GLOBAL PROGRAM ON
NATURE-BASED SOLUTIONS
FOR CLIMATE RESILIENCE

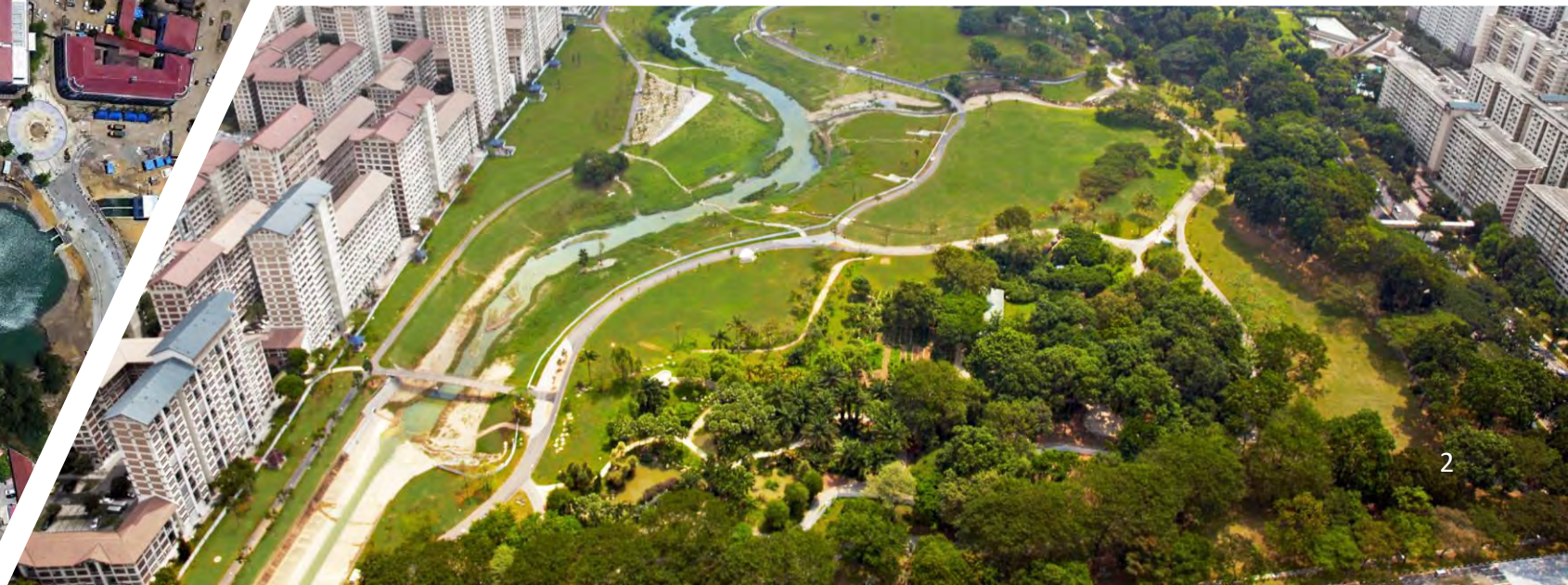
FFPRI International Seminar

