# NATURE-BASED SOLUTIONS TO ADDRESS CLIMATE CHANGE

**Beahrs ELP 2021**

Kairos Dela Cruz - Natalia A Rossi - Mor Seye Fall - Mekalia Paulos - Julika Tribukait

# CLIMATE CHANGE AND OUR NEW NORMAL


Climate change is happening, but it is happening **at a faster rate,** and it is here to stay…

The Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report (AR6) UNEQUIVOCALLY linked human activities to global warming.

**IPCC's AR6 warned of tipping points for breakaway climate change.**

The world is "trying" to **mobilize resources** to address climate change, but they are **woefully inadequate.**

Only $80 billion of the $100 billion commitment has been mobilized by developed countries.

**Time is running-out.**

Solutions have to address multiple challenges and should not (at the very least) make problems even worse.

# WHAT IS NbS?

"…actions to **protect, sustainably manage, and restore natural or modified ecosystems,** that address societal challenges effectively and adaptively, simultaneously **providing human well-being and biodiversity benefits.**"

- International Union for Conservation of Nature (IUCN)

vs. nature-derived solutions

vs. nature-inspired solutions

# WHAT IS NbS AND WHY WILL IT WORK?

- **NbS tackles multiple challenges**
  - Seven societal challenges: climate change mitigation and adaptation, disaster risk reduction, economic and social development, human health, food security, water security, environmental degradation and biodiversity loss
  - Co-benefits are central to NbS

- **NbS is cheaper and sustainable**
  - Estimates show that NbS is 2x-5x cheaper than hard infrastructure projects

