

INDIA FORUM FOR
Nature
BASED SOLUTIONS

Second Annual Summit 2026

Summary and Key Takeaways

9 March 2026 | New Delhi

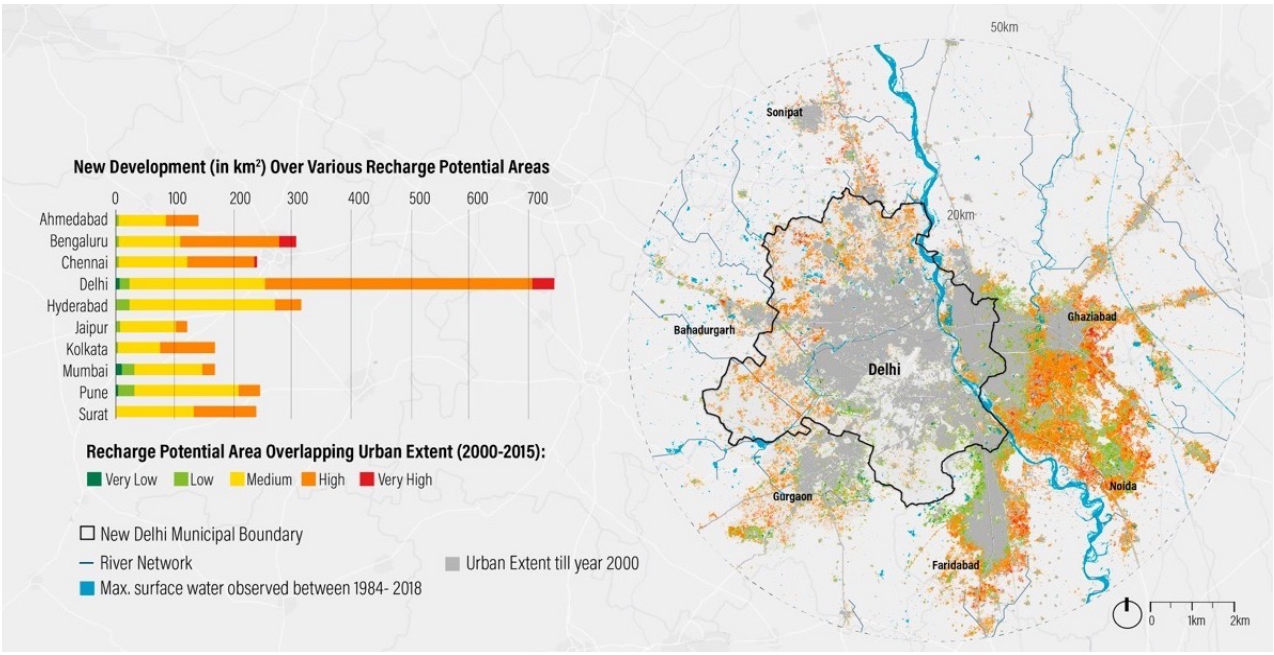


SHAPING CITIES THAT WORK WITH NATURE

India has witnessed a significant rise in the frequency and intensity of extreme climate events, including heatwaves, urban flooding, landslides and extreme rainfall episodes in recent years (Pandey, 2025). Nearly 8 out of 10 Indians live in districts vulnerable to such extreme climate events (Mohanty & Wadhawan, 2021). On one hand, the increasing occurrence of heatwaves exposes large parts of the country to extreme heat stress. On the other hand, India's urbanisation trends have converted natural spaces to concretised surfaces, affecting both ground water recharge capacity and causing frequent flooding events (Goswami et al., 2022).

INDIA'S URBANIZATION STORY

This map shows the impact of urbanization on natural infrastructure. Using open-source, high-resolution satellite imagery, it estimates how groundwater recharge is affected by the conversion of natural spaces to concretized surfaces.



Source: Goswami et al., 2022

Recent policy developments reflect the urgent need for adaptation and resilience measures to address the growing impact of these climate risks. The soon-to-be announced National Adaptation Plan (NAP) identifies strengthening knowledge systems, reducing exposure to climate risks and enhancing adaptive capacity as key priorities (MoEFCC & UNDP, 2025). In parallel, the National and State Disaster Mitigation Funds (NDMF and SDMF respectively) have been mobilised to support heat wave mitigation actions, while also encouraging co-financing from local governments, NGOs and private sector (Prime Minister's Office, 2025).

In addition, the Disaster Management Act was amended last year, enabling states to set up an Urban Disaster Management Authority (UDMA) to plan and manage climate-related disasters (Ministry of Home Affairs, 2026).

The potential of nature-based solutions (NbS) in mitigating climate risks and achieving social, ecological and economic co-benefits, has been well-documented across diverse contexts globally. India, too, has a long tradition of implementing NbS, however, limited research and knowledge, poor capacity and the absence of applicable standards and guidelines, continue to act as key barriers to scaling them across cities.

The India Forum for Nature-based Solutions works to bridge these gaps. The Forum is a coalition of research, practice and finance organisations working to build local evidence on how NbS can strengthen urban services and resilience, through peer exchange, technical training, knowledge sharing, and research.

The Forum also convenes and engages with stakeholders from across the ecosystem including government, private sector, think tanks and civil society, mainly through the Annual Summit event. The first edition of the Summit was held in 2024, bringing public and private actors together, to build synergies, foster dialogue, share learnings, and increase awareness about how NbS can be used to build resilient Indian cities.

The second edition was held in early 2026 with the objective of bringing visibility to subnational action in different ecosystems and generating more practical insights to inform the design and implementation of national policies, schemes, and programs for urban NbS.

The Summit sessions were designed to address the following key questions:

(a) How do governance and ecological boundaries become misaligned, and what models can enable coordinated action for managing shared assets?

(b) Which subnational practices and innovations should be amplified and scaled?

