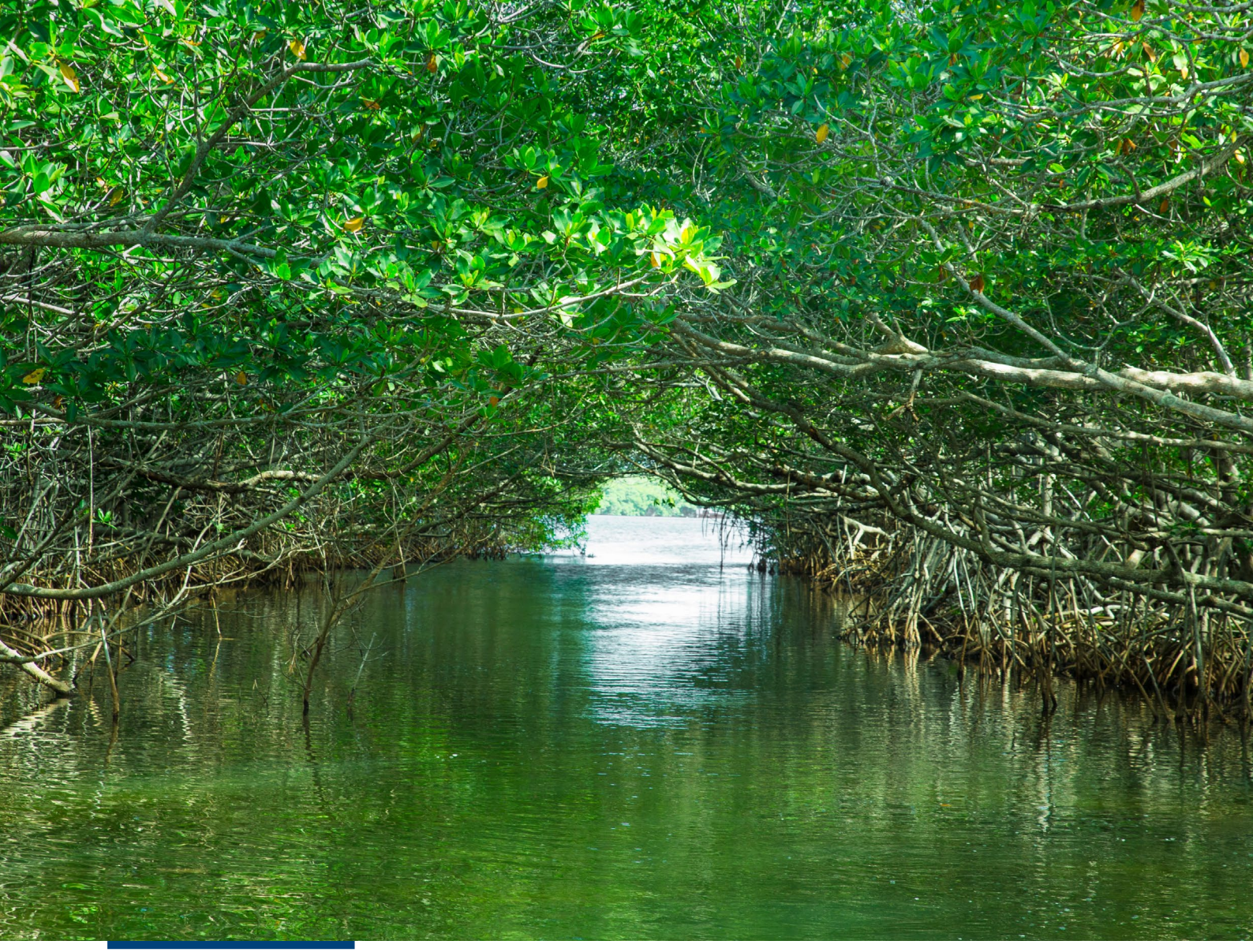

Unlocking Finance for Nature-based Solutions (NbS) in Indian Cities

Learnings and Insights from Case Studies

CPI | WRI India | CEEW

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INDIA FORUM FOR Nature BASED SOLUTIONS

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EXECUTIVE SUMMARY

Nature-based Solutions (NbS) are increasingly recognized as a critical pathway for addressing the intertwined challenges of climate change, biodiversity loss, and sustainable development (Ghaedi, Santos and Monteiro, 2026). Across the world, governments, businesses, and financial institutions are focusing on leveraging natural ecosystems to strengthen urban resilience and create more livable cities (World Bank, 2026; UNDP, 2025).

Recognizing this potential, the previous report, Unlocking Finance for Nature-based Solutions in Indian Cities, examined India's financing and policy landscape for urban NbS. The report found that while India has supportive national- and state-level policies/schemes to enhance private finance for urban NbS, many promising financing and business mechanisms/instruments remain underutilized, fragmented, and insufficient to support long-term implementation and maintenance (Wadhawan and Bajpai, 2024).

This report builds on that foundation and shifts the focus to understanding the essential elements of developing an investable NbS that works in practice. Through nine case studies from across India, this report examines how different financial and business mechanisms/instruments have been operationalized, the institutional arrangements that enabled implementation, the challenges encountered, and the lessons that can inform future investments.

CASE STUDY ANALYSIS

The report analyzes these case studies by intervention type, geography, financing, and business mechanisms/instruments, as well as the potential for replicability and scalability, to set out insights into what has made NbS financing work in practice in India and what continues to hold it back. (For more details, check Table 4: Summary and analysis of case studies). Across the nine case studies, the analysis shows the following themes and insights/learnings:

Table 1: Learnings and Insights from Thematic Analysis

Analysis Themes	Insights/Learnings
Reducing technical risk	▪ Across water-linked projects, feasibility studies as part of project design play an important role in determining the effectiveness of NbS ▪ MRV systems also played a key role in the long-term sustainability of all projects by enhancing trust and credibility, and long-term performance accountability ▪ Community inclusion within monitoring approaches allowed for capacity building for local communities, building community ownership and generating livelihoods
Gaining Institutional Access	▪ Policy alignment for NbS exists in India, and alignment with these schemes can help secure institutional buy-in ▪ Bundling NbS with grey infrastructure projects allowed NbS to overcome the lack of institutional acceptance. They enabled the inclusion of NbS elements in the project, which was funded by financial instruments that better reflected its risk-return profile
Securing Demand	▪ Demand articulation early on in the project determines the success of mechanisms ▪ User pay models for water continue to struggle with the skewed unit economics created by water subsidies and the political economy of water in India

Analysis Themes	Insights/Learnings
Sequencing across the finance stack	▪ Finance sequencing and phased capital deployment helped convergence of different types of capital, with each type of finance sequentially lowering risk or improving risk transferability
Crosscutting findings	▪ Challenge for NbS is less about the availability of capital and more about the design that allows willing capital to actually be deployed ▪ Feasibility work is under-resourced relative to its ability to reduce performance uncertainty ▪ Supportive policy exists but is fragmented across schemes that are hard to discover and converge ▪ Technically sound solutions may still fail to attract paying beneficiaries without demand articulation deliberately built in

RECOMMENDATIONS

The report found that successful cases reduced technical uncertainty through project preparation and monitoring, secured institutional access, established demand for project outcomes, and matched different forms of capital to different stages of development. The cases also show that no single financial or business mechanism/instrument fits all NbS. Projects with predictable revenues can support user charges or commercial finance; projects generating primarily public benefits require grants or public finance; and higher-risk projects can use concessional or philanthropic capital to prepare and de-risk investment before other capital enters. These findings suggest that India should focus less on creating another standalone financing instrument for NbS and more on strengthening the systems that allow existing capital to reach projects.

Based on these findings, the case study analysis and stakeholder consultations identified the following cross-cutting themes and recommendations for stakeholders across the NbS ecosystem:

Table 2: Stakeholder-Specific Recommendations

Themes	Key recommendations	Lead stakeholders
NbS Project Preparation Facility	Accounting for adequate time periods and financial support for feasibility assessments	Multilateral development banks, bilateral organizations; Philanthropy; Project developers
	NbS considerations could be integrated into existing project-preparation structures	City municipalities; Multilateral development banks; Project developers, NGOs and civil society
	Developing standardized but adaptable project-preparation templates for different NbS typologies	Central and state governments, City municipalities; Multilateral development banks; bilateral organizations; CSOs and think tanks
Fit-for-purpose Financing Taxonomy & Capital Stack	Creating a taxonomy to match capital to intervention and identify the sequencing of appropriate sources of capital for different stages of projects	Central and state governments; Multilateral development banks; Philanthropy; Private commercial financial institutions; bilateral organizations; CSOs and think tanks

Themes	Key recommendations	Lead stakeholders
Create an NbS Convergence and Implementation Framework	Central and state governments could develop guidance for NbS convergence	Central and State Governments; CSOs and think tanks
	Defining and clarifying roles and responsibilities	Multilateral Development banks; Bilateral organization; Project developers; CSOs and think tanks
	Extending convergence to procurement, technical standards and implementation procedures	City municipalities; Project developers
NbS Outcomes, Valuation & Monitoring Framework	A shift from input to outcome indicators to capture long-term impacts and benefits	Central and state governments; CSR regulators; Multilateral development banks; Philanthropy; Project developers

LIST OF ABBREVIATIONS

ABDP	Aravalli Biodiversity Park
ACA	Agroforestry Carbon Associate
ADB	Asian Development Bank
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BWSSB	Bangalore Water Supply and Sewerage Board
CCTS	Carbon Credit Trading Scheme
CEEW	Council on Energy, Environment and Water
CGWB	Central Ground Water Board
CPHEEO	Central Public Health and Environmental Engineering Organization
CPI	Climate Policy Initiative
CRU/CRUs	Carbon Removal Unit (s)
CSOs	Civil Society Organizations
CSR	Corporate Social Responsibility
CWD	Clear Water Dynamics
DDA	Delhi Development Authority
DEA	Department of Economic Affairs
DFIs	Development Finance Institutions
DPR/DPRs	Detailed Project Report (s)
DRPS	Decentralized Relief Payout System
DRTPS	Disaster Risk Transfer Parametric Insurance Solution
EbA	Ecosystem-based Adaptation
EIA	Environmental Impact Assessment
EUR	Euro
EWCD	Elderly, Women, Child and Disabled-friendly
FGDs	Focus Group Discussions
FPOs	Farmer Producer Organizations
FTE	Full-time Equivalent
GCC	Greater Chennai Corporation
GCF	Green Climate Fund
GEF	Global Environment Facility
GGGI	Global Green Growth Institute
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMDA	Gurugram Metropolitan Development Authority
GP	Gram Panchayat
ha	Hectare
HFDC	Haryana Forest Department Corporation
IAG	IAmGurgaon
IIFM	Indian Institute of Forest Management

IMC	Indore Municipal Corporation
IMD	India Meteorological Department
INR	Indian Rupee
IORA	IORA Ecological Solutions
ISF	InsuResilience Solutions Fund
ISWD	Integrated Stormwater Drainage
IUCN	International Union for Conservation of Nature
JFMC	Joint Forest Management Committee
JICA	Japan International Cooperation Agency
JJM	Jal Jeevan Mission
KL	kiloliters
KLD	Kiloliters per Day
Km	Kilometers
KPI	Key Performance Indicators
KSPCB	Karnataka State Pollution Control Board
LCPD	Liters per Capita per Day
LFC	Little Flower Convent (School)
LRRF	Livelihood Recovery and Resilience Fund
MAR	Managed Aquifer Recharge
MAWS	Municipal Administration and Water Supply
MBDA	Meghalaya Basin Development Authority
MCG	Municipal Corporation of Gurugram
MCLLMP	MBDA's Community-led Landscape Management Project
MegCare	Meghalaya Carbon Agroforestry for Community Resilience and Ecosystems
MGNREGA/S	Mahatma Gandhi National Rural Employment Guarantee Act/Scheme
MISHTI	Mangrove Initiative for Shoreline Habitats and Tangible Incomes
MLD	Million Liters per Day
MoU	Memorandum of Understanding
MRV	Monitoring, Reporting and Verification
NAPCC	National Action Plan on Climate Change
NbS	Nature-based Solutions
NCR	National Capital Region
NDRF	National Disaster Response Fund
NIWA	Netherlands International Water Ambition
NLRP	Narmada Landscape Restoration Project
NMSA	National Mission for Sustainable Agriculture
NRM	Natural Resource Management
NSDMA	Nagaland State Disaster Management Authority
NSDMIS	Nagaland State Disaster Management Information System
NTFP	Non-Timber Forest Product
NTPC	National Thermal Power Corporation
O&M	Operations and Maintenance
ODA	Official Development Assistance

OECM	Other Effective area-based Conservation Measure
OSR	Own Source Revenue
PES	Payment for Ecosystem Services
PKVY	Paramparagat Krishi Vikas Yojana
PMSKY	Pradhan Mantri Krishi Sinchayee Yojana
POA	Plot Owners' Association
PSI	People's Science Institute
PSU	Public Sector Undertaking
RBD	Rainbow Drive (community)
RBI	Reserve Bank of India
RDL	Rainbow Drive Layout
RMDD	Rural Management and Development Department
ROI	Return on Investment
RVO	Netherland Enterprise Agency
RWA	Resident Welfare Association
RWH	Rainwater Harvesting
SAPCC	State Action Plan on Climate Change
SBI	State Bank of India
SDMF	State Disaster Mitigation Fund
SDRF	State Disaster Response Fund
SIRD	State Institute of Rural Development
SPS	Samaj Pragati Sahyog
STP	Sewerage Treatment Plant
SWD	Stormwater Drainage
TA	Technical Assistance
TERI	The Energy and Resource Institute
TSG	Technical Support Group
UHI	Urban Heat Island
ULB	Urban Local Bodies
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USD	United States Dollar
VCF	Village Community Facilitator
VWB	Volumetric Water Benefit
VWSC	Village Water and Sanitation Committees
WaL	Water as Leverage
WRI	World Resource Institute

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1. INTRODUCTION

Nature-based Solutions (NbS) are increasingly recognized as a critical pathway for addressing the intertwined challenges of climate change, biodiversity loss, and sustainable development (Ghaedi, Santos and Monteiro, 2026). Across the world, governments, businesses, and financial institutions are investing in ecosystems not only to conserve nature but also to reduce disaster risks, enhance water security, improve agricultural productivity, strengthen urban resilience, and create more livable cities (World Bank, 2026; UNDP, 2025). Over the past decade, NbS have evolved from primarily environmental interventions to strategic investments that generate economic, social, and climate resilience dividends (Meraj and Hashimoto, 2025).

Recognizing this potential, the previous report, Unlocking Finance for Nature-based Solutions in Indian Cities, examined India's financing and policy landscape for urban NbS. It identified the existing enabling policy environment and the broad spectrum of financing and business mechanisms, including public finance, corporate social responsibility (CSR), philanthropy, green bonds, blended finance, multilateral funding, and private investment, which can be leveraged for financing urban NbS in India. The report found that while India has supportive national- and state-level policies and initiatives for urban NbS, it still needs significant targeted financing to implement NbS at scale. Most NbS initiatives rely on public budgets, CSR funding, donor grants, or philanthropic support, which are often fragmented and insufficient to support long-term implementation and maintenance (Wadhawan and Bajpai, 2024). Local governments frequently face limited fiscal capacity and technical expertise, while investors continue to encounter challenges related to project preparation, risk assessment, and the valuation of ecosystem services. As a result, many promising financing instruments remain underutilized despite growing interest from both public and private stakeholders.

This report builds on that foundation by shifting the focus from what financing instruments to how they work in practice. Financing alone is rarely sufficient to scale NbS. Successful implementation also depends on supportive policies, an investable project pipeline, capable institutions, technical expertise, stakeholder coordination, and appropriate mechanisms for allocating risks and responsibilities. Understanding how these elements interact is essential for developing an investable NbS market. Through **nine case studies from across India**, this report examines how different financing mechanisms have been operationalized, the institutional arrangements that enabled implementation, the challenges encountered, and the lessons that can inform future investments.

This report is the final document in a series of knowledge products developed to provide actionable direction to enhance project design and mobilize capital for nature-positive urban development in India. The reports that have been released include:

A guidebook and best-practices repository that provides a practical three-step framework to assess how the policy and regulatory sub-system supports urban NbS in India, and an assessment of the finance and business ecosystem for NbS. Supported by stakeholder insights, the best practices repository offers lessons from 9 global and domestic best practices to strengthen project models and unlock investment.

An overview document sharing early recommendations through stakeholder insights.

2. SCOPE AND APPROACH

This report seeks to generate practical evidence on financing NbS by examining nine case studies from across India. The study maps ecological outcomes with the **financial and business mechanisms/instruments** underpinning the initiatives and analyzes these mechanisms to identify the factors that supported their successful delivery. This includes the analysis of the financing instruments employed, stakeholder roles, governance arrangements, implementation processes, and enabling conditions. The report addresses the following key questions:

- What are the promising instruments and financing approaches that currently support NbS in India?
- What institutional, policy, and market conditions enabled these instruments and financing approaches to succeed? How did local factors enable or constrain the design and effective deployment of instruments?
- How can lessons from the documented cases improve the potential for replication of the instruments for urban NbS?

Relevance to the urban NbS context: While the report primarily focuses on NbS for cities and urban resilience, India's urban NbS ecosystem is still emerging, with relatively few mature examples operating at scale. To capture a broader range of financing innovations, the study also includes selected peri-urban, watershed, coastal, and landscape restoration initiatives that are not exclusively urban in their geographic setting. These cases are included because they demonstrate financing mechanisms, partnership models, and institutional arrangements that are directly relevant and adaptable to urban contexts. Where applicable, each case study discusses its relevance, transferability, and potential limitations for replication in cities.

METHODOLOGY

The final report captures learnings from case studies- both quantitative and qualitative- that support finance for the design, delivery and/ or sustenance of quality urban NbS projects in India. Data were collected for 9 innovative financing and business mechanisms (Check Table 4), shortlisted from a long list of 20+ projects that were identified through literature reviews, reports, databases, and consultations with subject-matter experts and partners at the India Forum for NbS.

Criteria for selecting 9 financing instruments and corresponding projects for deeper assessment were developed to foster innovation in instrument structure and delivery while ensuring a diverse mix of projects. This included variations in project age, investment size, and funding sources (a mix of public, private, and concessional finance), among other factors, to ensure that learnings from cases can be adapted to varied climate risks, geographies, and stakeholder needs, based on their current eligibility/ access to climate adaptation finance.

Table 3: Synthesis of the criteria developed for the selection of deep-dive case studies

Screening process	Criteria for inclusion
Literature screening: Identification of diverse and innovative finance/business models for urban NbS in India	**Focus on innovation**: Definitions from the literature (World Bank – tapping new sources and catalytic fundraising models, engaging investors beyond financial dimensions of transactions as partners and stakeholders in development) highlighting the need for non-traditional funding mixes to reduce the financing gap for urban NbS.
Consultations: Research on cases described during interviews/FGDs to understand data availability and innovation.	**Data availability**: Substantial data are available (with the ability to source quantitative data or use proxies). Financing processes and outcomes are discussed; stakeholders are clearly identified.

	Diversity:
	▪ Pan-India scope with a preference for cities where partners have a presence for potential follow-up interviews/surveys.
	▪ **Diversity in financing instruments** (as identified through the market study report)
	▪ **Diversity in ecosystems** addressed
	▪ **Project size** (project/program)
	▪ **Project age**: A mix of the following
	  • **Older models** for access to data on actual outcomes achieved and financial sustainability (Ex: TN water and sanitation pooled fund)
	  • **Ongoing programs** to understand where roadblocks are faced, and support that is required to mobilize finance (Ex: Water as Leverage, Farmers for Forests)
	▪ **Project stage: Financing for diverse NbS stages (climate risk assessment/geographic selection, portfolio design, project sourcing and evaluation, cost-benefit analysis, etc.)**
	▪ **Non-NbS considerations:** The scope can include non-NbS/hybrid cases that support nature mainstreaming (ex: cooling solutions); OR look at fund monitoring/management examples that consider a mix of solutions to support specific outcomes.
	▪ **Barriers addressed:** Addressing barriers identified during the market study stage

Best practices research: Selection of cases identified through the long list of best practices	**Maladaptation**: Avoid cases that may lead to the following ▪ **Social consequences**: Displacement, exclusionary, gentrification ▪ **Environmental consequences**: Hardscaping, monoculture, etc.