- **NbS puts people and environment at the center** of design and implementation

- **NbS is replicable and scalable**

# GUIDING QUESTIONS FOR CASE STUDIES

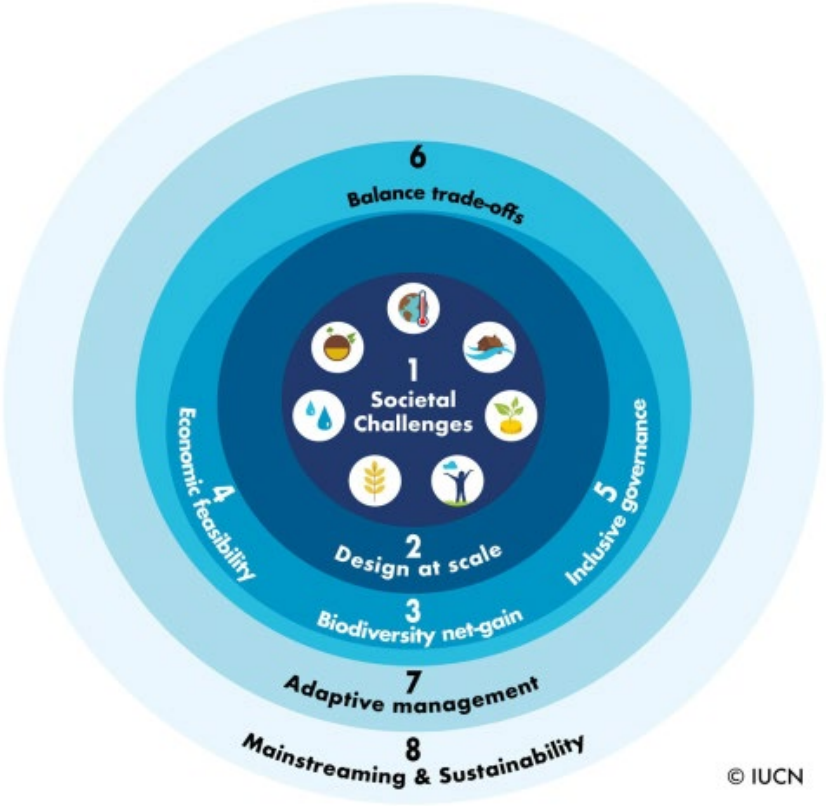



**Figure 2** The eight Criteria that make up the IUCN Global Standard for NbS are all interconnected.

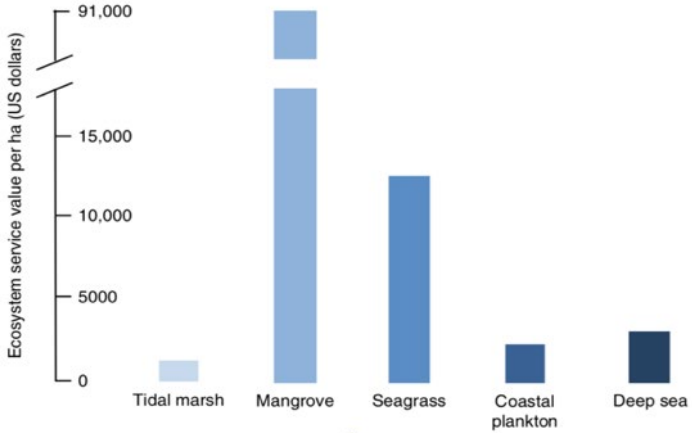
**Societal challenge = climate change**

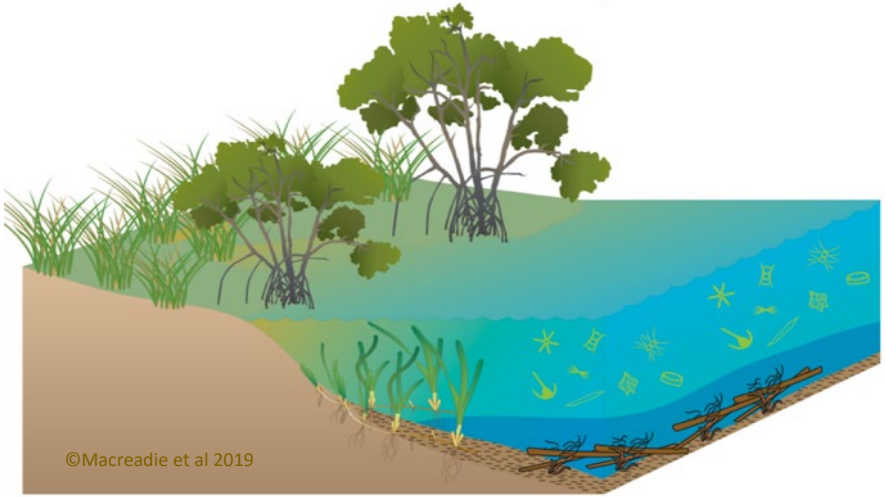
**Individual questions:**

- What's the **scale**?
- What NbS can be applied?
- What are the **biodiversity benefits**?
- What are other **co-benefits**?
- What are potential **negative impacts**?
- How does the NbS interact with the broader **land- or seascape** (now and in the future)?
- **Who is affected** by the NbS?
- Is the NbS **investible/bankable**?
- How is the **cost-effectiveness** (long-term vs. short-term) of the NbS, compared to engineered or other solutions?
- How **sustainable** is the NbS?

# MANGROVE RESTORATION AS NbS

- **Societal challenge:** climate-change-driven coastal flooding and loss of livelihoods
- **"NbS equation":** NbS {Climate mitigation benefits + Climate adaptation benefits + Co-benefits - (Negative consequences / unintended feedbacks)}
- **Mitigation benefits:** organic carbon storage
- **Adaptation benefits:** Flood protection and erosion control
- **Bundle of co-benefits:** Flood protection benefits, coastal protection, buffer shorelines, biodiversity, and fisheries enhancement
- **Potential negative consequences:** maladaptation, unsustainable
- **Most relevant at national and regional scales:** especially important in countries with extensive coastlines (SIDS)



