



# Towards a Water Sensitive Delhi: Strategic Recommendations for the Delhi Development Authority (DDA)

*A Position Paper based on the  
Outcomes of Delhi's Water  
Sensitivity Baseline Assessment*



# Executive Summary



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The Australia-India Water Security Initiative (AIWASI), led by the Department of Foreign Affairs and Trade (DFAT) and implemented through a consortium comprising the World Resources Institute (WRI), the National Institute of Urban Affairs (NIUA), the Mahila Housing Trust (MHT), and McGregor Coxall (Australia), seeks to promote the adoption of water-sensitive planning and design principles in Indian urban context.

This Position Paper is an outcome of the Delhi Water Sensitivity Baseline Assessment developed under the project, which evaluated Delhi's performance against the seven goals of the Water Sensitive Cities Index conceived by the Cooperative Research Centre for Water Sensitive Cities (CRCWSC), Australia. The assessment aims to understand the city's existing status in urban water management and to identify critical areas for action.

This Position Paper is intended to guide and support the mainstreaming of water-sensitive planning and design principles within the operations and larger vision of the Delhi Development Authority (DDA), the apex institution responsible for planning and development in Delhi. Comprising 16 departments overseeing different aspects of urban planning and development, the DDA manages a significant portfolio that includes approximately 5,050 hectares of green cover, 15 sports complexes, 429 local shopping centres, 7 district centres, 30 janta markets, and several urban heritage sites. The DDA also prepares the Master Plan for Delhi, which lays out city's 20-year development roadmap.

Both the Delhi Water Sensitivity Baseline and this Position Paper have been developed through extensive consultation with members of the Delhi Water Forum, a platform established under AIWASI. The Forum brings together six key government line agencies involved in water management, along with think tanks, academic institutions, community-based organisations (CBOs), and subject experts.



Delhi currently fares as a Drained city - the early stage of urban water management wherein the city's infrastructure and planning are designed to drain away water efficiently, rather than retain, reuse, or integrate it into the urban environment. To enable the transition towards a Water Sensitive City, the Delhi Development Authority (DDA) can play a pivotal role in embedding water-sensitive principles across planning, design, and governance frameworks. While this document presents a detailed analysis, the summary table below provides **a concise snapshot of the proposed transition pathway, outlining the key actions required and the DDA departments that can lead and support its implementation.**

Water Sensitive City Goals	Short term Actions (0-5 years)	Long-Term Actions (5-15 years)	Rationale
Lead and Supporting Departments			
Goal 1: Ensure Good Water Sensitive Governance	Undertaking <b>Training Needs Assessment</b> for different departments from the lens of water management / water cycle restoration	Establishing <b>Interdepartmental Water Cell</b> with an AI and Innovation Unit	<b>Institutional capacities:</b> Continuous capacity-building as a core function, not an occasional activity  <b>Innovation Integration and Scale up:</b> Transitioning from conventional approaches to advanced and innovative approached to city-wide water-sensitive practices
	Setting up <b>dedicated capacity building/ R&amp;D funds</b> on the basis of capacity building annual calendar tailored to the specific needs	Implementing <b>innovative pilot demonstrations</b> using local governance mechanisms and community stewardship	
DDA governing body  Personnel Department  Different Departments like Planning, Landscape, Horticulture, Engineering etc.	Establishing <b>data-driven governance systems in every department</b> and training officials to enable the transition (e.g. advancing data systems and mainstreaming AI and Predictive Modelling to water demand, water infrastructure etc.)	Enabling <b>Institutional policy reforms to integrate and monitor capacity building</b> , research and development aligned to 5 year individual and organisational targets	<b>Inter-department coordination:</b> Breaking the internal departmental silos and leveraging already in place platforms like DWF to enhance cross-learning.
	Strengthening <b>Delhi Water Forum (DWF)</b> as a platform for <b>plugging in specific subject expertise to different DDA departments</b> as well as an interface with the on-ground water issues and citizen aspirations	<b>Mainstreaming of Water-Sensitive Urban Design</b> and Planning within functioning and projects of <b>all the relevant DDA departments</b>	



Water Sensitive City Goals	Short term Actions (0-5 years)	Long-Term Actions (5-15 years)	Rationale
Lead and Supporting Departments			
Goal 2: Increase Community Capital	Establish <b>Standard Operating Procedures for engaging and empowering communities</b> across DDA's departments	Commissioning <b>city-wide programs like the "Co-Crete Delhi" Model for Community-Led Urban Asset Management</b>	<b>Jan bhagidari:</b> fostering a culture of using citizen science, environmental responsibility and shared ownership in public spaces.
Project design, Implementation and Infra Management Departments like: Planning, Architecture, Landscape/ Horticulture, Engineering	Launching <b>programs like Adopt a Park or Adopt a Drain stretch</b> in five priority planning zones	Establishing <b>city-wide one stop centres or online apps</b> to encourage citizens to report any service delivery, infrastructure or O&M issues with a 48-hour turn around time.	<b>Public-private-people project uptake:</b> increasing private and community uptake of projects with co-designing, implementation & co-managing projects across various DDA projects
Goal 3: Achieve equity of essential services	Enabling <b>water demand management measures through Master Plan initiatives</b> and strategic planning with the Delhi Jal Board, like pricing or incentivising judicious water use.	Creating a <b>ward-level dashboard to map provision and gaps in essential physical and social infrastructure</b> in tune with the changing landuse/ population	<b>Long-term Water Security for all:</b> With the development pressures in Delhi, the water source augmentation is a major concern to ensure water security. By mainstreaming conjunctive use of water and local source sustainability, long-term water security can be ensured for the existing and projected water demands.
Project design, Implementation and Infra Management Departments like: Planning, Architecture, Landscape/ Horticulture, Engineering	<b>Diversifying water sources</b> through reuse of used water, managed aquifer recharge at the building as well as the city level.	<b>Integrating recycled used water in city's main grid and directing any surplus potable water to under-served areas</b>	
Goal 4: Improve Productivity and Resource Efficiency	<b>Integrating the concept of water footprints/ water balance</b> at the built as well as city-scale to identify bulk users and potential contributors exhibiting mindful water use.	<b>Embedding water/ energy/ GHG emission audits</b> in the Master Plan to monitor them across the water management value chain and across different land uses like open spaces, economic centres etc.	<b>Mainstreaming Water-Energy-GHG Nexus in DDA's decision-making:</b> Fail-proofing the water treatment and sewage treatment infrastructure by pre-empting their water and energy demands as well as GHG emissions.



Water Sensitive City Goals	Short term Actions (0-5 years)	Long-Term Actions (5-15 years)	Rationale
Lead and Supporting Departments			
Project design, Implementation and Infra Management Departments like: Planning Architecture Landscape/ Horticulture Urban Heritage Department	<b>Instituting a Greenhouse Gas (GHG) Inventory specific to DDA's operations and developments.</b> Quantifying emissions, identifying high-impact sectors may inform prioritising low-carbon interventions in planning and infrastructure.	<b>Initiating a framework for generating and trading green credits/ water credits</b> for sustainable practices at the built/ site level such as energy-efficient building designs, enhanced green cover, and water-sensitive urban projects.	<b>DDA as a proactive enabler of climate-positive urban growth:</b> Implementing mechanisms for credits aligned with national carbon markets or city-level incentive programs, can help unlocking new incentivising mechanisms to nudge low energy, low water, and low carbon development.
Goal 5: Improve ecological health	<b>Commissioning Sponge Parks/ Managed Aquifer Recharge projects in 5 priority zones</b>	<b>City-Wide Rollout of Impervious Surface Fee:</b> creating a dedicated revenue streams to fund the maintenance and expansion of green infrastructure.	<b>Measurable environmental outcomes:</b> Conducting regular assessment and prioritisation of water ecosystems can help demonstrate quantifiable ecological improvements in DDA's jurisdiction.
Project design, Implementation and Infra Management Departments like: Planning Architecture Landscape/ Horticulture Urban Heritage Department Sports Complex	<b>Assessing the current conditions of water bodies/ wetlands using the Urban Water Bodies Diagnostic</b> Tool developed by NIUA. This can help in developing a database for 700+ water bodies in Delhi and in prioritising water bodies that require urgent action.	With support from mandatory Master Plan provisions, maintaining green buffers around water bodies and <b>reshaping them as blue-green infrastructure</b> , creating recreational avenues and opportunities for land value capture.	<b>Long-term climate resilience:</b> Implementing Sponge parks, wetland restoration, and green-blue corridors will help in improving flood management, groundwater recharge, and urban cooling, reducing disaster risk and future adaptation costs.
	<b>Creating a dynamic GIS based platform for existing land parcels in the River Yamuna floodplains</b> along with the land ownership, upcoming or ongoing projects and tracking progress of various interventions by DDA.	<b>Earmarking land for Redevelopment Projects to rehabilitate existing settlements</b> away from the river Yamuna.  Strategising a plan for capitalizing on the river view post ecosystem restoration to capture land value.	<b>Ecosystem Services Payout:</b> Rolling out of an Impervious Surface Fee and opportunities for land value capture around restored ecological zones provide DDA with sustainable financial mechanisms for infrastructure upkeep and future investments.



