

What are nature-based solutions for DRR? Concepts, trends and figures...



© UNEP: border zone between Haiti and Dom. Republic

F-2-F, Swiss NGO DRR Platform, December 6, 2017

Dr. K. Sudmeier-Rieux, UN Environment & IUCN Commission on Ecosystem Management

PEDRR

Partnership for Environment and Disaster Risk Reduction

Outline

1. Why are we here? What is the problem?
2. What are Nature-based solutions to disaster risk reduction?
3. What are challenges and opportunities for up-scaling Nature-based Solutions?

1. Why are we here?
What is the problem?
Nature-based solutions to what?

What is the problem?



Tropical Storm Jeanne, 2004
6,000 casualties in Haiti
18 casualties in Dominican
Republic
USD 7 billion total damages



This is the problem...



@UNEP, Haiti/Rep Dominican border

Natural? disaster..

**Yala National Park
Sri Lanka**



Yala Village
5 cm in resort



Yala Safari
7 m in resort
27 dead

Credit: Mc Adoo, 2008

Natural? disaster..



@Sudmeier-Rieux, Nepal 2016

What is a disaster and disaster risk?



Disaster: a serious disruption of a society which goes beyond local coping capacities..

Disaster risk: potential disaster losses

Risk: Hazard x Exposure X Vulnerability

UNISDR 2009

Hazards

Geophysical



Earthquakes



Tsunamis



Volcano eruptions

Hydro-meteorological



Storms



Flooding



Landslides / debris flows

Climatological



Heatwaves



Cold spells

Societal/ Technological

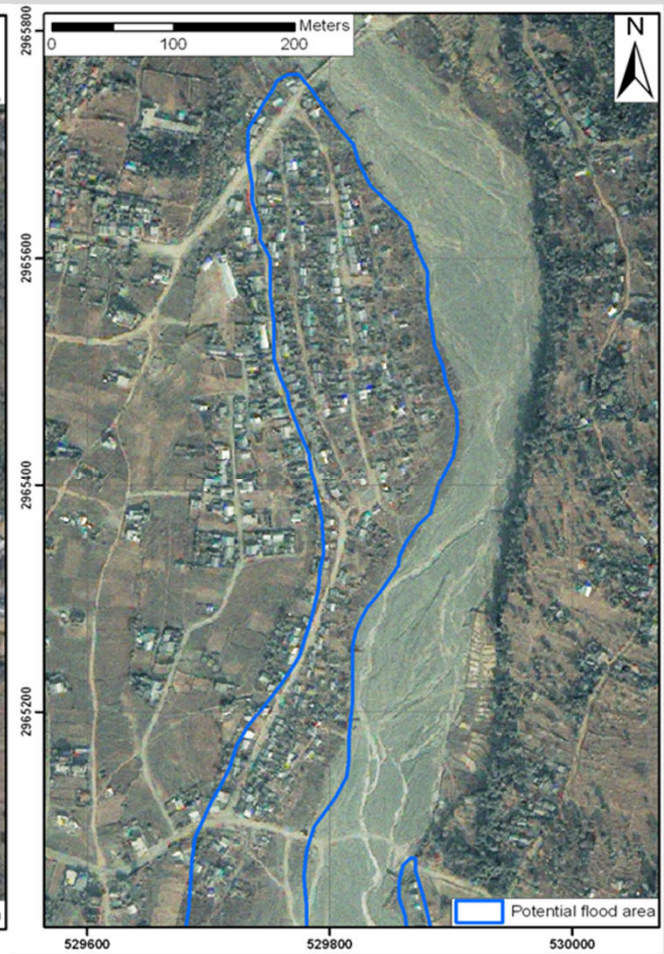


Exposure

Exposure:
Elements at risk
present in a hazard
zone and subject
to potential losses.
(UNISDR, 2009)



Dharan, Nepal, ©Google Earth, 2004



Dharan, Nepal, Ikonos/Dubois, Sudmeier/ UNIL, 2009

Vulnerability



Nepal ©Sudmeier-Rieux, 2009

The characteristics and circumstances of a community or system (ISDR, 2001).

The propensity or predisposition to be adversely affected (IPCC, SREX, 2012).

Many definitions & ways to measure

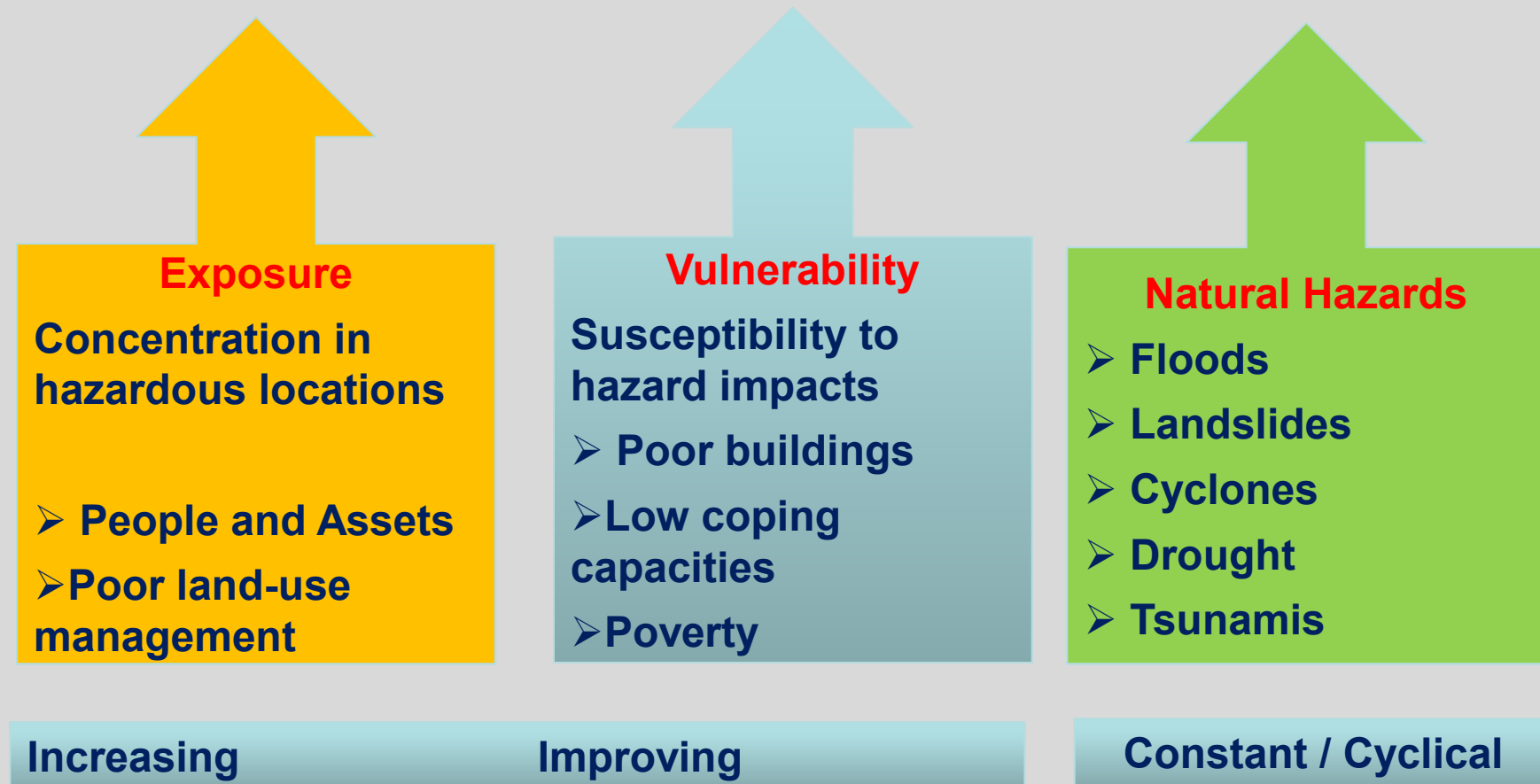
GDP, literacy rates or as physical characteristics of buildings.