The framework developed to assess the 9 instruments included in the '**Guidebook and best practices repository'** was expanded for a rigorous exploration of local factors, including the regulatory environment and policy sub-system, access to financing instruments, capacity to structure reliable business models, etc., that enable or hinder the effectiveness of instruments. Themes such as definitional factors to understand the NbS fit (climate risk addressed and other scoping criteria), local factors (eg. socio- economic assessment, existing site conditions, local livelihood opportunities, etc.), diversity factors (eg. stakeholder roles, local support) and performance factors (e.g. scale and sustainability) were assessed through interviews and secondary research (literature and policy reviews).

An analysis of financial factors to understand project fund flows (across the NbS lifecycle), financial efficiency, bankability, and investment mobilization was critical for developing insights and is part of the framework. Data were collected through a series of semi-structured interviews (with investors, project developers, and government officers) using questionnaires and survey tools, supported by literature/policy reviews. However, the MegCare and Nagaland DRTPS case studies are based entirely on secondary literature and have not been validated through primary stakeholder interviews. Findings have been analyzed to assess the performance of various instruments, such as PES, Technical Assistance, and risk transfer mechanisms (parametric insurance), and to examine the influence of local challenges (shifts in local government, unclear

exit strategies that impact the long-term generation of benefits, etc.) on potential revenue streams and ROI. Please note that all amounts mentioned in INR and EUR were converted to USD in the case studies using calendar-year conversion rates and averages.[1]

Limitations of the study:

- Most stakeholders expressed the need for an evidence base of learnings for investment models. However, the willingness to share documented information in the form of reports, publications, etc., as well as the lack of financial information (budgetary info on project cash flows, etc.) has remained a significant challenge in sourcing sufficient quantitative information for the calculation of estimates and cost-benefit analysis.
- Additionally, since some of the cases included in the list are older projects, tracking government officers and experts who were instrumental in delivering projects has been difficult due to transfers.
- The report remains to be validated to understand better the current capacities of local governments/ stakeholders to use the documented instruments. Furthermore, replication of the business cases included for urban environments remains unclear and requires context-specific testing/validation, which is beyond the scope of this research.

1 *INR to USD conversion rates using Handbook of Statistics on the Indian Economy 2025-26 0HSIE31072026042B2753EC8F4B9EA7081AF75B56AA20.PDF*
EUR to USD conversion rates using US dollar/Euro ECB reference exchange rate, Annual EXR.A.USD.EUR.SP00.A | ECB Data Portal

3. CASE STUDY DEEP DIVE AND ANALYSIS

The nine case studies, spanning different geographies, sectors, and financing structures, offer insights into what has made NbS financing work in practice in India and what continues to hold it back. The following table summarizes the case studies, including the intervention type, geography, financing mechanism, and potential for replicability and scalability.

Table 4: Summary and analysis of case studies

Case Study and Solution	Type of finance	Financial and Business Mechanism/ Instrument	Geography and Scale	Potential for Replicability and Scalability[2]			
				Enabling environment and institutional buy-in	Sustainability	Capital mobilization	Relevance in the urban context
Upper Yamuna Hydro Basin-Artificial Aquifer Recharge Project *Monsoon runoff management, groundwater recharge, watershed management, community-based water governance*	Private Philanthropy	Grant; Volumetric Water Benefit	Som river catchment: ~ 20,000 ha; Bhagwanpur Village, Haryana	An active **MoU with the water department** for infrastructure access and long-term handover, followed by a NoC on the DPR to support the project. **Community participation** and a focused philanthropic grant enabled the project design.	**Digital MRV design**, **community-based monitoring, and alignment** with governance structures strengthen long-term sustainability. However, Asset ownership beyond the 10-year contract period remains unclear.	A decade-long volumetric recharge contract ensures sustainability; however, funding sources beyond the contract period remain unclear.	**Relevant for urban and peri-urban watersheds**; community mobilization and infrastructure governance remain challenging at the city level.

2 *It is to be noted that the potential for scalability section covers a broad indicative analysis based on the report's findings, with the acknowledgment that the effectiveness, replicability, scalability, and sustainability of these interventions may be subject to various systemic factors beyond the purview of the analysis.*

Case Study and Solution	Type of finance	Financial and Business Mechanism/ Instrument	Geography and Scale	Potential for Replicability and Scalability[2]			
				Enabling environment and institutional buy-in	Sustainability	Capital mobilization	Relevance in the urban context
Rainbow Drive Layout- Nature-based Urban Water Management Project *Groundwater recharge, rainwater harvesting, demand management, wastewater treatment and reuse*	Household finance	Private household/ community finance; Use-pay Model	~ 13.8 ha of gated residential layout, Sarjapur Road, Bengaluru Urban District, Karnataka	**Governed by the Plot owners' association** voluntarily, with no institutional involvement at the ward/ city level. **Tariff design** is backed by demand analysis and an assessment of water production costs.	**Community-led and ongoing for over a decade**, the project demonstrates water security, sustainable waste management and urban greening. However, challenges persist in coordinating municipal water supply and stormwater drainage.	**A tariff-based cost-recovery mechanism funds operations and maintenance and future infrastructure replacement, with** a dedicated sinking fund for future investments.	Relevant as a model for **urban housing community financing**
Meghalaya Carbon Agroforestry for Community Resilience and Ecosystems (MegCare) *Ecosystem restoration, carbon sequestration, biodiversity conservation, livelihood diversification*	Philanthropic finance; Private finance	Private grants and Guarantee-backed debt financing; Carbon Finance	~ 150,000 ha targeted across the Garo and Khasi-Jaintia Hills, Meghalaya	**Partnership with Meghalaya Basin Development Authority** to leverage community mobilization and buy-in.	**Voluntary carbon market price volatility** remains a structural barrier.	**A financing mechanism linking restoration outcomes to carbon payments, access to a carbon marketplace, robust monitoring technology, and community stewardship unlocks** potential for future investment opportunities.	Carbon-financed agroforestry models depend heavily **on land availability and ownership**; they can be explored in peri-urban areas.
Water as Leverage (WaL)- City of 1000 Tanks Water Balance Model *Climate-resilient urban water infrastructure, flood and drought risk management, groundwater recharge and wastewater reuse*	International public finance	Bilateral Official Development Assistance (ODA)- Technical Assistance (TA), grants, priced service contract	LFC pilot footprint: ~ 0.18 ha, Chennai, Tamil Nadu	**Technical assistance delivered strong feasibility groundwork, aligning with national frameworks** such as AMRUT and the Jal Jeevan Mission. However, planning stalled at the GCF proposal stage due to coordination challenges between the local and central governments.	**The grant-funded pilot covered monitoring and maintenance, building** the case for future investment. However, long-term sustainability remains uncertain because the project lacks a local steward after the subsidy phase and demand for treated wastewater is weak.	**Sequenced grant funding** demonstrated potential to leverage future TA financing. However, institutional coordination challenges pose a barrier to moving beyond the proposal stage.	**Addresses Chennai's dual flood-drought challenge**, tested at a plot scale and now being studied for upscaling across 6 urban consumer typologies (residential, healthcare, industry, education, hospitality and water bodies)

Case Study and Solution	Type of finance	Financial and Business Mechanism/ Instrument	Geography and Scale	Potential for Replicability and Scalability[2]			
				Enabling environment and institutional buy-in	Sustainability	Capital mobilization	Relevance in the urban context
Narmada Landscape Restoration Project *Water conservation, forest landscape management, agricultural practices*	International and domestic public finance	Bilateral ODA, CSR, Ecosystem service payments (PES)	~10,000 ha targeted scope in Khargone district, Madhya Pradesh, along the Narmada River	**Strong multi-stakeholder partnerships** (USAID, NTPC, GGGI, IIFM, IUCN and others) and alignment with national schemes such as National Mission for Green India, National Water Mission.	**Subsidized water pricing** across Indian cities remains the biggest challenge for PES-based cost recovery.	**A financing mix of ODA and CSR funds** financed the design and implementation stage; however, long-term PES financing remains uncertain and depends on tangible benefits, such as avoided future infrastructure investments.	**The model is conceptually replicable for cities** dependent on water sources outside their administrative boundaries, but challenges such as subsidized urban water pricing restrict demand.
Disaster Risk Transfer Parametric Insurance Solution in Nagaland *Extreme precipitation in the monsoon months, windstorm/ hailstorm, flooding, rainfall-induced landslides*	Private finance; Public finance	Parametric insurance (for climate adaptation)	Nagaland, India	**State-led parametric insurance model** implemented by the state's disaster management authority (NSDMA).	**The phased premium-sharing structure is designed to shift the cost burden to the state progressively**. However, continued reliance on international co-financing underscores that self-sufficiency has not yet been proven.	The scheme has shown it can restructure and re-attract insurer participation after the pilot-phase setback.	**High premiums and coverage costs remain barriers to broader uptake of parametric insurance schemes across states, and many governments lack the** in-house capacity to evaluate climate risk models and negotiate fair terms.
Integrated Stormwater Drainage (ISWD) Project and Restoration of Kadapakkam Lake *Urban wetland restoration; groundwater recharge through rainwater harvesting; mitigation of localized flooding; biodiversity conservation*	International public finance; Domestic public finance	Sovereign loan; International adaptation grant; Public finance from the government of Tamil Nadu	Kosasthalaiyar River Basin in northern Chennai, Tamil Nadu, India	**Dedicated institutional mechanism** involving a multilateral development bank (ADB) and a global fund (GEF) compliant with state co-financing.	**Unified project management framework** for grey stormwater infrastructure and NbS. However, cost recovery for long-term O&M remains unclear.	**The project makes a case for embedding NbS in public infrastructure systems;** however, it is driven by an international grant rather than direct project finance, with no cost recovery or revenue stream.	Demonstrates integration of NbS in urban stormwater infrastructure

Case Study and Solution	Type of finance	Financial and Business Mechanism/ Instrument	Geography and Scale	Potential for Replicability and Scalability[2]			
				Enabling environment and institutional buy-in	Sustainability	Capital mobilization	Relevance in the urban context
Ecological Restoration and Biodiversity Conservation in the Aravalli Biodiversity Park *Ecological re-wilding; mine-site restoration; groundwater recharge and watershed management; mitigation of Urban Heat Island (UHI) effect*	CSR-based private finance	Corporate Social Responsibility (CSR) funds, individual donations	Semi-arid and rocky terrain spanning ~ (154-159 ha) in the Aravalli range, Gurugram, Haryana	The Municipality serves as the landowner, custodian, and provider of initial capital funding, in a **CSO-anchored public-private partnership**.	**10-year corporate stewardship through MoU** for long-term maintenance. However, O&M budgeting beyond this period remains unclear.	**Demonstrates pooling of CSR capital** through a stewardship contract, though CSR funding cycles remain annual.	Supports the restoration of urban degraded ecosystems
Sikkim Dhara Vikas Project for Water Security and Springshed Management *Ground aquifer recharge; enhancing water security; localized flood mitigation; forest cover restoration; enhancement of agro-pastoral livelihoods*	Domestic public finance; Household finance	Public finance scheme, user pay charges	Kitam Gram Panchayat, Namchi district, South Sikkim, India	**Integration of NbS in social protection scheme**, supported by GIS mapping and hydrological testing to identify groundwater flow pathways and demarcate critical springshed recharge areas.	Operational expenditure pooled through government budgets; community mobilization for O&M.	**Channeling upfront project costs will be challenging** in the absence of an employment guarantee scheme, as there are no urban counterparts. While an equitable user-pay model is in place, the amount may be insufficient to cover O&M costs without additional funding.	**Different land ownership patterns**, existing urban infrastructure, and pollution issues may affect the design and implementation of spring revival.

CASE STUDY ANALYSIS

Overall, the analysis emerging from the case studies falls under the following broad categories:

REDUCING TECHNICAL RISK

Across water-linked projects, feasibility studies, including hydrogeological surveys and tests as part of project design, played an important role in determining the effectiveness of NbS. However, funders and institutions alike often undervalue these stages in terms of the time and money they require.

- The project team for the Artificial Aquifer Recharge under Amazon conducted baseline studies to understand hydrogeological investigations, recharge potential, land tenure, water quality, and cost efficiency to help implement tailored solutions, and reduce regulatory and operational risks. This design phase took approximately 9 months to complete.
- Similarly, the Water as Leverage program in Chennai was initiated through a year-long engagement that included a feasibility study and DPR to develop a water balance model both at the city scale and at the plot level to understand better recharge areas for the design of a water balance model.

MRV systems also played a key role in the long-term sustainability of all projects by enhancing trust and credibility and by supporting and communicating long-term performance accountability. Importantly, community inclusion in monitoring approaches played a combined role in building local capacity, strengthening community ownership, generating livelihoods, and validating performance.

- Both the Meghalaya Carbon Agroforestry for Community Resilience and Ecosystems (MegCare) and the Artificial Aquifer Recharge projects combined some form of digital or satellite-based monitoring with locally recruited and trained community monitoring associates or technicians.

GAINING INSTITUTIONAL ACCESS

Interviewed stakeholders and project proponents broadly agree that policy alignment for NbS exists in India, and that aligning with these schemes can help secure institutional buy-in. These policies and plans signal government demand, while tools such as taxonomies and standards can support certain components of NbS projects. For example, under the Narmada Landscape Restoration Project, the distribution of soil health cards to farmers and the promotion of organic farming practices were aligned with the central schemes Rashtriya Krishi Vikas Yojana and Paramparagat Krishi Vikas Yojana (PKVY), respectively. However, scheme discovery and convergence remain a challenge.

In some case studies, bundling NbS with grey infrastructure projects helped overcome a lack of institutional acceptance or legitimacy. It enabled the project's NbS elements to be funded through instruments or mechanisms that better reflected its risk-return profile.

- The Kadapakkam lake project was enabled by piggybacking on the existing debt-financed stormwater investment. This convergence was facilitated by a shared reporting and project management framework that applied across both the grant- and debt-financed parts of the project.

- For the Aravalli Biodiversity Park, public agencies retained land ownership. They allocated funds for civil works. At the same time, CSR financed the ecological softscaping, allowing NbS to play a complementary role in strengthening urban resilience rather than a substitutionary role.

SECURING DEMAND

Demand articulation early on in the project determines the success of mechanisms- validating the performance of NbS is insufficient if no buyer is willing to pay for it. In the case of Artificial Aquifer Recharge, Amazon clearly articulated demand before project initiation. At the same time, the Rainbow Drive Urban Water Management Project conducted a demand analysis to determine the tariffs users would pay. Conversely, the Narmada Landscape Restoration Project's Payment-for-Ecosystem-Services model struggled because water subsidies skewed demand and ecosystem-service pricing.

While user-pay models for water will continue to struggle with the skewed unit economics created by water subsidies and the political economy of water in India, Rainbow Drive and Sikkim's Dhara Vikas project demonstrate that NbS can capture a market where public provision is either inadequate or falls through the cracks. While NbS cannot compete with subsidized prices, it is more competitive where people already pay for or access alternative systems, often informally.

SEQUENCING ACROSS THE FINANCE STACK

In many case studies, finance sequencing and phased capital deployment helped converge different types of capital, with each type of finance sequentially lowering risk or improving risk transferability.

- MegCare, for example, was initiated through early-stage grant support and transitioned to commercial debt financing backed by a financial guarantee to enable long-term investment in NbS.
- For the Nagaland Parametric Insurance, the InsuResilience Solutions Fund is supporting subsidized premiums, such that the State Government can assume a progressively greater share of the cost during the 3-year scheme period.

CROSSCUTTING FINDINGS

Across the nine case studies, a pattern emerges from our findings –

- The challenge for NbS is less the availability of capital and more the design that allows willing capital actually to be deployed towards NbS.
- Feasibility work is under-resourced relative to its ability to reduce performance uncertainty. Supportive policy exists but is fragmented across schemes that are hard to discover and converge.
- Technically sound solutions may still fail to attract paying beneficiaries without demand articulation deliberately built into project design.

CASE STUDY 1: UPPER YAMUNA HYDRO BASIN- ARTIFICIAL AQUIFER RECHARGE PROJECT

Project Description	
Financial and business mechanism/ Instrument	Volumetric Water Benefit (VWB) outcome-based service grant (philanthropic)
Priority themes	Monsoon runoff management, groundwater recharge, watershed management, community-based water governance
Region/ geography	Bhagwanpur village, Yamunanagar District, Haryana, India; upstream of Delhi Upper Yamuna watershed (Som River sub-basin) including peri-urban areas
Project Size	Not disclosed
Timeline	10-year contract. Civil works for the two gabion check dams/ weirs were completed at the onset of the 2026 monsoon, and first monsoon impoundment was observed in July 2026

PROJECT OVERVIEW

The Upper Yamuna Hydro Basin- Artificial Aquifer Recharge Project demonstrates how an outcome-based Volumetric Water Benefit (VWB) service grant, supported by digital Monitoring, Reporting, and Verification (MRV) systems, community governance, and public-institutional partnerships, can enable a nature-based solution for water security. A Managed Aquifer Recharge (MAR) intervention, implemented through gabion structures[3] and recharge shafts[4] aims to address groundwater depletion in Yamunanagar district by managing excess monsoon runoff (CGWB, 2020). The project deploys grey infrastructure to enhance natural water recharge processes (Check annexure 1 for project site pictures) and intends to integrate green solutions by planting trees around the structure. Located in the Upper Yamuna watershed immediately upstream of Delhi, the project is designed to replenish upstream aquifers that, with a delayed response, contribute to baseflow in the Yamuna River, a major source of Delhi's water supply[5].

The watershed-based intervention responds to growing water stress in Yamunanagar district, a result of rising irrigation and industrial demand outpacing natural recharge despite the district receiving comparatively higher annual rainfall within the state (Borana, 2012). The Som River, a seasonal tributary draining a catchment area of over 200 sq. km, carries substantial monsoon runoff, which largely leaves the watershed unutilized due to the absence of adequate recharge infrastructure (CGWB, 2007). Climate change is expected to intensify this challenge through a temperature rise of 1.3-1.6 degrees by mid-century and increased evapotranspiration losses, resulting in additional stress on groundwater resources (Haryana SAPCC, 2023).

