IMPROVE WATER SECURITY THROUGH GREEN INFRASTRUCTURE

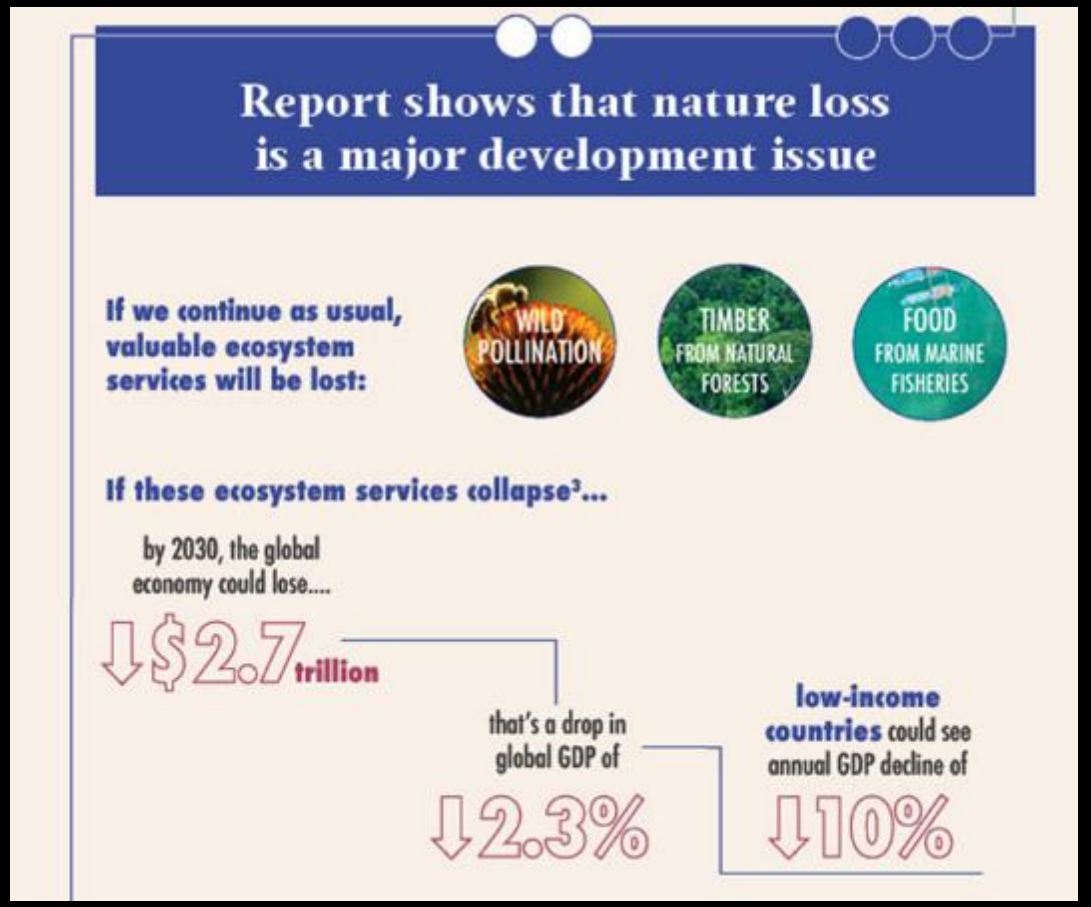
Global Perspectives and Experiences from the World Bank

Photo credit: Flickr/Melissa Leake, DoD

PRESENTATION STRUCTURE

- **Why:** Rationale for World Bank's Engagement on Green Infrastructure/Nature-Based Solutions
- **What:** World Bank's Efforts on Supporting the Implementation of Green Infrastructure/Nature-Based Solutions for Water Security
- **How:** Lessons on How to Implement Green Infrastructure/ Nature-Based Solutions