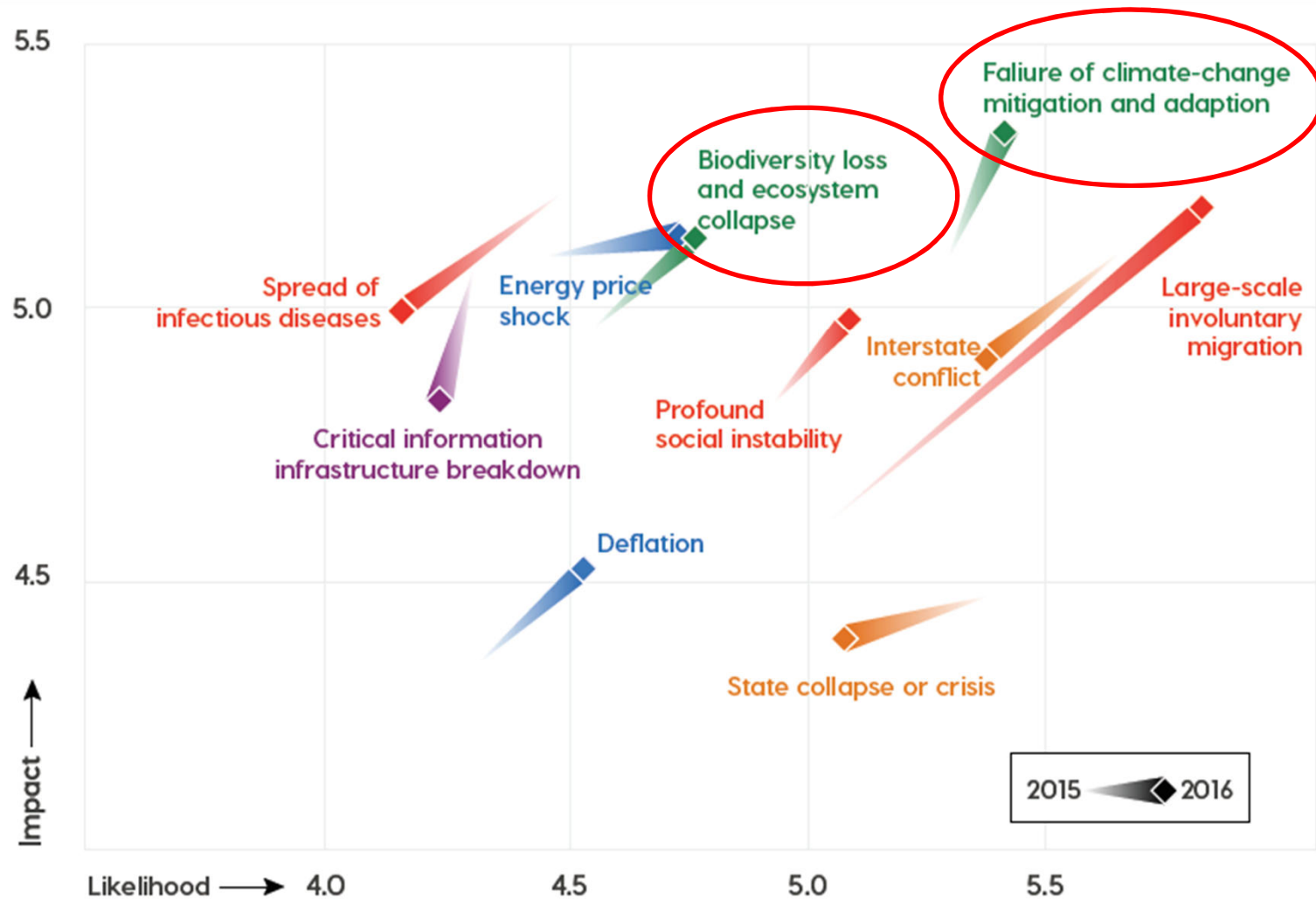
Nepal ©Sudmeier-Rieux, 2009

Why is risk of disasters increasing?

Large-scale **exposure & vulnerability** to a hazard



Why are we here?



Source: The Global Risks Report 2016, World Economic Forum

Why are we here?



CBD



Convention on Biological Diversity

Distr.
GENERAL

UNEP/CBD/COP/DEC/XII/20
17 October 2014

ORIGINAL: ENGLISH

CONFERENCE OF THE PARTIES TO THE
CONVENTION ON BIOLOGICAL DIVERSITY
Twelfth meeting
Pyeongchang, Republic of Korea, 6-17 October 2014
Agenda item 25

DECISION ADOPTED BY THE CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY

XII/20. Biodiversity and climate change and disaster risk reduction

The Conference of the Parties,

Acknowledging that, while biodiversity and ecosystems are vulnerable to climate change, the conservation and sustainable use of biodiversity and the restoration of ecosystems can play a significant role in

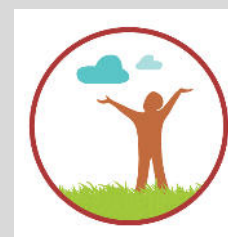
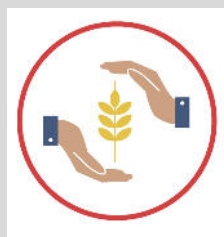
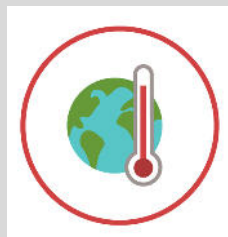
7. *Requests* the Executive Secretary, subject to the availability of resources:

(a) To promote ecosystem-based approaches to climate change adaptation and disaster risk reduction, taking advantage of opportunities presented by relevant processes and forums, in cooperation with relevant organizations, including the United Nations Framework Convention on Climate Change;

(b) To compile and analyse, in cooperation with relevant organizations, including the United Nations Office for Disaster Risk Reduction, the World Meteorological Organization, and the International Union for Conservation of Nature information on ecosystem-based approaches to disaster risk reduction;

(c) To compile experiences with ecosystem-based approaches to climate change adaptation and disaster risk reduction and to share them through the clearing-house mechanism;