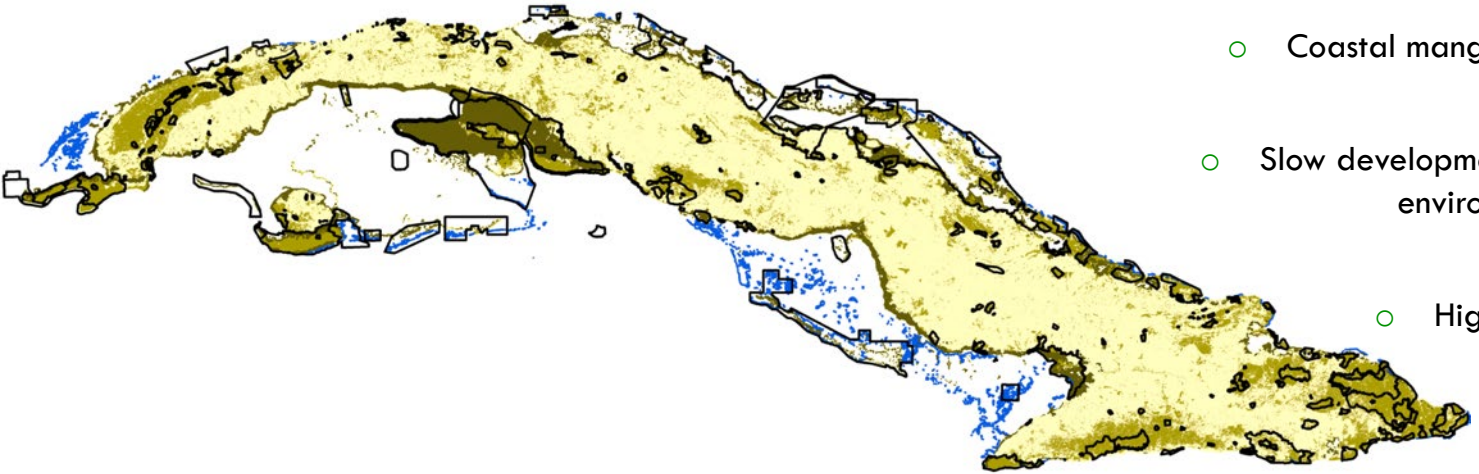



# MANGROVE RESTORATION AS NbS

NbS to reduce climate risks and build social-ecological resilience in southern Cuba

## Cuba

- Largest SIDS in the insular Caribbean
- Coastal mangroves~70% of coastline
- Slow development, low population, strong environmental agenda
- High climate risks



Protected areas
Coral reefs
Coastal wetlands (mangrove swamps and marshes)
Forests and matorral

