Economics and Financing of Nature-based Solutions in Asia and the Pacific

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Water Sector Challenges

Climate change is being primarily felt through water through intensification of the water cycle. The region accounts for 40% of disasters triggered by natural hazards and 84% of the people they affect. Urbanization will exacerbate this.

Food security depends on water security. Agriculture consumes an average of 70% of freshwater. Irrigation is the primary driver of groundwater pollution. Growing demand for food will increase pressure on water resources.

Inadequate access to basic water supply and sanitation services. 500 million people without access to basic water supplies, 1.14 billion people without access to sanitation.

Wetlands destruction is driving biodiversity loss. More than 30% of the global biodiversity has been lost because of the degradation of fresh-water ecosystems. One million known species might disappear by 2050

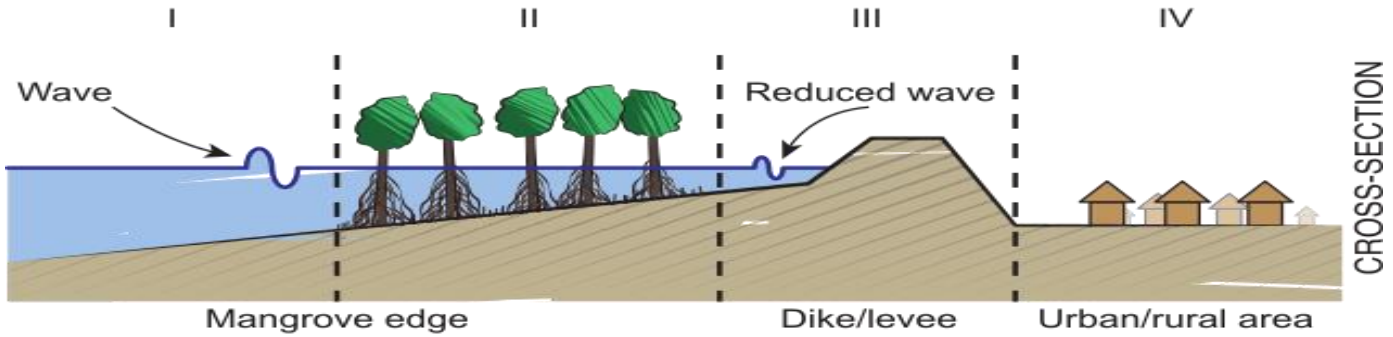
Water quality is deteriorating. 80% of urban wastewater is discharged untreated. Saline intrusion and arsenic are also growing threats to groundwater quality.

Infrastructure failure. Aging infrastructure. Poor maintenance. Inefficient operation.

NbS: to address societal challenges sustainably

NBS can contribute as they :

- are **flexible** and therefore adaptable to changes in climate
- can lead to **multiple co-benefits** for the environment and the local communities
- can be **cheaper** than grey solutions
- often contribute to **adaptation** and possibly mitigation
- can enhance design-life and decrease maintenance costs of hard structures, through **hybrid approaches**



ADB Strategy 2030 & NbS

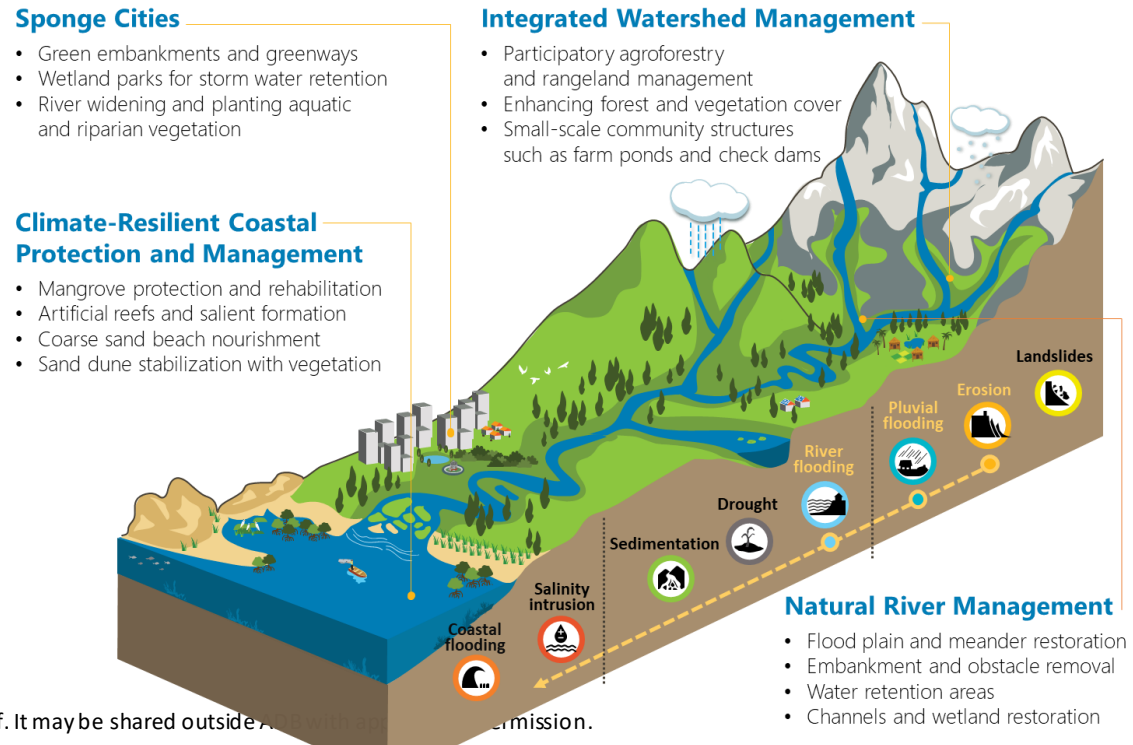
Operational Priorities

- Addressing Remaining Poverty and Reducing Inequalities
- Accelerating Progress in Gender Equality
- Tackling Climate Change, Building Climate and Disaster Resilience, and Enhancing Environmental Sustainability
- Making Cities More Livable
- Promoting Rural Development and Food Security
- Strengthening Governance and Institutional Capacity
- Fostering Regional Cooperation and Integration