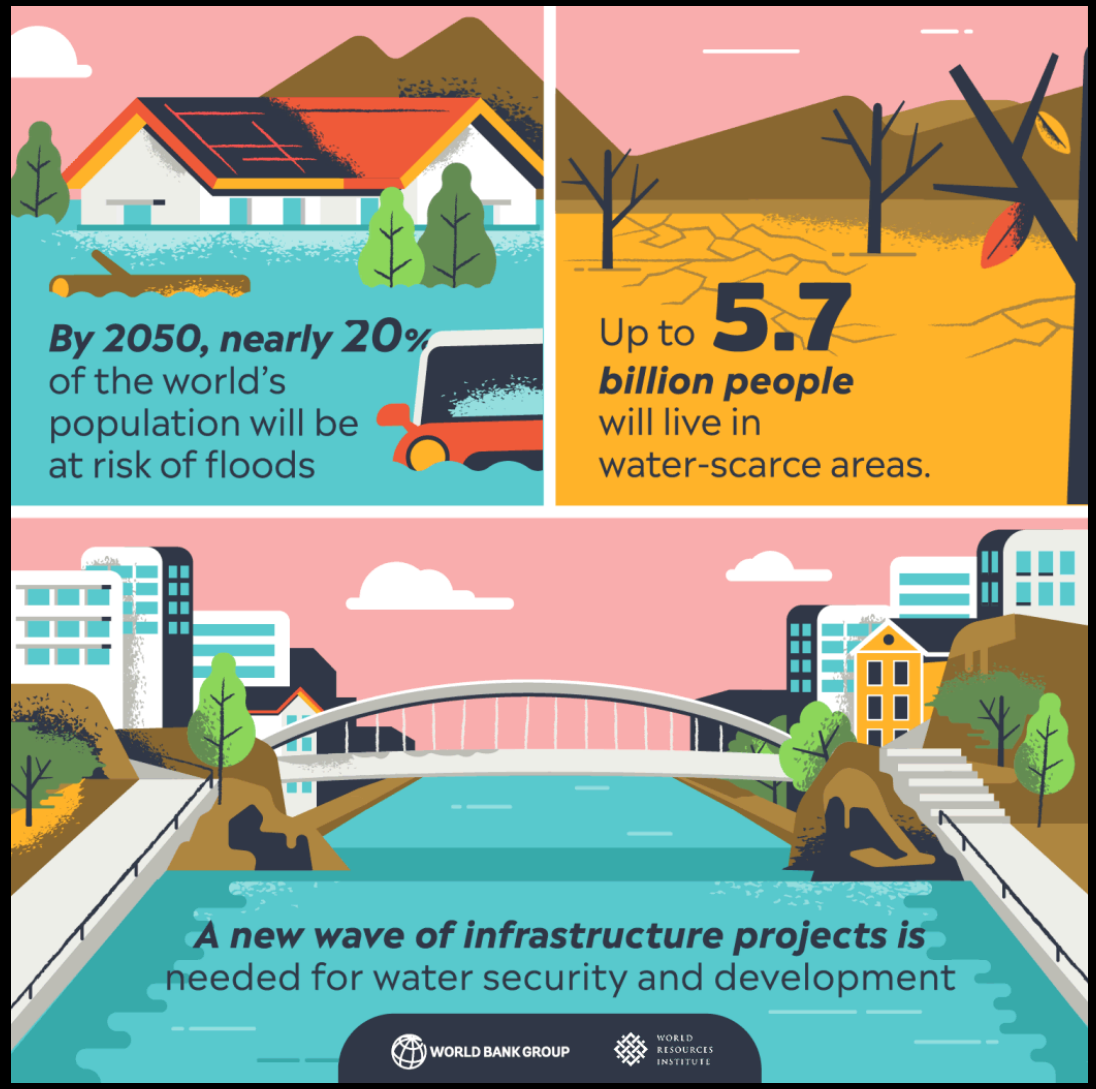
Published Recently

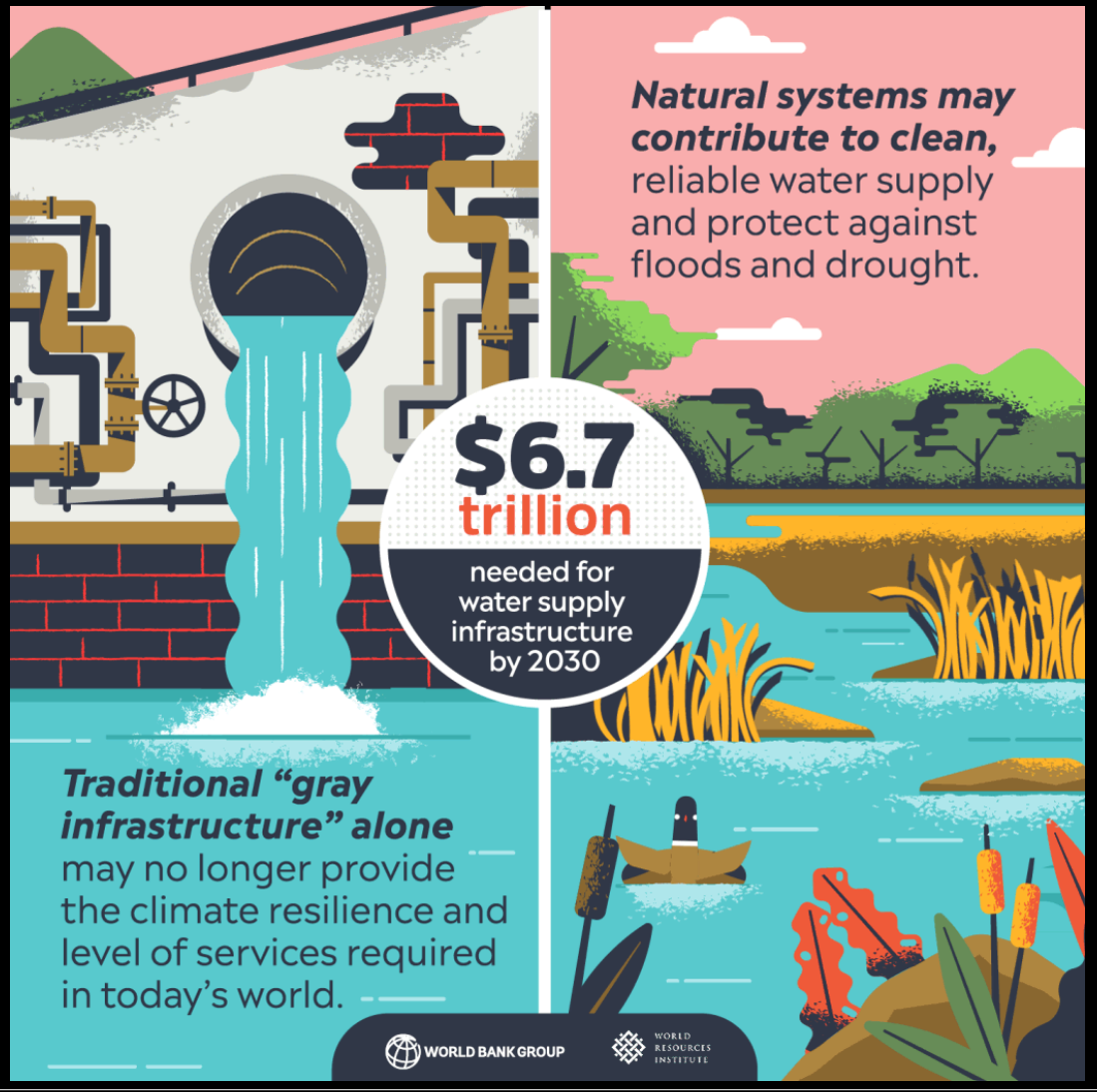


GWSP

WORLD BANK GROUP

Water challenges





GWSP

WORLD BANK GROUP

