NATURE-BASED SOLUTIONS TO MULTIPLE CRISES:

Scaling urban implementation in Asia and the Pacific

Supported by:

Federal Ministry for Economic Affairs and Climate Action

IKI INTERNATIONAL CLIMATE INITIATIVE

on the basis of a decision by the German Bundestag

Project partners

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ESCAP Economic and Social Commission for Asia and the Pacific

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Urban-Act Integrated Urban Climate Action for Low-Carbon & Resilient Cities

In the context of Urban-Act

The Integrated Urban Climate Action for Low-Carbon and Resilient Cities (Urban-Act) is a regional project over the period April 2022 to December 2027. This regional project aims to support the transformation towards low-carbon and resilient urban development in Asia-Pacific while also contributing to countries' Nationally Determined Contributions (NDCs) and the advancement of the Sustainable Development Goals (SDGs). Urban-Act is implemented in China, India, Indonesia, the Philippines, and Thailand. Regional project partners include the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the United Cities and Local Governments Asia-Pacific (UCLG ASPAC), the TU Dortmund and the University of Stuttgart, as well as national partners in each of the five partner countries.

Author:

Liam O'Connor
Associate Urban Climate Change Specialist,
Sustainable Urban Development Section,
ESCAP
Email: liam.oconnor@un.org

Design and layout

Tooptong Liamsuwan
PR and Communications Specialist,
GIZ Thailand
Email: tooptong.liamsuwan@giz.de

Yan Shen
Environmental Affairs Intern,
Sustainable Urban Development Section,
ESCAP
Email: yan.shen@un.org

Programme contact

Omar Siddique
Lead, Cities and Climate Change
Email: omar.siddique@un.org

Urban-Act online

https://www.urbansdgplatform.org/climateaction/viewAbout
https://t1p.de/wx0om (IKI website)
https://www.giz.de/en/worldwide/127907.html

Suggested citation

United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), (2025). *Nature-based solutions to multiple crises: Scaling urban implementation in Asia and the Pacific.* ESCAP, 2025. Print.

Published by

United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)

Bangkok, 2025

ACKNOWLEDGEMENTS

This policy brief was published under the Urban-Act policy brief series on integrated urban climate action for low-carbon and climate-resilient cities in Asia and the Pacific. It was developed by the Economic and Social Commission for Asia and the Pacific (ESCAP) with support from the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), United Cities and Local Governments Asia-Pacific (UCLG ASPAC), and TU Dortmund under the direction of Sangmin Nam, Director, Environment and Development Division, ESCAP; Curt Garrigan, Chief, Sustainable Urban Development Section, ESCAP; with contributions from Liam O'Connor, Omar Siddique, and Clinton Moore, Sustainable Urban Development Section, ESCAP; and Wolfgang Scholz, TU Dortmund University. This policy brief was reviewed by Heinrich Gudenus, GIZ; Helmi Abidin, UCLG ASPAC; Alice Siragusa, Rebecca Purba, Kanika Grover, and Nur Hamidah, Sustainable Urban Development Section, ESCAP.

The brief was edited by Alice Siragusa, Sustainable Urban Development Section, ESCAP. The layout and graphic design were produced by Tooptong Liamsuwan, GIZ and formatted by Yan Shen, Sustainable Urban Development Section, ESCAP.

Urban-Act Communications Task Force coordinated the launch and publication outreach.

Executive Summary

Loss of biodiversity, climate adaptation needs, and unsustainable urbanization represent multiple crises felt in Asia and the Pacific. These interconnected challenges threaten natural and built ecosystems and human wellbeing. There is a pressing need for transformative, multi-level actions. This brief examines the potential for nature-based solutions (NbS) to address these crises holistically and provide economic, social, biodiversity, and resilience benefits. To achieve Target 12[1] of the Convention on Biological Diversity (CBD), this brief recommends strengthening NbS integration in urban planning and policy, encouraging NbS Localization, using blended finance mechanisms, and harnessing scientific and local indigenous knowledge to scale NbS implementation in Asia and the Pacific cities and communities.

