The Nature Conservancy | Columbia Climate School, Climate, Earth, and Society | Columbia Center for Resilient Cities and Landscapes | HKILA The Hong Kong Institute of Landscape Architects

A Resilient Greater Bay Area

Accelerating a Landscape-Scale Resilience Portfolio and Collaboration Model for the Shenzhen River Basin and Deep Bay

Photo © Kyle Obermann

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AI USE DISCLOSURE

Generative AI tools were used selectively to support elements of report production, including editorial refinement, formatting, and visual development. The original and synthesized research, analysis, findings, concepts, strategies, recommendations, and underlying intellectual framework presented in this report were developed by the project team and workshop participants. AI-assisted outputs were reviewed, edited, and validated by the authors, who retain responsibility for the report's final content.

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THE RESILIENCE AND ADAPTATION ACCELERATOR PROGRAM

The **Resilience And Aaptation Accelerator**, is a program hosted at Columbia University Climate School in partnership with the Center for Resilient Cities and Landscapes. It connects local government and stakeholders with the urban design and climate research expertise and a global network of practitioners, funders, and researchers. Accelerators link resilience planning with the best available research to unlock political and financial pathways to implementation. This work is structured around a core set of functions that support collaboration, analysis, and delivery from concept through implementation.

- 18+ local site partners (national, state, and municipal governments)
- Researchers and educators across 8 academic Institutions globally
- 6+ major Global programs Including WWF Natural Capital Project, 10O Resilient Cities, the Resilient Reefs Initiative, and The Nature Conservancy (TNC)
- 1600+ of students, faculty, practitioners, and expert facilitators engaged
- $5M+ funding and finance capitalized for project Implementation on-ground
- 12+ new partnerships seeded

10ORC RESILIENCE ACCELERATOR
10ORC + CRCL + 100RC MEMBER CITIES

RESILIENT REEFS INITIATIVE
10ORC + CRCL + GREAT BARRIER REEF FOUNDATION

WWF NATURAL CAPITAL PROGRAM
CRCL + WORLD WILDLIFE FUND

RESILIENT GBA INITIATIVE
CRCL + COLUMBIA CLIMATE SCHOOL + THE NATURE CONSERVANCY + HONG KONG INSTITUTE OF LANDSCAPE ARCHITECTS

THE RESILIENT GREATER BAY AREA OF CHINA (GBA) INITIATIVE

Initiative among Columbia Climate School, The Nature Conservancy (TNC) and The Hong Kong Institute of Landscape Architects (HKILA).

RESILIENT GBA INITIATIVE

An integral part of TNC's global climate priorities that focus on **people-centered, nature-based** adaptation and resilience and contributes to the 2030 goal.

Its aims to **enhance biodiversity and climate resilience of critical land and marine habitats**, while **benefiting GBA coastal communities** from adapting to climate change.

THE RESILIENT GBA INITIATIVE GOALS

- Sensemake of existing policy, NbS / urbanization, and finance context and research.
- Co-convene stakeholders to design and prioritize regional urban, policy and financial strategies.
- Synthesize and make public actionable steps, drawings / visualizations, and strategies informed by stakeholder.

PART I.

RESILIENT GREATER BAY AREA

NBS ACCELERATOR

Photo © MOK Chi Kuen

Setting the Stakes

A CHANGING BAY AND CLIMATE

The Hong Kong–Shenzhen border and the Shenzhen River Basin represent a landscape where climate risk, ecological systems, technological advancement, extraordinary urbanization and economic growth, major infrastructure, and jurisdictional and geopolitical boundaries all come together. This interface sits within the much larger Pearl River Delta, where one of Asia's major river systems meets one of the world's largest and most economically productive urban regions.

The Greater Bay Area alone spans roughly 56,000 square kilometers, is home to more than 88 million people, and generates more than RMB 15 trillion in annual GDP—over US$2 trillion—placing the ecological transformation of the Pearl River Delta within a landscape of exceptional global economic significance and continued urban growth.

These factors make it a test case for the next generation of resilient development and adaptation investment. As climate risks extend across watersheds, coastlines, and metropolitan regions, Nature-based Solutions will increasingly require a shift from individual projects toward coordinated portfolios of investment, infrastructure, governance, and implementation.

The Greater Bay Area is especially consequential because this ecological interdependence unfolds across a complex administrative, legal, and political landscape. River systems, coastlines, estuaries, wetlands, and habitat corridors span Hong Kong, Shenzhen, and the broader delta, while the institutions responsible for managing them remain divided across jurisdictions.

This tension makes the GBA both challenging and uniquely generative as a setting for new approaches. Within the region, the Shenzhen River Basin and Deep Bay emerged as a particularly compelling starting point for strategic exploration: a practical geography in which to begin testing what a connectivity-oriented, ecosystem-based project development model could look like before scaling lessons outward to the wider GBA.

- The GBA consists 11 cities and SARs in southern China with 89 million people, and is one of the key economic engines of China
- Rapid urbanization process poses increasing pressure on critical ecosystems and climate resilience benefits they bring
- As a strategic region for adaptation nationally, it faces frequent rainstorms, severe flooding, heatwaves that disrupt infrastructure, supply chains, and economic activity

A UNIQUE MOMENT OF MOMENTUM

Across the GBA, governments, researchers, practitioners, and investors are paying increased attention to climate adaptation, biodiversity, ecological restoration, and sustainable urban development. At the same time, the region faces intensifying climate risks—including flooding, heat, coastal exposure, water quality pressures, and ecosystem degradation—that demand more integrated responses.

Recent policy developments, technical guidance, and demonstration projects also suggest growing institutional readiness for a more ambitious NbS agenda. Hong Kong's work to develop clearer guidance for integrating NbS into future development, alongside Shenzhen's active interest in learning from and advancing similar approaches, creates an opening to move from concept and pilot toward implementation pathways that are more coordinated, more investable, and more regionally relevant. This initiative was convened at a moment when the question is no longer whether NbS matters in the GBA, but how to accelerate in ways that are practical, cross-border, equitable, and durable. These strategies must also be contextualized in the broader economic development agenda of the region.

A CROSS-SECTION OF PEOPLE AND PARTNERS

This effort is deliberately cross-sector, cross-border, and cross-disciplinary. Participants brought expertise spanning ecology, planning, landscape architecture, engineering, policy, climate resilience, community engagement, implementation, and finance. This mix was essential because the challenge at hand is not purely technical. Delivering NbS at ecosystem scale requires coordination across disciplines and institutions: public agencies that set policy and invest in infrastructure; practitioners and designers who translate strategy into projects; researchers who contribute evidence and systems understanding; community and stewardship actors who ground interventions in place; and financial and implementation partners who can support delivery over time.

The Nature Conservancy brought a global conservation platform and a growing body of work on biodiversity, resilience, and nature finance; the Columbia University Climate School and Center for Resilient Cities and Landscapes contributed urban resilience and research.

Shenzhen River- Deep Bay Basin Map © The Nature Conservancy

SHENZHEN RIVER BASIN AT A CROSSROADS

Extraordinary growth and escalating climate risks demand integrated solutions for a resilient future.

SCALE + GROWTH

~600 KM² Cross-boundary catchment draining into Deep Bay (Shenzhen Bay)

~1M → ~2.5M Population projected to grow from today to full build-out

USD 215B GDP in high intensity hub

Rapid population growth driven by continued Shenzhen and Northern Metropolis development

LAND USE + ECONOMIC TRANSITION

- Transition from wetland–agricultural landscape to an I&T technopole
- Land-use change characterized by rapid urban expansion and coastal reclamation
- Livelihood transition from aquaculture and farming to technology and service industries

WATER + FLOOD RISK

~1,900 mm Mean annual precipitation, concentrated during monsoon season (April–September)

10–40% Increase in runoff through 2050, increasing flood and pollution risks

- Increasing exposure to compound flood hazards from rainfall, river flooding, storm surge, and sea-level rise
- Projected sea-level rise by 2100:

0.37–0.82 m (SSP2-4.5)
0.57–1.08 m (SSP5-8.5)

WATER QUALITY + ESTUARINE ECOSYSTEMS

- Water quality heavily impacted by rapid urbanization, industrial discharge, and nutrient loading
- High sedimentation rates and rising temperatures continue to reshape estuarine ecosystems

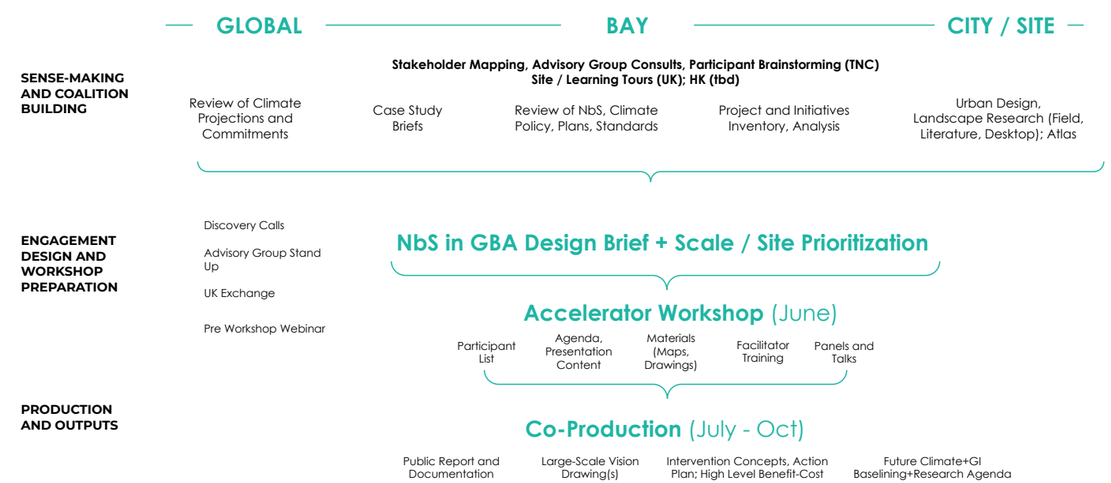
Photo © CEDD, AECOM

Methods and Collaborative Approaches

The Resilient Greater Bay Area Accelerator adopted a multi-scale, collaborative methodology that integrated global best practices with regional systems analysis and site-specific design investigation. The process began with a review of international case studies, climate projections, policy frameworks, and Nature-based Solutions (NbS) standards, complemented by stakeholder mapping, advisory consultations, and technical exchanges. These insights were synthesized into a regional design brief that identified priority landscapes and intervention opportunities across the Greater Bay Area (GBA).

This analytical foundation informed an Accelerator Workshop in June, 2026, where participants from government, academia, engineering, design, finance, conservation, and the private sector worked together to develop and refine strategic concepts. Through facilitated discussions, spatial analysis, and collaborative design exercises, the workshop generated a shared understanding of regional priorities and implementation pathways.

The final phase translated these discussions into a series of co-produced outputs, including a strategic vision for the Shenzhen River Basin, landscape-scale intervention concepts, implementation and financing pathways, and recommendations for future research, monitoring, and cross-boundary collaboration. The methodology intentionally combined evidence-based analysis with participatory design to ensure that recommendations were both scientifically grounded and institutionally actionable.



Accelerator Workshop

The Greater Bay Area (GBA) Nature-based Solutions (NbS) Accelerator Workshop convened practitioners, researchers, policymakers, designers, and implementation partners to explore how NbS can move from isolated projects toward a more connected, ecosystem-based approach to resilience across one of the world's most complex urban regions.

Co-organized by The Nature Conservancy (TNC), Columbia University Climate School, and The Hong Kong Institute of Landscape Architects (HKILA), the workshop was designed as a working session within a broader week of exchange on NbS in Hong Kong and Shenzhen, including site visits, technical discussions, and cross-sector dialogue.

"We need to transform constraints into opportunities rather than wait for the 'perfect' solution to fall on our lap."

— Michael Fong

Director of Civil Engineering and Development Department (CEDD) of the Hong Kong SAR, at the NbS Action Week

The outputs captured in this report are therefore not presented as a final masterplan. Rather, they represent a structured synthesis of dialogue intended to identify promising directions, prototype ideas, and next questions for further development. In that sense, the workshop should be understood as part of an iterative process: one aimed at testing how ecosystem-based, place-rooted, and action-oriented NbS strategies might be advanced across the GBA over time.

Workshop Objectives

- **Test existing NbS and Hong Kong NbS Design Guidelines and IUCN standards** to assess their relevance and applicability in a cross-border watershed context.
- **Identify potential future physical and spatial NbS strategies along cross-border transects,** with attention to flood risk reduction, ecological connectivity, urban pressures, and landscape-scale opportunity.
- **Design implementation pathways for NbS,** including the policy, finance, governance, and engagement conditions needed to move from concept to delivery.
- **Generate a landscape-scale visualization and shared regional perspective** on how NbS could support resilience, biodiversity, and cross-border coordination in the Greater Bay Area.

Workshop Supplies

Workshop in Action

A full day of collaboration-moving from landscape understanding to design, from ideas to implementation, and from local concepts to a shared regional vision.

01

Understand the Landscape

Teams examined the physical and biological environment using the NbS Design Guidelines as a lens.

02

Design NbS Approaches

Participants developed and mapped NbS strategies along cross-border transects, exploring how interventions can respond to local challenges.

03

Explore Implementation Conditions

Breakout discussions examined financing. governance, and engagement conditions needed to turn concepts into deliverable projects.

04

Synthesize a Regional Perspective

The day concluded with a collective discussion on connections across transects and opportunities for regional collaboration and scaling.

Interdisciplinary Workshop Teaming

More than 60 people across 40 organizations were represented across three geographies—Hong Kong, Shenzhen / the Greater Bay Area, and international partner organizations—and six sectors: finance, government, academia, design, conservation, and infrastructure.

Participants included representatives from:

- **Government and public authorities**
- **Finance, investment, and philanthropy**
- **Academia and research**
- **Engineering, infrastructure, and technical professions**
- **Civil society, conservation, and community organizations**
- **Design, landscape architecture, and planning**

Each were placed in a team, where they were tasked to design and prototype spatial NbS interventions across three cross-boundary typologies: (1) urban coastal, (2) wetlands, (3) mountainous geographical transects.

This mix of participants was central to the workshop's design. The objective was not only to generate spatial concepts for nature-based solutions, but also to bring into the same conversation the institutions and disciplines needed to shape policy, unlock investment, guide implementation, and support long-term stewardship across the watershed.

6

Cross-border transects

60+

Participants

4

Collaborative activitie

1

Shared regional vision

40+

Organizations

4

Geographies

6+

Sectors

GOVERNMENT & PUBLIC AUTHORITIES

- Civil Engineering and Development Department (CEDD), HKSAR Government
- Hong Kong-Shenzhen Innovation and Technology Park (HSITP)

FINANCE, INVESTMENT & PHILANTHROPY

- ADM Capital Foundation (ADMCF)
- Asian Development Bank (ADB)
- Asian Venture Philanthropy Network (AVPN)
- Beijing Green Finance and Sustainable Development Research Institute
- Center for Natural Capital Investment and Financing
- Glasgow Financial Alliance for Net Zero (GFANZ)
- Global Capacity Building Coalition
- International Finance Corporation (IFC)
- RS Group
- Seneca Impact Advisors
- Swire Properties
- Taskforce on Nature-related Financial Disclosures (TNFD)

ACADEMIA & RESEARCH

- Columbia Climate School
- Columbia University Graduate School of Architecture, Planning and Preservation (GSAPP)
- Chinese University of Hong Kong (CUHK)
- Chinese University of Hong Kong, Shenzhen
- Global Commission on the Economics of Water
- Hong Kong University of Science and Technology (HKUST)
- Hong Kong Polytechnic University (PolyU)
- Jockey Club Design Institute for Social Innovation (J.C.DISI)
- Princeton University
- University of Hong Kong (HKU)
- Xiamen University (XMU)

ENGINEERING, INFRASTRUCTURE & TECHNICAL PROFESSIONALS

- AEC Group
- AECOM
- Arup
- Gammon Engineering
- Hong Kong Green Building Council
- Hong Kong Institute of Qualified Environmental Professionals (HKIQEP)
- Institution of Civil Engineers Hong Kong Association (ICE HKA)

CIVIL SOCIETY, CONSERVATION & NGO COMMUNITY

- Civic Exchange
- Foundation for Sustainable Development (FSD)
- International Union for Conservation of Nature (IUCN)
- Kadoorie Farm and Botanic Garden (KFBG)
- Shenzhen Mangrove Wetlands Conservation Foundation (MCF)
- The Nature Conservancy (TNC)
- Wetland Conservation Association (WCA)
- WWF Hong Kong

DESIGN, LANDSCAPE ARCHITECTURE & PLANNING

- Hong Kong Green Building Council (HKGBC)
- Hong Kong Institute of Landscape Architects (HKILA)
- H Plus Limited
- International Federation of Landscape Architects Asia-Pacific Region (IFLA-APR)
- 2 Square Metres Design
- Henning Larsen
- Otherland
- Shenzhen Dream Eco Landscape Design Co., Ltd.
- Climate Change Adaptation Strategies (Mexico)

PART II.

READING THE GREATER BAY AREA AS A SYSTEM

Effective regional design begins with a shared understanding of place. Before the workshop, the research team analyzed the GBA across spatial, ecological, governance, and climate systems to build a common foundation for discussion. This allowed participants to focus on developing regional NbS strategies rather than first understanding the context.

Diagnostic Research before Design Scenarios

The following analysis examines the relationship between the built environment, natural systems, climate risk, and governance. It identifies where NbS could deliver the greatest ecological and social benefits, and where policy and governance could support implementation. These resources and insights informed the design scenarios and workshop discussions.

Atlas : NbS, Climate, Urban Context

The NbS Atlas was developed to establish a shared understanding of how climate risk is distributed across the GBA and how existing landscape conditions shape opportunities for intervention. By synthesizing datasets on flooding, urban heat, biodiversity, land cover, ecological connectivity, and patterns of urban development, the atlas moves beyond mapping individual hazards to reveal the spatial relationships between climate exposure and the region's natural and built systems.

The analysis demonstrates that climate risk is not evenly distributed across the landscape. Heat is concentrated within the region's most densely urbanized areas, where extensive impervious surfaces and limited vegetation intensify the urban heat island effect. Flood risk is similarly amplified in highly developed coastal and low-lying districts, where historic land reclamation, altered hydrology, and continued urban expansion have reduced the landscape's natural capacity to absorb and manage water.

At the same time, biodiversity loss is closely associated with fragmented ecological networks, highlighting the importance of maintaining landscape connectivity as development continues. The GBA's remaining forests, wetlands, mangroves, river corridors, agricultural landscapes, and ecological corridors are therefore strategic regional assets.

These systems provide multiple ecosystem services simultaneously—including flood attenuation, heat mitigation, carbon storage, habitat connectivity, and water regulation—and therefore represent some of the highest-value opportunities for NbS. Protecting and strengthening these existing ecological systems often delivers greater long-term resilience than creating isolated green interventions after development has occurred.

Photo © The Nature Conservancy

Biodiversity and Urban Expansion

Biodiversity across the GBA is increasingly concentrated within a fragmented network of forests, wetlands, mangroves, river corridors, and agricultural landscapes rather than within continuous natural habitat. Spatial analysis reveals that the value of these landscapes lies not only in their individual ecological function, but also in their connectivity, with ecological corridors serving as critical links that sustain biodiversity and ecosystem services across the region.

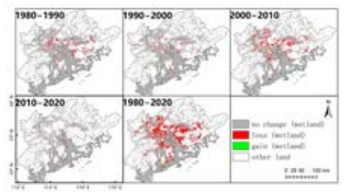
Areas where fragmentation is greatest often coincide with existing and planned urban expansion, highlighting where development pressures pose the greatest risk to long-term ecological resilience.

Together, these findings suggest that the highest-value NbS should prioritize protecting and reconnecting existing natural systems, recognizing them as regional infrastructure that underpins climate resilience, biodiversity conservation, and sustainable urban growth.

- The GBA's rapid urban expansion has led to significant habitat loss in wetland, farmland, and forest areas
- Remaining natural areas are becoming increasingly fragmented, reducing ecological integrity
- Key ecological corridors—essential for species movement and ecosystem resilience—are under pressure or broken in several urbanized zones

Land Cover

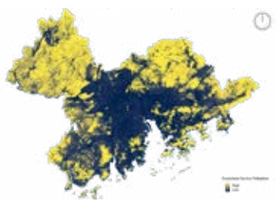
Wetland Loss



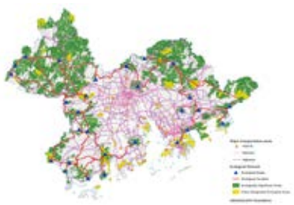
Spatial Conservation Methods

Ecological Corridors / Fragmentation

Ecosystem Services



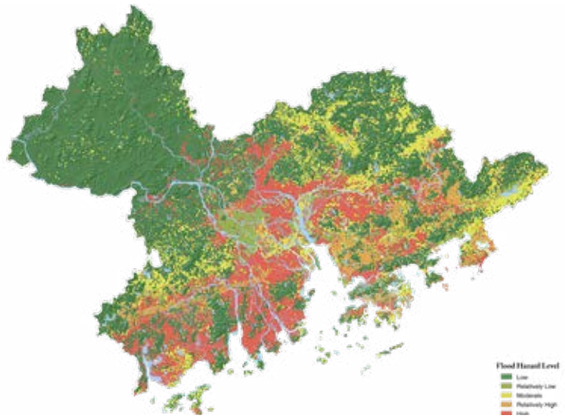
Ecological and Infrastructure

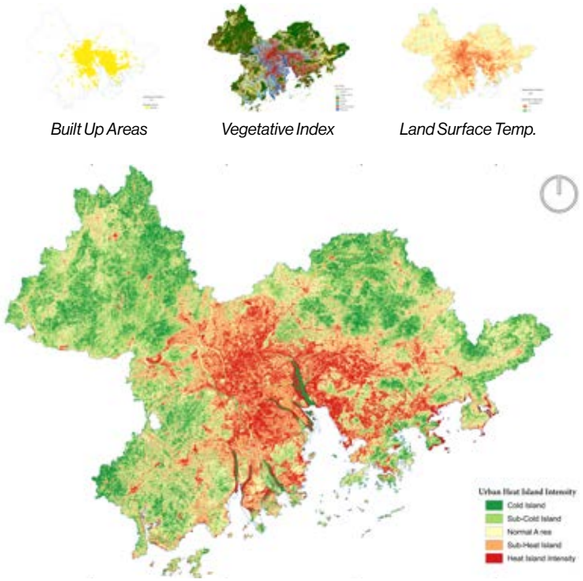


Flooding and Storms

Extreme rainfall (M1DP) *DEM* *Land Cover Built Up Areas* *Saline Intrusion*

- Highest hazard concentrations occur in downstream floodplains and the southwestern coastal region
- Driven by intense rainfall, flatter terrain, and higher impervious surface cover
- Coastal areas exceed inland cities in hazard levels, reflecting stronger precipitation signals in meteorological indices
- Low-lying and urbanised areas are most susceptible, as indicated by geological and hydrological indices





Built Up Areas *Vegetative Index* *Land Surface Temp.*

Urban Heat

- Pronounced heat islands span the GuangZhou – FoSshan → DongGuan → ShenZhen – Hong Kong corridor, aligning high LST with dense built-up areas and limited vegetation
- Northern mountainous/forested areas remain cooler, reflecting the stabilizing effect of natural land cover
- Most heat-exposed zones = continuous urban, low-vegetation districts, indicating priority targets for cooling and green infrastructure interventions

Design Logic

NbS Opportunity Co-Created with Urban Development

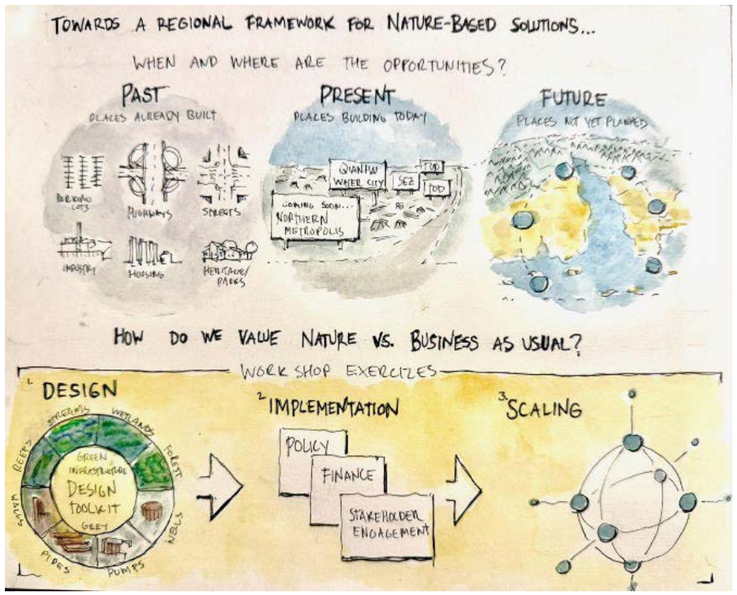
Development patterns have co-created both climate risk and NbS opportunities. The same decisions that concentrated people, infrastructure, and impervious surfaces also fragmented—or, in some places, preserved—the ecological systems that now underpin regional resilience.

