is such that it will promote eco-tourism and in no way shall induce any manner of adverse impact on the riverine ecology as the observatory is being built on Sultanganj-Aguwani Ghat bridge over the Ganga.

This four-storey observatory will be 40 ft high, with the bridge passing through its middle. The observatory building will be transparent, with glass from all sides to provide visitors the means to watch the dolphins in their natural habitat. A cafeteria at the dolphin observatory complex, along with a facility to park 75 vehicles is also proposed as part of the same. The construction work has already been started and till now four special pillars has been build. With Bihar hosting half of Gangetic Dolphins in India, this shall provide immense scope and revenue for aquatic tourism in the state.

### Unique/Key feature of the Intervention

The only Gangetic Dolphin observatory in the world.

Foster dolphin - citizen connect while integrating Gangetic dolphin conservation and creating a livelihood opportunity for local people





Rejuvenated lake (Source - Bhubaneswar Municipal Corporation)

# 16. LAKE CLEANING

## BHUBANESHWAR

### Nature of the Intervention



Partnership between ULB and CSR for rejuvenation of waterbodies

### Location of the Intervention



Bindusagar lake

### Implementation Agency



Institute of Chemical Technology, Indian Oil Corporation, State government

### Finance



CSR of Indian Oil Corporation Limited (IOCL)

### Brief description of the Intervention

The 'Clean Bindu Sagar' initiative, recently launched in Bhubaneswar, aims at reviving and transforming the largest water body in the capital city into a spiritual and tourist hotspot laced with modern amenities. Given the religious and social significance of this 21-acre holy pond within the city, it is visited daily by a large population. This intervention proposes to clean one of the oldest lakes with the latest technology.

A state-of-the-art technology known as Hydrodynamic Cavitation is being applied for cleaning up the water of 5 ponds. The technology has been developed by the Institute of Chemical Technology, Mumbai and has been successfully implemented in several projects throughout the country. Four pumping systems along with hydrodynamic cavitation reactor are being used around Bindu Sagar to make the water clean and increase the aesthetic value of the lake.

The clean up project is being funded from CSR expenditure of Indian Oil Corporation Limited (IOCL), while it is being carried out by ICT IOC, Bhubaneswar. Around ₹70 lakh from the Indian Oil CSR fund is being invested for the initiative.

### Unique/Key feature of the Intervention

The entire project is being funded under a Corporate Social Responsibility (CSR) initiative.



Interception and Diversion on Budu nallah



# 17. RESTORATION OF KUAKHAI RIVER

## BHUBANESWAR

### Nature of the Intervention



*River rejuvenation through catchment improvement approach*

### Location of the Intervention



*18 km stretch from Kathajodi river*

### Implementation Agency



*Bhubaneswar Municipal Corporation*

### Brief description of the Intervention

Kuakhai river, a distributary of river Kathajodi, originates near village Mundamuhan, flows along Bhubaneswar city, the capital city of Odisha state. Kuakhai river branches off into Daya river and Kushabhadra river near Balianta village. The river covers a distance of approximately 18 Km from its origin from Kathajodi river to its bifurcation at Balianta.

Actions already taken for maintaining the water quality of Kuakhai river are :

- Increase in flow of water in Kuakhai river during lean period by diverting water from Puri Main canal to Kuakhai river before Bhubaneswar FU/s monitoring station by constructing a regulated weir near village Kendupatna.
- Construction of Interception and Diversion on Budu nallah so as to divert water of Budu nallah to Gangua nallah instead of flowing into Kuakhai river near Mancheswar.
- Construction of community toilets/ public toilets to eradicate open defecation.
- Construction of tube wells and/or pipe water supply to the peripheral villages on both banks of the river to restrict in-stream activities on the river.

### Unique/Key feature of the Intervention

The BOD value in the identified stretch always remained within the tolerance limit of 3.0 mg/l during the period 2016-2018.



Dolphin safari (Source - Namami Gange, WII)

# 18. DOLPHIN SAFARI

## BIJNOR, PRAYAGRAJ AND VARANASI

### Nature of the Intervention



*Integrating river rejuvenation and aquatic life conservation while creating livelihood opportunities*

### Location of the Intervention



*Ganga stretch of Bijnor, Prayagraj and Varanasi*

### Implementation Agency



*WII*

### Finance



*Namami Gange*

### Brief description of the Intervention

There are about 3700 Gangetic dolphins in India across a variety of states in North and Northeastern parts of the country. Assam, Bihar, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh and West Bengal are majorly where these dolphins can be spotted in. To mark the celebration of the Ganga River Dolphin Day, the Indian government has announced the My Ganga My Dolphin campaign with a view to promote eco-tourism in the country.

The My Ganga My Dolphin campaign was launched also to help in conducting a better Dolphin census within the 250 kilometre stretch from Bijnor to Narora which will lead to the dolphin safaris being organised at the three of the River cities alliance cities namely Bijnor, Prayagraj and Varanasi among other locations. One of the objective of this initiative is to integrate Gangetic dolphin conservation and Ganga rejuvenation with local livelihoods. Trained volunteers from the local community, known as Ganga Praharis, will be at the forefront of this initiative and will lead tourists at all these dolphin sites on boat rides. Ganga Praharis have been at the forefront of the Clean Ganga initiative and have been tirelessly working towards improving the cleanliness of the Holy Ganges in every state that the river flows through.

### Unique/Key feature of the Intervention

Integrating Gangetic dolphin conservation and Ganga rejuvenation while creating a livelihood opportunity for local people





Puduchery Keni (Source - Chennai Smart Cities)

# 19. WATER BODY RESTORATION

## CHENNAI

### Nature of the Intervention



*Comprehensive citywide framework for restoration of water bodies*

### Location of the Intervention



*City-wide*

### Implementation Agency



Greater Chennai Corporation (GCC),  
Chennai Smart City Limited (CSCL),  
Civil Society Organisations

### Finance



*Smart Cities Mission, CSR*

### Brief description of the Intervention

Between 2016-2020, Chennai faced a number of climate induced disasters ranging from floods and cyclones to droughts. Realising the impacts of unplanned urbanisation on the water bodies and wetlands, the GCC along with CSCL created the **Chennai Water Restoration Framework** that aims at creating a robust framework for restorations of water bodies. Under this, GCC identified 210 water bodies and 15 temple tanks across 15 zones in its jurisdiction, to be taken up for rejuvenation.

By implementation of this project, the following impacts have been achieved and envisaged:

- Around 1 TMC of additional water to be stored in 210 water bodies covering an area of 969.69 acres. 130 out of 210 completed.
- Wetland restoration leading to rejuvenation of natural ecosystem- including return of aquatic birds and animals
- Increase in the average groundwater levels in Chennai- 2.5 metres increase, as of North East Monsoon 2020
- Creation of open community space- residents and walkers visiting for recreation and exercise

### Unique/Key feature of the Intervention

With the vision of 'Water Sufficient Chennai', each waterbody is provided with recharge wells to improve groundwater levels. Improved water quality via bio-remediation, and increased dissolved oxygen levels through ozonation technique.



Omakulam lake before and after the rejuvenation



Pura Kulam (Source - Chennai Smart Cities)

# 20. STORM WATER DRAINS: CONNECTING MISSING LINKS

## CHENNAI

### Nature of the Intervention



Provision of storm water drains for flood prevention and ground water recharge

### Location of the Intervention



City-wide

### Implementation Agency



Greater Chennai Corporation (GCC), Chennai Smart City Limited (CSCL)

### Finance



Chennai Mega City Development Mission (CMCDM)

### Brief description of the Intervention

The Greater Chennai Corporation and Chennai Smart City Limited are in the process of improving the existing storm water drain infrastructure in the city by:

- providing new storm water drains and
- providing the missing links at required locations with proper disposals to drain the water at proper disposal point

This has been proposed as a long term measure for avoiding water stagnation at vulnerable points where stagnation up to 2 feet is observed and where old existing drains constructed decades ago are collapsed or defunct due to caving, damage by utility department, natural ageing or absence of the connected links.

GCC has proposed to construct the missing links or improvement of defunct drains at 335 locations. GCC has also proposed provision of rain water harvesting at every 30m intervals to capture the rain water for recharging the groundwater.

### Unique/Key feature of the Intervention

A silt catch pit has been incorporated into the design at every 10m interval.



Captain Cotton Canal – before and after removal of Hyacinth Amphibian Vehicle (Source – Greater Chennai Corporation)



# 21. DESILTING OF CANALS

## CHENNAI

### Nature of the Intervention



*Application of modern machinery for desilting of canals*

### Location of the Intervention



*City-wide*

### Implementation Agency



Greater Chennai Corporation (GCC)

### Finance



Greater Chennai Corporation (GCC)

### Brief description of the Intervention

New machineries like Robotic excavator and Amphibian Vehicle are being engaged by GCC in open canals to remove the floating materials and desilting of canals periodically. Amphibian Machine has been purchased from Finland and is being used in Buckingham Canal, Captain Cotton Canal and Adyar river. Resultantly, water bodies were deepened and free flow of water is ensured.

- In Captain Cotton Canal, so far hyacinth and silt has been removed covering approximately 24,732 cum in an area of 89,270 sq.m. Similarly, so far hyacinth and silt has been removed covering approximately 29,250 cum in an area of 1,44,000 sq.m from Buckingham Canal.
- In Adyar river so far hyacinth and silt has been removed covering approximately 5400 cum in an area of 10,080 sq.m.

Robotic Excavators are being used for carrying out desilting operations from the canals having lesser width and where silt and water level is up to 8 feet. So far, 14,000 cum silt has been removed from M.G.R. canal, Mambalam canal and ReddyKuppam canal for a length of 4000 meter.

### Unique/Key feature of the Intervention

A timeline has been prepared and de-silting operations and removal of hyacinth has been carried out regularly in all 30 canals coming under the control of the Greater Chennai Corporation.



Rainwater Harvesting structures (Source - Akash Ganga Trust)

# 22. RAIN WATER HARVESTING INITIATIVE

## CHENNAI

### Nature of the Intervention



*Role of private/public trust organizations in mainstreaming Rainwater Harvesting at city scale*

### Location of the Intervention



*City-wide*

### Implementation Agency



*Akash Ganga Trust*

### Brief description of the Intervention

Realising that Chennai is a groundwater dependent city and has reasonably good shallow aquifers, the Akash Ganga Trust, has been deeply involved, since 2002, in popularising & promoting shallow aquifer recharge.

Rain Centre, a one – stop information & assistance centre for Rain Water Harvesting (RWH) was setup for the purpose of carrying out activities such as:

- Creating awareness about the need, relevance & importance of RWH among various sections of the society.
- Help the residents to implement RWH in their respective homes by offering free advice.
- Carry out periodic studies & surveys to understand and manage the SA by resorting to efficient aquifer recharge structures.

In the last two decades, resource persons have visited more than 1500 independent houses, multi-storeyed residential and commercial complexes, institutions, factories, offices etc. to suggest suitable rainwater harvesting systems in them. The institution has also implemented RWH in more than 700 of them with trained resource people. They have also constructed open wells in several apartment complexes and demonstrated self-sufficient water communities.

### Unique/Key feature of the Intervention

Since 2007, the institution has been sensitising residents of Chennai and other cities in Tamil Nadu about the existence of Shallow Aquifers.



Proposed riversfront regeneration through mangrove and walkway development (Source - Tamil Nadu Infrastructure Development Board, Chennai Rivers Restoration Trust)

# 23. CHENNAI RIVERS RESTORATION TRUST

## CHENNAI

### Nature of the Intervention



*Role of public trust organization in restoration of rivers and waterbodies*

### Location of the Intervention



*City-wide*

### Implementation Agency



*Chennai Rivers restoration Trust, Government of Tamil Nadu*

### Finance



*Government of Tamil Nadu*

### Brief description of the Intervention

The State of Tamil Nadu is committed to restoring the ecological health of waterways and water bodies by upstream treatment, desiltation, plugging of polluting outfalls, sewage treatment, scientific solid waste management, embankment protection and development of parking areas, walkways and parks.

In Chennai city, it was proposed to restore Cooum, Adyar and Kosasthalaiyar rivers, the Buckingham canal along with other smaller canals for a total length of 214 km and 42 water bodies in the Chennai Metropolitan Area which are highly degraded due to severe pollution. This project will be implemented under the aegis of Chennai Rivers Restoration Trust (CRRT).

The whole stretch of Cooum river was studied, and solutions have been proposed based on that analysis in depth. To start with, outfall surveys and water quality surveys were conducted and information was collected from the stakeholders involved in this sector. A survey was conducted to understand the current status of the flora and fauna along the river. Land currently encroached may be reclaimed to develop the riverfront, always with a proper resettlement of the affected people.