1 See Convention on Biological Diversity (CBD) (n.d.). Target 12.

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A multi-crisis for cities in Asia and the Pacific

Asia and the Pacific is facing a multi-crisis of biodiversity loss, climate change, pollution, and unsustainable urbanization. Declines in biodiversity pose significant threats to food security, cultural heritage, and countless ecosystem services[2] essential for human well-being. Climate change increases the frequency and intensity of extreme weather events, leading to economic losses, displacement, and health risks. Unsustainable urbanization contributes to land conversion, heightened air and water pollution, socio-economic inequalities, increased energy consumption, and resource depletion. Importantly, these challenges are complex and mutually reinforcing.

For example, deforestation driven by urban expansion reduces carbon sinks, contributing to both climate change and degraded biodiversity which in turn leads to lost ecosystem services and reduced climate resilience[3].

Resulting impacts are unevenly distributed across different sub-regions. Sea-level rise, coral reef degradation, and small island vulnerability pose significant threats to **Pacific Islands**; water scarcity, land degradation, and mountain ecosystem health are major concerns in **Central Asia**; and extreme heat, pollution, and unplanned urbanization are persistent challenges in **South and Southeast Asia**. Across all sub-regions,

2 Ecosystem services in this text refer to both the benefits people derive from ecosystems and their contributions to broader ecological health

3 See Lavorel, S. and others (2020). Co-producing ecosystem services for adapting to climate change.

however, these challenges particularly impact cities and undermine the ecological integrity upon which urban resilience depends.

Although urbanization linked to industrialisation in the region has lifted millions out of poverty, continued unsustainable urbanization incurs significant environmental and social costs. Overcrowded urban areas experience heat stress and greater risk of disasters like floods, especially in coastal cities and small island states, which disproportionately affect vulnerable populations like urban poor, women and girls, and persons with disabilities. Industrial areas and sprawling urban and peri-urban zones worsen air and water quality and cause significant habitat loss and fragmentation[4,5,6]. This tightens strains on ecosystems and wildlife populations in one of the most important regions for global conservation[7,8] and results in the loss of vital provisioning, regulating, and cultural ecosystem services, stalling progress for many development challenges in the region[9].

Urban and rural dynamics have also been affected with growing demand for food resulting in a decline in traditional agriculture in favour of intensive monoculture. This has significantly reduced the regions agricultural biodiversity (agrobiodiversity) leading to greater risks of pest outbreaks, disrupted nutrient cycling and hydrological regulation, and reduced resilience to environmental stresses, threatening global food and water security[9,10,11]. These risks, too, face great uncertainty with climate change.

4 See ESCAP (2023). The Future of Asian and Pacific Cities Report 2023: Crisis Resilient Urban Futures.
5 See Strang, K. and Rusli, N. (2021) The Challenges of Conserving Biodiversity: A Spotlight on Southeast Asia.
6 See Chaves, O.M. and others (2022). Wildlife is imperiled in peri-urban landscapes: threats to arboreal mammals.
7 See Tan, Y-L., and others (2022). Habitat change and biodiversity loss in South and Southeast Asian countries.
8 See Jung, M. and others (2021). Areas of global importance for conserving terrestrial biodiversity, carbon and water.
9 See IPBES (2018). Regional Assessment Report on Biodiversity and Ecosystem Services for Asia and the Pacific.
10 See Zimmerer, K.S., and others (2021). Urbanization and agrobiodiversity: Leveraging a key nexus for sustainable development.
11 See Wang, S. (2021) Agrobiodiversity and Agroecosystem Stability.

NbS in the built environment

The context of Asia and the Pacific presents both the need and opportunity for innovative and transformative actions to address these crises concurrently. NbS, including ecosystem-based adaptation (EbA)[12], have gained significant traction by offering complementary or alternative strategies to traditional grey infrastructure in addressing societal challenges. NbS involve actions inspired by nature to conserve, restore, and sustainably manage ecosystems which address social, economic, and environmental challenges effectively and adaptively by enhancing ecosystem services for human-wellbeing and biodiversity benefits[13].