Resilient Mountains Through Nature-Based Solutions

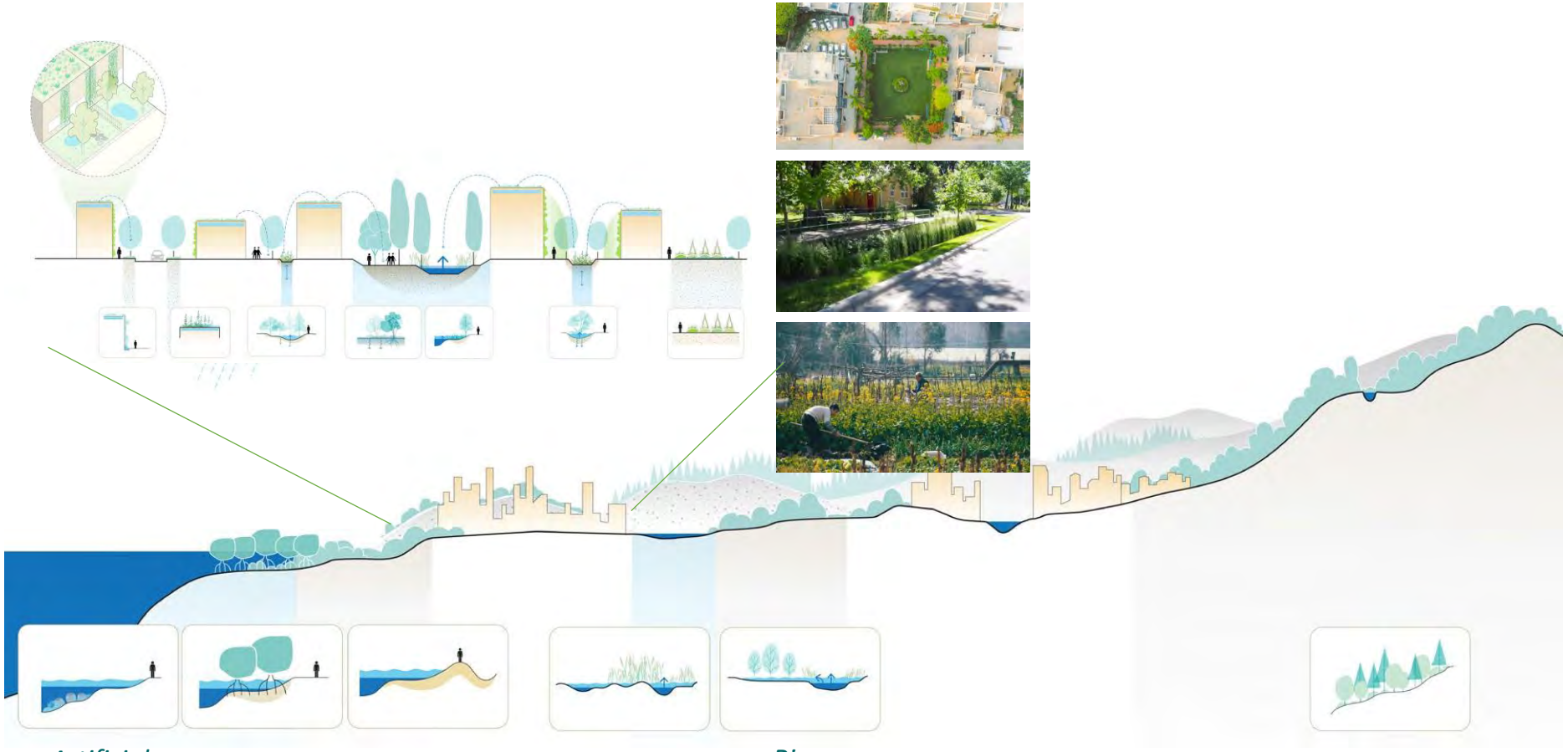
GFDRR
Global Facility for Disaster Reduction and Recovery