### Unique/Key feature of the Intervention

Every slum has been analysed with regard to flooding risk and compatibility with a new river front development.





Community participating in the cleanup drive (Source - Nagar Nigam Dehradun)

# 24. RISPANA RIVER REVIVAL MISSION

## DEHRADUN

### Nature of the Intervention



*Community centric approach for reviving natural water resources*

### Location of the Intervention



*Danda Dharampur*

### Implementation Agency



*Nagar Nigam Dehradun*

### Finance



*ULB Funds*

### Brief description of the Intervention

This mission aimed to revive the Rispana river flowing through Dehradun city. The length of the river flowing through the city is approximately 18 km, where the main challenge was pollution because of untreated wastewater and solid waste. Several stretches of the river in the city were completely covered with solid waste.

On the first day of the Mission, almost 100 metric tonnes of garbage, silt, and sludge were collected and cleaned from the river. The sewer outfalls into the river carrying almost 10 MLD of wastewater were tapped and diverted to the sewage treatment plants. Furthermore, what started as a movement by the government under the direction of the District Magistrate soon transformed into a people's movement. Over 8,000 people participated in the Mission, especially for planting 2.5 lakh saplings along the river. The initiative to rejuvenate the Rispana River has several spin-offs and co-benefits. For example, the rejuvenated river has helped in augmenting the groundwater levels in the city, which had dropped by almost 12 meters during the the period 2015 to 2019.

The city is currently exploring avenues to sustain and build on the buzz created by the Mission to ensure the longevity of the impact.

**Unique/Key feature of the Intervention**

More than 40 government and non-government organisations, and over 8,000 volunteers, school students, and people participated in the Mission.



घण्टाघर  
CLOCKTOWER ↑  
गार्डन & गॉल्फ  
GARDEN & GOLF ←  
चक्रवर्ती रोड  
CHABRATA ROAD →

ROYAL

डिजिटल लाइफ  
DIGITAL LIFE

डिजिटल लाइफ  
DIGITAL LIFE



# 25. CITY WATER BALANCE PLAN (CWBP)

## DEHRADUN

### Nature of the Intervention



*Comprehensive plan for water resource management*

### Location of the Intervention



*Pan City*

### Implementation Agency



*Dehradun Nagar Nigam and CURE*

### Finance



*USAID*

### Brief description of the Intervention

The Jal Jeevan Mission (Urban) in its recently released guidelines had suggested cities to conduct water balance plan study in order to promote circular economy of the water focusing on recycle/reuse of treated sewage, rejuvenation of water bodies and water conservation.

In this regard, the Dehradun city has conducted a water balance plan study with the support of US Agency for International Development (USAID) by Centre for Urban and Regional Excellence (CURE). The key findings of the study include satisfactory underground water availability, satisfactory piped water supply especially to the slum areas, intensive groundwater extraction, lack of convergence between all the stakeholder departments for better outcome, paucity of data and prevalence of water borne diseases.

The CWBP will facilitate the city administration in subsequent interventions for making the city more water resilient. Dehradun city water balance plan will work as a guideline for the rest of cities in Uttarakhand and other northern states on water issues as well.

### Unique/Key feature of the Intervention

Dehradun is the first city to conclude the study for CWBP in association with CURE and ImpactDASH in June 2020



Tapping and treatment of wastewater using bioremediation technology (Source - Farrukhabad Nagar Palika)

# 26. TAPPING OF DRAINS

## FARRUKHABAD

### Nature of the Intervention



River rejuvenation through catchment improvement approach

### Location of the Intervention



6 selected drains

### Implementation Agency



Nagar Palika Farrukhabad

### Finance



Nagar Palika Farrukhabad

### Brief description of the Intervention

Sewerage generation in the city of Farrukhabad is about 36.639 MLD, but there is no existing STP for treatment of the wastewater flowing through the drains and merging with the river Ganga. To reduce the pollution load in Ganga river coming from Farrukhabad city and to comply the NGT order to treat the drains using bioremediation technology as interim solution until sewage infrastructure is provided, Nagar Palika is using bioremediation method to clean the water and tap the drains falling in the Ganga.

There are 8 drains that directly discharge wastewater into the Ganga River, these are Pakkapul, Tokaghat, Bhoroghat, Amethikohna, Cant nala, Hathikhana, Dhirampur and Bargadiya ghat. Out of these 8 drains, two drains Hathikhana and Cant nala is being tapped and others are being treated using bioremediation technology. All the drains have also been provided with the screen bars to stop solid waste from flowing into the River Ganga along with wastewater from the drains

### Unique/Key feature of the Intervention

All the 8 drains are either being tapped or treated before it flows back to the river Ganga



Har ki Pauri ghat after the facelift initiative (Source - NMCG)

# 27. LEVERAGING CSR FUNDS FOR GHAT DEVELOPMENT

## HARIDWAR

### Nature of the Intervention



Leveraging non-government funds for renovating public spaces of religious importance

### Location of the Intervention



Har ki Pauri

### Implementation Agency



SPMG, Irrigation Department

### Finance



Clean Ganga Fund (CGF)

### Brief description of the Intervention

A growing metropolis and hub of religious tourism, Haridwar annually attracts lakhs of tourists who arrive in the ancient city to take a holy dip in river Ganga. Har Ki Pauri which is a famous ghat on the banks of the Ganges in Haridwar and a major landmark of the holy city was lacking the basic amenities for the visitors accessing the ghat on a daily basis.

Renovation of the ghat by provision of basic amenities for people visiting the ghat was done under the Namami Gange mission and was financed under the Clean Ganga Fund (CGF), which is a trust under the Indian Trust Act, 1882, to allow resident Indians, Non Resident Indians (NRIs) and Persons of Indian Origins (PIOs), Corporates (Public as well as private sector) to contribute towards the conservation of the river Ganga by Indian Oil Corporation Limited at a cost of ₹ 34.00 crore.

### Unique/Key feature of the Intervention

CSR funding was used for the renovation of the famous Har Ki Pauri ghat





Glimpse of 68 MLD STP in Haridwar (Source - NMCG)

# 28. POLLUTION ABATEMENT

## HARIDWAR

### Nature of the Intervention



*Innovative financing (Hybrid Annuity Model) for provision of citywide sanitary infrastructure*

### Location of the Intervention



*Haridwar*

### Implementation Agency



*SPMG, Haridwar Municipal Corporation*

### Finance



*Namami Gange*

### Brief description of the Intervention

Haridwar is one of the most revered pilgrim centre in India. The towns not only attract Indian pilgrims but also have large foreign tourists. In Haridwar, estimated sewage generation was 114 MLD (for year 2016) and 150 MLD (for year 2035). Sewage treatment capacity during the year 2014-15 was only 45 MLD. To prevent the discharge of sewage into the river, several initiatives have been taken under the Namami Gange mission. Out of 22 major drains in Haridwar, 21 of them have been completely tapped and the flow has been diverted. The infamous Kasawan Nala is one of the major drains that was tapped through interception and diversion project under the mission, limiting the pollution load in the Ganga river. The capacity of Sewage Treatment Plants (STPs) was enhanced by constructing new treatment capacity. Constructed under the Hybrid Annuity based PPP model, these STPs will exclusively address the sewage treatment requirements of the town. With the completion of all the STPs, the total sewage treatment capacity in Haridwar thus will be 145 MLD, which will be adequate to meet the sewage treatment demands of the town for coming years too. The total sanctioned cost of all the sewage management projects in Haridwar is ₹ 413.87 crore.

### Unique/Key feature of the Intervention

City has increased the sewage treatment capacity from 45 MLD to 150 MLD



Glimpse of Chandi ghat and Ganga Museum constructed on the bank of Ganga in Haridwar (Source - NMCG)



# 29. GHAT DEVELOPMENT

## HARIDWAR

### Nature of the Intervention



River fronts as cultural and recreational hubs

### Location of the Intervention



Chandi Ghat

### Implementation Agency



SPMG, Haridwar Municipal Corporation

### Finance



Namami Gange

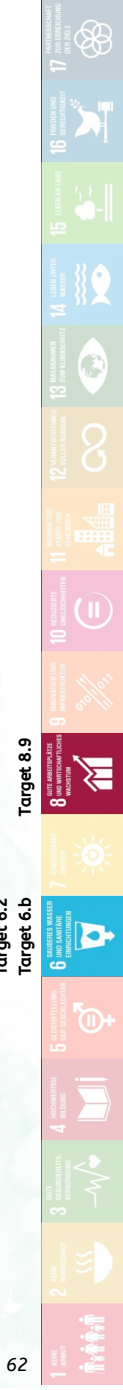
### Brief description of the Intervention

River fronts have potential to become the recreational and cultural hubs of city and emerge as a bustling and lively imagery associated with urban cities. It has potential to create environmental awareness for cleanliness of river. River front development would greatly enhance ecological awareness and tourism for the river edge and thus prevent disposal of untreated sewage into the river, and also prevent solid waste dumping on the river banks.

A river front has been developed for the people of Haridwar at Chandi Ghat with a cost of ₹ 69.18 Cr. A Ganga Museum named 'Ganga Avlokan' has also been developed in the building built on Chandi Ghat. This is an effort to make people aware of cultural importance of river Ganga, biodiversity and efforts being made for its conservation. A souvenir shop has also been developed which will also facilitate marketing of products made by trained Ganga Praharis mainly from the Ganga villages at the community level. Such efforts will give us strength in the direction of connecting all Ganga Praharis, Ganga defenders.

### Unique/Key feature of the Intervention

River front has become a space for people to connect with river and get to know about river more through the Ganga museum





Creating awareness towards waste segregation (Source - UNICEF)

# 30. MY GANGA, MY RESPONSIBILITY

## HARIDWAR, RISHIKESH

### Nature of the Intervention



*Multi-stakeholder engagement for reduction of plastic waste entering Ganga River*

### Location of the Intervention



8 waterbodies

### Implementation Agency



*GIZ, Rishikesh & Haridwar Municipal Corporation and Saahas NGO*

### Finance



*Unicef*

### Brief description of the Intervention

Situated on the banks of Ganga, are the vibrant, spiritual cities of Rishikesh and Haridwar that play host to millions of tourists and devotees who visit every year, which unfortunately, coupled with a rising demographic, the twin-cities are witnessing an increase in plastic waste. One management challenge has been the lack of segregating waste types at source, which helps the waste collectors and operators separate out plastics and recycle as much of it as possible. As of last year, awareness on the practice of source segregation was low, where 70% of households in Haridwar and 90% in Rishikesh were using a single bin for waste disposal.

Project Aviral is an initiative powered by the Alliance to End Plastic Waste (Alliance) and implemented by GIZ, in cooperation with Saahas NGO and Waste Warriors Society to tackle the growing plastic waste problem in this region. It has been working with municipal authorities to improve both waste management systems and spread awareness among residents and tourists on key practices such as source segregation and anti-littering. Residents are not only segregating their waste as per categories, but also volunteering to encourage their neighbors to follow the practice and monitor their waste daily, during collection. From organizing rallies to participating in clean up drives, and some even sharing letters to residents to encourage them to become aware about their waste practices, these young champions have been taking on responsibility for a sustainable future in their own hands.

### Unique/Key feature of the Intervention

Since the initiative rolled out, there has been a vast improvement in waste management practices among households





# 31. GREEN CREMATORIA

## HARIDWAR, RISHIKESH

### Nature of the Intervention



*Application of green technologies in crematoriums to achieve "ecologically-responsible cremation" thereby improving river health*

### Location of the Intervention



*Peri urban areas around Rishikesh and Haridwar*

### Implementation Agency



*Rishikesh Municipal Corporation*

### Finance



*Namami Gange*

### Brief description of the Intervention

In Uttarakhand, from where the Ganga originates, thousands of cremations are held per day at various crematoriums which are mostly at the banks of the Ganga or its tributaries. In the various ghats of Haridwar alone, around 1200 to 1500 cremations are done every month. The holy city has been increasingly grappling with the problem of air pollution and a significant contributor of the same are the large number of open cremations that happen along the banks of the river. In a first of its kind initiative, 'green' crematoriums are planned along the Ganga in the peri urban and rural areas at Haridwar & Rishikesh. These crematoriums will offer 'ecologically-responsible cremation' using green technology in which less wood will be utilised besides other safeguards to ensure that the environment and the holy river is not polluted as a result of the cremation process. While conventional crematoriums consume upto 600 kg of wood, the green crematoria will limit this amount to only 100 kg in order to ensure less trees are cut, and carbon emissions are reduced. These crematoriums will be using a specially created "pyre oven" that use less wood but generate enough heat to burn the body effectively. The special pyre ovens are designed to direct maximum heat near the head and waist parts of the body since these body parts require more time and intensity of heat to burn.