Development can simultaneously create exposure to hazards, fragment ecological systems, or preserve landscapes that continue to provide critical ecosystem services, making the built and natural environments inseparable in determining where interventions should be prioritized.

Central to this work is revealing where opportunities for NbS, especially at the landscapescale, might exist in a megalopolis. Individual NbS interventions, such as bioswales or stands of trees, provide local benefits, but addressing the climate crisis requires a regional, connected approach. Moreover, this initiative aims to question the underlying economic logic of megapolitan expansion, which often treats nature, and the great services it provides to humanity, as an afterthought, window-dressing, or "greenwashing."

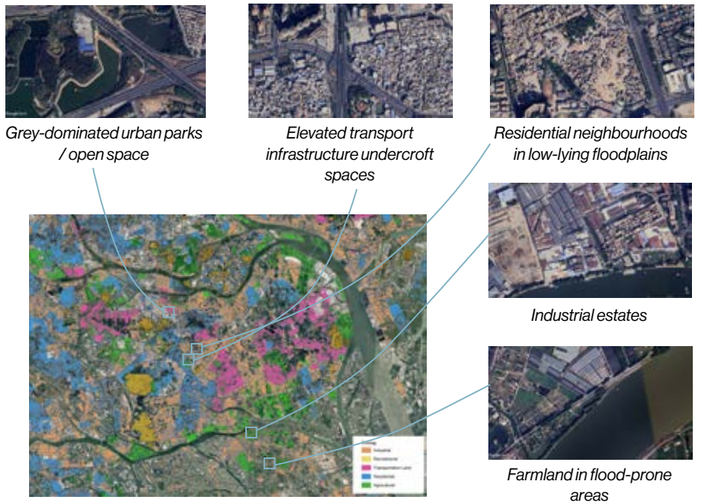
Indeed, many early pilot NbS projects, because of their limited scale, make great efforts toward public education in their execution, as one would do to move from pilot to scale. But this messaging can also reinforce the idea that a particular project is just a drop in the ocean, an insufficient measure to counter a mountain of risk. How then, can we have an honest conversation about making nature central everywhere as a matter of survival of our cities?

Three categories of opportunity for changing introducing more natural systems into urbanized areas to solve societal problems emerged:



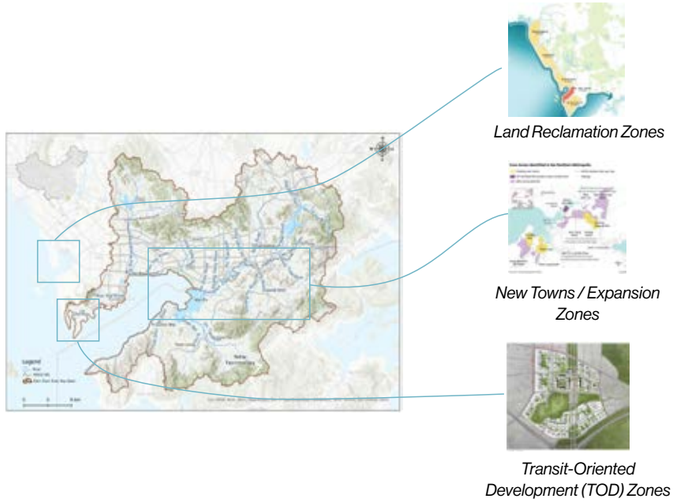
The Past: Retrofitting Existing Structures

A parking lot, a 1,000-year-old temple, a 100-story skyscraper and everything in between. Things that are already built are the most challenging places to change, especially if those places have great value in their current configuration. But these are the places at risk. Insuring the safety of the people and property in these places is one compelling incentive for retrofitting properties, but a property-by-property approach to risk reduction is more likely to result in localized, "grey" methods: air conditioning to combat heat; walls, pumps and pipes to manage flooding. Zoning and building codes can also create incentives for retrofitting; however, compelling properties to retrofit through regulation is burdensome and rare.



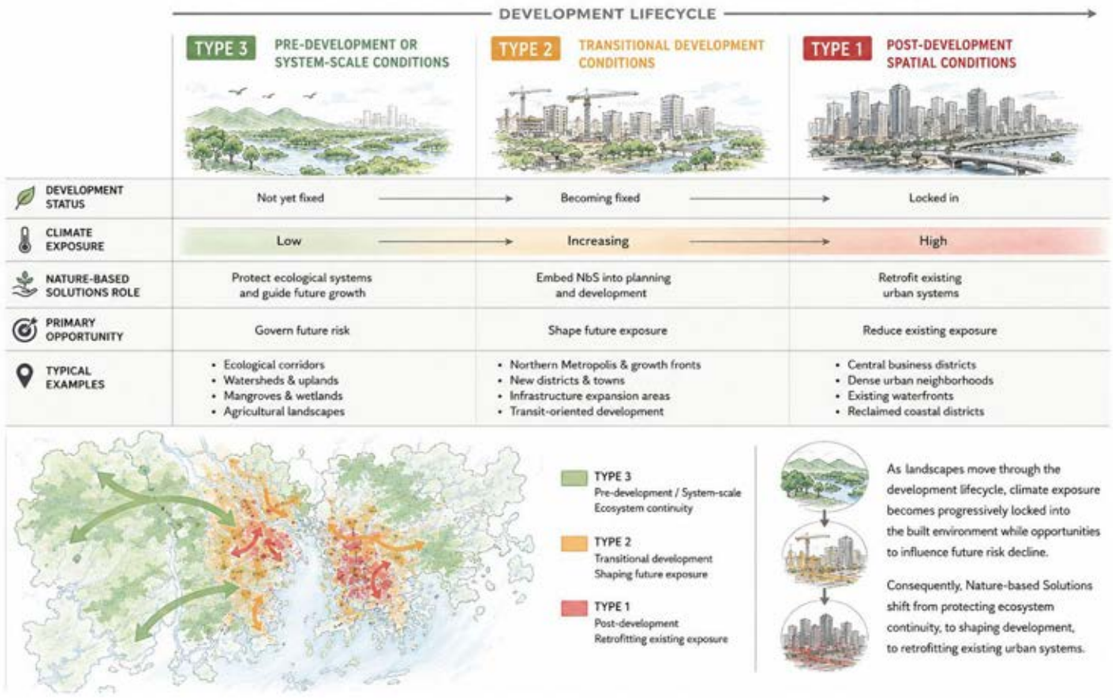
The Transitional: New Construction, Large Scale Development Plans

Much of a megapolitan expansion happens in waves, when a district (or in the GBA historically, reclaimed land) is repurposed through a public mandate to change uses. This is happening now with the Northern Metropolis (and has happened in many other places). Large-scale redevelopment presents the most immediate opportunity to change the nature of cities, but it also can be very challenging to compete with other public mandates, particularly providing housing, infrastructure and economic opportunity.



The Future: Places Not Yet Planned

No one knows how the GBA will grow in the future for sure, but plans and policies do shape space over time. When natural systems are recognized as vital infrastructure, ecological corridors might connect the population centers of the GBA as seamlessly as the bridges, tunnels and railroads do today.

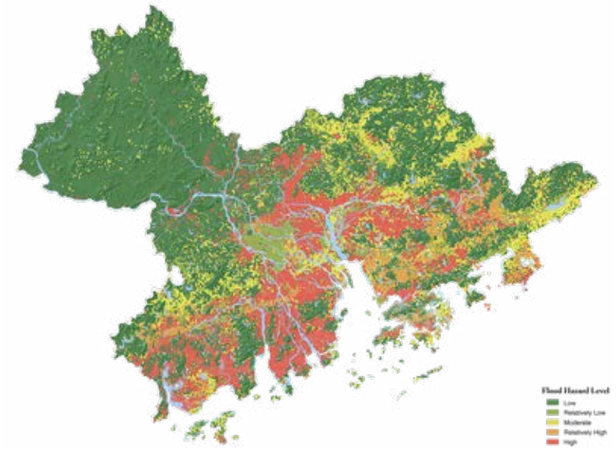


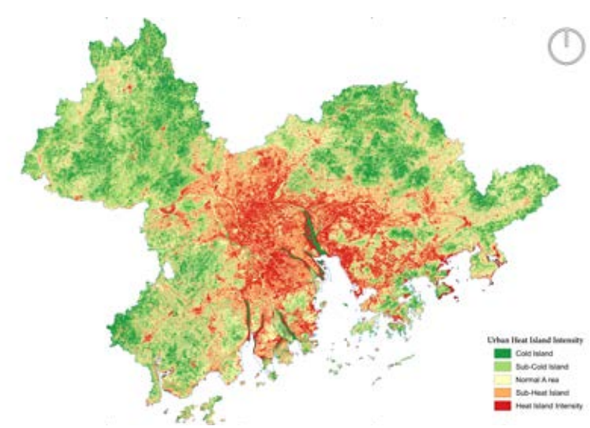
From Spatial Analysis to Priority Landscapes

As spatial systems move from fixed, built environments toward areas still being planned, locked-in climate exposure falls while the opportunity to shape outcomes with nature-based solutions (NbS) rises - reframing where and how intervention is possible. Rather than treating nature as residual land between urban areas, the analysis identifies the Greater Bay Area's remaining ecological systems as foundational regional infrastructure that underpins climate resilience, biodiversity, and long-term urban sustainability.

- **Coastal & low-lying districts**
- **Continuous urban heat-island belts**
- **Fragmented wetland–river–mountain corridors**
- **Infrastructure intersections**

The synthesis suggests that the Shenzhen River Basin represents one of the greatest leverage points for Nature-based Solutions in the Greater Bay Area, sitting at the intersection of coastal climate risk, ecological connectivity, and ongoing urban transformation. Recognizing its convergence of climate risk, ecological significance, and ongoing urban transformation, the Shenzhen River Basin was selected as the workshop's demonstration landscape. The watershed provided a practical setting to explore how integrated NbS can inform regional priorities and create implementation pathways applicable across the Greater Bay Area.





Several reclaimed or heavily urbanizing coastal districts (Zhuhai, Zhongshan, Jiangmen)

- Rapid urban expansion on reclaimed and low-lying coastal land increases exposure to flooding, storm surge, and sea-level rise.
- Major opportunity to integrate NbS into large-scale redevelopment before development patterns become fully established.

Guangzhou–Foshan–Dongguan urban corridor

- A highly urbanized metropolitan corridor characterized by extensive impervious surfaces, elevated urban heat, and fragmented ecological networks.
- Priority for retrofitting existing development with green infrastructure, urban greening, and restored ecological connections.

Pearl River estuarine and deltaic coastal zone

- A critical regional landscape where riverine and coastal processes converge, supporting flood regulation, biodiversity, and water quality.
- Protecting and restoring wetlands, mangroves, and estuarine habitats can deliver multiple climate adaptation and ecosystem benefits at regional scale.

Shenzhen–Northern Metropolis coastal belt

- One of the Greater Bay Area's most significant growth fronts, combining major planned urban expansion with internationally important ecological assets.
- A strategic opportunity to embed Nature-based Solutions into planning from the outset, demonstrating how future development can strengthen resilience while preserving ecological connectivity.

Policy Alignment & Implementation Gaps

Understanding the policy and institutional backdrop in the GBA was an essential early task. We began by sorting policies according to the level of governance – international, national, and sub-national -- and analyzing them individually to see where NbS appeared. Stacking these policies then allowed us to assess overall governance alignment, identify consensus themes across scale, and narrow in on key gaps. Ultimately, we reviewed dozens of policies. Here we offer a brief overview of the most important guiding documents and summarize our key takeaways.

Perhaps, most striking, **China's Ecological Civilization (2007)** offers a high-level vision and cultural touch-point for the region. Rooted in ancient philosophy, the policy emphasizes harmonious co-existence of people and planet. In 2018 the term was added into China's constitution, and one year later the **Outline Development Plan for the Guangdong-HK-Macao Greater Bay Area** laid out a strategy for integrating those key principles into green development projects in the region.

China has also been an active participant in global climate change policy, submitting two Nationally Determined Contributions as part of its obligations under the **Paris Agreement**. The most recent version (2025) explicitly describes NbS as a tool for achieving both mitigation and adaptation goals. For example, investing in afforestation is prioritized as a strategy for expanding the nation's carbon sink capacity, and planting more mangroves along the coastline is seen as a way to enhance biodiversity while improving natural buffers to storm surges and typhoons. These ambitions are further developed in **China's Adaptation Strategy 2035**, which deploys a whole-of-government approach that integrates NbS into ecosystem resilience and sector-based priorities for action. The country's **National Biodiversity Strategy and Action Plan (2023-2030)** aligns with the **Kunming-Montreal Global Diversity Framework**, naming NbS as a priority for ecosystem restoration, climate biodiversity co-management, and urban biodiversity.

Photo © Kyle Obermann

To implement these global commitments, Chinese Mainland and the Hong Kong Special Administrative Region have advanced NbS through policy frameworks for urban planning, development, and biodiversity enhancement.

Most prominently, **Chinese Mainland's 15th Five-Year Plan (2026–2030)** discusses green transformation, ecosystem restoration, and sustainable development, creating a supportive policy context for NbS. The Plan emphasizes ecosystem protection and restoration, carbon sinks, and biodiversity conservation. It provides a stronger national policy context for NbS, emphasizing integrated ecosystem protection and systematic governance, ecological security, cross-regional and cross-watershed coordination, and a "mountaintop-to-ocean" approach to restoration. Similarly, **Hong Kong's First 5-year Plan for Economic and Social Development (2026-2030)** emphasizes alignment between national economic planning and the implementation of NbS across the Northern Metropolis.

Financing for these ambitions has been addressed through a range of national policy documents, including Leveraging the **Role of Green Finance to Serve the Construction of a Beautiful China (2024)**. A joint directive by People's Bank of China, Ministry of Ecology and Environment, State Financial Regulatory Commission, China Securities Regulatory Commission, the policy commits to unified green finance standards, identifying landmark ecological projects to improve NbS bankability.

Urban and municipal scale strategies and action plans reflect efforts to implement national policy guidance. **Hong Kong's NbS Design Guidelines (2026)** offer three core principles for advancing projects across the landscape: promoting ecosystem diversity at multiple scales, embracing human-nature co-existence for mutual benefits, and improving resilience through NbS. The guidelines apply specifically to city-scale, offering design and performance evaluation tools. Drawing from the **IUCN Global Standard for NbS (2025)** guidelines, Hong Kong's design principles move from broad framing to local adoption.

At the regional scale, the research reviewed the **Outline Development Plan for the Greater Bay Area**, Guangdong's provincial climate and natural-resource plans, the **Northern Metropolis Development Strategy**, and emerging Shenzhen–Hong Kong cooperation agreements on ecological and environmental protection. Together, these policies provide a strong basis for treating ecological resilience as a **shared regional objective** and for connecting NbS to development, infrastructure, biodiversity, and climate-adaptation priorities across the GBA.

The opportunity, however, is alignment rather than uniformity. Hong Kong and Mainland China operate under distinct legal, regulatory, planning, and financial systems, meaning common ecological and resilience outcomes may need to be pursued through different jurisdiction-specific policy and implementation mechanisms. Insurance provides a clear example: **Hong Kong and Mainland China have distinct insurance markets, regulatory regimes, and risk-transfer structures, so insurance-related resilience levers cannot simply be applied uniformly across the GBA, even as the underlying climate and ecological risks are shared.** This makes cross-boundary coordination especially important: the regional opportunity is to establish shared objectives, standards, evidence, and outcomes while designing implementation pathways appropriate to each jurisdiction.

National — Chinese Mainland

- China's Nationally Determined Contribution (2025)
- Policies & Action for Addressing Climate Change (2025)
- Nat'l Standardized System for Addressing Climate Change (2025)
- Ecological Civilization (2007)
- Progress of Nat'l Climate Change Adaptation Strategy (2024)
- Climate Change Adaptation Strategy 2035 (2022)
- 14th 5-year plan (2021)
- 15th 5-year plan (2026)
- China's National Biodiversity Conservation Strategy Action Plan (2024)

Regional / Provincial — GBA / Guangdong Province / Hong Kong SAR

- Outline Development Plan for the GBA (2019)
- Action Plan for the Construction of the Beautiful China Pilot Zone in the Guangdong-Hong Kong-Macao Greater Bay Area (2025)
- Guangdong-Hong Kong-Macao Greater Bay Area Culture and Tourism Development Plan (2020)
- Guangdong Climate Adaptation Plan 25-35 (2024)
- Agreement on Comprehensively Deepening Shenzhen-Hong Kong Cooperation in Ecological and Environmental Protection (2024)
- Cooperation Arrangement on Carrying out Marine Ecological and Environmental Protection Work (2023)
- Implementation Opinions on the Establishment of a Nature Reserve System with National Parks as the Main Body (Guangdong Province, 2021)
- HK NbS Design Guidelines (2026)
- HK's Biodiversity Strategy & Action Plan (2025)
- HK Climate Action Plan 2050 (2021)
- 14th Five-Year Plan for the Protection and Development of Natural Resources in Guangdong Province (2021)

Municipal — Shenzhen / Northern Metropolis (NM)

- Shenzhen Climate Adaptation Plan 2023-35 (2024)
- Northern Metropolis Development Strategy (2021)

Selected Policies

Multi-Scale Policy Scan

Note: This scan reflects policies reviewed during the research workstream. Subsequent policy developments, including the 15th Five-Year Plan (2026–2030), should inform future updates to the analysis.

Photo © MOK Chi Kuen

AT THE GBA SCALE: TWO KEY POLICY CONSIDERATIONS

1 Align outcomes across distinct jurisdictions.

Mainland China and Hong Kong share increasingly aligned climate, biodiversity, and resilience ambitions, but operate through distinct legal, regulatory, planning, financial, and risk-transfer systems. Cross-boundary implementation therefore does not require identical instruments. Instead, coordination should establish shared objectives, standards, evidence, and performance outcomes, while enabling jurisdiction-specific pathways. Insurance provides a clear example: Hong Kong and Mainland China have distinct insurance markets, regulatory regimes, and risk-transfer structures, so the same risk-transfer mechanisms cannot necessarily be applied on both sides of the boundary—even where the underlying climate and ecological risks are shared.

2 Enable flexible, risk-informed implementation at landscape scales.

Many existing policies and delivery mechanisms remain organized by sector, jurisdiction, or individual project, while climate and ecological risks operate across those boundaries. Implementing NbS at watershed and regional scales will require mechanisms for cross-sector planning, shared risk and ecological data, coordinated investment, and adaptive management—allowing different jurisdictions and actors to contribute through different instruments toward a common landscape-scale resilience strategy. This flexibility can unlock the full resilience, biodiversity, and economic potential of NbS in the GBA.

The policy direction is clear, but the implementation architecture is not yet complete.

Across Mainland China, GBA, Hong Kong, and Shenzhen, the research identified four recurring gaps between policy ambition and implementation. These gaps provide a framework for understanding the barriers, and corresponding opportunities, explored throughout this effort.

Policy Gaps

NBS DESIGN STANDARDS AND TAXONOMIES

DESIGN + STANDARDS

Can NbS ambitions be translated into consistent standards, guidance, and investable definitions?

Regulatory standards are unevenly applied. Design guidelines are relatively mature for small-scale retrofits and new developments, but underdeveloped for large-scale, system-level retrofits across the GBA.

FINANCE AND VALUE CAPTURE

FINANCE

Can the region's ambitious growth in technology, transportation, housing, and tourism be leveraged to finance and sustain NbS and capture its economic and ecological value?

NbS can generate significant economic, ecological, and public value, but these benefits are often distributed across multiple beneficiaries and difficult to capture through conventional financing models. Without mechanisms to connect this value to funding and revenue pathways, NbS remains difficult to finance at scale.

IMPACT MONITORING AND EVIDENCE

MONITORING

Can outcomes be measured consistently enough to support decision-making and investment?

Fragmented data sources and inconsistent frameworks contribute to the lack of standardized Key Performance Indicators. Without reliable KPIs that weigh biodiversity and climate as well as urban development, it is difficult to build a persuasive evidence base.

CROSS-SECTOR AND CROSS-BOUNDARY DELIVERY

COORDINATION

Can institutions coordinate across jurisdictions, sectors, assets, and project scales?

While cross-sector collaboration is occurring across the GBA, it remains largely project-based rather than embedded across the NbS lifecycle or landscape scale. Across the China–Hong Kong boundary, differences in laws, institutional norms, and data-sharing capabilities further constrain coordinated planning and delivery.

Deeper Dives

Policy and Implementation Gaps

Scan to access the full policy analysis and supporting materials

To better understand the implementation barriers identified through the policy review, the research team conducted a deeper analysis of each of the four priority gaps: Nature-based Solution design standards and taxonomies, impact monitoring, access to finance, and scaled cross-sector partnership. Each deep dive examines the current policy landscape, identifies governance elements that facilitate progress (enablers) and those that hinder progress (disablers), summarizes progress made across the Greater Bay Area, and describes opportunities for action.

The analysis also builds upon recommendations generated during the January 2025 Nature-based Solutions Symposium, highlighting where additional work is needed to support implementation at regional scale.

Due to the depth of the analysis, each section is accessible through the QR code linking to the full discussion, references, and supporting materials.

Hong Kong's Civil Engineering and Development Department (CEDD) recently released NbS Design Guidelines that translate international principles into practical design guidance.

Together, these frameworks provide an important foundation for technical and financial certifications and standards as well as policy mainstreaming.

HK NbS Design Guidelines

Deeper Dives

Global and Local Standards

NbS standards are evolving rapidly and play an increasingly important role in creating a common language for design, evaluation, and investment. However, no single framework can capture the ecological, social, and institutional complexity of place. While standards help mobilize capital and mainstream practice, they must remain flexible enough to respond to local context and should complement—not substitute for—systemic policies that address the underlying drivers of climate risk, including patterns of urban development, infrastructure investment, and fossil fuel dependence.

The IUCN Global Standard for Nature-based Solutions is the benchmark framework for ensuring solution integrity and project credibility — but its greatest value is upstream, not at the reporting stage. When embedded at project origination rather than applied retroactively, the Standard's eight criteria function as a bankability framework. Criteria C3 (Biodiversity Net Gain), C4 (Economic Viability), and C8 (Jurisdictional Mainstreaming) directly address the three questions that determine whether a project can attract blended finance:

- **Does it generate verifiable ecological value?**
- **Is it economically sound over the long term?**
- **Does it align with the sovereign and regulatory context in which it operates?**

In a cross-boundary setting like the Greater Bay Area — where projects must navigate distinct regulatory regimes across Hong Kong and Mainland China — applying these criteria early is not a compliance burden. It is the mechanism that secures the long-term license to operate and unlocks the public co-investment needed to scale.

IUCN NbS Global Standard for NbS

World Bank's Catalogue of NbS for Urban Resilience

HKGBC Climate Change Framework for Built Environment

PART III.