3 ***Gabion Structures*** *are check dams made of stone-filled wire mesh cage to slow down surface runoff, reduce erosion and support groundwater recharge by increasing infiltration.*

4 ***Recharge Shafts*** *are vertical structures constructed to channel surface water directly into deeper soil layers or aquifers.*

5 *Surface-groundwater interactions and recharge sources in the upper Yamuna River basin: https://www.sciencedirect.com/science/article/abs/pii/S0013935125008382*

STAKEHOLDER ROLES

Table 5: Stakeholder Roles and Categorization for Upper Yamuna Hydro Basin-Artificial Aquifer Recharge Project

Role	Stakeholder	Category
Financier	Amazon	Service Grant
Primary implementation partners	Hasten Regeneration, Clear Water Dynamics, Arpan Seva Sansthan	Project developer
Enabling partners	Haryana's Jal Shakti Department, State and Yamunanagar District Administration	Government institution

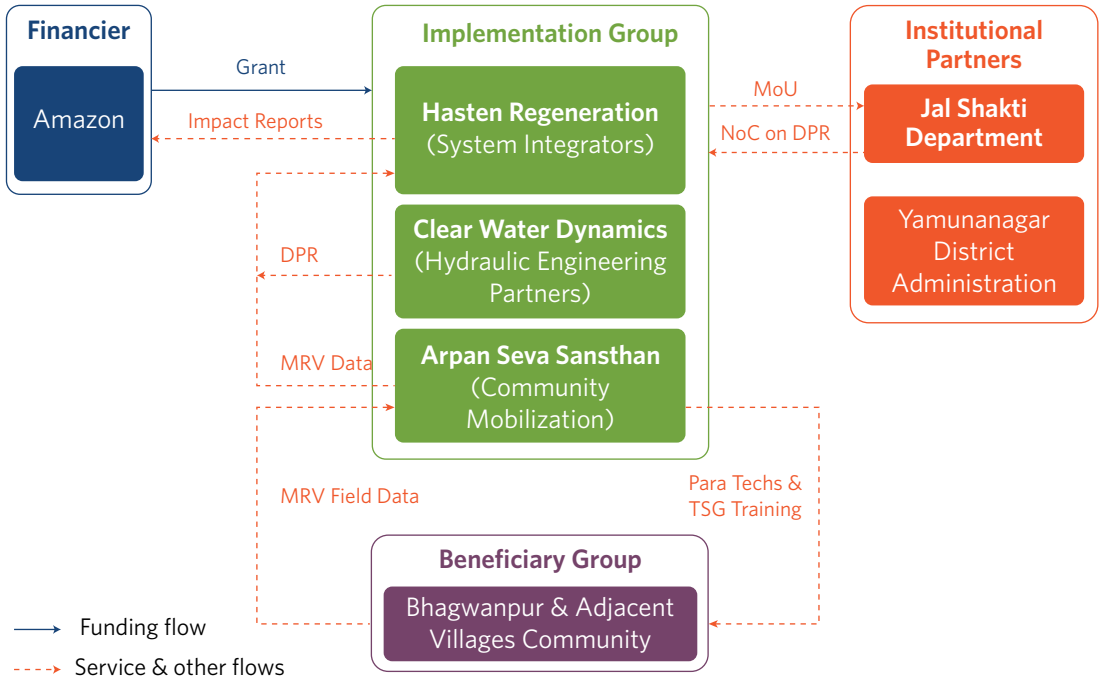
**For more details on the role of each stakeholder, please check Annexure-1*

FINANCIAL AND BUSINESS MECHANISM: HOW IT WORKS

Amazon, through its Water Stewardship Programme, has provided an outcome-based Volumetric Water Benefit (VWB) service grant for the project. The first phase covers capex to support project development, construction, and commissioning over approximately 22 months, followed by annual payments for monitoring and maintenance for the remainder of the 10-year contract period. Under this outcome-based model, grant disbursements are linked to achieving a minimum verified groundwater recharge target of 400,000 m^3 annually, similar to how other pay-for-performance models are structured.

The project is designed and implemented through a special partnership model rather than a single-organization approach. Hasten Regeneration serves as the systems integrator, coordinating Clear Water Dynamics, which provides the engineering and scientific foundation through the prepared Detailed Project Report (DPR) for the NbS intervention, and Arpan Seva Sansthan, which leads community mobilization and governance for the NbS intervention that requires a technical, nature, and social delivery convergence.

Figure 1: Financial and Business Mechanism Diagram of Upper Yamuna Hydro Basin-Artificial Aquifer Recharge Project



Source: *CPI Analysis*

The project has been implemented through close coordination with the Haryana Jal Shakti Department and the Yamunanagar District Administration to secure regulatory approvals, ensure institutional alignment, and plan for long-term operations and maintenance. The project also **integrates a hybrid Monitoring, Reporting, and Verification (MRV) system that combines digital monitoring technologies with community stewardship, delivered through locally trained Para-Technicians,** to support long-term performance accountability.

IMPACT/PERFORMANCE

The project is expected to generate the following various environmental, social, and economic impacts (check Table 6 below) following commissioning and post-monsoon validation:

Table 6: Expected Impact Against KPIs

Factors	KPI	Expected Value
Environmental	**Annual recharge target**	400,000 m^3 (400 million liters), based on PCSWMM[6] model
	Projected 10-year cumulative recharge	> 4,000,000 m^3 (4,000 million liters), based on CWD's 10-year modeling
	Climate adaptation	Improving adaptive capacity and reducing sensitivity of the local communities towards climate shocks
Social	**Primary beneficiary households**	Approx 250-260 households in Bhagwanpur village with peri-urban co-benefits
	Broader influence radius beneficiaries	Approx 800-1,200 households across 4-6 surrounding villages, with expected wider downstream benefits through contributions to baseflow in the Yamuna River, the watershed on which Delhi's water supply relies
	Community stewardship	3 Technical Support Groups (TSGs), 5 trained Para-Technicians, and participatory planning activities for a village-level water security plan.
Economic	**Employment generated for technicians**	Employment and skills pathway for Para-Technicians

**Detailed impacts estimates can be shared post-implementation*[7]

6 ***PCSWMM:*** *spatial decision support system and graphical software package used to simulate urban hydrology, hydraulics and water quality.*

7 *Civil works for the two gabion check dams/weirs were completed at the onset of the 2026 monsoon, and first monsoon impoundment was observed in July 2026; recharge shafts follow in the next construction phase. Sensors are installed at four monitoring locations, with data-logger validation and dashboard integration in progress. Values mentioned in the columns are based on estimated performance of the NbS intervention. A detailed MEL and impact assessment will be conducted post-2026 monsoons to check validity of these projected claims.*

KEY TAKEAWAYS AND INSIGHTS

POLICY AND ENABLING FACTORS

The project's alignment with local societal challenges of water security and climate change creates enabling conditions of institutional support. Haryana's climate action plan emphasizes groundwater conservation, water-use efficiency, and water resource management as key intervention areas (Haryana SAPCC, 2023).

The project design addressed technical and stakeholder factors to help reduce operational risks. From a stakeholder perspective, community participation was integrated into project design and implementation through Gram Sabha consultations, participatory planning, awareness campaigns, and Village Water Security Plans, helping to build local ownership. From a technical standpoint, the Managed Aquifer Recharge (MAR) intervention was designed based on favorable hydrogeological conditions and the Central Ground Water Board (CGWB) guidelines, providing a technically appropriate and context-specific approach to groundwater recharge (CGWB, 2000).

SUSTAINABILITY

Outcome-based Volumetric Water Benefit (VWB) grants provide a sustainable financing mechanism for long-term NbS implementation by linking payments to verified groundwater recharge outcomes (Reig & Vionnet, 2021). However, sustaining interventions beyond the 10-year contract period will require complementary public financing, continued corporate stewardship investments, or the development of mature pay-for-performance models and other long-term revenue mechanisms, all of which are gaining momentum in India. Convergence with public programmes such as Atal Bhujal Yojana and MGNREGS, and growing corporate water disclosure under SEBI's Business Responsibility and Sustainability Reporting (BRSR) framework, are creating new pathways for long-term co-investment (NITI Aayog, 2019).

Digital MRV design, community-based monitoring, and alignment with governance structures strengthen the project's long-term sustainability. These mechanisms promote continuous performance monitoring, community ownership, government alignment, and long-term operations and maintenance of the intervention. IoT sensors, a cross-validation protocol using community logs captured by Para-Techs, discrepancy flagging, and an annual third-party audit keep attention on continued performance and enable monitoring and maintenance after construction.

SCALABILITY AND REPLICABILITY

The project has completed its first construction phase and is now in its first monsoon monitoring cycle; the NbS intervention has significant potential for scaling through the integration of innovative financial and business mechanisms. It has been designed to align with Atal Bhujal Yojana[8] and the source-sustainability component of Jal Jeevan Mission[9], generating performance evidence from the pilot to support convergence with public financing[10]. Beyond public finance, the project can also explore other mechanisms, including Payment for Ecosystem Services (PES) and water fund models, to support long-term expansion and sustainability.

8 ***Atal Bhujal Yojana:*** *launched in 2019 to promote sustainable groundwater management through community participation, improved water-use efficiency and demand-side interventions in water stressed regions.*

9 ***Jal Jeevan Mission:*** *launched in 2019 with an objective of providing safe & adequate drinking water to all rural households. It also aims to implement source sustainability through grey water management.*

10 *Based on stakeholder interview.*

The MAR model has strong potential for replication across both river basins and urban areas, provided interventions are adapted to local hydrogeological and institutional contexts. In urban areas, the underlying aquifer recharge approach can be adapted through wetlands, lakes, urban parks, and stormwater systems, making it relevant for water-stressed cities (Rohilla et al., 2017). However, successful replication remains contingent on favorable hydrogeological conditions, the availability of suitable recharge pathways, and supporting watershed or lake infrastructure.

CASE STUDY 2: RAINBOW DRIVE LAYOUT- NATURE-BASED URBAN WATER MANAGEMENT PROJECT

Project Description	
Financial and business mechanism/Instrument	Private community-led finance + user-pay model
Priority themes	Groundwater recharge, rainwater harvesting, demand management, wastewater treatment and reuse
Region/ geography	Rainbow Drive (RBD) Community, Bengaluru Urban district, Karnataka
Project size	~ **INR 1 crore (~USD 166,473)**[11], comprising **INR 17.25 lakh (~USD 37,887)**[12] invested in individual and community recharge wells (up to 2010), **INR 85 lakh (~USD 141,502[8])** for the new green sewage treatment plant (STP) (up to 2015), and the remaining amount allocated to operations and maintenance (O&M)
Timeline	2004 – present

PROJECT OVERVIEW

The Rainbow Drive (RBD) project shows how private household finance, supported by a user-pay revenue model, can implement NbS for urban water security. The project pooled private household capital with a community-based user-pay mechanism to finance, operate, and maintain water infrastructure. Such NbS interventions were designed for water supply and demand management through rainwater harvesting and

11 *Conversion rate applied was USD 1 = INR 60.07, based on the average exchange rate for the 2010–2019 period.*
12 *Conversion rate applied was USD 1 = INR 45.53, based on the average exchange rate for the 2000–2009 period.*

recharge for artificial aquifer recharge, tiered water tariffs for efficient water use, and a green nature-based wastewater reuse system through a phytorid STP technology.[13]

Bengaluru faces a growing water security challenge driven by rapid urbanization, declining green cover, and overreliance on groundwater, leading to rapid depletion (Kulranjan et al., 2023; Ramachandra et al., 2017). The situation was more concerning in the city's periphery, including Rainbow Drive, which used to lack formal water supply or sewerage connection,[14] thus creating a dependency on private borewells and water tankers. In response, the RBD project adopted an integrated grey-green infrastructure approach that enabled the community to transition from groundwater over-extraction to balanced water use, in which artificial recharge exceeds withdrawal, thereby strengthening long-term water security (Krishnamurthy et al., 2009).

STAKEHOLDER ROLES

Table 7: Stakeholder Roles and Categorization for Rainbow Drive Layout's Urban Water Management Project

Role	Stakeholder	Category
Financiers	Private Households	Private Finance
Governance / Service provider	Plot Owners' Association (POA)	Resident Association
Primary implementation partners	Biome Environmental Solutions, Petrichor Emerging Technologies India Pvt Ltd	Project Developer

**For more details on the role of each stakeholder, please check Annexure-2*

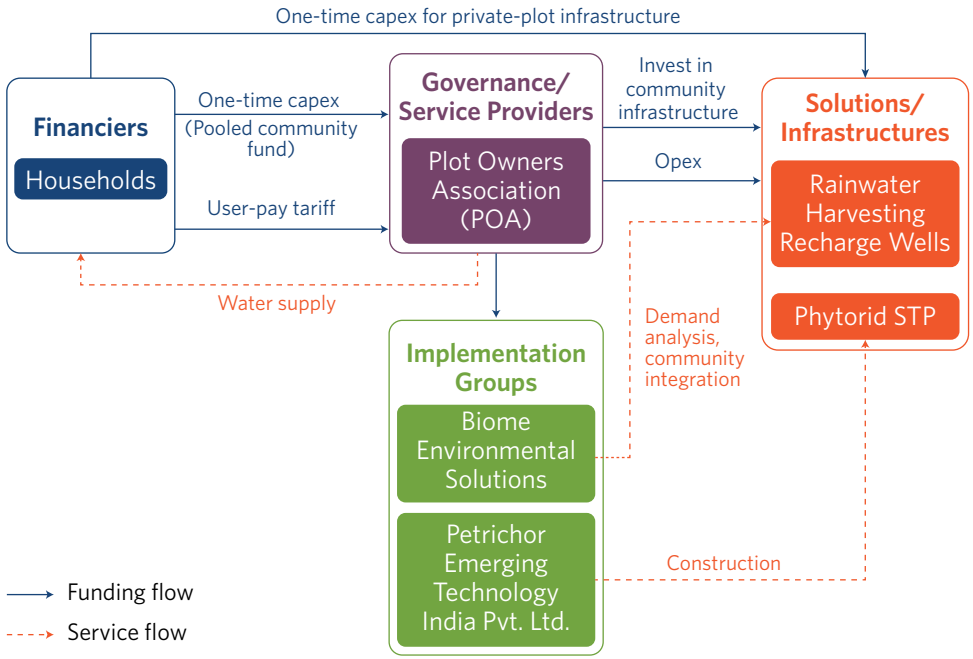
FINANCIAL AND BUSINESS MECHANISM: HOW IT WORKS

Private community-led finance (including households and pooled community contributions) formed the foundation of RBD's nature-based water infrastructure. Investments were mobilized through two complementary channels: individual households financed water infrastructure within their own properties, while the Plot Owners' Association (POA) pooled community contributions to develop shared NbS interventions. At the household level, residents invested in rooftop rainwater harvesting systems, private recharge wells, and rain barrels. At the community level, pooled funds built recharge wells and a nature-based sewage treatment plant.

13 *A Phytorid-based sewage treatment plant (STP) technology is a low-energy nature-based system that uses planted wetlands to treat wastewater while enabling reuse and providing ecological co-benefits.*

14 *Since 2023, this area has been connected to the city's water supply system by the Bangalore Water Supply and Sewerage Board (BWSSB). According to a member of POA, the community receives water approximately twice a week.*

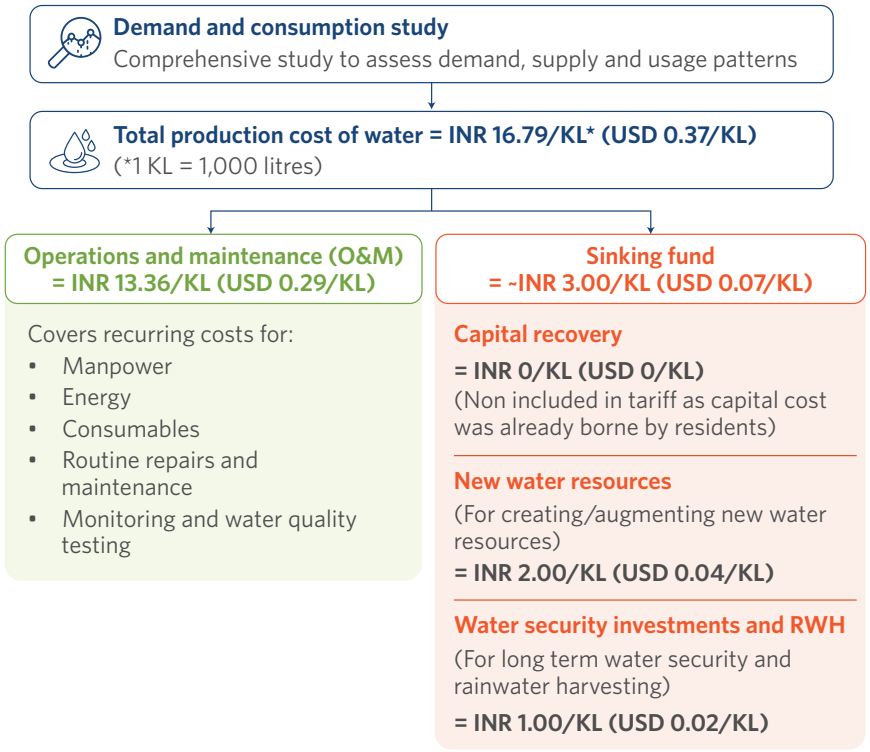
Figure 2: Rainbow Drive's Financial and Business Flow Diagram



Source: *CPI Analysis*

A user-pay model ensured cost recovery and long-term maintenance.
The POA introduced a tariff-based cost-recovery mechanism that financed operations and maintenance, as well as future infrastructure replacement, while creating a dedicated sinking fund for future investments (See Figure 3 below). Tariffs were determined using demand analysis and a production cost assessment of water undertaken by Biome Environmental Solutions, ensuring that water charges reflected the actual cost of service delivery while generating a predictable revenue stream to maintain and upgrade community assets (Krishnamurthy et al., 2009).

Figure 3: Tariff Breakdown Structure



Source: *When Pigs Fly – Citizens at the Center of Integrated Urban Water Management*

PERFORMANCE AND IMPACT

The project has generated various environmental and socio-economic benefits (see Table 8 below) compared with the baseline data.

Table 8: Comparative Analysis of KPIs (Baseline data Vs Post-Intervention Outcomes)

Factors	KPI	Baseline Data	Outcome/Status
Environmental	**Recharge wells**	5 households (2008)	59 community recharge wells by 2009; 240 by 2015. With 100% compliance by 2014-15 following tariff penalty redesign
	Wastewater treatment	2 Sewage Treatment Plants (STPs) were dysfunctional, failing Karnataka State Pollution Control Board (KSPCB) norms	New green STP of 250 Kilo Liters per Day (KLD) capacity commissioned in 2014-15, treating ~ 100-150 KLD with wastewater reuse for watering community gardens
Social	**Per capita water demand**	2008-09: 246 liters per capita per day (LCPD)	Reduced to ~150 LCPD by 2015 despite increase in occupancy
Economic	**Water tariff**	Flat INR 6/Kilo Liters (KL), i.e., USD 0.13[9] (pre-2008)	Block tariff (INR 10/KL - INR 60/KL, i.e. USD 0.2/KL – USD 1.3/KL)[9], depending upon consumption levels) recovering the true production cost of water

Over nearly two decades of implementation, the Rainbow Drive Layout (RBD) project has demonstrated that private community-led financing and user-pay mechanisms can sustain both cost recovery and water stewardship (Krishnamurthy et al., 2009). Progressive tariffs, financial incentives for recharge, and restrictions on private borewells encouraged efficient water use and groundwater conservation, enabling the community to shift from groundwater over-extraction to a water balance in which artificial recharge exceeded withdrawal (Krishnamurthy, 2016). Post-2016, the community has faced flooding risks and consequences of rapid urbanization (Krishnamurthy et al., 2009).[15]

KEY TAKEAWAYS AND INSIGHTS

POLICY AND ENABLING FACTORS

A registered association was the real institutional enabler for NbS interventions. The registered Plot Owners' Association (POA) enabled nature-based water management infrastructure through pooled investments, established enabling water-use by-laws, levied tariffs, and oversaw long-term operation and maintenance (Krishnamurthy, 2016). Its institutional legitimacy and policy support can enable sustained collective action for implementing local environmental initiatives and nature-based solutions (Jain C, 2017; Ramanath J, 2021). In this context, Biome Environmental Solutions acted as a catalyst for POA's strategic thinking by diagnosing initial water challenges and supporting community capacity building and awareness.

SUSTAINABILITY

Private community-led financing and cost recovery provide a sustained pathway for long-term ownership of nature-based water infrastructure. For more than a decade, the Rainbow Drive community mobilized nearly

15 *Urbanization around Rainbow Drive increased external stormwater flows, shifting flooding risks beyond community control with concerns towards broader land-use and urban planning challenges.*

INR 1 crore (USD 166,473[8]), including approximately INR 17.25 lakh (USD 37,887[9]) for recharge infrastructure by 2009-10 and a further INR 85 lakh (USD 141,502[8]) for the nature-based STP by 2014-15. By prioritizing investments in nature-based infrastructure and focusing user-pay revenues on operation and maintenance rather than capital recovery, the model strengthened community ownership while ensuring the continued operation of shared water assets.[16] Furthermore, such decentralized water infrastructure can complement BWSSB's municipal water supply[12] to ensure the community's long-term water security and resilience.[17]

SCALABILITY AND REPLICABILITY

The RBD project provides a use case for scaling community-managed NbS interventions in other private communities, but this depends on community buy-in and resources. Strong leadership and governance structures underpinned its success and mobilized collective action to scale community-managed NbS interventions. Therefore, successful scalability will depend on establishing community-led governance structures that can coordinate implementation and enforce common rules.