### Unique/Key feature of the Intervention

The project will be undertaken under the supervision of Parmarth Niketan, the largest ashram in Rishikesh.





Riverfront under development along the banks of Hooghly river

# 32. RIVERFRONT DEVELOPMENT

## HOOGHLY CHINSURAH

### Nature of the Intervention



Transforming waste lands into recreational areas for river-citizen interaction

### Location of the Intervention



Along river Hooghly

### Implementation Agency



Hooghly Chinsurah Municipality

### Finance



Green City Mission

### Brief description of the Intervention

Hooghly Chinsurah municipal corporation is working towards developing a number of functional landscaped green spaces in different stretches along the river ganga at Dhola Ghat, Old & New Potli Ghat, Annapurna Ghat, Bankim Ghat, Cemetery of Haji Mohammad Mohosin.

The developed landscaped areas will be functionally used as recreational areas with varieties of plantations, walkways, seating arrangements and proper illumination. Naturally landscaped riverside areas will help in providing the ecological balance in cities and also integrates river with the city

### Unique/Key feature of the Intervention

Development of riverside wasteland, dumping area into landscaped recreational areas leading towards garbage-free river citizen interactive areas and attempt to make pollution-free healthy river





Cleanliness drive along the river bank (Source - Swachh Bharat Mission)



# 33. GANGA CLEANING DRIVE

## HOWRAH

### Nature of the Intervention



Urban and rural administrations joining hands for river cleaning

### Location of the Intervention



Ganga Bordering Villages of Howrah

### Implementation Agency



Amra Susana Jalaprapat. Zilla Parishad of Howrah District

### Finance



Swachh Bharatt Mission Grameen, Ministry of Jal Shakti

### Brief description of the Intervention

In accordance with Swachh Bharat Mission Grameen (SBM-G) Phase II, the initiative was held in April 2022 to ensure ODF sustainability and visual cleanliness through solid and liquid waste management (SLWM).

The programme was implemented in the Ganga bordering Gram Panchayat regions of Howrah with notable excitement and voluntary engagement from a sizable number of Panchayati Raj Institution elected representatives, panchayat personnel, local communities, Self-Help Group members, and market traders. The self Help Group's involvement throughout the entire initiative was truly commendable. The programme was enthusiastically accepted by the locals, who praised the Howrah Zilla Parishad's initiative.

To stop people from disposing of plastic waste along with other household rubbish in public places, a sustained campaign for behaviour modification among the populace are being made. Local Gram Panchayats will play a significant role in leading the project, which is essential for maintaining the cleanliness of the Ganga and the wellbeing and safety of the people who live along its banks.

### Unique/Key feature of the Intervention

Conservation and restoration of Bio-diversity, providing cleaner water for irrigation, and enhancing navigability of the river and boost the livelihood of the communities in the Ganga Adjacent Areas.





# 34. ENVIRONMENTAL FRIENDLY BOATS

## HOWRAH

### Nature of the Intervention



*Environment friendly river mobility approaches for maintaining the river health*

### Location of the Intervention



*Hoogly River*

### Implementation Agency



*Garden Reach Ship-Builders and Engineers*

### Finance



*West Bengal State Transport Department, Government of West Bengal*

### Brief description of the Intervention

The West Bengal government intends to replace the Hooghly River ferries that run between several ghats along Kolkata, Howrah, and the suburbs with environmentally friendly boats. Garden Reach Shipbuilders and Engineers (GRSE) Ltd. and the state transportation department have a contract for the design and construction of a green vessel that will transport 150 people comfortably in air conditioning.

While the project has just kick-started, its completion is anticipated to transform the water transportation network in this area and boost national efforts to cut emissions and carbon footprints, transforming urban residents' lives. The project illustrates the GRSE's capacity to produce electric transportation solutions under the Make-in-India programme. The implementors are eager to replicate the success in this environmentally friendly endeavour in other places that may have waterways. Environmentalists have remarked that the vessels in use now have diesel engines and generate significant pollution. More ships can be ordered to replace the entire fleet of diesel-guzzlers if the green ferry prototype successfully completes trials.

### Unique/Key feature of the Intervention

First zero-emission initiative for Water-ways in India helping reduce river-pollution and climate-resilient at the same time





Before and after the waterbody rejuvenation (Source - Howrah Municipal Corporation)

# 35. PRESERVE WATER RESERVE WATER

## HOWRAH

### Nature of the Intervention



River rejuvenation through catchment improvement approach

### Location of the Intervention



75 water bodies

### Implementation Agency



Howrah Municipal Corporation

### Finance



State Government and HMC

### Brief description of the Intervention

The "Jal Dharo Jal Bhoro" scheme of the West Bengal State Government, is the flagship intervention to preserve the precious resources from ground and surface water and replenish the aquifer level

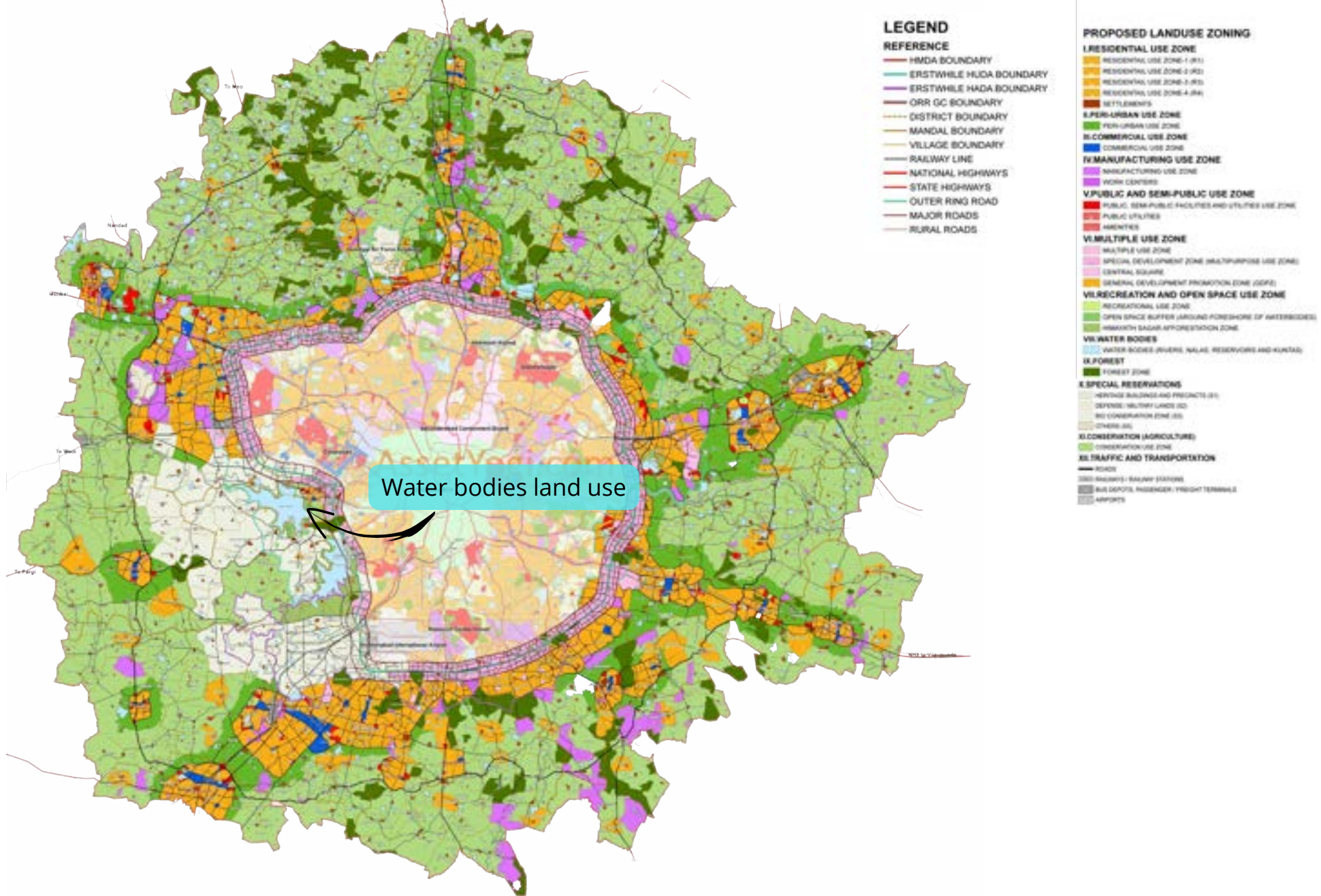
Howrah Municipal Corporation (HMC) leveraging the funds under this scheme has rejuvenated more than 75 water bodies in the past three years. These include cleaning and restoration using eco-friendly elements, and beautification

Besides these water bodies, the civic body has also taken up the project to clean and restore drains that covers a huge area from the Bakultala Bus Stand area on Andul Road to the road that connects Nazirganj Ghat. The lake, which is locally known as Nazirganj Khal, is around 1.25 km long and on average around 200 feet in width.

### Unique/Key feature of the Intervention

Urban water bodies and drain revival and management





Waterbody use zone map (Source - Hyderabad Metropolitan Development Area)

# 36. WATER BODIES USE ZONE

## HYDERABAD

### Nature of the Intervention



*Leveraging master plan as planning instrument for protection of water bodies*

### Location of the Intervention



*City-wide*

### Implementation Agency



*Hyderabad Metropolitan Development Authority (HMDA)*

### Brief description of the Intervention

In the revised development plan of Hyderabad Core Development Area, river, streams, nalas, storm water drains, lakes and kuntas have been assigned a separate use zone- Water Bodies.

In this zone, following provisions have been incorporated:

- A. In water body zone no construction is permitted
- B. No building /development activity shall be allowed in the bed of water bodies like river, or nala, and in the full Tank Level (FTL) of lake, pond, cheruvu or kunta / shikam lands.
- c. The above water bodies and courses shall be maintained as recreational/green buffer zone

No building activity other than recreational use shall be carried out within:

- i) 30 meters from the boundary of Lakes of area 10 Ha and above;
- ii) 9 meters from the boundary of lakes of area less than 10 Ha / kuntas /shikam lands; iii) 9 meters from the boundaries of Canal, Vagu, etc

**Unique/Key feature of the Intervention**

TRANSFERABLE DEVELOPMENT RIGHTS  
Grant of Transferable Development Rights (TDR) have been allowed or conservation and development of lakes / water bodies / nalas foreshores & Recreational buffer development with greenery, etc.





# 37. SIXTY-ONE LAKES RESTORATION

## HYDERABAD

### Nature of the Intervention



*Citywide restoration of water bodies by local administration*

### Location of the Intervention



*City-wide*

### Implementation Agency



*Greater Hyderabad Municipal Corporation (GHMC)*

### Finance



*Greater Hyderabad Municipal Corporation (GHMC)*

### Brief description of the Intervention

The Greater Hyderabad Municipal Corporation (GHMC) is undertaking the task of rejuvenating 61 lakes under its jurisdiction. Work on 5 lakes have already been initiated. The work has started with clearing out the solid waste and water hyacinth in a phased manner using floating trash collectors.

The Hyderabad Lakes & Water Bodies Management Circle (HL&WBM) and GHMC have put fencing in place for these water bodies, and they have also added walking tracks, bund strengthening, landscaping/ plantation, and illumination. At a number of points, sewage is being redirected away from the water bodies to reduce pollution.

The GHMC is taking up restoration work of weirs, sluice, bund strengthening, and fencing. Around 14 lakes are also being taken up by corporates under CSR to breathe a new lease of life into these water sources.

### Unique/Key feature of the Intervention

The effort is aimed at restoring Hyderabad's losing glory as city of lakes.

All these lakes are being envisioned as biodiversity zones.





**BEFORE**



**AFTER**



**BEFORE**



**AFTER**

Before and after of Lake rejuvenation and rainwater harvesting structure redevelopment (Source - Hyderabad Metropolitan Development Area)

# 38. WELLS AND LAKES RESTORATION

## HYDERABAD

### Nature of the Intervention



*Planning at micro watershed level for restoration of waterbodies and enhancing groundwater storage*

### Location of the Intervention



*Kondapur Masjid Banda Block*

### Implementation Agency



*The Rainwater Project*

### Brief description of the Intervention

In Kondapur block, The Rainwater Project worked with 7 colonies to restore groundwater in common areas. The Rainwater Project has divided Hyderabad into 98 micro watersheds within which every block is a water super block that can be replicated. They managed to restore a well and lake impacting more than 25000 people living around them. They executed innovative drain screens, solar-powered underwater bubble aeration, and by-pass channels as successful pilots, in revival of lakes and reducing urban flooding.