Although ecosystem services (ES) might appear less pertinent in urban settings, cities are substantial beneficiaries of these services and are increasingly recognized as important producers of ES[14]. This recognition drives the implementation of urban nature-based solutions (NbS), which aim to tackle various urban challenges by improving existing ES to deliver multiple co-benefits for urban inhabitants[15]. The following table lists some of the primary ES targeted by NbS.

Figure 1: Primary urban ecosystem services

Regulating	Cultural	Provisioning
Benefits from regulating ecosystem processes	*Nonmaterial benefits from ecosystems*	*Products derived from ecosystems*
• Stormwater regulation • City temperature regulation • Air and water purification • Noise reduction • Pollination and other ecological processes	• Aesthetic quality • Space for recreation and education • Cultural and spiritual enrichment • Preserving local identity and sense of place • Space for biodiversity	• Food and freshwater supply • Raw materials and construction • Energy supply • Medicines

Source: ESCAP

12 EbA, also referred to as Nature-based Solutions for Adaptation, involves a wide range of ecosystem management activities, such as the sustainable management of forests, grasslands, and wetlands, that increase the resilience and reduce the vulnerability of people and the environment to climate change (IUCN, n.d.).

13 See UNEP (2022). Nature-based Solutions for Climate Resilient Cities: Perspectives and experiences from Latin America

14 See Geneletti, D. and others (2020). Planning for Ecosystem Services in Cities.

15 Co-benefits in this case refer to the positive outcomes that a policy measure might have on several other agendas, enhancing overall environmental, social, and economic sustainability

China's sponge cities exemplify the multifunctionality of NbS interventions: Blue-green infrastructure that includes green spaces, permeable pavements, and retention ponds, improves cities' adaptive capacity by reducing flood risk and increasing environmental resilience, while contributing to mitigation by creating carbon sinks. Green and blue spaces also provide crucial habitats for various species, enhancing urban biodiversity and its provision of ES. These biodiversity benefits are particularly significant when strategic efforts are taken to restore degraded ecosystems and improve habitat connectivity, promoting species dispersal and pollination[16].

Effective natural flood management improves water and air quality, while equitable access to green spaces provides opportunities for recreation and social interaction making for more liveable and sustainable cities for urban users. The following table lists several co-benefits offered by different NbS, from building infrastructure to ecosystem restoration and climate-smart agriculture, with examples from the region. The subsequent diagram illustrates where such NbS could be implemented for transformative action.

Figure 2: Sponge city infrastructure in Laiwu City

Source: Charlie Qi

16 See Hyseni, C. and others (2021). The importance of blue and green landscape connectivity for biodiversity in urban ponds.