0 40 80 160 240 320
Kilometers

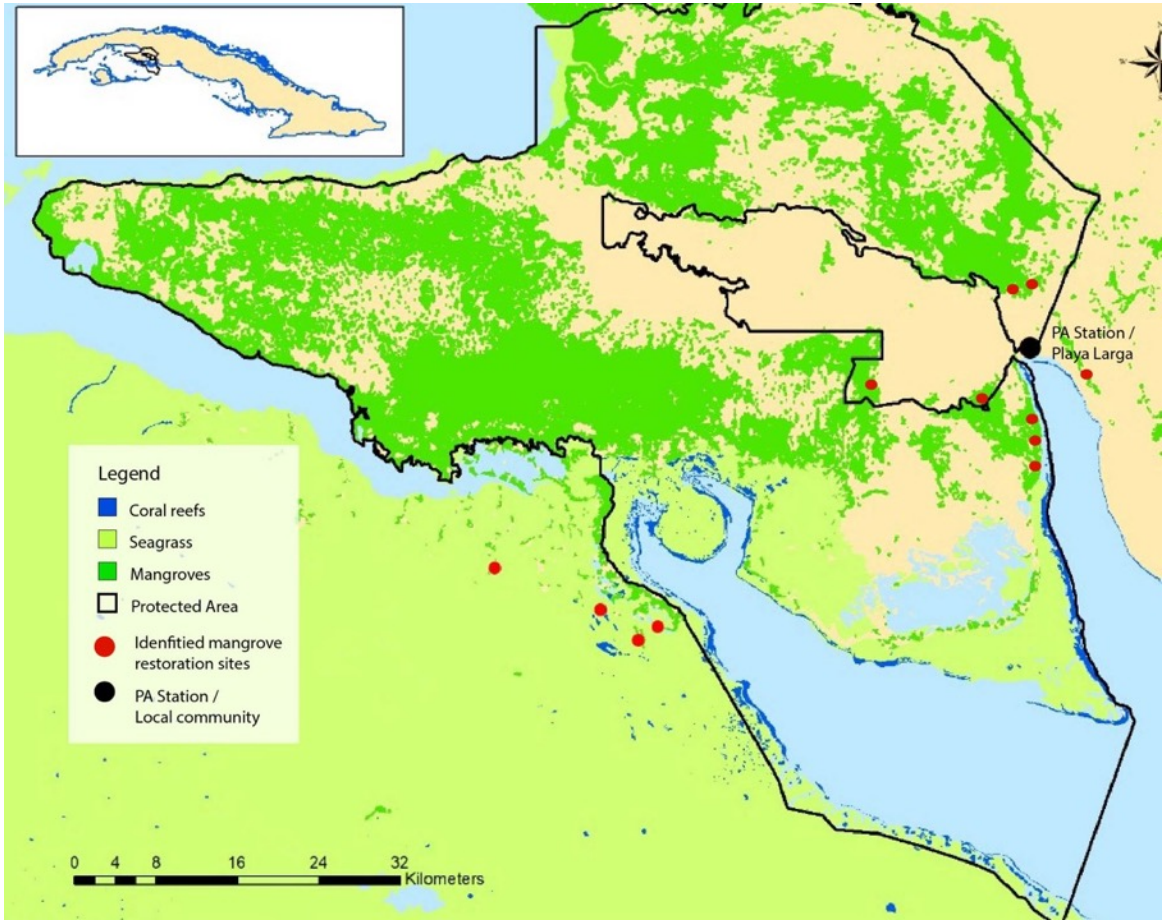
Wildlife Conservation Society

# MANGROVE RESTORATION AS NbS

NbS to reduce climate risks and build social-ecological resilience in southern Cuba

## The Zapata Peninsula

- ~5000 $Km^2$
- ~9000 people
- Over 450 kilometers of coastline (+ keys)
- 75 % of the total annual production of spiny lobster countrywide
- Nature-tourism hotspot



**Goal**

**INCREASE SOCIO-ECOLOGICAL RESILIENCE IN SOUTHERN CUBA**

**Outcomes**

- **Coastal mangroves with improved health and extent**
- **More resilient communities**

**Outputs**

- Restored coastal mangroves.
- Piloted new restoration technologies
- Carried out a climate change awareness campaign
- Incorporated mangrove restoration into fisheries cooperatives practices
- Strenghtened climate-ready frameworks for artisanal fisheries
- Piloted alternative livelihoods with community participation

**Assumptions**

- Extreme weather events do not backtrack advances of project actions
- Communities are not interested in participating in project activities

**Strategies**

- Restore coastal-mangroves that provide critical ecosystem services with community participation.
- Increase climate awareness and build capacities CC adaptation in local communities.

**Problem**

- **Partially degraded beaches, mangrove forests, seagrass beds, and coral reefs**
- **Dependency on fisheries and limited alternative livelihoods**

**Climate risks**

- Increased occurrence and intensity of hurricanes
- Rising seas
- Climate-driven reductions in fisheries productivity

# MANGROVE RESTORATION AS NbS

## Community-based mangrove restoration & innovation

### A solution to mitigate coastal erosion

- An optimal roots density to mitigate waves and currents action.
- A biomimetic structure of mangrove root trees
- A pile of units allowing to reach the desired water column occupancy

### A solution supporting ecosystem services

- Reefs supporting shellfish farming
- Reefs creating habitats and nursery areas for commercially important fish and shellfish species

### A functional solution on an ecological level

- A suitable rugosity for the colonization by the biodiversity
- Creation of a substrate, of habitats and nursery areas for numerous species
- Inexpensive, affordable and locally produced materials (wood, bamboo, concrete)
- Management and exploitation of the infrastructure by local communities

Module complexification with simple, lightweight and potentially versatile add-ons

SEABOOST

# MANGROVE RESTORATION AS NbS

NbS to reduce climate risks and build social-ecological resilience in southern Cuba