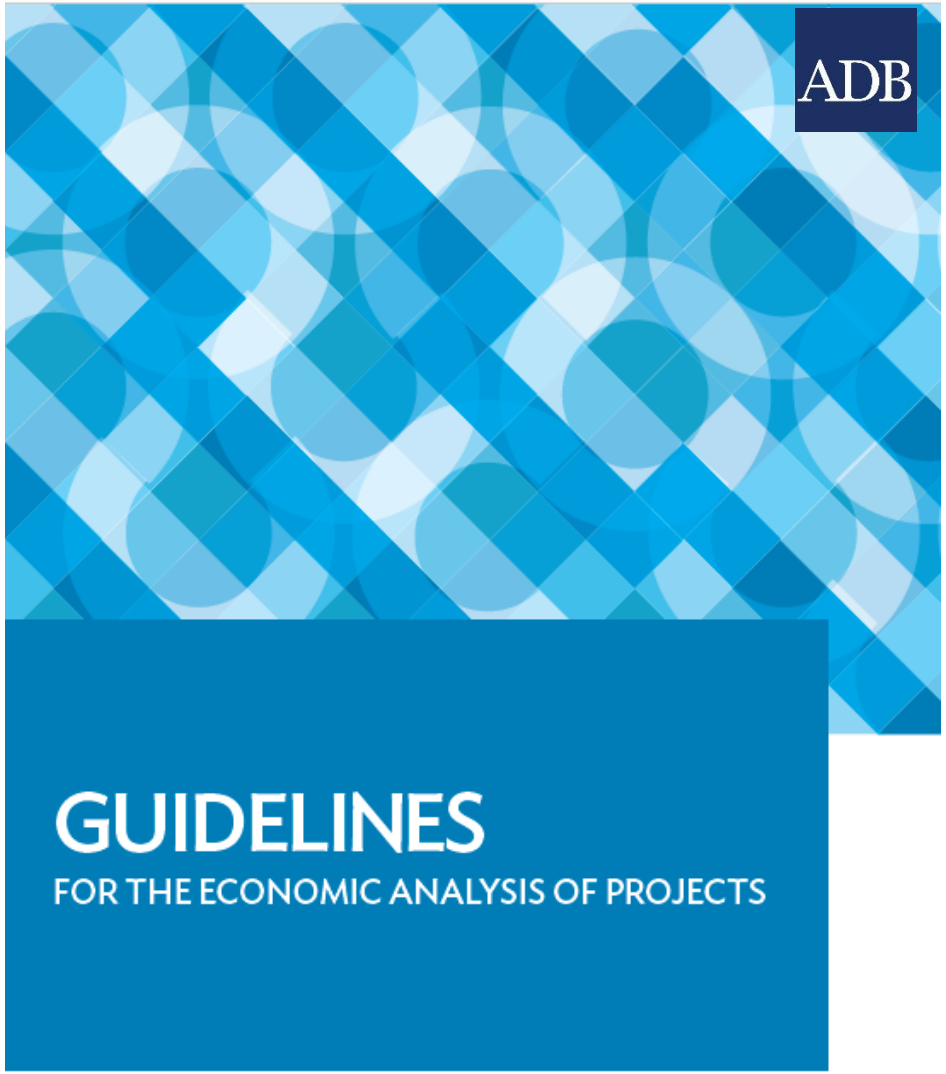
ADB assists its developing member countries to enhance environmental sustainability by investing in the conservation and restoration of natural capital through a variety of approaches, including the use of nature-based solutions.

Limited use of NbS in Asia and the Pacific

While nature-based solutions are increasingly demanded, their application in Asia and the Pacific is still limited due to a lack of knowledge and business cases about technical, economic and financing aspects of NBS project design



ECONOMIC ANALYSIS of ADB PROJECTS



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Economic Analysis (ADB)

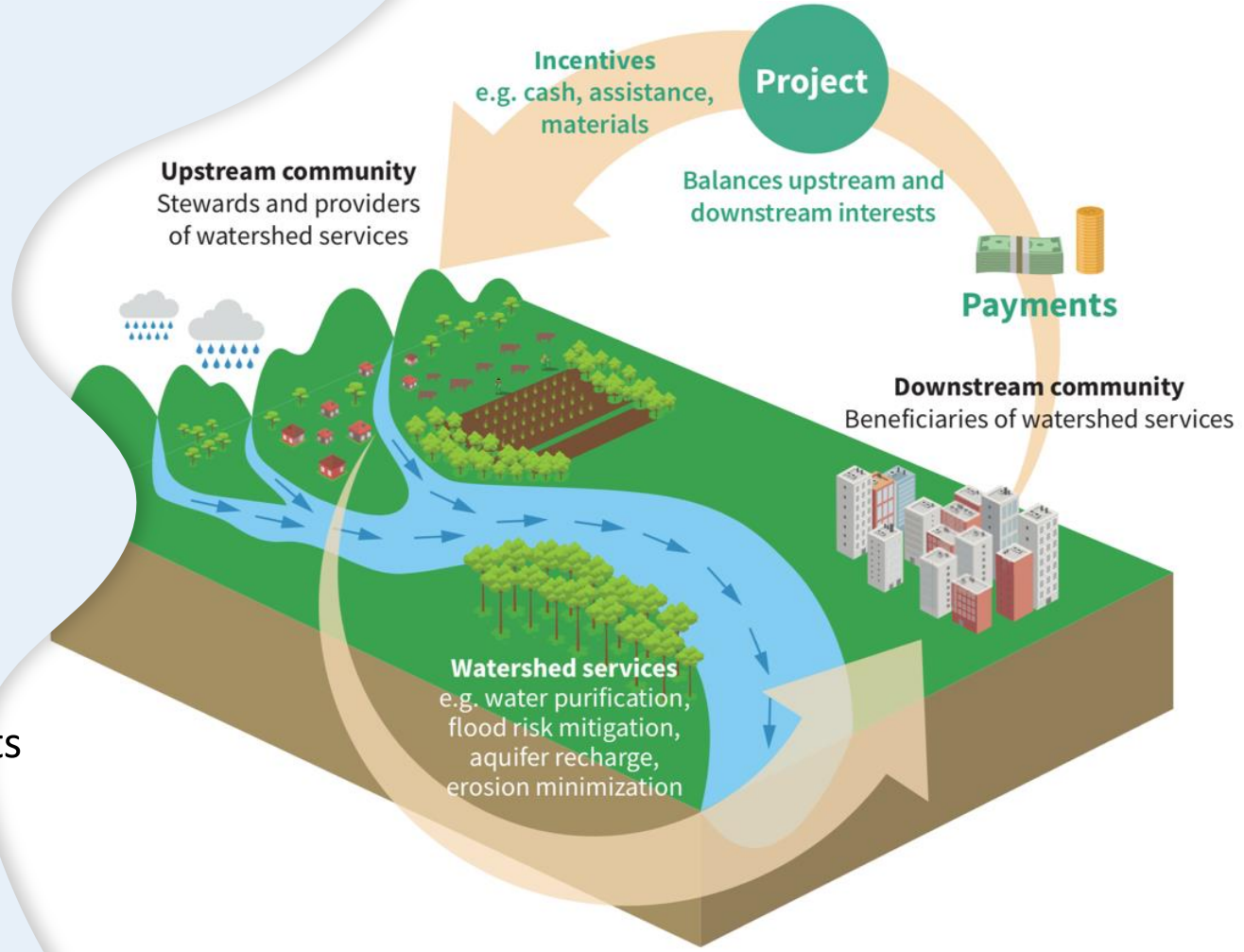
Cost–Benefit Analysis (CBA)