Figure 3: Co-benefits of nature-based solutions

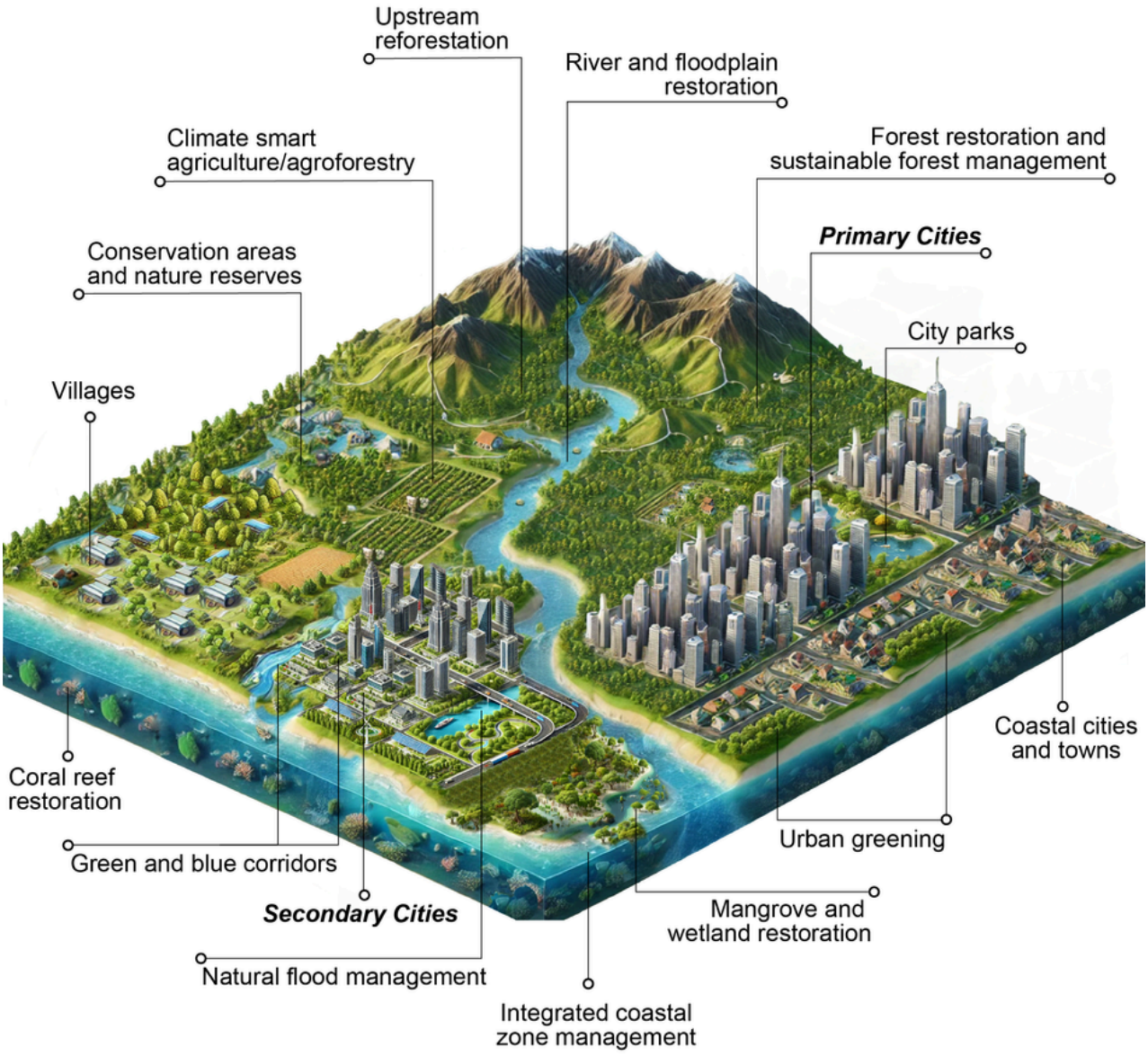
Type of nature-based solution		
	Climate action	Biodiversity conservation
Small-scale urban greening (green roofs, walls, roadside planting)	Reduced urban heat island effects, reduced stormwater runoff	Habitat creation for invertebrates and pollinators
Large-scale urban greening (forests, parks, green and blue corridors)	Carbon sequestration, slope stabilization, stormwater management	Habitat creation for birds and mammals, increased connectivity and genetic diversity
Blue-green infrastructure (rain gardens, stormwater parks, etc.)	Flood mitigation, water purification, climate regulation	Habitat creation, increased connectivity and species refuge
Wetland, mangrove, and coral reef restoration	Carbon sequestration, flood mitigation, coastal protection against storm surges	Habitat restoration, species recovery
Climate-smart agriculture, agroforestry, urban farming	Carbon sequestration, stormwater regulation, increased resilience to environmental shocks	Control of disease and pests, improved soil and agrobiodiversity

Source: ESCAP

17 See https://hpb-s.com/en/news/green-projects-in-uzbekistan/
18 See https://doi.org/10.1007/s40725-024-00213-9
19 See https://www.unsw.edu.au/research/project-halophyte
20 See https://unfccc.int/climate-action/momentum-for-change/women-for-results/nature-based-solutions
21 See https://www.mdpi.com/2073-445X/12/2/513