GWSP
GLOBAL WATER SECURITY & SANITATION PARTNERSHIP

WORLD BANK GROUP



Nature-based solutions across spatial scales



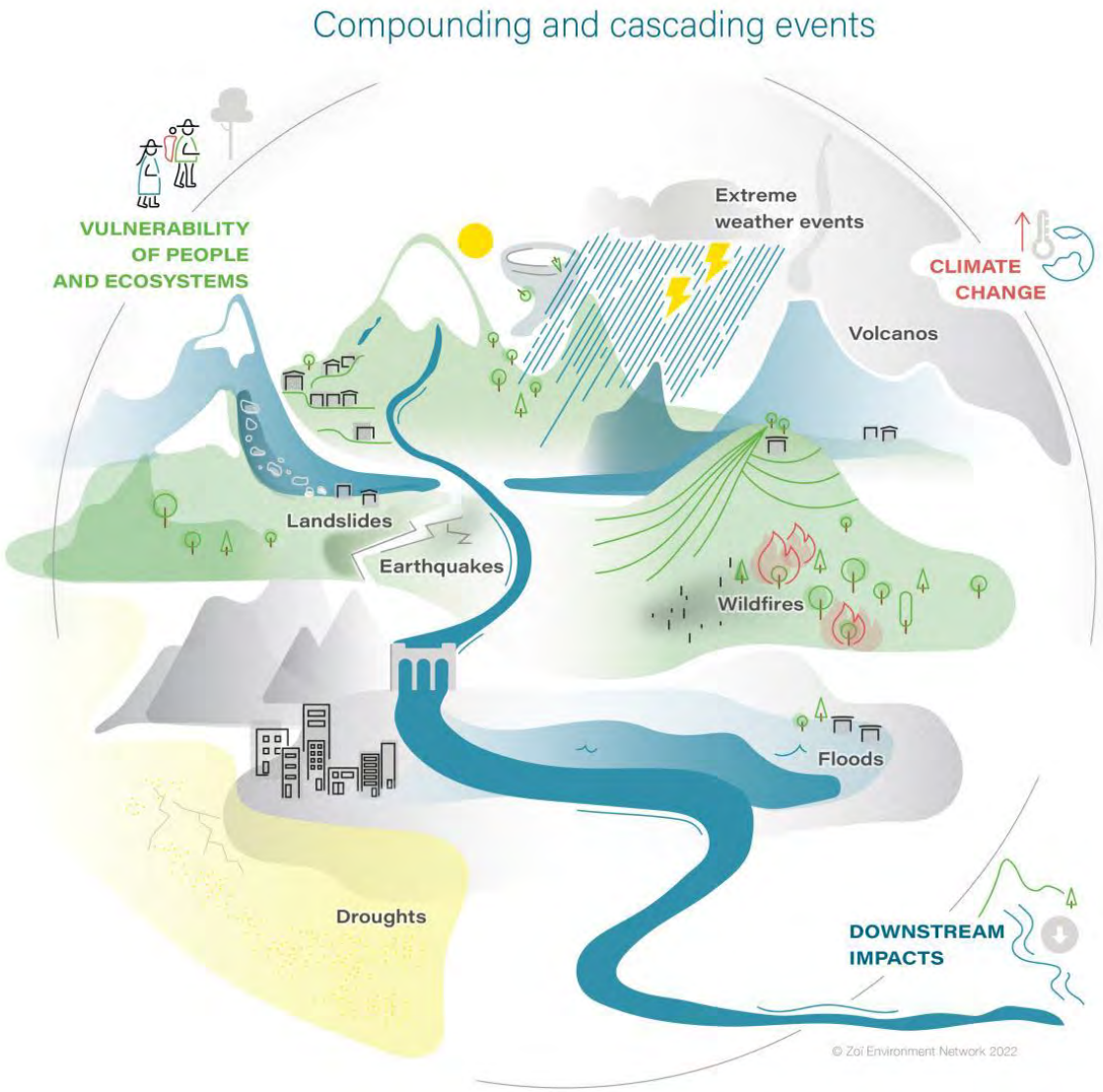
Upland forests

Mangrove forests

Sandy shores

DISASTER RISK IN MOUNTAINS

- High vulnerability
- In the forefront of climate change
- Provide crucial ecosystem services to billions of people living downstream
- Increasing exposure to hazards



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THE TRADITIONAL GRAY APPROACH IS NOT ENOUGH

ADVANTAGES

- **Essential role** in preventing floodwaters from damaging assets and harming people
- Deep **industry knowledge**
- High **performance certainty** and control

CHALLENGES

- **Alter natural flow regimes** that cause endanger biodiversity
- **Can increase flood** risk over time
- **Massive investment gap** in flood infrastructure

NATURE-BASED SOLUTIONS FOR DRR

Nature-based solutions protect, manage, enhance, and/or restore natural or nature-based features to address climate resilience and adaptation, while provisioning a wealth of valuable co-benefits.

Bishan Park (Singapore)

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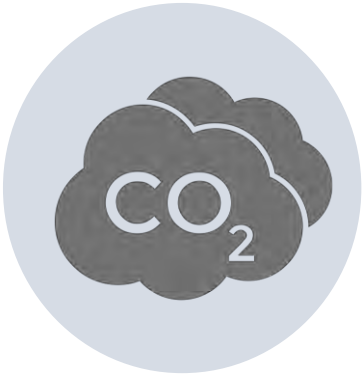
NATURE-BASED SOLUTIONS FOR DRR (2)

Global evidence demonstrates that NBS have a large potential for multi-hazard risk reduction and added benefits.

CBAs show that strategic conservation of floodplains can lead to **avoided increase in the economic and human costs** of flooding while providing multiple benefits[1]



Nature-based solutions can account for **more than 30% of the emissions reductions** needed to meet the Paris Accord.