Water Sensitive City Goals	Short term Actions (0-5 years)	Long-Term Actions (5-15 years)	Rationale
Lead and Supporting Departments			
Goal 6: Ensure Quality Urban Space	Designing and implementing green blue projects: <ul style="list-style-type: none"> <li>• Rejuvenating water bodies with green spaces and recreational activities</li> <li>• green blue continuums along drains</li> <li>• vertical gardens and rooftop greens in case of scarcity of land</li> </ul>	Having <b>a larger city-level strategy</b> like ABC program for Singapore, looking at identifying, designing and implementing city-wide projects with consideration to <b>networks of water rather than piecemeal interventions</b> .	<b>Social equity and liveability:</b> by creating accessible, multifunctional public spaces that benefit diverse communities across peri-urban and urban areas.  <b>A forward-looking strategy:</b> integrating ecological health, aesthetics, and citizen well-being into urban development.
Project design, Implementation and infra management Departments like: Planning Architecture Landscape/ Horticulture Engineering Land Management Department	Designing and rolling out <b>community stewardship programs</b> for <b>sustaining and maintaining these urban spaces post implementation</b> .	Building <b>partnerships with other departments and line agencies to co-invest and implement water sensitive urban planning and design projects</b> . Forums like Delhi Water Forum can be instrumental in driving such partnerships.	<b>Sustained Institutional partnerships</b> with line agencies, schools, eco-clubs, and civil society, enabling co-investment and shared responsibility for maintaining such spaces.
Goal 7: Promote Adaptive infrastructure	Creating local stewardship programs where RWAs, schools, or civil society groups to take on light upkeep tasks and discourage misuse or encroachment	Performance Monitoring and Public Dashboards: implementing ward-level dashboards to track green assets and their maintenance	<b>Scalable localised, community led adaptive infrastructure solutions:</b> Demonstrating water-sensitive design through pilot projects such as sponge parks, green corridors, decentralized wastewater systems etc. that integrate ecological and social functions.
Project design, Implementation and infra management Departments like: Planning Architecture Landscape/ Horticulture Engineering Land Management Department	Implementing <b>a ward level/settlement-level pilot</b> in partnership with the community and local agencies to showcase the benefits of integrated water management in <b>resolving water scarcity, localised flooding and water quality issues</b> .	Adopting <b>a city-wide Integrated Water Cycle Management approach by bringing stormwater, wastewater, groundwater, and surface water management under a unified planning and governance framework</b> , supported by a GIS-based digital platform for real-time mapping, monitoring, and decision-making across DDA's jurisdiction.	<b>Learning Laboratories:</b> Using these pilots as learning laboratories to test adaptive design and maintenance models, which can then be scaled up to the city level.



# Overview of Delhi's Water Landscape



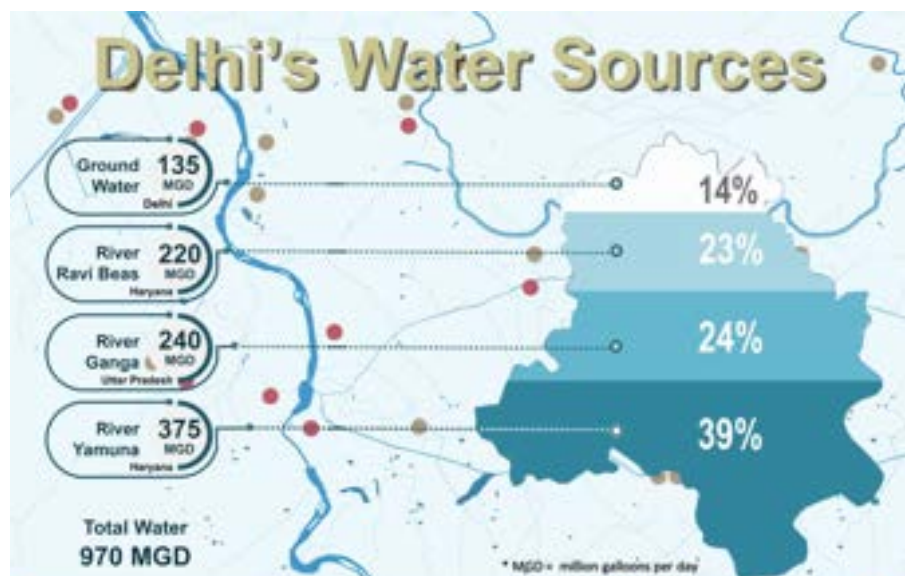
## Source and Demand of Water

Delhi's water supply system is heavily dependent on both surface water and groundwater resources. The total available water supply is approximately 970 million gallons per day (MGD), while the estimated demand stands at 1250 MGD, resulting in a supply shortfall of nearly 22%.

This heavy reliance on external river systems, coupled with growing urban pressures, climate variability, and groundwater depletion, highlights the need for a more resilient and adaptive water management approach.

Bridging this gap requires a paradigm shift – moving beyond conventional supply augmentation toward a holistic, integrated management of the entire urban water cycle.

Against this backdrop, a global framework such as the Water Sensitive Cities (WSC) approach provide actionable pathways to reimagine Delhi's water future, positioning it as a resilient, adaptive, and livable metropolis.



Source: Delhi Jal Board  
Year: 2024



# Moving Towards Water Sensitivity

A **Water-Sensitive City (WSC)** is not a static outcome but an evolving process of urban water transformation. As defined by Brown et al., cities transition through a series of stages: starting with a focus on potable water supply (Water Supply City), improving sanitation and public health (Sewered City), and managing flood risks (Drained City). These are followed by the restoration of urban waterways (Waterways City) and integrated water cycle management (Water Cycle City), ultimately progressing toward a Water-Sensitive City—where water is valued as a key element of urban sustainability, enhancing ecological health, social well-being, and long-term resilience.



# Water Sensitivity Analysis for Delhi

## Baseline

The Delhi Water Sensitivity Baseline Assessment provides a first-of-its-kind evaluation of where the city currently stands in this transition. It has helped to identify:

- Gaps in policy integration, governance, and implementation.
- Strengths in institutional mandates and community engagement.
- Opportunities to mainstream water-sensitive planning across urban systems.



The Water Sensitive Cities Index consists of 7 goals, each scored on a scale of 1 to 5. The scoring process was consensus-based, involving structured discussions among representatives from state and local governments, industry bodies, and private water utilities to ensure a holistic evaluation of urban water performance.



Goal 1: Ensure Good Water Sensitive Governance



Goal 2: Increase Community Capital



Goal 3: Achieve equity of essential services



Goal 4: Improve Productivity & Resource Efficiency



Goal 5: Improve ecological health



Goal 6: Ensure quality urban space



Goal 7: Promote Adaptive Infrastructure

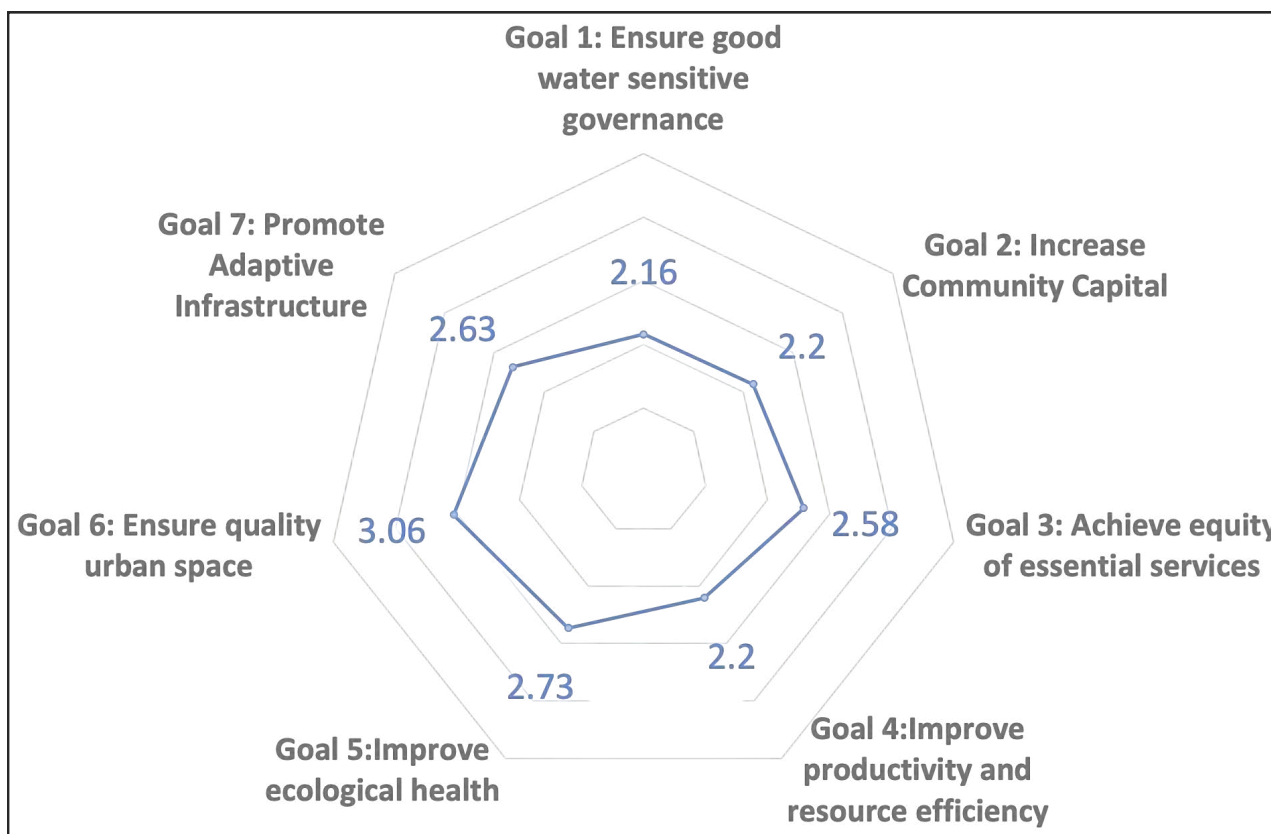
## Interpretation of Delhi's Water Sensitivity Score

Delhi's total water sensitivity score of 2.5 places it in the category of Low to Moderately Water-Sensitive, reflecting fragmented progress across various water management dimensions. The city exhibits some water-sensitive principles, but their implementation remains inconsistent and siloed, with a reactive rather than proactive approach to planning. This results in a focus on crisis management rather than long-term resilience, which hinders effective adaptation to the evolving challenges posed by urbanization and climate change.