- Estimate economic benefits and economic costs
- **Monetary values** of project benefits and costs must be identified over life-cycle
- Any **external effects** affecting the rest of the economy … such as adverse or beneficial environmental impacts **must be included**
- ENPV and the EIRR should be calculated
- ADB's adopted minimum required EIRR is 9%
- For projects that primarily **generate environmental benefits** (such as pollution control, protection of the ecosystem, flood control, and control of deforestation), **the minimum required EIRR can be lowered to 6%.**

ENPV = Economic Net Present Value EIRR = Economic Internal Rate of Return

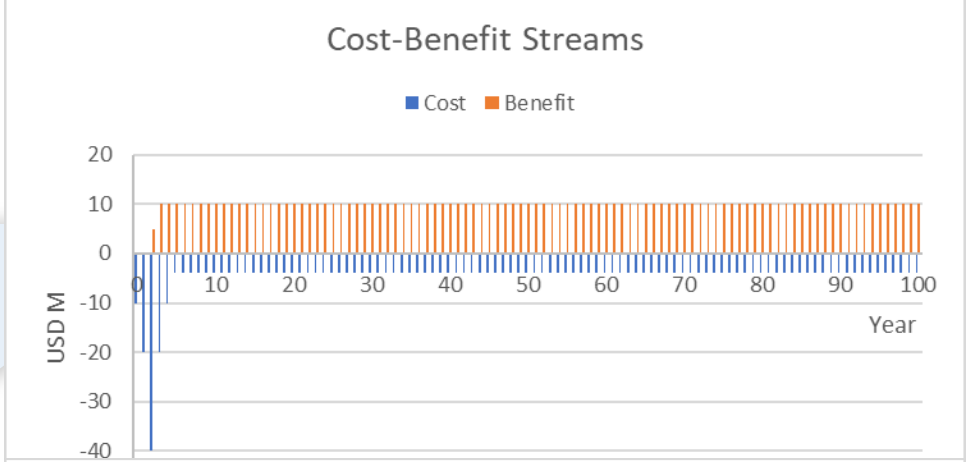
EIRR – Economic Internal Rate of Return

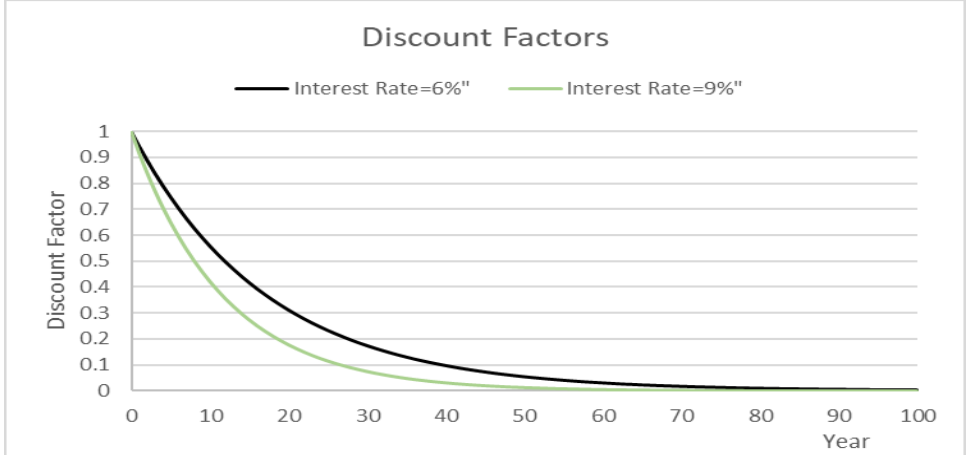
- Direct benefits, may include;
  - flood and drought risk management
  - prolonged lifespan of infrastructure (eg dams)
  - water and wastewater treatment
  - farming, fishing, forestry, food security
  - ecosystem rehabilitation
- Co-benefits, may include;
  - ecosystem services and biodiversity
  - ecosystem rehabilitation / water quality
  - recreation / coastal access
  - tourism
  - livelihood / cultural
  - healthiness
  - carbon sink / carbon sequestration / carbon credits
  - heat island reduction
  - job creation
  - land values ← !!!!!
  - rates ← !!!!!