SPATIAL STRATEGIES

From Projects to Portfolio

Building on the spatial and policy analyses, workshop participants developed Nature-based Solution concepts for three representative landscape transects across the Shenzhen River Basin:

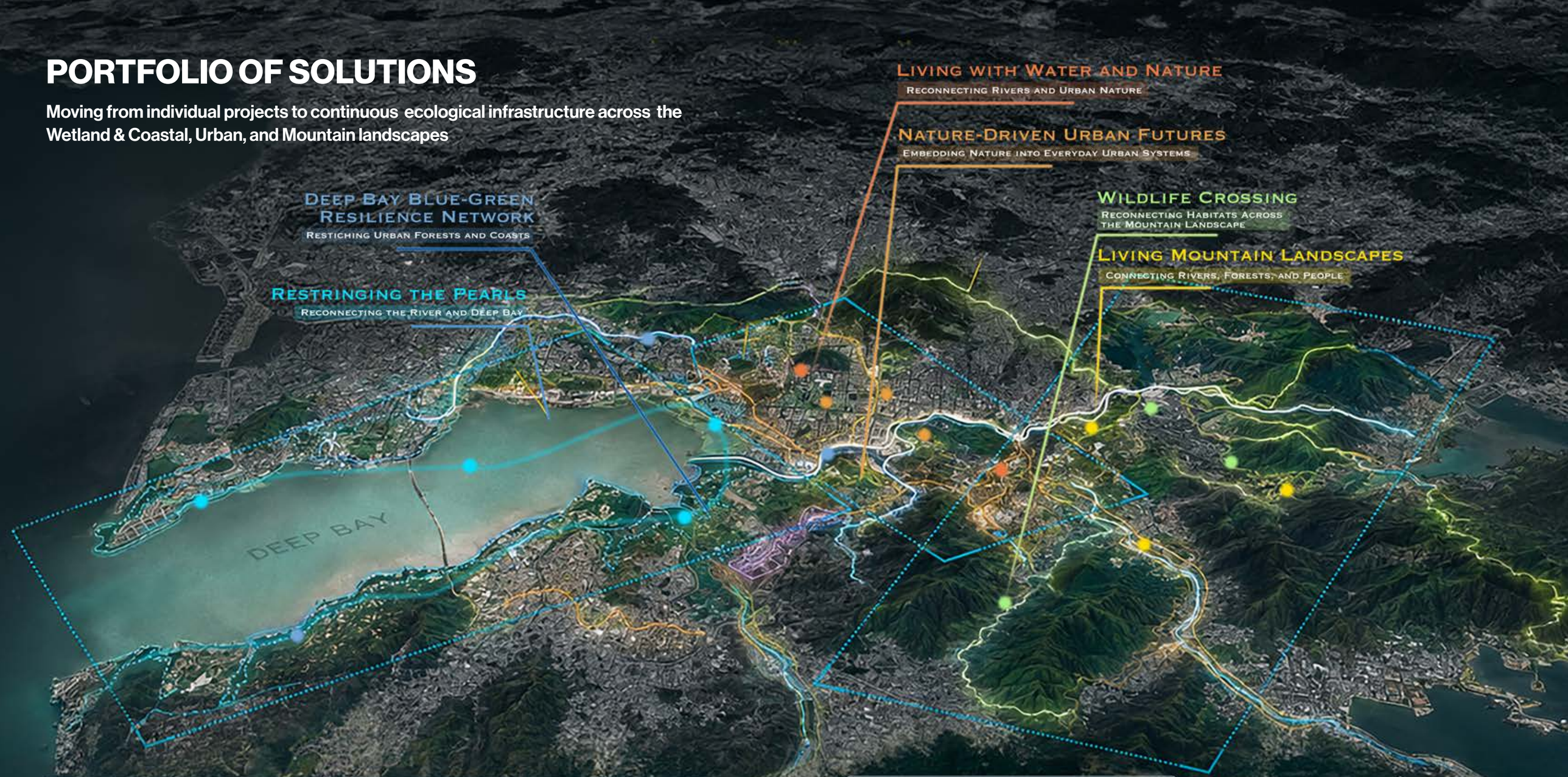
Urban, Wetland & Coastal, and Mountain

Rather than producing isolated site-specific proposals, each transect explored how multiple interventions could work together as a coordinated portfolio, demonstrating how landscape-scale planning can simultaneously reduce climate risk, restore ecosystem function, and support urban development.

The design concepts presented in this section are organized by landscape typology and workshop table. They illustrate how Nature-based Solutions can be applied across different development conditions while identifying common regional strategies that extend beyond any single location.

PORTFOLIO OF SOLUTIONS

Moving from individual projects to continuous ecological infrastructure across the Wetland & Coastal, Urban, and Mountain landscapes



EXAMPLES OF REVENUE-GENERATING ASSETS & PROGRAMS

MTR ASSETS & TRANSPORTATION INFRASTRUCTURE
Transit-oriented development, stations, depots, and corridors unlock value through connectivity and accessibility

NORTHERN METROPOLIS HOUSING
Planned new towns and neighborhoods create long-term demand and support susteinable, nature-positive growth

SAN TIN TECHNOPOLE
Innovation and technology hub driving high-value employment, investment, and regional economic growth

GEI WEI (TRADITIONAL FISH PONDS)
Aquaculture, recreation, and ecosystem services generate local livelihoods and cultural value

COMMERCIAL NURSERIES PROGRAM
Native plant production and landscape services support restoration at scale and create regional markets

ECOTOURISM & NATURE EXPERIENCES
Birdwatching, nature parks, trails, and cultural landscapes attract visitors and support local economies

Revenue examples are integrated with and depend on a healthy ecological infrastructure network

HOW THIS PLAN GENERATES VALUE

- Reduces climate and flood risk
- Enhances biodiversity and ecosystem services
- Creates livable, resilient and connected communities
- Generates sustainable economic and revenue opportunities
- Strengthens cross-boundary collaboration and stewardship

Wetland & Coastal Transect # 1

Understanding today's challenges and opportunities

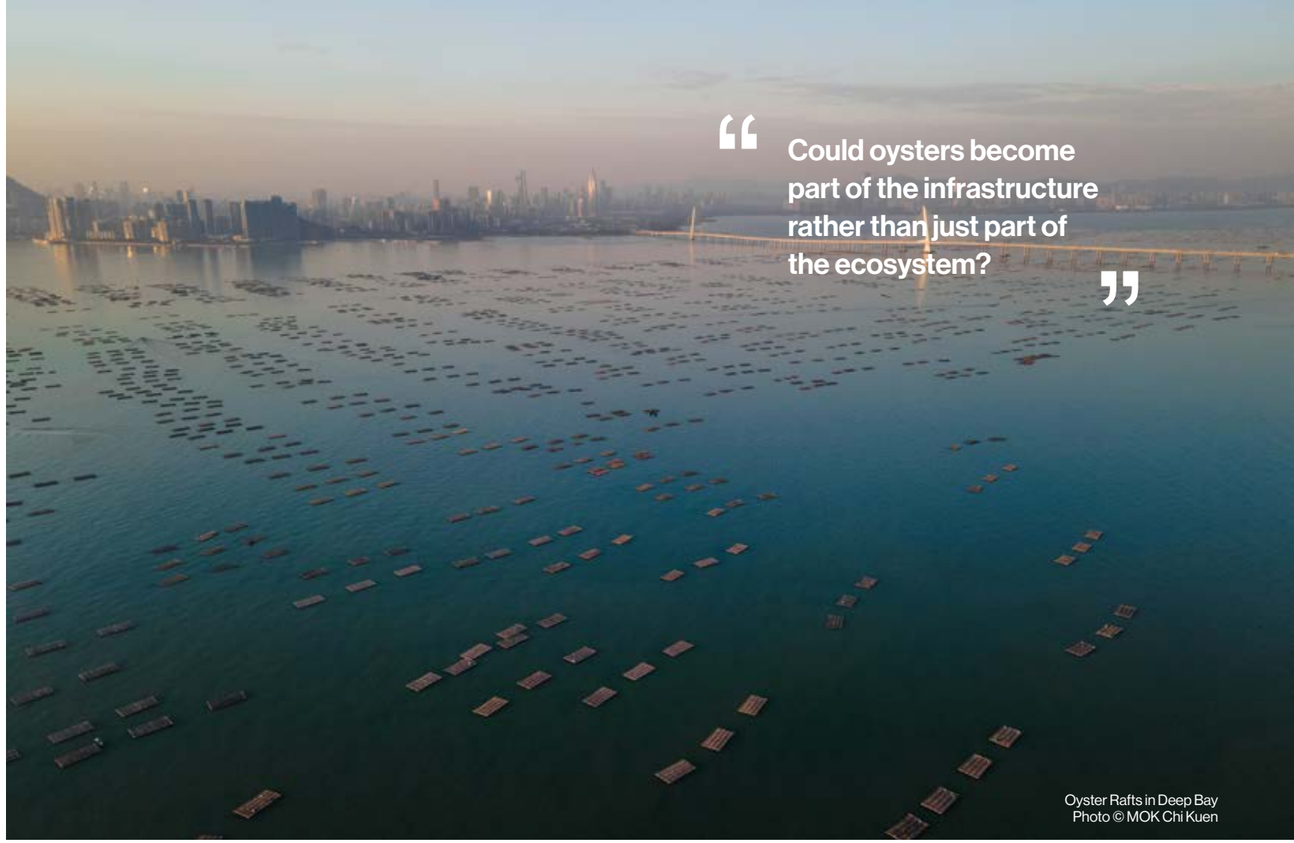
SITUATION ANALYSIS

Edge hardening and river straightening
Coastal port, housing and infrastructure development resulting in hydrological alteration

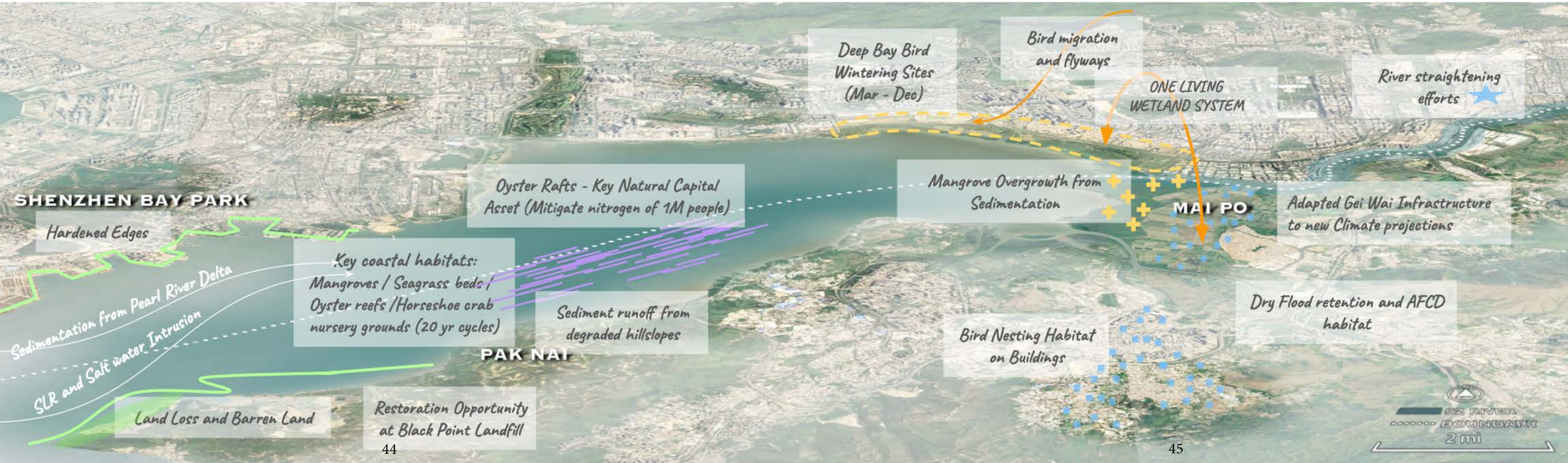
Leadership opportunities
Especially across the wetland at the mouth of the river, there are opportunities for cross-border leadership coordination of management

Unknown natural capital assessment
Bird nesting, mangroves, horseshoe crab breeding, oysters and bird wintering sites deliver risk protection and biodiversity

Untapped relationship between housing and ecosystem
Housing and technology could architecturally play a role in bird nesting, while also representing a large portion of economic development potential of the area to tap for risk broader risk reduction



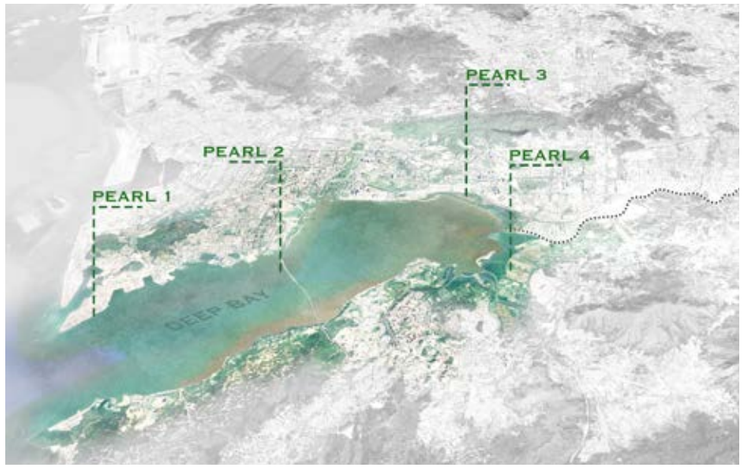
Oyster Rafts in Deep Bay
Photo © MOK Chi Kuen



Restringing the Pearls

Reconnecting the River and Deep Bay

The Shenzhen River estuary functions as a single ecological system despite the administrative boundary between Hong Kong and Shenzhen. ***Restringing the Pearls*** proposes a portfolio of NbS that reconnect wetlands, rivers, fish ponds, oyster reefs, mangroves, nature parks and coastal landscapes into a continuous ecological network that strengthens biodiversity, climate resilience, and cross-boundary stewardship.



Pearl 1. Restoring the Coastal Edge

Restore coastal edges across both sides of Shenzhen River through living shorelines, habitat restoration, and landfill rehabilitation, supported by reinvestment from development into long-term ecosystem stewardship and natural asset restoration

Enablers

- Cross-border ecological investment and coordination

Pearl 2. Oysters as Living Infrastructure

Expand oyster restoration that improves water quality, enhances biodiversity, and strengthens coastal resilience. Cross-boundary maintenance and post-typhoon debris management become integral components of long-term restoration.

Enablers

- Cross-border maintenance agreements
- Joint post-disaster debris management
- Coastal protection insurance

Pearl 3. Connecting Cross-Boundary Wetlands

Manage the Futian Wetland and Mai Po Nature Reserve as one connected wetland ecosystem. Coordinated restoration and management would strengthen biodiversity, improve habitat continuity, and increase the ecological resilience of Shenzhen River.

Enablers

- Joint wetland management
- Shared ecological baseline and monitoring

Pearl 4. Connecting Natural Ecological Areas

Reconnect the river corridor linking Shenzhen River with upstream habitats to create a continuous ecological network integrated with riverside parks. Modernize traditional gei wai fish ponds with smart water-control systems, creating regional blue-green infrastructure for flood resilience and ecological restoration.

Enablers

- Joint Hong Kong–Shenzhen management framework
- Ecological building and design standards
- Shared ecological monitoring

Wetland & Coastal Transect # 2

Understanding today's challenges and opportunities

SITUATION ANALYSIS

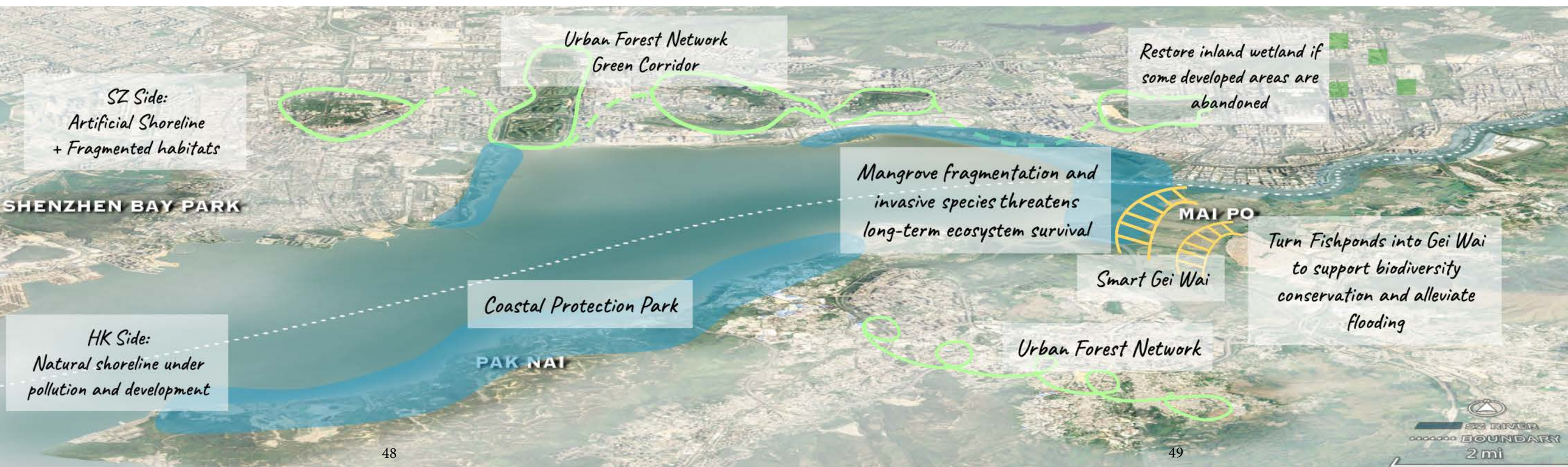
Mudflats are shrinking beneath invasive mangroves
Rapid expansion of Sonneratia is replacing open mudflats that support migratory birds

Oyster reefs lack coordinated management
Poorly managed oyster rafts can drift into other areas and become marine debris

Fish ponds can regain wetland functions
Traditional ponds could be restored as smart Gei Wai systems for biodiversity and flood storage

Ecological corridors remain disconnected
Engineered shorelines and disconnected habitats limit ecological connectivity across Shenzhen River

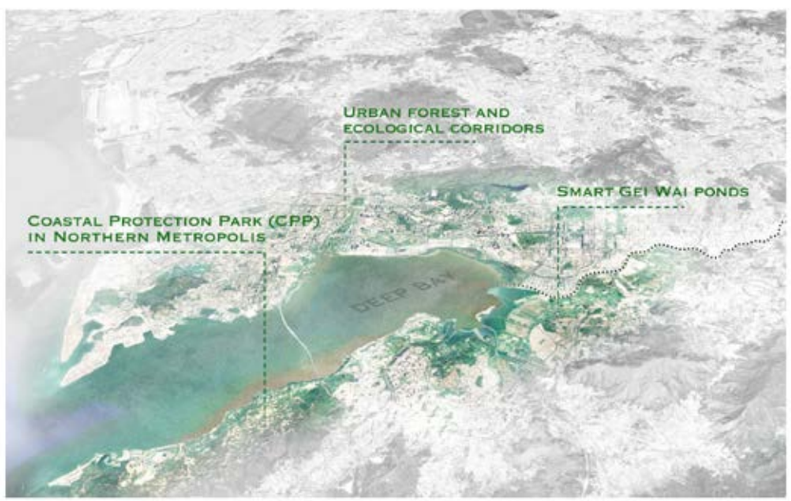
Photo © Mangrove Conservation Foundation



Deep Bay Blue-Green Resilience Network

Restiching Urban Forests and Coasts

Deep Bay's coastal landscapes form a shared blue-green resilience network that extends beyond administrative boundaries. Deep Bay Blue-Green Resilience Network combines coastal protection, habitat restoration, and smart water management to reconnect natural and working landscapes, including mangroves, oyster habitats, and traditional gei wai fish ponds. The resulting network strengthens coastal resilience, improves biodiversity, and creates a more adaptive estuarine system capable of responding to climate change and future development pressures.



Coastal Protection Park (CPP) in Northern Metropolis

Strengthen coastal resilience through expanded protection measures, including offshore artificial reefs, while incorporating existing mangroves, oyster habitats, aquaculture, and horseshoe crab habitat. Coordinate invasive mangrove management across Hong Kong and Shenzhen to support long-term ecosystem health.

Enablers

- Joint HK-SZ management framework - simultaneous removal effort
- Cross-border knowledge sharing of mangrove management experience

Smart Gei Wai* ponds (fishpond revitalization)

Scale smart gei wai ponds with sluice gates that can discharge water ahead of predicted typhoons, increasing flood storage capacity while restoring biodiversity, fisheries, and eco-tourism value. Aggregating multiple ponds could expand these benefits across the wider landscape.

Enablers

- Investment in sluice gate retrofit investment
- Pond-by-pond restoration program

Urban forest and ecological corridors

Reconnect fragmented coastal and inland urban forests through ecological corridors that link coastal and wetland areas, strengthen habitat connectivity, and support species movement. Integrate these connections into new and ongoing development to reduce impacts on existing habitats.

Enablers

- Joint HK-SZ management framework

**Gei wai: Traditional tidal shrimp and fish ponds in the Deep Bay wetlands, managed through controlled tidal water exchange.*

Urban Transect # 1

Understanding today's challenges and opportunities

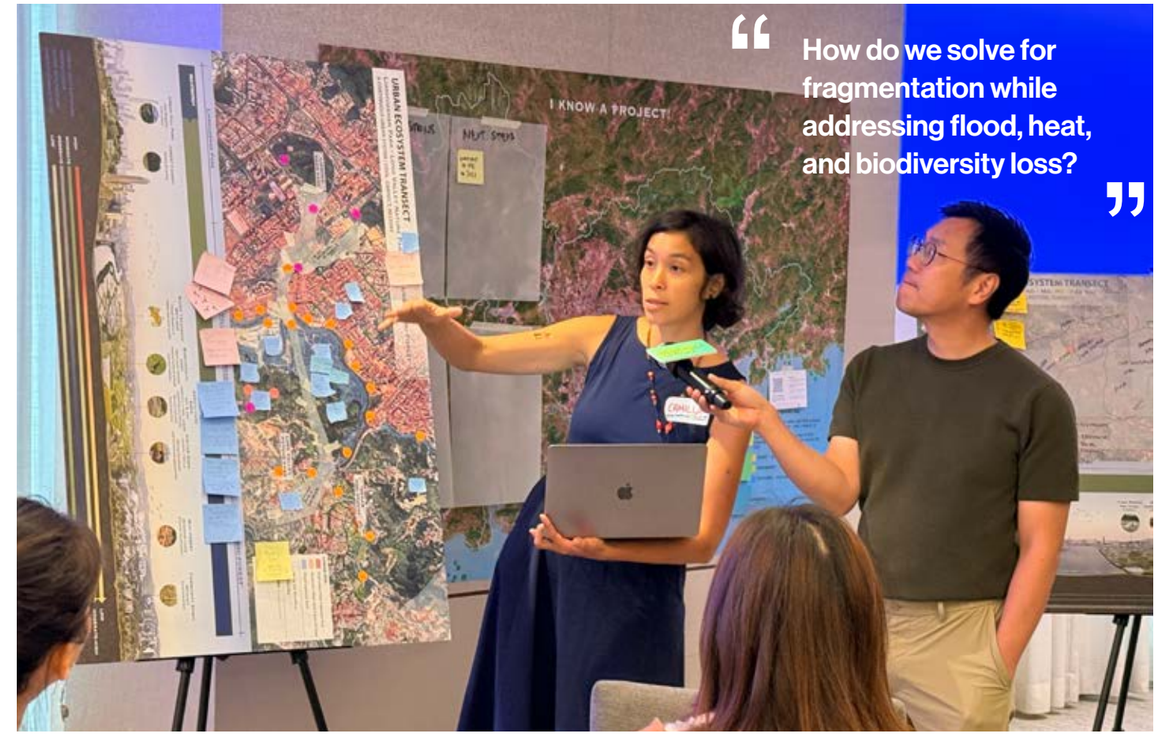
SITUATION ANALYSIS

Wildlife habitats at risk
Migratory birds, otters, oysters, and lowland species are threatened by habitat loss and urban development

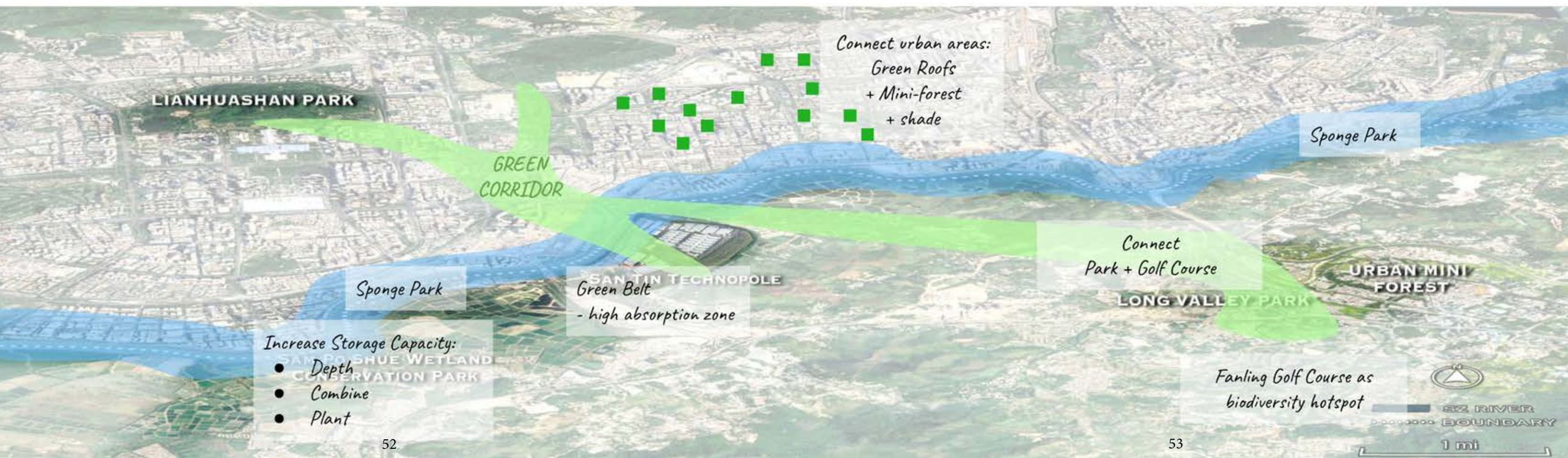
Increasing flood exposure
Sea level rise and extreme rainfall threaten low-lying wetlands and future urban areas.