They involved communities, religious institutions, schools, corporates and institutions in bringing substantial awareness and creating change by demonstrating the advantages of water-positive societies.

They also worked with public institutions to develop innovative modular maintenance-free rainwater harvesting methods that are also cost-effective and also supported numerous livelihoods in the process of restoring groundwater storage with various typologies of projects.

### Unique/Key feature of the Intervention

The Rainwater Project has been developed in the hope of creating a collective, city-wide action for improving groundwater with awareness and end-to-end execution.



Before and after of Bansilalpet stepwell restoration (Source - The Rainwater Projects)

# 39. WELLS AND STEPWELLS RESTORATION

## HYDERABAD

### Nature of the Intervention



*Restoration of traditional wells for groundwater recharge and strengthening the community connect*

### Location of the Intervention



City-wide

### Implementation Agency



The Rainwater Project

### Finance



CSR

### Brief description of the Intervention

The Rainwater Project has been restoring defunct historic wells and step-wells across the city for rainwater harvesting and groundwater recharge. Realising that these historical structures have lost their significance, and are filled with garbage and construction debris, the Rainwater Project has restored them to re-establish their function of shallow aquifer recharge as well as strengthen the connect with the communities around them. Two of their landmark step well restoration are:

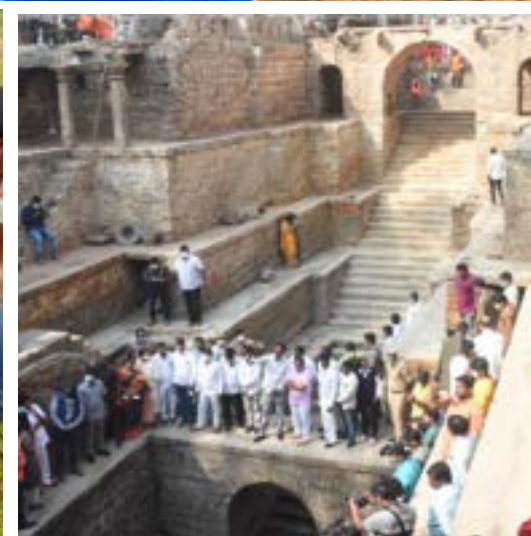
- **Bansilalpet stepwell:** The 18th-century old stepwell at Bansilalpet, Secunderabad was revived with fresh water gushing from deep below, after more than 500 tonnes of garbage was removed from near the Nalla Pochamma Temple, to unearth the 57 feet deep water stream. Around 2000 tonnes of debris was removed from the well to make the water clean.
- **Gachi-baoli stepwell:** This historical stepwell precinct was restored with the help of collective community action, with the team also building a preliminary understanding of the well as well as the locality. The well was desilted and structural alterations were done from the historical context and archival research. Cultural association for the community has been re-established and rain gardens and recharge pits have been introduced.

### Unique/Key feature of the Intervention

For the long term sustenance of the initiative, all restoration projects follow a collective action and ownership model, wherein the association with the structures has been re-established for the surrounding community



Boys' hope floats: Citizens get involved to restore Kudikunta lake's pristine form



Engaging citizens in rainwater harvesting mission (Source - The Rainwater Projects)

# 40. SOCIAL MOVEMENT FOR WATER SELF-RELIANCE

## HYDERABAD

### Nature of the Intervention



*Role of social enterprise in mainstreaming rainwater recharge through community engagement*

### Location of the Intervention



City-wide

### Implementation Agency



The Rainwater Project

### Brief description of the Intervention

The Rainwater Project has been working to bring a paradigm shift in the urban development and management towards the goal of increasing rainwater recharge from 8% to 80%. For this they have also undertaken a number community awareness activities, such as:

- Campaigns to seed actions for Rain Water Harvesting
- Education and awareness to mainstream innovation in rainwater harvesting to solve for challenges in the urban context.
- Engaging communities around lakes leading to formation of Lake Protection Committees
- Restoration of bores in academic institutions, old factories and common public areas with public participation
- Connecting with farm plot owners as well as individual house owners
- Connecting with developers, builders and commercial spaces
- Re-establishing the value of historical recharge structures for the communities
- Capacity building workshops with communities, RWAs, schools, slum communities and religious institutions
- Training younger minds towards water stewardship

### Unique/Key feature of the Intervention

The Rainwater Project was successful in improving the lives of 3 lakh people with cleaner environment and better water future in their first pilot water superblock, wherein they restored and regenerated a lake and well.



Deteriorated condition of lakes in Jangipur city (Source - Jangipur Municipal Corporation)



# 41. WATERBODY REJUVENATION

## JANGIPUR

### Nature of the Intervention



*Multi pronged approach for water body rejuvenation*

### Location of the Intervention



*Mirdhapara Tantipara Road*

### Implementation Agency



*Jangipur Municipal Corporation*

### Finance



*AMRUT 2.0*

### Brief description of the Intervention

The city of Jangipur has initiated a mission for waterbody rejuvenation in order to clean waterbody through de-silting, de-weeding, aeration, reduction of nutrients, removal of invasive aquatic plant species. The outcome of this rejuvenation are restored, healthy waterbodies and its surrounding ecosystems having a positive impact on both human life and urban biodiversity, increased opportunities for local community employment and avenues for revenue generation by leveraging the waterbody ecosystem.

To initiate this project, a water body under Jangipur Municipality situated at Mirdhapara has been selected for rejuvenation under AMRUT 2.0 project and preparation of DPR is under process.

### Unique/Key feature of the Intervention

Healthy rejuvenated waterscapes free of pollution, more blue-greens, increased urban biodiversity and better quality of human life.



Introduction of new innovations in full value chain of leather production (Source - Namami Gange, SOLIDARIDAD)

# 42. INDUSTRIAL POLLUTION ABATEMENT

## KANPUR

### Nature of the Intervention



*Strategy for industrial pollution abatement based on value chain analysis of leather making process*

### Location of the Intervention



*Kanpur*

### Implementation Agency



*Solidaridad*

### Finance



*Netherlands Enterprise Agency (RVO)*

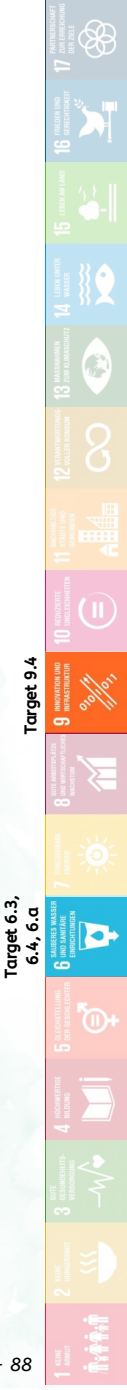
### Brief description of the Intervention

Industries are believed to be the major cause of pollution in our rivers and water bodies. There are around 1000 river water dependent industries located in the main stem of River Ganga. NMCG has taken an inventory of Grossly Polluting Industries in the Ganga Basin as per which it was found that industrial pockets in the catchments of Ram Ganga and Kali tributaries and in Kanpur city are significant sources of industrial pollution.

A consortium was created between Soliladidad, Stahl, a leading global chemical company; Uttar Pradesh Leather Industry Association, Govt. of Uttar Pradesh, PUM Netherlands senior experts and other key stakeholders to optimize water usage and contribute to the improvement in water quality of Ganga. A value chain analysis matrix of leather processes was developed which listed down each process involved in tanning and subsequent key pollutants. This offered a wide range of solutions that can be adopted based on tannery capacity, available infrastructure, financial resources and space. Based on this analysis, various eco-friendly technologies were introduced, followed by scientific analysis and business case calculations in order to prove the techno-commercial viability of adopting these interventions for the tanners. These interventions aim to reduce overall effluent load discharged from the tanneries and enhance water resource efficiency.

### Unique/Key feature of the Intervention

Most of the operating industries are MSMEs - the backbone of the Indian economy as they contribute to 40% of overall exports, about 30% of the country's GDP and employ around 110 Million people. Thus, they are the growth accelerators and employment generators





The infamous 140 MLD Sisamu Nala before and after the tapping (Source - NMCG)

# 43. TAPPING OF SISAMAU NALA

## KANPUR

### Nature of the Intervention



*Interception and diversion of untreated wastewater flow in drains for pollution abatement*

### Location of the Intervention



*Sisamau Naala*

### Implementation Agency



*UP Jal Nigam*

### Finance



*Namami Gange*

### Brief description of the Intervention

The 12 kilometres long and 6 metres wide Sisamau Nullah used to discharge 140 MLD (million litres daily) of sewage and contaminated water into the Ganga. The drain was tapped under the Namami Gange mission by introducing the interception and diversion scheme. After providing a tapping point at Bakarmandi in Kanpur, 80 MLD of wastewater of the Sisamau Nullah is sent to the Bhingawan sewage treatment plant (STP). From there, the treated wastewater is directed to the Pandu river. Another 60 MLD is being sent to the newly-built pumping station near the riverside powerhouse by making a tapping point downstream of Sisamau Nullah, which is further pumped to the Jajmau STP.

8 more small drains having total capacity of 50 MLD, the Parmia, Guptarghat, Shitalabazar, Wajidpur, Budhiaghat, Nawabganj, Myormil and Dubka Nullahs, passing through Kanpur city and flowing into the Ganga have been tapped.

### Unique/Key feature of the Intervention

This is the country's largest open drain, built by the British in 1892 that passes through 40 mohallas and inhabited by close to 1.5 million people.



Treatment of wastewater flowing through drains (Source - Kanpur Nagar Nigam)

# 44. PHYTO/BIO-REMEDIATION TECHNOLOGY FOR DRAINS CARRYING WASTEWATER

## KANPUR

### Nature of the Intervention



*Reducing the pollution load on river and treatment infrastructure by treating wastewater flowing in drains*

### Location of the Intervention



*Kanpur (Ganga and Pandu rivers)*

### Implementation Agency



*Kanpur Nagar Nigam and Bioxgreen technology pvt. Ltd*

### Finance



*Kanpur Nagar Nigam – 15th Finance Commission*

### Brief description of the Intervention

NGT wide its order O.E. no./200/2000 asked Kanpur Nagar Nigam (KNN) to treat wastewater to prescribed standards before being discharged into the Ganga and Pandu Rivers. Four untapped drains falling in the purview of the municipal corporation is carrying around 75 MLD wastewater which is directly discharged into the Pandu River flowing in southwest of city. The permanent solution for wastewater treatment is expected to take about 1.5 years. Therefore, to control the pollution KNN decided to use Phyto and Bio-remediation technology for the in-situ treatment of wastewater flowing in drains and falling in the Pandu River. By E-tendering process KNN hired Bioxgreen technology pvt. Ltd. for bio-remediation treatment. Similarly, three other drains falling in the Ganga River were also treated with the bio-remediation technique. Total around 88 MLD untreated wastewater falling in the Pandu and Ganga River was treated with the Bio-remediation technique.

### Unique/Key feature of the Intervention

Treatment of drains through is an immediate relief from pollution affecting natural waterbodies before STPs are constructed, and with reduction in the BOD load it can reduce load on STPs O&M cost.





Miyawaki forest development (Source - Kanpur Nagar Nigam)



# 45. GREENING OF THE KANPUR CITY USING MIYAWAKI FOREST TECHNIQUE

## KANPUR

### Nature of the Intervention



*Innovative plantation strategy for enhancing local biodiversity and ecology*

### Location of the Intervention



*Panki-Kalyanpur, ordinance factory; Kanpur*

### Implementation Agency



*Kanpur Nagar Nigam*

### Finance



*Kanpur Nagar Nigam – 15th Finance Commission*

### Brief description of the Intervention

The urbanisation stimulates addition of greenhouse gases in cities which is one of the reasons for rising temperature/urban heat island effects in cities. Urban greening can help in acting as carbon sinks and further reduce the high temperature impacts. Conventional afforestation is time consuming and a resource intensive activity.

Kanpur Nagar Nigam has planted 2.5 lakh saplings in six different locations in the city using Miyawaki plantation technique. Green belts are being planted along roadsides and open spaces in city. The project is implemented by Kanpur Nagar Nigam using the 15th finance commission grant. This technique has higher survival index for plants compared to conventional methods. Given the scarcity of land in urban areas this method is quite useful as the forestation can be contextualised in any space.