How nbS complies with the World bank's core mandates

Twin goals:

- **Reduce poverty**
- **Increase shared prosperity**

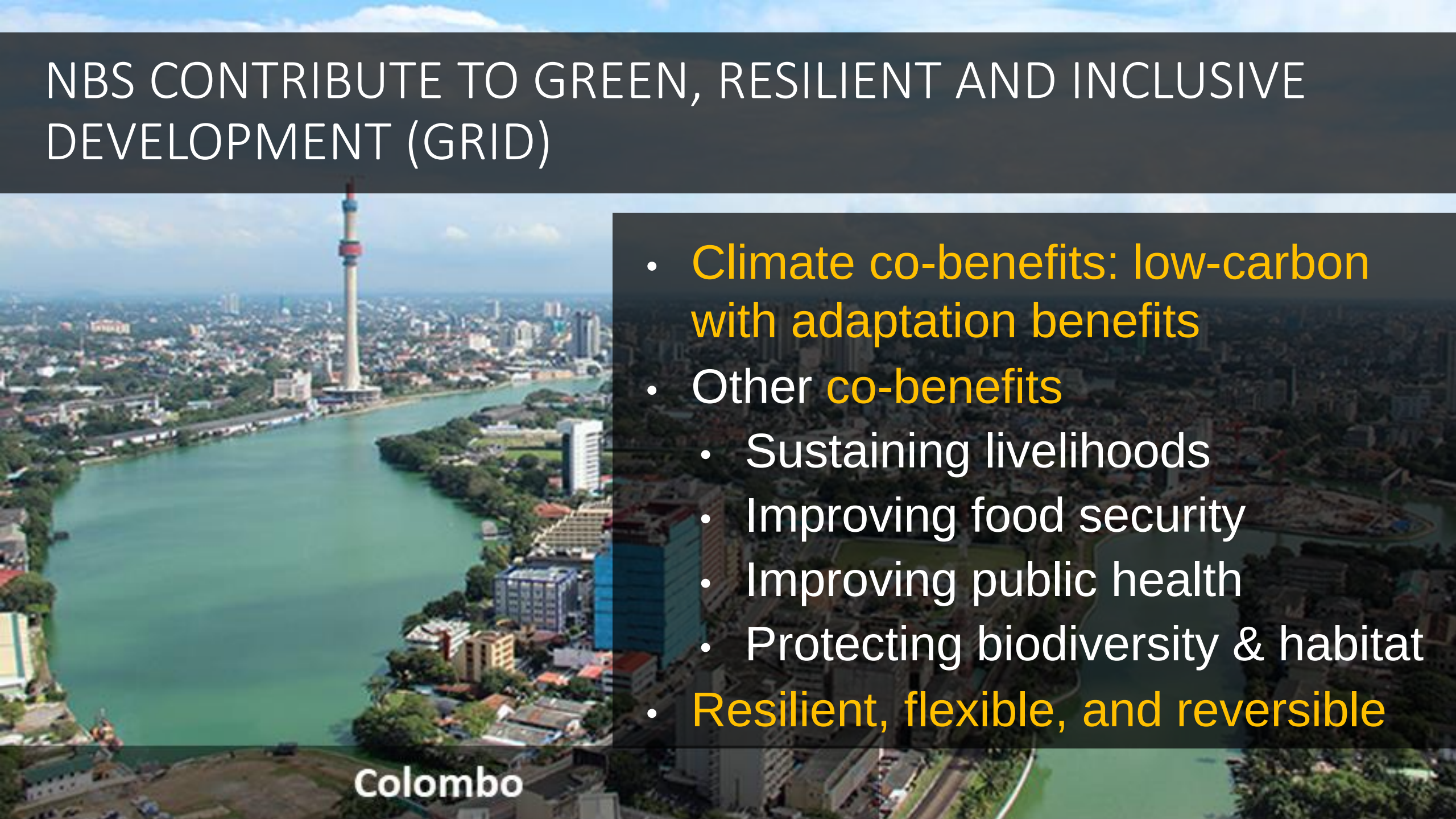
Climate Action Plan (2016, 2019 and 2021-2025)