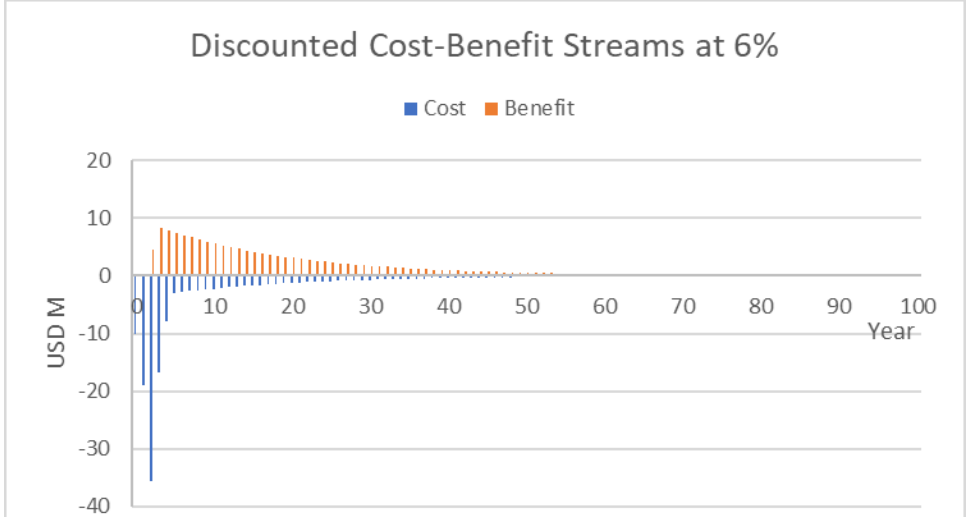


EIRR – Economic Internal Rate of Return

- Cost and Benefit annual streams
  - Project cost
  - Annual maintenance
  - Annual benefits (and co-benefits)
  - NbS may take several years to deliver benefits
- EIRR: 6% vs 9%
  - 6% obviously easier to achieve.
  - 6% allows longer project life-cycle benefits to be assessed – important for NbS.
  - Area :- the country
  - Potential to explore marginal costs and marginal benefits
  - Extend operational life !!
- Need to internalize all externalities
  - » Quantify <u>all</u> co-benefits in monetary terms
  - » Over the full life of the project
  - » Use willingness-to-pay