The city is situated at a **Drained City–Waterways City Transition**, reflecting a shift away from basic infrastructure (water supply, sanitation, and flood management) to more advanced water-sensitive goals.

While there are ongoing efforts for waterway restoration and lake rejuvenation, these efforts are often piecemeal, localized, and lack a system-wide integration that is necessary to create a truly water-sensitive city.

The web-chart of Delhi's baseline analysis indicates the lowest scoring goal to be "Ensure Water Sensitive Governance", highlighting the need for stronger coordination, clearer policies, and enhanced governance structures for effective implementation. On the other hand, the highest scoring goal is "Ensure Quality Urban Spaces", indicating progress in integrating water-sensitive practices into urban planning, but with significant room for growth in governance and systemic water management integration.



# Enabling Water Sensitivity through Urban Planning



## Why Delhi Development Authority (DDA)?

The Delhi Development Authority (DDA), as the primary agency responsible for urban planning, is well-positioned to lead this transition. The Master Plan, which DDA formulates, serves as a crucial instrument for embedding water-sensitive strategies into long-term urban policy and implementation.

DDA manages a significant portfolio, including 5,050.97 hectares of green cover, 15 sports complexes, 429 local shopping centers, 7 district centers, townships, 30 janta markets, and urban heritage sites, in addition to its regular urban planning and construction activities. This extensive management portfolio enables DDA to play a key role in shaping both the economic and ecological landscape of Delhi.

Given its huge influence and responsibilities, DDA has the potential to be the forefront of the process of transforming Delhi into a Water Sensitive City. This position paper aims to assist DDA in this critical transition, providing recommendations and strategies to integrate water sensitivity into its institution, policies and instruments.

While DDA's role is central, achieving a Water-Sensitive City will require a collaborative effort across multiple agencies to ensure an integrated and coordinated approach.



# Structure & Evolution of DDA



## History

After India's independence in 1947, Delhi's population grew very quickly due to the arrival of refugees, which made it clear that the city needed proper planning. The Delhi Development Authority (DDA) was set up on 30th December 1957 under the Delhi Development Act, 1957. Its main goal was to ensure that Delhi developed in a planned and organized way. With help from the Ford Foundation, Delhi's first Master Plan was made in 1962. Over time, DDA's role has expanded, and today it works on housing, infrastructure, environment, and heritage conservation to build a better future for Delhi.



## Structure

There are total 16 departments in DDA:

- Land Disposal Department
- Housing Department
- Architecture Department
- Accounts (Finance) Department
- Landscape Department
- Horticulture Department
- Public Relations Department
- Personnel Department
- Sports Department
- Land Management Department
- Planning Department
- Systems (IT) Department
- Secretary Department
- Urban Heritage Department
- Vigilance Department
- Engineering Department





## Catalysts for Water-Sensitive Urban Development in DDA

- **Architecture Department:** Designs building layouts, ensures architectural aesthetics, prepares plans for DDA buildings and projects, and checks adherence to design standards.
- **Landscape Department:** Designs and develops landscapes for parks, recreational areas, and green belts to enhance urban aesthetics.
- **Horticulture Department:** Maintains public parks, gardens, road medians, and green belts; ensures the beautification of public spaces through plantation and maintenance activities.
- **Sports Department:** Develops and maintains sports complexes, stadiums, and facilities; promotes sports and organizes tournaments and events.
- **Land Management Department:** Handles acquisition of land, development of new sectors, recovery of encroachments, and management of DDA's vast land assets.
- **Planning Department:** Prepares and updates the Master Plans of Delhi (MPD), Zonal Plans, layout plans, land-use policies, and regulatory frameworks for planned urban growth.
- **Urban Heritage Department:** Works towards conservation, protection, and promotion of Delhi's historic monuments, cultural sites, and heritage areas and integrates heritage into urban planning
- **Engineering Department:** Executes civil engineering works such as construction of roads, bridges, drainage systems, sports facilities, commercial complexes, and other urban infrastructure.

climate-responsive  
and water-efficient  
built environments

water-sensitive  
design principles  
to enhance urban  
liveability

urban greening  
and stormwater  
management

sustainable water  
use practices for  
operation &  
maintainence

water-sensitive  
land use practices

embedding water-  
sensitive urban  
planning at a city-  
wide scale

revitalisation of  
traditional water  
bodies and  
indegenous systems

adopting water-  
sensitive  
construction  
methods



# Goal-wise Strategic Recommendations



This position paper builds on the Delhi Water Sensitivity Baseline Assessment and aligns with the institutional mandate of the Delhi Development Authority (DDA). For each of the seven Water Sensitive City (WSC) Index goals, an ideal scenario (score of 5) was outlined based on national and global benchmarks.

To ground the recommendations in Delhi's current context, existing strengths and weaknesses were identified through a review of the Master Plan for Delhi, DDA's annual reports, past planning documents, and other publicly available materials on DDA's website.

The analysis was used to map DDA's functional role and influence under each goal. The resulting recommendations are tailored accordingly: from institutional integration models and capacity-building frameworks (Goal 1) to community-driven asset management (Goal 2), equitable service strategies (Goal 3), and resource efficiency mechanisms such as GHG inventories and green credits (Goal 4). For ecological health, livability, and adaptive infrastructure (Goals 5–7), strategies are organized in structured formats linking actions with case-based inspiration from global best practices. The framework is designed to be implementable, scalable, and rooted in DDA's planning functions.





# Goal 1: Ensuring Water Sensitive Governance

## Importance of Water-Sensitive Governance

Goal 1 of the WSC framework adopts a multidimensional approach to governance, emphasizing the importance of organizational vision and leadership, diverse and evolving skill sets through regular upskilling, knowledge sharing, stakeholder collaboration, and the alignment of budgets and policies. Together, these factors empower key champions to drive and sustain the transition process effectively.

DDA being one of the primary champions it is necessary for it to make sure all the factors are performing at desired rate. The current performance of DDA in these factors have been given below in the form of strengths and Gaps.



Score for Goal 1



## Strengths

- The Delhi Development Authority (DDA) currently has 51 directors/ commissioners level positions, with 5 assigned to horticulture and landscape, 2 to planning, and 4 to engineering functions. Recruitment rules allow candidates from diverse disciplines, including economics, sociology, geography, and water-related sciences, to apply for research roles.
- Training activities are conducted regularly; in 2023-24 DDA conducted 78 internal training programs, and 13 external training programs.
- Technical drawings and detailed plans are systematically retained, and an e-office system ensures that official communications and resources are available online, promoting transparency and accessibility.



- The Master Plan for Delhi (MPD) incorporates water-sensitive urban development principles. WSUD measures are mandatory for new developments in greenfield areas and have been integrated into riverfront redevelopment projects. MPD 2041 further promotes sustainable growth through incentives like additional Floor Area Ratio (FAR) and the Blue-Green Factor.
- The MPD emphasizes partnerships and citizen engagement. Although DDA lacks a formal, ongoing citizen engagement process, significant outreach was conducted during MPD preparation, involving CSOs, RWAs, market associations, youth, persons with disabilities, gender-focused NGOs, and residents of informal settlements. Approximately 5,000 vision statements were collected.
- Water and the environment are recognized as key priorities in MPD 2041.
- The Engineering Department has a dedicated budget for water sector projects. However, there is no dedicated R&D section or earmarked funding for research activities.
- DDA consistently applies GEDSI (Gender Equality, Disability, and Social Inclusion) principles across its projects. Public consultations are structured during planning exercises, though continuous citizen engagement mechanisms are yet to be institutionalized.



## Opportunities

- Only 8 out of 78 training programs conducted in the year 2023-24 were related to water sensitivity.
  - Although multidisciplinary skills are available within DDA, they are limited to a small number of individuals, primarily concentrated in research-related roles.
  - Water-related projects within DDA operations are largely focused on riverfront development and initiatives in parks and gardens, with relatively few projects beyond these sectors.
- While mechanisms for implementing water-sensitive strategies exist and the policy framework clearly mandates Water-Sensitive Urban Design (WSUD), there is a notable gap in actual implementation. Regular monitoring and evaluation mechanisms for WSUD are limited, and incentives to promote the adoption of WSUD practices remain insufficient.