To address these questions, a nuanced understanding of subnational efforts being undertaken to address heat stress and flooding, as well as the challenges faced in different ecosystems such as rivers and coastal habitats was elaborated during the summit:

SESSION TITLE	THEME	COLLABORATIVELY ANCHORED BY
Opening Plenary | Bridging National Ambition and Local Innovation	Policy & governance	Secretariat, India Forum for Nature-based Solutions
Urban Flood Risk Mitigation: Potential and Limits for NbS interventions at City Scale	Flood resilience	National Institute of Urban Affairs (NIUA) & GIZ India
NbS for Coastal Resilience: Urban Communities as Active Guardians	Coastal resilience	WWF India & WRI India
From Basin to City: Reconnecting Rivers, Nature and Urban Water Systems	River rejuvenation	GIZ India & WWF India
Scaling Heat Resilience Through NbS	Heat resilience	Council on Energy, Environment and Water (CEEW) & WRI India
Closing Plenary | From Pilots to Policy: Taking Proven Solutions to Scale	Scaling NbS to address climate risks	CEEW, NIUA, WRI India, WWF India

The following sections give an overview of the sessions conducted during the Summit, highlighting key insights, emerging solutions and opportunities that emerged. They reflect the presentations and discussions of participants and do not necessarily represent the views of participating institutions.

OPENING PLENARY
Bridging National Ambition and Local Innovation

The Annual Summit opened with a compelling call for collective action to shift NbS from the realm of research and policy discourse into tangible, on-ground action.



Photo credit: WRI India.

PANEL DISCUSSION	
Speakers	▪ **Christian Kapfensteiner,** Director, Sustainable Urban Development, GIZ India ▪ **Nalin Kumar Srivastava,** Deputy Director General, National Mission for Clean Ganga (NMCG) ▪ **Rajiv Ranjan Mishra,** Former Director General, NMCG and Chief Advisor, National Institute of Urban Affairs (NIUA) ▪ **Ravi Singh,** Secretary General and Chief Executive Officer, WWF India
Moderator	▪ **Aarathi Kumar,** Senior Program Manager, WRI India

Speakers highlighted a shared imperative: the need to simplify, contextualise, and integrate NbS into mainstream government planning and implementation cycles. A recurring theme that came up during the Summit, was the need to frame climate and ecological challenges in ways that encourage participation so that communities, institutions, and private actors feel compelled to act rather than observe. Panellists shared structural gaps, including the absence of NbS standards, inadequate data layers, and the lack of procurement pipelines, including within municipal schedules of rates (SORs), that are already established for grey infrastructure.

The plenary concluded with a set of clear short and long-term actions. In the short term, participants called for targeted interventions using existing GIS and wetland data, greater private sector participation, and simplified communication of the NbS concepts to encourage broader adoption. The consensus was that NbS must be integrated into government project cycles with the same ease as conventional infrastructure, and lessons from such successful community-led initiatives in rural India, must be incorporated into traditional NbS practices, ensuring they can be implemented on large scales. Additionally, the need for better alignment between the ecological and administrative boundaries was highlighted.

Ravi Singh (WWF India) set the tone by emphasising the need to frame NbS in ways that encourage people to participate. He highlighted the need for creating a community of practice, such as the forum, that would bridge the gap between theory and implementation of learnings based on formal research which are informed by on-ground actions.

Christian Kapfensteiner (GIZ India) emphasised climate change adaptations and NbS as effective measures that work with ecosystems to reduce climate risks. He shared examples of projects such as the Climate Smart Cities and the Support to Ganga Rejuvenation-III, which works with integrationof NbS into urban planning, and the Integrated River Basin Planning and Management (RBM) , as tools that can be leveraged to mainstream NbS. He stressed upon the urgent need to develop pathways to finance including private finance (that support and upscale) such efforts in the sector, which was seconded by Nalin Kumar Srivastava.

Nalin Kumar Srivastava (NMCG) shared examples of programs, including the Namami Gange 3.0 where transition from sewage treatment plant (STP)-centric approaches to fully integrated river rejuvenation efforts has been seen – this has been helpful in identifying where NbS is a better solutions than grey infrastructure (for e.g. cleaning of small < 3m drains). Efforts for ecosystem monitoring initiatives such as the Uttar Pradesh drone survey GIS layer, that provides a 'health card' for all wetlands in the Ganga basin, were shared as ways to prioritize rejuvenation targets.

Rajiv Ranjan Mishra (NIUA) brought forth the need to prioritise the conservation and protection of existing natural assets as a first step. He highlighted the need for guidance to break down NbS on the basis of typology, scale and context relevance as a step to simplify NbS for a range of actors.

URBAN FLOOD RISK MITIGATION
Potential and Limits for NbS Interventions at City Scale

Speakers at this session highlighted the critical need to integrate NbS into existing city planning processes, through drainage plans and Urban River Management Plans (URMPs). They also highlighted the need to reimagine urban water management holistically — integrating supply, wastewater, and storm water.



Photo credit: WRI India.

ROUNDTABLE	
Speakers	▪ **Depinder Kapur,** Head-C-Cube, NIUA ▪ **Dr Umamaheshwaran Rajasekar,** Director – Urban Practice, Coalition for Disaster Resilient Infrastructure (CDRI) ▪ **Dr Ritu Rao,** Director, Natural Heritage Division, Indian National Trust for Art and Cultural Heritage (INTACH) ▪ **Jyoti Verma,** Senior Research Specialist, NIUA ▪ **Subhasish Borah,** Assistant Director, Directorate of Town & Country Planning, Government of Assam ▪ **Yogita Lokhande,** Programme Component Manager, Sustainable Urban Development – Smart Cities II (SUDSC II) and EU Project Support to Sustainable Urbanisation in India, GIZ India.
Moderator	▪ **Anshul Abassi,** Lead (Policy and Planning), Climate Centre for Cities (C-Cube), NIUA

Based on learnings and success stories from other Indian cities like Chennai, the Town and Country Planning Department (T&CP) and Guwahati Metropolitan Development Authority (GMDA) of the Government of Assam have initiated projects based on the principles of NbS. They are designing and implementing sponge parks to address urban flooding and improve groundwater recharge.

Urban flooding has become the norm across Indian cities, affecting metropolitan areas as well as small and medium sized towns. Various cities face similar vulnerabilities, such as drainage failures and impervious surfaces.

In such a scenario, it is important that the NbS being proposed are contextualised based on the regional and local challenges across varying scales and urban morphology. Currently, NbS interventions hold merit for strengthening resilience, yet they lack clarity in tailoring the solutions to respond to the diverse urban flood dynamics in a certain geography.