Nature-based Solutions & the Sustainable Development Goals



SDG 1 - No poverty

SDG 2 - No hunger

SDG 3 - Good health and well-being

SDG 6 - Clean water and sanitation

SDG 11 - Sustainable cities and communities

SDG 13 - Climate action

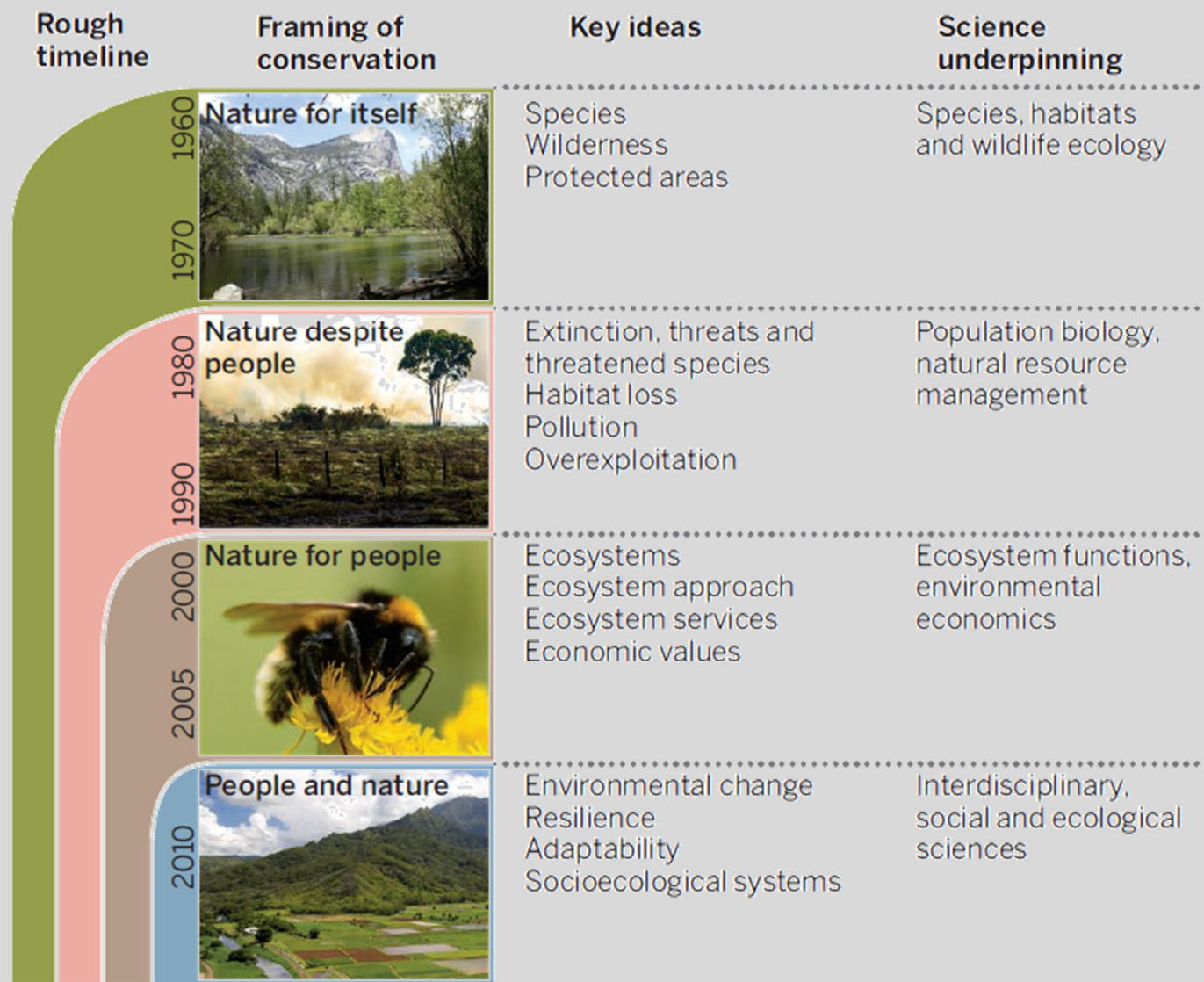
SDG 14 - Life below water

SDG 15 - Life on land

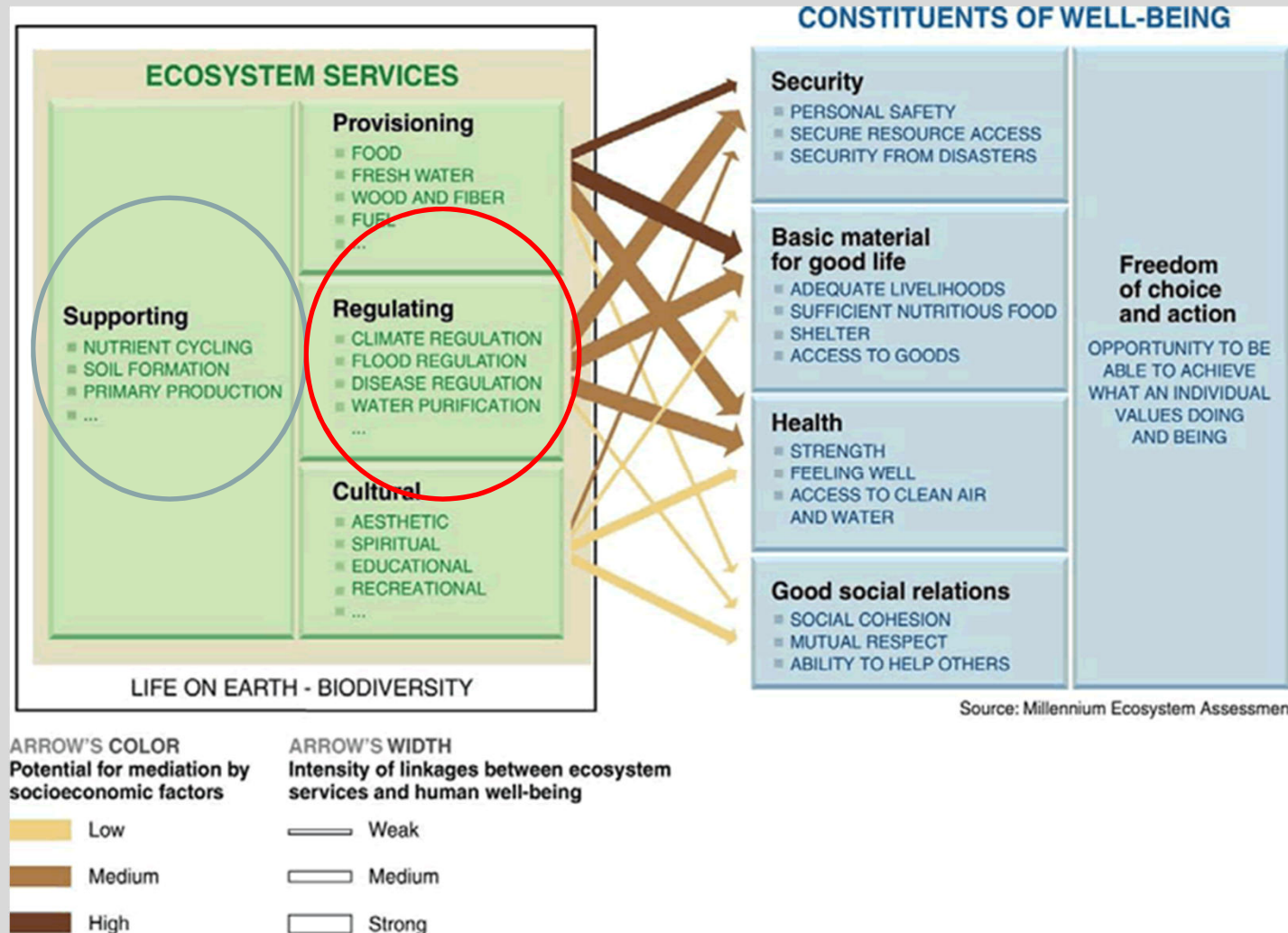


2. What are Nature-based solutions (NbS) to disaster risk reduction?

Evolving views on nature and conservation



Ecosystem services and DRR...



What are Nature-based Solutions?

Actions to protect, manage and restore natural or modified ecosystems, which address societal challenges*, effectively and adaptively, providing human well-being and biodiversity benefits.

** Societal challenges: climate change, food security, water security, human health, natural disasters, social and economic development*



Nature-based solutions approaches..

1. Ecosystem restoration approaches

ER EE FLR

2. Issue-specific ecosystem-related

EbA EbM Eco-DRR CAS

3. Infrastructure-related approaches

GI NI

4. Ecosystem-based management

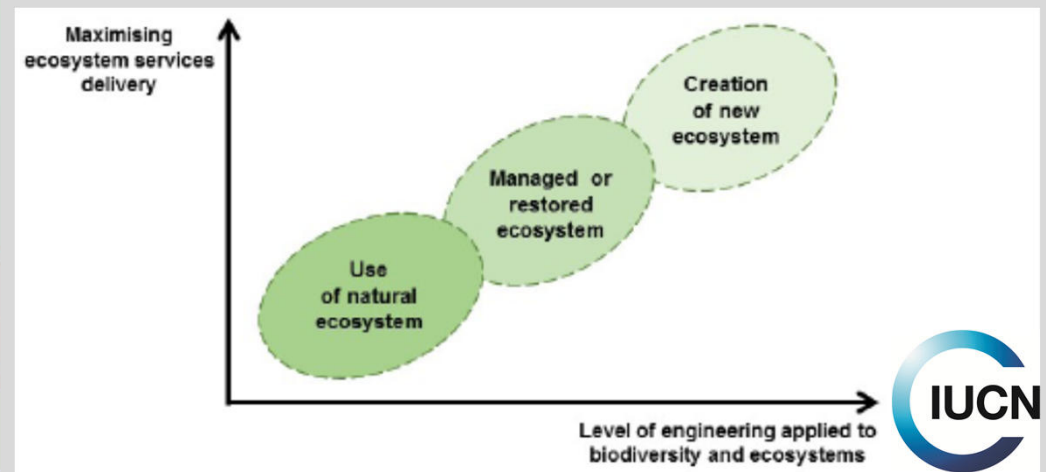
EbMgt

5. Ecosystem protection approaches

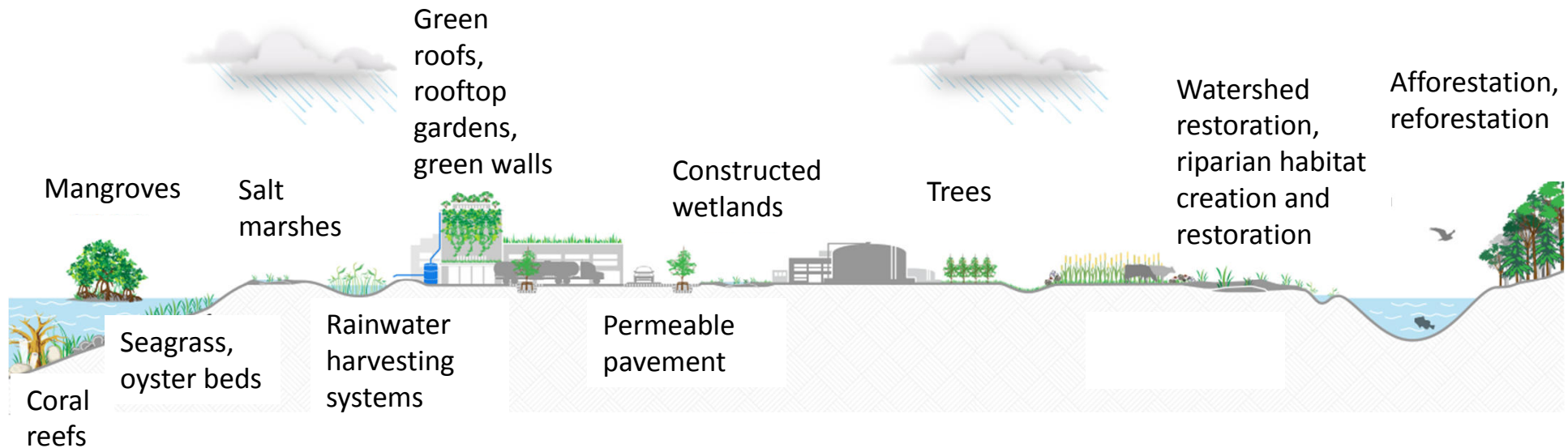
AbC



Nature based solutions are..