Replicating RBD's work beyond privately managed communities requires synergies and support from public institutions. This will depend on encouraging RWA and community institutions to supplement and complement ULB efforts (Ramanath J, 2021)**.** It will require coordinated planning among utilities, urban local bodies, planning agencies, and land-owning institutions/individuals, particularly where recharge infrastructure must be integrated into public land, parks, lakes, drains, and mixed-ownership urban areas.

16 *Based on KII interview.*
17 *Based on interview with RBD's resident and member of POA.*

CASE STUDY 3: MEGHALAYA CARBON AGROFORESTRY FOR COMMUNITY RESILIENCE AND ECOSYSTEMS[18]

Project Description	
Financial and business mechanism	Carbon Finance + Debt financing backed by a financial guarantee + start-up grant
Priority themes	Ecosystem restoration, carbon sequestration, biodiversity conservation, livelihood diversification
Region/ geography	Garo Hills and Khasi-Jaintia Hills, Meghalaya, North-East India
Project size	IORA's Implementation Costs: ~ INR 26.2 crore (~USD 3.1 million)[19] (first 5 years); ~ EUR 23 million (~USD 24.84 million)[20] (for full 30-year crediting period) Caspian's debt finance: INR 8.5 crore (~ USD 0.98 million)[21] supported via a guarantee by Rabo Foundation (2025)
Timeline/ Project age	Initiation – 2024, extending over a period of 30 years

PROJECT OVERVIEW

Meghalaya Carbon Agroforestry for Community Resilience and Ecosystems (MegCare) is structured as a carbon finance project that began with early-stage grant support and has since transitioned to commercial debt financing, backed by a financial guarantee, to enable long-term investment

18 *The case study has been developed entirely from secondary literature and has not been validated through primary stakeholder interviews. A complete list of sources is provided in references section.*
19 *Conversion rate applied was USD 1 = INR 83.7, based on the average exchange rate for 2024.*
20 *Conversion rate applied was EUR 1 = USD 1.11, based on the average exchange rate for 2024.*
21 *Conversion rate applied was USD 1 = INR 87.2, based on the average exchange rate for 2025.*

in nature-based solutions. Rabo Foundation's start-up grant supported the initial development, whereas Caspian Impact Investments provided an INR 8.5 crore (~ USD 0.98 million17) debt facility underwritten against future Carbon Removal Units (CRUs) which will be sold via Acorn marketplace (Hub Network, 2025). The agro-forestry-based NbS intervention in Khasi-Jaintia and Garo Hills of Meghalaya that plants and restores native tree species with existing food and cash crops[22] to generate CRUs (Acorn Design Document, n.a.; MegCare Field Guide, n.a.).

Meghalaya has a high dependence on agriculture and the prevalence of environmentally unsustainable farming methods- Jhum cultivation[23]resulting in high levels of land degradation, declining forest quality, and limited opportunities for livelihood diversification. (MCCC & MBDA, 2025). This project links agroforestry with verified carbon revenues that provide patient capital needed to incentivize long-term operations and maintenance (Brasil-Leigh et al., 2024) of agroforestry programs.[24] (Acorn Design Document, n.a.).

STAKEHOLDER ROLES

Table 9: Stakeholder Roles and Categorization for MegCare Project

Role	Stakeholder	Category
Financiers	Rabo Foundation,Caspian Impact Investment,Global carbon credit buyers via Acorn platform	Philanthropy, Private Finance, Private corporations
Primary implementation partners	IORA Ecological Solutions	Project Developer
Enabling partners	Meghalaya Basin Development Authority (MBDA),Rabobank's Acorn carbon marketplace	Government Institution, Private Registry/Marketplace
Beneficiary	Community and smallholder farmers of Garo and Khasi-Jaintia Hills	Local Community

**For more details on the role of each stakeholder, please check Annexure-3*

FINANCIAL AND BUSINESS MECHANISM: HOW IT WORKS

MegCare's financing mix draws on different types of capital at different project stages. The project's design phase and initial farmer onboarding were supported through a start-up grant from Rabo Foundation. Commercial debt became viable once this grant-funded phase had built a track record of farmer participation and a credible basis for projecting future carbon outcomes. Backed by Rabo Foundation's guarantee structure, Caspian Impact Investments extended an INR 8.5 crore (~ USD 0.98

22 *Few examples: turmeric, ginger, maize, paddy and pineapple.*

23 ***Jhum cultivation,*** *or shifting cultivation, is a traditional rotational farming practice among the hill tribes of North-East India in which a forest patch is cleared, burned and cultivated for 1-2 years before being left fallow for several years while a new patch is cultivated.*

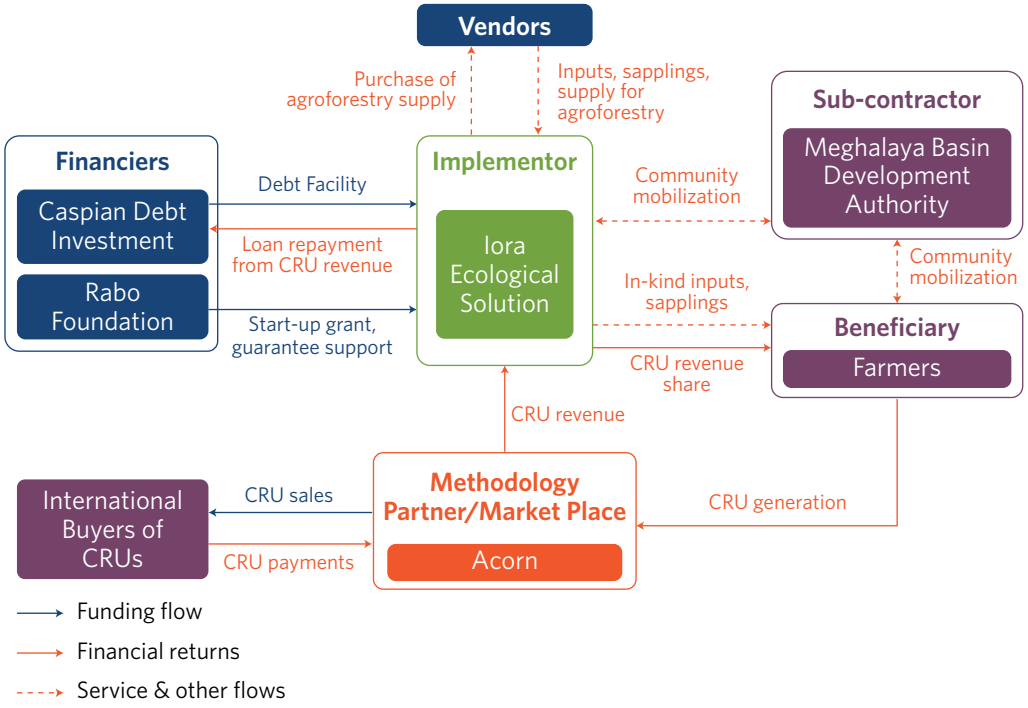
24 *MBDA's Community-led Landscape Management Project (MCLLMP) and JICA-funded MegLife.*

million) debt facility to IORA Ecological Solutions, underwritten against future CRUs. (check figure 4 below)

The business model centers on long-term carbon revenue generation and benefit-sharing with participating communities. By linking restoration outcomes to carbon payments, the project creates a cost-recovery system for funders and farmers. The project sells CRUs generated through agroforestry practices through the Acorn carbon marketplace to create a recurring revenue stream. 80% of this CRU revenue is transferred directly to farmers, whereas IORA utilizes the remaining 20% for project operations, monitoring activities, and repayment of the debt facility (Acorn Design Document). Apart from this, farmers also generate additional revenue from the sale of Non-Timber Forest Products (NTFP)[25] via local value chains (MegCare Field Guide).

MegCare is implemented through a partnership model where each stakeholder provides a distinct service. IORA manages implementation and MRV; MBDA leverages its institutional presence and community networks to mobilize farmers; and Acorn provides the carbon methodology and marketplace (Acorn, 2021). This ensures institutional continuity, community involvement, and access to local vendors for agroforestry procurement.

Figure 4: MegCare's Financial and Business Flow Diagram



Source: *Acorn Design Document; MegCare; IORA Ecological Solutions*

IMPACT/PERFORMANCE

The project is expected to generate the following environmental, social, and economic impacts (check Table 10 below) through smallholder agroforestry across the Garo and Khasi-Jaintia Hills:

25 ***Non-Timber Forest Products (NTFP)*** *are forest products other than timber such as fruits, medicinal plants, honey etc.*

Table 10: MegCare's Expected Outcomes Against KPIs

Factors	KPI	Outcome/Status[26]
Environmental	**New + gap-filled agroforestry area**	Up to 150,000 ha (50,000 ha of existing gap filling + 100,000 ha of new plantation, phased from 2024-2027)
	Carbon Removal Units (CRUs) generation	~Average of 4.6 CRUs per farmer per year for 30 years (range: 1.7-7)
	Climate adaptation	Improved water retention and soil fertility, reduced soil erosion via promoted agroforestry species
Social	**Farmer participation**	~10,000 farmers onboarded (targeting ~80,000 farmers across Meghalaya)
	Local employment opportunity	~60 Agroforestry Carbon Associates (ACAs), mostly youth from the community
Economic	**Intercropping Income**	~INR 90,000 (~USD 1075.315)or EUR 880 (USD 950.416) per year per ha
	Yield revenue (tree-produce)	Average EUR 3,761 (USD 4,061.916) per year over 30 years [range: EUR 450-6,800 (USD 486-7,34416) depending upon species and year]
	CRU income	~ EUR 216 (USD 233.316) per farmer per year

Project design leverages monitoring technology alongside community stewardship that strengthens implementation credibility and local ownership. It utilizes a hybrid MRV system that combines Acorn's satellite-based monitoring and GPS mapping with field-level verification by locally recruited Agroforestry Carbon Associates (ACAs) (Acorn Design Document).

26 *Values in this table are drawn from Acorn Design Document. As the intervention has not yet completed its full onboarding cycle, the values presented below are modelled and projected figures.*

KEY TAKEAWAYS AND INSIGHTS

POLICY AND ENABLING FACTORS

MegCare's NbS intervention aligns well with national and sub-national policies for agroforestry-based restoration. The National Agroforestry Policy (2014) (Department of Agriculture & Cooperation, 2014) and Meghalaya's SAPCC focus on restoring degraded landscapes (MCCC & MBDA, 2025). Furthermore, schemes such as Nagar Van Yojana and MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes) support community-participatory afforestation and mangrove restoration in urban and coastal areas of Indian cities (MoEFCC, n.a., PIB 2024).

The project leverages existing institutions to strengthen implementation efficiency and continuity. IORA uses the MBDA's existing Village Community Facilitator (VCF) network, through a sub-contracting structure, to engage with the community. This enables IORA to inherit established community trust and reduces the cost of building a network from scratch (Acorn Design Document, n.a). In an urban context, a similar model could integrate into existing city planning frameworks, improving institutional support and community participation.

SUSTAINABILITY

The project demonstrates an innovative financial mechanism that leverages guarantee-backed debt financing with a secure carbon market mechanism to mobilize early-stage private capital. MegCare showcases a sustainable financing pathway for early-stage NbS projects by unlocking commercial capital before carbon credit returns are generated. In contrast, Acorn's global carbon platform provides

access to credible buyers and a secure market mechanism for price discovery (Acorn, 2021). As the Carbon Credit Trading Scheme (CCTS) is being implemented in India, this project could further leverage domestic carbon markets, given that agriculture and forestry are approved sectors in the CCTS offset mechanism (Bureau of Energy Efficiency, 2024).

A phased financing approach matches capital deployment with the project's evolving risk and each stage of development. Initial grant funding from the Rabo Foundation supported project design and farmer onboarding, followed by a guarantee that unlocked commercial financing from Caspian Impact Investments underwritten by CRUs to support scale-up.

SCALABILITY AND REPLICABILITY

Land availability and institutional readiness are critical for scaling a project. A significant challenge to replicating carbon-financed agroforestry models is land availability and governance agreements in urban and peri-urban contexts. Challenges arise from insufficient continuous land availability, which makes this economically unviable in urban areas (Food and Agriculture Organization of the United Nations, n.a.). One approach to address fragmented ownership constraints in urban and peri-urban regions can be collaboration among landholding entities, individuals, and urban local bodies.

Voluntary carbon market price volatility remains a structural barrier to replication. MegCare's financial model assumes an average CRU price of EUR 47 (USD 50.816) per farmer over the next 30 years. As of the first quarter of 2024, the average price of voluntary carbon credits in India was about USD 2.35 per ton of CO2, whereas globally, the price ranged from USD 8 to 30 per ton (CostMos, 2026). This gap reflects the sensitivity of CRU-backed revenue projections and the marketplace where they are ultimately sold.

CASE STUDY 4: WATER AS LEVERAGE- CITY OF 1000 TANKS WATER BALANCE MODEL IN CHENNAI

Project description	
Instrument classification	Technical Assistance (TA) + Bilateral Official Development Assistance
Priority themes	Climate-resilient urban water infrastructure, flood and drought risk management, groundwater recharge, and wastewater reuse
Region/ geography	Southeast Asia (Chennai)
Project size	South-East Asia EUR 3 million (~USD 3.36 million)[27] in public funding + in-kind contributions by City of 1000 Tanks team members
Timeline	2018-ongoing

PROJECT OVERVIEW

The Water as Leverage (WaL) program, commissioned by the Dutch Ministry of Infrastructure and Water Management and executed by RVO (Netherlands Enterprise Agency, n.d.), provides Technical Assistance (TA) in the form of grants, capacity-building training, and project preparation support to help cities design investment-ready, climate-resilient urban water projects. RVO initiated the program through a public tender, with a Call for Action issued in 2018, for the cities of Chennai, Khulna, and Semarang. Through a pre-defined priced service contract and grants, the TA supported the activities of City of 1000 Tanks, which developed a water balance concept to shift the framing of flooding (and water pollution) and scarcity as separate problems with independent solutions, towards a water cycle where solutions could be designed to address challenges simultaneously.

27 *Conversion rate applied was EUR 1 = USD 1.12, based on the average exchange rate for the 2018-25 period.*

Chennai was selected for its extreme exposure to climate risks, including both chronic drought and recurrent flooding (Palanichamy, 2019). Rapid urbanization has also destroyed the historic network of thousands of water-retaining tanks and ponds[28] that once managed these extremes, replacing permeable land with impervious surfaces, preventing groundwater recharge and accelerating flooding (World Water Atlas, n.d.). WaL enabled the team to deliver technically and financially viable solutions across program and project scales, where primary interventions include construction of wetlands and septic tanks for wastewater treatment, reuse, and aquifer recharge; rainwater harvesting (RWH) and bioswales to distribute water; water retention areas, recharge wells, other planted water infiltration areas, as well as socio-cultural interventions.[29]

STAKEHOLDER ROLES

Table 11: Stakeholder Roles and Categorization for WaL Project

Role	Stakeholder	Category
Financier	Netherlands Enterprise Agency (RVO.nl)	International Public Finance
Primary implementation partners	City of 1000 tanks consortium (OOZE architects & urbanists, Madras Terrace, Care Earth Trust, IIT-M and others)	Project Developer
Enabling partners	Refer to Annexure-4 for partners across origination, implementation and scale	

**For more details on the role of each stakeholder, please check Annexure-4*

28 *Eries are interconnected earthen catchments built historically by farming communities to capture seasonal monsoon rainfall. They recharge local ground water tables, prevent severe floods, and supply steady water for crop irrigation.*

29 *Example - a young water ambassadors campaign supported by the Goethe Institut.*

FINANCIAL AND BUSINESS MECHANISM: HOW IT WORKS

The TA program in Chennai was delivered through a series of pre-defined, priced service contracts and grants awarded to the City of 1000 Tanks consortium, with each one building on the evidence and legitimacy generated by the last.

2018-2019 | Feasibility study and city-wide strategy development: The initial contract of EUR 200,000 (~USD 230,000)[30] facilitated the development of a **water balance vision** for the city, specifically focusing on 4 flagship projects representing different urban conditions and sectors in the city districts of Mylapore, Chitra Nagar, Koyambedu, and Mambalam[31] in the form of spatial and capacity assessment plans to identify and design systemic NbS projects, together with a pre-feasibility study to demonstrate cost savings of NbS compared to grey infrastructure.

2020-2027 | Proof of concept at Little Flower Convent (LFC): A subsequent grant of EUR 650,000[32] (~USD 721,500)[33] with some local co-financing and in-kind contributions from team members, supported the construction of a water balance pilot to validate the city-scale vision. The grant funding covered the full project lifecycle, including **maintenance and monitoring activities for 5 years,** to evaluate intervention performance over time and streamline monitoring.

2024-2026 | A follow-on study to sustain and scale interventions: A structured upscaling study was commissioned to identify incentives and models for sustaining solutions within privately-owned plots. The

30 *Conversion rate applied was EUR 1 = USD 1.15, based on the average exchange rate for the 2018-19 period.*

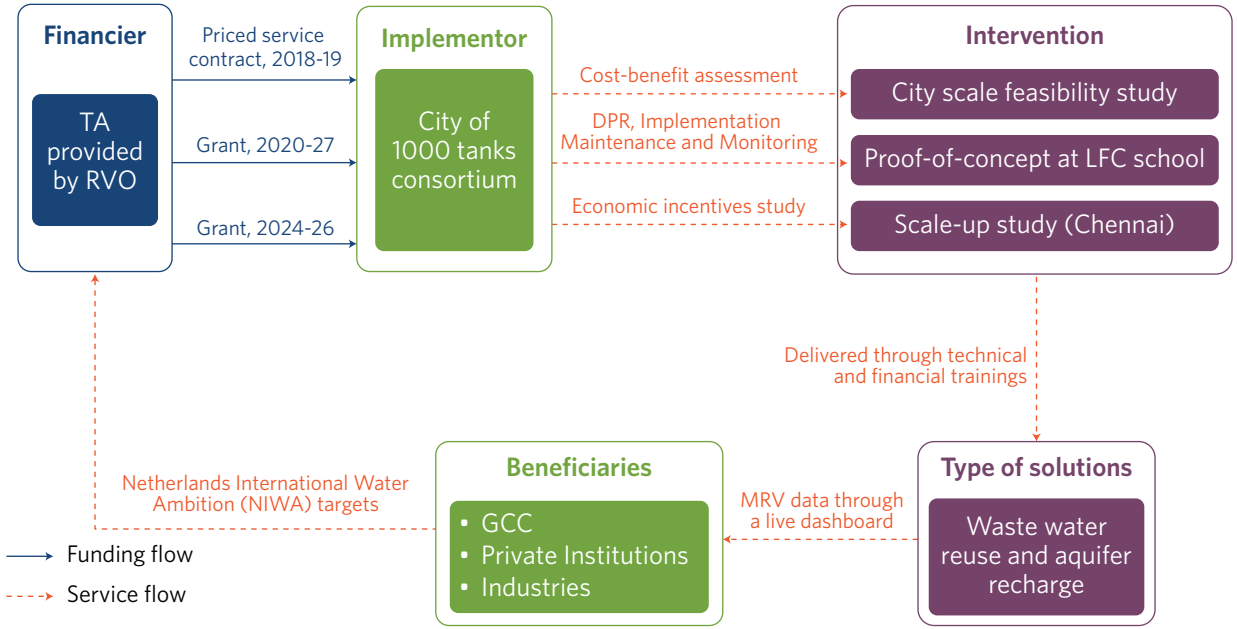
31 *Mylapore (Heritage Programme), Chitra Nagar (Disaster Resilient Housing Programmes, E.W.S. neighbourhood), Koyambedu (Green Industry Program), & Mambalam (Smart Waterways Programme).*

32 *The Water Balance Pilot at LFC was funded through a separate, additional grant from Partners for Water (PfW) - a parallel Dutch government programme also administered by RVO. The grant funding covered all stages from research and concept development, DPR preparation, and engineering design, NbS implementation to maintenance and monitoring.*

33 *Conversion rate applied was EUR 1 = USD 1.11, based on the average exchange rate for the 2020-25 period.*

ongoing study targets six private-sector consumer groups - residential buildings, hotels and resorts, educational institutions, healthcare facilities, industries and offices, and water bodies - across Chennai.