This session highlighted the development of relevant frameworks and plans to help cities integrate and adopt NbS solutions. The NIUA-led Delhi Urban Flood Risk Mitigation Programme (UFRMP) for NDMA, alongside the Urban River Management Plan (URMP), exemplify approaches to solve the challenge of urban flooding using hybrid NbS (Shinde et al., 2020). The action strategies under these initiatives are developed collaboratively with experts, local authorities and multi-level governance stakeholders to identify practical, ground-tested NbS opportunities. GIZ has also been working with multiple cities such as Coimbatore, Manikonda, and Guwahati, to support the integration of NbS through a dedicated framework and actionable roadmaps. For example, GIZ's sponge park framework has helped Chennai adopt a sponge-city approach for storm water management.

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This session was designed to focus on identifying the primary distress factors behind urban flooding events, the first principles that can guide zone specific approaches across India's diverse climate and physiographic regions, low-cost NbS measures to address pluvial flooding effectively, and the governance mechanisms that can strengthen implementation and management of urban flood mitigation.

CASE STUDIES

(i) The Directorate of Town & Country Planning, Government of Assam, demonstrated Guwahati's approach to flood mitigation, highlighting a collaborative model involving multiple relevant agencies working together on drainage restoration and management. They adopted varied digital innovations and sponge-city interventions as long-term strategies for planning and managing flood risks (Das, 2025). The June 2025 flood event in Guwahati was identified as a key trigger behind these actions.

(ii) The National Institute of Urban Affairs (NIUA) presented the Delhi Urban Flood Risk Management Programme, showcasing how hybrid NbS approaches can be adopted to solve flood risks in Delhi. The initiatives proposed in the programme were drawn from fieldwork, prioritizing interventions such as restoring water bodies, decentralized rainwater harvesting, riparian zoning, and revitalizing natural hydrology that align with the city's geology and sprawl.

EMERGING CHALLENGES AND SOLUTIONS

- **Planning:** Urban flooding in Indian cities is a result of poor planning and inadequate governance, with climate change further exacerbating such risks. Existing master plans are made based on landuse patterns and do not incorporate network-informed drainage approaches. As a result, the sub-basin impact on floodplains, wetlands, natural drains, ground water levels, etc., are not considered in these plans.

  It is imperative to update the drainage master plans through risk-informed watershed approaches and prioritizing the vulnerable wards through hydrological. In addition, forming multi-agency climate cells for ongoing coordination and maintenance across flood-drought cycles needs consideration.

- **Evidence building:** Most NbS-based research focuses on local climate regulation, while the research on water regulation remains negligible. Dr. Ritu Rao mentioned that despite its higher levels of vulnerability, the research in the Global South remains limited.

  Robust research efforts are needed to record the potential of NbS solutions to mitigate floods, improve water quality and enable water security. Sponge interventions such as street redesigning for raingardens and expansion of permeable surfaces need to be developed through iterative processes to better understand site-specific suitability of solutions.

- **River and water management:** Indian cities historically had naturally interconnected networks of lakes, wells, ponds and streams which served as an NbS system. However, over the years, the loss of lakes and wetlands, encroachment of natural drains, and the expansion of impervious surfaces, have become the key drivers of systemic flooding in Indian cities.

  Rivers need to be studied as interconnected systems in which drains, storm water, wetlands, water bodies, and groundwater are all components of a single network. Additionally, 'discharge' is often ignored in the increasing discourse around 'recharge'. It is important to enable 'discharge' through the restoration of natural drains, floodplains etc., in the areas that have high ground water levels.

- **Disaster management and capacity:** Most cities in India respond to disasters such as floods with response, recovery and reconstruction activities. Flood risk management requires expertise that integrates both engineering and NbS – a capability that remains limited. In addition, the weak inter-departmental coordination also acts as a barrier to effective management.

  There is an urgent need to prioritize pre-disaster management approaches such as preservation, preparation and mitigation. Measures such as clearing silt, removing encroachments and debris for restoring drains and the installation of flood markers for year-round risk visibility are important.

BASIN TO CITY
Reconnecting Rivers, Nature and Urban Water Systems

The session brought together basin managers, urban water practitioners, ecologists, and climate change experts to examine how NbS can support river rejuvenation while addressing urban water resources security and management.



Photo credit: WRI India.

PANEL DISCUSSION	
Speakers	▪ **Rajiv Ranjan Mishra,** Former Director General, NMCG and Chief Advisor, NIUA ▪ **Neelima Soni,** Director (Landscape), Delhi Development Authority (DDA), Government of NCT of Delhi ▪ **Manu Bhatnagar,** Principal Director, INTACH ▪ **D. Ramegowda,** Assistant Executive Engineer, City Municipal Council, Doddabelalpura ▪ **G. Rajthilak,** Project Manager, Kovai Kulangal Padhukappu Amaippu (NGO), Coimbatore. ▪ **B. Raagul,** Assistant Engineer, TN Water Resources Department, Tirupur ▪ **Dr. R.K. Srivastava,** District Ganga Committee USN ▪ **Dr. Mahreen Matto,** Team Lead, SCBP, NIUA ▪ **Kunal Bharat,** Project Manager, GIZ India ▪ **Dr. Sejal Worah,** Program Director, WWF India
Moderator	▪ **Chhavi Sharda,** Water Resources Advisor (Technical Expert), Support to Namami Gange, GIZ

The discussion explored the need to shift the narrative from concrete or "grey" infrastructure towards NbS (grey-blue-green), that treat rivers as living systems, and help recognize the inextricable link between healthy cities and river basins. Many rivers are polluted by inadequately treated waste, hampering the ecological resilience they could have provided as a healthy, connected system.

Repositioning cities as active actors within a larger hydrological story can help balance urban water security with the ancient rhythm of the floodplains. On the ground, this vision is beginning to take shape through the patient restoration of the Yamuna floodplains in Delhi, where ten million trees and a scientific seven-step methodology are turning riverbanks back into natural sponges, and through the integrated management of wetlands in the Kashmir Valley. We are also seeing interventions ranging from the return of bird biodiversity along the Noyyal River, to the installation of floating solar and the screening systems in Doddaballapura's wetlands, which are shifting the focus towards biological remediation.