- There is currently no formalized process within DDA to ensure cross-departmental collaboration on water-sensitive projects; most interdepartmental interactions occur through responses to RTI applications.
- Despite existing policy mandates, systematic implementation remains a challenge. Citizens are not formally involved in DDA’s internal decision-making processes, and continuous, active dialogue with communities is limited, reducing opportunities for public influence on project outcomes.
- While water management and environmental sustainability are recognized under MPD Vision 2041 goals—specifically under Goal 1 (Prioritizing the Environment) and Goal 6 (Developing Resilient Physical Infrastructure)—water is not articulated as a standalone objective. Additionally, water and environmental concerns are not consistently reflected across all sections of the plan.
- Although regular training activities are conducted, there is scope to include more external training programs focused on WSUD, as well as to expand WSUD-related content within internal training initiatives.



## Recommendations

Based on the above assessment, it is evident that there is a gap in DDA’s current perception and integration of Water-Sensitive Urban Design (WSUD) across its activities. To address this, it is essential to sensitize different departments within DDA according to their specific requirements related to WSUD.

Accordingly, a comprehensive list of potential activities has been developed aligned with DDA’s existing training framework. Through a combination of specialized courses, collaborative initiatives, and national and international exposure visits, these recommendations aim to firmly embed water sensitivity across all of DDA’s activities.





# Collaboration and Capacity Building Opportunities

## International Exposures

Beneficiary Departments of DDA	Course Name	Organisation, Country	Frequency of workshop	Link for details
<ul style="list-style-type: none"> <li>• Planning</li> <li>• Architecture</li> <li>• Landscape</li> <li>• Horticulture</li> </ul>	Les Ateliers – International workshops of planning and urban design	Les Ateliers, France	Once a year	<a href="https://www.ateliers.org/en/workshops/?type=cery">https://www.ateliers.org/en/workshops/?type=cery</a>
<ul style="list-style-type: none"> <li>• Planning</li> <li>• Architecture</li> <li>• Landscape</li> <li>• Horticulture</li> </ul>	Urban Management Tools for Climate Change	Institute of Housing & Urban Development Studies, Erasmus University, Netherlands	Annually	<a href="https://www.ihs.nl/en/education/short-courses/urban-management-tools-climate-change">https://www.ihs.nl/en/education/short-courses/urban-management-tools-climate-change</a>
<ul style="list-style-type: none"> <li>• Planning</li> <li>• Architecture</li> <li>• Landscape</li> <li>• Horticulture</li> <li>• Housing</li> <li>• Engineering</li> </ul>	Urban Management: Good Governance in Complex Contemporary Cities	Institute of Housing & Urban Development Studies, Erasmus University, Netherlands	Annually	<a href="https://www.ihs.nl/en/education/short-courses/urban-management-good-governance-complex-contemporary-cities">https://www.ihs.nl/en/education/short-courses/urban-management-good-governance-complex-contemporary-cities</a>



Beneficiary Departments of DDA	Course Name	Organisation, Country	Frequency of workshop	Link for details
<ul style="list-style-type: none"> <li>• Planning</li> <li>• Architecture</li> <li>• Landscape</li> <li>• Horticulture</li> </ul>	Urban Planning and Development Training Courses	GLOMACS Dubai, London, and other international cities	Monthly	<a href="https://glomacs.com/training-courses/urban-planning-and-development">https://glomacs.com/training-courses/urban-planning-and-development</a>
<ul style="list-style-type: none"> <li>• Planning</li> <li>• Architecture</li> <li>• Landscape</li> <li>• Horticulture</li> </ul>	World Planning Congress Cities & Regions in Action	International Society of City and Regional Planners (ISOCARP) Different Countries	Yearly	<a href="https://isocarp.org/">https://isocarp.org/</a>
<ul style="list-style-type: none"> <li>• Landscape</li> <li>• Horticulture</li> </ul>	Global Landscapes Forum: Topics like Sustainable Landscapes, Youth in Landscapes	Global Landscape Forum	Annually	<a href="https://www.globallandscapesforum.org/">https://www.globallandscapesforum.org/</a>
<ul style="list-style-type: none"> <li>• Horticulture</li> </ul>	International Horticulture Conference Topics: Advanced horticultural techniques, garden management, and plant science.	Royal Horticultural Society/ RHS, UK	Once in two years	<a href="https://www.rhs.org.uk/science/environmental-horticulture-group">https://www.rhs.org.uk/science/environmental-horticulture-group</a>
<ul style="list-style-type: none"> <li>• Landscape</li> </ul>	Landscaping & Public Space Design	International Federation of Landscape Architects, Saudi Arabia	Yearly	<a href="https://www.iflaworld.com/ifla-events">https://www.iflaworld.com/ifla-events</a>





Beneficiary Departments of DDA	Course Name	Organisation, Country	Frequency of workshop	Link for details
<ul style="list-style-type: none"> <li>Urban Heritage</li> </ul>	Conservation of architectural heritage	International Centre for the Study of the Preservation and Restoration of Cultural Property, Italy	Monthly/ Once in two months	<a href="https://www.iccrom.org/what-we-do/courses">https://www.iccrom.org/what-we-do/courses</a>
<ul style="list-style-type: none"> <li>Urban Heritage</li> </ul>	Cultural Heritage Trainings: Strategies for managing and preserving urban heritage sites.	University of Oxford	Weekly	<a href="https://www.conted.ox.ac.uk/about/cultural-heritage">https://www.conted.ox.ac.uk/about/cultural-heritage</a>
<ul style="list-style-type: none"> <li>Planning</li> <li>Architecture</li> <li>Landscape</li> <li>Horticulture</li> <li>Urban Heritage</li> <li>Housing</li> <li>Engineering</li> </ul>	Tailored training on topics like building climate resilience for cities, Circular economy, sustainable land management, etc. designed to strengthen local policies and programs, delivered through a combination of in-country sessions and international modules in Rotterdam	Erasmus University, Rotterdam	on-request	<a href="https://www.ihs.nl/en/advisory-training-and-research/training/tailor-made-training">https://www.ihs.nl/en/advisory-training-and-research/training/tailor-made-training</a>
<ul style="list-style-type: none"> <li>Planning</li> <li>Architecture</li> <li>Landscape</li> <li>Horticulture</li> <li>Urban Heritage</li> <li>Housing</li> <li>Engineering</li> </ul>	Identifying strategies to progress transition to a water sensitive city	Co-operative Research Centre for Water Sensitive Cities	on-request	<a href="https://watersensitivecities.org.au/content/training-programs-for-key-water-sensitive-cities-tools/">https://watersensitivecities.org.au/content/training-programs-for-key-water-sensitive-cities-tools/</a>





## National Exposures

Beneficiary Departments of DDA	Course Name	Organisation	Frequency of workshop	Link for details
<ul style="list-style-type: none"> <li>• Planning</li> <li>• Architecture</li> <li>• Landscape</li> <li>• Horticulture</li> <li>• Urban Heritage</li> <li>• Housing</li> <li>• Engineering</li> </ul>	Urban Development Training focusing on Management of urban areas, including planning, service delivery, grievance redressal, poverty alleviation, housing, and citizen participation	Indian Institute of Public Administration	Periodic; schedules announced by IIPA	<a href="https://www.iipa.org.in/cms/public/training_course/35">https://www.iipa.org.in/cms/public/training_course/35</a>
<ul style="list-style-type: none"> <li>• Architecture</li> <li>• Landscape</li> </ul>	Workshops focusing on various themes in landscape architecture	Indian Society of Landscape Architects (ISOLA)	Periodic workshops across different zones in India.	<a href="https://www.isola.org.in/workshops/">https://www.isola.org.in/workshops/</a>
<ul style="list-style-type: none"> <li>• Planning</li> <li>• Architecture</li> <li>• Landscape</li> <li>• Horticulture</li> <li>• Urban Heritage</li> <li>• Housing</li> <li>• Engineering</li> </ul>	Tailored programs for public and private sector organizations to facilitate solutions to critical problems in the built environment ranging from urban planning, housing policy, and urban transport, to building energy performance, heritage conservation, water and sanitation management, and resilient infrastructure design.	CEPT University	on request	<a href="https://cept.ac.in/cept-professional-programs/training-programs-for-organizations">https://cept.ac.in/cept-professional-programs/training-programs-for-organizations</a>