World Bank's Green, Resilient, Inclusive Development COVID-19 response

Environmental and Social Framework (ESF)

"A Water Secure World for All" strategy

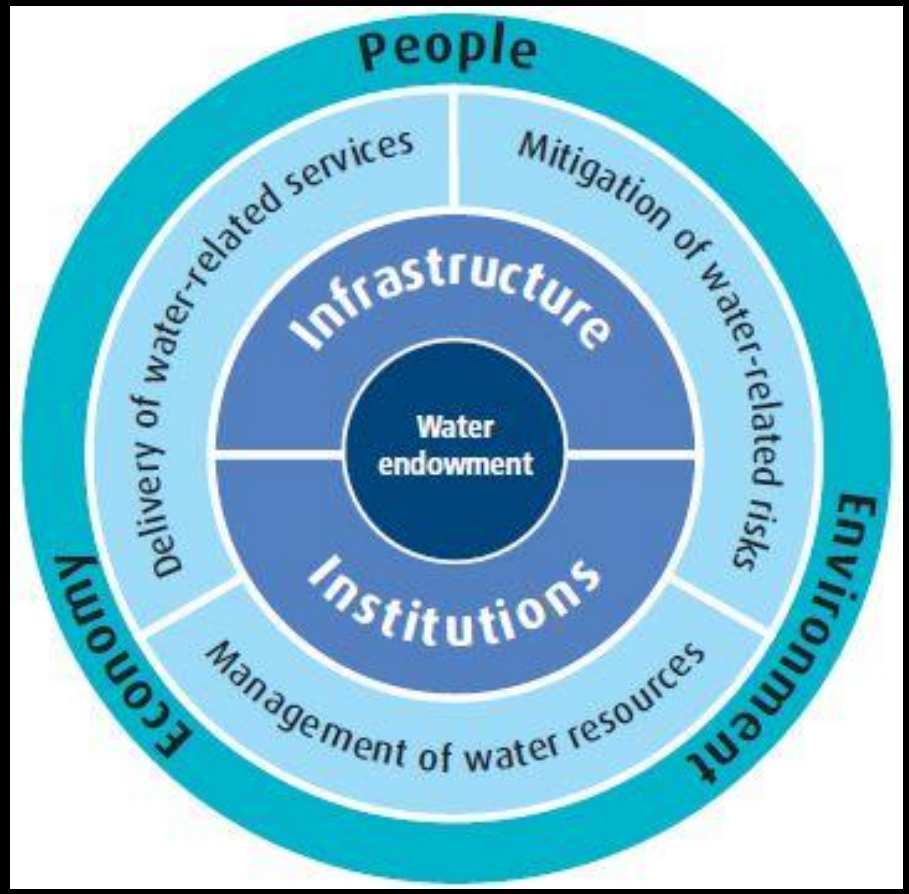
NBS CONTRIBUTE TO GREEN, RESILIENT AND INCLUSIVE DEVELOPMENT (GRID)



- Climate co-benefits: low-carbon with adaptation benefits
- Other co-benefits
  - Sustaining livelihoods
  - Improving food security
  - Improving public health
  - Protecting biodiversity & habitat
- Resilient, flexible, and reversible

A Water Secure World for All

WATER SECURITY FOR ALL



The availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies (Grey and Sadoff, 2007)

The EPIC Response Framework

PROGRAM AREAS

ENABLE
- National Frameworks: Laws, Agencies, Strategic Plans
- Facilitating Whole-of-Society Approach
- Hydro-Met Services