Fragmented ecological networks
Mountains, rivers, wetlands, and parks remain disconnected, limiting species movement across the landscape

Disrupted hydrologic flows
As ecosystems become building sites across the urban setting, water cannot flow naturally, contributing to floods



"How do we solve for fragmentation while addressing flood, heat, and biodiversity loss?"

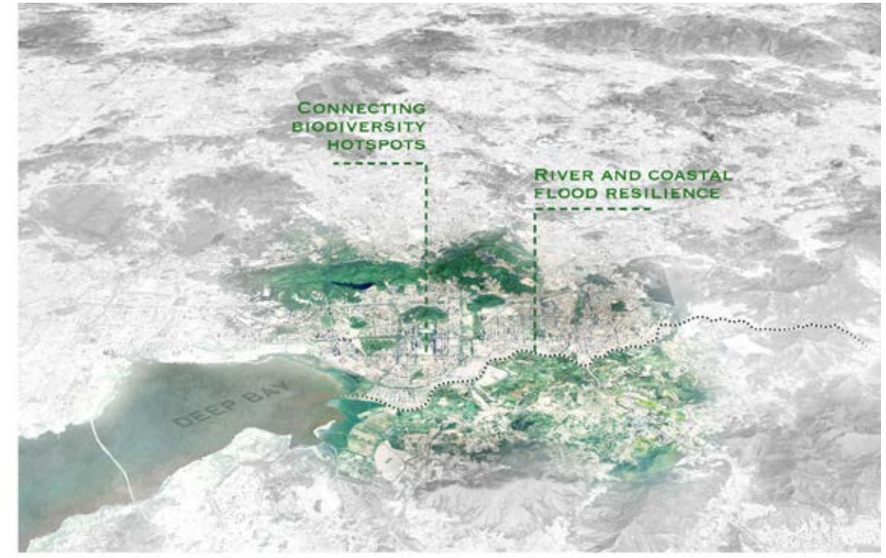


Urban Transect #1

Living with Water and Nature

Connecting Sponge Infrastructure and Urban Biodiversity

As urban areas continue to expand across the Greater Bay Area, future development plans offer an opportunity to rethink how cities interact with water and nature. Future development should integrate interconnected sponge infrastructure and urban biodiversity hotspots into the urban fabric, creating a blue-green network that reconnects rivers, restores ecosystem functions, and enhances climate resilience.

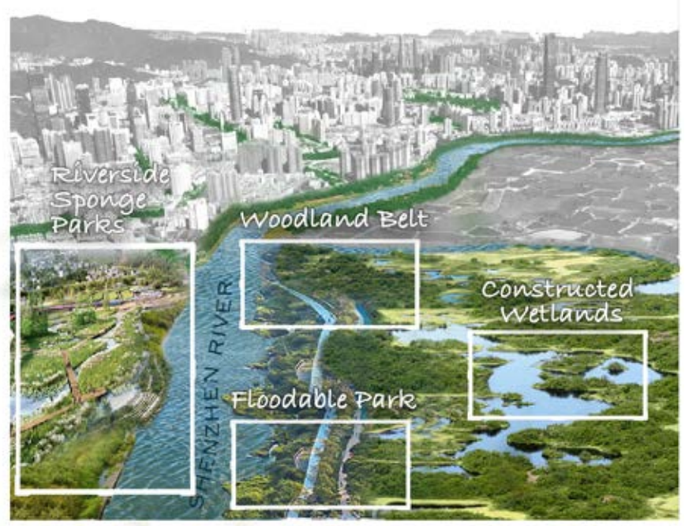


River and coastal flood resilience

Build storage capacity and sponge-city-type interventions along river and coastal areas. Explore opportunities to replicate planned green belt in Lok Ma Chau Loop as a model for high-absorption design.

Enablers

- Mainstream sponge city design standards for implementation across Shenzhen River coastal zone
- Invest in long-term coastal protection infrastructure



Connecting biodiversity hotspots

Increase green/ biodiverse corridor connectivity to reduce fragmentation, with attention to both horizontal and vertical greening (e.g., roofs, streets). These installations have climate co-benefits: improved habitat connectivity increases green cover and mitigates heat.

Enablers

- Embed ecological connectivity principles into urban design guidelines
- Develop GBA-wide biodiversity management plan
- Scale local native-plant nursery program to improve availability

Urban Transect # 2

Understanding today's challenges and opportunities

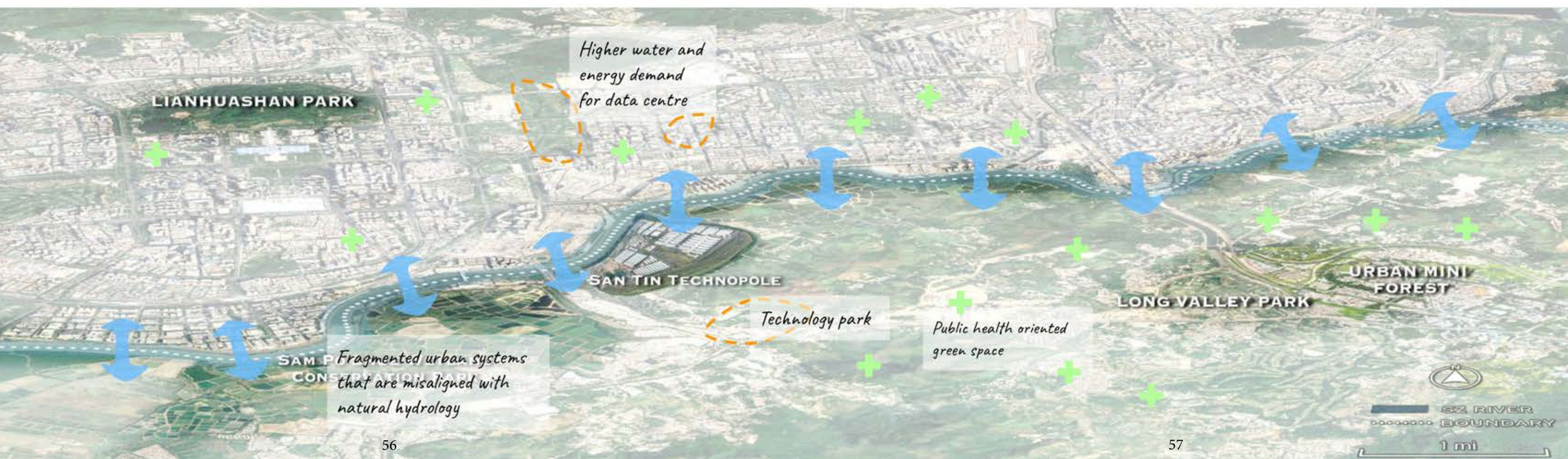
SITUATION ANALYSIS

Rising water demand
Population growth, industry, and AI infrastructure are placing greater pressure on existing freshwater resources

Urban heat
Dense urban development is intensifying heat exposure, particularly across highly built-up areas

Fragmented ecological networks
Natural hydrological processes have been altered by urban development, reducing water storage and ecological functions

Loss of natural landscapes
Wetlands and natural ecosystems have been replaced by intensive urban development

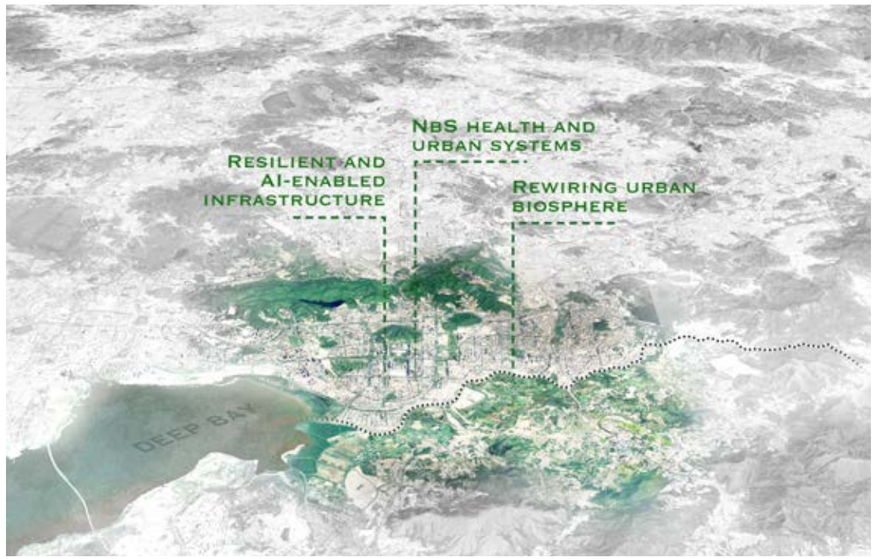


Urban Transect #2

Nature-Driven Urban Futures

Embedding Biophilic Design into Everyday Urban Systems

As cities evolve, NbS must move beyond individual projects and become embedded within the systems that shape urban life. From AI infrastructure and its growing water and energy demands to watershed planning, public health, and community well-being, these interventions show how ecological thinking can shape future urban systems. Together, they promote cities that are more resilient, healthier, smarter, and more closely connected to natural processes.



Resilient Infrastructure for the AI Economy

Integrate water sourcing and storage into data center and AI infrastructure to increase flood resilience while responding to growing water demand. Combine NbS with renewable energy and biodiversity measures, supported by AI-enabled monitoring and early warning systems for extreme climate events

Enablers

- Engaging with corporates along their infrastructure asset planning lifecycle (e.g., water-demand assessment requirements)
- Embed NbS in long-term city master/zoning plans

Rewiring urban biosphere

Reconnect fragmented urban systems with natural hydrology through river-basin planning and stronger links between villages, wetlands, and urban centers. Expand opportunities for eco-tourism, recreation, and blue-green mobility to strengthen connections between communities and natural systems.

Enablers

- Enhanced river-basin based planning framework
- Eco-tourism and nature-based recreation strategy connecting villages, wetlands, and urban centers
- Blue-green mobility network (cycling, hiking, and water-based transport corridors)
- Community-led stewardship and village partnership programmes

NbS health and urban systems

Expand access to nature near parks, schools, healthcare facilities, and communities to strengthen the public health benefits of NbS. Integrate health-oriented green spaces with flood management functions, such as sponge-city measures, to support healthier and more resilient urban environments.

Enablers

- Collaborative planning between health, planning and green space agencies
- Health-oriented green space design standards for hospitals, schools and communities

Mountain Transect # 1

Understanding today's challenges and opportunities

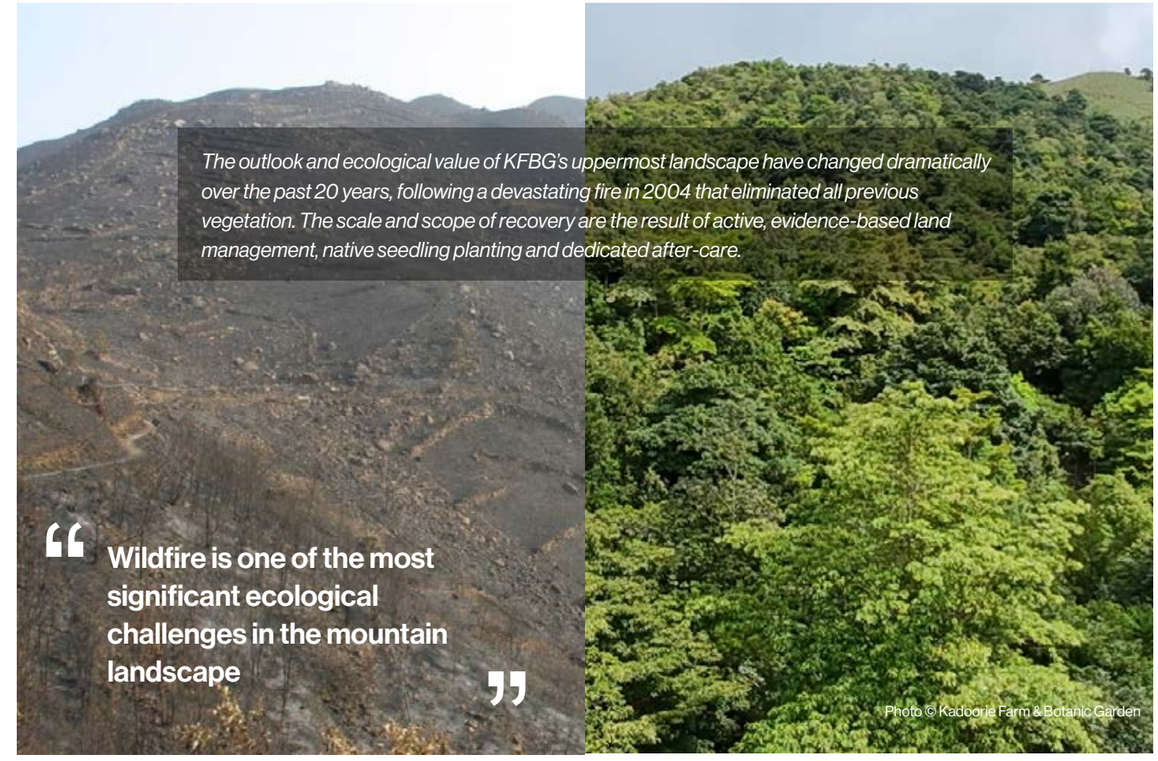
SITUATION ANALYSIS

Fragmented forest corridors
Roads, villages, railways, and new development areas are breaking up continuous forest habitats and disrupting wildlife movement.

Weak mountain–river connectivity
Poor forest management increases downstream flood, sedimentation, and landslide risks during extreme weather events.

Frequent human-caused wildfires
Repeated fires prevent forest regeneration, degrade grasslands, and slow habitat recovery

Large areas remain suitable for restoration
Existing country parks, degraded hillsides, and former disturbed lands provide opportunities for large-scale native forest recovery

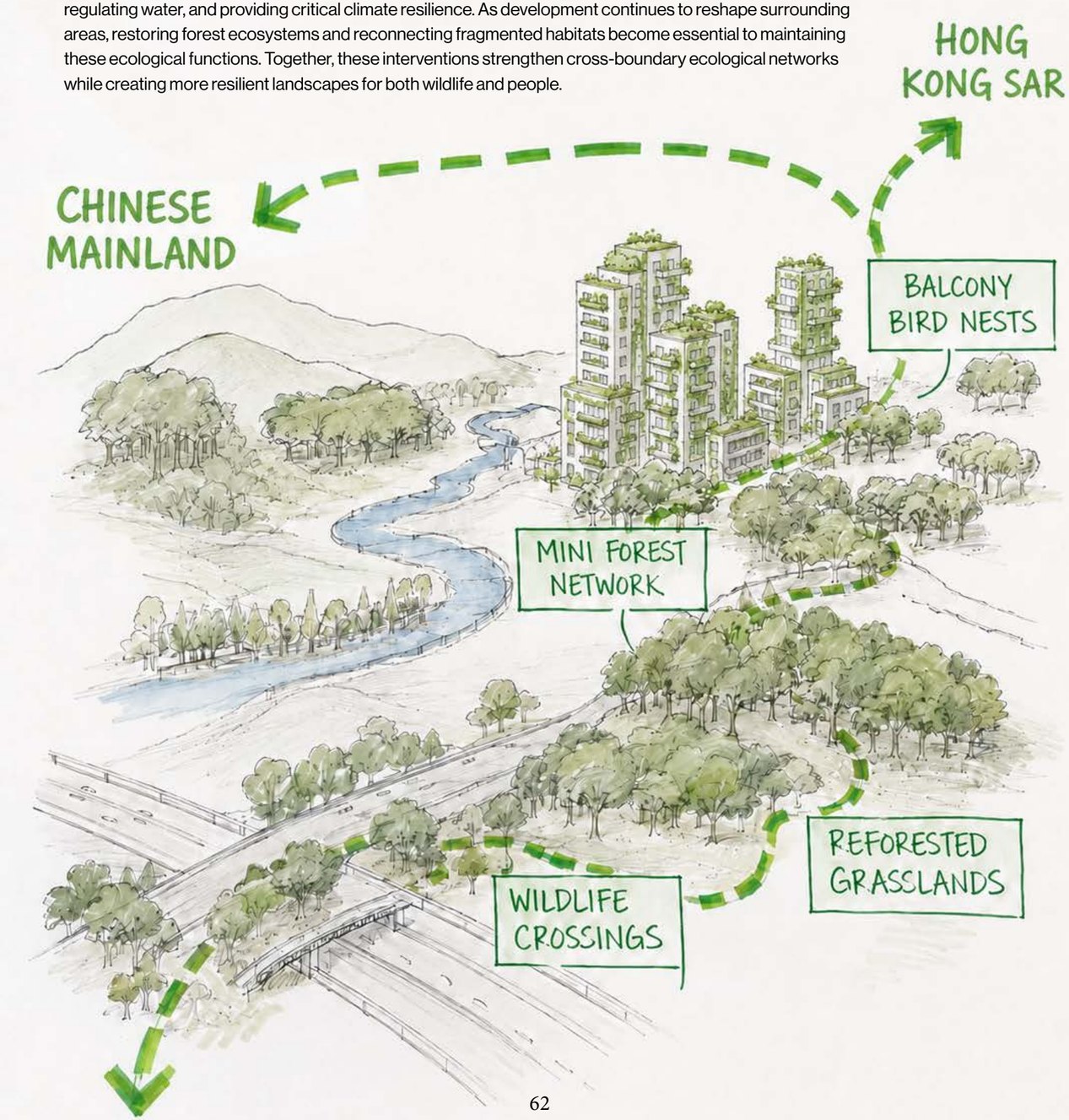


Mountain Transect #1

Wildlife Crossing

Reconnecting Habitats Across the Mountain Landscape

Mountain landscapes form the ecological backbone of the Greater Bay Area, supporting biodiversity, regulating water, and providing critical climate resilience. As development continues to reshape surrounding areas, restoring forest ecosystems and reconnecting fragmented habitats become essential to maintaining these ecological functions. Together, these interventions strengthen cross-boundary ecological networks while creating more resilient landscapes for both wildlife and people.



Repurpose or adapt existing land use (e.g., golf course)

Repurpose golf courses as sponge landscapes that increase water retention while improving habitat connectivity through partial rewilding.

Enablers

- Incentive structures to encourage voluntary participation from private landowners (e.g., revenues from biodiversity credits)

Wildlife crossings infrastructure

Connect fragmented habitats through wildlife overpasses, ecological bridges, underpasses, tunnels, and green decks over highways. Manage mountain habitats as one connected cross-boundary system to support species movement, genetic exchange, and resilient wildlife populations.

Enablers

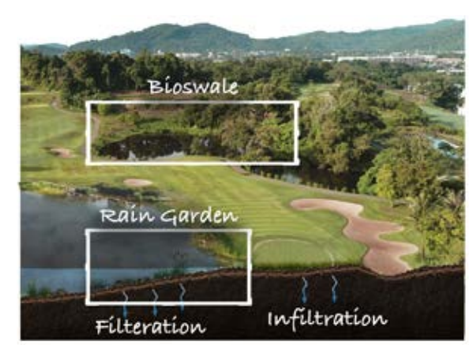
- Joint HK-SZ management framework
- Shared ecological baseline and monitoring data

Urban mini-forest network

Expand the CEDD mini-forest concept into an interconnected network that links dense urban development with country parks and natural forests.

Enablers

- Embed NbS/CEDD mini forest design mandate across NM master/zoning plans



Large-scale reforestation

Restore native forest cover to reduce wildfire risk while improving biodiversity, slope stabilization, water regulation, cooling, and climate resilience. Prioritize restoration around areas affected by fires and natural burial sites.

Enablers

- Scale local native-plant nursery program
- Forestry guidelines and design to ensure effective prevention/ containment of fire

** Further research is needed to explore how wildlife crossings can support ecological connectivity while meeting border security requirements.*

Mountain Transect # 2

Understanding today's challenges and opportunities

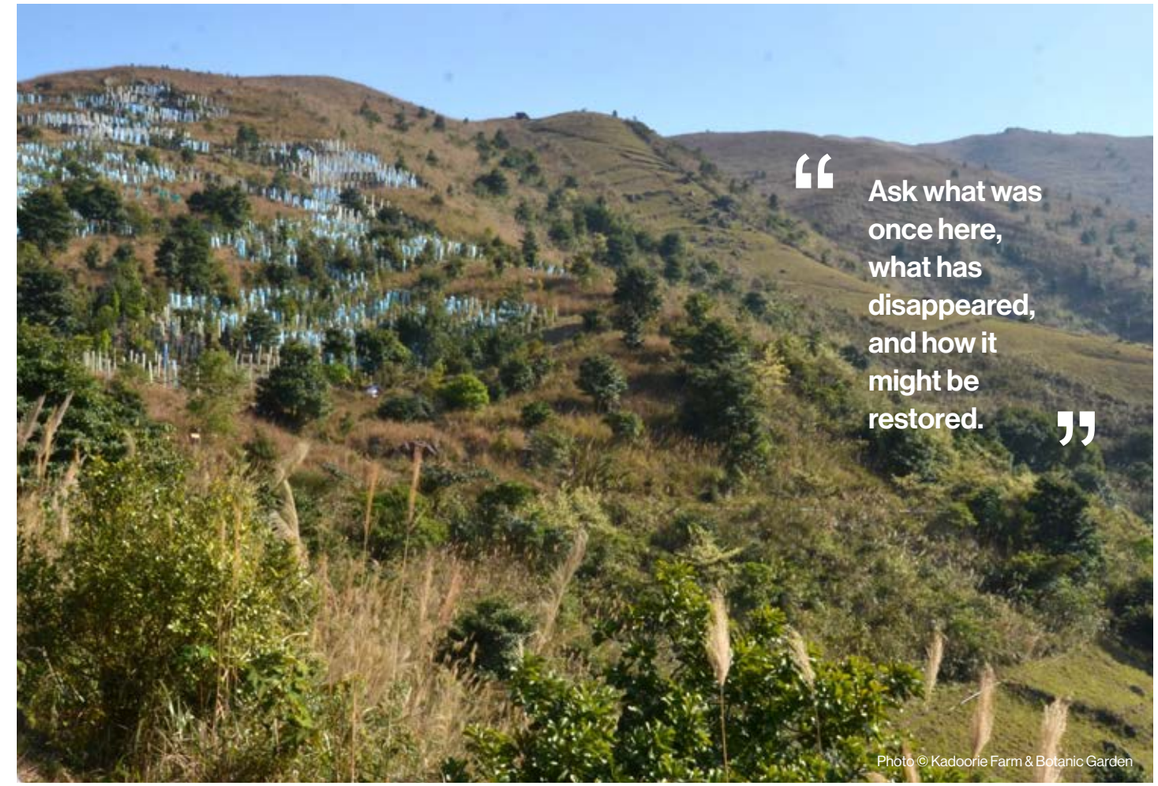
SITUATION ANALYSIS

Fragmented ecological connections
Roads, border infrastructure, and future development areas interrupt wildlife movement between mountain landscapes

Complex land ownership
Mixed public, private, and village land ownership creates challenges for coordinated conservation and restoration

Increasing climate risks
Sea level rise and flood exposure threaten low-lying areas and require long-term cross-border planning

Large restoration potential
Existing protected areas, degraded hillsides, and planned open spaces provide opportunities to strengthen ecological connectivity and support ecotourism and nature-based recreation

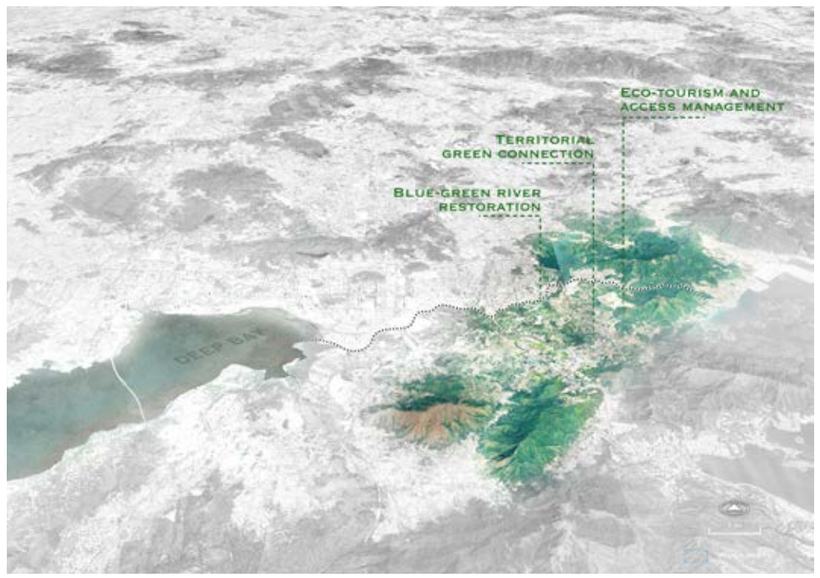


Mountain Transect #2

Living Mountain Landscapes

Connecting Rivers, Forests, and People

Mountain landscapes are more than protected forests—they are interconnected systems where ecological processes, waterways, and human activities continuously interact. Strengthening ecological connectivity, restoring river corridors, and guiding visitor access together create healthier mountain landscapes that support biodiversity while accommodating recreation and future development



Blue-green river restoration

Restore forested mountain slopes and riparian corridors to retain and filter water before it reaches downstream rivers and floodplains. Reconnect upstream and downstream ecosystems while balancing watershed protection with urban and industrial development.