### Unique/Key feature of the Intervention

The Miyawaki forestation drive in the city engaged youth participation



नमो  
गंगा

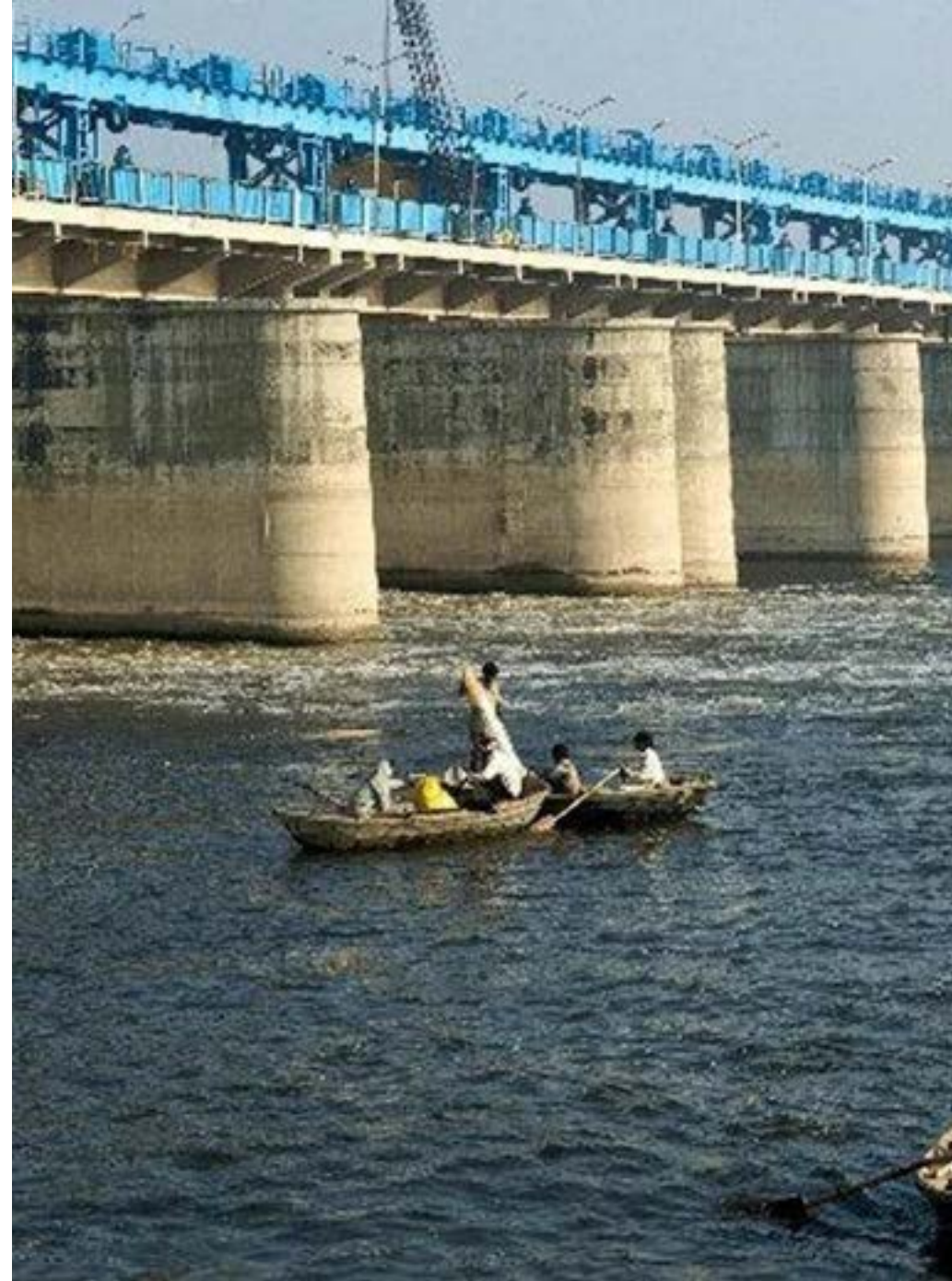


**niu**  
National Institute of Urban Affairs

# URBAN RIVER MANAGEMENT PLAN KANPUR



**KANPUR NAGAR NIGAM**  
Uttar Pradesh



# 46. KANPUR URBAN RIVER MANAGEMENT PLAN

## KANPUR

### Nature of the Intervention



*Adopting Urban River Management Plan (URMP) Framework for maintaining healthy urban river stretches*

### Location of the Intervention



*Pan City*

### Implementation Agency



*National Institute of Urban Affairs (NIUA)*

### Finance



*Namami Gange*

### Brief description of the Intervention

Kanpur city is located along main stem of Ganga and also bears a historical significance. The city was also notoriously famous for polluting Ganga river through tannery industries and has initiated attempt to improve the business as usual scenario. National Institute of Urban Affairs (NIUA), in association with the National Mission for Clean Ganga (NMCG) has developed Urban River Management Plan for Kanpur, a strategic framework for managing urban river stretches. The purpose of this document (Urban River Management Plan, URMP) is to develop a dedicated strategy for managing the extent of the Rivers Ganga and Pandu—that flow through the city of Kanpur—in an efficient and sustainable manner.

The URMP framework is based on the three pillar of sustainable development—Economics, Social, and Environment. It has proposed nineteen tangible and practical actions for managing the two rivers under a ten-point agenda (or objectives) to ensure the “Nirmal” and “Aviral” nature of the rivers in the city. This version of the URMP (Version 1.0) for Kanpur City is short-term in nature, targeting actions over a 2-3 year period. However, the URMP document is a living document, which will address issues related river management on continuous basis in subsequent versions.

### Unique/Key feature of the Intervention

Kanpur is the first city to have prepared Urban River Management Plan



Fecal Sludge Management Call Centre and branding of desludging vehicles (Source - Kanpur Nagar Nigam)

# 47. FORMALIZATION OF DESLUDERS FOR IMPROVED FSSM

## KANPUR

### Nature of the Intervention



*Streamlining the desludging services provided by private sector*

### Location of the Intervention



*Pan City*

### Implementation Agency



*Jalkal Vibhag, Kanpur Nagar Nigam and Population Services International India (PSI)*

### Finance



*MAVERICK VENTURE*

### Brief description of the Intervention

In Kanpur city, there are almost 92,200 households connected to the septic tanks, forming almost 20% of total households in the city, connected to on-site system. To cater to this population, there are around 40 private tanker operators with 50 desludging vehicles. The Private Truck Operators (PTO) association formed as “Kanpur Septic Tank Seva Samiti” has entered into an MOU with Jalkal Vibhag, Kanpur Nagar Nigam in December for 3 years. This has empowered the PTOs association to demand their rights as an entrepreneur from Kanpur Nagar Nigam (KNN).

PSI supported branding of these 50 desludging tankers, looking at the benefits and recognition of branding. Association has made branding mandatory for all new tankers at their own expense for registering them with Jalkal Vibhag, KNN. A Fecal Sludge Management call center has been created and these 50 desludging vehicles are being tracked through call center using tracking software. Trained manpower is deployed in the centre to track the movement of desludging vehicles, monitor safe disposal, and address customer requests and grievances. All 5 safe disposal locations are geo-fenced to ensure 100% real-time reporting of the safe disposal of FS in FSM call center MIS.

### Unique/Key feature of the Intervention

Kanpur Nagar Nigam has registered all the 50 desludging vehicles by providing licence to the 40 private tanker operators



# 48. SEWAGE INFRASTRUCTURE – HYBRID ANNUITY MODE

## MAHESHTALA

### Nature of the Intervention



River rejuvenation through involving private sector

### Location of the Intervention



Maheshtala

### Implementation Agency



Kolkata Metropolitan Development Authority (KMDA)

### Finance



Development Bank of Austria

### Brief description of the Intervention

Maheshtala, one of the 29 towns in the catchment of the polluted stretch of Ganga river is situated on the east bank of River Ganga. The pollution abatement project at Maheshtala aims to stop the flow of sewerage into River Ganga from the town. The major components of the project include a 35 MLD STP, 4 pumping stations, 6 diversion structures, Repair & Rehabilitation work, 15 years Operation and Maintenance (O&M).

This project is under Hybrid Annuity Mode (HAM) wherein 40% construction cost will be paid during construction period and balance 60% as quarterly annuities along with interest and O&M cost over a period of 15 years. NMCG signed two quadripartite agreements for development of sewage infrastructure, including a 35 MLD STP for Maheshtala under HAM at a total cost of ₹273.52 crores. Oesterreichische Entwicklungsbank AG (Development Bank of Austria) is financing Maheshtala Waste Water Management Private Limited (MWWMPL), which will be responsible for entire development and operation of both sewerage network and STPs for 15 years of concession period. The payment during operations period will be subject to achievement of Key Performance Indicators (KPIs) in terms of treated wastewater quality for the STPs.

### Unique/Key feature of the Intervention

The Hybrid mode of constructing and managing sewerage network



(Source - NMG & Cleartech Water)



# 49. REUSE OF TREATED WASTEWATER

## MATHURA VRINDAVAN

### Nature of the Intervention



Re-use of treated wastewater to reduce stress on fresh water sources

### Location of the Intervention



Mathura

### Implementation Agency



SPMG, ULB and IOCL

### Finance



Namami Gange and IOCL

### Brief description of the Intervention

Mathura sewage project integrates both the construction of new STPs and existing infrastructural maintenance under one operator for the whole city. With a capstone component of a 20 MLD Tertiary Treatment Plant (TTP) for reuse of treated waste water, this is being supplied to Mathura Refinery of Indian Oil Corporation Ltd (IOCL) for non-potable purpose. The project sanctioned at ₹ 437.95 crores, is unique as it helps towards Nirmal as well as Aviral Ganga through creation of adequate sewerage treatment capacity and reduced fresh water abstraction through reuse of 20 MLD treated waste water.

Tapping of Nallas falling in river Yamuna will reduce pollution and sewage reuse by IOCL to ensure about 2 Crore litre per day of excess water in the river. This unique model is designed to use secondary treated wastewater from existing STPs post treatment to produce industry grade water for usage in IOCL refinery at predetermined rates and quality levels while also promoting market for recycle/reuse of treated wastewater in India. This will further help in sustaining the operation of infrastructure created which is a need-of-the-hour in the sewage sector. In 16 MLD UASB plant, reduction in methane emission into the atmosphere is being achieved by reutilising bio-gas for power production through revamping the entire system.

### Unique/Key feature of the Intervention

This is India's first city-wide Integrated Sewage Infrastructure Development of STP and associated infrastructure under the One-City-One-Operator scheme and reuse of wastewater

Target 6.3,  
6.4



Dolphin eco-park (Source - Munger)

# 50. DOLPHIN ECO PARK

## MUNGER

### Nature of the Intervention



*Creating awareness on ecosystem services and biodiversity support provided by river*

### Location of the Intervention



*Sojhi Ghat*

### Implementation Agency



*Environment and Forest Department, Govt. of Bihar*

### Finance



*Environment and Forest Department, Govt. of Bihar*

### Brief description of the Intervention

A dolphin eco-park has been developed at the Ganga Sojhi Ghat in the historic city of Munger in Bihar by the State Forest Department with the sole purpose of conserving the Gangetic Dolphins while also creating a community awareness about the same with the help of dolphin trackers.

Despite a small area of 1 acre, the park has been made aesthetically pleasing through murals and some artistic features. Developed with the intention of aquatic tourism, tourists will also be able to see the adventures of dolphins in the Ganges by coming here as part of national aquatic fauna sightseeing. Facilities such as tourist rest rooms, toilets, benches in the shape of various aquatic creatures to generate awareness among tourists regarding declining aquatic creatures count are also proposed here. Tree plantations, pedestrian pathways for walking and boating provisions are also proposed as part of the eco park landscape. Overall this is a great initiative for creating a people-river connect and dolphin - people connect as well.

### Unique/Key feature of the Intervention

Perhaps the only Gangetic Dolphin Eco Park in India and entire of South East Asia at present.



Glimpse of sewage infrastructure under creation in Patna (Source - NMCG)

# 51. URBAN RENEWAL OF CITY'S SEWERAGE INFRASTRUCTURE

## PATNA

### Nature of the Intervention



*Public Private Partnership (PPP) approach in delivering citywide sewerage services*

### Location of the Intervention



Patna City

### Implementation Agency



SPMG, Patna Municipal Corporation

### Finance



Namami Gange

### Brief description of the Intervention

Patna, situated on the southern bank of Ganga, is surrounded by two other rivers on two other sides: Sone River and Pun-Pun River. Rising population of Patna have significantly contributed to rise in the flow of untreated sewage being discharged directly into the river. In order to tackle the pollution load comprising a current sewage generation of about 230 MLD and a projected increase to 320 MLD by 2035, a comprehensive city-wide sewerage scheme has been developed for creating new sewerage infrastructure with a sanctioned cost of Rs 3237 Cr.