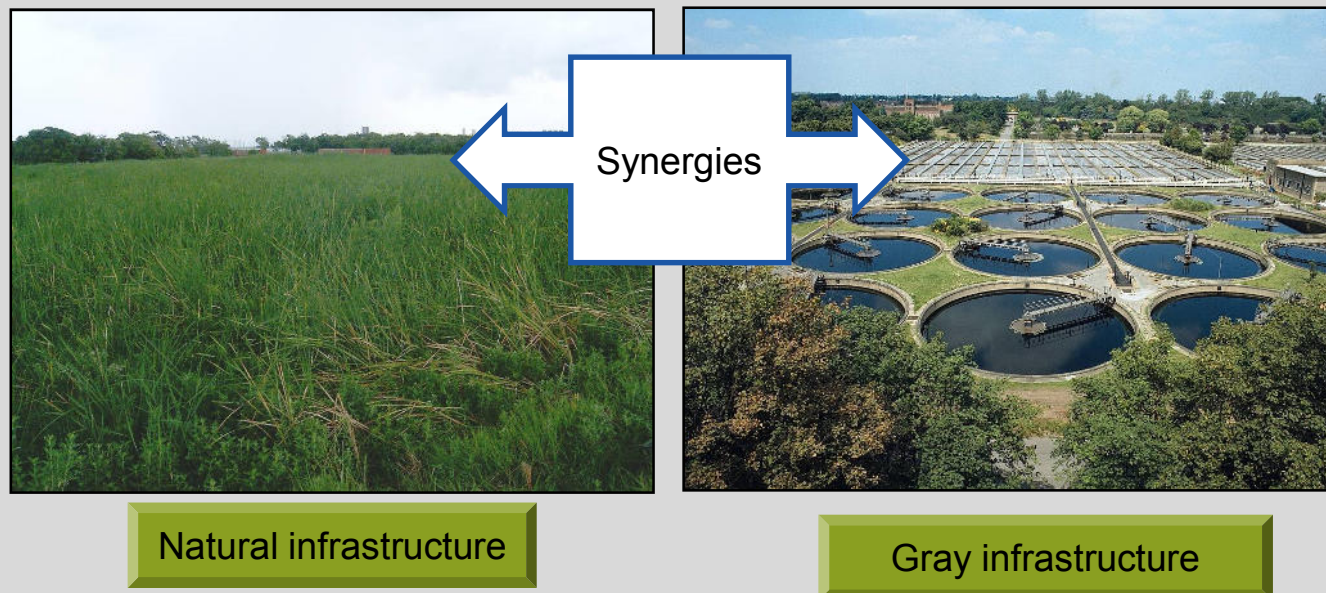
Services provided by NI solutions



<http://www.naturalinfrastructureforbusiness.org/>

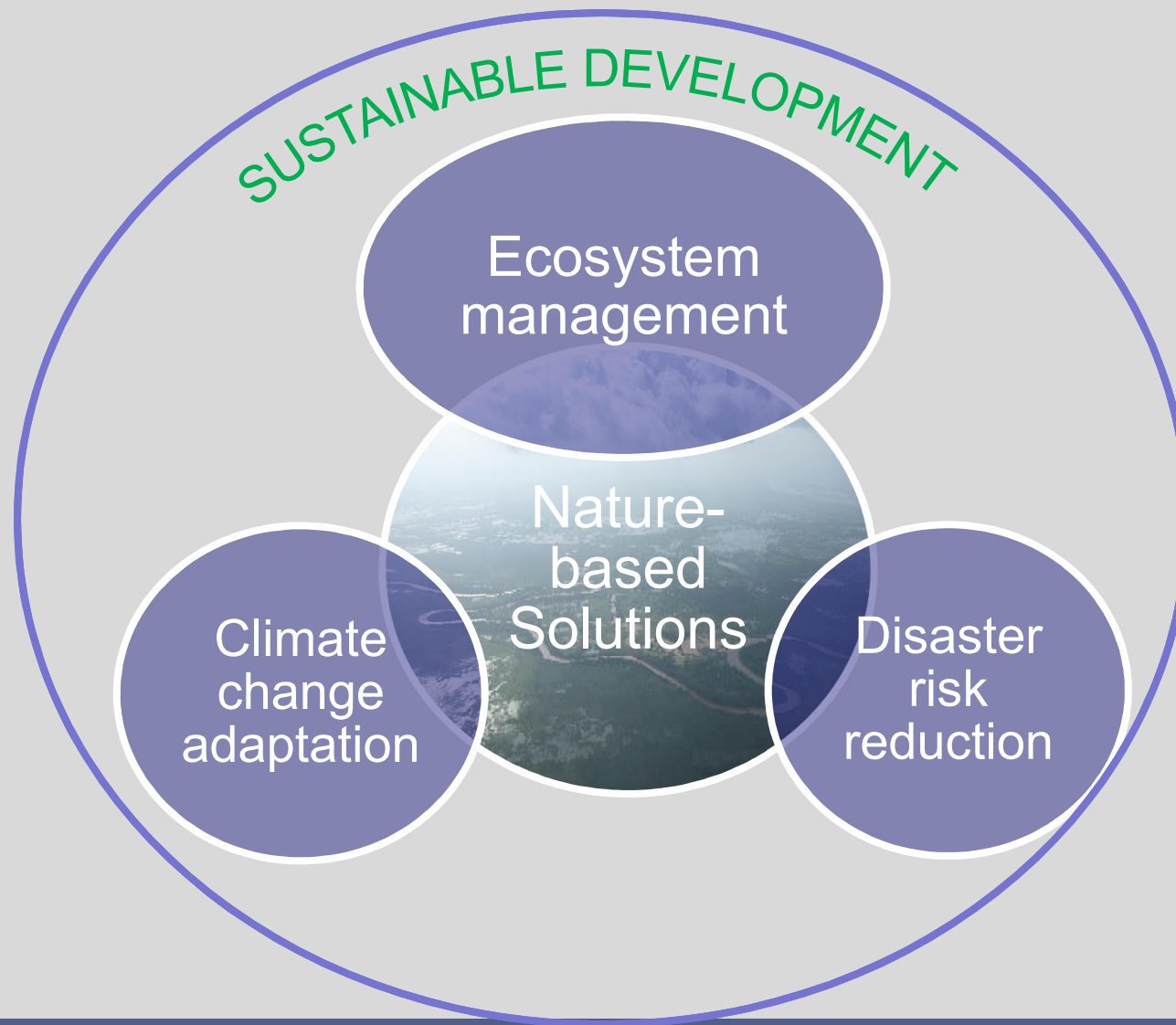
Nature based solutions are also..

Hybrid approaches, utilizing a **combination** of *natural* and *gray infrastructure*, may provide an **optimum solution** to shocks and improve the overall resilience of an organization. **Synergies** occur from combining both engineering schemes, each building upon their **respective strengths**



Source WBCSD/ Shell

Nature based solutions are..



CCA versus DRR?

Climate change adaptation

Chronic climate impacts:
drought, agriculture production
Time frame: **long term**

Scale: **global** climate change

Actors: UNFCCC, national
adaptation committees

Disaster Risk Reduction

Acute impacts: extreme weather

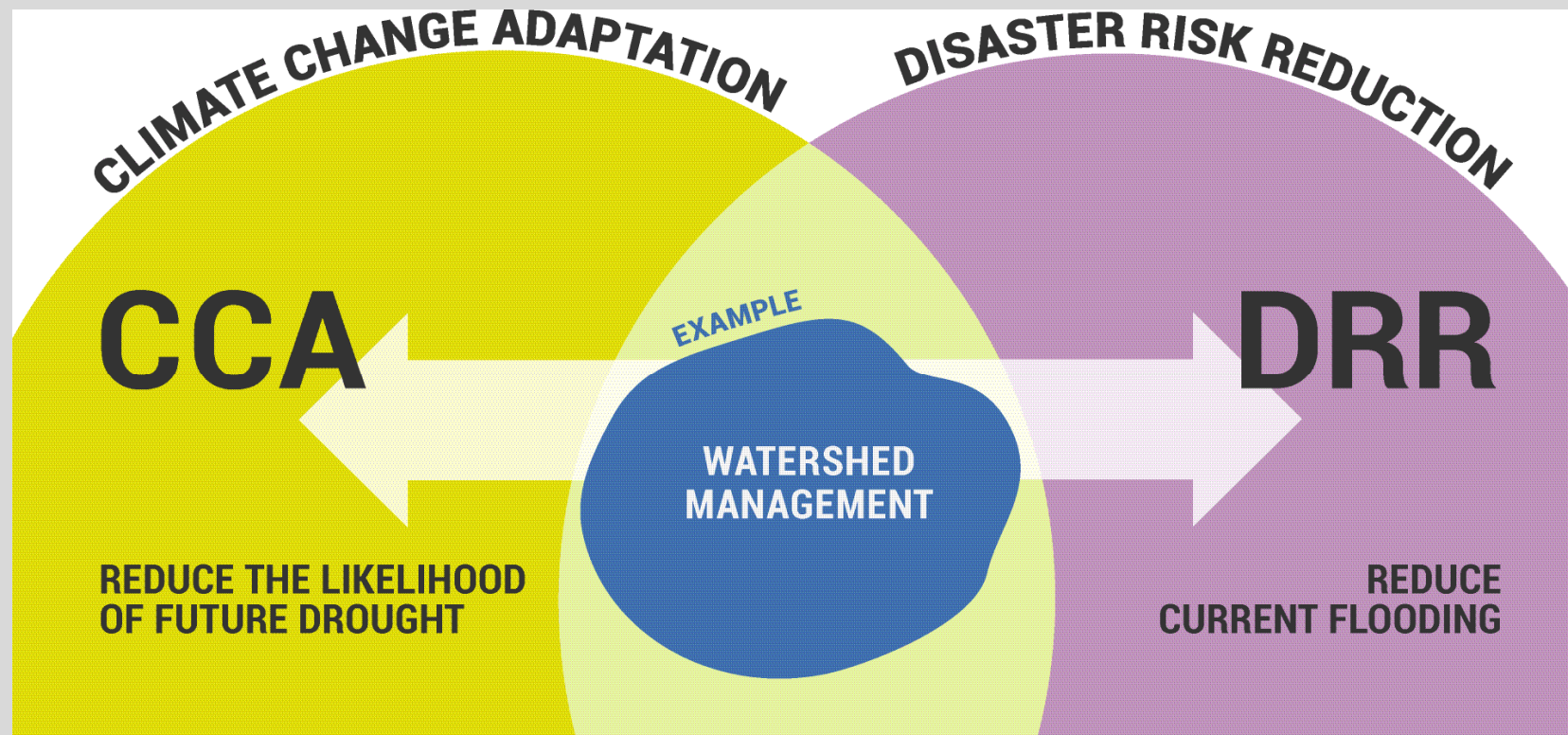
Time frame: **immediate** to medium
term

Scale: **locally specific** hazard events

Actors: UNISDR, civil protection/
humanitarian assistance



CCA versus DRR?



Different policy arenas



United Nations
Climate Change Conference



MANAGING THE RISKS OF EXTREME
EVENTS AND DISASTERS TO ADVANCE
CLIMATE CHANGE ADAPTATION



Outcome Document - Open Working Group on
Sustainable Development Goals

SAVE THE DATE / 14-18 March 2015

**3rd World Conference on
Disaster Risk Reduction**

Sendai City, Miyagi Prefecture, Japan

SPECIAL REPORT OF THE
INTERGOVERNMENTAL PANEL
ON CLIMATE CHANGE

ipcc  

Ecosystem-based DRR

Ecosystems can prevent or mitigate **hazards**

Ecosystems can reduce **exposure** by functioning as natural buffers

Ecosystems can reduce **vulnerability** by supporting livelihoods – before, during and after disasters

A no regrets strategy...



Wetlands buffer flooding + DRR..