Beneficiary Departments of DDA	Course Name	Organisation	Frequency of workshop	Link for details
<ul style="list-style-type: none"> <li>Urban Heritage</li> </ul>	Field guide for built environment professionals on heritage conservation	CEPT Research and Development Foundation (CRDF)	Scheduled courses; dates announced accordingly	<a href="https://crdf.org.in/project/certificate-course-on-wooden-heritage-conservation-batch-2">https://crdf.org.in/project/certificate-course-on-wooden-heritage-conservation-batch-2</a>
<ul style="list-style-type: none"> <li>Architecture</li> <li>Landscape</li> <li>Engineering</li> <li>Planning</li> </ul>	Capacity building in urban planning, with an emphasis on sustainable infrastructure, water-sensitive design, and participatory governance.	IIT Roorkee – AMRUT Centre of Urban Planning	Ongoing projects and training series under the AMRUT	<a href="https://iitr.ac.in/Departments/Architecture%20and%20Planning%20Department/index.html">https://iitr.ac.in/Departments/Architecture%20and%20Planning%20Department/index.html</a>
<ul style="list-style-type: none"> <li>Planning</li> <li>Architecture</li> <li>Landscape</li> <li>Horticulture</li> <li>Urban Heritage</li> <li>Housing</li> <li>Engineering</li> </ul>	Tailored programs for public and private sector organizations to facilitate solutions to critical problems in the built environment ranging from urban planning, housing policy, and urban transport, to building energy performance, heritage conservation, water and sanitation management, and resilient infrastructure design.	CEPT University	on request	<a href="https://cept.ac.in/cept-professional-programs/training-programs-for-organizations">https://cept.ac.in/cept-professional-programs/training-programs-for-organizations</a>





# Delhi Water Sensitive Governance Model

Actions	Recommendation	Link for reference
<p><b>Institutional Integration &amp; Mandate Realignment</b></p>	<p>Learning from Melbourne Water’s integrated structure, where a single utility oversees water supply, wastewater, drainage, and floodplain management, DDA can establish an <b>Interdepartmental Water Cell</b> to bring together its Planning, Horticulture, Engineering, Landscape, and Housing divisions. This cell would streamline internal coordination and align DDA’s planning mandates with the roles of key external agencies like DJB, CPCB, CGWA, and MCD. Such integration will enable cohesive action on urban water challenges, reduce overlaps, and enhance the implementation of multi-functional, water-sensitive urban projects.</p>	<ul style="list-style-type: none"> <li>• Melbourne’s integrated urban water governance across Melbourne Water, local councils, and planning departments.</li> </ul>
<p><b>Planning-Policy-Implementation Continuum</b></p>	<p>Singapore’s ABC Waters Programme integrates water management into urban planning by mandating sustainable drainage and community-friendly water features in public spaces. DDA can adopt a similar approach by <b>institutionalizing shallow aquifer mapping and recharge interventions within land use planning and public project design</b>—ensuring that every new development contributes to Delhi’s groundwater sustainability goals.</p>	<ul style="list-style-type: none"> <li>• Singapore’s ABC Waters Programme (Active, Beautiful, Clean) which integrates urban design with water functions.</li> </ul>





Actions	Recommendation	Link for reference
<p><b>Capacity Building through Regular Engagement in existing Delhi Water Forum</b></p>	<p><b>Leverage the existing Delhi Water Forum (DWF)</b> to institutionalize regular capacity-building and knowledge-sharing sessions across DDA departments. Use this platform to co-learn with DJB, CGWA, and other key stakeholders, ensuring planning and engineering teams stay updated on water-sensitive design practices and co-develop site-specific solutions through continuous dialogue.</p>	<ul style="list-style-type: none"> <li>• <a href="#">Australia-India Water Security Initiative</a></li> </ul>
<p><b>Data-Driven Governance</b></p>	<p><b>Establish an integrated GIS and data dashboard</b> to map shallow aquifers, blue-green assets, and recharge potential across DDA-managed areas. Drawing inspiration from eThekweni Municipality's open-data platform, this system can support participatory governance by enabling public access to water-related data and facilitating informed decision-making for land use planning and infrastructure projects.</p>	<ul style="list-style-type: none"> <li>• <a href="#">eThekweni Municipality, South Africa, which uses GIS and community water audits for participatory governance.</a></li> </ul>
<p><b>Community-Led Water Governance</b></p>	<p>Inspired by the Puttenahalli Neighbourhood Lake Improvement Trust model in Bengaluru, DDA can formalize communities by <b>signing MoUs with Resident Welfare Associations (RWAs), schools, and civic groups to co-manage green-blue assets.</b> These partnerships can be backed by initial support from DDA, CSR funding, and community mobilization drives. Activities like clean-up drives, gardening days, and student-led awareness campaigns can foster a culture of environmental responsibility and shared ownership in public spaces.</p>	<ul style="list-style-type: none"> <li>• <a href="#">Bangalore's Citizen Lake Rejuvenation Movements</a></li> </ul>





# Goal 2: Increase Community Capital

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## Benefit of Empowering Communities

Goal 2 of the WSC framework emphasizes the central role of communities as active partners in the urban water transition. It focuses on strengthening community capital through trust-building, participatory decision-making, inclusivity, and capacity development. This goal recognizes that empowered and well-connected communities are essential not only for ensuring long-term sustainability of water systems but also for enhancing social resilience, equity, and shared responsibility.

In the context of Delhi, where diverse socio-economic and cultural groups coexist, building strong community capital can unlock grassroots innovation, improve accountability, and bridge the gap between planning and on-ground implementation. As a key planning and development agency, DDA must take proactive steps to embed community engagement into its projects and policies—from planning and construction to operation and maintenance of public assets. The performance of DDA under this goal is presented below through its strengths and existing gaps.


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Score for Goal 2



## Strengths

- By requiring water harvesting certificates during building plan approvals, DDA ensures that water conservation practices are integrated at the community level from the start.
  - In collaboration with organizations like the Delhi Urban Art Commission, DDA has worked to raise public awareness about the cultural and historical importance of water structures.
- 



- Though DDA's primary focus is on planning and infrastructure, it also fosters community involvement through initiatives like the 'Adoption of Park' program. This program empowers local groups to take responsibility for park maintenance.



## Opportunities

- Currently, there are no dedicated outreach programs to actively engage the community, and there is potential to deepen public interest in water sensitivity. Although some water-related assets have seen community ownership due to development initiatives, there are still areas where such ownership could be encouraged with more focused efforts.

- While DDA has made strides in water management, these efforts have largely been driven by organizations, with the community's involvement being more limited. The emphasis has predominantly been on infrastructural improvements, with room to further integrate community capacity-building initiatives that foster greater understanding and participation in water-related issues. Additionally, while the Master Plan for Delhi (MPD) 2041 outlines provisions for indigenous involvement, there is scope for further legislative support to ensure broader community engagement in water management.



## Recommendations

- Inspired by Bhubaneswar's *Drain 10* rejuvenation initiative—where a collaborative governance model integrated government agencies, technical experts, self-help groups, and young professionals, the following approach for Delhi adapts a similar ethos. It focuses on embedding community participation to build local capacity and ensure sustained upkeep of public assets such as parks, markets, sports complexes, drains, and water bodies.





# “Co-Create Delhi” Model for Community-Led Urban Asset Management

**Core Idea:** A collaborative, multi-stakeholder platform that brings together DDA, Technical Experts, Youth Fellows (via platforms like *Delhi Yuva Kendra Sangathan*), and Local Community Groups (RWAs, SHGs, Community Action Groups) to co-design, implement, and monitor sustainable solutions for public infrastructure and water-sensitive urban spaces. This can also be done through leveraging on the existing **Delhi Water Forum** and scaling it up for implementable projects.



## Stakeholders

- **Government Backbone (DDA & MCD):** To Allocate budget, streamline approvals, and integrate into planning/zonal frameworks.
- **Expert Partners:** To Support capacity building, system design, and performance monitoring.
- **Community Anchors (RWAs, SHGs, local schools, market associations):** To Provide user feedback, co-maintain infrastructure.
- **Youth Fellows (Internships through Delhi Skill & Entrepreneurship University)** To Engage in participatory mapping, citizen surveys, behavioral nudges & Support implementation and documentation.



## Implementation via Urban Pilot Zones

- Start with pilot zones such as a park, market complex, or a lake/pond per zone in each administrative division under DDA. These become live urban learning labs.



## Policy Leveraging

- Tie-in with existing initiatives like “*Jan-Bhagidari*”
- Establish Standard Operating Procedures for empowering communities under DDA's departments.



## Envisaged Benefits:

- Reduced O&M costs through shared responsibility.
- Locally suited interventions with higher success rates.
- Integration of water sensitivity into Delhi's fabric at a micro-scale.



# Goal 3: Achieve equity of essential services

## Importance of Equity in Essential Services

Ensuring equitable access to essential services is central to a city's journey towards becoming a Water Sensitive City (WSC). Goal 3 of the WSC framework focuses on providing safe, reliable, and affordable water, sanitation, and drainage services for all, especially for vulnerable and underserved communities. It emphasizes the need for inclusive planning, targeted investments, and community engagement to address historical service gaps and build resilience.

DDA, as a key agency, plays a critical role in ensuring that the benefits of water-sensitive initiatives reach all sections of society. The current performance of DDA on these factors is outlined below in the form of strengths and gaps.



Score for Goal 3



## Strengths

- Multiple projects have been launched to improve groundwater recharge, stormwater management, and wastewater treatment.
- DDA has initiated large-scale projects such as Trunk Drain TD-2 and TD-5 in Dwarka to intercept sewage outfalls and treat polluted water through tertiary treatment at onsite STPs.
- Since January 2020, DDA has planned the installation of 100 decentralized STPs using technologies like Moving Bed Biofilm Reactor (MBBR), constructed wetlands, and in-situ bioremediation.
- Classification of flood-prone areas based on Yamuna water levels aims to better inform urban planning, especially in high-risk zones.