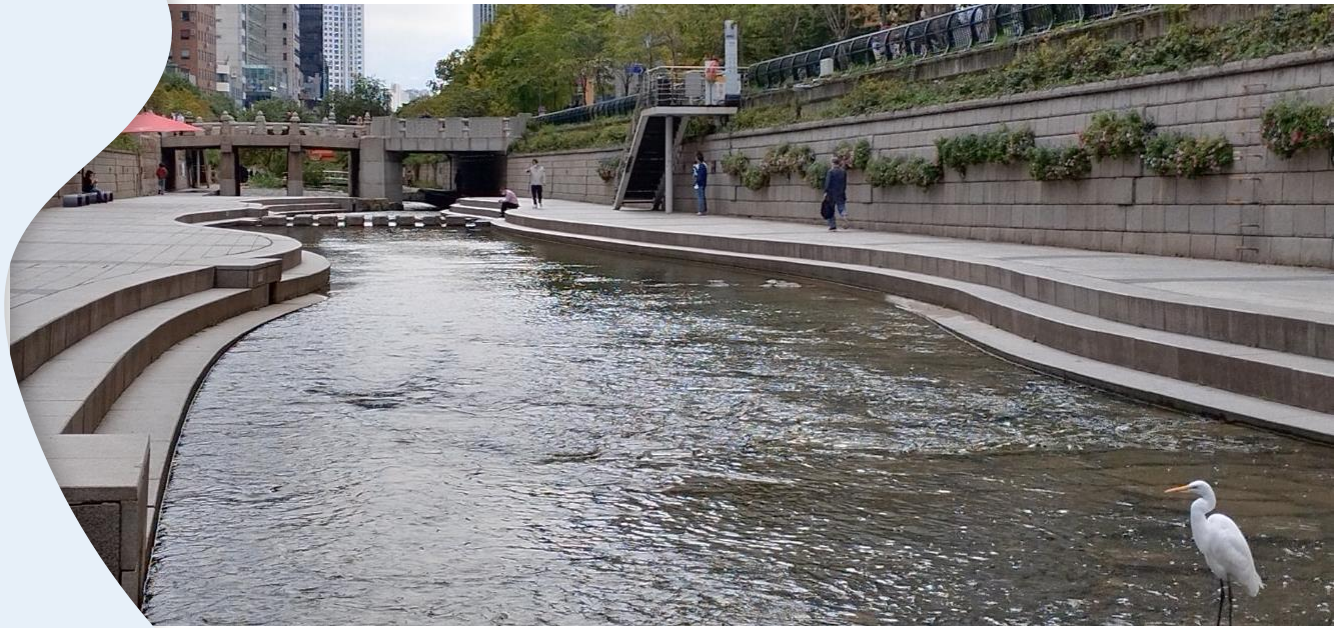






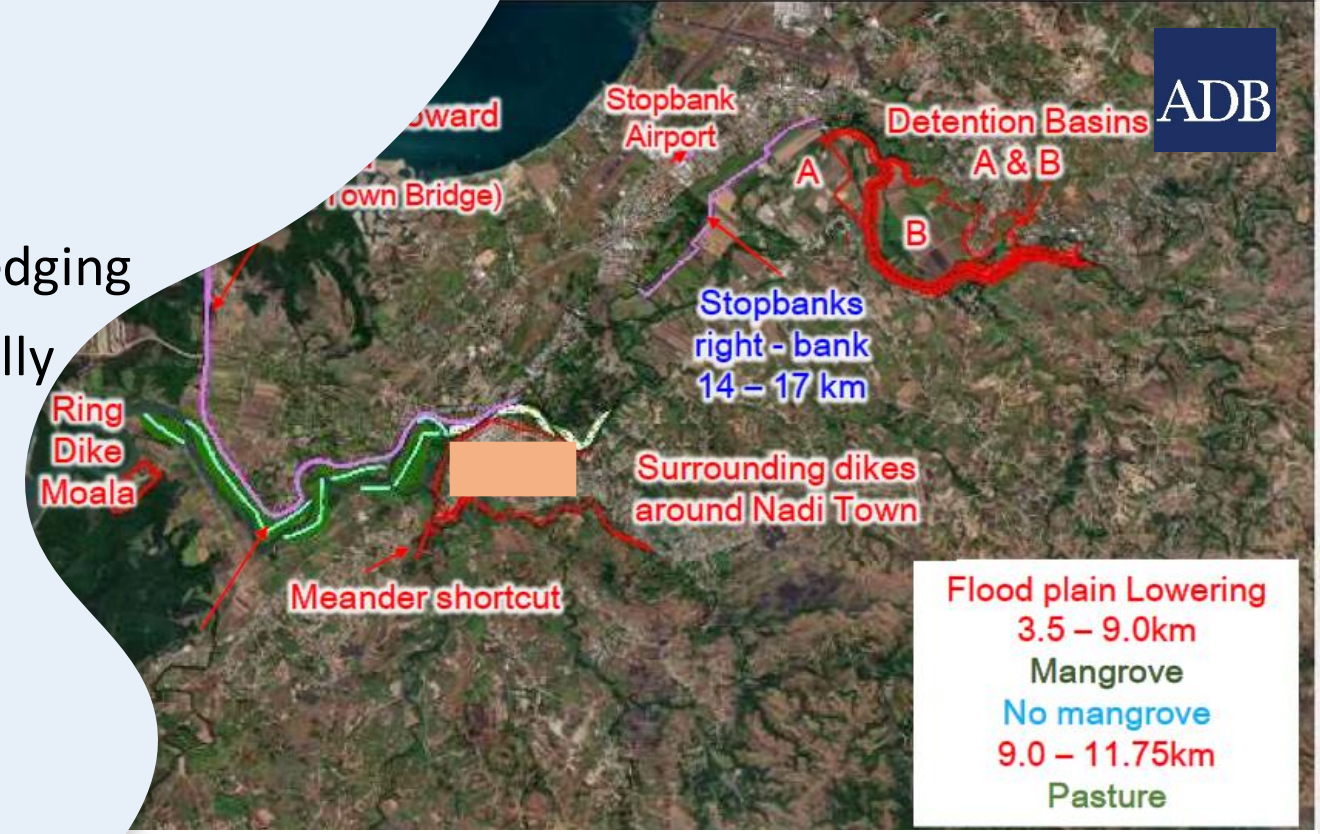
Cheonggyecheon Stream, Seoul, Korea

- 11 km long modern public recreation space in downtown Seoul, South Korea.
- Rapid post-war economic development caused original stream to be covered by transportation infrastructure.
- Massive urban renewal project
- Initially attracted much public criticism, however, since its opening in 2005, it has become popular among residents and tourists.
- Cost: US$ 335 million
- Benefits: ?
  - ecosystem rehabilitation
  - recreation
  - tourism
  - livelihood
  - healthiness
  - heat island reduction
- Willingness to pay !

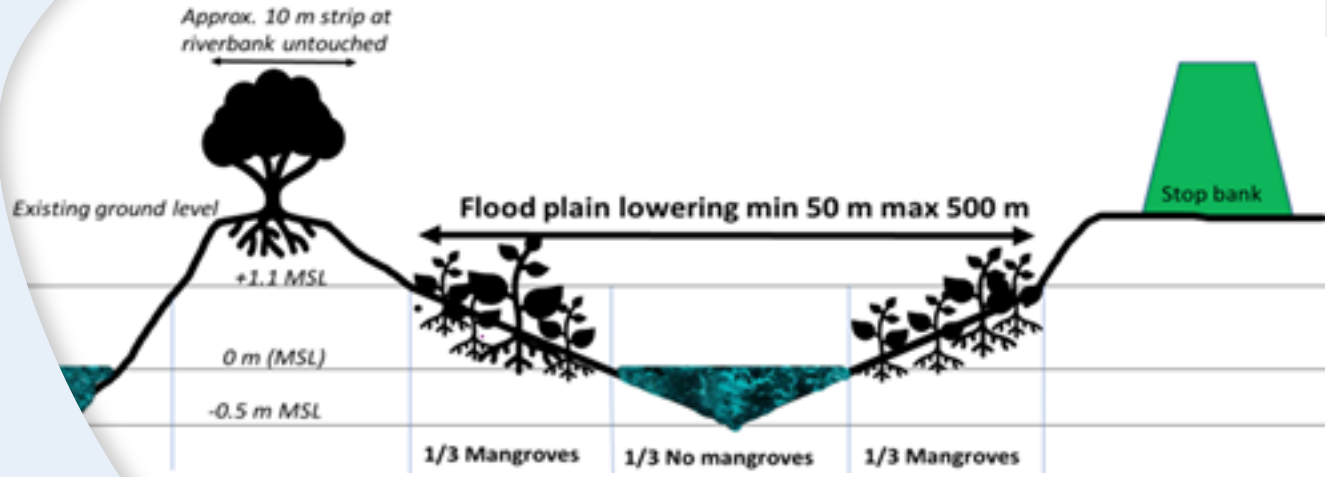


Nadi River, Fiji

- River critical and natural habitat ➔ no river dredging
- Floodplain mid-catchment storage used optimally
- Conveyance increased by lowering floodplain
- Lowered floodplain options:
  - Base case: pasture – slightly above high tide
  - Alternative: mangroves - at around MSL
- Direct benefit – flood mitigation
- Co-benefits of mangroves:
  - » recreation
  - » tourism
  - » livelihood / healthiness
  - » fisheries
- » Marginal costs > Marginal benefits ($\Delta B/\Delta C < 1$)
- » Mangroves not the preferred option



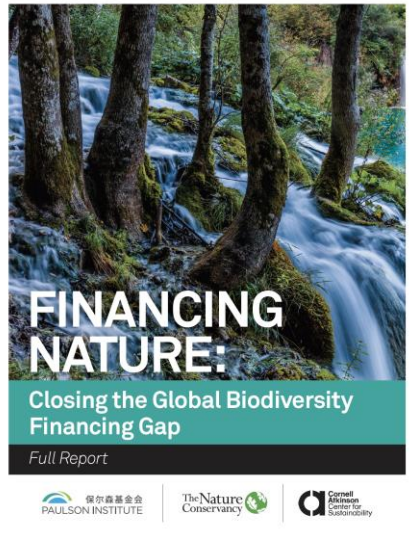
Flood plain lowering concept with mangroves



FINANCING of ADB PROJECTS

Current Financing Levels of NbS

- *Use of NbS is limited due to the lack of awareness, expertise, and financing.*
- *Green infrastructure accounts for less than 5% of the total investment in water-related infrastructure*
- *Capital flows into NBS are not tracked or consistently reported*
- ***USD 133 billion** per annum invested in NBS globally, mainly by governments*
  - *Mainly by Government (**USD 112 B/year)** to protect biodiversity and landscapes and sustainable forestry, fisheries, water resources, environmental protection*
- ***USD 8,100 B** investment in nature needed by 2050 (UNEP, 2021)*



NbS and Climate Financing

ADB has raised its climate ambition from US$80 billion to US$100 billion cumulatively from 2019 to 2030

75% of ADB's committed operations to support climate change mitigation and adaptation by 2030

How can finance for NbS be strengthened?