Credit: Sudmeier- Rieux, Thailand

Forests/ grasses – mountain protection + DRR

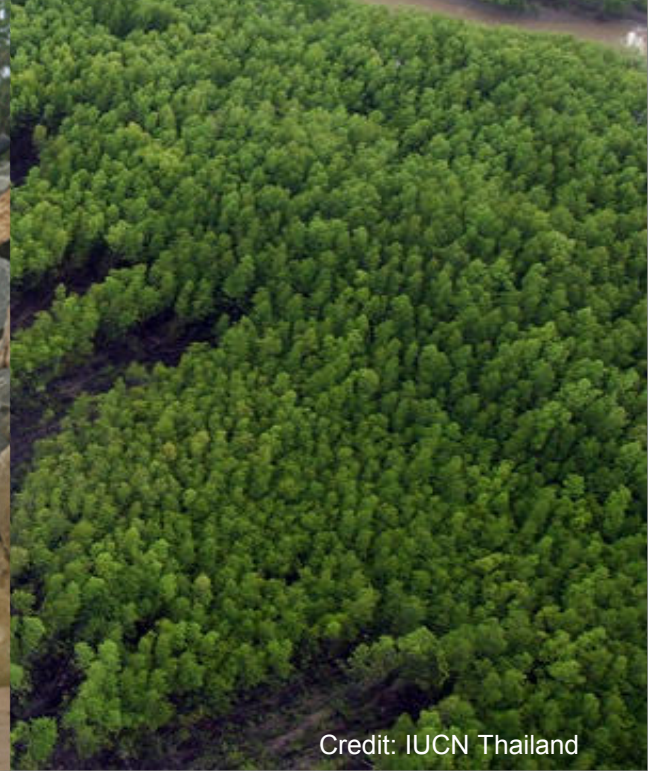


Credit: Sudmeier- Rieux, Switzerland

Vegetation for coastal protection + DRR



Credit: McAdoo, Sri Lanka



Credit: IUCN Thailand

Eco-DRR management approaches

Integrated Coastal
Zone Management
(ICZM) + DRR

Integrated Water
Resource
Management
(IWRM) + DRR

Protected Area
Management
(PAs) + DRR

Integrated Fire
Management
(IFM)

Sustainable Land
Management (SLM)/
Ecosystem
restoration

Community-based Natural Resource & Risk Management

Spatial planning
EIA / SEA + DRR

3. What are challenges and opportunities for up-scaling NbS?

Challenge 1: Convincing the engineers

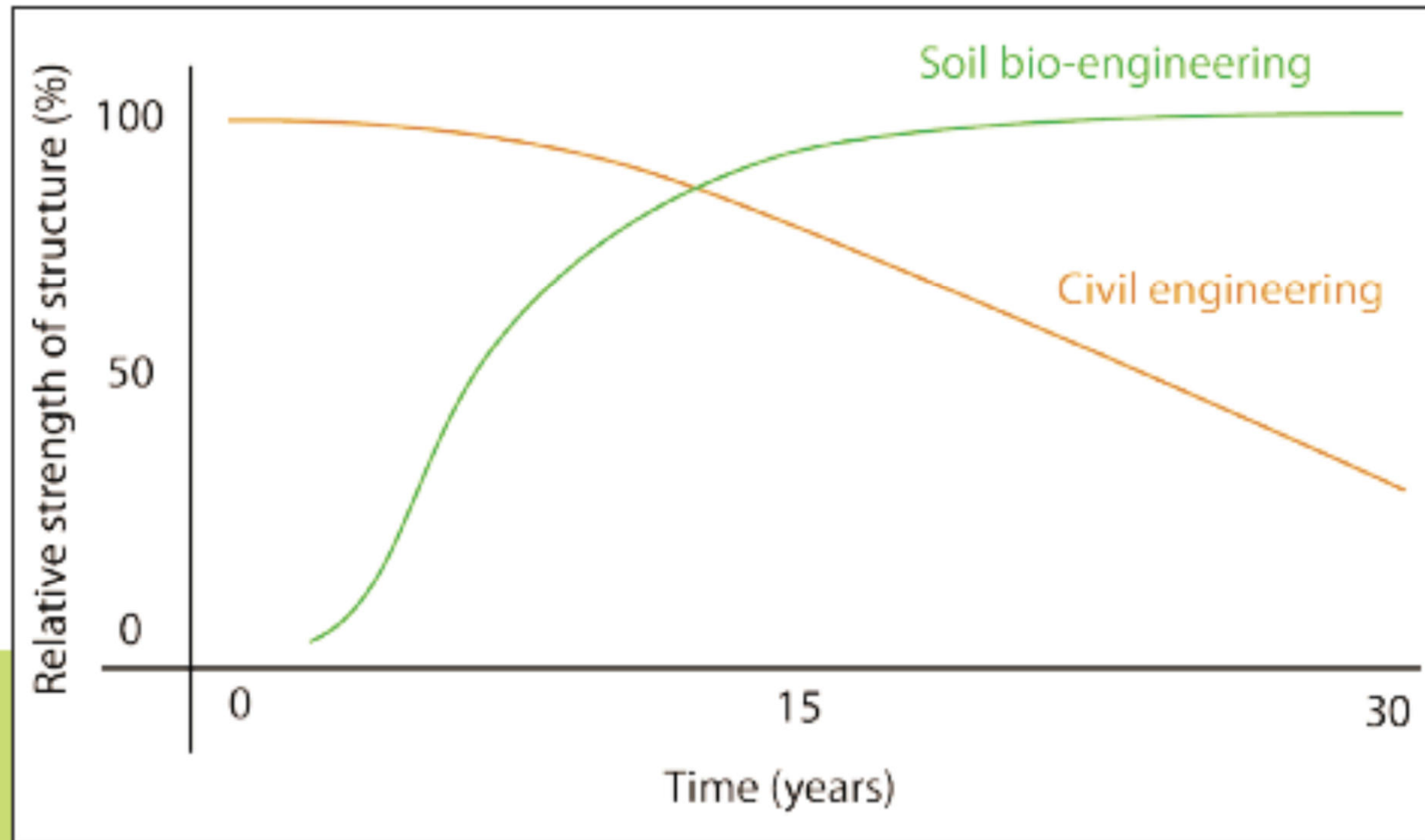


Natori City, Japan

2011 Earthquake (8.9 magnitude) and
Tsunami (10 m)

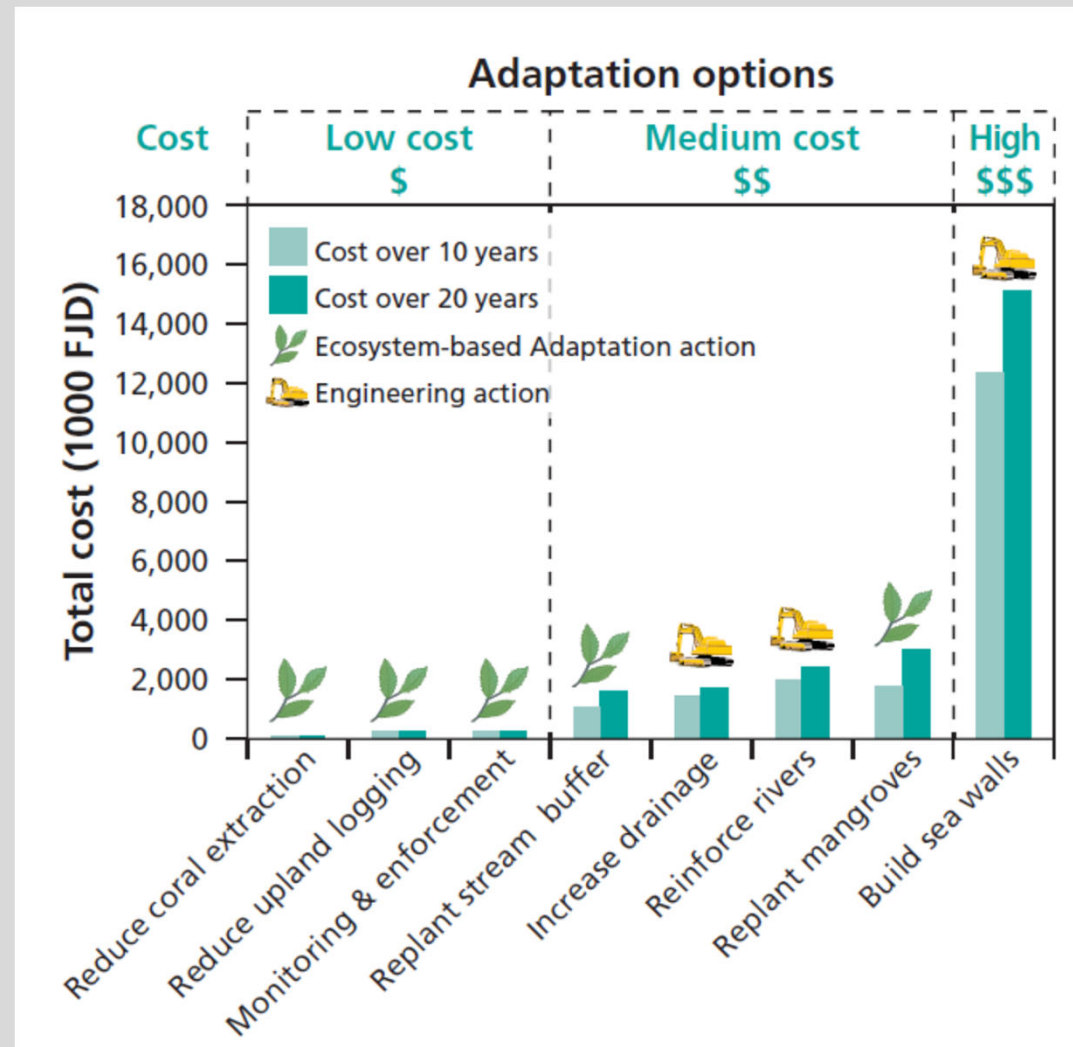
- Depends on type and intensity of hazard
- Health and composition of ecosystems
- Requires correct technical expertise!
- Combined solutions with hard infrastructure may be needed

Convincing the engineers, cont'd...