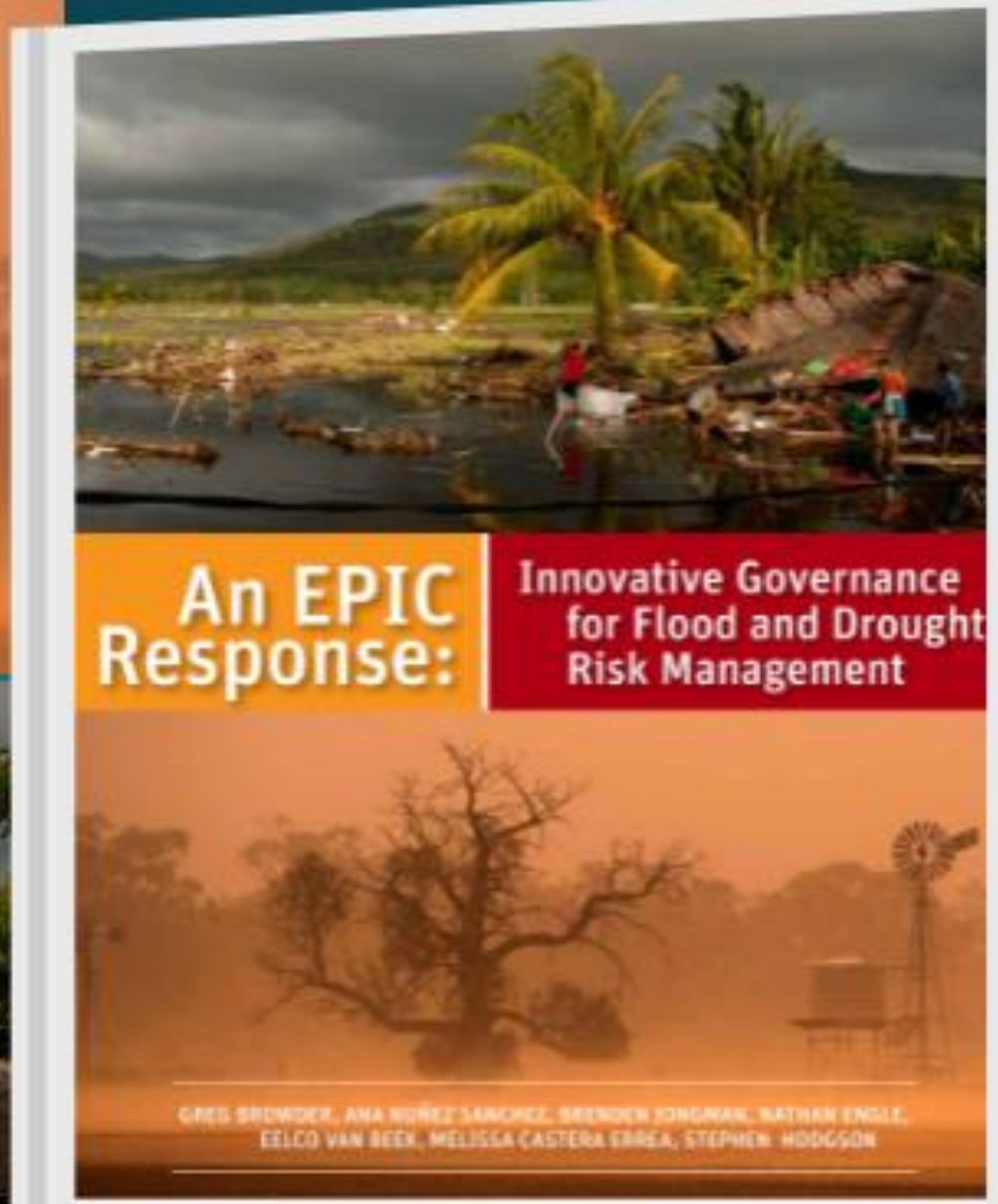
PLAN
- Flood and Drought Risk Mitigation and Contingency Planning

INVEST
- Healthy Watershed
- Water Resources Infrastructure

CONTROL
- Water Allocation and Groundwater Management
- Floodplain Management

RESPOND
- Drought Monitoring, Response, and Recovery
- Flood Monitoring, Response, and Recovery
- Disaster Risk Financing