These efforts highlight that nature-based approaches, such as dendroremediation and decentralised wastewater treatment (DEWATS), are not only ecological imperatives, but also cost-effective tools that can generate livelihood opportunities for local communities. Ultimately, the survival of these water bodies depends on moving beyond isolated pilot projects, and towards a unified, basin-wide strategy that bridges the gap between policy and people-first action.

The government provides the framework and guidance for river basin planning and management, the actual work happens locally. District committees identify the most pressing issues, while local communities and leaders - the local "Mitra", including religious figures, influence solutions to keep the river clean and healthy.

CASE STUDIES

(i) The DDA presented the Yamuna Floodplain Restoration initiative, highlighting institutional interventions, such as the establishment of an expert panel to guide scientific planning approaches and the development of a composite plan to integrate NbS, land-use planning and public engagement for the restoration of the Yamuna floodplain. The reported impact included the restoration of approximately 35 hectares of land, the planting of nearly 10 million trees, and a measurable increase in bird species and biodiversity (Dewan et al., 2020).

(ii) The Municipal Corporation of Doddaballapura (Bengaluru sub-basin) shared wetland restoration initiatives undertaken in partnership with WWF India to support the restoration and management of 41 wetlands. Associated interventions for waste and wastewater management were addressed by installing screening systems and aquatic plants to improve water purification. Floating solar power systems contributed to energy generation, while also improving water quality and biochemical oxygen demand (BOD) levels (WWF India, n.d.).

EMERGING CHALLENGES AND SOLUTIONS

- **Planning and governance:** Lack of planning at hydrological scales (such as rivers, wetlands, lakes and small ponds) within municipal frameworks, including limited channels for coordination between hydrology, fisheries, forest and other departments, emerged as major factors contributing to the loss of riverine ecology. Additionally, the speakers highlighted the lack of coordinated institutional frameworks for large-scale river and floodplain restoration efforts and the limited local level capacities for operations and maintenance (O&M) of decentralized systems which present a persistent challenge.

  Some speakers suggested that incorporating representatives of local level organisations (District Ganga Committees or DGCs) within district level institutions could be a possible solution to give district authorities the reach to integrate local practices within larger scale basin management programmes. The Ganga Authorities Order, 2016, provides flexibility to the Chair of the DGC (DM) to induct local-level institutions. This will also provide inputs for designing NbS for local areas that respond to the topography, hydrology, ecology, and its impact on a large scale.

  As an example of multi-sectoral coordination, the Consortium for DEWATS dissemination (CDD) shared approaches to integrate sanitation systems with waterbody rejuvenation initiatives, such as the development of decentralized wastewater treatment and faecal sludge treatment solutions suited to different scales of settlements.

  The speakers highlighted the importance of adopting a step-wise approach across the project lifecycle – from creating inventories of existing natural resources such as wetlands (through the Wetland India Portal), to the development of integrated management plans for priority wetlands. To ensure effective implementation, they discussed enhancing stakeholder capacities through knowledge support such as e-learning modules.

- **Community and behavioural barriers:** A disconnect between local needs and river restoration strategies, particularly in urban areas can lead to weak community ownership and participation- impacting long-term sustainability and the longevity of solutions. Large government programmes often do not effectively reach the grassroots level, resulting in a gap between policy and community awareness.

  The speakers emphasised the importance of amplifying community led practices for the implementation and maintenance of water conservation, and the prevention of solid waste dumping. This was followed by a discussion on ways to integrate lessons into formal governance and procurement frameworks and creating channels for communicating local knowledge with relevant stakeholders

NbS FOR COASTAL RESILIENCE
Urban Communities as Active Guardians

The session highlighted the critical ecosystem services provided by existing coastal ecosystems. The discussion also explored the significance and institutionalization of citizen science and citizen led monitoring through varied examples of practice and governance models in coastal geographies.



Photo credit: WRI India.

PANEL DISCUSSION	
Speakers	▪ **Dr. Dipnarayan Ganguly,** Scientist C, Futuristic Research Division (FTR), National Centre for Sustainable Coastal Management (NCSCM) ▪ **Dr. Nehru Prabhakaran,** Scientist, Wildlife Institute of India ▪ **Dr. Ninad Raut,** Associate Chief Manager - Wetland Management (Mangroves), Soonabai Pirojsha Godrej Foundation (SPGF) ▪ **Haripriya E.,** Sr. Programme Associate, Dakshin Foundation ▪ **Ritesh Kumar,** Director, Wetlands International-South Asia (WISA)
Moderators	▪ **Dr. Priya Narayanan,** Senior Program Manager, WRI India ▪ **Suresh Babu,** Director – Rivers Basins & Water Policy, WWF India

Coastal resilience extends beyond finite engineering projects; it is a continuous movement and a network of ecosystems and actors, where community stewardship is a primary driver of success. Reclaiming the historic harmony between people and landscapes that is now threatened by rapid urbanization and climate instability. Addressing this requires actors in the NbS ecosystem to recognize residents as active guardians rather than passive beneficiaries. The discussion emphasised the importance of identifying the triggers that inspire local "champions" and fosters in them a transformative understanding of how ecosystems underpin lives and livelihoods. This discussion on coastal resilience was curated on how to move the needle from simple awareness to a culture of collective, community-led action.

Examples from Dakshin Foundation shed light on ways to democratize knowledge, including thinking of communities as partners and key knowledge holders to build coastal resilience. The discussion identified important action points to enable embedding of such models into formal governance. Combining community narratives and lived experiences across seascapes with other forms of data, and valuation frameworks to assess ecosystem benefits such as InVEST by the Natural Capital Alliance being piloted in urban cities (Stanford - Natural Capital Alliance, n.d.), are steps towards co-creation and building collaborative stewardship models.

The discussion brought forth the critical role of NbS in bridging the gap between grassroots action and formal governance. Moving beyond the high costs and ecological limitations of "grey" infrastructure, examples from research and practice demonstrated how mangroves, wetlands, and coastal ecosystems offer adaptable and regenerative forms of protection. These can be integrated with engineering solutions to offset challenges of coastal flooding and storm surges. Drawing on proof-of-concepts from the local initiatives (Sundarbans, Odisha, Mumbai, and Chennai), the session addressed science (singular geographical focus for research), technology (grey engineering approaches and non-contextual solutions), and institutional barriers (lack of coordination between sectors and scales) involved in embedding NbS into mainstream policy.