Source: CESVI, 2013

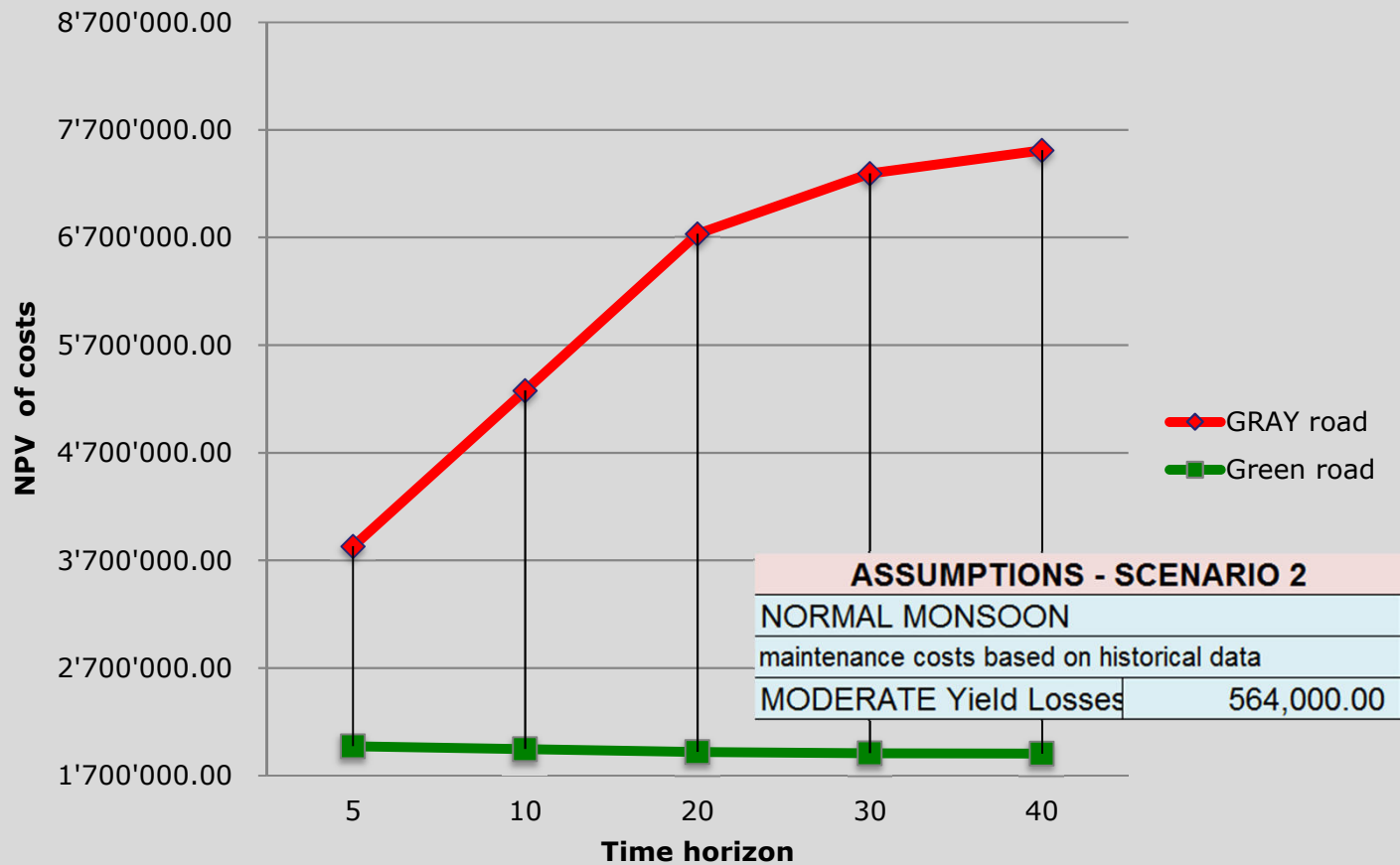
Challenge 2: Convincing the Ministry of Finance



Source:
SREP, 2013

Challenge 3: Convincing the Min. of Finance, again

NPV of cost - Green vs Gray Roads- Scenario 2



Credit: Vicarelli, in prep

Stabilizing slopes with local deep rooted grasses



Supported by:



Federal Ministry for the
Environment, Nature Conservation,
Building and Nuclear Safety

based on a decision of the German Bundestag



Grasses provide multiple benefits

- A regular income flow associated to the harvesting of fodder and broom grass used for road stabilization (20,000 NPR per year per km 200 USD)



Opportunity 1: Global uptake of Eco-DRR



CBD



Convention on
Biological Diversity

Distr.
GENERAL

UNEP/CBD/COP/DEC/XII/20
17 October 2014

ORIGINAL: ENGLISH



SAVE THE DATE / 14-18 March 2015

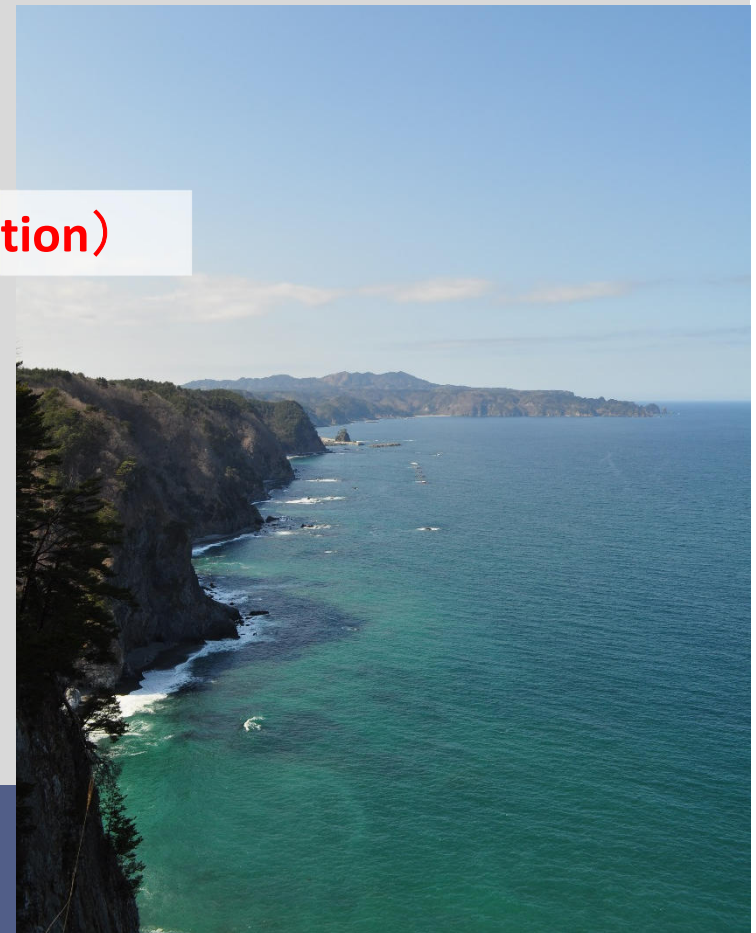
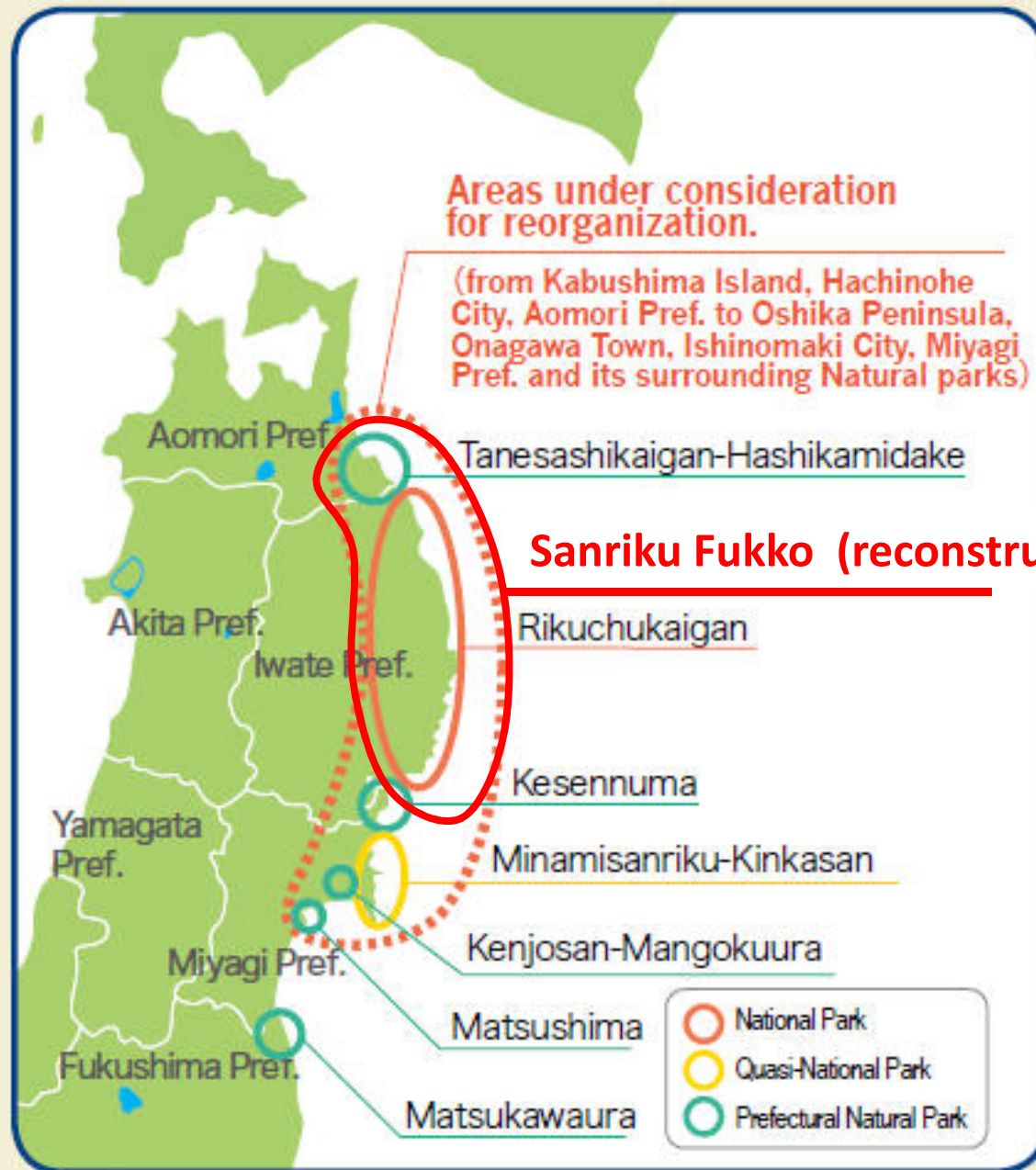
**3rd World Conference on
Disaster Risk Reduction**