IMPACT

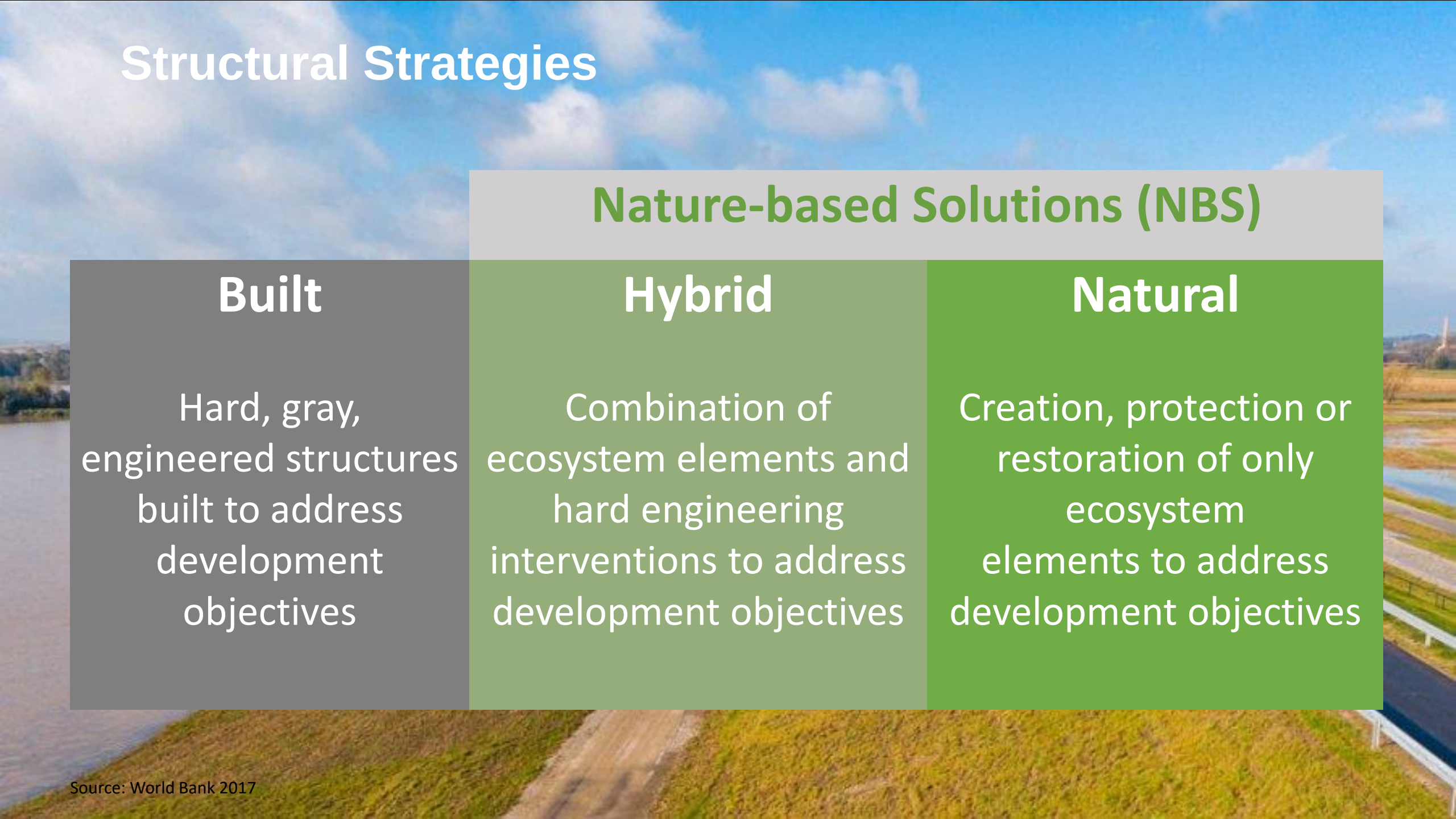


NATURE-BASED SOLUTIONS DEFINED

- Nature-based solutions (NBS): An umbrella term referring to actions that protect, sustainably manage, and restore natural or modified ecosystems to address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.
- Green Infrastructure: A subset of NBS that utilizes natural systems to help produce higher-quality, more resilient, and lower-cost infrastructure services to improve water security.

Photo: Flickr/JLR Sousa Source: Browder et al. 2019

Structural Strategies



	Nature-based Solutions (NBS)	
Built	**Hybrid**	**Natural**
Hard, gray, engineered structures built to address development objectives	Combination of ecosystem elements and hard engineering interventions to address development objectives	Creation, protection or restoration of only ecosystem elements to address development objectives

Source: World Bank 2017

How grey and green infrastructure can work together

SERVICE	GRAY INFRASTRUCTURE COMPONENTS	EXAMPLES OF GREEN INFRASTRUCTURE COMPONENTS AND THEIR FUNCTION
Water supply and sanitation	Reservoirs, treatment plants, pipe network	**Watersheds:** Improve source water quality and thereby reduce treatment requirements **Wetlands:** Filter wastewater effluent and thereby reduce wastewater treatment requirements
Hydropower	Reservoirs and power plants	**Watersheds:** Reduce sediment inflows and extend life of reservoirs and power plants
Coastal flood protection	Embankments, groynes, sluice gates	**Mangrove forests:** Decrease wave energy and storm surges and thereby reduce embankment requirements
Urban flood management	Storm drains, pumps, outfalls	**Urban flood retention areas:** Store stormwater and thereby reduce drain and pump requirements
River flood management	Embankments, sluice gates, pump stations	**River floodplains:** Store flood waters and thereby reduce embankment requirements
Agriculture irrigation and drainage	Barrages/dams, irrigation and drainage canals	**Agricultural soils:** Increase soil water storage capacity and reduce irrigation requirements

FEASIBILITY FACTORS

Technical

Financial

Legal

Institutional

Social

MARKET DRIVERS FOR NATURE-BASED SOLUTIONS

Lower and avoided costs	○ Cape Town watershed restoration (elimination of alien species) is 1/10 of the cost of alternative measures such as desalination, water recycling, and groundwater exploration. ○ $9 ml investment in green infrastructure to manage storm and sewer water runoff in Portland yielded savings of $224 ml. ○ Green-grey infrastructure solutions for flood management in New York City amounts to $1.5 bn in savings over grey only infrastructure.
Generation of additional cash flow	○ Carbon credits, water quality credits, and, potentially, biodiversity credits.
Access to green and sustainability-linked finance	○ Nature-based solutions are accepted use of proceeds for Green Bond and Green Loans ○ Half of the surveyed investors managing $20 trillion in assets are interested in issuing sustainability-linked bonds pegged to biodiversity performance. Other themes of focus included water, waste, and pollution.
Additional economic benefits and economic growth in the area with green infrastructure	○ Up to 20% increase in property values translating into higher taxes for municipalities. ○ Lowers urban heat effect and air conditioning costs. ○ Generates new business in recreational activities, bringing in additional tax revenue.
Greater return on investment	○ The rate of return on nature-based solutions is estimated to be between 2.5 and 4 times the initial investment.
Regulation	○ Peru mandated water utilities to invest in nature-based solutions, such as protecting high-altitude wetlands and forests, rotational grazing to protect grasslands, to enhance its water security in the face of climate change.

WHY CONSIDER NATURE-BASED SOLUTIONS IN INFRASTRUCTURE PROJECTS?

- **Nature-based solutions provide cost effective adaptation solutions to address adaptation needs of clients in a budget constrained post-COVID environment**
- **Nature-based solution generate additional climate, economic, and social benefits, some of which could be monetized/ generate cash flow for clients**

Water supply	○ Restoration of upland forests and watersheds could yield $890 million in annual savings in water treatment costs for 534 largest cities at a cost of less than $2 per person per year. Savings come from lower capital, maintenance and treatment costs.
Storm and flood management	○ Mangrove forests' preservation and restoration is 2-5 times cheaper than engineered structures and delivers additional economic and climate benefits up to 10 times the costs: ▪ $82 bn per year in avoided losses from coastal flooding; ▪ $20 bn per year in reduced insurance payouts for losses; ▪ $50 bn per year in benefits for fisheries, forestry, and ecotourism and can generate additional revenue from carbon and biodiversity credits.
Urban heat effect	○ Annual investment of $100 million in urban gardens could create shade to cut average temperatures by 1°C for 77 million people and cut air conditioning costs by up to 40%
Urban rain capture/flood management	○ The green roof market is estimated to reach $9 billion in 2020 and to grow 12 percent annually over the next decade, creating an annual investment opportunity of $15 billion.