- In the Draft Master Plan for Delhi 2041 (MPD-2041), zoning regulations for the Yamuna floodplain have been revised to balance ecological protection with regulated development.
- DDA promotes the use of multifunctional landscapes (e.g., basins, wetlands) within parks and floodplains to manage stormwater and recharge groundwater.
- Revival and conservation of historic water structures like baolis, tanks, and lakes are prioritized, linking water sensitivity with heritage conservation.



### Opportunities

- Sanitation systems, though available, suffer from inadequate maintenance and a lack of community ownership.
- Capacity shortfalls and inconsistent maintenance continue to affect system performance.
- Risk assessment, community preparedness, and infrastructural resilience to extreme weather events (especially monsoon flooding) remain limited.



### Recommendations

Delhi Development Authority (DDA) has made considerable strides in enhancing access to essential services. To further these efforts, four key recommendations are proposed under two complementary tracks. First, digital enablers such as a civic infrastructure portal for real-time issue reporting and equity mapping dashboards can support more responsive and data-driven governance. Second, community-centric approaches like “Adopt-a-Spot” programs and local co-design initiatives can empower residents to co-manage and maintain public spaces.





# Actionable Strategies for Equitable Water Services


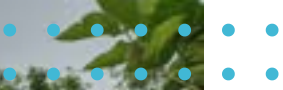
Actions	Recommendation	Link for reference
<p><b>Local Adoption</b></p>	<p>Inspired by the participatory approach of the Sidewalk Toronto Project, DDA can launch <b>“Adopt-a-Spot” and Co-Design Initiatives</b> that empower local communities—especially in marginalised areas—to shape and steward public spaces. Through design workshops and stewardship agreements, residents can contribute to planning and maintain parks, water bodies, or green buffers. DDA can facilitate this by offering <b>basic toolkits, recognition incentives, and integration into area-level planning processes.</b></p>	<ul style="list-style-type: none"> <li>• <a href="#">Participatory Planning in the Sidewalk Toronto Project</a></li> </ul>
<p><b>Digital Portals</b></p>	<p>Inspired by Vancouver’s Volunteer-based portal, DDA can develop a <b>Digital Civic Infrastructure Portal</b> focused on assets under its purview—such as parks, green spaces, and public toilets. The portal can allow residents to report issues, rate amenities, and access ward-level dashboards. Reports unrelated to DDA (e.g., sewerage or drainage) can be auto-forwarded to the responsible agency (like DJB or I&amp;FC), enhancing cross-agency coordination, timely maintenance, and citizen trust.</p>	<ul style="list-style-type: none"> <li>• <a href="#">Vancouver Volunteer Programs</a></li> </ul>
<p><b>Public goods Equity Dashboards</b></p>	<p>DDA can develop <b>Equity Mapping Dashboards</b> utilizing GIS data to identify and prioritize underserved areas lacking in sanitation, green spaces, and flood resilience. Inspired by Melbourne Water’s approach, these dashboards can guide equitable investments by highlighting disparities and informing planning decisions. Integrating such tools into DDA’s planning processes will promote balanced urban development and enhance resilience in vulnerable communities.</p>	<ul style="list-style-type: none"> <li>• <a href="#">Good Design Guide for Buildings in Flood Affected Areas</a></li> <li>• <a href="#">Melbourne Water Dashboard</a></li> </ul>





Actions	Recommendation	Link for reference
<b>Local Empowerment</b>	While DDA has created physical assets like STPs and drains, there is still a lack of community participation in maintaining and protecting these systems. Learning from Agra's Building Water Resilient Neighborhoods program, where 24 slums benefited by mobilizing communities to take ownership and conserve the water bodies in their settlements. DDA should initiate <b>community-based programs where local residents are trained through RWAs</b> and engaged in managing rainwater harvesting systems, small treatment units, and neighborhood water bodies.	<ul style="list-style-type: none"><li>• <a href="#">Agra's Building Water Resilient Neighborhoods program</a></li></ul>





# Goal 4: Improve productivity and resource efficiency

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## Importance of improving productivity and resource efficiency

Goal 4 ensures that water systems become more sustainable, resilient, and efficient in resource use. By promoting the reuse of water and energy recovery, it helps reduce waste and environmental impact. Shifting towards low-carbon energy sources within water infrastructure supports climate goals. Innovation and collaboration between businesses and governments drives economic growth and new solutions. Managing water demand efficiently protects limited water resources, while maximizing community benefits strengthens social and economic wellbeing.

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Score for Goal 4



## Strengths

- DDA has advanced the reuse of treated wastewater for horticulture. This is being implemented through pipelines from centralized STPs operated by DJB and DDA, tanker supply from DJB STPs, and the installation of decentralized STPs and wastewater treatment plants within parks.
- A policy framework for energy recovery is in place, supported by existing technical knowledge and planning intent.

Demonstrating early progress, initiatives such as the Baansera solar park highlight DDA's efforts to integrate renewable energy infrastructure within urban projects.

- The Master Plan further reinforces this direction by promoting the mainstreaming of waste recycling and the transition to renewable energy sources.





- Additionally, the mandatory requirement for green ratings under the Unified Building Bye-Laws (UBBL) for new developments is a positive step towards reducing energy consumption from mechanical heating and cooling systems and mitigating environmental pollution.
- Specific targets have been set, such as limiting per capita water supply to 40 GPCD in these areas, with water demand in Green Development Areas expected to be primarily met through treated wastewater.
- Additionally, regeneration and Transit-Oriented Development (TOD) schemes are designed to avoid additional water supply beyond the existing requirements, with exceptions only for vacant land, where supply will be provided at 50 GPCD.
- DDA has also encouraged water-efficient structures, particularly in residential areas, through various policy measures, alongside indirect efforts like repurposing defunct or abandoned borewells for rainwater harvesting.
- In several unauthorized communities, water ATM plants have been introduced, providing residents with direct access to potable water.



## Opportunities

- Despite these initial measures, the scale and coverage of energy recovery initiatives remain limited.
- The mandate to provide solar infrastructure at a lower cost presents challenges for widespread adoption, potentially restricting the expansion of renewable energy systems across developments.
- While the Master Plan emphasizes the need to mainstream energy recovery efforts, implementation across projects has been relatively slow.
- There is a significant lack of knowledge and awareness regarding greenhouse gas (GHG) emissions associated with water system infrastructure.
- Strategies are needed to be developed for incorporating low-carbon energy alternatives.
- There is a lack of strategic policy frameworks to actively encourage new businesses within the water sector.





## Recommendations

To enhance productivity and resource efficiency under Goal 4, DDA can adopt two strategic interventions. First, instituting a Greenhouse Gas (GHG) Inventory specific to its operations and developments would allow the Authority to quantify emissions, identify high-impact sectors, and prioritize low-carbon interventions in planning and infrastructure. Second, DDA can initiate a framework for generating and trading green credits through sustainable practices such as energy-efficient building designs, enhanced green cover, and water-sensitive urban projects. These credits can be aligned with national carbon markets or city-level incentive programs, positioning DDA as a proactive enabler of climate-positive urban growth while unlocking new financing opportunities.





# Establishing & Maintaining a GHG Inventory

DDA should maintain a GHG inventory and separate GHG department tracking its emissions, and convert DDA's multiple activities into green credits to incentivise its activities. An example explaining the process, based on secondary data is given below.



## Energy Consumption

DDA's large scale of operations in Delhi including offices, parks, colonies, urban forests, and riverfront projects and transportation-related activities has significant energy consumption.



## Electricity-Related Emissions

- For electricity consumption, DDA's operations are assumed to be similar to large municipal agencies like the Municipal Corporation of Delhi (MCD) and the Delhi Jal Board (DJB). Based on data from the Central Electricity Authority (CEA) Annual Report 2022-23, such agencies typically consume around 20–30 million units (kWh) annually for administrative offices, urban parks, streetlights, and public infrastructure. Therefore, for this GHG Inventory, DDA's annual electricity consumption is reasonably estimated at 25 million kWh.
- If the emission factor is taken as 0.82 kg CO<sub>2</sub> per kWh, according to the CEA's CO<sub>2</sub> Baseline Database for Indian Power Sector, Version 20 (2023),
- Emissions = 25,000,000 kWh × 0.82 kg CO<sub>2</sub>/kWh  
= **20,500,000 kg CO<sub>2</sub>**



## Vehicular Emissions

- Regarding vehicular emissions, the assumption is that DDA maintains a fleet of approximately 400 vehicles, based on the scale of ongoing projects and field operations. The vehicle usage is estimated at 10 liters per day per vehicle, with operations occurring for around 250 days annually.
- It is assumed that about 70% of the fleet are diesel vehicles(Large trucks and tempos) and 30% consist of petrol vehicles (official cars).