Enablers

- Engaging with corporates along their Land-use coordination between human/industrial density vs ecological services
- Mainstream sponge city design guidelines

Territorial green connection

Connect green corridors across the Hong Kong–Shenzhen border to support wildlife movement and reconnect fragmented habitats. Expand reforestation to strengthen country parks and green belts as part of a continuous ecological network.

Enablers

- Shared GBA-level ecological baseline data (currently withheld by SZ side)

Eco-tourism and access management

Create designated eco-tourism zones that balance visitor access with habitat protection. Manage recreation and access to reduce pressure on sensitive mountain ecosystems while supporting environmental education.

Enablers

- NM zoning designation
- Introduce eco-tourism protocols, expanding on Guangdong-Hong Kong-Macao Greater Bay Area Culture and Tourism Development Plan (2020)

PART IV.

IMPLEMENTATION STRATEGIES

From Insights to Action

Collective Insights

The workshop generated hundreds of ideas spanning planning, ecology, engineering, finance, governance, community engagement, and policy. Six overarching insights emerged that cut across disciplines and provide a strategic foundation for implementing NbS at basin scale. These insights establish a shared framework for thinking about resilience across the Greater Bay Area and inform the implementation strategies presented in the following chapter.

Connectivity must extend beyond ecological systems

Throughout the workshop, participants consistently emphasized that connectivity is not solely an ecological concept. While restoring habitat corridors and reconnecting fragmented landscapes remain essential, long-term resilience also depends upon connecting institutions, financing mechanisms, governance systems, and implementation partners. Across the Shenzhen River Basin, climate risks, ecological processes, and urban development operate across jurisdictional boundaries, and NbS should be understood not as isolated projects, but as components of these already interconnected systems. This framing of connectivity is consistent with **China's Ecological Civilization** philosophy, promoting long-term, systems-level thinking that serves people and nature alike.

DESIGN + STANDARDS | MONITORING
FINANCE | COORDINATION

Place-based stewardship is central to implementation

Successful implementation depends upon the people who depend on landscapes - those whose livelihoods, homes, and identify are tied to place. Participants consistently emphasized that local communities should be viewed as long-term implementation partners rather than simply stakeholders to be consulted.

Participants emphasized the importance of engaging local communities and place-based actors early, particularly rural communities and other groups with strong and direct ties to the landscape. Clear policy guidance, communication, and financial incentives were identified as essential to building durable support for NbS over time. Participants also noted the importance of broadening the stakeholder landscape to include actors not traditionally engaged in NbS discussions—such as insurers—whose role may become increasingly important in an emerging nature and resilience market.

Workshop teams noted that our modern, anthropocentric development script has too often left vulnerable populations with little say over consequential decisions that reshape their landscapes. Coastal and estuarine communities in GBA already experience impacts from climate change that threaten livelihoods and cultural identities; NbS must be seen not only as addressing an ecological challenge, but a social and economic one too. **IUCN's updated Global NbS Standards** make this explicit by calling for inclusive governance that gives local communities agency in shaping outcomes.

DESIGN + STANDARDS | MONITORING
FINANCE | COORDINATION

Existing governance platforms provide the most credible entry points

Rather than proposing entirely new governance structures, some participants identified value in working through existing policy processes, institutional platforms, and government planning cycles. For example, there may be opportunities to align NbS priorities with Hong Kong government planning processes, build on current coordination mechanisms, and use the **Climate Action Plan** steering process and public consultation channels as entry points for broader NbS integration. The **Northern Metropolis** was also discussed as a potential demonstration site for more ecosystem-based and cross-border collaboration, with the government potentially playing a convening role through a regional NbS Coordination Mechanism or platform model.

DESIGN + STANDARDS | MONITORING
FINANCE | COORDINATION

Finance must evolve from projects to portfolios

Adaptation, resilience, and NbS financing gaps are well documented. Precision is needed to match projects with the right capital across the public, philanthropic, or private spectrum, each of which operates with different risk appetites, time horizons, and return expectations.

Portfolio thinking also expands how value is understood. NbS generates multiple forms of public value—including reduced climate risk, biodiversity conservation, public health, tourism, and cultural benefits—that are rarely reflected within conventional project finance. Unlocking investment therefore requires financing models capable of recognizing these broader outcomes. Public-sector funding, private-sector incentives, and regional investment vehicles may each require distinct framing. Workshop teams identified a number of mechanisms worth further exploration, including ecotourism-linked revenues, incentives for private operators, and the expansion of green bond categories to better accommodate nature-based investments. The discussion highlighted the need for a stepwise strategy that links project concepts and portfolios to public priorities, investable structures, and implementation realities.

DESIGN + STANDARDS | MONITORING
FINANCE | COORDINATION

Coss-sector exchange is itself a strategic asset

A core value of the workshop was the opportunity for finance, government, academia, design, engineering, and conservation actors to work through the same set of spatial and implementation challenges together. This cross-sector exchange helped test assumptions, connect design ideas to delivery conditions, and reveal where different institutions and disciplines can play complementary roles. The workshop demonstrated that advancing NbS at watershed scale will depend not only on strong project ideas, but also on stronger relationships and a more shared language across sectors.

DESIGN + STANDARDS | MONITORING
FINANCE | COORDINATION

Scaling the work will require deeper engagement across Shenzhen and the wider GBA, as well as internationally

Participants recognized that the workshop created a strong foundation, but also that broader representation from Shenzhen and other Greater Bay Area institutions will be essential to the next phases of work. If the initiative is to move from concept development toward implementation and scaling, future engagement will need to deepen cross-border participation, strengthen ties with Shenzhen-based actors, and clarify the role of a longer-term Greater Bay Area partnership or mission platform. Scaling NbS in this context will depend as much on who is at the table as on the technical merits of any individual intervention.

The Greater Bay Area combines exceptional ecological assets, rapid urban transformation, internationally recognized financial institutions, and an increasingly integrated regional governance landscape. These characteristics position the region to become a global demonstration for implementing Nature-based Solutions at metropolitan scale.

Participants viewed the Shenzhen River Basin as an ideal starting point not only because it solves every regional challenge, but also because it provides a shared landscape in which new governance models, financing approaches, and implementation partnerships can be tested before being expanded across the Greater Bay Area and beyond.

DESIGN + STANDARDS | MONITORING
FINANCE | COORDINATION

Cross-Border Implementation Concepts

Workshop attendees articulated a regional vision for NbS as interconnected ecological infrastructure capable of strengthening resilience, biodiversity, and quality of life across the GBA. Realizing that vision falls to the institutions, financial systems, policies, and partnerships capable of translating ambitious ideas into implementable projects and, ultimately, into a coordinated portfolio of investments at regional scale. Throughout the workshop, participants identified a series of complementary pathways toward those ends.

The strategies presented in this chapter are organized around three interdependent dimensions—**governance, finance, and engagement**—each supported by potential policy reforms, institutional innovations, and early pilot opportunities that can help move from demonstration projects toward long-term, system-wide implementation.

Governance

- Coordinating Action Across Institutions and Scales

Engagement

- Expanding Delivery Capacity: Beneficiary-First Approach
- Situating Institutional Finance

Finance

- Defining the Investment Proposition and Baseline
- Preparing the Portfolio and Selecting Fit-for-Purpose Vehicles
- Using Policy and Incentives to Enable Finance
- Testing NbS as an Asset: Gei Wai Proof of Concept

A NOTE ON THE WORKSHOP CONCEPTS AND ACTORS

The initiatives, strategies, and actors presented here are illustrative concepts emerging from the workshop, intended to support further scoping, coordination, and coalition-building. Inclusion of specific actors indicates potential relevance and does not imply commitment, endorsement, or a defined role.

Photo © Derek Tang

GOVERNANCE STRATEGIES

Coordinating Action Across Institutions and Scales

For the purposes of this strategy, cross-boundary governance refers primarily to coordination across the Shenzhen River / Deep Bay landscape between Hong Kong and Shenzhen, situated within the wider policy and institutional context of the Greater Bay Area.

Shenzhen River / Deep Bay	Primary implementation geography
Hong Kong ↔ Shenzhen	Principal cross-boundary coordination
Greater Bay Area / Guangdong	Regional enabling context
Mainland Central Government	National policy and strategic context

Responsible institutions differ across Hong Kong SAR, Shenzhen, Guangdong, and national government according to their respective mandates. Rather than proposing a new institution, some participants focused on clarifying how existing actors can contribute according to their respective mandates and capabilities. In the SZ River Basin, Responsibilities relevant to NbS are distributed across multiple ministries and agencies. Responsibilities relevant to NbS are distributed across government agencies and public bodies responsible for:

- **Ecology, biodiversity, and environmental protection**
- **Planning, development, and urban greening**
- **Water, drainage, and flood management**
- **Coastal and ecological restoration**
- **Land management and public assets**

A distributed governance model works through existing institutions rather than creating a new governing body. Different actors contribute where they have the mandate, expertise, assets, or capacity to act—from government policy and planning to private-sector investment, technical expertise, land management, and community stewardship. The challenge is to coordinate these efforts around shared priorities for the landscape.

No single institution governs NbS implementation across the Shenzhen River / Deep Bay landscape. Nor does effective cross-boundary action necessarily require creating one. The opportunity is to establish mechanisms through which existing institutions can coordinate around shared outcomes while acting through their respective mandates, jurisdictions, and capabilities.

Depending on the complexity, maturity, and level of authority required for cross-boundary NbS coordination, the following existing mechanisms could be tested and aligned to advance emerging strategies and initiatives:

- **High-Level Summit Mechanism:** Highest-level mechanism, appropriate for priorities requiring direct national-level **leadership, authorization, or oversight.**
- **Greater Bay Area Joint Meeting Mechanism:** Appropriate for defined cross-boundary initiatives that have been incorporated into major government priorities or require GBA-level coordination.
- **Hong Kong–Guangdong Cooperation Joint Meeting:** Provides a platform to advance NbS initiatives agreed by both governments, establish annual priorities, and convene dedicated working groups for implementation.
- **Specialized Coordination Mechanisms:** Appropriate for emerging or exploratory initiatives requiring focused technical, policy, or institutional coordination before formalization.
- **Routine Mainland–Hong Kong Liaison Mechanisms:** Existing thematic coordination channels could incorporate NbS into regular agendas, enabling agencies to identify priorities, resolve implementation issues, and coordinate specific actions on an ongoing basis.

INITIATIVE IDEAS	
Ecological Master Planning and Valuation Initiative	Prepare a cross-boundary ecological infrastructure plan identifying priority habitats, corridors, restoration areas, and biodiversity assets; Undertake ecological baseline mapping, native seed research, ecosystem monitoring, and ecosystem service valuation to guide investment decisions.
Native Commercial Nurseries Program	Repurpose underutilized land for urban nurseries; Lease vacant government land—including former military land—for native plant nurseries, urban farms, and restoration supply chains.
Nature-Positive Private Development Policy	Require biodiversity management and net gain through lease conditions rather than relying solely on **Environmental Impact Assessment**; Require biodiversity plans for new developments and encourage retrofits on existing properties to contribute to regional ecological goals.
Standards and Certification to Mobilize Finance Initiative	Create common KPIs, certification systems, and technical guidance that can support implementation and unlock finance by reducing risk through standardization; Translate **CEDD's NbS Design Guidelines** into an investment credential within the Hong Kong's green bond taxonomy, creating a trusted benchmark that enables banks, insurers, and investors to evaluate and finance nature-based solution; Aggregate projects into investment-ready portfolios through an intermediary platform or dedicated investment vehicle capable of combining projects of different sizes, revenue profiles, and risk characteristics into products suitable for institutional investors.
Public Lands Partnership and Media Campaign	Enable NGOs to formally co-manage wetlands, conservation areas, and restoration sites while supporting monitoring and long-term maintenance; Launch public engagement campaigns that make biodiversity visible and desirable through schools, community programmes, volunteer opportunities, and social media influencers.
Coordinated Policy and Leadership at Multiple Scales	Embed NbS into **HK's inaugural Five-Year Plan** during the current public consultation period to support long-term implementation; Build on a proven public engagement model used in **Hong Kong's Climate Action Plan 2050** where more than 3,000 submissions informed the final strategy; Align with **China's 15th Five-Year Plan** on biodiversity and ecological security to strengthen policy coherence and unlock national funding; Use the Northern Metropolis as a regional demonstration zone to pilot integrated ecological infrastructure and generate evidence.

ENGAGEMENT STRATEGIES

Expanding Delivery Capacity

Responsibility for NbS implementation and maintenance remains heavily concentrated within government agencies. While governments play an essential role in planning, regulation, and public investment, this model limits the pace and scale of implementation and places long-term stewardship within already constrained public institutions. A more sustainable approach will include more robust direct participation by civil society and the private sector. Principles for scaling NbS regionally will require:

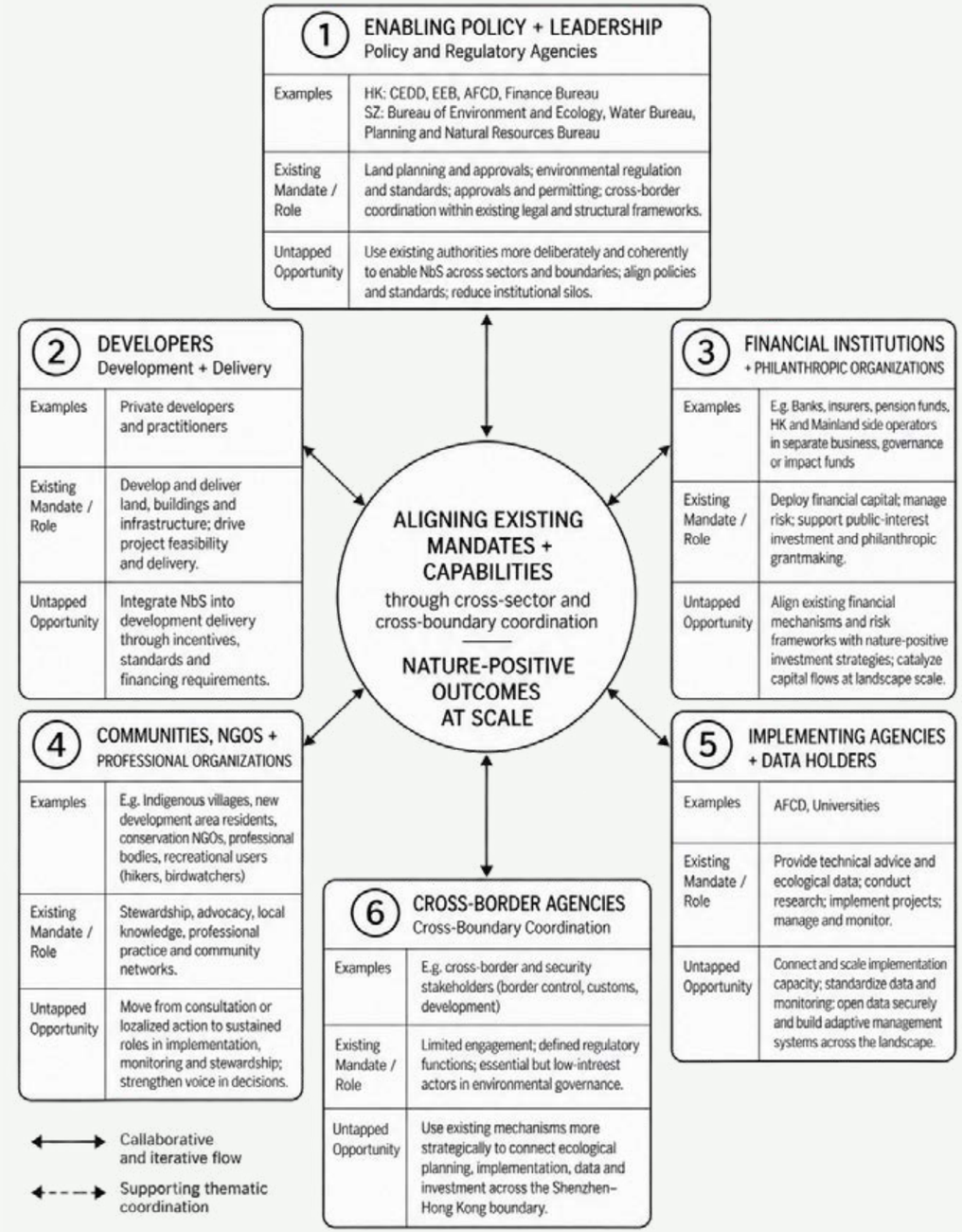
- **Updated regulatory frameworks** to allow NGOs, research institutions, and community groups to execute projects directly, thereby reducing the number of intermediary approvals required and improving efficiency;
- **Distributed implementation responsibility** across multiple sectors to expand pipeline of implementable NbS projects;
- **Expanded risk pools** to move beyond dependence on any single actor's capacity or budget cycle; and,
- **Broadened public engagement** throughout the implementation process

Beneficiary First Approach

Many NbS strategies struggle to attract investment not because the ecological case is weak per se, but because the intended beneficiaries are murky. Diffuse, untapped beneficiaries make it structurally difficult to design value-recovery instruments from those who gain, and weakens the case for payment.

Compounding this dynamic, engagement strategies across the GBA are frequently misaligned - the actors most capable of designing and delivering NbS are consistently relegated to supporting roles. The stakeholder landscape reveals that many organizations with the greatest technical knowledge and implementation capacity currently occupy peripheral roles within project governance, while those with formal decision-making authority often have relatively limited interest in ecological outcomes. **Capacity is not simply a matter of engaging more stakeholders, but of positioning existing stakeholders into roles better aligned with their comparative advantages.**

ALIGNING STAKEHOLDERS WITH UNTAPPED POWER



Situating Institutional Finance

Engaging the Financial Sector: Insurers and Institutions

Many financial institutions remain unaware of the potential for NbS to help them approach investment opportunities and manage climate risks effectively. Strategic engagement can yield long-term partnerships that reflect the distinct motivations of different stakeholder groups rather than relying on a single value proposition for NbS. Priorities for this kind of outreach include insurers and banks. Workshop participants clarified where there may be opportunity for alignment:

INSURERS

- **Recognize where insurers hold climate risk through underwriting**, claims exposure, and investment portfolios, and where NbS could reduce expected losses.
- **Incorporate NbS into risk models** and underwriting, supported by credible evidence of reduced flood, landslide, wildfire, heat, and other physical risks.
- **Reflect demonstrated risk reduction** in pricing, coverage, and investment, creating financial incentives for assets and developments that incorporate NbS.

BANKS AND FINANCIAL INSTITUTIONS

- **Identify climate risk embedded in lending and investment portfolios**, including exposure to assets, developments, infrastructure, and businesses vulnerable to physical hazards.
- **Match resilience benefits to financial time horizons**. Mortgages, infrastructure debt, bonds, and other longer-duration investments can remain exposed for decades, making future climate conditions material to decisions made today.
- **Use reduced risk to improve financing conditions** through preferential lending, longer tenors, or other mechanisms that make NbS-integrated development more attractive.

PROTECTING AND ADAPTING THE SYSTEMS THAT UNDERPIN ENTERPRISE VALUE

For companies exposed to climate volatility, NbS and adaptation can protect more than physical assets. Flooding, heat, water stress, and ecosystem degradation can disrupt operations, supply chains, customers, and future cash flows—ultimately affecting enterprise value. NbS can therefore function as a resilience investment: reducing physical risk, protecting business continuity, and helping preserve the conditions on which long-term earnings and asset values depend.

Photo © The Nature Conservancy

CONCEPTUAL COORDINATION MECHANISM AND INITIATIVES

ENABLING POLICY + LEADERSHIP
Strategic alignment and national policy direction, including GBA development

NATIONAL LEVEL
(Strategic Direction)

KEY ACTORS
Central Government of PRC

CORE ROLE
Strategic alignment and national policy direction, including GBA development

REGIONAL / PROVINCIAL LEVEL
(Coordination & Alignment)

KEY ACTORS
Guangdong Provincial Government
Hong Kong SAR Government
Macao SAR Government

CORE ROLE
Regional coordination, policy alignment, and enabling frameworks

MUNICIPAL / IMPLEMENTATION LEVEL
(Joint Planning & Implementation)

KEY ACTORS
Shenzhen Municipal People's Government
Northern Metropolis Coordination Office

CORE ROLE
Joint planning, coordination, and implementation across the Shenzhen River / Deep Bay landscape

DELIVERY LEVEL
(Implementation & Delivery)

KEY ACTORS
Public and statutory bodies, landowners, developers, financial institutions, professional institutions, universities, NGOs, communities

CORE ROLE
Implementation capacity, land/assets, technical expertise, finance + direct holders of risk

SHENZHEN RIVER / DEEP BAY IMPLEMENTATION PLATFORM
Integrated coordination, data sharing, project preparation, and adaptive management across the watershed

PLAN THE LANDSCAPE

Ecological Master Planning
Prepare a cross-boundary ecological infrastructure plan
Map habitats, corridors, restoration areas and biodiversity assets
Establish ecological baselines and guide future investment and development

CHANGE DEVELOPMENT PRACTICE

Nature-Positive Private Development Policy
Require biodiversity management and net gain
Embed biodiversity planning in new development and retrofits
Align incentives and connectivity across the landscape

BUILD THE MARKET

Native Commercial Nurseries
Repurpose land for native plant nurseries and restoration supply

Standards + Certification
Develop common KPIs, standards and technical guidance
Translate NbS guidance into investment credentials
Aggregate projects into investable portfolios

STEWARD THE LANDSCAPE

Public Lands Partnership + Media Campaign
Co-manage wetlands, conservation areas and ecological assets
Support monitoring, maintenance and adaptive management
Build public awareness and long-term stewardship.

COORDINATED POLICY + LEADERSHIP AT MULTIPLE SCALES

Embed HKSAR Five-Year Plan
Establish long-term implementation to support NbS

Build on Hong Kong's Climate Action Plan 2050
Embed nature-based solutions in policy, planning and public engagement

Align with China's 15th Five-Year Plan
Strengthen biodiversity and ecological security, unlock national funding and policy coherence

Use the Northern Metropolis
Demonstration zone for pilot integrated ecological infrastructure and learning

FINANCE STRATEGIES

Defining the Investment Proposition and Baselines

A portfolio approach to NbS begins with the economics of the landscape, not the financing needs of individual projects. In the Shenzhen River Basin, this means establishing a baseline of ecosystem services, existing and planned economic assets, development trajectories, and physical climate risk; identifying where value is being created, placed at risk, protected, or left uncaptured; and assembling NbS interventions in response. The resulting portfolio can demonstrate how nature-based infrastructure collectively reduces risk and supports value, even when individual interventions do not generate standalone revenue.

Build the Economic Case at the Watershed and Urban Scale

Before individual projects are assessed for investment, establish the underlying economics of the Shenzhen River Basin and Deep Bay as an interconnected ecological and urban system. This creates a common baseline for understanding where NbS can protect, enable, or create economic value.