Benefits		
Pollution and waste	Social and economic benefits for urbanization	Examples
Pollutant absorption and improved air quality	Increased property value, building efficiency gains, reduced vulnerability to extreme heat	Green buildings[17], Uzbekistan
Nutrient fixation, improved air and water quality	More recreational spaces, reduced noise pollution, improved mental health and community cohesion, reduced crime	China's National Forest City action[18]
Water filtration and reduced pollution	Improved urban aesthetics, reduced heat island effects, fewer water-borne diseases	Chulalongkorn Centenary Park,[19] Thailand
Reduced air and water pollution, nutrient fixation	Reduced erosion, improved recreational and economic opportunities	Mangrove restoration[20] in Viti Levu, Fiji
Nutrient fixation, reduced organic waste via composting	Local food production, appreciation of indigenous and local knowledge in agriculture	Traditional agroforestry[21] Punjab, Pakistan

Figure 4: Nature-based solutions in various urban and rural contexts



Source: ChatGPT / ESCAP

Challenges in implementing NbS in Asia and the Pacific

Widespread implementation of NbS in Asia and the Pacific is hindered by a significant gap in knowledge about NbS and how to quantify its economic benefits (e.g. from energy efficiency gains or flood mitigation potential). As the concept is still relatively novel, there is often little sense of urgency or political will from decision-makers leading to a lack of supportive policy and legislative frameworks[22,23]. For example, urban planning regulations often restrict the double or triple use of land for NbS by assigning only single land use categories, limiting innovative solutions in densely populated areas. Additionally, inadequate valuation mechanisms have resulted in higher perceived costs and subsequently far less financial support for NbS. Moreover, creating an effective valuation mechanism for NbS is itself a challenge as most valuations focus only on tangible, quantifiable benefits, overlooking abstract benefits such as amenity and biodiversity value[24].

Despite a wealth of traditional and indigenous knowledge associated with NbS in the region, significant challenges persist due to poor documentation of this knowledge and limited involvement of ground-level and civil society workers. This lack of consideration for local realities can lead to NbS that fail to deliver desired co-benefits. Furthermore, the absence of standardized implementation guidelines and monitoring and evaluation (M&E) frameworks complicates the scaling of NbS in urban areas. These factors, combined with inadequate financial support and a preference for more predictable, traditional interventions, make it particularly difficult to institutionalize NbS into urban planning processes in the region[22,25].

Another challenge in urban areas involves limited collaborative governance. Cross-sectoral policy fragmentation with climate change, biodiversity, and urbanization strategies is common and integration of national strategies to local plans is limited[26,27]. A lack of effective coordination between subnational governments also limits cities' ability to address transboundary issues. This is especially true for peri-urban zones governed by a matrix of local, regional, and national authorities[28].

22 See Molnar-Tanaka, K. and S. Surminski (2024), "Nature-based solutions for flood management in Asia and the Pacific"
23 See Suratno, A. and others (2023). Study on Nature-based Solutions (NbS) in ASEAN.
24 See Pottinger-Glass, C. and others (2024). Scaling Nature-based Solutions (NbS) in the Mekong: Workshop synthesis report.
25 See Toxopeus, H. and Polzin, F. (2021). Reviewing financing barriers and strategies for urban nature-based solutions
26 See Zari, M.P., and others (2019). Utilising nature-based solutions to increase resilience in Pacific Ocean Cities.
27 See Kaurak-Fontez, B., Marchetti, L., and Salbitano, F. (2023). Integration of nature-based solutions (NBS) in local policy and planning toward transformative change. Evidence from Barcelona, Lisbon, and Turin.
28 See Morais de Lima, A.P. and others (2022). Framework for Planning and Evaluation of Nature-Based Solutions for Water in Peri-Urban Areas.

Sectoral silos and limited coordination across levels of governments thus indicate a lack of engagement with relevant stakeholders and missed opportunities for synergies. Therefore, there is a need for enhanced capacity and knowledge sharing among government actors, including municipal and city governments, environmental departments, and NGOs, to capitalize on NbS co-benefits.