There are 4 STP's in the city, with installed capacity of 109 MLD, however the utilisation is at the most 64 MLD. Under Namami Gange mission, all 6 sewage zones in Patna have been covered with 11 sewerage schemes for providing 100% sewage treatment facility with 350 MLD STP capacity along with 1140.3 km sewerage network to cater demand of 2035 population. Two projects, Beur STP (43 MLD) and Karmalichak STP (37MLD) have been completed and will benefit approximately 8 Lakh people with sanitation facility and total sewage treatment capacity of 80 MLD. The concept of one city one operator has also been adapted by integrating the development of new STPs with existing treatment infrastructure in the city/town under HAM, to improve accountability and governance with city wide contract.

**Unique/Key feature of the Intervention**

For the first time in Patna a PPP approach of Hybrid Annuity Mode (HAM), Performance Linked Payments, 15 years long term Infrastructure Operation & Maintenance (O&M) included for sewerage projects.



Patna River Front developed as a public space to connect to river Ganga (Source - NMCg)

# 52. RIVER FRONT DEVELOPMENT

## PATNA

### Nature of the Intervention



*Eco-friendly riverfronts for river-citizen connect*

### Location of the Intervention



*Patna City*

### Implementation Agency



*SPMG, Patna Municipal Corporation*

### Finance



*Namami Gange*

### Brief description of the Intervention

The River Ganga has religious significance for the city of Patna with the famous Chhat Puja of Eastern India celebrated in Patna with great gaiety on river Ganga's banks. Prior to 2013, the existing facilities at the Ghats in Patna were really poor. The Ghats were neither big enough to accommodate thousands of devotees during Chhath festival nor had any facility like changing rooms or toilets. There was hardly any Ghats where visitors to Patna can go for an enjoyable glimpse of river Ganges. Further the riverbank surface was majorly hardscape as they are either Ghats or stone pitched with virtually very little softscape along the river edge.

Patna River Front Development (RFD) has been developed to connect people of Patna to the river with a cost of ₹ 336 Cr. having 16 new ghats with 5.5 Km promenade, 1 crematorium, 3 multipurpose buildings. RFD Patna has now become a major tourist destination and a much-needed public space where people can enjoy their walk along the banks of Ganga. The beautiful design of RFD Patna has also bagged international recognition and awards

### Unique/Key feature of the Intervention

Increased river - people connect, more permeable softscape, public placemaking zone and a prime internationally acclaimed tourist destination for visitors and locals.





Bakarganj Nala before and after the treatment (Source - NMCG)



# 53. REJUVENATION OF DRAINS USING BIOREMEDIATION

## PATNA

### Nature of the Intervention



*In-situ treatment of domestic wastewater in natural drains through nature based solutions*

### Location of the Intervention



*Bakarganj Nala*

### Implementation Agency



*M/s US Environ*

### Finance



*Namami Gange*

### Brief description of the Intervention

In view of prevailing big gap between sewage generation and treatment capacity in India, CPCB has proposed to work on application of 'In-situ sewage treatment with bioremediation technology' which is relatively cost-effective and offers simpler solution to Municipalities. In-situ Bioremediation refers to "Treatment of sewage in the running battery of flow without displacing; and by employing microbial consortia in aerobic and facultative environment to degrade sewage resulting into CO<sub>2</sub> and H<sub>2</sub>O and reduce odour. M/s US Environ, a firm based out of New Delhi demonstrated a in-situ treatment at Bakarganj Nala, Patna. The Eco Bio Block (EBB) technology being practiced by the firm has already been demonstrated abroad (Japan and Malaysia) as well as in India (Mayur Vihar drain, Delhi). EBB is manufactured by volcanic rock and other marine – materials, serves as houses for micro-organisms that provide supportive structure. The EBB structures have 3 models of placement for effective contact with running water. The technology also works at minimum temperature of 100 degree celsius.

### Unique/Key feature of the Intervention

Nature based, cost effective solution to purifying sewage water with a treatment efficiency of more than 90%. for the removal of is BOD, COD and TSS.





A glimpse of rejuvenated Adalatganj lake (Source - Patna Smart City)

# 54. LAKE REDEVELOPMENT

## PATNA

### Nature of the Intervention



*Creating vibrant lake fronts for public recreation*

### Location of the Intervention



*Adalatganj*

### Implementation Agency



M/s Sai Highway and Builders Pvt Ltd and M/s Green Environmental Technology

### Finance



*Smart City Mission*

### Brief description of the Intervention

Patna has been long associated with parks and water bodies as place of recreation and the age old tradition of living with nature has to be revived in the present context. Adalatganj lake redevelopment project has been taken up under the Smart City Mission. The overall area of this lake is 11368 Sq.mm having a catchment area of 7834 sq. m with depth of 5m from nearest road levels. Under this project, the existing lake has been redeveloped at the cost of ₹ 10.62 crore. An inverted filter technique has been used for preventing suspended materials, litters etc into the sub-soil. The three layer filter has finer materials on the top and coarser materials in the bottom. The bacterial quality of the water recharging ground water table will also be considerably improved by this inverted filter.

The 7.90 acre land is redeveloped into public plaza. The proposed lake development is broken into smaller zones with land undulation and pathways creating an organic flow of space with efficient lighting. A promenade around the lake with slope stabilisation has been provided. There are many activities that has been introduced in and around the lake like boating, light & sound show, open air theatre, Food Kiosks & Rest Rooms and playscape.

### Unique/Key feature of the Intervention

Improved place making areas , better quality of water, increased connect of public with the lake and the surrounding landscape, better urban biodiversity





Proposed design of mandiri Nala (Source - Patna Smart City)

# 55. REDEVELOPMENT OF MANDIRI NALA

## PATNA

### Nature of the Intervention



*Leveraging natural drains for urban mobility and public placemaking*

### Location of the Intervention



*Mandiri Nala*

### Implementation Agency



National Projects  
Construction Corporation

### Finance



Smart City  
Mission

### Brief description of the Intervention

Mandiri Nala is the main-city drainage line connecting government administrative area and housing to the Ganga River with settlement on both sides of the drain. A kutchra drain carries discharge of Ward nos. 21, 24 , 25, 26 and 27. With time, the edges of Nala have been encroached with unplanned development of squatters along the edges. Due to an open cross section, the Nala has become a dumping ground of solid wastes and the situation is worsening day by day. The project for drain redevelopment is sanctioned at the cost of ₹ 67.11 crore. Implementation of this project will enhance the aesthetic view due to creation of spaces for public place making, pedestrian zones and enhanced quality of life.

Major design interventions proposed under the project are

- Construction of box drain
- Two lane road (5.5 m wide) from income tax roundabout till bans ghat, with uniform carriageway over top slab with median.
- Development of facilities for pedestrians, hawkers in the form of public placemaking.
- Beautification and Landscaping of the footpath, junctions.
- Provision of Street furniture (Signage's, Lane marking)

### Unique/Key feature of the Intervention

Enhanced quality of life , increased connect and awareness of people towards the nala, potential for livelihood



Beur STP (Source - NMC, World Bank India)

# 56. CO-TREATMENT OF SEPTAGE FOR REDUCING POLLUTION LOAD IN GANGA

## PATNA

### Nature of the Intervention



*Leveraging conventional sewage treatment infrastructure for handling faecal sludge and septage*

### Location of the Intervention



*Beur STP*

### Implementation Agency



*National Projects Construction Corporation*

### Finance



*Smart City Mission*

### Brief description of the Intervention

The Patna Municipal Corporation (PMC) with an area of 109.21 km<sup>2</sup> had a population of 1.68 million in 2011 had an estimated present population of around 1.8 million. Majority of households with IHHLs in Patna are based on septic tanks. PMC has 8 vacuum tankers with jetting and suction machine assembled with a truck/tractor. Emptied septage is discharged into nearby open areas, open drains (connected to River Pun-Pun and River Ganga or sewer manholes). To tackle that, co-treatment of septage is being undertaken at the Beur STP having combined installed capacity of 35 MLD (20 MLD and 15 MLD). The 15 MLD train is currently defunct and work is underway to set up a new STP, with a capacity of 33 MLD, at the same site. The STP is based on an Activated Sludge Process (ASP) technology. The STP receives waste water flow of ~18 MLD and there is spare treatment capacity of ~2 MLD which is being used for co-treatment of septage. A key stakeholder in this initiative has been a Civil Society Organization (CSO), PSI, which under a grant from the Bill and Melinda Gates Foundation (BMGF) undertook research and advocacy with key institutions, namely, UD & HD and BRJP, and brought them on board for initiating co-treatment as a mechanism to ensure that septage collected by private desludging operators from on-site sanitation systems is not dumped in the open and/or in drains and that most of the waste water generated is treated.

### Unique/Key feature of the Intervention

Reduced pollution load from the open drains and eventually from the rivers flowing through or along the Patna city



Drains in Prayagraj before and after the treatment through RENEU technology (Source - NMCG, NEERI)



# 57. RENEU – BIOREMEDIATION OF DRAINS

## PRAYAGRAJ

### Nature of the Intervention



*In-situ treatment of domestic wastewater in natural drains through nature based treatment solutions*

### Location of the Intervention



*Prayagraj*

### Implementation Agency



*NEERI*

### Finance



*Namami Gange*

### Brief description of the Intervention

The Ganga River is the most revered in India and hosts large gatherings along its bank in various parts of the year. One such large gathering called the Kumbh Mela attracts millions of pilgrims who take holy dip in the river. To abate pollution reaching Ganga river from the six major drains in a short time, the National Mission for Clean Ganga implemented Bioremediation technology with help of the National Environmental Engineering Research Institute (NEERI). 6 drains with 2 MLD of wastewater was treated using the In-situ bioremediation process.

The In-situ treatment with acronym RENEU (Restoration of Nallahs with Ecological Units) was developed by NEERI that uses the natural attenuation principle with engineered tools to treat sewage drain water as it flows in the drains. The treatment system was installed in such a way that the drain gets transformed into a public space and attracts the visibility of people due to its natural appearance. In-situ drain treatment with RENEU technology fulfilled the standard discharge norms with a 40% reduction in BOD and COD in all drains.

### Unique/Key feature of the Intervention

Bacterial load was found to be reduced by a factor of ten even sometimes more.

Target 8.3

Target 6.3



*Water hyacinth in Mula Mutha River (Source - Mongabay)*

# 58. MULA MUTHA RIVER REJUVENATION PROJECT

## PUNE

### Nature of the Intervention



*Holistic management of urban river stretches*

### Location of the Intervention



*44 km of the river stretch in Pune*

### Implementation Agency



*Pune Municipal Corporation*

### Finance



*NRCD, JICA soft loan, ULB funds*

### Brief description of the Intervention

The Mula and Mutha are important rivers passing through the heart of Pune City. Once considered the lifeline of the city today are in a severely deteriorated state largely because of pollution concerns. In 2018, the Mula-Mutha river (formed after the merging of the Mula and Mutha rivers) was found to be the second-most polluted river in Maharashtra. In March 2022, the Hon'ble Prime Minister Sh. Narendra Modi laid the foundation stone for the Mulla Mutha River Rejuvenation Project. The project aims to redesign and reengineer a 44-kilometer stretch of the Mula, Mutha, and Mula-Mutha rivers in order to clean and beautify the rivers.

The project aims to address concerns of frequent flooding, untreated sewage discharge, solid waste and debris dumping, and poor condition of the river beds and banks. Under the proposed project, the city government plans to construct 11 new STPs of 396 MLD treatment capacity to cater to the sewage generation up to 2027 along with laying 113.6 km of sewers. The project has proposed to ensure 79% of green embankments to reduce the risk of flooding. To make the river more accessible to the public, 50 new ghats will be developed. Furthermore, 270 new access points will be created along with the existing 53. The project will be completed in 11 phases over 10 years with budget of ₹ 4,727 crores.