- **Ecosystem services and natural assets:** wetlands, rivers, forests, coastal habitats, and the services they provide.
- **Existing assets and economic activity:** housing, infrastructure, businesses, transport networks, and public facilities.
- **Planned development and future investment:** new housing, infrastructure, technology investment, the Northern Metropolis, and San Tin Technopole.
- **Current and future physical climate risk:** flooding, sea-level rise, storm surge, extreme rainfall, heat, and other hazards.
- **Ecological degradation and transferred risk:** where landscape change diminishes ecosystem services, increases exposure, or transfers risk elsewhere.

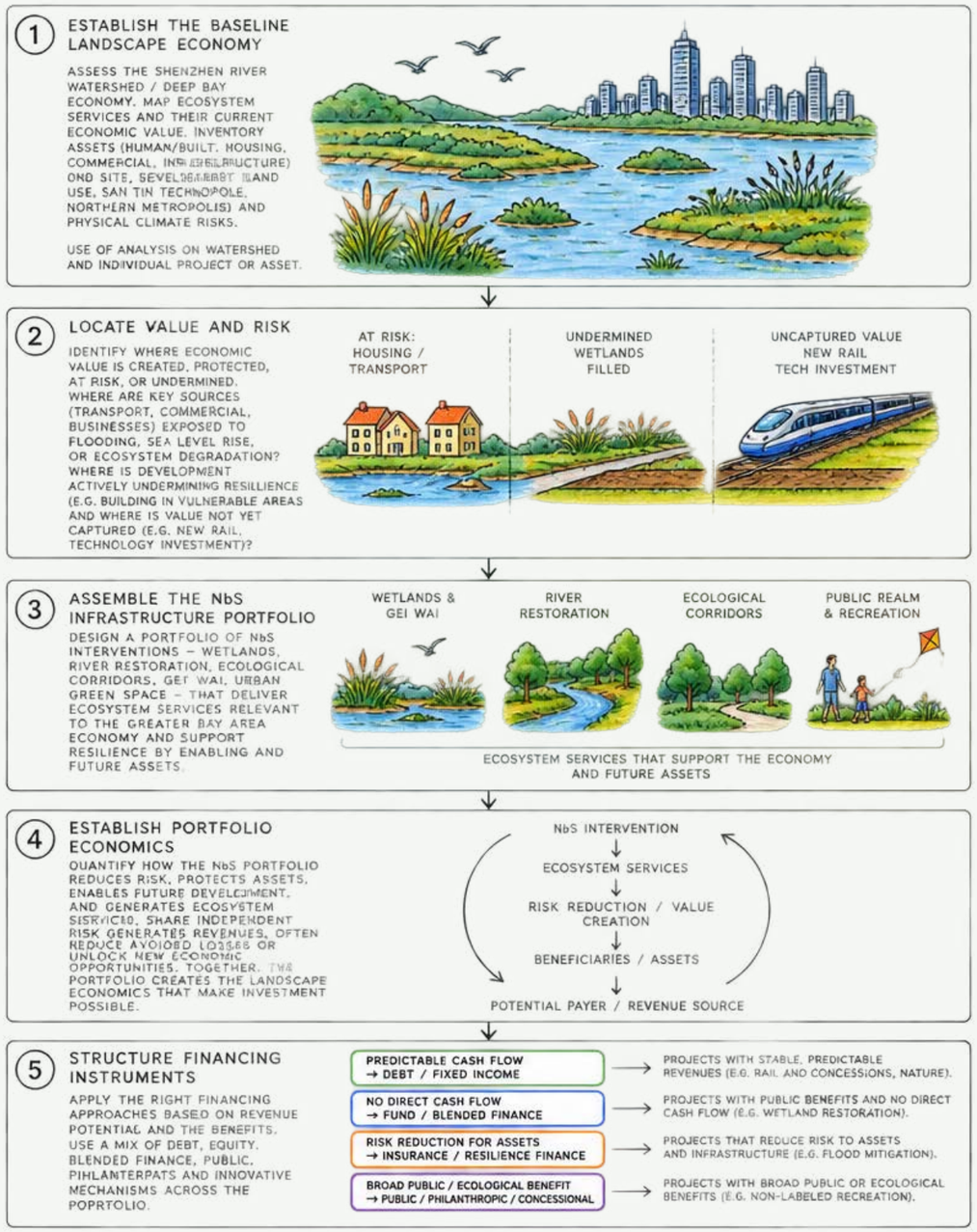
Identify where value and risk are currently misaligned

A baseline creates a way to look beyond the question "Does this NbS project generate revenue?" and instead asks: **Where is economic and ecological value being created, exposed, protected, undermined, or left uncaptured across the watershed?**

- **Value at risk** → What existing assets, communities, infrastructure, and economic activities are already exposed to climate and ecological risk?
- **Future value at risk** → Where is significant new economic value being created—through housing, rail, technology, infrastructure, and development—without corresponding investment in landscape resilience?
- **Value being undermined** → Where are development patterns or activities degrading the ecological systems on which resilience and economic activity depend?
- **Value not captured** → Which ecosystem services and risk-reduction benefits currently generate significant economic value but have no mechanism for recognizing, pricing, or capturing that value?
- **Value that could be enabled** → Where could investment in NbS reduce risk or improve environmental performance in ways that support future development, infrastructure, investment, or economic activity?

NBS PORTFOLIO BUILDING PROCESS

These underlying steps create the conditions for landscape scale planning to be positioned within the content of urban growth and value creation. It has the potential to reduce risk for assets at scale, not simply at a project or firm level.



FINANCE STRATEGIES

Preparing the Portfolio and Selecting Fit-for-Purpose Vehicles

Assemble the NbS Infrastructure Portfolio in View of These Conditions

Rather than evaluating NbS through project- or firm-level investment and cost-benefit analysis, the portfolio should be assembled around what interventions collectively do for the regional economy and landscape. Wetlands, river systems, gei wai, ecological corridors, nurseries, public realm, and other NbS and adaptation interventions can be understood as an interconnected infrastructure system that generates multiple forms of value across the basin.

This requires linking each intervention to the benefits it produces, such as reduced flood exposure and avoided losses, improved water quality, biodiversity gains, recreation and tourism, or support for future development—and then identifying the assets, communities, institutions, and economic activities that benefit. In some cases, these beneficiaries may represent potential payers or revenue sources; in others, the benefits will remain fundamentally public or ecological goods. **At the portfolio scale, these different forms of value can be considered together, revealing economic benefits and risk-reduction functions that may not be visible when projects are evaluated individually.**

Select Financing Vehicles and Layer Capital Based on Portfolio Economics

Once the economics of the Shenzhen River–Deep Bay portfolio are understood, financing can be structured. Understanding where risk sits across assets, facilities, operations, and economic development is critical to quantifying and timing exposure, identifying who bears the risk, and determining where investment can reduce or transfer it.

Some interventions may generate predictable or directly capturable cash flows, such as leases, user fees, commercial activity, development-linked revenues, or other contracted payments. These may support more conventional investment structures, including debt or fixed-income instruments, dedicated funds, or SPVs.

Other interventions create substantial economic value but do not produce a direct project-level revenue stream. Wetland restoration, ecological corridors, flood-risk reduction, habitat enhancement, and other public or landscape-scale interventions may instead protect property and infrastructure, reduce future losses, enable development, or generate broader ecosystem and social benefits. These benefits can justify public expenditure, concessional capital, philanthropy, or other forms of catalytic funding even where they cannot be directly monetized.

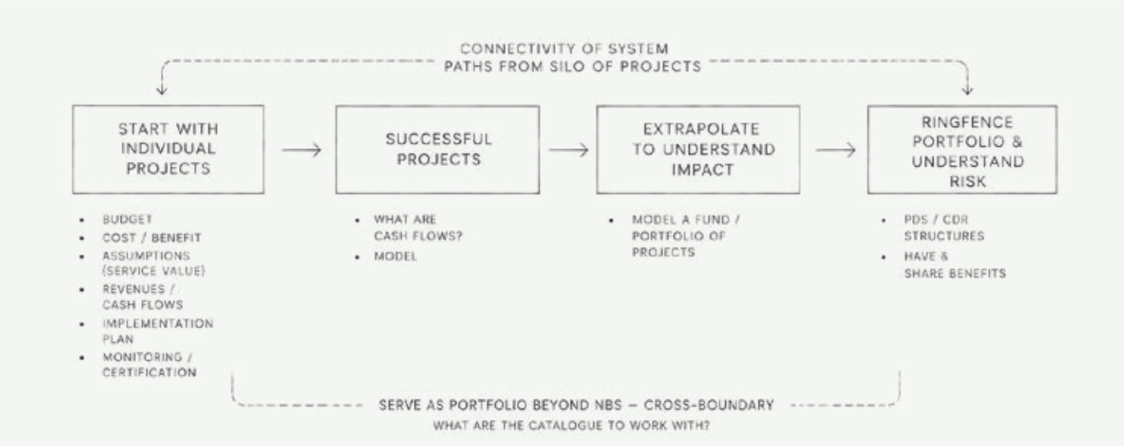
The key question is therefore not whether a single intervention is "bankable," but whether it generates a predictable revenue stream that can be contributed to the landscape. If not, then what form of capital is appropriate to the value it creates or risk it mitigates?

For each intervention or group of interventions within the GBA portfolio, the first step is to determine whether there is a predictable revenue stream and how directly that revenue can be captured. This informs the appropriate financing vehicle, from fixed-income instruments and dedicated funds to SPVs, blended structures, or public delivery mechanisms.

Then, decision making around the mix and sequencing of capital within that vehicle can be pursued. Different layers of public, philanthropic, concessional, and commercial capital can play different roles: funding early-stage development, absorbing or reducing risk, establishing performance, and ultimately enabling investment capital to enter where revenues and returns become sufficiently predictable.

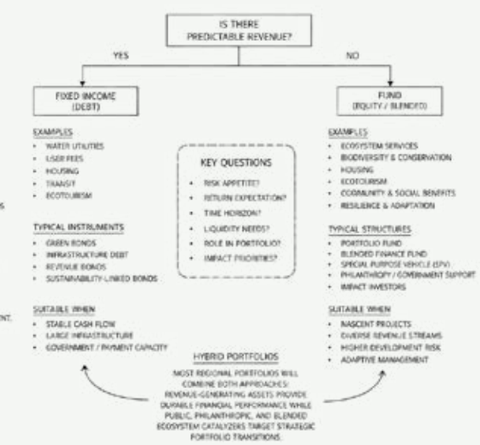
The objective is not to force every component of the portfolio to become independently revenue-generating. This decision-making process allows revenue-generating and value-capturing components to sit alongside essential public-good investments while directing each source of capital toward the risks and returns it is best positioned to carry.

Build from Projects to a Portfolio



Match Capital to Risk and Return

Match Financing Vehicles to Value



FINANCE STRATEGIES

Using Policy and Incentives to Enable Finance

Policy and regulatory frameworks shape the conditions under which capital can participate in NbS. In the GBA, the opportunity is not only to identify new sources of finance, but to use existing policy mandates, public investment, planning tools, and market incentives to make ecological outcomes more visible, valuable, and investable.

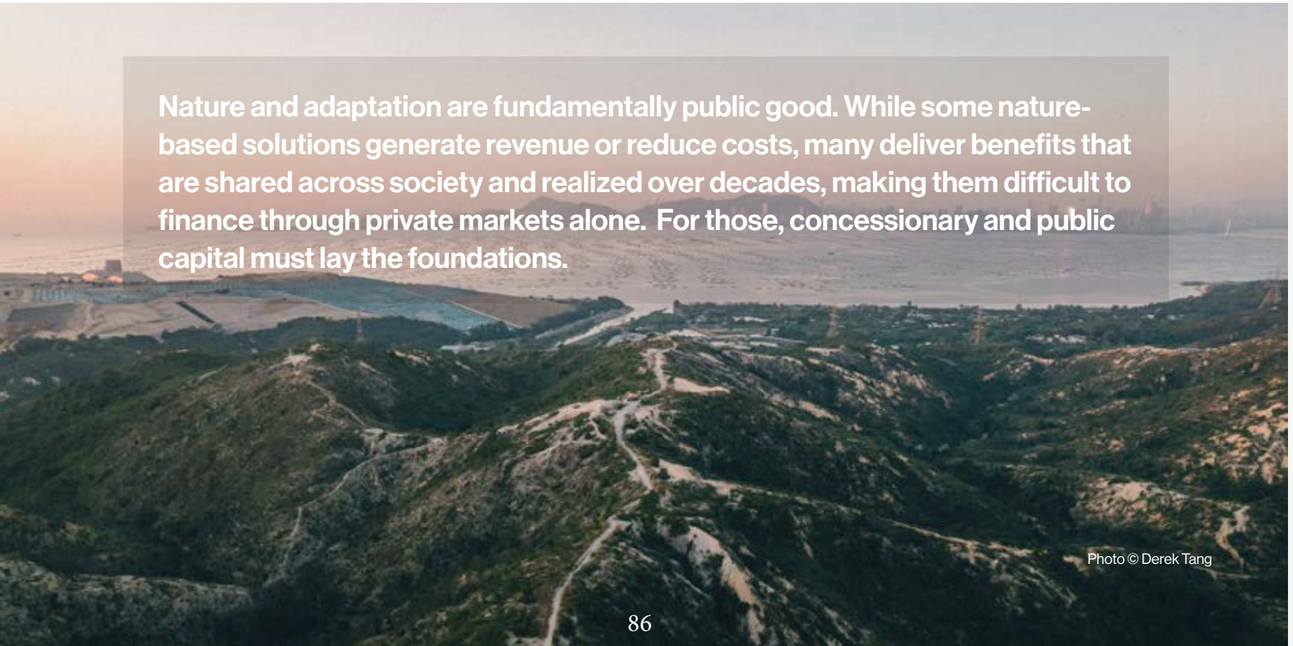
The policy findings point to a particular need to **bridge policy ambition and implementation**. The levers below illustrate how government can help close that gap: **enabling** investment by reducing uncertainty and establishing common standards; **investing** strategically where public capital can unlock or de-risk broader participation; and **scaling** successful approaches through incentives, procurement, land policy, and other mechanisms that embed NbS within mainstream development.

For the GBA, these levers are particularly important because value, risk, and responsibility are distributed across jurisdictions, public agencies, infrastructure operators, developers, landowners, and communities. Used in combination, policy and incentive mechanisms can help align these actors around shared outcomes—creating clearer pathways from ecological and resilience benefits to the institutions and capital that can help deliver them.

No single lever will be sufficient. The opportunity is to assemble a coordinated package of enabling policy, public investment, and market incentives appropriate to different projects, actors, and stages of the NbS portfolio.

Across these levers, four are particularly important for the GBA:

- **Embedding NbS within public investment and development planning**
- **Aggregating interventions through portfolio-level funding mechanisms**
- **Establishing credible impact standards and verification**
- **Using land and development incentives to connect ecological outcomes with future economic value.**



Nature and adaptation are fundamentally public good. While some nature-based solutions generate revenue or reduce costs, many deliver benefits that are shared across society and realized over decades, making them difficult to finance through private markets alone. For those, concessionary and public capital must lay the foundations.

Photo © Derek Tang

INITIATIVE IDEAS TO OVERCOME BARRIERS

ENABLE: BUILD THE FOUNDATIONS AND STANDARDS

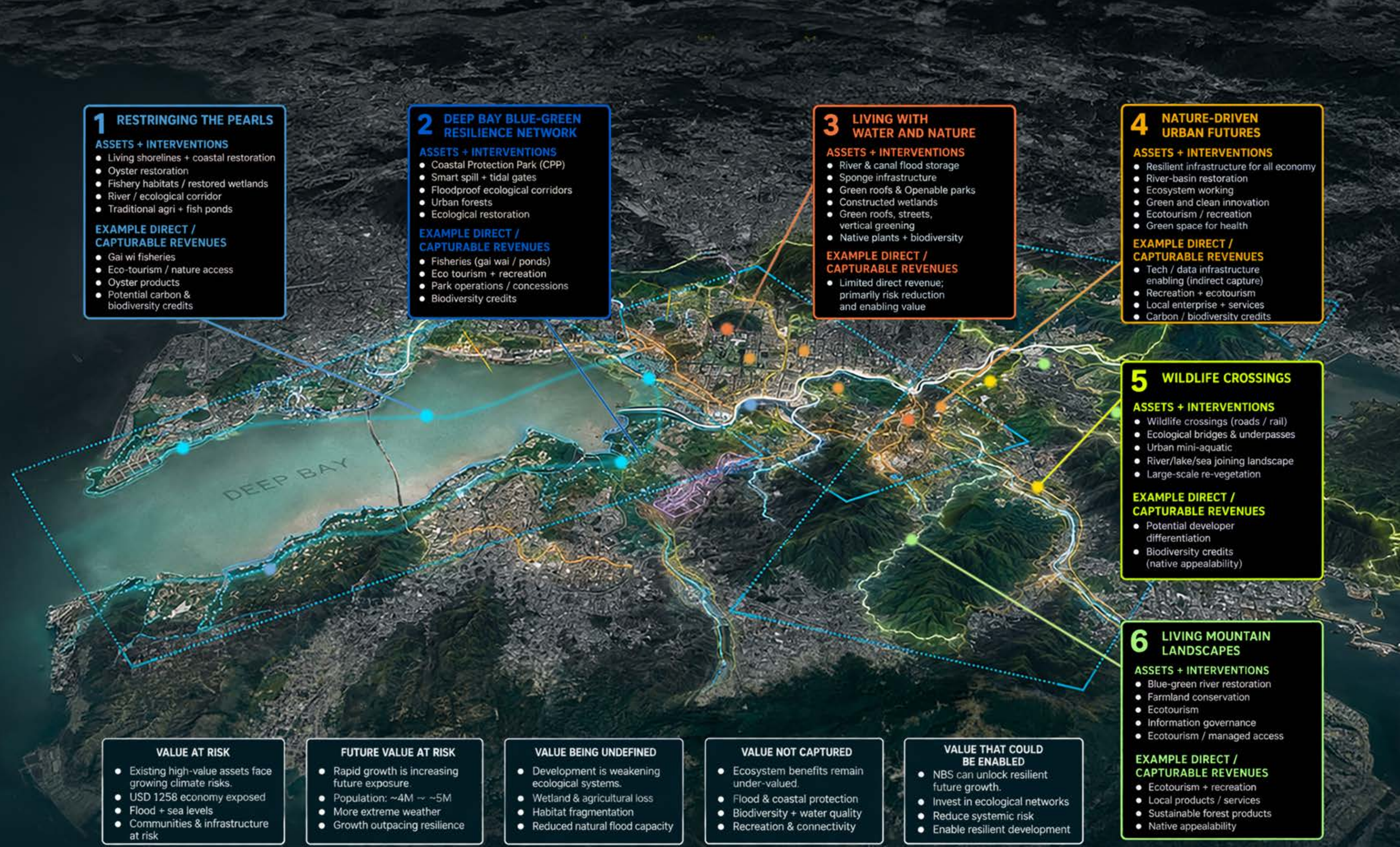
POLICY LEVER	IMPLEMENTATION OBSTACLES	INITIATIVES AND OPPORTUNITIES
EXPAND GREEN FINANCE TAXONOMY	Green finance categories are too narrow to accommodate the full range of nature-based solution investments.	Expand eligible asset classes to include green bonds, sustainability-linked finance, and other financial instruments to support nature positive projects.
INTEGRATE NBs INTO ENVIRONMENTAL IMPACT ASSESSMENT (EIA)	Nature-based interventions are often treated as optional mitigation rather than core project infrastructure.	Require developers to address a defined proportion of project area/impact through NBS before construction begins, establishing a baseline for nature-positive development.
CREATE FLEXIBLE REGULATORY PILOT SCHEMES	Existing regulations can limit Innovation and often reverse-greening ecosystem activities.	Establish pilot regulatory pathways that allow carefully managed commercial activities similar to the proposed Wetland GC Wai model, to test sustainable revenue generation.
ESTABLISH VERIFIED IMPACT ASSESSMENT AND CERTIFICATION	Investors require credible, comparable evidence of environmental performance.	Standardize and track ecological and financial performance over time, support post-investment accountability and compliance, and reduce greenwashing risk through disclosures that demonstrate ecological outcomes and investment performance.

INVEST: SCALE THROUGH LARGER POOLS OF CAPITAL FOR DEVELOPMENT

POLICY LEVER	IMPLEMENTATION OBSTACLES	INITIATIVES AND OPPORTUNITIES
GOVERNMENTAL COMPENSATION FOR BIODIVERSITY STEWARDSHIP	Private landowners often receive little financial benefit for maintaining ecological services that generate public value.	Compensate verified conservation outcomes through stewardship payments supported by robust baseline data and MRV systems.
INCREASE BLENDED INVESTMENTS	Fiscal levers are largely directional through public acquisition, providing limited incentives for private risk reduction.	In Hong Kong, explore matched-based mezzanine and risk transfer structures linked to verified outcomes and resilience value. China should pilot national the NBS and biodiversity bonds across provincial markets to deepen institutional investor base and build a project pipeline bank for qualifying NBS via institutions.
LAND VALUE CAPTURE	NbS investments often increase surrounding land value without returning value to ecosystem management.	Capture a portion of increased land value created by resilience investments and reinvest it into long-term ecosystem conservation and maintenance.

SCALE: MOBILIZE MARKETS AND MAINSTREAM INVESTMENT

POLICY LEVER	IMPLEMENTATION OBSTACLES	INITIATIVES AND OPPORTUNITIES
PAYMENTS FOR ECOSYSTEM SERVICES (PES)	Beneficiaries of ecosystem services are often disconnected from those who manage and maintain them.	Establish nationwide-scale payment mechanisms reflecting downstream beneficiaries--including utilities, municipalities, and industries--with ecosystem providers through fee-for-maintaining ecosystem models.
SCALE THROUGH LARGER POOLS OF CAPITAL FOR DEVELOPMENT	Public funding remains fragmented and primarily grant / concessional-based instruments.	Expand financing for ecosystem services through beneficiary payments, ecological compensation, resilience and infrastructure funding, and other public and private revenue streams. Explore pooled or regional funding mechaninms that can aggregate revenues and reinvest them in ecosystem protection and restoration.
ALIGN WITH CHINA'S ECOLOGICAL PRODUCT VALUE REALIZATION FRAMEWORK (生态产品价值实现机制)	Existing national policy provides mechanisms to recognize and monetize ecological asset value, remains underutilized for NBS.	Position nature-based investments within China's ecological product value framework to improve access to national funding, policy incentives, and emerging market mechanisms.


DEEP BAY
1 RESTRINGING THE PEARLS
ASSETS + INTERVENTIONS
Living shorelines + coastal restoration
Oyster restoration
Fishery habitats / restored wetlands
River / ecological corridor
Traditional agri + fish ponds
EXAMPLE DIRECT / CAPTURABLE REVENUES
Gai wi fisheries
Eco-tourism / nature access
Oyster products
Potential carbon & biodiversity credits
2 DEEP BAY BLUE-GREEN RESILIENCE NETWORK
ASSETS + INTERVENTIONS
Coastal Protection Park (CPP)
Smart spill + tidal gates
Floodproof ecological corridors
Urban forests
Ecological restoration
EXAMPLE DIRECT / CAPTURABLE REVENUES
Fisheries (gai wai / ponds)
Eco tourism + recreation
Park operations / concessions
Biodiversity credits
3 LIVING WITH WATER AND NATURE
ASSETS + INTERVENTIONS
River & canal flood storage
Sponge infrastructure
Green roofs & Openable parks
Constructed wetlands
Green roofs, streets, vertical greening
Native plants + biodiversity
EXAMPLE DIRECT / CAPTURABLE REVENUES
Limited direct revenue; primarily risk reduction and enabling value
4 NATURE-DRIVEN URBAN FUTURES
ASSETS + INTERVENTIONS
Resilient infrastructure for all economy
River-basin restoration
Ecosystem working
Green and clean innovation
Ecotourism / recreation
Green space for health
EXAMPLE DIRECT / CAPTURABLE REVENUES
Tech / data infrastructure enabling (indirect capture)
Recreation + ecotourism
Local enterprise + services
Carbon / biodiversity credits
5 WILDLIFE CROSSINGS
ASSETS + INTERVENTIONS
Wildlife crossings (roads / rail)
Ecological bridges & underpasses
Urban mini-aquatic
River/lake/sea joining landscape
Large-scale re-vegetation
EXAMPLE DIRECT / CAPTURABLE REVENUES
Potential developer differentiation
Biodiversity credits (native appealability)
6 LIVING MOUNTAIN LANDSCAPES
ASSETS + INTERVENTIONS
Blue-green river restoration
Farmland conservation
Ecotourism
Information governance
Ecotourism / managed access
EXAMPLE DIRECT / CAPTURABLE REVENUES
Ecotourism + recreation
Local products / services
Sustainable forest products
Native appealability
VALUE AT RISK
Existing high-value assets face growing climate risks.
USD 1258 economy exposed
Flood + sea levels
Communities & infrastructure at risk
FUTURE VALUE AT RISK
Rapid growth is increasing future exposure.
Population: ~4M → ~5M
More extreme weather
Growth outpacing resilience
VALUE BEING UNDEFINED
Development is weakening ecological systems.
Wetland & agricultural loss
Habitat fragmentation
Reduced natural flood capacity
VALUE NOT CAPTURED
Ecosystem benefits remain under-valued.
Flood & coastal protection
Biodiversity + water quality
Recreation & connectivity
VALUE THAT COULD BE ENABLED
NBS can unlock resilient future growth.
Invest in ecological networks
Reduce systemic risk
Enable resilient development

FINANCE STRATEGIES

NBS as an Asset: Gei Wai Proof of Concept

The revitalization of traditional tidal shrimp ponds in Gei wai along the Shenzhen River emerged as a practical demonstration of how productive ecosystems can generate commercial value while delivering biodiversity, resilience, and community benefits. Historically, Gei Wai ponds were productive aquaculture systems that used natural tidal cycles for fish and shrimp farming. However, many were converted into enclosed fish ponds with artificial feeding following socio-economic shifts in the 1970s, and later became under-utilized or abandoned as import competition from mainland China increased in the 1990s. Their revitalization presents an opportunity to restore ecological function while generating diversified revenue streams.