Sendai City, Miyagi Prefecture, Japan



Opportunity 2: National level uptake, Japan

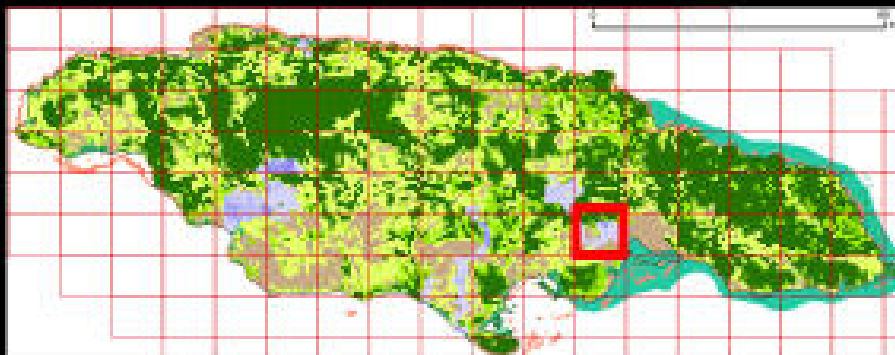
Sanriku Fukko
National Park
Designated on May 24,
2013



Opportunity 3: Innovative tools for Eco-DRR

Opportunity mapping for Eco-DRR and CCA

Cross mapping



Each cell (10 x 10 km) will contain:

- Exposed population for each hazard
- Surface covered by each ecosystem
- Needed type of action for given combination hazard/ecosystem

		<i>Exposure</i>	
		Low	High
<i>Ecosystem</i>	High	Status quo	Protection project
	Low	Status quo	Restoration project



UNIVERSITÉ
DE GENÈVE



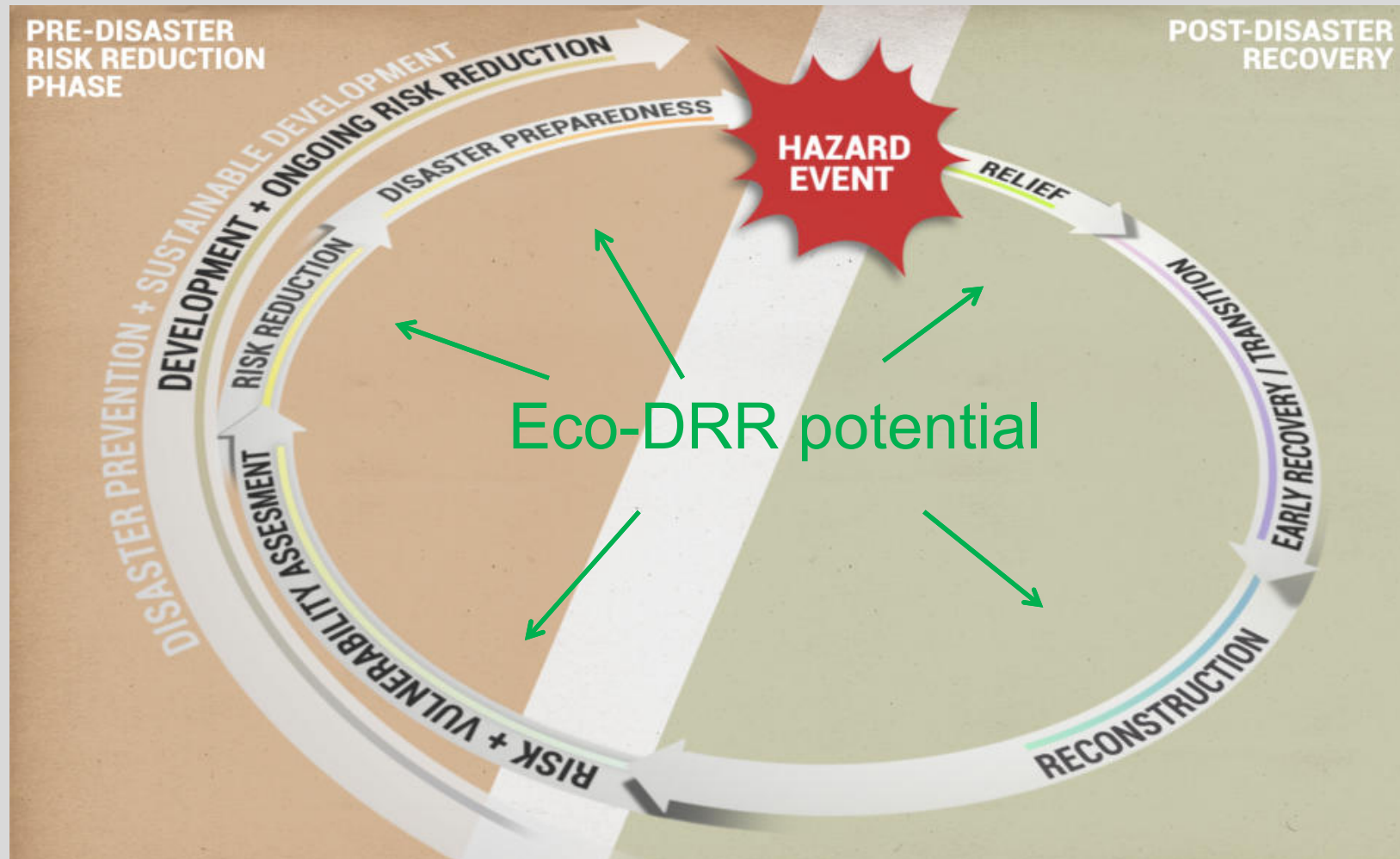
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra



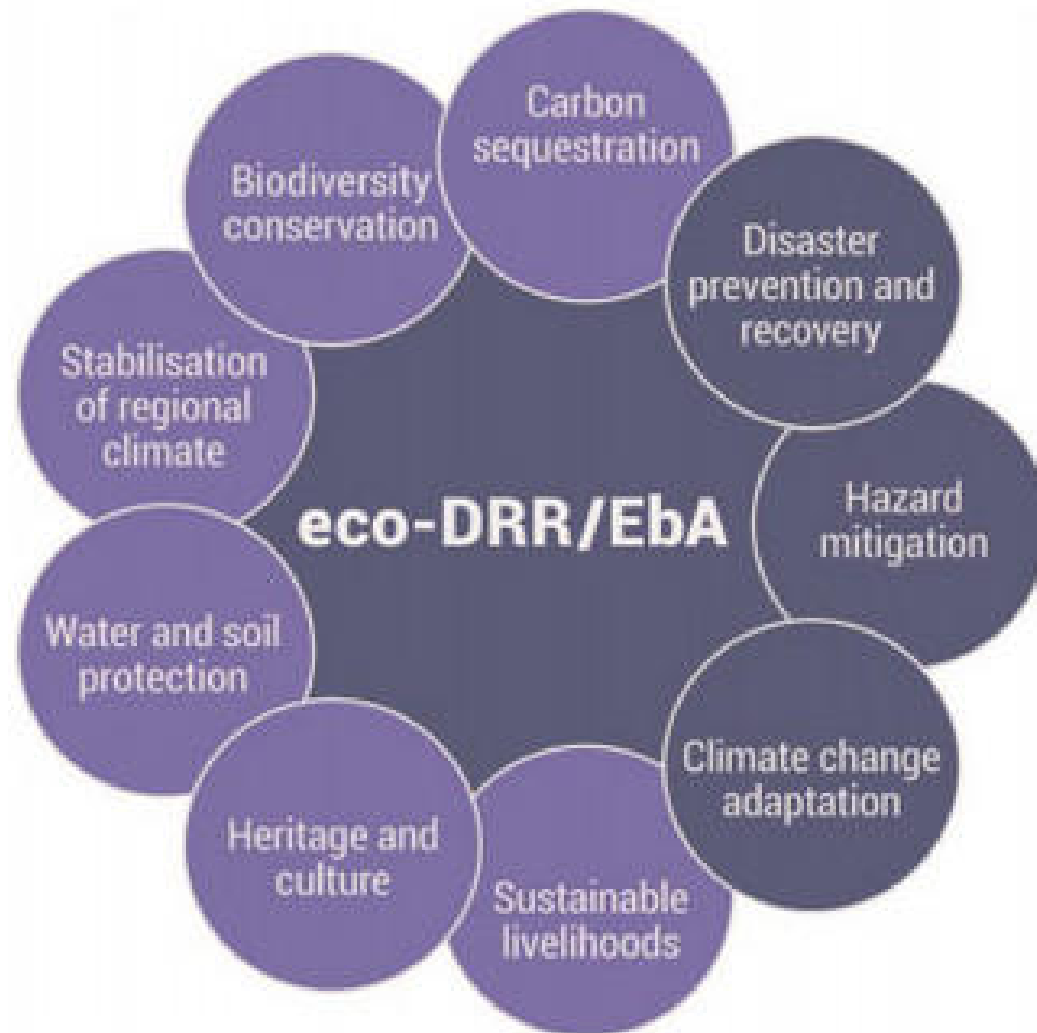
GRID
Geneva



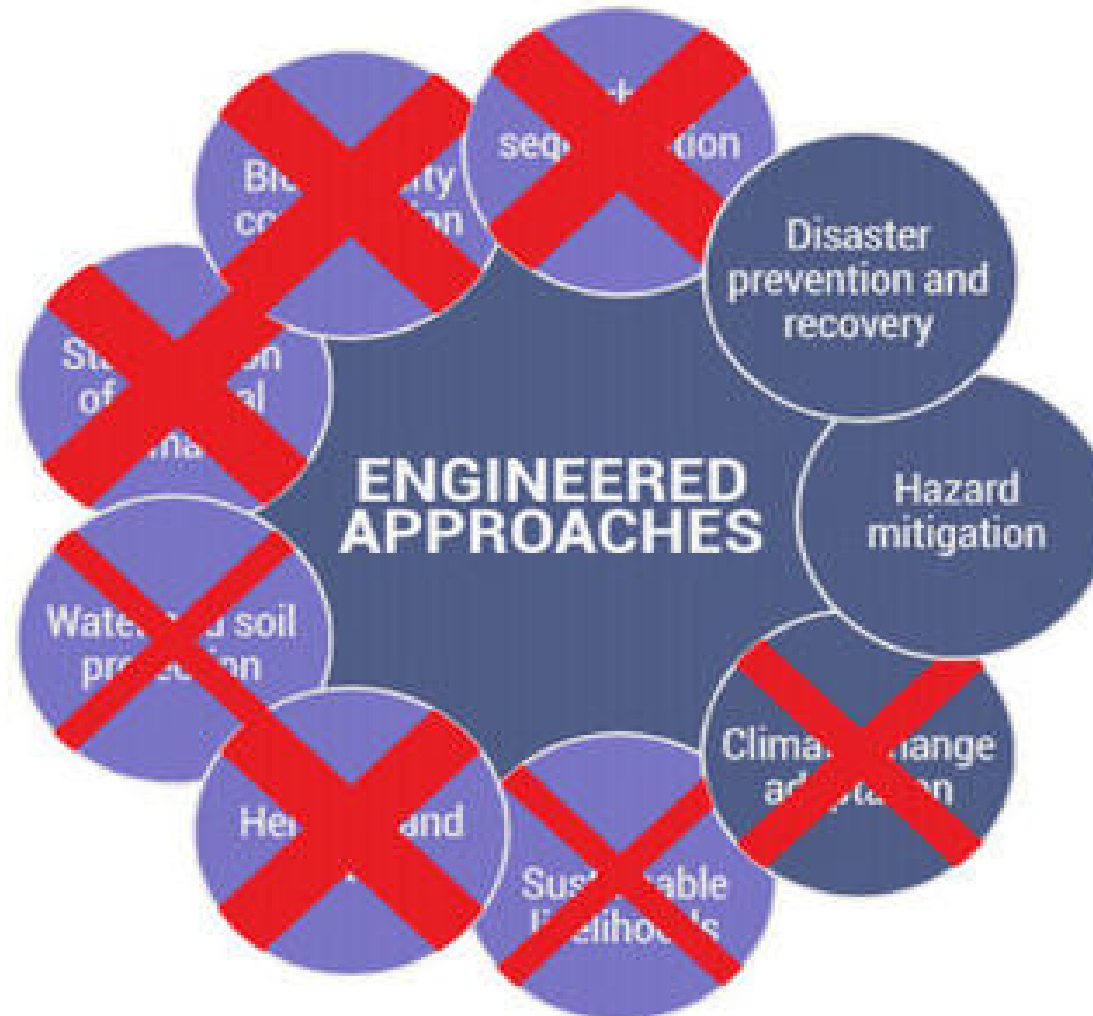
Conclusion: There is a solution to each problem



Conclusion: Multiple benefits of Eco-DRR



Conclusion: Engineered approaches to DRR



The Partnership for Environment and Disaster Risk Reduction

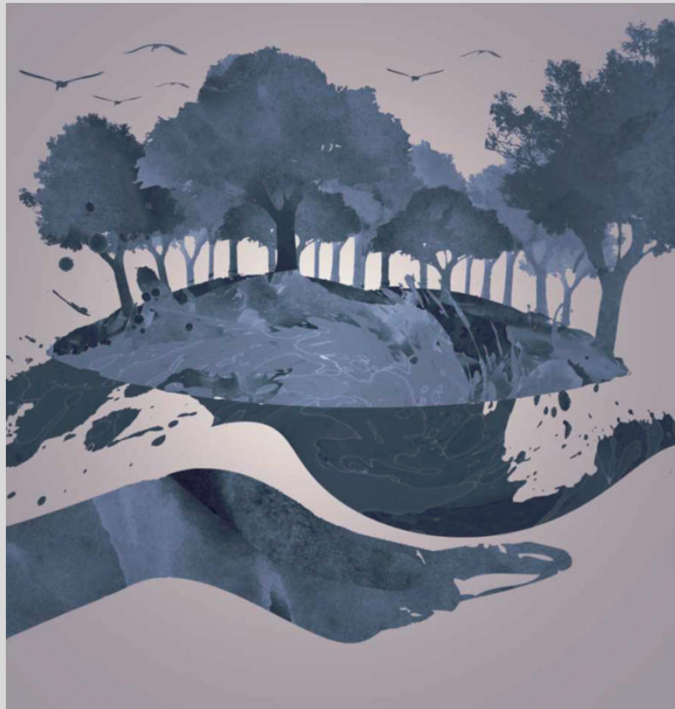


Asian Disaster Preparedness Center (ADPC) • Council of Europe • Global Fire Monitoring Center (GFMC) • Global Risk Forum • International Union for the Conservation of Nature (IUCN) • ProAct Network • Stockholm Environment Institute (SEI) • The Nature Conservancy (TNC) • UN International Strategy for Disaster Reduction (UN/ISDR) • United Nations Development Programme (UNDP) • United Nations Educational, Scientific and Cultural Organization (UNESCO) • United Nations Environment Programme (UNEP) • United Nations University-Institute for Environment and Human Security (UNU-EHS) • Asian University Network of Environment and Disaster Risk Reduction (AUNEDM) • Helvetas Swiss Intercooperation • Wetlands International • World Wide Fund for Nature (WWF) • Convention on Biological Diversity (CBD) • Ramsar Convention on Wetlands • World Business Council for Sustainable Development (WBCSD) • International Institute for Sustainable Development (IISD) • Global Network of Civil Society Organisations for Disaster Reduction (GNDR)

www.pedrr.org

More opportunity for learning..

Master's course for universities



Massive Open Online Course

<https://courses.adpc.net>



CNRD
Center for Natural Resources
and Development

Join our community of practice!

Understanding the role of ecosystems in disaster risk reduction and adaptation since 2008:

1. Science and knowledge: (Renaud et al. 2013, 2016)
2. Policy advocacy: Ecosystems and the Sendai framework
3. Capacity building: MSc course and a MOOC- Disasters and Ecosystems

Sign up for our weekly newsletter:

www.pedrr.org

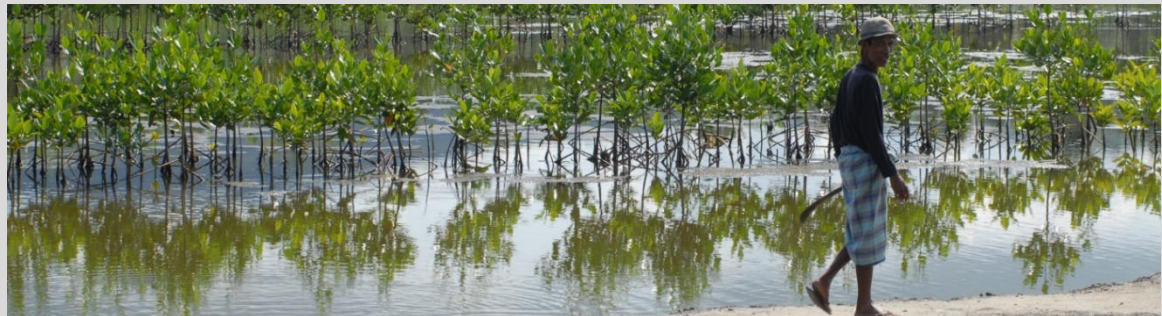
FB: PEDRR

MOOC: Disasters and ecosystems

Linked in: Eco-DRR-4-NbS

PEDRR

Ecosystems for Adaptation
and Disaster Risk Reduction



Thank you for listening!

PEDRR

Ecosystems for Adaptation
and Disaster Risk Reduction



United Nations
Environment Programme

karen.sudmeier@un.org

www.pedrr.org