### Unique/Key feature of the Intervention

Augmenting the river flow by constructing a barrage downstream to hold water in the river



*Existing Mula Mutha riverfront*



*Proposed design of river front by integrating religious heritage and natural landscape (Source - Pune Municipal Corporation)*

# 59. RIVERFRONT ACTIVATION AND PLACEMAKING IN PUNE

## PUNE

### Nature of the Intervention



*Integrating cultural heritage in designing riverfronts*

### Location of the Intervention



*Pune*

### Implementation Agency



*Pune Municipal Corporation*

### Finance



*NRCD, JICA soft loan, ULB funds*

### Brief description of the Intervention

The Municipal Corporation of Pune is working towards transforming the riverfront into a healthy, vibrant place to live and thrive. Some notable features of the riverfront design include:

- Constructing dedicated tanks for idol immersion, which will remain segregated from the river water.
- Restoring and enhancing the space around temples and dargahs along the riverfront and integrating these spaces in the riverfront design as part of public place making.
- Creating a green continuum along the riverfront by linking existing parks, gardens and other green open spaces.
- Developing 88km of continuous promenade, which can be cycle-friendly and pedestrian friendly, with strategically placed cycle renting booths and parking spaces.

### Unique/Key feature of the Intervention

18 temples, 18 crematoriums and burial grounds alongside the river will be integrated into the project





*Existing condition of Gujar Vidyalya Pond*



*Proposed design of the Gujar Pond*



Revival of Gujar pond in process (Source - Pune Municipal Corporation)

# 60. GUJAR VIDYALAYA POND REVIVAL

## PUNE

### Nature of the Intervention



*Restoration of waterbodies for ground water recharge*

### Location of the Intervention



*Handewadi, Southeast Pune*

### Implementation Agency



*Pune Municipal Corporation, Mission Groundwater and ACWADAM*

### Finance



*Pune Municipal Corporation*

### Brief description of the Intervention

In 2021, the Pune Municipal Corporation took up a unique project to revive a water percolation pond in Handewadi, Southeast Pune ; right at the gate of the Dada Gujar Madhyamik Vidyalaya. The PMC road department officials came across the pond during road construction work in the ward. The need to allocate space for a footpath was extended into an opportunity for the revival of the percolation pond and therefore creation of a unique public open space around it.

Rainwater from Handewadi flows into this percolation pond. A stone and sand filter has been created to receive and harvest rainwater run-off from the now built-up neighborhood. Two newly constructed filtration pits screen out leaves and rubbish flowing in with the rainwater. In addition, three small springs bring water naturally percolating in the surrounding area into the pond. Two recharge shafts of 200 feet in depth have been constructed to direct the pond water into the aquifer below. A place-making site is being developed around the lake for people to interact with the lake along with provision of seating space and sidewalks. The green cover of the area has been increased by planting 20 different trees/plant species.

### Unique/Key feature of the Intervention

Murals of rainwater harvesting have been painted over the school compound for students to see a 'LIVE working Model' of 'Water Cycle' and 'Rain Water Harvesting'



Polluted drain flowing through the city (Source - Pune Municipal Corporation)



# 61. REJUVENATING DRAINS TO AUGMENT GROUNDWATER RECHARGE

## PUNE

### Nature of the Intervention



*Creating vibrant nalla fronts as public space*

### Location of the Intervention



*Near JSPM Pharmacy College*

### Implementation Agency



*Pune Municipal Corporation,  
Mission Groundwater and  
ACWADAM*

### Finance



*Pune Municipal Corporation*

### Brief description of the Intervention

While most drains are rejuvenated for the purpose of improving the quality and aesthetics of the flowing water body, the case of the Mohammadwadi drain in Pune is a little different as its rejuvenation is primarily from the perspective of augmenting groundwater recharge as the site is located on a natural recharge zone identified through an initiative of mapping Pune's aquifers over the last five years.

Originating to the east of the Mohammadwadi forest area, this drain flows past JSPM pharmacy college. Over the years, substantial silt has been deposited in the drain bed owing to general neglect. As part of the ongoing restoration effort garbage, weeds like lantana and congress grass, and accumulated silt from the bed have been removed. The silt is used to stabilize the banks which will be re-vegetated. In addition to the cleaning of the drain, a natural retaining structure along with a green belt in the form of a biodiversity park adjacent to the left side of the drain is under development. The other side of the drain will be developed as a recreational avenue for residents with a cycle track and walkway.

### Unique/Key feature of the Intervention

The neglected city drain will be used for large-scale groundwater recharge.



Sewage treatment infrastructure (Source - Namami Gange)

# 62. POLLUTION ABATEMENT INFRASTRUCTURE

## SAHIBGANJ

### Nature of the Intervention



*Provision of sanitary infrastructure to ensure 100% citywide sewage collection and treatment*

### Location of the Intervention



*STP at Chanan and kulipada*

### Implementation Agency



*Urban Development Dept, JUIDCO*

### Finance



*World Bank/Jharkhand State*

### Brief description of the Intervention

Prior to 2020, the entire volume of approx. 9 MLD municipal wastewater would find its way untreated into Ganga River thereby causing severe pollution. For managing the wastewater generated at household level, a proposal was being considered for each household to have a leach pit. However, this posed high risk of groundwater contamination. In 2015 a detailed project report for provision of sewerage system and wastewater treatment infrastructure in town of Sahibganj was prepared.

As part of the project, sewer network of approx. 55 km in length is laid across the town collected domestic wastewater from around 12500 households of the total 18,200 households in Sahibganj town. The wastewater generated is treated in two STPs of 7 MLD and 5 MLD at Chanan area and Kulipada (pipeline road). The STPs started its operations in January 2020 and are functioning to its capacity.

### Unique/Key feature of the Intervention

Sahibganj will achieve the status of 100% sewerage coverage, when the balance 5700 households will connect to the sewer network. With this 100% of the wastewater generated in the town will be conveyed to the STP and treated wastewater is finally discharged into Ganga River resulting in significant reduction in pollution loads.





Dhobhi Jharna Nala (Source - Sahibganj Nagar Parishad)

# 63. PROTECTION OF DHOBHI JHARNA NALLA

## SAHIBGANJ

### Nature of the Intervention



*Innovative approaches for rejuvenation of natural drains*

### Location of the Intervention



*12 km stretch of nalla running through Sahibganj*

### Implementation Agency



*Minor irrigation*

### Finance



*State Funds*

### Brief description of the Intervention

Dhobhi Jharna, one of the scenic tourist places in Sahibganj, is formed at the base of Kaneri Hill and transverses around 12.5 km (part of it through Sahibganj town) as natural drain before finally discharging into Ganga River. Due to land encroachment and waste being dumped into the drains, the natural falls and the natural drain passing through the town is losing its beauty. This has further endangered the aspect of the nalla becoming extinct.

The district administration is working progressively on protecting this natural asset by measures like fencing of 6 km stretch running through the town so that waste disposal into drains can be restricted, plantation of trees on both edges of the nalla to enhance the eco-system and measures around desilting of the drain to increase the water carrying capacity. To further leverage the tourism potential through place making around the Jharna and nalla, it is being proposed to construct parks along the nalla for people to gather and enjoy the scenic beauty.

### Unique/Key feature of the Intervention

Provision of gabions along the nallas to check erosion of edges due to high water flows





Haat at Bijlee Ghat (Source - Dainik Jaagran)

# 64. “GHAT PAR HAAT” PROGRAM

## SAHIBGANJ

### Nature of the Intervention



*Leveraging waterfronts for generating livelihoods and enhancing river-citizen connect*

### Location of the Intervention



*Bijlee Ghat, Sahibganj*

### Implementation Agency



*District Administration*

### Finance



*District/ULB Funds*

### Brief description of the Intervention

With an objective to raise awareness amongst citizens regarding cleanliness in Ganga River and to promote the local art and products manufactured in Sahibganj, the district administration of Sahibganj as part of the 75th Azadi ka Amrut Mahotsav is organising “Ghat par Haat” program. The Haat will have stalls showcasing and selling earthen utensils, products made under Palas brand, toys made locally in Sahibganj town, bamboo and jute products etc.

The stalls are being set up by the district administration and given to sellers on nominal cost. Along with stalls other activities like Ganga Aarti and Bhajan Sandhya would enhance the social connect amongst local citizens and tourists coming from other areas. Such interventions are win-win from point that it helps raising awareness amongst people on conserving our natural resources as well as provide opportunities for livelihoods for people.

### Unique/Key feature of the Intervention

Photo booth at Haat for people to click photo with local products and upload on social media for wider outreach.



Green Bridge Technology (Source - Green Water Revolution Pvt Ltd.)



# 65. GREEN BRIDGE TECHNOLOGY

## UDAIPUR

### Nature of the Intervention



*Application of innovative approaches for restoration of riverine eco-system*

### Location of the Intervention



*Ayad River*

### Implementation Agency



*Jheel Sanrakshan Samiti,  
Shrishti Eco-Research  
Institute*

### Finance



*Udaipur Chamber of  
Commerce and Industry,  
Village Panchayats,  
Hindustan Zinc. Ltd.  
(PPP Model)*

### Brief description of the Intervention

Jheel Samrakshan Samiti, a grassroots organisation, used the Green Bridge Technology created by Shristi Eco Research Institute (SERI), a Pune-based company, to clean 700 metres of the Ahar river immediately before it entered the lake. JSS developed this technology with labour assistance from the impacted village communities and donations from individuals, businesses, and the government in an inspiring example of people's involvement and participation. The technology is currently being utilised to clean portions of Ahar River that had turned into sewer drainage canal flowing into Udai Sagar Lake.

The technology entails constructing several stone structures in the form of an inverted V along the specified length. The fabric made of coconut husk covers the inverted V. Then it is filled with a mixture of bacteria and a biochemical solution before being covered once again with coconut husk. The river's heavy metal deposits are cleaned up by the solution carried downstream by the water that passes through these structures. On both sides of the river, cannas are grown, acting as a natural sewage and waste sponge.

### Unique/Key feature of the Intervention

Restored aquatic life with increase in dissolved oxygen level from zero to 6.9ppm in less than two months.

Fecal coliforms fell by more than 80%, and the acidity level dropped from a pH of 10 to 8.



# 66. REJUVENATION OF LAKES

## UDAIPUR

### Nature of the Intervention



*Local administration and non-government organizations partnering for conservation of waterbodies*

### Location of the Intervention



*Lake Pichola and Fatehsagar*

### Implementation Agency



*Jheel Sanrakshan Samiti, Shrishti Eco-Research Institute*

### Finance



*Smart Cities Mission, AMRUT, National Lake Conservation Programme (NLCP)*

### Brief description of the Intervention

The clear lakes of Udaipur have long been the city's main draw for tourists. Udaipur has recently taken a number of actions to reduce lake pollution and improve the area around the lake. Some of the notable actions include:

- The closure of sewage discharge points and commissioning of sewage treatment plants
- The prohibition of idol immersion in the lakes
- The deployment of de-weeding machines
- Patrolling as well as CCTV based surveillance of the lakes
- Commissioning of Open Gyms

With regard to the rejuvenation of all the lakes, there have been emerging benefits of various interventions, with Pichola and Fatehsagar being the two main lakes of the city. As activities like idol immersion and sewage outflow have been fully stopped in these lakes, the lakes have healed and rejuvenated to a large extent. Keeping in mind the needs of local stakeholders, a separate tank has been provided for their idol immersion. De-weeding is done to preserve the aesthetics of the lakes and reduce eutrophication.

### Unique/Key feature of the Intervention

The cleanliness and attractiveness of the lakes in Udaipur are steadily improving, and this is evident in the increased footfall and gradual increase in numbers of people coming to these places.





Glimpse of Jalaj Boat along the ghats of Varanasi (Source - NMCG & WRI)

# 67. GANGA PRAHARIS – JALAJ

## VARANASI

### Nature of the Intervention



*Innovative strategies linking river centric livelihoods and ganga rejuvenation*

### Location of the Intervention



*Ghats of Varanasi*

### Implementation Agency



*WII and NMCG*

### Finance



*Namami Gange*

### Brief description of the Intervention

Under a project assigned to Wild Life Institute of India, Dehradun a cadre of “Ganga Praharis” have been raised for providing various services connected with Ganga rejuvenation. More than 630 Ganga Praharis have been trained so far, out of which around 340 are in Uttar Pradesh. 70 of them are from Varanasi district. The Ganga Praharis are also being trained in areas such as Biodiversity based tourism, Health and Wellness, Prasad and Incense Stick Making, Green Agriculture such as Bio compost, Vermicompost and Nursery Management in collaboration with Green Skill Development Program of Ministry of Environment, Forest & Climate Change. They are actively engaging and educating local communities and tourists regarding Ganga rejuvenation, Biodiversity Conservation and cleanliness activities.

To make Ganga rejuvenation program acceptable to the local communities dependent on Ganga River is by providing alternate Livelihood programs and to ensure the participation of women. A mobile livelihood centre ‘Jalaj’ in the form of a boat which moves along the ghats of Varanasi and the villages, displaying and selling goods prepared by the Ganga Praharis has been started.