Figure 5: WaL's Financial and Business Flow Diagram



Source: *WRI India analysis*

IMPACT/PERFORMANCE

The project generated the following environmental benefits (see Table 12 below) from the LFC school pilot:

Table 12: WaL's Projected Performance Against KPIs

Factors	KPI	Projected Value
Environmental	**Green cover increase**	650 plants (that treat wastewater) irrigated using treated water; 900 m^2 garden within 1800 m^2 overall footprint
	Daily water recycled and recharged	27 KLD (data updated every 24 hours). Reduced wastewater volume to city sewers. Treated water used for irrigation. Reduced freshwater consumption for watering the plants. Recharge to local aquifer
	Solar energy generation	100% solar-powered electricity used for pumps
	Heat reduction	5°C cooling in microclimate produced by plants and trees (in outdoor shaded areas and living quarters)

The TA financed activities that are typically bypassed by private finance: feasibility studies for coordinated action, building political buy-in, and performance risks associated with NbS that most financiers are unfamiliar with. For the LFC pilot, TA support enabled

the ground team to test localized yet replicable solutions that address the school's environmental and social needs. Solutions such as ecological STP, well integrated within the public spaces of the campus, demonstrated multi-functional use of NbS, with treated wastewater reused largely for irrigation and the surplus directed into the recharge wells (Partners for Water editorial board, 2023). According to the city-scale feasibility study, financial benefits and government cost savings from implementation at scale were estimated at USD 1 billion and USD 44 million annually in 2019, compared with standard practices.

A live remote monitoring dashboard (City of 1000 tanks, n.d.) records changes in water flow, energy consumption, and groundwater levels. The pilot remains in the active monitoring phase, where results are being used to inform technical streamlining and cost optimization for future replication.

KEY TAKEAWAYS AND INSIGHTS

POLICY AND ENABLING FACTORS

Decentralized wastewater treatment systems are designed to meet local effluent-discharge standards. Alignment of regulatory standards such as CPHEEO guidelines that underpin government programs promoting reuse initiatives such as Jal Jeevan Mission, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), and the Smart Cities Mission, offers potential to scale similar interventions through public funding and integration into public urban infrastructure programs (Financing Treated Used Water Reuse in India, 2025). However, while effluent treatment is regulated through national missions and Pollution Control Boards, sector-specific reuse mandates or enforceable financial incentives for reuse remain to be strengthened (Amita Bhaduri, 2026).

SUSTAINABILITY

The LFC pilot demonstrates a preliminary economic case for investing in DPRs to de-risk NbS projects and improve their bankability for future replication. A Green Climate Fund (GCF) application was explored as a follow-up to the Mylapore heritage trail feasibility assessments developed under the city-scale vision, with an indicative program of approximately USD 16–20 million to treat 4 MLD of water and benefit around 50,000 people. While this concept was discussed with relevant national stakeholders, coordination across local and central government levels proved challenging, and the proposal has not yet advanced to formal submission for GCF review in Korea (City of 1,000 Tanks, 2019).

The grant support was instrumental in facilitating project design and preparation at LFC. The subsidy covered the initial project activities like research and concept development, DPR preparation, engineering design, and operations and maintenance, enabling the team to address technical barriers such as limited local data on the existing sewerage network at the LFC school, as well as advocating for social challenges experienced in the Indian context like reuse of treated water.

SCALABILITY AND REPLICABILITY

Building an economic case for maintenance and monitoring of decentralized NbS and infrastructure for water resilience. While one of WaL's core TA offerings was to strengthen local institutions for maintenance and reduce operational failures, the water balance pilot has not yet secured a local steward to assume long-term maintenance responsibilities. The ongoing subsidy phase focuses on identifying incentives and business models to address this risk, particularly for privately owned plots. Similarly, identifying and involving beneficiaries of improved water quality and groundwater yields early can build long-term stewardship

beyond the project's life. Systems like the digital dashboard can demonstrate aggregated outcomes from decentralized solutions, providing evidence of benefits to justify future maintenance investments.

While the WaL program demonstrates the impact of decentralized interventions, their long-term viability remains limited due to weak market demand for treated water. Factors such as subsidies for freshwater, regulatory standards for treated-water reuse, additional capital and investments in distribution networks, and weak economic incentives (such as lower tariffs for treated used water) contribute to low demand for recycled wastewater (Financing Treated Used Water Reuse in India, 2025).

CASE STUDY 5: NARMADA LANDSCAPE RESTORATION PROJECT

Project Description	
Financial and Business Mechanism	Bilateral ODA + CSR + Ecosystem service payments (PES)
Priority themes/ interventions	Water conservation, forest landscape management, agricultural practices
Region/ geography	Nani and Vansavali tributaries along the stretch of the Narmada River between Omkareshwar and Maheshwar dams in Khargone district, Madhya Pradesh
Project size	USAID grant amount: 1,583,307 USD; NTPC grant amount 1,660,000 USD
Timeline/ Project age	2020-24 (4 years)

PROJECT OVERVIEW

The NLRP project was designed to demonstrate the interlinkages between healthy upstream catchments and downstream water security by maintaining the flow of ecosystem services through a payment-for-ecosystem-services model. The NLRP project was designed to demonstrate the interlinkages between healthy upstream catchments and downstream water security by maintaining the flow of ecosystem services through a payment-for-ecosystem-services model.

Nearby cities such as Indore currently depend on the Narmada River for over 60% of municipal water supply (Indore Municipal Corporation, n.d.). The IMC pumps water over 80 kilometers from the Jalud pumping station,

costing roughly INR 21 (USD 0.251)[34] per kilolitre (Richhariya, 2024), while cost recovery from user charges is only about 25% (Asian Development Bank & World Bank, 2025). A key objective of NLRP was to establish an incentive mechanism to enable the riparian forest and farm communities of the Narmada basin to adopt sustainable land & water management practices[35] thereby protecting downstream users against future water shortages, higher sediment filtration costs, and erratic flows (NTPC, 2023). Landscape interventions[36] such as loss of forest cover, reduced soil fertility, and nutrient pollution associated with excessive use of chemical fertilizers were implemented in the upstream catchment area.

STAKEHOLDER ROLES

Table 13: Stakeholder Roles and Categorization for Narmada Landscape Restoration Project

Role	Stakeholder	Category
Financiers	U.S. Agency for International Development (USAID), National Thermal Power Corporation (NTPC) Ltd	International Public Finance, Domestic Public Finance[37]
Primary implementation partners	Global Green Growth Institute (GGGI) Indian Institute for Forest Management (IIFM)	Project Developer
Enabling partners	Samaj Pragati Sahyog (SPS), Indore Municipal Corporation (IMC), Community groups (Joint Forest Management Committees, SHGs, FPOs, etc.), International Union for Conservation of Nature (IUCN), IORA Ecological Solutions	Civil Society Organization, Government Institution, International Environmental Organization, Environmental Advisory Group

FINANCIAL AND BUSINESS MECHANISM: HOW IT WORKS

The project blended official development assistance (ODA) by USAID and domestic CSR funding by NTPC Ltd, resulting in total financing of USD 3,500,000 (GGGI, n.d.) distributed equally to implementation partners GGGI and IIFM (check figure below). IORA and IUCN were onboarded to design the proof-of-concept PES structure where end-users like Indore Municipal Corporation (IMC) and industries can compensate the catchment community for their role in ensuring clean and reliable water supply (IORA Ecological Solutions, n.d.).

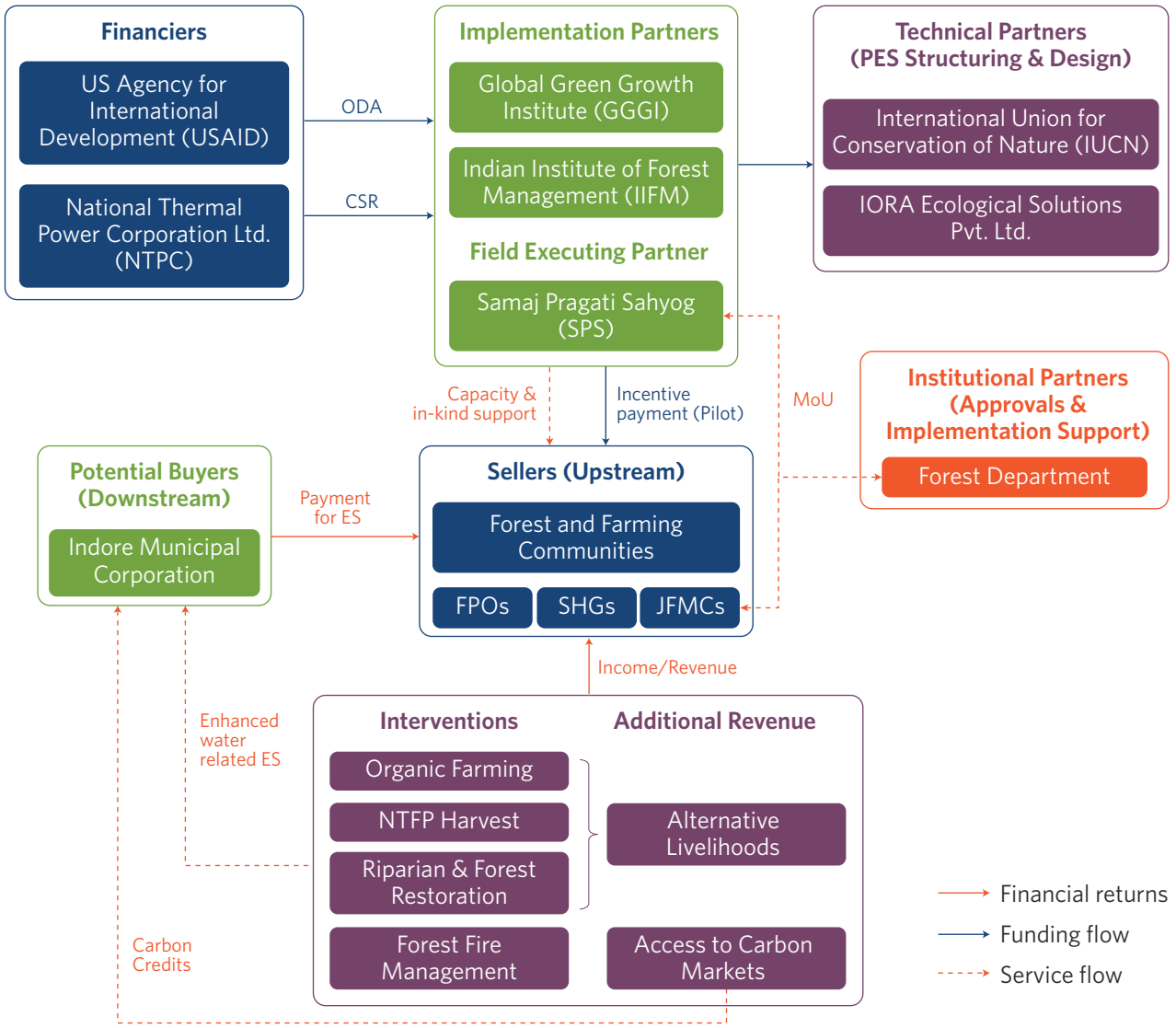
- **Establishing bio-physical baselines:** The team established baselines in the upstream project area, measuring tangible hydrological changes across the 10,000-hectare target geographical scope (such as run-off reduction, supply augmentation targets, and water quality parameters-mentioned in the impact table) as rationale to determine financial transfers and frequency.
- **Economic valuation of benefits (to determine performance-linked payment values):** Clean water being a non-market asset, required the use of replacement cost and avoided cost models to evaluate benefits (such as water treatment costs saved at the Jalad pumping station; infrastructure upgrades leading to reduced siltation, leading to lower expenditures on dredging and pump maintenance).

34 *Conversion rate applied was USD 1 = INR 83.7, based on the average exchange rate for 2024.*
35 *Water management practices were selected to improve the quality and quantity of water in select tributaries of the Narmada River between Omkareshwar and Maheshwar Dams in Khargone district, Madhya Pradesh.*
36 *Interventions include organic farming to reduce agricultural runoff, restoration of degraded forestland; establishment of dam structures for aquifer recharge and runoff control.*
37 *CSR funding originates from a Public Sector Undertaking (PSU) that is wholly owned by the government and is therefore classified as domestic public finance.*

- **The PES mechanism for payment distribution was as follows:**
  - Buyer side (Indore Municipal Corporation)- The economic valuation determined a proposed premium or micro-cess that could be added to urban water charges to fund upstream ecosystem management sustainably.
  - Seller side (Upstream communities)- Payments were distributed to upstream agricultural and forest communities and tied directly to verified land management actions, such as applying biofertilizers or maintaining forest cover.

Certain challenges limited the model's delivery, as the team did not secure a committed buyer at the start of operations. **The Indore Municipal Corporation already heavily subsidized the treated water supply to Indore city,** so setting up a continuous payment system with additional funds for the PES model was not feasible.

Figure 6: Financial and Business Structure Diagram for Ecosystem Services Payments- NLRP



Source: *WRI India analysis*

IMPACT/PERFORMANCE

The project has generated the following environmental and social benefits (check table 14 below):

Table 14: NLRP's Documented Impact Against KPIs

Factors	KPI	Documented impact
Environmental	**Water availability in streams within project area**	▪ 18% increase in availability of water due to upstream land management interventions ▪ Multi-cropping enabled due to water availability in summer season
	Water quality in streams within project area	▪ 25% improvement in water quality due to upstream land management interventions
	Biophysical conditions of soil	▪ 7000 ha of agricultural and forest land with improved soil health
Social	**Market linkages and certification programs**	▪ 100 farmers provided with organic certification and market linkages for value-added produce
	Enhanced capacities	▪ 1,706 beneficiaries, including 483 women, institutional strengthening of JFMC, SHGs and FPOs for long-term sustainable change

Source: *(GGGI, n.d.), (Jamwal, 2024)*

Along with fiscal transfers, the incentive structure for NLRP included a mix of in-kind contributions such as community infrastructure projects (building local dam structures to reduce farming costs), access to markets, resource support (such as biofertilizers), and capacity development for farm and forest communities, which increased buy-in for the PES structure.

Even though the PES model was not implemented, a pilot was conducted in 2024 across 3 villages (Beklya, Navrangpura, Sirsiya) on the north bank to incentivize the participation of voluntary groups (10 members/group) in forest-fire management (Jamwal, 2024). Payments to the groups were linked to actions undertaken to reduce the frequency of forest fires and were managed by IIFM with support from the forest department.

KEY TAKEAWAYS AND INSIGHTS

POLICY AND ENABLING FACTORS

The project explores dual income opportunities- compensation through a PES model along with government-backed livelihood support through alignment with public schemes. The project's design is closely integrated with the goals of the National Mission for a Green India and the National Water Mission under the National Action Plan on Climate Change (NAPCC) to promote water security. The distribution of soil health cards to farmers and promotion of organic farming practices aligned with the central schemes of Rashtriya Krishi Vikas Yojana and Paramparagat Krishi Vikas Yojana (PKVY)[38] respectively. Farmers were registered under the National Programme for Organic Production (GGGI-IIFM, 2023), a commercially recognized credential to increase income from sale of certified organic produce.

38 *Under National Mission for Sustainable Agriculture (NMSA).*

SUSTAINABILITY

Bundling additional ecosystem services (combining watershed protection benefits with other marketable outcomes, such as carbon credits) to create a more attractive, multifaceted package for buyers. A DPR for Results-Based Payment was created to explore the feasibility of generating and aggregating carbon and green credit incentives by promoting organic farming and forestland restoration. Part of the revenue was to sustain the PES fund, and the other to contribute towards income generation for upstream communities (feasibility studies carried out with Kosher Climate India Pvt Ltd) (ICASS policy brief).

Additional revenue sources were identified to incentivize upstream communities' participation further. Improved water availability in streams due to NRM interventions (dam structures and riparian buffer restoration) enabled multi-cropping for revenue (ex: cotton, wheat) (GGGI-IIFM, 2023). Sustainable NTFP harvest from *palash* trees (e.g., lac resin, dona pattal) offered more immediate income opportunities, providing livelihood security in addition to payments from the IMC through the PES fund.

SCALABILITY AND REPLICABILITY

Identification of a controlled catchment to map upstream stakeholders and related watershed improvements. The geographical scope of the Payment for Ecosystem Services (PES) model was restricted to a target area of roughly 10,000 hectares in the Khargone district of Madhya Pradesh, with the intention of creating a closed-loop economic model. However, several identified pollution sources lay beyond this region, highlighting alignment challenges between ecosystem and institutional boundaries. This impacted the evaluation of change in water quality resulting from sustainable agricultural and forestry practices.

The PES concept may apply to settlements that rely on water sources beyond administrative boundaries and are managed by external stakeholders. In practice, subsidized water supplies (as in the case of Indore water supply) can substantially weaken the direct financial incentive to support PES payments. Successful replication of such PES models depends on tangible benefits, such as reduced treatment costs or avoided future infrastructure investments, to support their financial case and lock in buyer demand.

CASE STUDY 6: DISASTER RISK TRANSFER PARAMETRIC INSURANCE SOLUTION (DRTPS)

Project info	
Financial and business mechanism	Parametric insurance (for climate adaptation)
Priority themes	Extreme precipitation in the monsoon months, windstorm/ hailstorm, flooding, rainfall-induced landslides
Region/ geography	State of Nagaland
Project size (premium and sum insured)	2024-27 DRTPS: total insurance coverage of INR 150 crores (~ USD 17.02 million)[39] across 3 years
Timeline/ Project age	2021-23 pilot; 2024-27 (5 years; currently ongoing)

PROJECT OVERVIEW

The Disaster Risk Transfer Parametric Insurance Solution (DRTPS) is a state-level parametric insurance initiative piloted by the Nagaland State Disaster Management Authority (NSDMA) in partnership with SBI General Insurance and other partners. The product provides predetermined insurance payouts for extreme climate events when pre-agreed weather thresholds are met.

The state of Nagaland has a monsoonal (wet-dry) climate with high humidity levels and annual rainfall averaging 1800- 2500 mm (NSDMA, n.d.). Available relief funds[40] cover only a fraction of damages from rainfall-induced floods and landslides, windstorm/ hailstorm events (NSDMA 2024). In a broader resilience context, DRTPS can provide predictable, fast liquidity to cover disaster response costs and reduce pressure on public finance (emergency relief funds) by risk transfer so that government can spend more on grey-green infrastructure (and the restoration of natural ecosystems such as mangroves) to protect communities against future climate risks.