### ● Diesel Vehicles (70% of fleet)

- $280 \text{ vehicles} \times 10 \text{ liters/day} \times 250 \text{ days} = 700,000 \text{ liters/year}$
- $\text{Emissions} = 700,000 \text{ liters} \times 2.68 \text{ kg CO}_2/\text{liter} = 1,876,000 \text{ kg CO}_2/\text{year} = \mathbf{1,876 \text{ tCO}_2/\text{year}}$

### ● Petrol Vehicles (30% of fleet)

- $120 \text{ vehicles} \times 10 \text{ liters/day} \times 250 \text{ days} = 300,000 \text{ liters/year}$
- $\text{Emissions} = 300,000 \text{ liters} \times 2.31 \text{ kg CO}_2/\text{liter} = 693,000 \text{ kg CO}_2/\text{year} = \mathbf{693 \text{ tCO}_2/\text{year}}$



## Total Emissions

Category	Emissions (tCO <sub>2</sub> /year)
Electricity Consumption	20,500
Vehicular Fuel Usage	2,569
Total	<b>23,069 tCO<sub>2</sub>/year</b>





# Leveraging 'Green Credits' Program

Green Credit Program (GCP)\* is an innovative market-based mechanism designed to incentivize voluntary environmental actions across diverse sectors, by various stakeholders like individuals, communities, private sector industries, and companies. DDA, with its extensive land assets, including riverfront development projects, urban forests, biodiversity parks, and large greenfield areas has a huge opportunity to leverage the Green Credit Program. By aligning existing and upcoming projects (e.g., urban foresting, afforestation, wetland creation, river rejuvenation) with GCP guidelines, DDA can, monetize environmental services through Green Credits, Enhance ESG credentials, Comply with future green mandates or even trade credits in the national Green Credit market.



## Step 1: Identify Eligible Projects

List out all the ongoing projects and conduct baseline studies on them like vegetation, soil quality, biodiversity, water bodies. Ensure all the land records are available and they are digitally coordinated on GIS. Make sure they align with GCP guidelines

examples:

Tree Plantation.

- Water Management (riverfront wetland restoration).
- Waste Management (if parks have recycling units, composting, etc.).
- Air Pollution Reduction (urban forests contribute)



## Step 2: Formal Registration with GCP Platform

Visit the official GreenCredit Program web portal and Register DDA as a participant/entity. (<https://www.moefcc-gcp.in/>)

Submit applications describing each project you wish to register:

- Detailed project description (objectives, location, methods).
- Size and scale (hectares, number of trees, water bodies restored, etc.).
- Estimated environmental benefits (tree count, carbon sequestration, biodiversity enrichment, etc.).

\* GreenCreditRules,2023:  
<https://d28fok4odypdh0.cloudfront.net/green-credit-program-notification-closedct3600050pzj8wdrcth8.pdf>



### **Step 3 :Project Implementation with Compliance to GCP Standards**

Implement plantations, wetland restorations, green landscaping, riverbank re-greening following scientifically sound, biodiversity-based principles (not monoculture plantations).

Activities should strictly follow GCP-prescribed methodologies to be eligible for credits. Examples:

- Native species plantation instead of exotic species.
- Biodiversity emphasis.
- Soil and water conservation integration.

Maintain photographic evidence, GIS tracking, plantation records, and survival rates of trees.



### **Step 4: Third-Party Verification**

After 2 years of activity completion, an independent agency, appointed by the GCP Administrator (Indian Council of Forestry Research and Education or others), will conduct a verification audit.

DDA must proactively maintain ready-to-share:

- Maps, site photographs.
- Progress reports.
- Land ownership proofs.



### **Step 5: Issuance of Green Credit Certificates**

Based on successful third-party audit, the GCP Administrator will Issue Certificates of Green Credits to DDA. Credits will be digitally stored in the Green Credit Registry managed by GCP.



### **Step 6: Utilisation of Green Credits**

Utilisation Options:

- DDA can use Green Credits to meet environmental mandates (e.g., future forest diversion compensations).
- DDA can showcase Green Credits in its annual sustainability reports or city-level ESG commitments.
- When the trading platform is launched, DDA can choose to sell excess credits in the domestic market to industries needing environmental offsets – thus generating revenue. (initial pilot trades likely during mid to late 2025).





# Goal 5: Improve Ecological Health

## Importance of Improving Ecological Health

The objectives outlined under Goal 5 including fostering a healthy and biodiverse habitat, ensuring improved surface water quality and flow, enhancing groundwater quality and natural replenishment, and protecting areas of high ecological value—are fundamental to the environmental resilience and long-term sustainability of Delhi. These targets collectively contribute to the restoration of ecological balance, improved public health outcomes, and greater climate adaptation capacity. The Delhi Development Authority (DDA), as the principal urban planning agency, has a critical mandate in this regard. Through strategic land use planning, ecological zoning, protection and revival of natural water bodies, and implementation of integrated water management practices, DDA is uniquely positioned to embed these environmental goals into the fabric of urban development. Its role is instrumental in translating ecological priorities into actionable frameworks within the Master Plan and ensuring their enforcement on the ground.



## Strengths

- MPD-2041 promotes water-sensitive urban design with features like green roofs, rain gardens, and bioswales to manage stormwater, enhance urban greenery, and integrate water management strategies for restoring water bodies and biodiversity. Also encourages retrofitting of existing infrastructure to improve resilience and aligns with DDA's goals of ecological restoration and sustainable urban water systems.



Score for Goal 5



- DDA has recognized the ecological importance of water bodies through policies and planning frameworks, with mechanisms supporting periodic assessments and rejuvenation of major water bodies, alongside ecological restoration projects piloted at key locations.
- Supports groundwater recharge through rainwater harvesting and promotes low-impact development (LID) in urban planning, with pilot projects demonstrating the potential for treated used water (TUV) reuse and green infrastructure integration.
- MPD-2041 reinforces conservation through the identification and preservation of ecological hotspots, such as the Delhi Ridge, Yamuna floodplains, and wetlands, as critical to Delhi's environmental resilience.
- Public awareness campaigns and eco-restoration projects complement these efforts.
- DDA has designated Natural Conservation Zones (NCZs) in the Land Use Plan of MPD-2041, which includes areas like the Ridge, wetlands, and biodiversity parks.
- DDA collaborates with organizations like the Delhi Biodiversity Foundation and Delhi Parks & Gardens Society to maintain records of native and protected species, with platforms like eBird enabling birdwatchers and citizen scientists to contribute to monitoring efforts.



## Opportunities

- Key gaps remain in implementation: monitoring is not systematic or real-time and is often reactive, triggered only during water-borne disease outbreaks or visible deterioration.
- Smaller or less prominent water bodies are frequently overlooked, and integrated data systems for proactive ecological and infrastructure responses are lacking.
- No policies currently exist for real-time piezometric monitoring, protection of groundwater-dependent ecosystems, or the integration of aquifer recharge zones into planning.





- Implementation varies widely; many ecological zones face issues like encroachments, illegal dumping, and a lack of active maintenance.
- Monitoring systems are fragmented, and community-led conservation efforts are not yet institutionalized.
- Catchment degradation, illegal construction, and dumping threaten the ecological function of many conservation hotspots.
- MPD-2041 emphasizes the need for cross-agency enforcement, community surveillance, and the use of GIS-based tools for boundary protection.
- Although a biodiversity database exists, it is not consistently updated or integrated across departments.
- Faunal data, especially for groups beyond birds (such as insects, reptiles, and small mammals), remains sparse and fragmented.



## Recommendations

DDA already performs many activities related to improving ecological health. In addition to various activities already performed by DDA, it could incorporate 2 more recommendations, policy for monitoring and maintenance and city wide initiatives. Through this DDA could ensure that their activities are making real world tangible impacts ensuring upgradation of the current ecological health.





# Policy and Planning Levers to Enhance Urban Ecological Health

Actions	Recommendation	Link for reference
<p><b>City wide initiatives to improve ecological health</b></p>	<p>DDA can <b>retrofit urban areas with green infrastructure—like rain gardens, wetlands, and permeable pavements</b>—based on Wuhan’s sponge city model. This can help reduce urban flooding, recharge groundwater, and improve ecological function. Implementation should involve inter-agency coordination, public-private partnerships, and capacity building to scale impact across Delhi.</p>	<p><b>Wuhan’s Sponge City Model</b></p>
<p><b>Impervious Surface Fee Policy for Urban Resilience</b></p>	<p>While stormwater management falls under the I&amp;FC Department, DDA can play a key planning and coordination role by integrating a tiered imperviousness fee framework into Delhi’s future Master Plans. The fee—calculated based on the area of non-permeable surfaces on a property—can be implemented in collaboration with MCD (for billing via property tax systems) and I&amp;FC (for drainage and runoff management).</p> <p>This model encourages property owners to adopt green infrastructure such as green roofs, permeable pavements, and rain gardens by financially disincentivizing excessive hardscaping. Revenue collected can be earmarked by I&amp;FC for decentralized water-sensitive interventions, especially in flood-prone and ecologically vulnerable areas.</p> <p>DDA’s role can include:</p> <ul style="list-style-type: none"> <li>• <b>Embedding fee logic into land use planning and development control regulations</b></li> <li>• <b>Facilitating coordination between I&amp;FC and MCD</b></li> <li>• <b>Providing technical support for mapping impervious surfaces using GIS</b></li> <li>• <b>Creating incentive-linked planning norms for green retrofits in redevelopment zones</b></li> </ul> <p>Inspired by German cities like Berlin and Munich, this user-pays model promotes shared responsibility, reduces stormwater burden, and funds citywide ecological upgrades.</p>	<p><b>Germany’s Imperviousness Fee Model</b></p>





# Goal 6: Ensure quality urban space

## The Importance of Enhancing Natural Ecosystems

Enhancing natural ecosystems is fundamental to ensuring the creation of quality urban spaces and achieving a resilient, livable city. Goal 6 of the WSC framework emphasizes the integration of green and blue infrastructure, ecological restoration, and equitable access to nature within urban areas. A well-connected and healthy natural environment not only improves biodiversity but also provides critical services such as flood management, air quality improvement, urban cooling, and enhanced public wellbeing.