GLOBAL PROGRAM ON NATURE-BASED SOLUTIONS FOR CLIMATE RESILIENCE

AN INITIATIVE OF WORLD BANK GROUP

GFDRR
Global Facility for Disaster Reduction and Recovery

GWSP
GLOBAL WATER SECURITY & SANITATION PARTNERSHIP

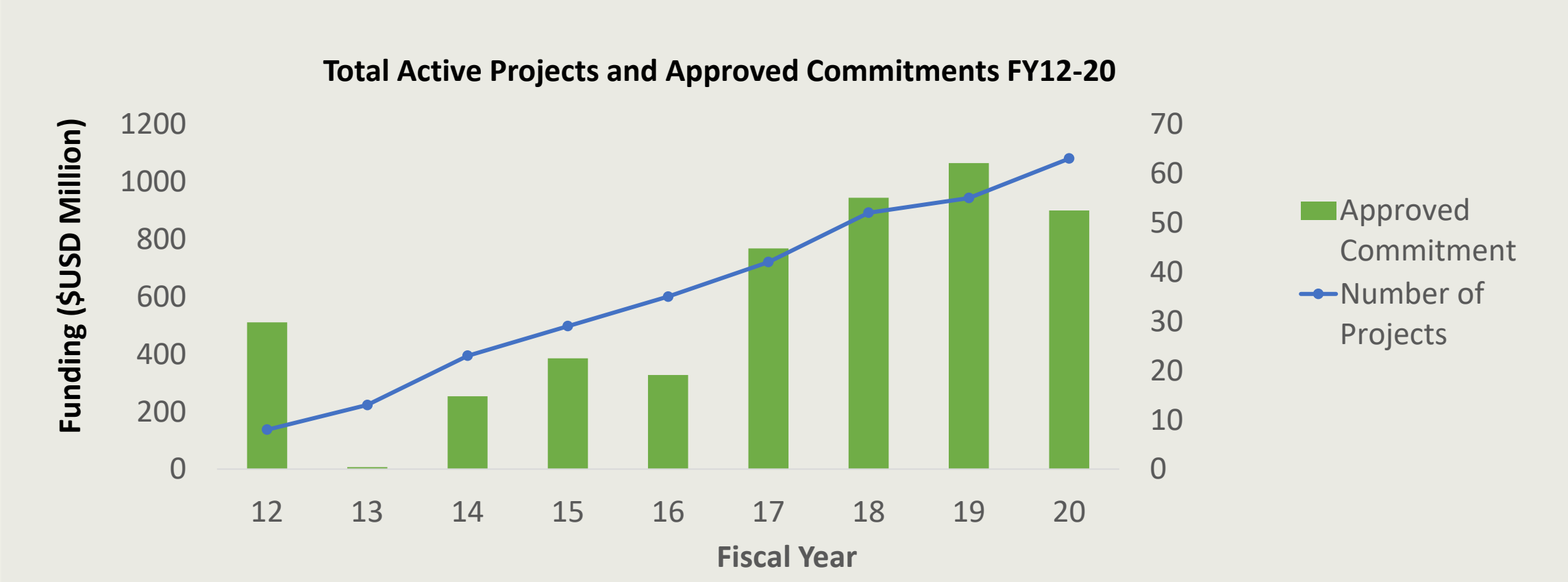
PROBLUE

PROGREEN

GLOBAL PROGRAM ON
NATURE-BASED SOLUTIONS
FOR CLIMATE RESILIENCE

A portfolio review identified a total of **73 lending projects** with project components using NBS for Climate Resilience from FY12 to FY20.