The ultimate objective is to provide a roadmap for endorsing nature-led solutions that are not only scientifically robust, but also deeply integrated into the local governance and socio-economic fabric of urban coasts.

CASE STUDIES

Artisanal fishing boats docked along the Palk Bay coastline, a region shaped by generations of small-scale fishing communities.



Photo credit: E. Haripriya/Dakshin Foundation.

Ocean Stewards working with local fishers to document traditional ecological knowledge through participatory approaches in the Palk Bay region, Tamil Nadu.



Photo credit: Sangeetha U./Dakshin Foundation.

(i) The Dakshin Foundation presented the Tamil Nadu Coastal Stewardship model that focussed on the Palk Bay region of Tamil Nadu, centred in districts like Ramanathapuram(Prakash, n.d.). The project demonstrated community-led marine conservation efforts through programmes such as the coastal grassroots fellowship (CGF) for coastal governance working closely with women and youth representatives.

(ii) Coastal Ecosystem Citizen Science (BNHS / The Asian Waterbird Census) shared approaches for citizen participation by popularizing tools that were used for initiative in Kashmir to show bird transitions, assess wetland health and advocate for protected area status.

(iii) WWF India presented the application of the Wetland Health Card in Tamil Nadu, which identifies indicators and threshold values (water quality, biodiversity, etc.) Combining these with historic data to map trends enables communities and local governments to effectively monitor and track conservation progress.

EMERGING CHALLENGES AND SOLUTIONS

- **Governance:** National programmes are not effectively integrating local knowledge and the specific needs of coastal communities. The speakers emphasised the need to recognise that coastal communities face different problems than inland communities. This is further compounded by both seaside and terrestrial challenges. While NbS can help address such issues, they are often more time consuming, and therefore not of interest to stakeholders, despite yielding better longer-term results.

  Practitioners working with coastal communities, such as the Dakshin Foundation, discussed ways to embed community participation and stewardship models within formal municipal frameworks to develop pathways for collaborative management of resources, thereby strengthening coastal governance and management. Another suggestion was to draw inspiration from the lived experiences and build on the already existing governance systems, through local-level institutions like the village management committees.

  Tools for cost-benefit analysis such as InVEST (for which the Pichavaram mangroves provide a case study) were discussed as approaches for assessing the economic viability of hybrid NbS (Debroy et al., 2014) solutions in the long-term that can help offset the climate impacts of grey infrastructure.

- **Planning:** The lack of integrated spatial planning for coastal ecosystems emerged as a challenge. Over-indexing on one ecosystem, through research or implementation, as opposed to planning through an interconnected approach for coastal resilience at large was highlighted.

  Ninad Raut (SPGF) brought forth the importance of adopting a holistic approach to assess socio-economic conditions, livelihood dependencies on mangrove ecosystems, environmental assessments, and the gaps between policy and on-ground action with the aim to develop inclusive outcomes for people and nature. Speakers also emphasized the need for planning at both the macro-level (through engagements with the Maharashtra Coastal Zone Management Authority, etc.) and micro-level (interdepartmental coordination at the ward and city scale) to resolve conflicts.

- **Community knowledge and evidence generation:** The narrative of coastal communities must shift, from disaster victims to guardians and stewards of their ecosystem. The speakers emphasised the importance of recognizing and community knowledge of climate and biodiversity in formal planning systems.

  Approaches to popularize NbS concepts through citizen-led programs, where community champions can be upskilled were suggested, to develop a shared language around coastal resilience efforts. Another suggestion was to work with fisherfolk and coastal communities to build transferable skills in ecological monitoring and participatory mapping. This can help communities assert agency and manage resources better, while supporting livelihoods and nature.

  Dakshin Foundation highlighted the importance of democratising knowledge and working with communities as partners and key knowledge holders. Speakers discussed the use of media such as photography and film as tools for storytelling and disseminating local knowledge collaboratively with communities. Additionally, the importance of ground-truthing was emphasised to combine data with lived experiences across seascapes, and prioritising both satellite imagery, and local documentation and archives.

SCALING HEAT RESILIENCE THROUGH NbS

The session covered barriers to adopting urban NbS at scale as well as passive building design interventions in dense cities for heat mitigation. The importance of vulnerability mapping and heat risk hotspot mapping as part of Heat Action Plan development was discussed along with financing solutions and sources. The need for more local contextualized knowledge and evidence on the linkage between greening typologies and micro-climate impact efficiency was also emphasized.



Photo credit: WRI India.

ROUNDTABLE	
Speakers	▪ **Akhil Singhal,** Senior Associate, Rainmatter India (RMI) Foundation ▪ **Deepti Talpade,** Program Lead, Urban Development and Resilience, WRI India ▪ **Dr Umamaheshwaran Rajasekar,** Director – Urban Practice, CDRI ▪ **Nidhi Batra,** Lead – Biodiversity Conservation & Blue Economy, Agence Française de Développement (AFD) ▪ **Ritika Kapoor,** Climate Change and Health Specialist, Natural Resources Defence Council ▪ **Shilesh Hariharan,** Principal Architect, City of 1,000 tanks ▪ **Sourav Kumar Biswas,** Director, Sponge Collaborative
Moderators	▪ **Dr. Vishwas Chitale,** Fellow and Lead-Climate Resilience, CEEW ▪ **Lubaina Rangwala,** Program Director - Urban Development & Resilience, WRI India

India's heat crisis is both intensifying and spreading unevenly. With 57% of the country's districts, home to 76% of the population (Mohanty & Wadhawan, 2021), already vulnerable to extreme heat, the scale is significant. The burden falls disproportionately on smaller urban centers, which are warming rapidly with the weakest institutional capacity to respond. The more insidious shift is nocturnal. As warmer nights outpace hot days, physiological heat stress accumulates without relief, compounding the risk for populations with the fewest options to adapt.