Rapid population growth and urbanization pose another challenge in many countries in Asia and the Pacific. Rising pressures for housing and infrastructure result in large-scale land-use change that directly competes with NbS for space. Moreover, existing overcrowded urban spaces with limited land tenure can hinder NbS implementation[17] but also offer opportunities to utilize NbS strategies to improve living conditions and secure land tenure. To achieve CBD Target 12, which aims to "significantly increase the area and quality and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas", SDG11, and the Paris Agreement, this brief advocates for promoting transformative NbS at all urban scales. By integrating NbS into urban planning and development, cities in Asia and the Pacific can create sustainable and resilient futures for all.

“To achieve CBD Target 12, SDG11, and the Paris Agreement, this brief advocates for promoting transformative NbS at all urban scales. By integrating NbS into urban planning and development, cities in Asia and the Pacific can create sustainable and resilient futures for all.”

NbS opportunities and recommendations

By using nature as inspiration, NbS can be a cost-effective, inclusive, and resilient response to the multi-crisis faced in Asia and the Pacific[29]. The region's rich biodiversity and cultural heritage offers the opportunity for ambitious and transformative NbS, provided effort is made to institutionalize NbS across urban planning and policy, enhance multilevel governance, and unlock finance for implementation. The following recommendations for national-local level governments, planning departments, and financial institutions aim to support NbS implementation in Asia and the Pacific.

Defining nature-based solutions

To effectively scale-up implementation, clear and contextually relevant definitions of NbS in supportive policy and legislative frameworks are crucial. For this, countries and/or cities should:

- **Develop or adopt a practical and environmentally and culturally relevant definition** of nature-based solutions. Consider using the IUCN Global Standard definition.
- **Integrate the chosen definition into national-local level policies, regulations, and guidelines,** tailoring as necessary to the given level of government.

NbS Localization

NbS localization is the process of adapting and customizing NbS, recognizing the diversity of cultural perspectives and environmental conditions across different regions, for local development plans and strategies. To effectively 'localize' NbS:

- Vertically integrate national NbS policies in local development plans, adapting definitions and planning principles to the local context.
- Harness local and indigenous knowledge systems: Local governments should actively engage with both academia and local and indigenous communities to inform robust and ecologically sound NbS design that addresses local needs and avoids exacerbating existing inequalities.

Example:
Establishment of the First nations Advisory Panel for the strategic planning of a multi-city region in New South Wales, Australia

> ***Indigenous peoples are nature, and nature is Indigenous peoples - If we talk about nature-based solutions, then we need to talk about Indigenous people's solutions.***
>
> An Indigenous leader from Malaysia speaking at the Asia-Pacific Climate Week, 2023

29 See McAvoy, D. and others (2023). Localized nature-based solutions for enhanced climate resilience and community wellbeing in urban informal settlements.

Mainstreaming NbS in land-use and urban planning

While urban NbS can act as powerful tools in leveraging ES to deliver multiple spatial, social, economic, and environmental benefits, there is a need to integrate these solutions into land-use and urban planning to capitalize on these benefits[30].

- **Strategic planning**: Cities, especially secondary and emerging ones, should develop long-term strategic visions for NbS implementation, including integrating NbS in infrastructure, resilience, disaster risk, and biodiversity planning frameworks. Consider using the UNDRR NbS Toolkit[31] for integration best practices.
- **Approve NbS as valid technical solutions** to various urban challenges (e.g. flood protection, urban heat mitigation), promoting them as alternatives to grey infrastructure.
- **Incorporate NbS into zoning regulations**: Review and update zoning codes that allow for multifunctional land use and prioritize green spaces, urban forests, and other NbS. Governments should work with academia and local communities to conduct NbS feasibility assessments and identify priority areas, considering peri-urban zones to leverage greater land availability, for transformative NbS interventions.
- **Develop local implementation guidelines and performance-based standards** for context-specific interventions and effective monitoring that focuses on achieving general outcomes rather than specific prescriptions, allowing for adaptive management that demonstrates long-term viability.
- **Assign urban planning departments leading roles** in the development and maintenance of urban NbS to ensure effective integration, long-term planning, and coordination.
- **Participatory planning and co-production**: NbS should take a collaborative, multi-actor partnership approach that engages with and delegates power to local communities, ensuring NbS are culturally appropriate, foster community ownership, and can support land tenure for long-term sustainability.
- **Urban renewal and regeneration**: Incorporate green infrastructure into redevelopment plans and prioritize NbS for urban renewal and regeneration projects.
- **Consider incentive programs**: national and local governments could offer tax breaks, subsidies, and carbon and biodiversity credits to businesses implementing NbS and use awards and certifications to recognize and reward exemplary NbS projects.