DDA, being a leading agency in Delhi's urban planning, plays a central role in embedding ecosystem restoration and connectivity into city development. It is necessary for DDA to ensure that efforts are consistent, inclusive, and implemented at the ground level. The current performance of DDA in these aspects has been outlined below through identified strengths and opportunities.



Score for Goal 6



### Strengths

- Master Plan for Delhi 2041 (MPD-2041) Prioritizes Green and Blue Infrastructure – Encourages increased green spaces in new developments, regeneration projects, and interconnected green-blue networks to restore natural water systems.
- Transit-Oriented Development (TOD) Policy Promotes Open Spaces – Ensures that up to 30% of the total area in TOD zones is allocated for green spaces, with at least 20% designated as public green spaces.





- Integration of Water-Sensitive Urban Design (WSUD) Principles – MPD-2041 emphasizes WSUD features such as rain gardens, bioswales, and green roofs to improve stormwater management and groundwater recharge.
- Policy Framework for Tree Canopy Protection – Unified Building Bye-Laws (UBBL) 2016 encourage tree preservation and enhancement in urban developments to strengthen green infrastructure.



## Opportunities

- Dense areas like west Delhi lack adequate access to quality green spaces.
- Despite supportive frameworks like MPD-2041 and UBBL 2016, green and water-sensitive infrastructure is not uniformly integrated across urban development projects.
- Water-sensitive features such as bioswales, rain gardens, and green roofs are underutilized, especially in retrofitting existing spaces.
- Citizen participation in greening and water-sensitive initiatives remains low.



## Recommendations

DDA already performs many activities related to enhancing the quality of urban spaces. In addition to various initiatives already undertaken by DDA, it could incorporate two further recommendations: a policy for systematic monitoring and maintenance and city-wide green activation initiatives. Through these, DDA can ensure that its efforts in creating green and blue infrastructure result in real-world, tangible improvements in urban livability, accessibility, and ecological resilience. These measures would help bridge existing implementation gaps and ensure the long-term sustainability and inclusivity of quality urban spaces across Delhi.





# Greening Strategies for Livable Urban Spaces



Actions	Recommendation	Link for reference
<p><b>Linear Green Corridors</b></p>	<p>DDA has already implemented green buffers and linear landscaping in many parts of Delhi, particularly along major roads and wider right-of-way corridors. However, scaling this approach across fragmented or underutilized urban spaces—especially alongside stormwater drains, in peri-urban areas, and on informal pathways—can significantly enhance ecological connectivity. Inspired by Medellín’s Green Corridors Initiative, expanding these corridors with native vegetation, shaded pedestrian paths, and bioswales can strengthen Delhi’s green network, improve microclimate, and support low-cost stormwater management, especially in marginalized communities.</p>	<p><b>**Medellín’s interconnected green corridors</b></p>
<p><b>Strengthening Community Involvement in Urban Greening</b></p>	<p>Building on its existing engagement with RWAs, DDA can deepen community participation by adopting strategies from MillionTreesNYC and Singapore’s Park Connector Network. This includes organizing large-scale, volunteer-led planting events, offering tree stewardship training, and enabling residents to track tree health through digital tools. Partnering with schools, eco-clubs, and local groups for feedback and co-monitoring will create stronger local ownership and ensure the long-term success of urban greening efforts—especially in peri-urban areas.</p>	<ul style="list-style-type: none"> <li>• <b>Million Trees of New York</b></li> <li>• <b>Singapore’s Park Connector Network</b></li> </ul>

\*\*Reference 1  
Reference 2





# Goal 7: Promote Adaptive Infrastructure

## Benefits of having Adaptive Infrastructure

Adaptive infrastructure helps Delhi respond better to climate challenges such as flooding, heat, and waterlogging—areas where DDA plays a key role through planning, design, and land management. Integrating green and blue infrastructure into urban layouts—such as bioswales, shaded corridors, and multifunctional parks—can reduce surface runoff, improve microclimates, and enhance liveability. Designing infrastructure with dual functions (e.g., roads with stormwater management or sports grounds with water retention) increases efficiency without demanding additional land. DDA’s role in zoning, development control, and public space creation allows it to embed resilience principles early in the urban form. Ensuring that infrastructure is robust, context-specific, and maintained through participatory models also enhances long-term cost-effectiveness and citizen ownership. By enabling adaptive infrastructure through its planning tools and development schemes, DDA can directly support a more climate-resilient, inclusive, and efficient urban environment.



Score for Goal 7



## Strengths

- MPD advocates an Integrated Urban Water Management (IUWM) approach, which interconnects water supply, wastewater management, and stormwater drainage to create adaptable systems.
- DDA has adopted policies that promote decentralised systems such as DEWATS (Decentralised Wastewater Treatment Systems), rainwater harvesting, and groundwater recharge, indicating formal support at the institutional level. Decentralized treatment plants in large housing complexes also enable local reuse.

- For decentralised wastewater and stormwater systems, DDA consults planners, environmental engineers, and public health experts to ensure technically sound and locally adapted solutions, as highlighted in its planning documents.
  - DDA's action plan includes repurposing sealed borewells into rainwater harvesting structures, aligning with sustainable water management practices.
  - DDA plans to incorporate all assets, including green-blue infrastructure, into a comprehensive GIS-based system. This GIS system will support maintenance tracking and better planning for future needs, enabling a more data-driven approach to asset management.
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## Opportunities

- Limited alignment between DDA and Delhi Jal Board delays the rollout of integrated infrastructure in planned areas.
- Although policy frameworks support decentralised solutions like DEWATS and rainwater harvesting, there is no city-wide strategy to systematically integrate these with centralised systems.
- The absence of institutionalised mechanisms for citizen engagement in planning and maintenance undermines the long-term functionality and adaptability of infrastructure.
- Regular audits for green-blue infrastructure are not yet a standard practice.



## Recommendations

In Delhi, blue-green infrastructure—such as rain gardens, urban wetlands, and bioswales—often suffers from inconsistent upkeep, leading to reduced performance, especially during monsoon seasons. Drawing on global best practices, the Delhi Development Authority (DDA) can institutionalize a structured maintenance regime inspired by Melbourne Water's WSUD Maintenance Guidelines and New York City's Green Infrastructure Program. Both Melbourne and NYC emphasize the importance of ownership—not just by agencies but by citizens.



# Maintenance Framework for Blue-Green Infrastructure



## Tiered Maintenance Model

Following Melbourne Water's classification, maintenance should be divided into:

- **Proactive maintenance** (e.g., scheduled inspections, weeding, and litter removal),
- **Reactive maintenance** (responding to specific complaints or damage), and
- **Rectification** (asset renewal when regular maintenance fails).



## District-Level Maintenance Contracts

Inspired by NYC DEP's model of area-based contracting, DDA can engage local contractors to maintain green infrastructure across specific zones (e.g., south-west Delhi or flood-prone wards). This encourages localized accountability and streamlines vendor management.



## Asset-Type-Specific Guidelines

Create detailed Standard Operating Procedures (SOPs) for various assets such as:

- Raingardens and bioswales
- Permeable pavements
- Urban tree pits
- Constructed wetlands

These SOPs should clarify both civil (engineering) and landscape (vegetation) responsibilities, as both are essential for functionality and aesthetics.



## Performance Monitoring and Public Dashboards

Like NYC's inclusion of performance audits and geographic tracking, DDA can implement ward-level dashboards to track:


- Number and type of green assets
- Inspection status
- Maintenance records and costs
- Performance indicators like infiltration capacity or vegetation health



## Community Co-Stewardship and Training

- Conduct training for internal staff and contractors
- Create local stewardship programs where RWAs, schools, or civil society groups take on light upkeep tasks
- Hold annual awareness drives to encourage public engagement and discourage misuse or encroachment





# Conclusion & Way Forward

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This position paper provides a structured roadmap for the Delhi Development Authority (DDA) to transition toward a water-sensitive, climate-resilient urban future. Drawing from global best practices, local data, and institutional mandates, the paper outlines tailored recommendations across seven key goals of water sensitivity. By identifying current strengths and gaps through a detailed baseline assessment, and aligning them with DDA's functional scope, the paper offers actionable, goal-wise strategies for systemic improvement.

Going forward, DDA can initiate pilot implementations for select recommendations, integrate feedback loops through community forums, and institutionalize an interdepartmental coordination mechanism. Establishing periodic monitoring, leveraging digital tools for asset tracking, and fostering partnerships with knowledge institutions and civil society will be critical to scaling these efforts. This document serves as both a guide and a foundation for DDA to lead Delhi's transition into a water-sensitive city.