Community engagement & potential for employment

Bundle of co-benefits

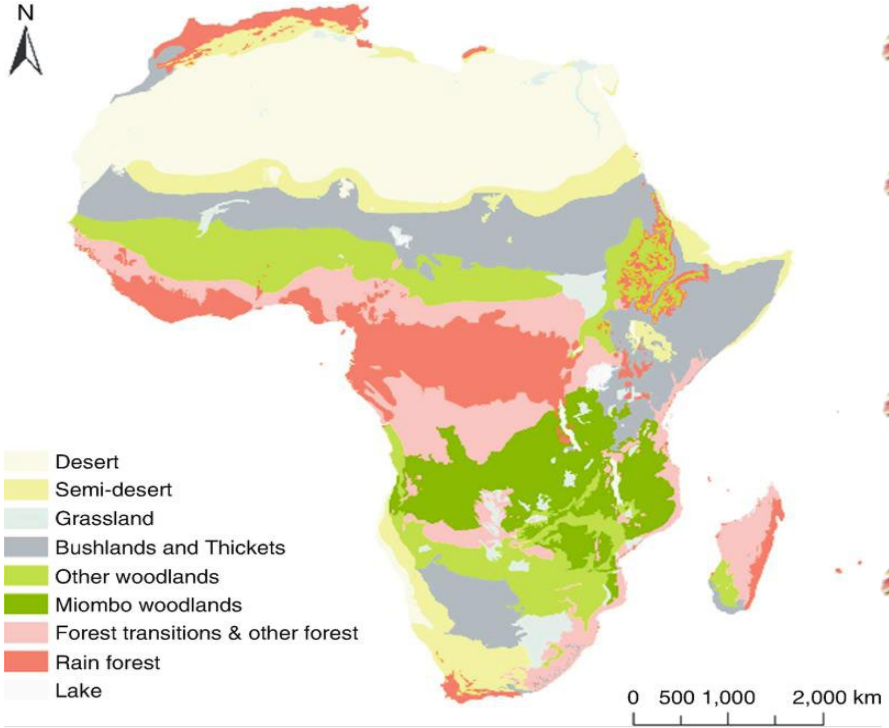
Significant lower cost than hard engineered structures

Needs participatory approach since the get-go

Needs social and environmental impact assessments

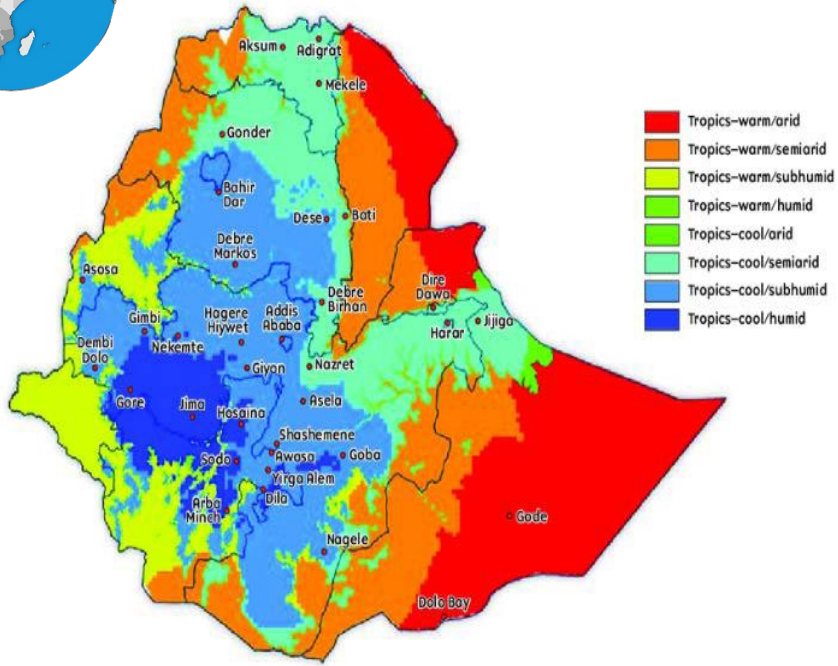
Needs adaptive management approach

# AFRICA




- Home to a rich and diverse animal, plant, and marine biodiversity
- Rapidly degraded natural resources due to high deforestation, increased human/livestock population, poor agricultural practices, and other unsustainable land use practices
- Climate change -> loss of 50%+ African bird and mammal species; 20%–30% decline in lake productivity; significant loss of plant species
- Is a leader in restoring degraded ecosystems - 25+ nations have pledged to restore 100 million ha of degraded landscapes

# ETHIOPIA




- Recognizing extent of land/forest degradation, Ethiopia made strong voluntary commitment in context of '*Bonn Challenge*' to implement forest landscape restoration of 15 million ha
- Ambitiously plans to plant 20 billion seedlings [2019-2024]; of which 5 billion seedlings have been planted in 2020 alone
- UNECA in collaboration with MoWIE developed a community-led NbS programme

# NbS FOR WATER / ENERGY INFRASTRUCTURE AND COMMUNITY RESILIENCE IN ETHIOPIA

Aims to build resilience of infrastructure, communities and ecosystems in the surrounding catchment areas of selected hydropower dams – integrated natural resource management intervention

13 CLIMATE ACTION

Contributes to Ethiopia's low-emission, climate resilient infrastructure and development plans by deploying appropriate forms of green interventions

Pilot implemented in three hotspot areas of Nile Sub-Basins (Mugar, Guder and Jemma watersheds)