Can **empower communities** through participation in project operations. This **enhances project sustainability** as long-term viability is highly dependent on community support.

In mountainous areas, NBS can be a cost-effective solution to reduce flooding, increase biodiversity, and **reduced landslide risk along with erosion and sedimentation.**

This can also extend the life of hydropower infrastructure, support agriculture, and protect transport infrastructure.

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ENHANCING THE BENEFITS OF NATURAL AND BUILT SOLUTIONS

Nature can provide additional value to gray approaches:

- Provide wide range of **additional co-benefits**
- Ads **cost-effectiveness**
- Can be designed as **resilient**, flexible, climate adaptation measures
- Allow natural ecosystems/watersheds to **function naturally.**

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FORESTS FOR DISASTER RISK REDUCTION IN MOUNTAINS

1 2 3

Snow avalanche risks

4

Rockfall risk

5

Floods and debris flow risk

6

Landslides

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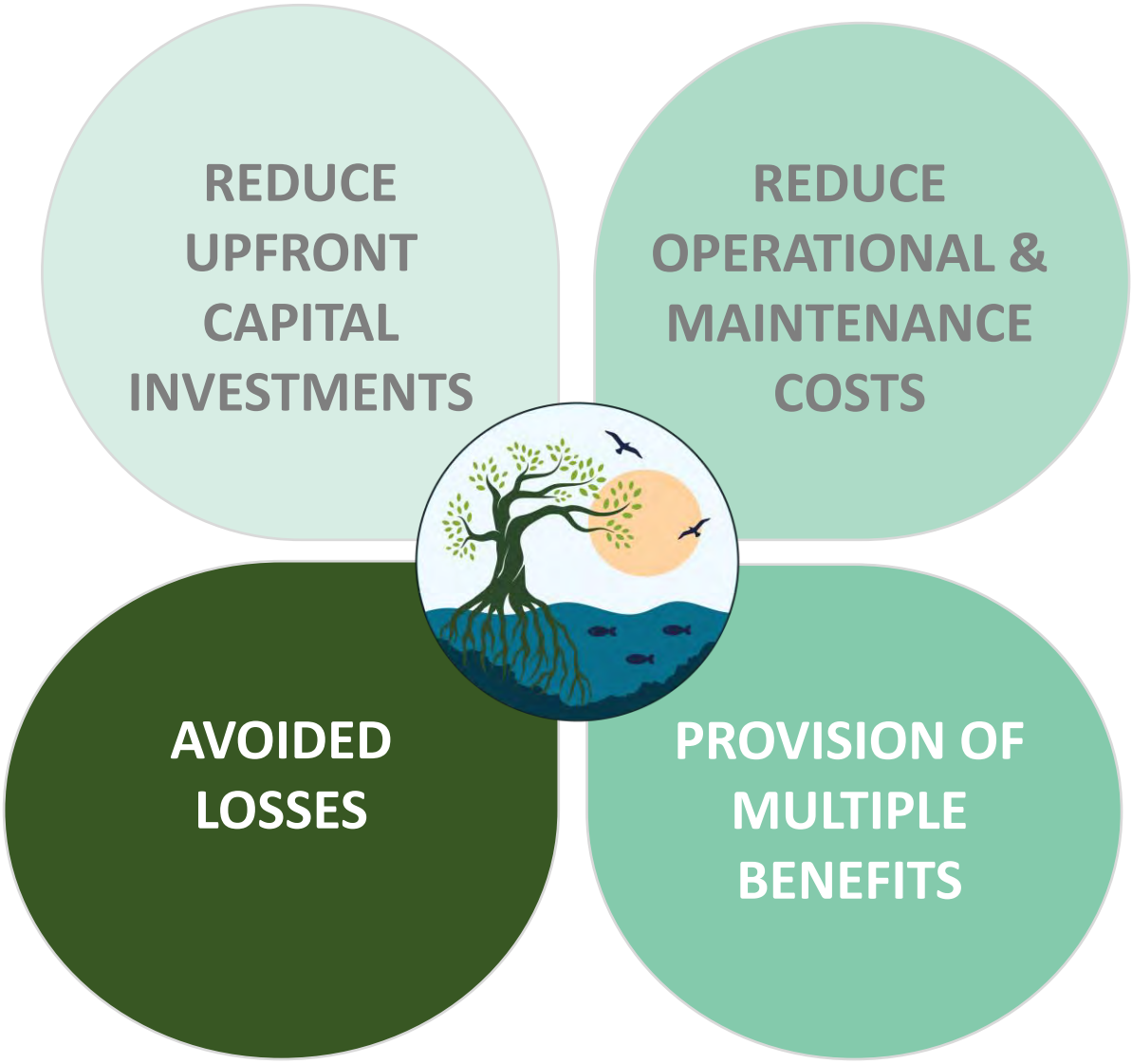
WHAT IS THE BUSINESS CASE FOR NBS?