STAKEHOLDER ROLES

Table 15: Stakeholder Roles and Categorization for DRTPS Project

Role	Stakeholder	Category
Financiers	InsuResilience Global Partnership; InsuResilience Solutions Fund	Private Finance
	DRTPS 2024-27: SBI General Insurance, Munich Re (Lead reinsurer), GIC RE (Reinsurer)	Private Insurer Private Reinsurer Public Reinsurer
	Pilot 2021: TATA AIG, Swiss Re	Private Insurer Private Reinsurer
Primary implementation partners	Nagaland State Disaster Management Authority (NSDMA)	Project developer/ government institution
Enabling partners	Faber Consulting AG, InRisk Labs	Technical Partners

39 *Conversion rate applied was USD 1 = INR 88.12, based on the average exchange rate for the 2024-26 period (for 2026, daily reference rates up to July 31st were taken from the RBI website).*

40 *State Disaster Response Fund (SDRF); and the National Disaster Response Fund (NDRF) for livelihood compensation, post disaster recovery and re-construction efforts. NDRF disbursement is subject to a three-tier assessment and approval process, while the SDRF is only released in two equal instalments.*

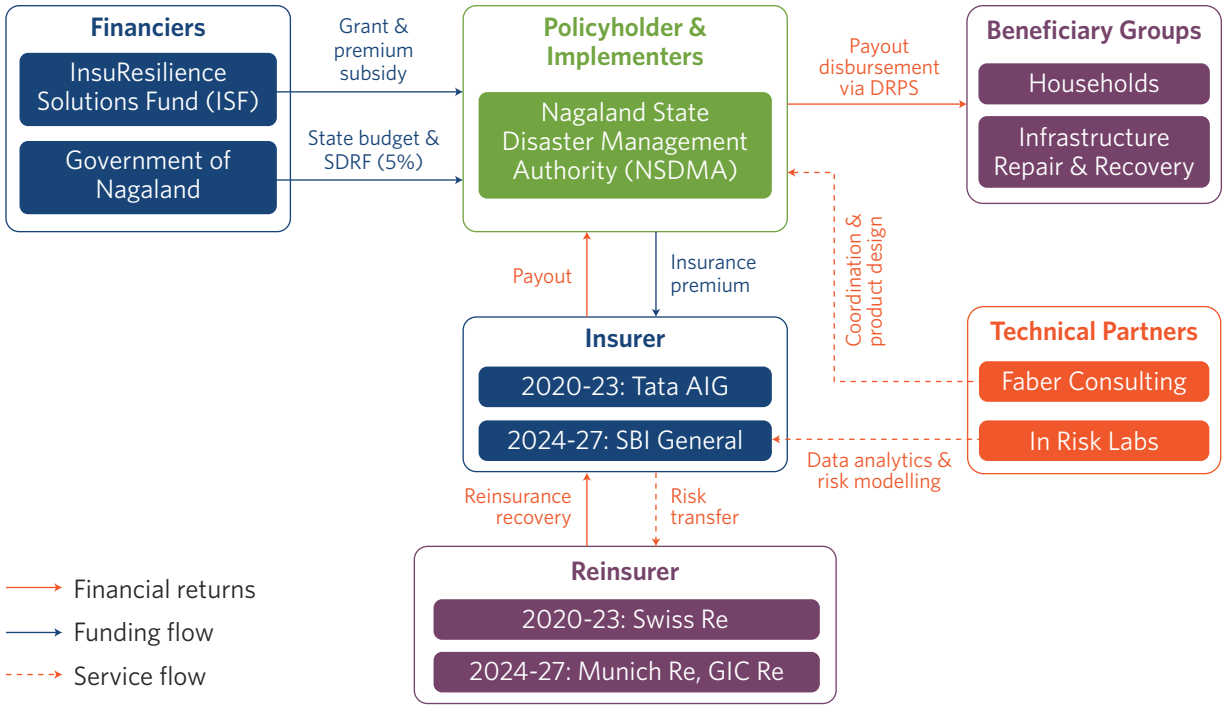
FINANCIAL AND BUSINESS MECHANISM: HOW IT WORKS

The pilot was funded through a mix of state funds and international grants. Implemented by the NSDMA, the pilot policy was developed by Tata AIG General Insurance Company Ltd and reinsurer Swiss Re for parametric insurance coverage in 2020-21 (see figure 7 below). Premium payments were sourced from state funds[41] and subsidized through international climate grants by the InsuResilience Solutions Fund (ISF) for co-funding 50% of development costs (ISF, 2021). The initial pilot failed to trigger payouts to participating communities despite heavy rains and floods, as the trigger threshold was set too high (Sirur S. , 2024). This was caused by a mismatch between satellite data and ground-truth data (data received from the IMD), requiring spatially granular, verifiable data.

Redesign of the insurance product to improve trigger accuracy. After the pilot's failure, the state redesigned the product as a multi-tier structure[42] using gridded rainfall data from the IMD and the state's 34 Automatic Weather Stations to determine accurate trigger points for the release of payouts. The upgraded scheme is a multi-year Disaster Risk Transfer Parametric Insurance Solution (DRTPS) effective from 2024 to 2027. SBI General Insurance underwrote it, backed by reinsurers Munich Re, GIC Re, and other partners, in alignment with NSDMA's terms of reference (NSDMA 2024).

The redesigned scheme adopts a phased premium-sharing mechanism. As per the agreement, the state pays an annual premium of INR 4.5 crores (~USD 510,667.335) for annual coverage of up to INR 50 crores (~USD 5.67 million35) for 3 years. Premiums are partly funded through an InsuResilience Solutions Fund, which covers 50% of the premium in the first year, then tapers to 40% and 35% (ISF, 2025). This approach incentivizes the State Government to assume an increasingly large share of the cost.

Figure 7: Financial and Business Flow Diagram for Nagaland DRTPS



Source: *WRI India analysis*

41 *Leveraging financial mechanisms aligned with state disaster response and mitigation planning.*

42 *A partial payout of 10% is triggered when cumulative rainfall crosses 1500 mm, with additional 10% increments for every 80 mm increase, scaling to a 100% payout if rainfall reaches 2200 mm.*

IMPACT/PERFORMANCE

350,000 households totaling around 2 million people have been protected by the parametric excess rainfall insurance obtained by NSDMA, with payouts triggered totaling INR 1.06 crore (~USD 120,290.535) to residents affected by heavy rainfall and landslides.

KEY TAKEAWAYS AND INSIGHTS

The project offers insights into parametric insurance products for risk management, working alongside risk-reduction mechanisms such as NbS to strengthen overall climate resilience.

POLICY AND ENABLING FACTORS

The DRTPS injects fresh, supplementary capital (effectively boosting state response resources by approximately 22%), bridging the gap before long-term state or central disaster recovery funds are released. Augmenting fixed SDRF allocations currently requires tapping into the National Disaster Response Fund (NDRF) or securing specific State Disaster Mitigation Fund (SDMF) grants. Central teams can take 30 to 90 days to disburse relief and reconstruction funds (following ground assessments and verification by central committees), with non-standard costs generally absorbed by the state. By transferring a portion of financial risk to insurers, Nagaland reduces fiscal strain on state resources earmarked for regular state operations and capital projects or for rapid recovery (of natural assets) to prevent further weather-related damage.

SUSTAINABILITY

Rapid, decentralized distribution through tools such as the blockchain-based Decentralized Relief Payout System (DRPS) enables timely relief payments. The NSDMIS platform[43] addresses bureaucratic delays, ensuring aid arrives faster than through standard SDRF channels, and is especially advantageous in hilly and remote regions like Nagaland, where traditional banking systems and damage-verification procedures can delay relief funding. The DRTPS can also complement climate adaptation efforts, delivering compounding benefits over the long term.[44]

Reducing basis risk (mismatch between trigger and actual damage) through more accurate data-based thresholds to release timely payouts. The DRTPS scheme demonstrates the potential of involving insurance companies and risk managers early in co-designing products (tiered and multi-trigger designs) based on local risk profiles. This could involve, for instance, using historical data collected from gridded weather stations to predefine thresholds based on variance in local climatic conditions. Basis risk can be further mitigated by pairing parametric policies with traditional indemnity-based policies as a hybrid risk-management strategy for immediate payouts while indemnity claims are processed.

SCALABILITY AND REPLICABILITY

International organizations such as the InsuResilience Solutions Fund co-financed and subsidized the DRTPS, rather than relying solely on local budget allocations. Launched in mid-2024 as a three-year risk-transfer solution, the current policy runs through mid-2027. NSDMA will likely need

43 *https://sdma.maharashtra.gov.in/en/national-disaster-management-information-system-ndmis/*

44 *As an example of bundling services for short term support and long term climate resilience- SEWA aims to expand its parametric insurance into a Livelihood Recovery and Resilience Fund (LRRF) offering not just payouts, but low-cost credit, emergency grants, and climate adaptation financing.*

to either integrate the premium burden directly into the state's annual budget Brief Note or seek financial risk pooling from the central government to partially subsidize state-level premiums. While pilots find support through premium subsidies, seed capital, and technical assistance from development organizations (e.g., the World Bank, the ISF, etc.) to cover costs, insurance can be complemented by loss and damage funds, or scaled through further alignment with NAPCC missions/ national disaster response frameworks.[45]

High premiums and coverage costs remain a significant challenge for broader uptake of parametric insurance schemes across states. Without pooled risk across districts or states, insurers are unable to offer competitive pricing, leading to greater reliance on philanthropic funds to finance premium costs. Many governments lack in-house capacity to evaluate climate risk models and negotiate fair terms.

For urban NbS-linked insurance, the inclusion of NbS asset maintenance in eligibility criteria or premium calculations can be explored, so that approaches combine risk transfer (e.g., insurance) with risk reduction (e.g., hazard mitigation).

45 *Pioneered by The Nature Conservancy, policies like the Quintana Roo Reef Trust in Mexico use satellite data to measure hurricane wind speeds. When a storm crosses a threshold, funds are released immediately to deploy diving teams to clear debris and right broken corals before they perish. The Coastal Management Zone Trust purchased the policy using coastal concession fees from the tourism industry and coastal property-adjacent owners or users, in addition to some government funding. The policy helps to maintain the reef and, by extension, the resilience of the community that relies on it (GFI n.d.).*

CASE STUDY 7: INTEGRATED STORMWATER DRAINAGE PROJECT AND RESTORATION OF KADAPAKKAM LAKE IN THE KOSASTHALAIYAR RIVER BASIN, CHENNAI, TAMIL NADU, INDIA

Project description	
Financial and business mechanism / Instrument	Sovereign loan + International adaptation grant + Sub-national public finance
Priority themes	Urban wetland restoration; groundwater recharge through rainwater harvesting; mitigation of localized flooding; biodiversity conservation
Region/geography	Kadapakkam Lake and peri-urban coastal interface of the Kosasthalaiyar River Basin in northern Chennai
Project size	**USD 470 million** ADB-supported stormwater investment across 45 project packages; the Kadapakkam Lake package valued separately at **USD 9.49 million**
Timeline	Detailed Project Report (DPR) preparation: 2016 - 2017; Financing restructuring: 2020; Approvals and allocation of funds: 2022; Implementation: 2024 - present

PROJECT OVERVIEW

The Integrated Stormwater Drainage (ISWD) project and restoration of Kadapakkam Lake demonstrate how a financing mix, which combines a sovereign loan from the Asian Development Bank (ADB) for grey infrastructure, an adaptation grant from the Global Environment Facility (GEF) administered through ADB for the Lake restoration component, and co-financing by the government of Tamil Nadu, can successfully

embed NbS interventions within a large-scale, sovereign-financed urban infrastructure programme (ADB, 2022; Castro-Wooldridge, 2020). The Lake restoration component, along with forty-five civil works packages, prioritizes urban flood mitigation by expanding and rehabilitating stormwater drains to channel monsoon overflow into natural drainage channels.

In northern Chennai, the Kosasthalaiyar river basin is a flood-prone coastal zone (Arunachalam, Saravanavel and Kochuparampil, 2023; Muneerudeen, 2024), which is experiencing rapid and unplanned urbanization resulting in land-use change, degradation of wetlands and natural drainage channels, groundwater depletion, and seasonal water stress (Rosado et al., 2024; Ramaiah and Avtar, 2019). In this context, the project focuses on restoring Kadapakkam Lake urban wetland, which plays a crucial role in regulating stormwater flows, enabling groundwater recharge, enhancing water quality, and creating climate resilience. However, local governments are fiscally constrained in implementing NbS interventions; as such, these interventions lack revenue-generating potential and often compete with grey infrastructure investments that offer more immediate and tangible returns (Zarei, 2025). To address these challenges, the project adopts a financing mix that converges multiple financial flows to overcome the local government's fiscal constraints, integrates NbS components into a larger grey infrastructure project, and ensures state government support for efficient project management.

STAKEHOLDER ROLES

Table 16: Stakeholder Roles and Categorization for ISWD Project

Role	Stakeholder	Category
Financiers	Asian Development Bank (ADB); Global Environment Facility (GEF) Government of Tamil Nadu	Developmental Finance Bank
Institutional partner	Department of Economic Affairs (DEA), Government of India	Government institution (National)
Executing agency	Municipal Administration and Water Supply (MAWS) Department, Government of Tamil Nadu	Government institution (Sub-national)
Implementing agency	Stormwater Drain Department (SWD), Greater Chennai Corporation (GCC)	Government institution (Sub-national)

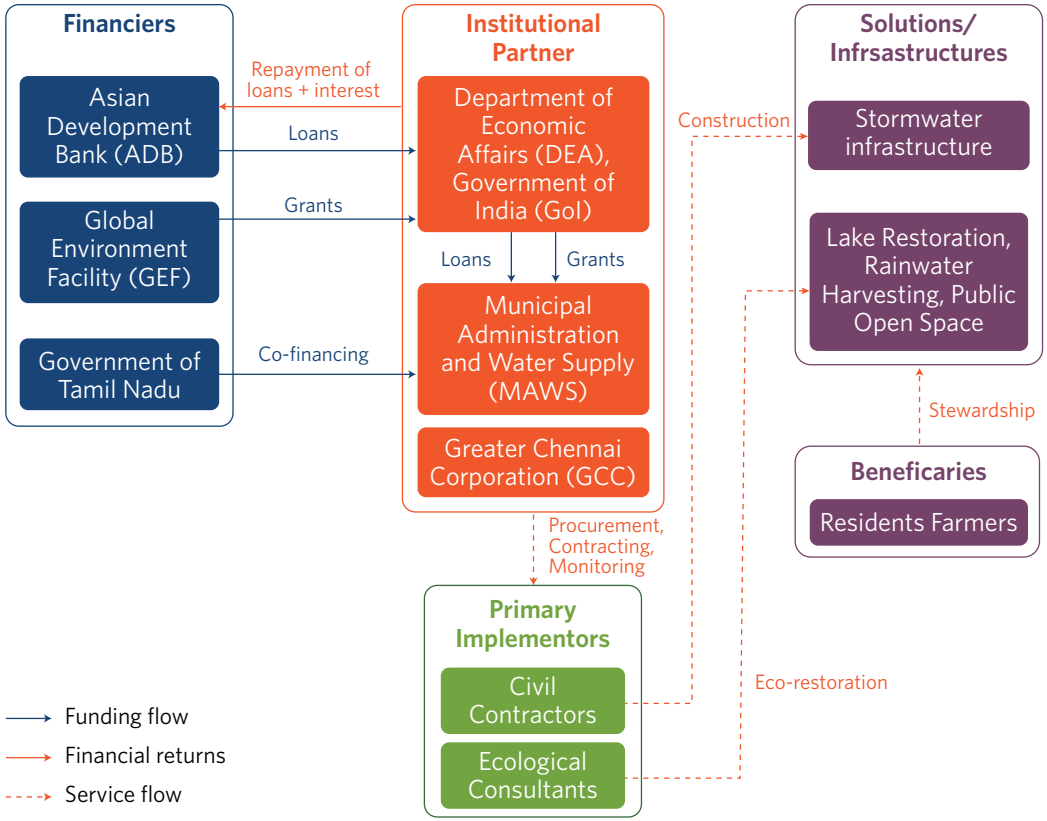
**The project had ecological restoration consultants and civil engineering firms that acted as the primary implementers. For more details on the roles of each stakeholder, refer to Annexure 5*

FINANCIAL AND BUSINESS MECHANISM: HOW IT WORKS

The financial mechanism of this initiative is structured as a financing mix that converges financial flows from multiple sources and instruments (see Figure 8). Within the mix, ADB's sovereign loan component earmarked USD 470 million to cover 45 project packages to upgrade stormwater infrastructure. The USD 9.49 million Kadapakkam Lake restoration was structured as a separate grant package, with 72.5 percent (USD 6.88 million) financed by GEF through ADB and the remaining 27.5 percent by the government of Tamil Nadu to demonstrate provincial ownership.

The model redesigned the loan component into a grant to absorb the non-revenue-generating NbS components into a conventional infrastructure project. Grants absorbed the non-revenue-generating ecological restoration components, including lake restoration, rainwater harvesting, and public green spaces, while loans supported the grey stormwater infrastructure. This reduced the government's repayment burden while enabling simultaneous investment in grey and green infrastructure.

Figure 8: ISWD's Financial and Business Flow Diagram



Source: *CEEW analysis*

IMPACT/PERFORMANCE

The project has generated various environmental and socio-economic benefits (see Table 17 below).

Table 17: ISWD's Projected Performance Against KPIs

Factor	Key Performance Indicator (KPI)	Projected value[46]
Environment	**Lake volumetric holding capacity**	Holding capacity increased from 1.1 million cubic meters to 1.9 million cubic meters by desilting nearly 7.2 lakh cubic meters of accumulated muck
	Biodiversity conservation	Restore native vegetation and remove invasive species
	Water availability	Improved groundwater recharge and water storage capacity to enhance water availability even during the lean season
	Urban flood resilience	Improved stormwater retention through percolation pits and infiltration by lake restoration
Social	**Inclusive public and recreation**	Incorporation of Elderly-, Women-, Child-, and Disabled-friendly (EWCD) features to create safe and accessible pathways and playgrounds that serve over 300 active users
Economic	**Revenue generation**	User-fee models are under evaluation for public assets such as a badminton court, a cricket ground, and park entry

46 *The values mentioned herein are gathered from 2 rounds of stakeholder consultations. These can be verified post the impact assessment reports for the project are published.*

In addition to green NbS components, the project design deployed eco-friendly construction materials wherever technically feasible. For instance, bioengineering measures such as grass planting for slope stabilization, fly-ash bricks, and terracotta brickwork for public utilities like staircases, lavatories, and amphitheaters. This green component-specific design approach maintains engineering standards while embedding sustainability considerations into the project's grey components.

KEY TAKEAWAYS AND INSIGHTS

POLICY AND ENABLING FACTORS

Convergence of the policy landscape at national and sub-national levels creates an enabling environment. At the national level, the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) promotes urban water rejuvenation, stormwater management, and sustainable urban infrastructure. At the state level, the Tamil Nadu State Action Plan on Climate Change (TNSAPCC) prioritizes urban flood resilience, eco-restoration, and climate adaptation. These policy frameworks could enable the integration of NbS components into large infrastructure projects, where conventional projects often compromise them.

The project establishes a dedicated institutional mechanism to improve technical oversight. GCC has convened a standing Lake Management Committee, bringing on board hydrologists, environmental experts, public authorities, industrialists, and farmers.

SUSTAINABILITY

Self-sustaining revenue streams can ensure the operation and maintenance of project assets. GCC is exploring targeted revenue streams, including user fees for public recreation utilities and a nominal lake complex entry fee, expected to cover recurring costs.

A unified project management framework improves the project's efficiency and sustainability. The joint administration of the GEF adaptation grant and the ADB sovereign loan is a key enabling feature of this financing structure, ensuring coordinated planning, implementation, and oversight of both grey and green infrastructure components. This ensured a synchronized monitoring mechanism for disbursement and oversight of both loan and grant components. Additionally, this translated into unified procurement, safeguard, and reporting protocols across both financing components, lowering transaction costs and ensuring seamless coordination.

SCALABILITY AND REPLICABILITY

The project demonstrates the potential to scale NbS interventions by mainstreaming NbS within infrastructure projects, despite the fiscal constraints faced by states and urban local bodies. The financial model improved the financial viability of integrating NbS into conventional stormwater infrastructure projects. The nature-positive components deliver a crucial environmental benefit of mitigating localized urban flooding. Given the limited scope of cost recovery in the intervention, the GEF grant incorporates the NbS component into grey measures without increasing the state's repayment obligations.