Gei Wai Revenue Model and Feasibility Testing

While initial capital outlay comes from concessionary capital sources (e.g., government or philanthropic), the system is designed to become operationally self-financing through diversified potential revenue sources:

Example Program Offerings

1 PREMIUM FISHERIES

- LEVERAGE SUSTAINABILITY CERTIFICATION (E.G., MSC, ASC, BAP)
- FOCUS ON HIGH-END, EXPERIENCE-LINKED PRODUCTS (ORGANIC SEAFOOD, SPECIALTY AQUACULTURE)
- PARTNER WITH PREMIUM RESTAURANTS, HOTELS AND RETAILERS
- BUILD BRAND AROUND QUALITY, TRACEABILITY AND ECOLOGICAL INTEGRITY

2 ECO-TOURISM

- HIGH-END, BESPOKE EXPERIENTIAL TOURS
- HALF-DAY HARVESTING EXPERIENCES LINKED TO LOCAL RESTAURANTS
- BIRDWATCHING, NATURE AND HERITAGE INTERPRETATION
- PARTNERSHIPS WITH HOTELS, CULTURAL INSTITUTIONS AND TOUR OPERATORS
- TARGET PROVEN VISITORS, NOT MASS TOURISM

3 EDUCATION & CULTURAL SERVICES

- SCHOOL AND UNIVERSITY PARTNERSHIPS
- FIELD TRIPS, RESEARCH AND CITIZEN SCIENCE
- CULTURAL HERITAGE PROGRAMS THAT CELEBRATE LOCAL TRADITIONS
- BUILD LONG-TERM CONSTITUENCY AND STEWARDSHIP FOR THE SYSTEM
- POSITIVE SPILLOVER FOR LOCAL HOSPITALITY AND RETAIL BUSINESSES

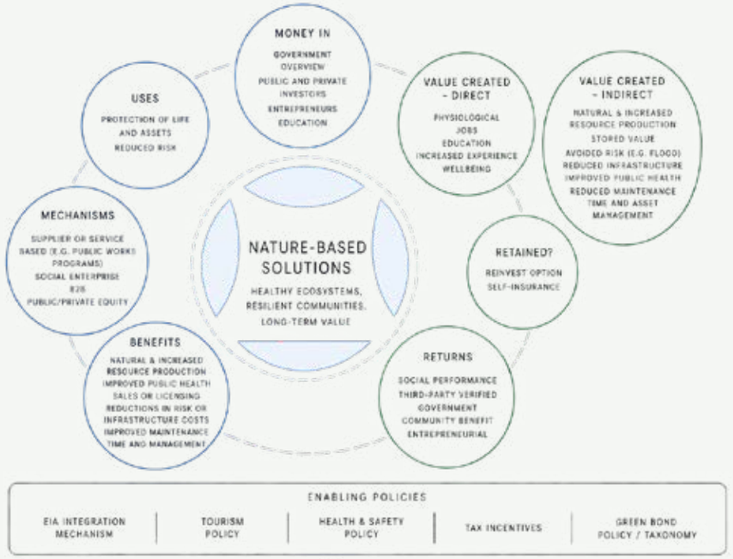
While initial restoration may require public, philanthropic, or other concessional capital, long-term management should not depend on any single commercial use or revenue source. The Gei Wai proof of concept should therefore test a diversified revenue model combining productive uses and visitor or educational revenues with potential payments from corporate, industrial, and commercial beneficiaries of improved ecological performance. Similar diversified approaches have been applied in other wetland-restoration contexts, including TNC-supported projects in Zhejiang, where voluntary corporate purchases of water-related environmental credits have helped channel private funding toward ecological restoration.

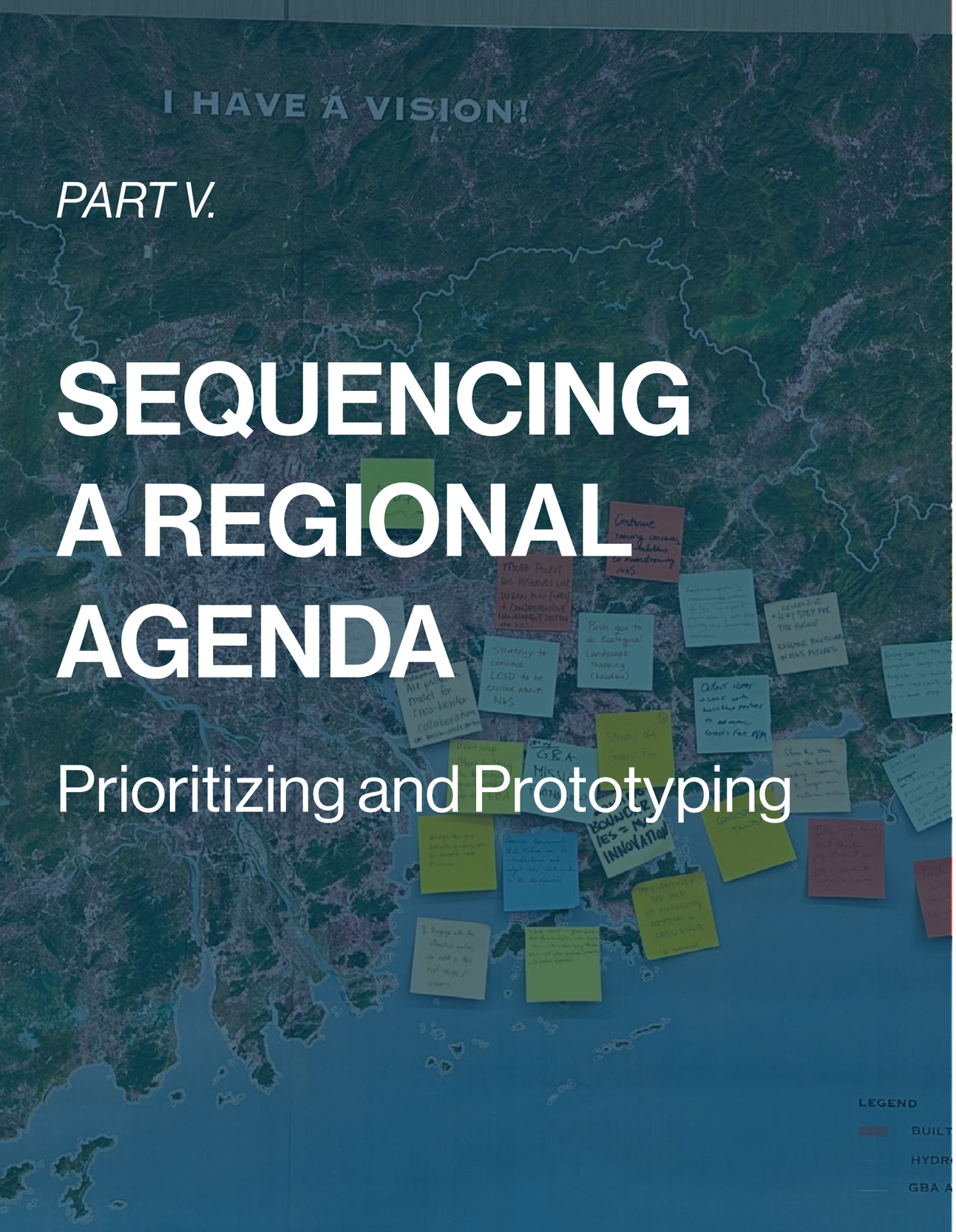
For Gei Wai, future feasibility work could assess whether comparable mechanisms—including voluntary water-related payments or credits, corporate sustainability contributions, and other beneficiary-pays arrangements—could complement more established revenue and public funding sources.

However, given the nascent and largely voluntary nature of these markets, their viability and integrity should not be assumed. Any application would require careful assessment of buyer demand, additionality, verification, transaction costs, and safeguards against greenwashing. The objective is not to identify a single mechanism capable of "paying for" restoration, but to determine whether multiple revenue and funding streams, tied to different beneficiaries and forms of value, can collectively support long-term stewardship.

While developed around Gei Wai, the underlying financing logic extends beyond aquaculture. The model demonstrates how productive ecosystems can combine ecological restoration with diversified revenue generation, providing a template for structuring other Nature-based Solutions as investable assets across the Greater Bay Area.

Conceptual Business Model Canvas





PART V.

SEQUENCING A REGIONAL AGENDA

Prioritizing and Prototyping

Scaling NbS means decisions must be made across multiple scales: selecting priority landscapes, establishing the governance and financing systems that enable implementation, and identifying demonstration projects that build momentum.

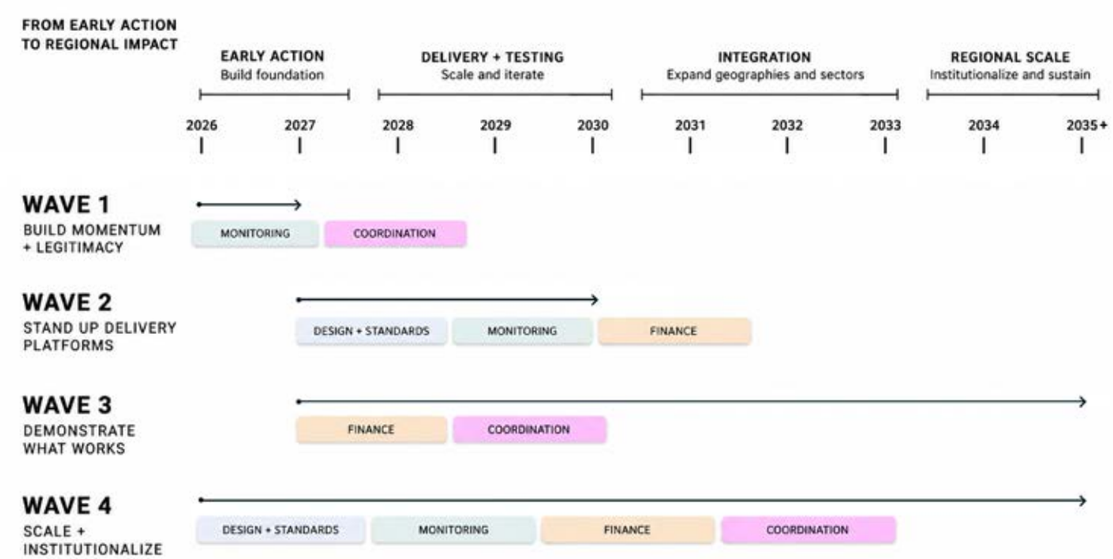
The implementation strategies presented in the previous chapter describe what is required to increase the number and more strategically place NbS across the GBA landscape. This section focuses on how to prioritize action in a rapidly changing climate and development context.

Climate change makes sequencing particularly important. Time is itself a strategic variable.

Every government-led planning cycle, infrastructure investment, and major private-sector-led development decision either expands or constrains future adaptation options. Once urban form, transport corridors, drainage systems, and development patterns are established, opportunities to integrate NbS become more technically challenging and significantly more expensive. Acting during periods of major investment and policy reform therefore offers a unique opportunity to reduce future climate risk while avoiding costly retrofits.

The workshop identified four overlapping waves through which implementation that can advance concurrently over different time horizons, building momentum from early action toward a regional approach.

Several policy and implementation opportunities are already emerging across the GBA. At the national level, implementation of the **Mainland's Fifteenth Five-Year Plan** provides a broader policy framework for biodiversity, ecological security, and green development. At the regional and local levels, **Hong Kong's First Five-Year Plan**, continued planning for the Northern Metropolis, and Shenzhen's **Measures on Comprehensively Strengthening Ecological Environmental Protection to Promote High-Quality Economic Development (2024–2027)** create opportunities to integrate NbS into planning, investment, and development. **New NbS design guidelines** and **high-level regional and international platforms such as APEC** can further strengthen partnerships, attract investment, and broaden implementation.



Wave 1. Build Momentum and Legitimacy

2026 - 2027

The first priority is creating the political legitimacy, partnerships, and policy conditions needed to support long-term implementation. Public consultation for Hong Kong's First Five-Year Plan, the implementation of the Northern Metropolis Development Strategy, and upcoming international fora such as the International Federation of Landscape Architects (IFLA) World Congress provide opportunities to influence policy, strengthen partnerships, and position the Shenzhen River Basin as a flagship demonstration landscape.

1.1 ESTABLISH A REGIONAL MANDATE AND COALITION PUBLIC LEGITIMACY

Use immediate policy windows to establish NbS as a regional implementation priority rather than a collection of isolated projects

- Submit coordinated NbS recommendations through **Hong Kong's First Five-Year Plan consultation process**.
- Align recommendations with **China's Fifteenth Five-Year Plan** priorities for biodiversity, ecological security, and resilience.
- Establish a **Hong Kong–Mainland working group** to align Five-Year Plan priorities around biodiversity and ecological infrastructure.
- Build from existing **GBA coordination precedents**, including regional standards and air-quality collaboration, to advance a cross-boundary NbS coordination mechanism.
- Publish and launch the GBA NbS Accelerator report and implementation agenda
- Establish a regular **Hong Kong–Shenzhen NbS dialogue and knowledge-exchange forum**. Engage government, developers, infrastructure owners, conservation organizations, universities, investors, insurers, and communities around the watershed prototype.
- Use **high-level regional and international platforms, such as Asia Pacific Economic Cooperation (APEC)** , alongside relevant green finance and professional forums, such as the **IFLA World Forum** to launch partnerships and the implementation agenda.

LEVERS

- *Hong Kong's First Five-Year Plan*
- *Mainland Fifteenth Five-Year Plan*

OUTPUTS AND OUTCOMES

- *A recognized regional mandate*
- *Initial institutional coalition*
- *Common implementation agenda*

1.2 ESTABLISH THE Shenzhen River Basin AS THE PRIORITY PROTOTYPE AND ESTABLISH ECONOMIC CASE

Move immediately from a regional proposition to a defined landscape where coordination, design, finance, and governance can be tested together. Use the watershed to connect ecological restoration with planned infrastructure, development, and economic assets.

- Establish the **Shenzhen River Basin portfolio** Framework as the basis for an initial regional prototype.
- Undertake a **watershed-scale economic analysis** to quantify value at risk, avoided losses, ecosystem-service value, development value enabled, costs of inaction, and potential direct and capturable revenues associated with the NbS portfolio.
  - **Value at risk:** Existing assets, infrastructure, economic activity, and communities exposed to climate and ecological risks.
  - **Future value at risk:** Planned development and investment, including the Northern Metropolis and San Tin Technopole.
  - **Cost of inaction:** Expected losses, avoided damages, and rising adaptation costs under a business-as-usual trajectory.
  - **Value currently unpriced or uncaptured:** Ecosystem services and wider social, ecological, and economic benefits.
  - **Value enabled by NbS:** Avoided losses, development value protected or unlocked, and potential direct or capturable revenues.
  - **Distribution of costs and benefits:** Where value accrues, where risk sits, and which public and private actors have a financial stake in intervention.
- Designate the **Northern Metropolis as an NbS demonstration district**, using the watershed analysis to inform priorities.
- Embed **NbS requirements into outstanding Northern Metropolis planning and Terms of Reference**, including San Tin Technopole, before major development decisions are locked in.

LEVERS

- *Northern Metropolis planning*
- *San Tin Technopole planning / TORs*
- *Relevant Hong Kong and Shenzhen spatial/ecological planning processes*
- *Public investment and infrastructure appraisal processes*

OUTPUTS AND OUTCOMES

- *Defined demonstration geography*
- *Climate-anchored Economic impact analysis and ecosystem services valuation*

Wave 2. Stand Up Delivery Platforms

2-5 Years

The second stage builds on the political support generated in the first foundational wave, and focuses on establishing the institutional, technical, and financial capabilities that enable projects to move efficiently from concept through implementation and investment. These programs form the implementation infrastructure that supports multiple projects across the GBA while creating consistency in governance, financing, monitoring, and delivery. These implementation platforms reduce many of the institutional barriers identified throughout the workshop while creating the conditions for long-term investment and coordinated project delivery.

2.1 STRENGTHEN REGIONAL DELIVERY CAPACITY

Create durable capacity for cross-boundary leadership, technical coordination, project preparation, and implementation, building through existing **Hong Kong–Shenzhen and Guangdong–Hong Kong mechanisms wherever possible rather than creating parallel institutions.**

- ◻ **Establish a Cross-Boundary Steering Committee** to guide the shared regional vision, coordinate priorities, and provide policy alignment and regulatory endorsement. Embed or formally link this function to existing Hong Kong–Shenzhen and Guangdong–Hong Kong coordination mechanisms.
- ◻ Develop a **technical Centre of Excellence or advisory function** for applied research, capacity building, standards and certification, monitoring, technical assistance, and regional communications. Test the appropriate institutional home and governance model during implementation.
- ◻ Establish a **coordinated NbS project-preparation and investment function** to advance priority interventions through feasibility, design, permitting, financial modelling, and investment preparation. Align with existing or emerging GBA green-finance institutions and funding mechanisms.
- ◻ Establish **cross-border data-sharing agreements** and common protocols to support coordinated delivery.

LEVERS

- *Hong Kong–Shenzhen and Guangdong–Hong Kong cooperation mechanisms*
- *Hong Kong First Five-Year Plan*
- *Mainland Fifteenth Five-Year Plan*
- *Existing GBA green-finance institutions and initiatives*
- *Existing cross-boundary data and technical cooperation mechanisms*

OUTPUTS AND OUTCOMES

- *Cross-boundary steering and coordination mechanism*
- *Technical advisory and implementation capacity*
- *Project-preparation and investment pipeline*
- *Clear institutional roles and reduced duplication*

2.2 DEVELOP COMMON STANDARDS AND CERTIFICATION TO ENABLE FINANCE

Advance this work through the cross-boundary steering and technical advisory functions established under 2.1, using existing Hong Kong–Mainland standards and regulatory mechanisms as the starting point. Translate existing technical guidance into consistent criteria that can support implementation, procurement, evaluation, and investment. Create pathways through which different kinds of NbS can access capital appropriate to their benefits, revenue profiles, and risk.

- ◻ Develop a **Certification / Standards Pathway** for regional NbS and pilot an **NbS certification framework aligned with IUCN and CEDD guidance.**
- ◻ Translate **HK-CEDD's NbS Design Guidelines into an investment credential** that banks, insurers, and investors can use to assess interventions.
- ◻ **Develop an NbS Green Bond pathway linking certification to future bond issuances.**
- ◻ Expand green-finance eligibility to explicitly recognize biodiversity and NbS within **Hong Kong's sustainable-finance / green-bond taxonomy.**
- ◻ Design a **regional NbS investment platform** capable of aggregating projects into institutional portfolios and develop structures capable of combining projects of different sizes, revenue profiles, and risk characteristics.
- ◻ Test **blended NbS portfolios combining revenue-generating and public-benefit assets.** Establish pathways for public investment and green bonds for public-good resilience interventions.
- ◻ Test private investment vehicles, **including dedicated funds and districts, debt instruments, and SPVs,** for interventions with capturable revenues.

LEVERS

- *Northern Metropolis planning*
- *San Tin Technopole planning / TORs*
- *Relevant Hong Kong and Shenzhen spatial/ecological planning processes*
- *Public investment and infrastructure appraisal processes*

OUTPUTS AND OUTCOMES

- *Defined demonstration geography*
- *Climate-anchored Economic impact analysis and ecosystem services valuation*

Wave 3. Demonstrate What is Working

2 - 10 years

Implementation should focus on projects capable of demonstrating ecological performance, commercial viability, and public value. Use a deliberately selected set of projects and portfolios to demonstrate ecological performance, public value, implementation feasibility, and viable economic and financing models. Early projects build technical experience, generate public confidence, attract investment, and provide evidence that can inform future policy and financing decisions. Projects should therefore be selected primarily for their individual merits but for the role they play within a broader watershed portfolio.

3.1 SELECT DEMONSTRATIONS FOR STRATEGIC VALUE

To prioritize interventions based on their contribution to the Shenzhen River–Deep Bay landscape and would collectively support portfolio-level evaluation of costs, ecosystem services and GEP value;

Selection Criteria	Rationale / Demonstration Value
Ecological connectivity	Reconnects fragmented wetland, river, coastal, and upland systems while demonstrating cumulative biodiversity and ecosystem-service gains.
Climate risk reduction	Targets areas of existing and projected overlapping flood, heat, sea-level-rise, storm, and water-management risk while demonstrating measurable resilience and avoided-loss benefits.
Cross-boundary value	Creates shared benefits across Hong Kong and Shenzhen while testing cross-boundary NbS governance, design, and delivery.
Development interface	Tests NbS where ecological systems intersect with major growth and infrastructure, including the Northern Metropolis, demonstrating integration with planning and investment.
Portfolio leverage	Fills critical gaps between interventions and tests whether connected projects generate greater ecological, resilience, and economic value as a portfolio.
Replicabilities	Represents conditions found elsewhere in the GBA, generating evidence for regional guidance and 2–5 sub regional replication opportunities.
Existing momentum and leadership	Builds on active agency, community, landowner, or partner leadership to accelerate delivery and test models capable of sustained implementation.

LEVERS

- *National Climate Change Adaptation Strategy 2035*
- *Mainland China's NDC and Fifteenth Five-Year Plan*
- *Hong Kong Climate Action Plan 2050*
- *Gross Ecosystem Product (GEP) and ecosystem-service valuation frameworks*

OUTPUTS AND OUTCOMES

- *Prioritized landscape demonstration portfolio and GEP value creation*
- *Development of GBA guidance for ecosystem-based climate and biodiversity resilience*
- *Framework for portfolio performance and value evaluation*
- *Pathway for GBA guidance and subregional replication*
- *Identification of 2–5 subregional replication opportunities*

3.2 DELIVER JOINT DEMONSTRATION PROJECTS

Use implementation itself to build institutional trust, test standards, generate evidence, and improve cross-boundary delivery.

- ◻ Launch a series of joint **Hong Kong–Shenzhen pilot projects** and deliver initial **Shenzhen River Basin demonstration projects.**
- ◻ Document implementation barriers, delivery costs, ecological outcomes, and governance lessons.

LEVERS

- *Northern Metropolis Action Agenda and development programme*
- *San Tin Technopole planning and infrastructure delivery*
- *Northern Metropolis environmental mitigation and ecological enhancement requirements*
- *CEDD public works and NbS design guidance*
- *Mainland ecological restoration and Shenzhen River management programmes*
- *15th Five-Year Plan implementation funding and programmes*

OUTPUTS AND OUTCOMES

- Implemented demonstrations and performance evidence
- Tested governance and delivery approaches

3.3 PROVE ECONOMIC VALUE AND REVENUE MODELS

Use demonstration evidence to quantify the wider economic and resilience value of NbS and test where that value can support long-term stewardship and investment.

- ◻ **Quantify the economic and resilience value** of the demonstration portfolio, including avoided losses, ecosystem-service/ GEP value, and benefits to public and private assets.
- ◻ **Test a diversified Gei Wai revenue model** across potential revenue sources such as ecotourism, native commercial nurseries, productive landscapes, development, infrastructure, and ecosystem services.
- ◻ Partner with **major property and infrastructure asset owners** (e.g., Link REIT, MTR) to test how NbS resilience benefits can be incorporated into investment and asset-management decisions.