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THE CATALYTIC ROLE OF THE WORLD BANK

- Funding initial project steps and supporting project design
- Advocating for holistic landscape approaches
- Building capacity
- Providing catalytic capital in blended capital strategies

De-Risking Investments in Nature-based and Hybrid Infrastructure

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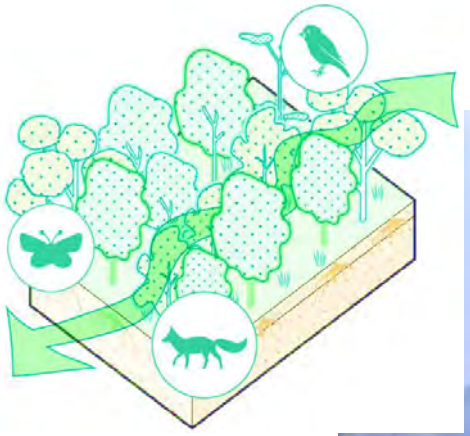

Reforestation

- **Upstream watershed characteristics** influence downstream river floods
- **Reforesting areas** over 25-40% have been shown to decrease the flood maximum by 20%[1]
- **Reduces land-use change** that increases flood runoff

Benefits

- Soil production, reduced erosion, landslide risk, and sedimentation
- Habitat creation
- Carbon sequestration
- Increase resilience of infrastructure

Considerations

- Poor designs lead to negligible benefits (ex. targeted reforestation vs simple reforestation)
- Problems of scale and aggregate costs; large private ownership of land creates high costs
- Importance of data and monitoring

Credit: Darshan Simha

Using Nature to Reduce Flooding and Landslide Risk

Case Study: Himachal Pradesh, India

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The **Himachal Pradesh State Roads Transformation Project** is working to addressing the landslides and flash floods that affects road connectivity in Himachal Pradesh. These events block rural populations from accessing basic services, such as hospitals.

To protect against landslides and floods, the project will implement engineering solutions that include natural-based solutions, also known as bioengineering interventions, as well as control vehicular emission to address climate risks. **Women-led groups will receive 30% of the non-mechanized maintenance contracts** for the bioengineering solutions.

This project builds upon the work done in the previous Himachal Pradesh States Roads project, which created the Himachal Pradesh State Road, used bioengineering, and upgraded 435 km of roads. **The project saw reduced death rates and vehicle operating costs.**

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Terracing

- There is a long history of civilization employing terracing
- It reduces flooding by absorbing water and draining the excess to the next step down; runoff and soil loss reduced by more than 80% in one study in South Asia.
- Considered one of the best techniques for erosion control, terraces effectively trap sediment.

Benefits

- Conservation of soil and water
- Carbon sequestration
- Enhancement of crop yield and food security
- Enhancement of biodiversity compared to non-nature-based features

Considerations

- Must understand the physical processes to determine maintenance criteria.
- Labor-intensive
- Choosing terrace design should be guided by level of rainfall and context-specific topographical, soil, and other hydrological factors

Landscapes Restoration for Multiple Benefits

Case Study: Burundi

The **Burundi Landscape Restoration Project** is working to support the development of policies and capacities to plan and implement land preservation and restoration in the targeted project areas, using a resilient and integrated landscape approach. The interventions include soil bioengineering, restoring degraded lands, and agroforestry.

Reforestation is expected to amount **to $5.1 USD Million** (NPV), and the **internal rate of return is 26%,** which arises from direct income increase, avoidance of yield or income loss that would occur without project, and flood risk reduction.

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Thank you

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