The session explored the need to shift the framing of cooling solutions away from air-conditioning and grey infrastructure, and towards NbS that treat cities as thermal systems. These systems should be created to link green cover, urban form and the lived experience of heat. With traditional urban design practices prioritising concretisation over canopy, density over shade, and plot-level compliance over neighbourhood scale approaches, the city loses the ecological buffering that only interconnected blue-green spaces can provide.

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Cities are beginning to undertake action towards this on-ground. The Jodhpur Heat Action Plan, released in 2023, attempts to understand the positioning of heat hotspots, while the Churu Heat Action Plan identifies where greening can be introduced, recommends native species, and indicates where funds can be leveraged from.

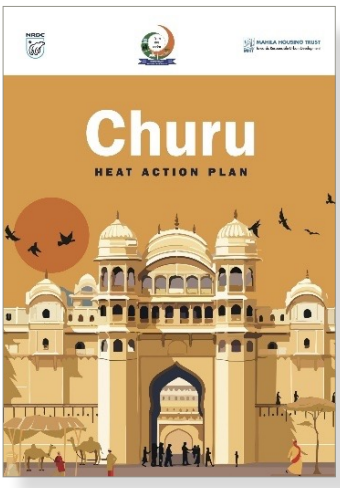
These efforts highlight that nature-based approaches, such as cooling corridors of trees and vegetation along rivers, green roofs and cool roofs in informal settlements, and dedicated green corridors as in Gandhinagar and Chandigarh, are not isolated interventions, but components of an interconnected system. Ultimately, the longevity of these interventions depends on moving beyond isolated pilot projects towards a holistic approach where green infrastructure is integrated with blue infrastructure and aligned across regulation, local planning, and investment mechanisms.

While Heat Action Plans may provide the framework and early warning systems, true heat resilience belongs to the neighbourhood and to the park kept open during the peak afternoon for the informal worker who is out when shade is limited. The discussion called for a new form of urban governance, one that connects climate data with community reality, and design ambition with equitable access. Only by ensuring that open space is equitably available, and that nature-based cooling reaches those most exposed, can cities remain liveable as the heat deepens.

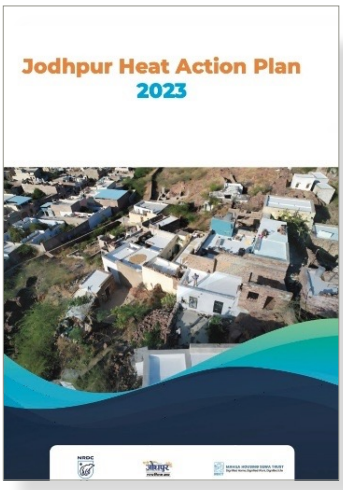
CASE STUDIES

(i) The integration of heat mitigation measures into Heat Action Plans (including financing options) as demonstrated by NRDC in Jodhpur and Churu, highlight the shift from emergency response, centred around advisories and early warning systems, towards urban resilience. In 2023, the Jodhpur Heat Action Plan released maps of heat hotspots (Jodhpur Nagar Nigam et al., 2023). The Churu Heat Action Plan identifies opportunities where greening can come in, recommends native species, and identifies where funds can be leveraged from (Municipal Council Churu et al., 2025).

(ii) Incorporating heat resilient infrastructure into built environment (Lodha – RMI collaboration) spanning three levers of urban design, building design and orientation, where building orientation plays a critical role in thermal performance. Passive interventions being integrated include permeable pavements, cool corridors, cool surfaces and tree plantations, with micro-climate assessment models under development to quantify the temperature reduction potential from various interventions. The discussion also highlighted that NbS often require approximately three years of advance planning, underscoring the need for early-stage integration into project timelines *(Shrivastava et al., 2025).*



Churu Heat Action Plans



Jodhpur Heat Action Plans

EMERGING CHALLENGES AND SOLUTIONS

- **Governance:** City authorities are responsible for managing and maintaining city-wide green cover. Designating open areas does not automatically reduce temperature unless the land is genuinely vegetated; barren or hardscaped open spaces do not deliver cooling. In the absence of clear regulatory mandates (e.g., bylaws, shade/green cover requirements) and weak coordination among policy, planning, and on-ground execution, the maintenance of existing green cover remains inconsistent, and its cooling function is not realised.

  As a solution, a change is needed in how land is viewed by a city. Umamaheshwaran Rajasekar highlighted that 'land value capture' can give quantifiable insights into how a percent increase in temperature leads to energy consumption, disruption of services and reduced water availability. Such an approach can help assign precise values to NbS measures, and inform how budgetary resources are allocated to maintain and manage green and blue-green infrastructure.

- **Financing:** NbS are perceived as 'soft' elements, while large-scale infrastructure is treated as a 'hard' investment. This shapes how capital flows to each, for instance, standalone NbS projects are too small to attract development finance institutions, so project bundling and a clear pipeline are needed to bring institutional capital in. Financing also tends to be short-lived, as the core donor typically exits after a few years, leaving a gap that long-term funding mechanisms must fill.

  It is important to mainstream NbS into large infrastructure projects, which also increases the funding opportunity. The speakers emphasised the need to think of an exit plan at the inception of the project itself, since the life cycle of NbS projects requires long-term funding. Exploring opportunities, like CSR, bringing project developers and financiers at the same table from the get-go, helps prevent financial hurdles.

- **Planning:** Planning frameworks such as Development Plans often mandate a percentage of green space, but they do not specify the type, quality, or function of green cover. This leaves developers with discretion, often resulting in token green spaces that do not meaningfully contribute to cooling or ecological benefits. Urban heat mitigation often is an afterthought, thus is not integrated with urban design, infrastructure planning and landuse systems.

  As cities densify, there is a need for building by-laws that enable the built environment to create a shadow effect. In addition, there needs to be a conscious effort in planning to create dedicated green corridors, such as those developed in Gandhinagar and Chandigarh. The focus should not only be on creating open spaces, but on designing natural spaces integrated with buildings and surrounding areas, with pocket parks and community-led greening replicated across neighbourhoods through community participation.

- **Social and equity barriers:** Unequal access to green and shaded spaces in the city (for e.g., urban parks kept closed in afternoons during peak summer) are a significant challenge. Cooling solutions are often unaffordable and are not designed considering the needs of informal workers and vulnerable populations.