30 See Lechner, A.M. and others (2020). Challenges and considerations of applying nature-based solutions in low- and middle-income countries in Southeast and East Asia.

31 See UNDRR and UNU-EHS (2023). Nature-based Solutions for Comprehensive Disaster and Climate Risk Management

- Capacity building: Governments should invest in programs that train city officials on strategic urban and peri-urban planning, the technical aspects of NbS engineering, and adaptive M&E.

Example:
Singapore has developed long-term plans, prioritizes NbS in zoning, and actively fosters community involvement, resulting in the world renowned "Garden City"

Multilevel governance

To effectively implement NbS in Asia and the Pacific, policymakers must foster multilevel governance with strong cross-sectoral collaboration, intermunicipal cooperation, and capacity building.

- **Enhanced horizontal cooperation between sectors and departments at all levels of government to mainstream NbS**: As suggested by the CBD's Global Biodiversity Framework, all levels of government should collaboratively review and update existing policies and technical guidelines to enable NbS and cities should develop their own local development plans in line with national policy. Effective collaboration among various sectors, departments, and statutory authorities e.g. via interdepartmental committees, can overcome siloed thinking and is crucial for policy and regulatory coherence. Additionally, collaboration with experts in landscape ecology, urban planning, and other relevant fields can help overcome reliance on grey infrastructure and design multifunctional NbS.
- Improved intermunicipal cooperation and integrated coastal zone management: To effectively and efficiently address transboundary issues like climate change-induced flooding and air pollution that transcend multiple jurisdictions, neighbouring municipalities, particularly coastal cities, should work together to pool resources and expertise to develop joint strategies and implement coordinated NbS interventions.
- **Capacity building**: Governments should invest in programs that train city officials on cross-sectoral policy development and intermunicipal cooperation.

Example:
Mangrove restoration in the Sundarbans of India and Bangladesh demonstrates successful multilevel governance and collaboration in NbS implementation that has led to improved coastal protection, biodiversity, and local livelihoods.

Finance

Unlocking the full potential of NbS in Asia and the Pacific will require improved valuation of NbS and its co-benefits, strengthened capacity building, and utilizing innovative funding mechanisms.

- **Conduct research on NbS accountancy, valuation, and monitoring** to support the integration of NbS into financial frameworks. Although it has been notoriously difficult to evaluate the nonmaterial benefits from nature, better methods of accounting NbS co-benefits will be needed to compete with conventional grey infrastructure. Research suggests using cost-benefit analysis to consider the long-term socioeconomic and ecological costs of inaction.
- **Capacity building**: Governments should invest in programs that train city officials to better understand the financial benefits of NbS.
- **Utilize blended finance to mobilize private and public capital for NbS**: governments at all levels and philanthropic funds should seek to partner with the private sector to de-risk NbS investments using de-risking funds, grants, concessional capital, and technical assistance funds to scale NbS implementation by bridging the gap between perceived project risk and investors return expectations.

Example:
The Asia Development Bank's Nature Solutions Finance Hub looks to upscale NbS in the region by facilitating blended finance and de-risking investments.

“Although it has been notoriously difficult to evaluate the nonmaterial benefits from nature, better methods of accounting NbS co-benefits will be needed to compete with conventional grey infrastructure. Research suggests using cost-benefit analysis to consider the long-term socioeconomic and ecological costs of inaction.”

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