# SPECIFIC OBJECTIVES of the NbS INTERVENTION

✓ Increase carbon sequestration by managing 10,000 ha of indigenous and exotic tree species

(Green Legacy Initiative)

✓ Rehabilitate up to 10,000 ha of degraded lands through construction of soil and water conservation structures

✓ Build resilience of infrastructure, ecosystems and local communities:

- reducing siltation;
- improving 10,000 households' livelihoods

(energy saving cook stoves, fruit trees, fodder trees, beehives)

✓ Enhance capacity of local government/communities (esp. youth and women) via training/capacity development interventions

✓ Reduce carbon footprint of ECA/UN operations in Ethiopia by 50% via carbon-offsetting scheme.

# EXPECTED OUTCOMES

- Reduced vulnerability
- Degraded lands in the selected watershed **reforested/ afforested**
- Enhanced hydro-infrastructure **resilience**
  - Long-term rehabilitation structures to reduce siltation maintained
- Ecosystem **sustainability** and services enhanced
- Greenhouse gases sequestration boosted
  - Improved monitoring and verification of greenhouse gas through inventories and capacity development
- Existing natural forests/ shrubs managed
- Soil and water conservation structures on degraded areas constructed
- Improved **livelihoods** through **diversification** (eg. fuel saving cookstoves)
- **Employment** and entrepreneurial opportunities created for **local communities**, esp. targeting **youth** and **women**
- Watershed management and market linkage community formed and capacitated
- Human and institutional **capacity** enhanced

# LESSONS LEARNT

- Early multi-stakeholder involvement to create ownership (**whole-of-society** approach)
- Building awareness for buy-in
- NbS costs < other interventions
  [Estimate: $54 billion vs. $228 billion]
- Linking project with livelihood and economic diversification objectives by creating job opportunities.
- Enhancing financial sustainability for long-term success
  [ecosystem services payment]
- Inclusive training and capacitation of surrounding communities
- Carbon markets, including international voluntary markets

| |  **Mangrove restoration in Cuba** |  **Energy infrastructure and community resilience in Ethiopia** |
|---|---|---|
| **Societal challenge / Scale** | Climate-change driven coastal flooding and loss of livelihoods / Zapata Peninsula | Climate change exacerbating already degraded lands / 3 key hydro-facility catchment areas across the country |
| **CC Adaptation / Mitigation benefits** | Flood protection, erosion control, livelihoods / blue carbon storage | Soil erosion control, reforestation, livelihoods / carbon storage |
| **Biodiversity benefits / Bundle of co-benefits** | Increase quality and quantity of habitat for biodiversity (mangroves) / Fisheries, recreation, coastal protection | Increase quality and quantity of habitat for biodiversity |
| **Primary NbS beneficiaries / community engagement** | **Coastal communities, country (NDCs) / high community engagement** | **Local communities, country (NDCs) / high community engagement** |
| **Investible/bankable potential of NbS** | **Low** (due to limited access to international markets) | **High** |
| **Cost-effectiveness compared to engineered or other solutions** | Several levels of magnitude **more cost effective** than building and maintaining extensive sea wall or similar | Considered **more cost effective** than non NbS solution |
| **Potential negative impacts of the NbS** | **Low participation, uneven benefit distribution, post project management** | **Low participation, uneven benefit distribution, post project management** |

# CONCLUSIONS & RECOMMENDATIONS

- ✓ NbS **can be an effective tool** to address climate change while delivering multiple co-benefits.
- ✓ NbS does **not equal conservation.**
- ✓ NbS is **not perfect.**
- ✓ NbS is **just one of the tools** in the toolbox.
- ✓ The two case studies show NbS potential and advantages, but **no "one size fits all" solution.**
- ✓ <u>To apply NbS</u>:
  - ✓ Start with and don't lose focus on the **societal challenge.**
  - ✓ Be aware of **root causes.**
  - ✓ Define the **level and boundaries** of your intervention.
  - ✓ Apply a holistic **land- or seascape** approach.
  - ✓ Ensure equal and continuous **engagement of all stakeholders** from the very start.
  - ✓ Be clear about **trade-offs and limitations.**
  - ✓ Ensure **sustainability** of the intervention (inter alia through secured funding and stakeholder buy-in).
  - ✓ Take **future climate change impacts** into account.

# THANK YOU!