These components are valued at an estimated **4.6 Billion USD**

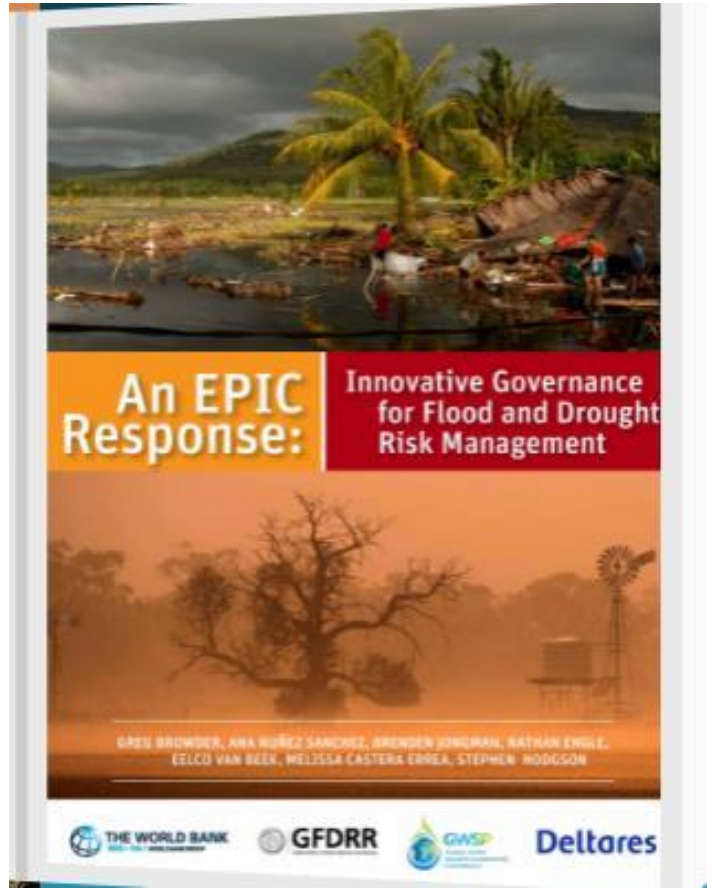


IMPLEMENTATION GUIDANCE BY THE WORLD BANK

The Role of Green Infrastructure Solutions in Urban FRM

Managing Coasts with Natural Solutions

NBS Guidance Note



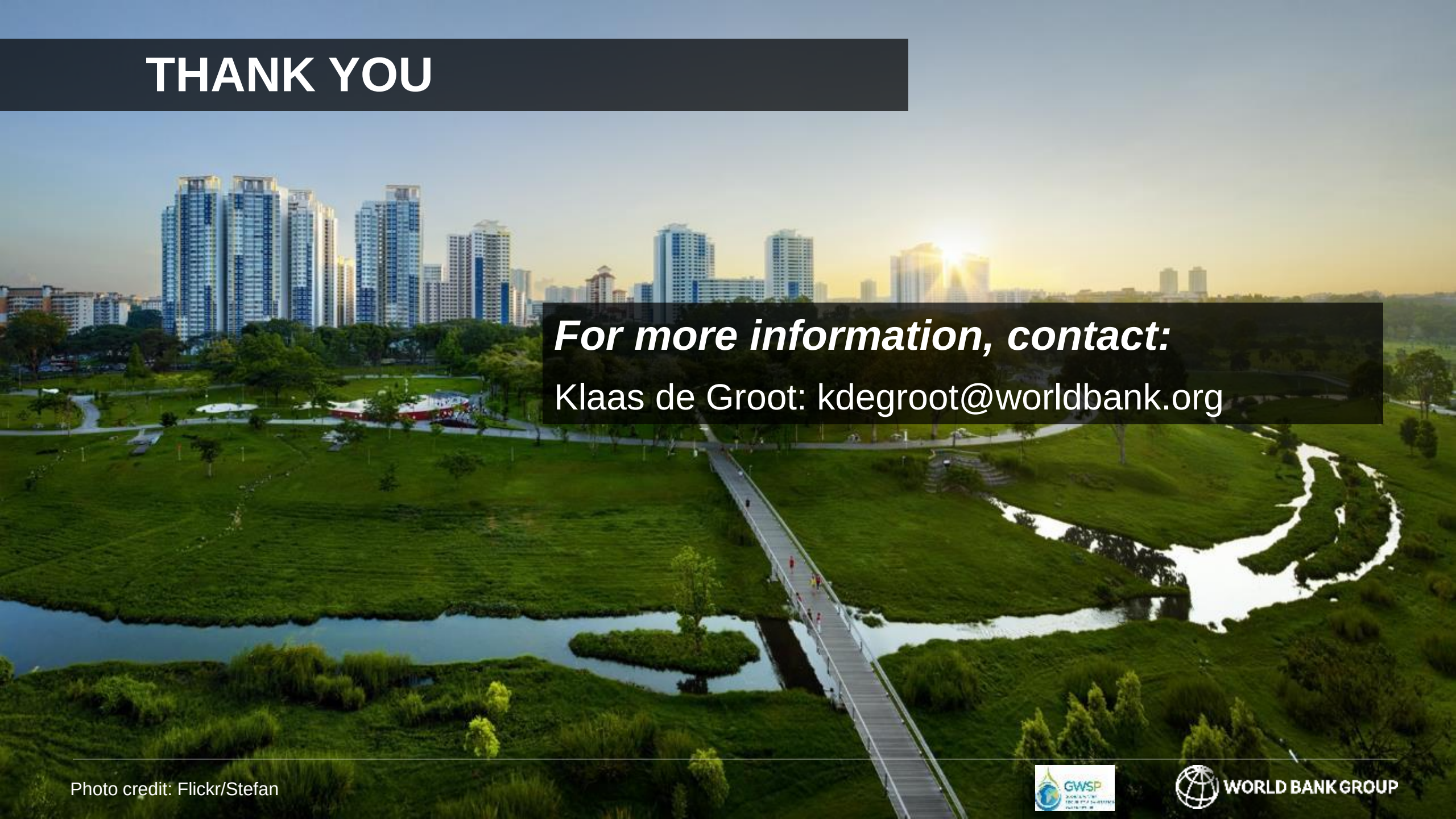
NBS for DRM Booklet

Mini-Studio Guide

Learning from the Japan Experience

WORLD BANK GROUP

THANK YOU



For more information, contact:

Klaas de Groot: kdegroot@worldbank.org

Photo credit: Flickr/Stefan

GWSP

WORLD BANK GROUP