Scaling through broadening of financing base by exploring the possibility of tapping into Corporate Social Responsibility (CSR) contributions. The state is seeking to leverage more funds by exploring CSR contributions from industrial corridors and corporate houses to complement the financing mix. Detailed project plans, with federal cooperation and state support, can enable replication across cities and regions. GCC's urban flood management model has been adopted by other emerging urban centers in Tamil Nadu, including Coimbatore, Tiruppur, Trichy, and Madurai (Bizzotto, 2025). These cities are raising independent capital for urban resilience investments. This has been made possible due to a well-documented technical project plan and state support.

CASE STUDY 8: ECOLOGICAL RESTORATION AND BIODIVERSITY CONSERVATION IN THE ARAVALLI BIODIVERSITY PARK, GURUGRAM, NATIONAL CAPITAL REGION (NCR), HARYANA, INDIA

Project description	
Financial and Business Mechanism / Instrument	Corporate Social Responsibility (CSR) funds + individual donations
Priority themes	Ecological re-wilding; mine-site restoration; groundwater recharge and watershed management; mitigation of Urban Heat Island (UHI) effect
Region/geography	Gurugram, National Capital Region (NCR), Haryana; Semi-arid and rocky terrain spanning 380 - 392 acres in the Aravalli range
Project size	Capital expenditure of nearly INR 3 -4 crore (~USD 0.5 – 0.66 million);[47] Operational expenditure of nearly INR 5 crore (~ USD 0.83 million)43 from 2009 - 2020, INR 1.5 crore (~ USD 0.2 million)[48] since 2021
Timeline	2009 - present

PROJECT OVERVIEW

The Aravalli Biodiversity Park (ABDP) leverages Corporate Social Responsibility (CSR) financing, structured via a public-private-civil society partnership, to mobilize long-term finance for urban NbS intervention. The

47 *Conversion rate applied was USD 1 = INR 60.27, based on the average exchange rate for the 2009–2020 period.*
48 *Conversion rate applied was USD 1 = INR 73.92, based on the average exchange rate for 2021.*

project structure enabled long-term ecological restoration and biodiversity conservation, channeling legally mandated CSR finance to technical teams at minimal cost to the public exchequer.

The project site within the Aravalli Biodiversity Park was a topographically degraded landscape (DDA, n.d.) that had undergone decades of quarrying, mining, and stone-crushing activities, resulting in deep pits, fractured bedrock, stripped topsoil, and a substandard hydrological profile (FAO, n.d.; IAG, 2020). Overall, the region also faced environmental challenges from heat waves, flash floods, and ambient air pollution. In 2004, a landmark Supreme Court judgment banned mining and industrial activities in the Aravallis, and the land was transferred to the Municipal Corporation of Gurugram (MCG). At the time of land transfer, the site was dominated by an ecological monoculture of Prosopis juliflora (vilayati kikar) and aggressive alien tree species that suppressed native flora and depleted the water table (Dhasmana, 2016). Accordingly, MCG signed a non-financial master Memorandum of Understanding (MoU) with IAmGrugaon (IAG), a non-governmental organization (NGO), for fundraising, subcontractor management, and implementation of NbS and restoration interventions on the project site.

STAKEHOLDER ROLES

Table 18: Stakeholder Roles and Categorization for ABDP Project

Role	Stakeholder	Category
Asset owner and Financier	Municipal Corporation of Gurugram (MCG)	Urban local body
Financiers	Hero MotoCorp Ltd. (anchor ten-year CSR partner); nearly 70 corporate contributors including KPMG India, Coca-Cola, Bharti Airtel, BlackRock, Genpact	Private corporations
Primary implementation group	IAmGurgaon (IAG) led, with technical implementation by the ecological restoration firm, The Rewilders, and architecture firm, Saka	Project developers
Institutional/ enabling partners	Haryana Forest Development Corporation (HFDC); Gurugram Metropolitan Development Authority (GMDA)	Sub-national government institutions

**For more details on the role of each stakeholder, please check Annexure-6*

FINANCIAL AND BUSINESS MECHANISM: HOW IT WORKS

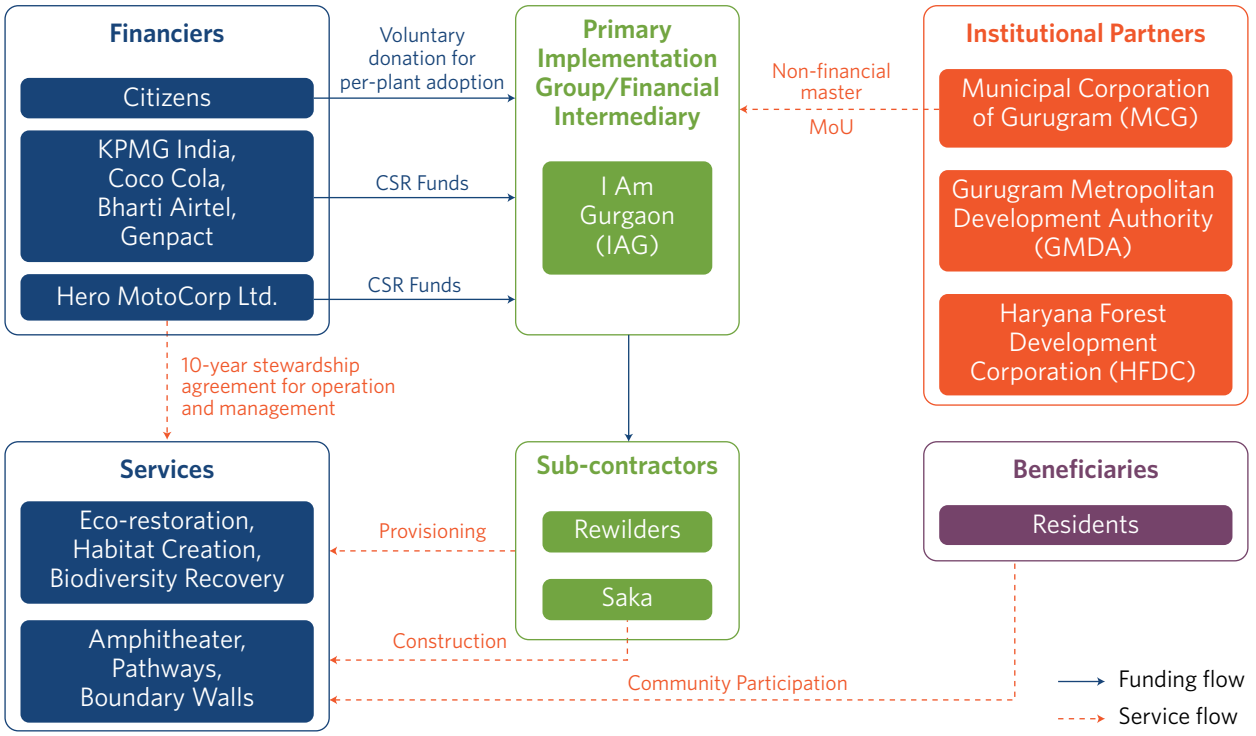
Aravalli Biodiversity Park (ABDP) shows how a CSR financing structure can mobilize multiple CSR contributions while strategically complementing public finance for NbS implementation (see Figure 9 below). The MoU between MCG and IAG enabled MCG to retain public land ownership and allocate USD 0.5-0.66 million to fund primary civil works, such as perimeter walls, access gates, and pathways. At the same time, IAG mobilized and managed CSR funding for ecological restoration

activities. This arrangement separated hardscape civil infrastructure from softscape ecological restoration.

IAG channeled CSR financing to sub-contract different technical executors for distinct components of NbS intentions. Based on technical expertise, IAG awarded contracts to organizations: the architecture firm Saka handled hardscape grey assets, later taken over by Ar. Gaurav Bhatnagar, while a technical consultancy group, The Rewilders, carried out softscape green interventions.

IAG designed corporate engagement partnerships and stewardship agreements to support the long-term operations and maintenance of NbS initiatives. IAG adopted a per-plant package to involve individual citizens and short-term corporate engagements for plantation drives and nursery establishment. Nearly 70 corporate houses, including KPMG India, Coca-Cola, Bharti Airtel, BlackRock, and Genpact, joined to fund the project's eco-restoration interventions. To strengthen continuity beyond initial restoration activities, IAG entered into a 10-year stewardship agreement with Hero MotoCorp in 2021, contributing USD 0.2 million over the period to support the park's long-term operations and maintenance. (TERI, 2022). Prior to this, USD 0.83 million was allocated from 2009 to 2020 as operational expenditure for the park.

Figure 9: ABDP's Financial and Business Flow Diagram



Source: *CEEW analysis*

IMPACT/PERFORMANCE

The project has generated various environmental and socio-economic benefits (see Table 19).

Table 19: ABDP's Projected Performance Against KPIs

Factor	Key Performance Indicator (KPI)	Projected value
Environment	**Eradication of invasive species**	Near-complete removal of *Prosopis juliflora*
	Recovery of native biodiversity	Re-establishment of 300 native plant species (90 trees, 40 shrubs, 30 climbers, and 60 grass species; 201 bird species recorded (Dhasmana, 2016; IAG, 2020)
	Groundwater recharge	Groundwater table recovered from 48 meters to 36 meters in depth (a rise of 12 meters);[49] annual recharge estimated at 320 million liters
	Air quality regulation	Canopy cover contributes to trapping particulate matter
Social	**Recreation and well-being**	Monthly footfall of nearly 30,000 visitors[48]
Economic	**Full-time equivalent (FTE) green jobs**	Nearly 50 permanent staff; 1 curator, 1 naturalist-educator, supervisors, ~22 gardeners, ~25 guards[48]

49 *Stakeholder consultation with Mr Vijay Dhasmana, the Chief Ecologist and Founder – The Rewilders.*

ABDP has seen sustained implementation progress through a phased transition from restoration to institutional ownership to corporate stewardship. After the MCG received the land in 2009, the initial phase (2010–2020) focused on the park's ecological restoration. In 2020, the park transitioned to municipal ownership and institutional management with IAG. Building on this transition, in 2021, ABDP moved to the corporate stewardship phase for long-term park maintenance.

KEY TAKEAWAYS AND INSIGHTS

POLICY AND ENABLING FACTORS

A statutory CSR mandate creates an enabling environment for mobilizing CSR finance for NbS activities. Section 135 of the Companies Act, 2013 requires corporate houses to spend 2 percent of net profit towards CSR. This created a steady, recurring pool of private capital that IAG could channel toward ecological restoration (TERI, 2022).

A public-private partnership enabled institutional support and NbS implementation. MCG's willingness to execute a non-financial MoU with IAG enabled private corporations to facilitate day-to-day maintenance on public land by deploying private CSR funding. Moreover, ABDP is implementing these NbS interventions at zero direct cost to the exchequer.

SUSTAINABILITY

The project's progression from restoration and establishment to institutional integration and stewardship allows for long-term sustainability. A core operational insight from the project is that eco-restoration initiatives require funding partners to commit for the long term, beyond the standard two- to three-year CSR window. To advance this,

IAG leveraged corporate partnerships and stewardship agreements that incorporated multi-year operations and maintenance packages.

SCALABILITY AND REPLICABILITY

Public-private partnership with CSR finance can be tailored to different urban and ecosystem contexts. The ABDP project demonstrated how urban local bodies can implement NbS interventions and biodiversity conservation, a model that can be replicated across cities. This model is already being replicated in Gurugram at the 180-acre Aravalli Nagar Van site and at the 100-acre Sikandarpur Pahari site, both now several years into implementation.

CASE STUDY 9: SIKKIM DHARA VIKAS PROJECT FOR WATER SECURITY AND SPRINGSHED MANAGEMENT, KITAM GRAM PANCHAYAT, SIKKIM, INDIA

Project description	
Financial and business mechanism / Instrument	Public finance scheme + user pay charges
Priority themes	Ground aquifer recharge; enhancing water security; localized flood mitigation; forest cover restoration; enhancement of agro-pastoral livelihoods
Region/geography	Kitam Gram Panchayat, Namchi district, South Sikkim, India
Project size	MGNREGS capital expenditure of INR 2 - 3 lakhs (~USD 3413 – 5120);[50] annual operational expenditure of INR 20,000 - 50,000 (~USD 341 – 853)48
Timeline	Started in 2013 with feasibility and hydrogeological mapping, and post-2015 in the implementation and maintenance phase

PROJECT OVERVIEW

The Dhara Vikas project is a public finance initiative that leverages the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)[51] to support rural employment wages for landscape restoration activities that enhance rural water security. In Kitam Gram Panchayat, targeted NbS interventions to facilitate springshed management and augment water

50 *Conversion rate applied was USD 1 = INR 58.6, based on the average exchange rate in 2013.*
51 *MGNERGA has been replaced by Viksit Bharat-Guarantee for Rozgar and Ajeevika Mission (Gramin) (VB-G RAM G) Act, 2025.*

supply were implemented by deploying MGNREGA funds to complete grey infrastructure, such as digging contour trenches and percolation pits.

Kitam Gram Panchayat (GP), a rain-shadow area in South Sikkim, faces rising temperatures, erratic rainfall, and declining winter precipitation, which has reduced water availability in natural springs (dharas) for potable and irrigation purposes (Rai, 2022). Two such streams, Mickfola Kfolcha, which fed the Upper and Middle wards of GP, and Dhara Kfolcha, which fed the Lower ward of GP, had turned from perennial to seasonal. This forced women to spend roughly one-and-a-half hours a day fetching water from distant sources. To address this gap, the project dug over 300 trenches in the recharge zone, located 12-15 kilometers away in the high forest with steep terrain, and constructed percolation pits to create water-recharge infrastructure. MGNREGS, conventionally known for implementing grey infrastructure, was leveraged to implement engineering measures that enhance ecosystem services, such as enriching water supply and mitigating flood risk.

STAKEHOLDER ROLES

Table 20: Stakeholder Roles and Categorization for Dhara Vikas Project

Role	Stakeholder	Categories
Financier	Ministry of Rural Development, Government of India	Government institutions (National)
Primary implementation partners	Rural Management and Development Department (RMDD); State Institute of Rural Development (SIRD)	Government institution (sub-national)
Local implementation partner	Gram Panchayat (GP)	Local public authority (Sub-national institution)
Technical and knowledge partner	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Technical support agency

**For more details on the role of each stakeholder, please check Annexure 7*

FINANCIAL AND BUSINESS MECHANISM: HOW IT WORKS

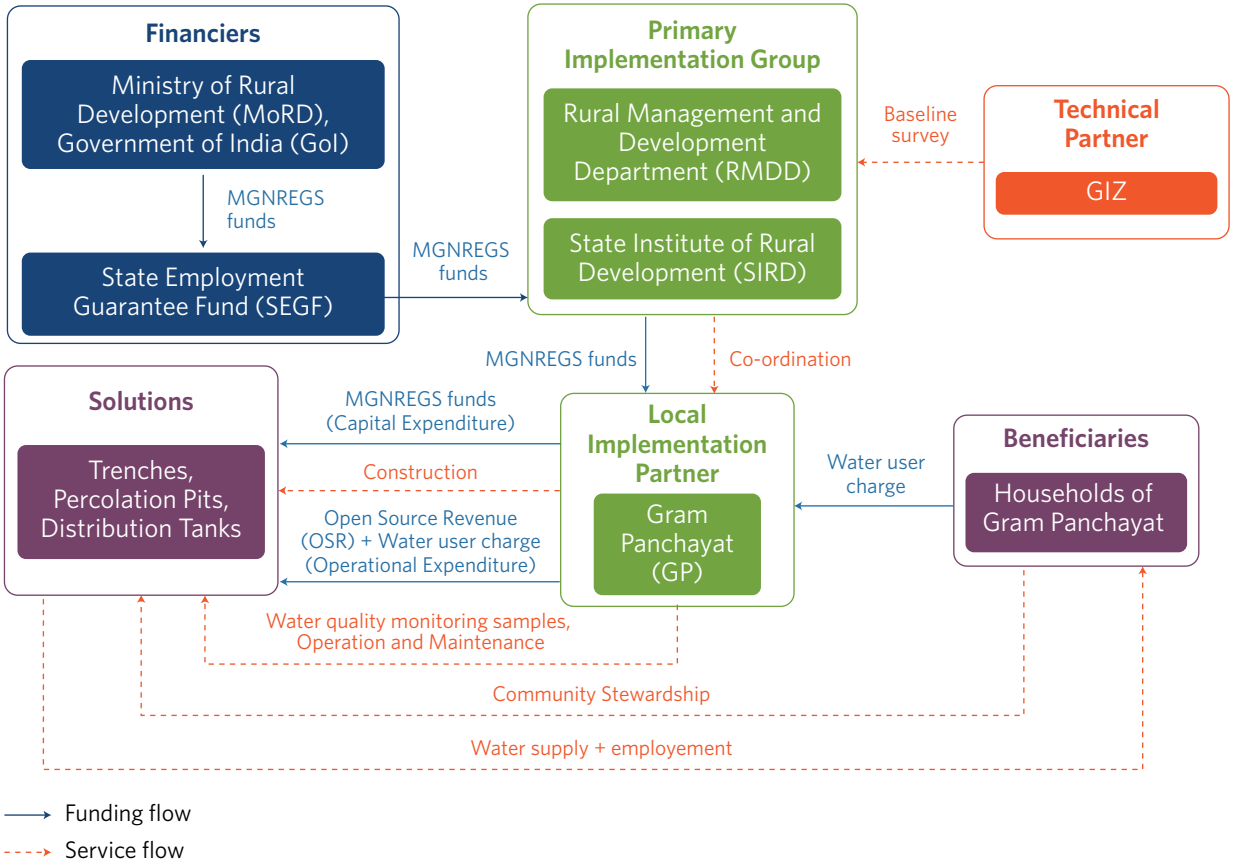
The financial model leverages public finance, with synergies between national and sub-national scheme finance, to implement NbS (see figure 10 below). The Ministry of Rural Development, Government of India, disburses the state share to the State Employment Guarantee Fund, which disburses these funds to RMDD, which then channels them to GPs through district and block administrations, enabling the implementation of public works (PSI, n.d.). However, the operational expenditure uses one-half of water and sanitation grants from the central government and Own Source Revenue (OSR) from the Gram Panchayat for structural cleaning, such as de-silting, and day-to-day maintenance, such as clearing landslide-affected trenches and building distribution tanks.

The project demonstrates a user-pays business model for operations and maintenance. For maintenance of trenches and distribution pipelines, Kitam GP introduced a monthly household water-user charge, INR 30 (~USD 0.5)[52] in Upper and Middle wards in 2014-15 and was increased to INR 50 (~USD 0.8[50]) for all three wards.

52 *Conversion rate applied was USD 1 = INR 64.16, based on the average exchange rate of 2015.*

Community mobilization with members offering voluntary physical maintenance *(Shram Daan)* work was unique. GP paid a total of INR 500 (~USD 8[50]) to community members to offset logistics and food costs, ensuring this in-kind support supplements state development grants, including MGNREGS funds and water and sanitation grants. This instilled a sense of responsibility and belonging among residents, strengthening stewardship.

Figure 10: Dhara Vikas Project's Financial and Business Flow Diagram



Source: *CEEW Analysis*

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), in collaboration with the Rural Management and Development Department (RMDD) and the State Institute of Rural Development (SIRD), carried out GIS-based mapping of streams and groundwater recharge areas, along with hydrogeological testing. This mapping enables the identification of groundwater flow pathways and the demarcation of critical springshed recharge areas. This ultimately results in sustained spring discharge and long-term water security.