The gap needs to be closed via innovative finance;

- *blended finance (private money from the global financial markets and public resources)*
- *make projects more technically and economically feasible;*
  - *creating income streams*
  - *linking financing to results,*
  - *redistributing risk,*
  - *matching the investment tenor with project needs*
- *creating a scalable portfolio*
- *tapping new funding sources*
- *leveraging off climate finance commitments*

Sources of Finance

- *Multilateral Development Banks (**ADB**, WBG)*
- *Bilateral Development Finance Institutions (KfW)*

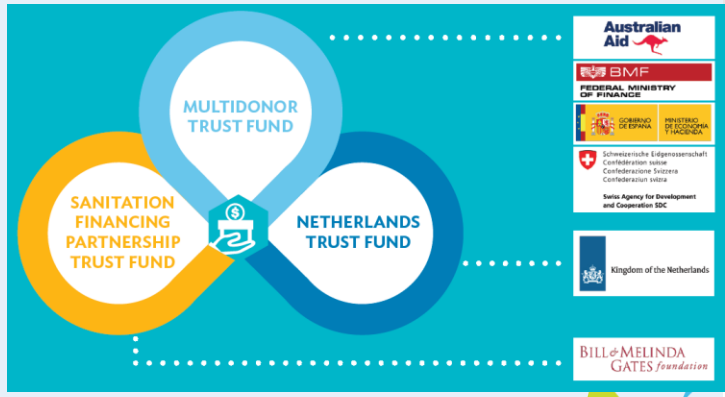
} *International Public Financial Sources*

- *Green Climate Fund (GCF) & Global Environment Facility (GEF)*
- *Domestic Public Sources*

- *Private Finance Sources*
  - *Institutional Investors (eg pension funds, SWF)*
  - *Environmental Corporate Social Responsibility (ESG)*
- *Blended Finance Sources*
  - *Aid agencies, public donors, **MDBs**, private foundations, commercial banks, investors, think tanks, and NGOs*

Financing Instruments for ADB

- *Ordinary Capital Resources (OCR)*
- *Concessional Resources – Asian Development Fund (ADF)*
- *Grants;*
  - *Water Financing Partnership Facility (WFPF)*
  - *Urban Resilience Trust Fund (URTF)*
  - *Climate Change Fund (CCF)*
  - *ASEAN Catalytic Green Finance Facility (ACGF)*
- *Technical Assistance Special Fund (TASF)*



ADB credit rating:-

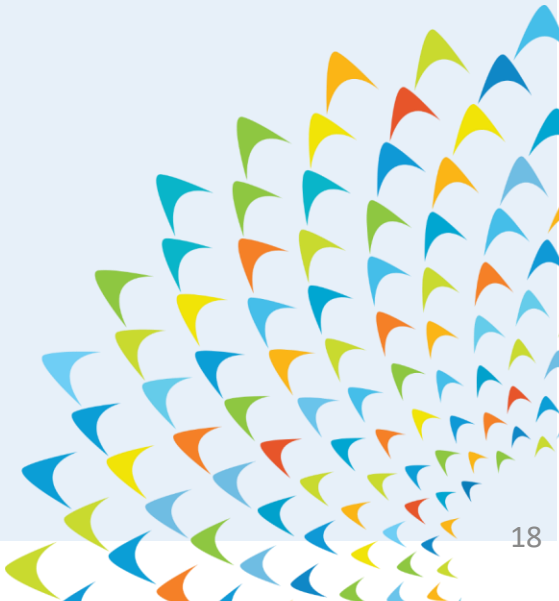
- *Fitch:- AAA*
- *Moody's:- AAA*
- *S&P:- AAA*

Other Financing Instruments

- ***Market-based instruments***
- ***Green bonds*** *and microcredits*
- ***Payments for ecosystem services***
- *Biodiversity offsets*
- ***Public–private partnerships (PPP)***
- *Voluntary carbon markets*
- *Bilateral and trilateral debt-for-nature swaps*
- *Combination*

Need to cover;

- *Investment capital costs*
- *Operating and maintenance costs*



Barriers to Financing NbS

- *Information gaps*
- *Competition for Govt financial resources*
- *Low returns*
- *Institutional inertia*
- *Lack of institutional capacity*
- *Perceived higher risk*
- *Policy failures*
- *Short-termism*
- *Undefined financial responsibilities*
- *Undervaluing natural capital*
- *Reliance on voluntary commitments*

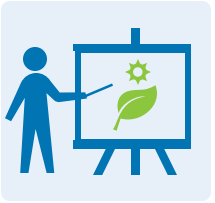
Removing Barriers to Financing NbS

Governments can play a significant role in removing barriers to financing NBS by:

- *Facilitating the scaling up of NBS*
- *Providing certainty*
- *Providing liquidity*

ADB's Role

- **Promoting, mainstreaming and upscaling**
- **Enabling the regulatory and legal environment** Creating a policy environment that enables laws and formal instruments to be addressed.
- **Project Preparation** integrating NbS with conventional engineering with NbS technical, economic and financial knowledge. Managing risk and driving innovation. Financing arrangements. Providing operational support.
- **Investments, Financing, Co-financing:** Strategic use of resources to finance NbS (e.g., concessional loans, grants, technical assistance). Innovative financing. Potential of ecosystem services and PPP.
- **Piloting:** Trialing good practices in combination of NbS (green and gray infrastructure), upscaling.
- **Partnerships:** Improving cross-sectoral collaboration and public participation. NBS can require much greater levels of cross-sectoral and institutional collaboration than grey-infrastructure approaches. Multi-stakeholder approach under a common agenda.
- **Metrics, maintenance, monitoring and reporting** Adaptive management and monitoring to deal with natural dynamics at various temporal and spatial scales.