  In response, many cities have increased the hours of operation for parks to keep them open during the peak afternoons for informal workers. The speakers highlighted the importance of ensuring that the trees planted in the parks have high foliage to provide shade, and funding should go towards achieving this. Strategies such as gardening in the backyards of informal settlements, green roofs, cooling corridors along rivers, and cool roof tiling were identified as accessible options.

CLOSING PLENARY
From Pilots to Policy: Taking Proven Solutions to Scale

The closing plenary brought together moderators and speakers from across heat, coastal resilience, rivers, and urban flooding sessions that took place throughout the day. A central message that emerged across all panels was that NbS must be understood as complementary to – and not competing – with grey infrastructure, and that, hybrid approaches offer the most pragmatic near-term pathway to scale and acceptance.



Photo credit: WRI India.

PANEL DISCUSSION	
Keynote address	▪ **Sir David King,** Chair, Climate Crisis Advisory Group, CCAG, and **Zack King**, Director, CCAG
Speakers	▪ **Depinder Kapur,** Head-C-Cube, NIUA ▪ **Dr. Dipnarayan Ganguly,** Scientist C, Futuristic Research Division (FTR), NCSCM ▪ **Dr. Vishwas Chitale**, Fellow and Lead-Climate Resilience, CEEW ▪ **Suresh Babu,** Director – Rivers Basins & Water Policy, WWF India
Moderators	▪ **Lubaina Rangwala**, Program Director - Urban Development & Resilience, WRI India ▪ **Aarathi Kumar,** Senior Program Manager, WRI India

In the heat discussions, speakers challenged participants to move beyond Heat Action Plans as purely reactive tools, and toward long-term mitigation frameworks. On coastal resilience, the discussion highlighted that communities need to be recast from disaster victims into active stewards of coastal ecosystems. On rivers, a diverse group representing nine different river basins underscored that NbS cannot be applied in isolation. They highlighted that basin-scale thinking, nested planning structures, and robust documentation of evidence are all essential.

Sir David King emphasised that the world is already past 1.5° C warming and urged for a shift towards an "ecological civilisation" that places human and ecosystem well-being at the centre, rather than the prevailing logic that assigns negligible value to nature.

Across themes, the Summit converged on three long-term imperatives: integrating NbS seamlessly into government procurement and planning processes, building practitioner capacity through partnerships with engineering and planning institutions, and investing in better evidence which can clearly communicate and demystify NbS for the wide range of audiences to move from promise to practice.

KEY TAKEAWAYS

The Summit provided a platform for deep engagement on how we can better leverage NbS as tools for building climate resilience across Indian cities. Here's a quick overview of some key insights from our speakers across sessions.

1. Shift from standalone NbS to hybrid, integrated systems

A central message emerging across sessions was the need to move beyond treating NbS as isolated interventions. Instead, it was emphasised that they should be integrated with conventional infrastructure and embedded within broader urban systems.

- Urban challenges should be addressed through integrated system thinking, for example shifting from a sewage treatment plant approach to holistic river basin management that considers sewage treatment, biodiversity, and river health together.
- NbS should be mainstreamed into government planning and infrastructure processes, making it as routine to develop an NbS project as it is to develop a grey infrastructure project.

2 . Demystifying NbS by simplifying, mainstreaming into government processes and capacity building is essential to address biases

- NbS must be simplified in communication, design, and implementation frameworks to increase uptake among policymakers and practitioners. Clear taxonomies and sector-specific guidance can help cities understand which NbS solutions are most appropriate for different contexts.
- Municipal engineers and planners need capacity building, training, and standard operating procedures (SOPs) to implement and monitor NbS effectively.

3. Risk-informed and systems-based climate resilience planning and action is necessary for addressing compounding climate and development risks

- Urban planning should shift to watershed and risk-informed approaches, particularly for flood management and drainage planning. Updating drainage master plans using hydrological assessments and seasonal baselines can help identify vulnerable areas and prioritize interventions for this.
- Cities should move from plot-level interventions to neighbourhood-scale interconnected design, where green, blue, and built systems interact to create cooling effects.

4. Scale, pipeline development, and institutional readiness are critical for attracting investment

- Development finance institutions (DFIs) and multilateral development banks (MDBs) prefer large-scale investment opportunities, making project bundling and pipelines essential.
- Government agencies must demonstrate institutional capacity, financial management, and monitoring systems to attract funding.
- Early collaboration between project developers and financiers can help ensure projects are structured in ways that are financeable.

5. Evidence and communication are a must for wider acceptance and adoption of NbS

- Governments should improve transparency and public communication to support behavioural change as an adaptation response to extreme weather.
- NbS research and practice should better integrate social and ecological perspectives, particularly from Global South contexts. Evidence on social, ecological, and economic benefits of NbS must be documented and communicated in simple, accessible language.
- National goals and targets such as the Viksit Bharat must link its focus areas to human wellbeing and ecological health, and NbS adoption can be one of the key approaches to achieve this.
- Regional level discussions at state and city level centred around local context and challenges is key for having nuanced understanding of local barriers, support required and developing localised tailored pathways.



Photo credit: WRI India.

APPENDIX A: Exhibition

The Summit also had 13 posters, prominently displayed for speakers and attendees to view between the sessions and during the breaks. The posters display various tools supporting adoption and management of NbS, and practices and interventions across cities in India. A summary of each poster has been shared in the below table.

Click **here** to view all the posters.