IMPACT/PERFORMANCE

The project has generated the following environmental and socio-economic benefits:

Table 21: Dhara Vikas Project's Projected Performance Against KPIs

Factor	Key Performance Indicator (KPI)	Projected value[53]
Environment	**Groundwater recharge**	Revival of catchment areas of local water bodies
	Increase in forest/ green cover	Visible increase in localized green cover across the rain-shadow terrains
	Spring discharge rate	10 - 15% increase in year-round spring discharge volume; nearly 50% of households report availability of water in the lean period
Social	**Time burden of water collection**	Reduction from 1.5 hours/day spent by women; decline in disputes between upstream and downstream villages after piped water supply
Economic	**Employment**	Nearly 32 job card holders engaged in building trenches
	Cost recovery	Household water-user charges raised and standardized for all three wards for O&M

Performance monitoring strengthened the intervention's long-term management and outcomes. The Dhara Vikas initiative integrated performance monitoring into the local authorities' workstreams. The initiative monitored water flow, discharge rates, and water quality at the block and local levels. As a result, it delivered significant nature-based and socio-economic benefits by improving access to clean potable water, reducing time spent fetching water, improving the efficiency of household sanitation infrastructure, and reducing contamination of downstream water. Regular performance tracking provides evidence of outcomes and directly justifies ongoing budget allocations.

KEY TAKEAWAYS AND INSIGHTS

POLICY AND ENABLING FACTORS

Policy-level convergence across national and sub-national schemes for creating an enabling environment for springshed restoration. The institutionalization of an explicit springshed mandate was reinforced by the convergence of schemes such as MGNREGS for labor-intensive works, Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) for watershed development and water conservation, and Dhara Vikas, a state-led initiative for rural development and natural resource management (Rathod et al., 2021).

Alignment with central schemes and functioning of Village Water and Sanitation Committees (VWSCs). The project achieved long-term sustainability by aligning with state-sponsored infrastructure programs, such as the Jal Jeevan Mission (JJM), to ensure the availability of distribution pipes and household taps to channel water from natural springs.

53 *Stakeholder consultation with Ms Savitri Chettri, former Panchayat President at Kitam Gram Panchayat.*

SUSTAINABILITY

Levying of water user charges to ensure steady flow of operational funds. Monthly household-level water user fees safeguard assets against fluctuations in state allocations from development schemes. Continuous upskilling of residents to ensure water quality monitoring and maintenance supports the long-term sustainability of natural ecosystems.

Community stewardship by a participatory approach towards technical design and localized implementation supports long-term operation and maintenance. Participatory GIS and hydrogeological mapping enabled engineers to target 10-15 percent of the catchment with the highest recharge potential, reducing costs and the area of soil disturbance (Mishra, 2022). Deploying para-hydrogeologists and barefoot engineers among residents ensured technical expertise was embedded among locals rather than in external partners who serve for a limited time.

Community integration and local employment generation can ensure community-based NbS interventions. Neighboring villages whose land lies within the recharge zone may resist the interventions because they lack tangible benefits and perceive an increased landslide risk. It is suggested that offering employment opportunities to the communities during implementation, rather than treating consent for the recharge area as a legal formality, is pertinent to avoiding such conflicts in other similar geographical contexts.

SCALABILITY AND REPLICABILITY

The financial and operational architecture of this springshed model is highly replicable across similar rural contexts. In urban contexts, such as Shillong, spring-revival efforts can succeed, provided recharge-area mapping precedes the project's design phase. Although replicability in urban landscapes may be fairly limited, given that this is a rural-area-focused social protection scheme, the core financing mechanism can be leveraged alongside a blended financing model. Herein, public grants may be combined with philanthropic capital or international loans to cover the upfront costs of project implementation.

4. RECOMMENDATIONS- SCALABILITY AND REPLICABILITY

Case studies and stakeholder consultations demonstrate that India does not necessarily need a new standalone financing instrument for NbS. Instead, the immediate priority is to address the market failures that prevent existing capital sources from reaching high-quality NbS projects at scale. The consultations highlighted common constraints across the 9 projects: limited project preparation and NbS integration, fragmented and mismatched financing across the project lifecycle, limited policy and institutional convergence, inadequate long-term O&M arrangements, and the absence of standardized impact measurement frameworks.

NbS projects need to be easier to prepare, helping project developers identify the right capital for their needs, enabling different government programs and stakeholders to work together, and creating credible evidence of outcomes and value. With NbS initiatives involving multiple stakeholders, ecosystem types, and different public institutions, the recommendations shared are very broad-based, focusing on systemic institutional interventions/structuring (Check Table 22). Focus group discussions and stakeholder interviews corroborate the recommendations shared below.

Table 22: Institutional interventions/ structuring needed to realize recommendations

Themes	Challenge	Recommendations	Stakeholders
Improve project preparation support for NbS	Limited recognition of design and feasibility studies as a risk minimization mechanism	▪ **Accounting for adequate time periods and financial support for feasibility assessments** can help translate technical uncertainties around performance and outcomes into quantifiable parameters and help build confidence in the project. ▪ This is particularly important for NbS, where the risk profile of such interventions is relatively less understood and may therefore be perceived as higher risk by financiers.	▪ Developmental Financial Institutions (DFIs), including multilateral development banks ▪ Public sector institutions, including bilateral organizations ▪ Philanthropy ▪ Project developers
	NbS elements are rarely integrated into early design stages of projects. Instead, they are usually planned as parallel, stand-alone structures	▪ **NbS considerations could be integrated into existing project-preparation structures,** creating dedicated project-preparation windows within relevant climate, urban and infrastructure finance facilities where needed.	▪ Government institutions including city municipalities ▪ Developmental Financial Institutions (DFIs), including multilateral development banks ▪ Project developers ▪ NGOs and civil society
	Absence of standardized project-preparation guidance hinders the selection of the appropriate outcome-based interventions, which tend to increase the transaction costs while preparing new projects	▪ **Developing standardized but adaptable project-preparation templates for different NbS typologies.** These could include guidance on defining outcomes, identifying appropriate interventions, and subsequently estimating costs and financing requirements.	▪ Central and state governments ▪ Government institutions including city municipalities ▪ Developmental Financial Institutions (DFIs), including multilateral development banks ▪ Public sector institutions, including bilateral organizations ▪ CSOs and think tanks

Themes	Challenge	Recommendations	Stakeholders
Develop a Fit-for-Purpose Capital-Matching and Sequencing Framework for NbS	Limited capital deployment remains a key barrier for NbS projects due to multiple reasons, such as a mismatch between available financing and project characteristics, absence of appropriate capital stacking, and lack of viable business models	▪ **Creating a taxonomy to match capital to intervention.** This will categorize projects by factors such as revenue potential, risk, beneficiaries, scale, public-good characteristics, and maturity. This matters because many NbS projects generate substantial public and environmental benefits without predictable revenue streams. ▪ **Projects with clear revenue streams could be directed towards commercial debt, equity, or user-payment models;** projects with revenue potential but higher risks could access blended finance, guarantees, or concessional capital; while **interventions with predominantly public-good benefits** could continue to rely on government budgets, grants, CSR, and philanthropic capital. ▪ **Tailored frameworks can be built to help identify the sequencing of appropriate sources of capital for different stages of projects.** For example, philanthropic or CSR funding could support project preparation and demonstration; concessional capital could de-risk early implementation; and private concessional or commercial finance could subsequently be mobilized where a viable revenue or risk-reduction proposition exists.	▪ Central and state governments ▪ Developmental Financial Institutions (DFIs), including multilateral development banks ▪ Public sector institutions, including bilateral organizations ▪ Philanthropy ▪ Private commercial financial institutions ▪ CSOs and think tanks
Create an NbS Convergence and Implementation Framework	NbS financing remains fragmented, with limited convergence between national and sub-national policies and schemes	▪ **Central and state governments could develop guidance for NbS convergence** that enables existing schemes, budgets and institutional mandates to be aligned around shared NbS outcomes. ▪ Tools such as the Urban NbS Finlink[54] being developed under the CPPF, could help city government officials identify suitable financing opportunities for urban NbS, including relevant existing schemes.	▪ Central and state governments ▪ CSOs and think tanks
	Limited long-term arrangements for maintenance and operations	▪ **Defining and clarifying roles and responsibilities** for asset ownership, maintenance, and outcomes management at the project level. ▪ Enable models that allow intermediaries like NGOs, CSOs, and other specialized organizations to mobilize and manage funding while public authorities retain statutory ownership and oversight.	▪ Developmental Financial Institutions (DFIs), including multilateral development banks ▪ Public sector institutions, including bilateral organizations ▪ Project developers ▪ CSO and think tanks

54 *NbS Finlink is an open access decision support tool that connects urban NbS project ideas with public, commercial and international funding sources, helping practitioners move from concept to implementation.*

Themes	Challenge	Recommendations	Stakeholders
Create an NbS Convergence and Implementation Framework	Limited integration of NbS within Schedule of Rates (SoR), standard civil-works documents, procurement and project preparation processes	▪ **Extending convergence to procurement, technical standards and implementation procedures.** Developing standard specifications, BoQ templates, and procurement guidance for commonly used NbS interventions could significantly reduce transaction costs and facilitate integration into public infrastructure projects.	▪ Government institutions including city municipalities ▪ Project developers
Establish a Common Framework for NbS Outcomes, Valuation and Monitoring	NbS projects lack integration of impact metrics that capture their long-term outcomes and benefits	▪ **A shift from input to outcome indicators,** such as the number of trees planted, to track measurable outcomes such as flood-risk reduction, water recharge, temperature reduction, biodiversity recovery, avoided economic losses, and livelihood benefits.	▪ Central and state governments ▪ CSR regulators ▪ Developmental Financial Institutions (DFIs), including multilateral development banks ▪ Philanthropy ▪ Project developers

5. ANNEXURES

ANNEXURE-1: DETAILED STAKEHOLDER MAPPING FOR UPPER YAMUNA HYDRO BASIN PROJECT

Role	Organization	Description
Financier	Amazon	Created a service grant agreement to meet the goals of Amazon.
Implementation Group- System Integrator	Hasten Regeneration	System integrator and platform responsible for overall strategy, funder relations, partner coordination, and Monitoring, Reporting and Verification (MRV) design.
Implementation Group- Hydraulic Engineering Partner	Clear Water Dynamics	Responsible for all engineering dimensions including hydraulic modeling, structural design of gabion weirs and recharge shafts, MAR network designs, and Detailed Project Report (DPR) preparation.
Implementation Group- Community Mobilization Partner	Arpan Seva Sansthan	Leads community engagement, formation of 3 village-level Technical Support Groups (TSGs), training community members as Groundwater Para-Technicians, conducting community meetings (including farmer group consultations) and co-developing village water security planning.
Beneficiary Group	Bhagwanpur and adjacent villages community	Engaged through community mobilization, and governance and technical groups established for infrastructure oversight and future monitoring. This group consists of 800-1,200 households across 4-6 villages.
Institutional Partner	Haryana's Jal Shakti Department	Issued NoC on the DPR and holds an active MoU with Hasten for infrastructure access and long-term operational handover. This formal institutional partnership signals government alignment and creates pathways for the infrastructure to be absorbed into state water management systems.

Gabion check dams/weirs at the project site: ponding upstream of a weir (left) and overflow during first monsoon impoundment, July 2026 (right).

Source: *Project team (Hasten Regeneration / Clear Water Dynamics)*

ANNEXURE-2: DETAILED STAKEHOLDER MAPPING AND TARIFF SLABS FOR RAINBOW DRIVE PROJECT

Role	Organization	Description
Primary Financier/ Beneficiary Group	Residents of Rainbow Drive	Households self-financed their rainwater harvesting/recharge systems. They contribute to community recharge infrastructure through block tariffs. By 2015, RDL had 258 households.
Governance and Utility/ Service provider	Plot Owners' Association	Plays a dual role as a governance and utility service provider to households. Registered association with 12 elected members and has enforcement authority overseeing the establishment, operations, and management of water resources. Provides water, sanitation, landscape, and other services to each household.
Implementation Partner – Technical Design & Community Mobilization	Biome Environmental Solutions	Conducted initial diagnosis of Rainbow Drive's water challenges; supported recharge-well strategy and demonstration design; advised on demand management, production-cost estimation, tariff design, and household behavior-change approaches.
Wastewater Technology Partner	Petrichor Emerging Technologies India Pvt Ltd[55]	Provided and implemented the 250 KLD Phytorid-based wastewater treatment system selected by the POA, which was commissioned in 2014.

Consumption Slab	Tariff (2008)
10 KL	INR 10/KL
11-20 KL	INR 15/KL
21-40 KL	INR 25/KL
41-60 KL	INR 40/KL
>60 KL	INR 60/KL

Consumption Slab	Tariff (2013-14)
Up to 15 KL	INR 38/KL
15 - 25 KL	INR 50/KL
Above 25 KL	INR 140/KL

55 Based on interview with RBD resident and member of POA

ANNEXURE-3: DETAILED STAKEHOLDER MAPPING FOR MEGCARE PROJECT

Role	Organization	Description
Financier	Rabo Foundation	Provided the start-up grant that financed the project's design phase and initial farmer onboarding; backed Caspian's debt facility by providing a guarantee structure.
Financier (debt facility)	Caspian Impact Investments	Provided INR 8.5 crore (~ USD 0.98 million17) debt facility against future CRU revenue.
Implementer	IORA Ecological Solutions	Responsible for overall agroforestry design, farmer onboarding, MRV coordination, and CRU revenue distribution.
Sub-Contractor: Community Mobilization	Meghalaya Basin Development Authority (MBDA)	State government agency (1000+ staff, governing council chaired by chief secretary) responsible for community mobilization through its existing Village Community Facilitator (VCF) network.
Marketplace	Acorn (Rabobank)	Owns the smallholder agroforestry carbon methodology that guides the design, verification, and pricing of CRUs; operates a marketplace where CRUs are sold to global buyers.
Beneficiary Group	Smallholders and community farmers of Garo and Khasi-Jaintia Hills	Engaged via project councils, village-level nurseries, and regular ACA field visits.

ANNEXURE-4: DETAILED STAKEHOLDER MAPPING FOR WAL PROJECT

Role	Organization	Description
Commissioner for WaL	The Special Envoy for International Water Affairs, Henk Ovink, and the Netherlands Enterprise Agency (RVO.nl) on behalf of the Ministry of Foreign Affairs	The Netherlands Ministry of Foreign Affairs and the Netherlands Special Envoy for International Affairs commissioned the call to action through an international tender. The Netherlands Enterprise Agency (RVO.nl) serves as the Contracting Authority and executing agency, including the Call for Action.
City of 1000 Tanks- Chennai Urban Vision 2018- 2019		
In partnership with	Partners for Resilience, Architecture Workroom Brussels, Dutch Ministry of Infrastructure and Water Management, Global Centre on Adaptation, UN/ World Bank High Level Panel on Water	Technical support for the development of conceptual tender designs for presentation to beneficiary cities and investors to raise interest and find partnership within the institutional and MFI. Monitoring, guidance and assessment during the call from summer 2018 until April 2019.
City of 1000 tanks team	OOZE architects & urbanists, Madras Terrace, IIT Madras, EVI, Care Earth Trust, IRCDUC, Uravugal Social Welfare Trust, Goethe Institut Chennai, Paperman Foundation, Rain Center, TU Delft-Urbanism, IHE Delft, HKV Consultants	Responsible for pre-feasibility study and the design of a spatial planning approach for sustainable systemic water management solutions for the city of Chennai, focusing on areas of Mylapore, Chitra Nagar, Koyambedu, & Mambalam.

Role	Organization	Description
City of 1000 Tanks- Water balance pilot for the Little Flower School 2021-2027		
In partnership with	Dutch Ministry of Infrastructure and Water Management, Little Flower School, Goethe Institut Chennai, CRC	RVO grant funding covered the full project lifecycle over approximately 6.5 years, spanning research and concept development, DPR preparation, engineering design, implementation of NbS systems on site, and ongoing operations and maintenance. Wipro Foundation funded recharge wells; Nike funded solar system optimization through Synergy India Ventures.
City of 1000 tanks team	OOZE architects & urbanists, Madras Terrace, Atma Water – Auroville, EVI, IIT Madras, Care Earth Trust, Goethe Institut Chennai, Chennai Resilience Centre, IRCDUC, Urayugal Social Welfare Trust, Paperman Foundation	Responsible for all engineering dimensions including baseline testing, design development and Detailed Project Report (DPR) preparation, implementation and maintenance. Design of components within the larger implementation plan was completed by consultants- for eg., recharge wells within a catchment tank at IIT Madras.
Contractors	Madras Terrace Works, Nala Builders, Green Line Builders, Gowatr, Aqua Cycle	Implementation of engineering solutions and the design of components such as the live online monitoring system (Gowatr).

ANNEXURE-5: DETAILED STAKEHOLDER MAPPING FOR ISWD PROJECT

Role	Organization	Description
Financiers	Asian Development Bank (ADB); Global Environment Facility (GEF)	Sovereign lender providing USD 470 million for 45 grey infrastructure packages, and acts as the administering agency for the GEF adaptation grant; provides a USD 6.88 million (out of USD 9.49 million) adaptation grant for restoration of Kadapakkam Lake
Co-financier	Government of Tamil Nadu	Provides the remaining amount of the Kadapakkam Lake package cost
Institutional partner	Department of Economic Affairs, Government of India	Approves and channels multilateral funds to the Government of Tamil Nadu
Executing agency	Municipal Administration and Water Supply (MAWS) Department, Government of Tamil Nadu	Budgeting and overseeing the project implementation activities
Implementing agency	Stormwater Drain Department (SWD), Greater Chennai Corporation (GCC)	Procurement, contracting, and day-to-day project management
Technical contractors	Ecological restoration consultants	Execute on-ground implementation of softscape or ecological restoration activities
Civil contractors	Civil engineering firms	Execute on-ground implementation of civil works like drainage and de-silting activities

ANNEXURE-6: DETAILED STAKEHOLDER MAPPING FOR ABDP PROJECT

Role	Organization	Description
Asset owner and Financier	Municipal Corporation of Gurugram (MCG)	Retains statutory land ownership; funded initial civil infrastructure (boundary walls, gates, pathways, amphitheater); spearheaded execution of master MoU
Financiers	Hero MotoCorp Ltd. (anchor ten-year CSR partner); nearly 70 corporate contributors including KPMG India, Coca-Cola, Bharti Airtel, BlackRock, Genpact	10-year CSR stewardship agreement for operation and maintenance (infrastructure upgradation, redevelopment of nurseries); Funded the establishment of nurseries and corporate volunteer planting drives
Primary implementation partner	IAmGurgaon (IAG)	Execution of master MoU with MCG; fundraising and management of CSR funds and citizen donations; sub-contracts hardscape and softscape specialists
Technical implementation partners	The Rewilders	Reference-site mapping, selection of native plant species, long-term ecological monitoring
Design and architecture partner	Saka	Construction and redesign of civil structures like gates, pathways, amphitheater
Institutional/enabling partners	Haryana Forest Development Corporation (HFDC); Gurugram Metropolitan Development Authority (GMDA)	undertook initial afforestation by planting saplings; coordinates on public utilities, such as water pipelines that intersect the restoration site

ANNEXURE-7: DETAILED STAKEHOLDER MAPPING FOR DHARA VIKAS PROJECT

Role	Organization	Description
Financier	Ministry of Rural Development, Government of India	Channels MGNREGS funds to the Gram Panchayat via the State Employment Guarantee Fund. This facilitates earthworks like building trenches and percolation pits
Primary implementation partner	Rural Management and Development Department (RMDD), Government of Sikkim; State Institute of Rural Development (SIRD)	Conceptualization of the interventions; regular monitoring of water recharge rate and water quality
Local implementation partner	Gram Panchayat	Deploys OSR and household water user charges for O&M, and offers incentives (logistics, food) to trench-digging volunteers; mobilization of local labor
Technical and knowledge partner	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Carried out baseline hydrogeological surveys; GIS-based catchment mapping; training of para-hydrogeologists and barefoot engineers

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