NbS clinic providing advisory service

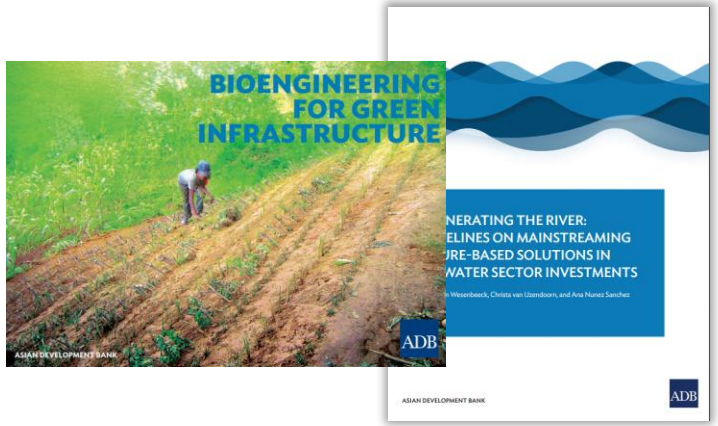
Knowledge brokering connecting project officers with knowledge and resources

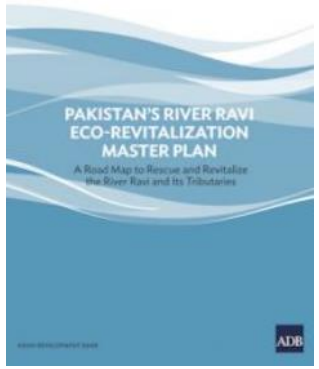
Upstream support creating enabling conditions

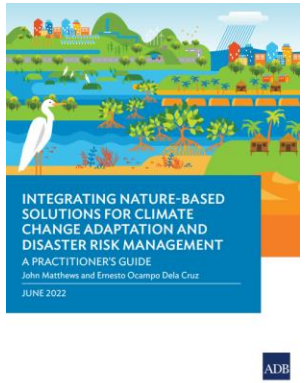
Study tour providing hands-on experience

ADB's Role

- **Knowledge work:-** developing guidance notes & case studies

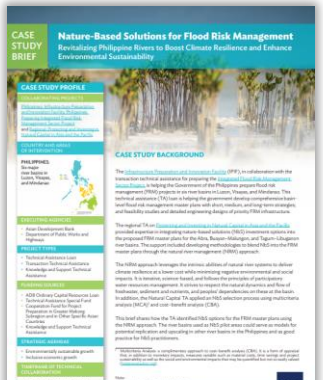


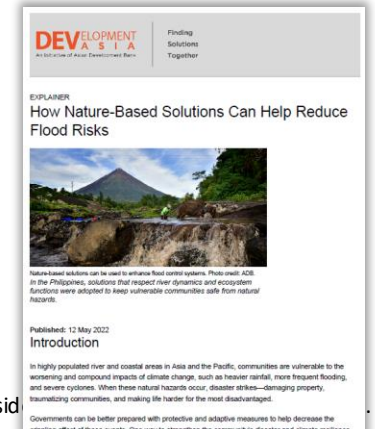




- Bioengineering for Green Infrastructure
- Guidelines for Mainstreaming Natural River Management in ADB Water Sector Investments
- Nature-Based Solutions for New Clark City, October 2019
- Resilient Coastal Cities for Enhancing Tourism Economy: Integrated Planning Approaches
- Practitioners guide to integrating NBS for Climate Change adaptation and disaster risk management in ADB projects
- Green Infrastructure Investment Opportunities
- River Ravi Eco-revitalization Master Plan
- Integrating nature-based solutions for climate change adaptation and disaster risk management: a practitioner's guide

- **Capacity building:-** organizing seminars & trainings. Increasing awareness. Involving youth. Creating NbS communities





- **Case study**: Nature-Based Solutions for Flood Risk Management: Revitalizing Philippine Rivers to Boost Climate Resilience and Enhance Environmental Stability
- **Webinar**: Deep Dive A Science-Based Landscape Approach to Managing Rivers and Coasts
- **Explainer**: How Nature-Based Solutions Can Help Reduce Flood Risks | Development Asia

Summary: Economics and Financing NbS

A holistic approach needed as financing alone is not enough, including:

- *Expanding knowledge base and enhancing capacity*
- *Creating an enabling policy environment, including regulatory support*
- *Incorporating co-benefits of NbS into project appraisal*
- *Create predictable, long-term income streams*
- *Developing innovative financing for scaling up NbS projects (e.g., green bonds, public-private partnerships)*
- *Creating economic and regulatory incentives through, e.g., market-based instruments can help induce private funding for NbS*
- *Strategically use finance resources to de-risk NbS (e.g., concessional loans, grants, technical assistance)*

ADB project examples using NbS

Regional

Revitalization of Informal Settlements and their Environments using a Water-Sensitive Approach

> Decentralized, green infrastructure

Pakistan

Flood Emergency Reconstruction and Resilience Project

> Bioengineering to stabilize slopes

Viet Nam

Promoting Climate Resilient Rural Infrastructure in the Northern Mountain Provinces