LEVERS

- *Northern Metropolis land development and infrastructure investment*
- *San Tin Technopole development and mitigation requirements*
- *Public works capital and asset-management budgets*
- *Private development, REIT and infrastructure asset-management cycles*
- *GEP and ecosystem-service valuation frameworks*
- *Hong Kong/Mainland sustainable-finance and disclosure frameworks*

OUTPUTS AND OUTCOMES

- *Demonstrated economic and resilience value*
- *Tested revenue and investment models*

Wave 4. Scale from Projects to Regional and International Systems

1 - 10 years

The Shenzhen River–Deep Bay portfolio is intended not as an endpoint, but as a prototype for a different model of regional resilience: one that connects individual NbS investments across landscapes, infrastructure systems, jurisdictions, and investment cycles.

Over the longer term, demonstrated approaches could provide the foundation for two related pathways: expanding the portfolio model across the GBA and positioning the GBA as a transferable model for other bay and delta regions. The pace and form of this expansion will depend on demonstrated performance, institutional alignment, financing capacity, and future regional priorities.

4.1 ASSEMBLE MULTIPLE WATERSHED PORTFOLIOS TO SCALE REGIONALLY

If the Shenzhen River–Deep Bay approach demonstrates value, individual projects could progressively connect into a wider network of watershed portfolios and ecological infrastructure across the GBA. This could mean linking NbS with major infrastructure and development programs; extending successful approaches to additional watersheds; connecting wetlands, rivers, coastlines, forests, and urban systems; and increasingly coordinating investment at the landscape rather than project scale.

- ◻ Aggregate successful demonstrations into **coordinated watershed portfolios**. Link natural assets with infrastructure, development, productive landscapes, and public spaces.
- ◻ Issue or support **NbS-aligned green bonds** where appropriate.
- ◻ Deliver multiple watershed portfolios across the GBA, beyond the Shenzhen River Basin as a prototype for additional landscapes.

LEVERS

- *Northern Metropolis and other major GBA development and infrastructure programs*
- *Hong Kong and Mainland public-works capital and asset-management cycles*
- *Mainland green-finance and Hong Kong sustainable-finance frameworks*
- *GBA cross-boundary planning and coordination mechanisms*
- *Portfolio performance and GEP / ecosystem-service valuation evidence*

LONG TERM POTENTIAL

- *Connected watershed portfolios across the GBA*
- *NbS embedded within major infrastructure and development cycles*
- *Regional ecological connectivity and resilience*
- *Portfolio-scale financing and investment*

4.2 POSITION THE GBA AS A REGIONAL + INTERNATIONAL DEMONSTRATION

At sufficient scale, the GBA could become an important demonstration of cross-boundary metropolitan NbS implementation — particularly for rapidly urbanizing bay and delta regions. Evidence from implementation could contribute to national ecological and climate priorities while informing international practice through future COP/CBD processes and partnerships with other regions. The value would be not simply individual projects, but a transferable model for coordinating NbS design, governance, valuation, finance, and monitoring across jurisdictions and at landscape scale.

- ◻ Showcase the **Shenzhen River Basin prototype** through future COP and CBD convenings.
- ◻ Position the GBA as a demonstration of cross-boundary metropolitan NbS implementation.
- ◻ Share the GBA's ecosystem-based NbS design, governance, finance, and monitoring model with other delta and bay regions.

LEVERS

- *China's national climate-adaptation and ecological-civilization priorities*
- *15th Five-Year Plan implementation and subsequent national planning cycles*
- *Guangdong–Hong Kong–Macao GBA policy and cooperation mechanisms*
- *National standards and guidance for NbS, ecological restoration, and resilient infrastructure*
- *UNFCCC COP and CBD implementation processes*
- *International bay- and delta-region partnerships and knowledge networks*

LONG TERM POTENTIAL

- *GBA demonstration model for ecosystem-based climate resilience*
- *Contribution to national policy and implementation*
- *International exchange with other bay and delta regions*
- *Transferable approaches to governance, finance, and portfolio delivery*

The Shenzhen Basin - Deep Bay landscape is a place to begin, not an endpoint. By demonstrating how NbS can be planned, delivered, valued, and financed as interconnected regional infrastructure, the portfolio can establish a foundation for broader implementation across the GBA and a model that other rapidly urbanizing bay and delta regions can adapt to their own contexts.

Concluding Reflections

The challenge of climate adaptation, resilience, and nature-based solutions is not simply demonstrating that they reduce risks posed by climate change and variability, but also determining how they can enhance ecological services, shape development pathways, social and ecological justice, and patterns of investment at every scale. The Greater Bay Area is an unusually consequential place in which to test that proposition, bringing landscape-scale climate risk, rapid urbanization, and infrastructure investment together in one region.

In China, the Greater Bay Area, and broader Pearl River Delta, the scale and pace of urbanization and infrastructure investment coincide with livelihood changes, cultural shifts, dramatic economic and technological change, geopolitics, and ecological and biodiversity loss. The region reveals how choices made today can have implications far beyond the GBA and Shenzhen River Watershed. This is true both within rapidly developing regions and where China and other major infrastructure-investing economies invest abroad. These choices shape the carbon-intensive systems that continue to drive climate change and the technologies and infrastructure intended to enable the transition. NbS cannot simply compensate after the fact for ecological degradation, extraction, or the loss of livelihoods and culture produced through the development process itself. We cannot afford to leave the underlying development model unquestioned.

The next generation of the Resilience and Adaptation Accelerator, and models like it, is therefore poised to expand not only where and at what scale this work happens, but also who participates in shaping it. This first phase in the GBA brought together government, conservation, design, engineering, finance, academia, and other professional communities to establish an early version of a shared framework for challenge definition and action. Future phases can and should include deeper and more comprehensive representation from Shenzhen and municipalities throughout the Greater Bay Area and Pearl River Delta. They also have the potential to embed the resilience vision and principles represented here into the first tranche of the NbS project pipeline. Together, these two imperatives can anchor early action in a clear contribution toward the broader goals of resilience and adaptation as the urban landscape continues to transform.

Importantly, future phases can and should extend that model to more deeply engage communities, neighborhoods, workers, land users, and livelihoods directly exposed to climate risk and development change. It can place lived experience into equal standing with technical and institutional expertise to identify vulnerabilities, negotiate trade-offs, and define what resilience and public value mean in particular places. In so doing it holds the potential to reshape financial and social values and therefore their translations in built and ecological environments.

In the spirit of any iterative and collaborative process, this work should be understood as a snapshot in time rather than a comprehensive or final account. As with research and convening efforts of this kind, its scope was necessarily shaped by the time, resources, participants, and information available during this phase. Not every relevant policy, initiative, perspective, or institution could be reviewed or represented, and the conditions described here will continue to evolve. The findings and recommendations should therefore be situated within a broader and dynamic continuum of learning, relationship-building, experimentation, and change. It provides a foundation to be tested, expanded, challenged, and refined.

This is also where international exchange matters. The partnerships embedded in this work are in the spirit not of models to be copied from one context to another; but in the richness of contrasting and complementary living laboratories. New York, where Columbia University itself is embedded in its own complex ecosystem of stakeholders involved in climate change and society, offers lessons from retrofitting resilience into an intensely developed region. Meanwhile, the GBA and Asia Pacific, more broadly, present opportunities—and risks—in shaping a rapidly changing one. Exchange and partnership can make visible different approaches to governance, engineering, public process, finance, stewardship, and community participation, while creating space to question where existing development models or cultures of practice themselves need to change.

The transition and adaptation imperative also calls for a generational shift in how philanthropy and financial services understand, embed, and invest in resilience and NbS. Adaptation and resilience investment is not only about protecting firms, assets, or financial returns. It is also about producing and safeguarding public goods whose benefits are widely distributed across communities, economies, ecosystems, and generations. Many of those benefits cannot be captured through conventional project revenues, even where economic, ecological, and social value is substantial. Public capital must continue to form the strong base of the pyramid. Philanthropy and catalytic capital can play a distinctive role alongside it, supporting early-stage planning, community engagement, institutional capacity, demonstration, and coordination that markets and public budgets often struggle to fund or guarantee. In turn, and alongside binding design and investment standards, these forms of capital can help larger pools of public and private investment recognize and act on the broader value that resilience creates.

The longer-term potential of the Accelerator is therefore larger than scaling a portfolio of NbS projects. It is to build an enduring platform for partnership and shared learning: testing how nature can function as regional infrastructure; how public, private, philanthropic, and community interests can be brought into the same conversation; and ultimately, how development choices can produce greater ecological resilience, social value, and stewardship of place rather than reproduce the vulnerabilities they are intended to solve.

Photo © Kyle Obermann

Appendix A.

Preliminary NbS Portfolio Value Assessment: Integrated benefits, costs of inaction, value leakage, and net value creation

ASSEMBLED NbS PORTFOLIO → INTEGRATED BENEFITS

PORTFOLIO (TERRITORIES)	KEY INTERVENTIONS / ASSETS (EXAMPLES)	DIRECT REGENERATE / CAPTURABLE VALUE	MONETIZABLE / INVESTABLE BENEFIT	PUBLIC + ECOLOGICAL VALUE
1 **RESTRINGING THE PEARLS** Reconnecting the River and Deep Bay	• Living shorelines + coastal restoration • Oyster restoration • Fishery habitats / restored wetlands • River / ecological corridor • Traditional agri + fish ponds	• Gei wai fisheries • Eco-tourism / nature access • Oyster products • Potential carbon & biodiversity credits	• Avoided flood damage • Protected water quality • Protected coastal assets • Developer eco-credits • Insurance / risk transfer	• Wetland habitat + biodiversity • Oyster reef habitat • Habitat connectivity • Water quality improvement • Cultural landscapes
2 **DEEP BAY BLUE-GREEN RESILENCE NETWORK** Restoring Flooding Plains and Coasts	• Coastal Protection Park (CPP) • Smart spill + tidal gates • Floodproof ecological corridors • Urban forests • Ecological restoration	• Fisheries (gei wai / ponds) • Eco tourism + recreation • Park operations / concessions • Biodiversity credits	• Flood damage / attenuation • Protected nieighbobroods, • business, infrastructure • Reduced dredging + recovery • Infrastructure investment	• Mangroves, wetlands, ponds • Urban forests + cooling • Habitat connectivity • Coastal protection • Biodiversity
3 **LIVING WITH WATER + NATURE** Connecting Sponge Infrastructure and Urban Biodiversity	• River & canal flood storage • Sponge infrastructure • Green roofs & Openable parks • Constructed wetlands • Green roofs, streets, vertical greening • Native plants + biodiversity	(limited direct revenue; primarily risk reduction and enabling value)	• Reduced flood damage • Protects housing + transport • Enables resilient development • Lower taxbase / capital loss • Improves public health / productivity	• Urban biodiversity • Stormwater treatment • Cooling / heat mitigation • Healthier habitat • Cultural + social value
4 **NATURE-DRIVEN URBAN FUTURES** Building the Green Infrastructure Systems	• Resilient infrastructure for all economy • River-basin restoration • Ecoystem working • Green and clean innovation • Ecotourism / recreation • Green space for health	• Tech / data infrastructure • Enabling (indirect capture) • Recreation + ecotourism • Local enterprise + services • Carbon / biodiversity credits	• Water security for I&T / AI • Food resilience for technopoles • Protected transport networks • Property value uplift • Reduced operational disruption	• River health + biodiversity • Resilient + low-carbon • Cultural landscapes • Urban cooling • Green mobility benefits
5 **WILDLIFE CROSSINGS** Building Safe Passages for Biodiversity and People	• Wildlife crossings (roads / rail) • Ecological bridges & underpasses • Urban mini-aquatic • River/lake/sea joining landscape • Large-scale re-vegetation	• Potential deeeloper differentation • Biodiversity credits (native appealability)	• Avoided ecological + legal risk • Peace of mind for developers • Supports sustainable land use • Approvals	• Habitat connectivity • Species continuity • Eco-diversity • Biodiversity • Ecosystem resilience
6 **LIVING INNOVATION LANDSCAPES** Connecting People, Places and Ecology	• Blue-green river restoration • Farmland conservation • Ecotourism • Information governance • Ecotourism / managed access	• Ecotourism + recreation • Local products / services • Sustainable forest products • Native appealability	• Watershed protection • Reduced flood + Lower risks • Provides future tax revenue • Avoided treatment / dredging costs	• Water resilience • Soil rehabilitation • Wildlife habitat • Carbon sequestration • Biodiversity

COST OF INACTION / VALUE LEAKAGE

GROWING EXPOSURE OF PEOPLE, ASSETS + INVESTUMENT

- Population projected to grow from ~1M today to ~2.5M at full build-out.
- USD 215B economy in a high-intensity hub driving more housing, infrastucture, business, and I&T investment into watershed.
- Rapid urban expansion and coastal reclamation place more value into an increasingly exposed landscape.

RISING PHYSICAL RISK + DISRUPTION

- ~1,900 mm of annual precipitation concentrated in the monsoon season (Apr–Sep).
- 10–40% increase in runoff through 2050, increasing flood and pollution risks.
- Increasing exposure to compound flood hazards from raimfall, river flooding, storm surge, and sea-level rise.
- Projected sea-level rise by 2100: 0.37–0.82 m (SSP2–4.5) and 0.57–1.08 m (SSP5–8.5).
- Disruption to housing, transport, businesses, infrastructure and communities.

LOSS OF NATURAL RISK-MANAGEMENT CAPACITY

- Transition from wetland-agricultural landscape to an I&T technopole.
- Wetland loss, fragmented habitats, altered drainage, and sedimentation degrade natural flood attenuation and water regulation.
- Declining water quality from rapid urbanization, industrial discharge, and nutrient loading.

HIGHER FUTURE ADAPTATION COSTS

- Increasing need for engineered flood defenses, drainage upgrades, heat mitigation, and seawalls as risks intensify.
- Lock-in of high-carbon, high-maintenance infrastructure.
- Higher insurance, emergency response, and recovery liabilities.

FOREGONE ECONOMIC, SOCIAL + ECOLOGICAL VALUE

- Lost fisheries, ecotourism, recreation, nursery, and biodiversity opportunities.
- Weakened ecosystem services: water purification, cooling, carbon storage, and habitat provision.
- Reduced liveability, public health, and cultural value.
- Missed opportunity to position the region as a global leader in nature-positive development and ecological innovation.

NET VALUE CREATED

POSITIVE BALANCE: PROTECTED + ENABLED + CAPTURABLE VALUE

PROTECTS EXISTING VALUE

- Reduces physical risk to people, housing, transport, businesses, infrastructure and communities.
- Safeguards existing economic assets and public investment.
- Maintains and enhances natural systems that regulate water, reduce heat, and buffer coastal hazards.

ENABLES FUTURE GROWTH

- Builds climate-resilient foundations for Northern Metropolis, San Tin Technopole and the 4th / delta economy.
- Supports integrated land-water-city planning that unlocks productivity, liveability, and investable places.

GENERATES ECONOMIC OPPORTUNITY

- Fisheries, ecotourism, recreation, commercial services, nature nurseries, and ecological restoration jobs.
- Biodiversity credits, carbon markets, and green finance instruments.
- Attraction of I&T, talent, and capital aligned with ecological civilization goals.

BUILDS PUBLIC + ECOLOGICAL WEALTH

- Restored wetlands, rivers, and coastal ecosystems provide flood attenuation, cooling, water quality improvement, and habitat.
- Improves public health, cultural value, and long-term ecosystems. Strengthens community stewardship, equity, and social cohesion.

CAPTURES AND LOCKS IN LONG-TERM VALUE

- Standards, certification, and transparent measurement capture and economic value.
- Blended finance and market mechanisms mobilize private investment.
- Positions the GBA as a global model for ecological civilization and cross-boundary cooperation.

ENABLED BY POLICY + LEADERSHIP AT MULTIPLE SCALES

NATIONAL: CHINA'S ECOLOGICAL CIVILIZATION 15TH FIVE-YEAR PLAN (2026–2030)

- Build a Beautiful China and modernize harmony between people and nature
- Improve ecosystem quality and biodiversity
- Promote green, low-carbon development and climate resilience
- Reform ecological protection and compensation mechanisms
- Support GBA as a world-class city cluster

REGIONAL: GREATER BAY AREA AMBITIONS

- GBA Development Plan: world-class bay area, high-quality growth
- Integrated ecological and environmental protection
- Climate-adaptive infrastructure and disaster risk reduction
- Green, innovation-driven industries and modern services
- Cross-boundary infrastructure, data, and market connectivity

ENABLED BY POLICY + LEADERSHIP AT MULTIPLE SCALES

PROVINCIAL / SAR

GUANGDONG

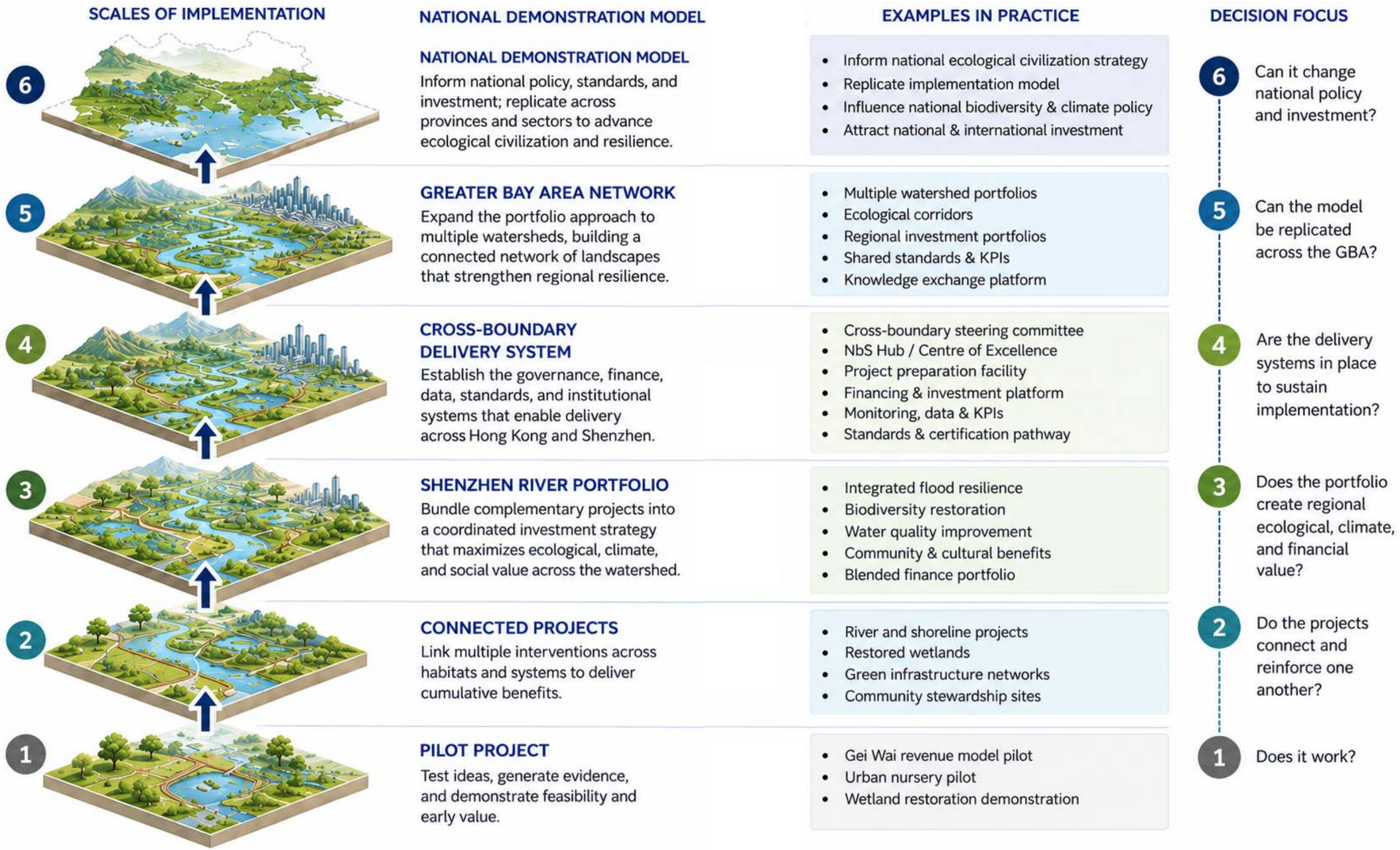
- Build a liveable, resilient, and sustainable city
- Enhance climate resilience and disaster preparedness
- Advance green finance and sustainable development
- Innovate for a smart city and I&T ecosystem
- Strengthen regional collaboration within the GBA

HONG KONG: HKSAR 5-YEAR PLAN (2023–2027)

- Build a liveable, resilient, and sustainable city
- Enhance climate resilience and disaster preparedness
- Advance green finance and sustainable development
- Innovate for a smart city and I&T ecosystem
- Strengthen regional collaboration within the GBA

Appendix B.

NbS Portfolio: Scales of Implementation and Delivery Pathway



Appendix C.

China 15th Five-Year Plan: Implications Analysis for NbS in the Greater Bay Area

Explanation of the Recommendations of the Central Committee of the Communist Party of China for Formulating the 15th Five-Year Plan for National Economic and Social Development

Xi Jinping

Comrades,

On behalf of the Political Bureau of the Party Central Committee, I will now brief you on the drafting of the Recommendations of the Central Committee of the Communist Party of China for Formulating the 15th Five-Year Plan for National Economic and Social Development.

I. The Drafting Process

Formulating medium- and long-term plans to guide economic and social development is an important means by which our Party governs the country. As we will accomplish the 14th Five-Year Plan (2021–2025) this year, it is necessary to work out the 15th Five-Year Plan (2026–2030). Fulfilling this task is of vital importance for facilitating the sustained and sound development of our economy and society and putting China on firmer foundations for basically achieving socialist modernization as planned.

In January this year, the Political Bureau decided that the 20th Central Committee would discuss recommendations for the 15th Five-Year Plan at its fourth plenary session. A group was then established for the purpose of drafting the recommendations under the auspices of the Standing Committee of the Political Bureau. I was chief of this group, while my colleagues Li Qiang, Wang Huning, Cai Qi, and Ding Xuexiang served as its deputy chiefs. The group also included heads of relevant departments and localities. On February 11, the group convened its first meeting, after which the drafting work officially began.

Throughout the drafting process, the Central Committee followed a

TARGETS AND AMBITIONS	GBA IMPLICATIONS
Main targets (Ch3) • *"Reduce CO2 emission/unit GDP by 17% "* • *"Increase high-quality water bodies to 85% (from 80%)"* • *"Increase forest coverage to 25.8% (from 25.1%)"*	• NbS outcomes can be tied to clearly-measurable national quantitative targets
Marine resources (Ch32) • *"Strengthen prevention of marine environmental risks at the source, advance pollution control, shoreline remediation, conservation and restoration in key sea areas"* • *Keep retention rate of natural continental shorelines at no less than 35%"* • *"Explore development of marine carbon sink accounting"*	• Sets political ambition for marine NbS projects • Marine carbon sink accounting can formalize blue NbS taxonomies and impact metrics
Energy conservation (Ch47, §2) • *"Build zero-carbon factories and parks"* • *"Strengthen energy conservation and carbon reduction renovation of existing buildings and municipal facilities*	• Sets political ambition for urban NbS projects (e.g., green roofs, building retrofits, urban forests, sponge city etc.)

TARGETS AND AMBITIONS	GBA IMPLICATIONS
Climate Adaptation (Ch47, §3) • *"Increase carbon sink capacity of ecosystems"* • *"Improve the monitoring and accounting system for carbon sinks"*	• Carbon accounting system can address impact monitoring gap in GBA
Policy system for green development (Ch50, §2) • *"Innovate the mechanisms for conservation incentives and investment incentives"* • *"Green taxation system"* • *"Preferential tax policies supporting resource conservation and the use of green products"* • *"Enrich green financial products and services"* • *"Establish and improve the green and low-carbon standard system, and promote the improvement, alignment and mutual recognition of international rules and standards"*	• Unlock new sources of financing for NbS projects • Alignment with international frameworks also addresses both standards/taxonomies and impact monitoring gaps
HK and Macao Prosperity & Stability (Ch59, §2) • *"Deepen collaborative innovation in industry, academia and research with the mainland"* • *"Further deepen Guangdong-Hong Kong-Macao cooperation"*	• Sets national policy mandate for GBA-level coordination • Northern Metropolis as potential demonstration platform for zero-carbon buildings and green industry services

Source: China's 15th Five Year Plan full text [Chinese], Civic Exchange (2026) Policy brief on the 15th Five-Year Plan

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