S.NO.	POSTER TITLE	BRIEF DESCRIPTION	CREATED BY
1	Framework for Lake Rejuvenation	The three-part poster introduces the framework, a systems-based decision support tool provides a step-by-step process that makes lake rejuvenation systemic, trans-parent and evidence-based.	WELL Labs
2	Mapathon: A Tool for Greener Cities	The poster explains the purpose, need and applicability and impacts observed as a result of conducting Mapathons. These are community led initiatives to identify structured repository of potential sites ideal for greening in a city, using scientific methods and technology.	WRI India
3	District Ganga Plan Handbook: Empowering Local Governance for Global River Standards	The poster introduces the DGP Handbook, a technical guiding tool for Ganga river basin planning and management at the district level. The tool is adopted by the District ganga Committees to prepare respective District Ganga Plans.	GIZ
4	River Basin Management Toolbox	The poster explains the context, benefits and policy alignment with the toolbox. It is a comprehensive technical guidance framework, providing scientific methodology to achieve good status for river basins by improving water quality, quantity and ecosystem health.	GIZ
5	Decode NbS: A Decision Nudging Tool	The poster covers the core aspects of the web-based decision nudging tool, which supports cities to select relevant NbS solutions for climate resilience.	C-Cube, NIUA and WWF India
6	Sustainable Fishing Practice	Sustainable Mangrove Fisheries approach is introduced. These are WWF India's efforts towards addressing aquaculture degradation caused by mangrove loss, reduced biodiversity and declining productivity	WWF India
7	Living Shoreline	WWF India's project in the Sunderbans to mitigate impact from sea level rise is shared. Terra cotta rings are being used to build elevation naturally and address erosion.	WWF India
8	Mangrove Coalition	The poster introduces the coalition, launched in 2025, dedicated to safeguarding urban mangrove ecosystems in India. Its initial focus is on Mumbai and Chennai—coastal megacities with long coastlines and mangrove ecosystems.	WWF India
9	Nature-based Solutions: Arkavathy River Basin and Bashetihalli Wetland Multi-Stakeholder Success Story: Bashettihalli	WWF India's restoration efforts in the Arkavathy River Basin and Bashetihalli Wetland through stakeholder engagement and adoption of NbS solutions is explained.	WWF India
10	Evidence Based Decision Support Tool for Implementing IWWM in schools	Poster introduces the AquaWISE, a decision support tool for implementing Integrated Waste Water Management in Schools	Ashoka Trust for Research in Ecology and the Environment (ATREE)
11	LakeRevive: A Decision-Support Tool for Implementing Nature-based Solutions (NbS) in Urban Lake Restoration	Poster explains about LakeRevive, an innovative decision-support tool designed to help contractors, site engineers, environmental professionals & citizen volunteers select appropriate NbS for urban lake restoration initiatives.	ATREE
12	Reviving The Blue with Green: Native Flora for Lake Health And Resilience	The poster explains the important role of using native vegetation to restore habitat loss and improve ecosystem health of the lakes.	ATREE
13	Approach for Restoration of Urban Lakes: A Case Study from Rapidly Urbanizing Catchments in the Global South	The poster shares a framework for lake restoration that incorporates feasibility of adopting NbS solutions and emphasizes long term sustenance of a restored lake.	ATREE

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Abbreviations

AFD	Agence Française de Développement
ATREE	Ashoka Trust for Research in Ecology and the Environment
BNHS	Bombay Natural History Society
BOD	Biochemical Oxygen Demand
CCAG	Climate Crisis Advisory Group
CDD	Consortium for DEWATS Dissemination
CDRI	Coalition for Disaster Resilient Infrastructure
CEEW	Council on Energy, Environment and Water
CGF	Coastal Grassroots Fellowship
CGWB	Central Ground Water Board
C-CUBE	Climate Centre for Cities, NIUA
CSR	Corporate Social Responsibility
CWC	Central Water Commission
DDA	Delhi Development Authority
DEWATS	Decentralized Wastewater Treatment Systems
DFI	Development Finance Institution
DGP	District Ganga Plan
EU	European Union
FTR	Futuristic Research Division, National Centre for Sustainable Coastal Management
GCF	Green Climate Fund
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HAP	Heat Action Plan
ICC	India Climate Collaborative
INTACH	Indian National Trust for Art and Cultural Heritage
INVEST	Integrated Valuation of Ecosystem Services and Trade-offs
IWWM	Integrated Wastewater Management
MDB	Multilateral Development Bank
MOEFCC	Ministry of Environment, Forest and Climate Change
NAP	National Adaptation Plan
NbS	Nature-based Solutions
NCSCM	National Centre for Sustainable Coastal Management
NCT	National Capital Territory
NDMA	National Disaster Management Authority
NDMF	National Disaster Mitigation Fund
NIUA	National Institute of Urban Affairs
NMCG	National Mission for Clean Ganga
NRDC	Natural Resources Defence Council

Abbreviations

RBM	River Basin Management
RMI	Rocky Mountain Institute
SDMF	State Disaster Mitigation Fund
SOP	Standard Operating Procedure
SPGF	Soonabai Pirojsha Godrej Foundation
STP	Sewage Treatment Plant
SUDSC II	Sustainable Urban Development, Smart Cities II
TNC	The Nature Conservancy
UDMA	Urban Disaster Management Authority
UFRMP	Urban Flood Risk Mitigation Programme
UN	United Nations
UNDP	United Nations Development Programme
URMP	Urban River Management Plan
WISA	Wetlands International South Asia
WRI INDIA	World Resources Institute India
WWF INDIA	World Wide Fund for Nature India

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About the India Forum for Nature-based Solutions

The India Forum for Nature-based Solutions (NbS) is a coalition of research, practice and finance organisations working to scale up the adoption of NbS to shape climate resilient cities and communities in India. The forum aims to climate proof 100 million residents and infrastructure worth $100 billion in Indian cities by 2030. The Forum supports peer-to-peer exchange of best practices, technical training, knowledge sharing and research towards strengthening local knowledge and build evidence around the use of nature-based solutions for urban services and resilience situated within the local context of social, economic, political and institutional structures of Indian cities.

Some of these insights were presented during the session 'From Basin to City: Reconnecting Rivers, Nature and Urban Water Systems,' co-hosted by GIZ India and WWF India, under the aegis of the Support to Ganga Rejuvenation Project-III. The Indo German Bilateral Cooperation Project, 'Support to Ganga Rejuvenation (SGR)-III' is implemented by GIZ India in conjunction with the 'India EU Water Initiative,' co-financed by the European Union and the German Federal Ministry for Economic Cooperation and Development (BMZ). Working closely with the Ministry of Jal Shakti (Government of India) and its organisations i.e. National Mission for Clean Ganga (NMCG), Brahmaputra Board (BB), Central Water Commission (CWC), and Central Ground Water Board (CGWB), this initiative embodies a strong commitment to strengthen river basin governance across the country.



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