### Unique/Key feature of the Intervention

Ganga Praharis have also been trained on and off site in conducting awareness campaigns, cleanliness drives, plantation, river survey and rescue and rehabilitation activities for aquatic fauna in distress.

Target 8.3,  
8.9

Target 6.b





Assi river rejuvenation in process (Source - Varanasi Municipal Corporation)

# 68. ASSI RIVER REJUVENATION

## VARANASI

### Nature of the Intervention



*In-situ treatment of domestic wastewater in drains through nature based solutions*

### Location of the Intervention



Assi River

### Implementation Agency



INTACH

### Finance



INTACH

### Brief description of the Intervention

The name Varanasi itself is interpreted to be derived from combination of ‘Varuna’ and ‘Asi’ ; the name of rivers. The river Assi is a minor tributary of the river Ganga and is struggling for its existence. Most of the river stretch has been converted to Nala due to Illegal construction works and encroachment on the whole river. The total 5.5 km length of the river flows through the Varanasi city, numerous narrow nallas are merging with Assi river with untreated waste due to which the river is now called as Assi Nala.

INTACH, a renowned national non profit organization initiated a pilot project at its own cost to reduce pollution in Assi River using low cost unconventional technology of bioremediation. Application of bacterial Bioremediation was successfully demonstrated in the 2.5 km long Assi drain carrying around 70 MLD sewage in the city of Varanasi by INTACH. Bioremediation treatment involved anaerobic facultative live bacteria strains in diluted water at 6 locations along the drain. To increase the retention time, coir logs were used along with bio media to allow bacterial growth. Substantial reduction in odour and improvement in water quality was observed by using this technology.

### Unique/Key feature of the Intervention

Reduced pollution, increased river - people connect, bioremediation technique, reduced odour and improvement in water quality







# 69. COMPREHENSIVE WATER MANAGEMENT PLAN

## VARANASI AND UDAIPUR

### Nature of the Intervention



*Application of frameworks for achieving water secure cities*

### Location of the Intervention



*Pan City*

### Implementation Agency



*National Institute of Urban Affairs (NIUA)*

### Finance



*Embassy of Denmark and MoHUA*

### Brief description of the Intervention

The project for preparation of comprehensive water management plan (CWMP), aims to support the agenda of AMRUT 2.0 of creating water-secure cities in India. It is carried out in association with the Ministry of Housing and Urban Affairs under the Green Strategic Partnership between India and Denmark. The objective of the project is to introduce new and contemporary way of managing the four core elements of the urban water sector, i.e. water supply management, wastewater management, stormwater management, and water environment management, in a holistic and synergistic manner.

The project aspires to create an enabling environment for CWMP's that are Resource-sensitive (shifting from supply to demand management), Forward-looking (integrating water thinking into long-term Plans), Inclusive (in collaboration with a wide range of stakeholders), Transformative (targeting proactive reforms), State-of-the-art (embracing innovation)

### Unique/Key feature of the Intervention

The CWMP builds on the City Water Balance Plans and City Water Management Plans under AMRUT 2.0 and addresses the entire urban water cycle



Varuna River Rejuvenation (Source - Varanasi Nagar Nigam)

# 70. VARUNA RIVER REJUVENATION VARANASI

## Nature of the Intervention



*River rejuvenation through catchment improvement approach*

## Location of the Intervention



*Varuna River Stretch*

## Implementation Agency



*U.P. Irrigation & Water Resources Department*

## Finance



*State Govt.*

## Brief description of the Intervention

The Varuna River is a minor tributary of the Ganges River in Uttar Pradesh, India. It originates at Phulpur in the Prayagraj district and merges into the Ganges near Sarai Mohana in the Varanasi district. Once a healthy river is now flowing with municipal and industrial waste in it. An estimated 59.81 MLD of wastewater is being discharged in the river of which 59.7 MLD is domestic sewage. There are 14 Drains that discharge into river Varuna out of which 6 drains have been tapped till date and the domestic sewage is pumped to sewage treatment plant at Dinapur and Goithiha. The remaining 8 drains being untapped, there is direct discharge of untreated domestic sewage in the river.

An action plan has been prepared for the rejuvenation of the Varuna river which includes channelization of Varuna (10.300 km) in the city, retaining of river slope and soil stabilisation (14.00 km), construction of ghats (7 nos.) and steps, laying HDPE pipe (14.00 km) on both sides to intercept waste water and divert towards sewage pumping station and treatment plants, arrangement for bringing water from Ganga in Varuna through Gyanpur pump canal, making footpath (14.00 km), railing, lighting arrangement along the river and restoration of regulator.

## Unique/Key feature of the Intervention

Interception of the wastewater being discharged into the river and creating a open space for people to connect with river





Kund rejuvenation (Source - Namami Gange)

# 71. KUND RESTORATION VARANASI

## Nature of the Intervention



Conservation of cultural heritage

## Location of the Intervention



Ganga River Stretch

## Implementation Agency



Varanasi Development Authority (VDA)

## Finance



Namami Gange

## Brief description of the Intervention

Varanasi is interspersed with sacred kunds, they are an inseparable element of the urban fabric of the organic core of the ancient city. These kunds also suffer from poor water quality, degeneration, wastewater discharge, broken ghats, boundary issue, lighting issue and landscape issue.

A project was taken up under Namami Gange mission for the restoration of 8 kunds at the cost of Rs 18.87 Cr., for which a Detailed Project Report (DPR) was prepared by INTACH. The project has been completed and inaugurated by Hon'ble Prime Minister of India. The major works executed on these Kunds include: upgradation of public/ open space through pathways, lighting, signages, railings, desilting and removal of weeds, restoration and construction of Ghats, construction of retaining walls, electrical and plumbing works, bioremediation etc.. The name of Kunds taken up under this project are- Kalha Kund (Shivpur), Dudhiya Kund (Shivpur), Laxmi Kund (Shikrol), Pahariya Kund (Sarnath), Panchkosi Kund (Nagwa), Kabir Kund (Dashashamedh), Rewa Kund (Nagwa) and Bakhariya Kund (Jaethpura).

## Unique/Key feature of the Intervention

Ground water recharge, improved aesthetics, better water quality and increased connect of people with the city's heritage



Proposed plan for khirkiya Ghat (Source - Varanasi Nagar Nigam)

# 72. KHIRKIYA GHAT DEVELOPMENT

## VARANASI

### Nature of the Intervention



*Creating a space for citizen to connect with river*

### Location of the Intervention



*Khirkiya Ghat*

### Implementation Agency



*PLANNER INDIA*

### Finance



*Namami Gange*

### Brief description of the Intervention

One of the 84 ghats of Varanasi, Khirkiya Ghat, having an area of around 11.5 acres is being renovated using modern techniques, and it will soon have all the advanced facilities that other existing ghats do not. Khirkiya Ghat will become a new centre of attraction for people from all over the world visiting Kashi to see the captivating images of the crescent-shaped ghats along the Ganga river. The estimated cost of the total project is around ₹. 35.83 crore. The main aim of the development project was to make it accessible via water, land and air.

The renovated ghat will be developed as eco-friendly ghat and will be laced with facilities like, water adventure sports, jetty, food court, park, morning walk stretch etc. It will have parking facility for 120 four-wheelers and 250 two-wheelers. "The structure of the ghat will be based on GABION and will look like the other old ghats but would be safe even during disasters like floods. A multipurpose platform is being built on 1.6 acres on which two helicopters would be able to land at a time. A CNG station is also being built at the Ghat for a CNG-powered boat to prevent pollution in the Ganga.

### Unique/Key feature of the Intervention

Khirkiya ghat is being developed with modern amenities to boost the river economy





Improvement of 26 Ghats along the Ganga River stretch



# 73. GHAT IMPROVEMENT

## VARANASI

### Nature of the Intervention



Ghat improvement along the Ganga Stretch

### Location of the Intervention



26 Ghats

### Implementation Agency



Varanasi Nagar Nigam

### Finance



Namami Gange

### Brief description of the Intervention

Varanasi city has 88 ghats, most of them are bathing and puja ceremonial ghats, while two ghats, Manikarnika and Harishchandra, are used exclusively as cremation sites. Most of the ghats in Varanasi were rebuilt in the 18th century under the Maratha Empire.

To improve the visitor's experience and provide the basic facilities at these ghats, a project was sanctioned for the restoration/ retrofitting of 26 Ghats in Varanasi at an estimated cost of Rs 11.73 Cr. The project is completed and handed over to ULB. The major works executed under this project include better sanitation facility, bolder pitching and RCC work at damaged platform, repair work for damaged stairs, launching aprons etc. The name of 26 ghats are:- 1.) Prabhu Ghat, 2.) Bhadaini Ghat, 3.) Janaki Ghat, 4.) Anandmai Ghat, 5.) Badrinarayan Ghat, 6.) Gola Ghat, 7.) Trilochan Ghat, 8.) Naya Ghat, 9.) Ram Ghat, 10.) Nishadraj Ghat, 11.) Gai Ghat, 12.) Bundiparkota Ghat, 13.) Mansarovar Ghat, 14.) Jain Ghat, 15.) Sankatha Ghat, 16.) Pandey Ghat, 17.) Lal Ghat, 18.) Kedar Ghat, 19.) Chauki Ghat, 20.) Jatar Ghat, 21.) Sakka Ghat, 22.) Telianala Ghat, 23.) Raja Gwalior Ghat, 24.) Narad Ghat, 25.) Sheetala Ghat and 26.) Nandeshwar Ghat

### Unique/Key feature of the Intervention

26 Ghats along the Ganga River were reconstructed to provide better amenities and connect people to the River Stretch





Payakapuram lake before the rejuvenation



Payakapuram lake during the cleaning and development process



Payakapuram lake after rejuvenation (Source - Vijaywada Municipal Corporation)

# 74. PAYAKAPURAM WATER BODY RESTORATION

## VIJAYWADA

### Nature of the Intervention



*Holistic approach for restoring urban water bodies*

### Location of the Intervention



*Payakapuram Waterbody (2.60 acres)*

### Implementation Agency



*Vijayawada Municipal Corporation (VMC)*

### Finance



*VMC General Funds*

### Brief description of the Intervention

The Payakapuram waterbody restoration initiated in February 2021, with the purpose of restoring the waterbody and its surrounding area back to a healthy ecosystem that can have a positive impact on human life.

The available land in the water body area has been developed to create serene and pleasurable landscape for the citizens, with a wide range of potential experiences. Some of the key improvements include strengthening of Payakapuram Cheruvu Bund; desilting; removal of water hyacinth and horse weed; beautification of water body; construction of 3.05m wide and 500 m long peripheral walking track; plantation of trees and spaces for landscape greenery; and development of pathways, seating plaza, children play area. This restoration project costed around ₹ 330 Lakhs.

### Unique/Key feature of the Intervention

Project addressed multiple aspects of urban water resource management, such as creation of aesthetically pleasing public spaces, solid and liquid waste management and heritage conservation



*Polluted stretch of the canal flowing through the city*



*Canal after the rejuvenation*



*A vibrant space created along the canal (Source - Vijaywada Municipal Corporation)*

# 75. REJUVENATING THE CANALS FLOWING THROUGH VIJAYAWADA

## VIJAYAWADA

### Nature of the Intervention



*Holistic approach for restoring urban water bodies*

### Location of the Intervention



*Nearly 20 Kms of Canal Bund (Bandar, Ryves & Eluru Canals)*

### Implementation Agency



*Vijayawada Municipal Corporation (VMC)*

### Finance



*AMRUT 2.0  
15th Finance  
Commission*

### Brief description of the Intervention

The city of Vijayawada has three major canals flowing through it - Bandar Canal, Ryves Canal, and Eluru Canal. All three canals are severely polluted largely because of the discharge of untreated sewage. The problem is accentuated by the fact that the canal water is sourced for drinking and irrigation purposes downstream. While there have been some initiatives taken up by the municipal body to curtail the flow of sewage and single-use plastic waste, this has not been a permanent solution.

The VMC has, therefore, prepared a long-term robust rejuvenation plan to manage the canals based on a gap assessment of existing infrastructure, analysis of pollutants causing canal pollution, and possibilities of diverting the untreated sewage to the treatment plants.

Under the Plan, a 20.70km of canal bund has already been taken up as a pilot for greenery and beautification, to create serene and pleasurable landscape areas for the citizens, and improve the environmental conditions and liveability of the city. Pathways and walking tracks have been developed for continuous passage and cycling purposes.

### Unique/Key feature of the Intervention

Lays equal emphasis on pollution abatement and beautification in order to arrive at a long-term sustainable solution

Target 11.7

Target 8.9







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