> Bioengineering

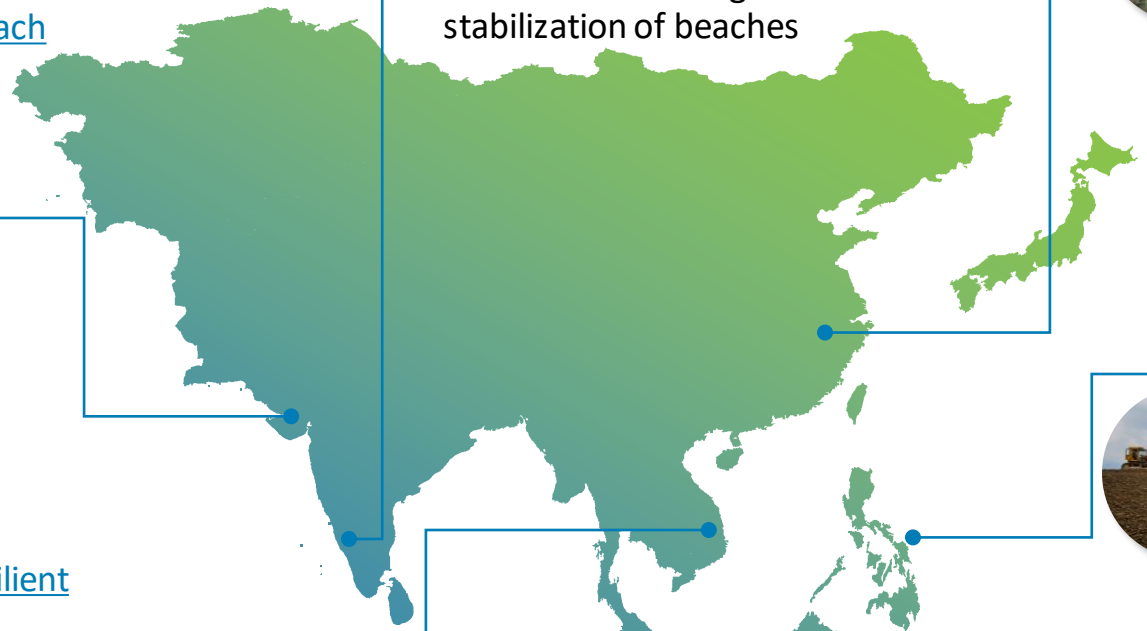
Secondary Green Cities Development Project

> Water-sensitive urban design

India

Sustainable Coastal Protection and Management Investment Program

> Artificial geotextile submerged reefs and the enlargement and stabilization of beaches



PRC

Jiangxi Pingxiang Integrated Rural-Urban Infrastructure Development

> Sponge city

Yangtze River Green Ecological Corridor Comprehensive Agriculture Development

> Protection and rehabilitation of agro-ecosystems

Philippines

Integrated Flood Risk Management Sector Project

> Landscape approach

Indonesia

Revitalization of Informal Settlements

> Green infrastructure to biologically treat water

ADB Project Examples using NbS

- India: Sustainable Coastal Protection and Management Investment Program using the artificial geotextile submerged reefs to address sea level rise and intensive storm surges and the beach nourishment, dune construction, and plantations to enlarge and stabilize beaches
- Pakistan: Flood Emergency Reconstruction and Resilience Project rebuilt and upgraded roads, bridges and other infrastructure damaged by the devastating September 2014 floods, integrating a program of bioengineering to stabilize slopes, with 2.5 million trees planted with 70% grown by women in local nurseries
- Philippines: Integrated Flood Risk Management Sector Project taking landscape approach with multiple NBS measures at the basin scale, including restoring floodplain, wetlands, and meander; reviving old channels; removing embankments and obstacles; and creating retention areas to improve flood conveyance, increase water retention, and reduce bank erosion
- PRC: Jiangxi Pingxiang Integrated Rural-Urban Infrastructure Development employing the sponge city concept with the use of forests, wetlands, preserved flood plains, and bio-retention ponds to reduce flood risk
- PRC: Yangtze River Green Ecological Corridor Comprehensive Agriculture Development Project adopting various NBS practices to, for example, reduce water, fertilizer and pesticide use, and greenhouse gas emissions to make agriculture more productive and sustainable, promoting the protection and rehabilitation of agro-ecosystems
- Viet Nam: Promoting Climate Resilient Rural Infrastructure in the Northern Mountain Provinces using bioengineering for roadside slope stabilization
- Viet Nam: Secondary Green Cities Development Project developing small-scale “green” and climate resilient infrastructure through water-sensitive urban design in the cities of Hue, Ha Giang, and Vinh Yen to strengthen socioeconomic development in the urban areas
- Regional: Revitalization of Informal Settlements and their Environments using a Water-Sensitive Approach using decentralized, green infrastructure to biologically treat water to improve the environmental quality and health of the community in Makassar, Indonesia and Suva, Fiji

Natural Capital Lab

- Natural Capital Lab (NCL): ADB initiative to **transform and scale-up investments in natural resources** to ensure inclusive economic and environmentally sustainable growth
- NCL supporting 4 key actions:

Enhancing understanding of and methods for **natural capital accounting**

Strengthening **policy, institutional, governance and regulatory frameworks and tools**

Catalyzing **sustainable finance and innovative financing** mechanisms

Building **knowledge, capacities and partnerships**

- NCL will serve as a vehicle to **test nature-positive solutions, share knowledge, and act as implementation mechanism** to transform the way nature is managed in Asia and the Pacific.

ASEAN Catalytic Green Finance Facility (ACGF): Focus on Green COVID-19 Recovery in Southeast Asia

ACGF COVID-response supports DMCs to:

- Create **green jobs** for economic recovery
- **Prioritize NDCs** as part of recovery
- **Avoid lock-in** of carbon intensive infrastructure and strengthen resilience

- Developing COVID Recovery projects incl. capital markets
  - 4 concepts proposed
  - TA for 2 Bonds Underway
- Additional concessional funds to accelerate green recovery
  - Green Climate Fund ($300 million)
  - UK / CDP (discussions underway)
- Promoting knowledge on green recovery
  - ACGF Knowledge products/events on COVID recovery
  - Investment criteria for Green Recovery (green jobs)

The **ASEAN Catalytic Green Finance Facility: Green Recovery Program (ACGF GRP)** is an urgently needed and pioneering initiative which aims to embed three integrated objectives into the mainstream of countries' economic recovery planning post the COVID-19 pandemic: a) "green infrastructure development", b) "catalyzing of capital" from all sources – commercial, private and public, and, c) urgent need for upscaling such efforts through a programmatic approach developing - rapidly - a large pipeline of projects.

Funding Approved from Green Climate Fund: **$300 million**