



# Nature-Based Solutions (NbS) - A Response to Climate Change

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The Future of Beaches and Coastal Ecosystems in Sardinia: What Actions to Address Climate Challenges? – Massama-OR, January 30, 2025



**Funded by  
the European Union**



Schweizerische Eidgenossenschaft  
Confédération suisse  
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Swiss Confederation

Federal Department of Economic Affairs,  
Education and Research EAER  
State Secretariat for Education,  
Research and Innovation SERI

This work has received funding from the  
Swiss State Secretariat for Education,  
Research and Innovation (SERI).

Grant Agreement No. 101112972

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# What Are Nature-Based Solutions (NbS)?

- ▶ Solutions designed to address problems caused by the imbalance between **HUMANS** and **NATURE**.
- ▶ Actions aimed at protecting, conserving, restoring, sustainably using, and managing natural or modified terrestrial, freshwater, coastal, and marine ecosystems.
- ▶ These solutions simultaneously provide human well-being, ecosystem services, resilience, and biodiversity benefits.

*The European Green Deal strengthens efforts for climate protection, resilience building, prevention, and adaptation. Implementing nature-based solutions across landscapes is considered essential to achieving the goals of key EU policy priorities, particularly **the EU Biodiversity Strategy for 2030** and the **EU Adaptation Strategy**, to promote biodiversity and make Europe more climate-resilient.*

*“Restoring nature’s health is fundamental to our physical and mental well-being and is a strategic move in the fight against climate change and epidemics. It is at the core of our growth strategy, the European Green Deal, and is part of a European recovery that gives back to the planet more than it takes.”*

Ursula von der Leyen, President of the European Commission, commenting on the EU Biodiversity Strategy for 2030.

# What Are Nature-Based Solutions (NbS)?

## EU Definition:

*Solutions that are inspired and supported by nature, which are **cost-effective**, simultaneously provide **environmental, social and economic** benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions*

## Where can NbS be used?



Water system



Urban areas



Forests



Wetlands



Agriculture



Marine ecosystems

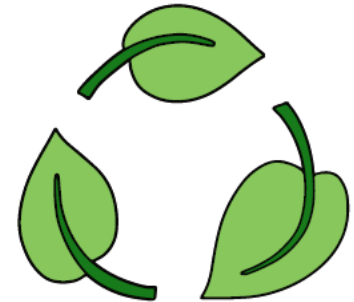
# Benefits of Using NbS

**Sustainability:** Long-term solutions that adapt to environmental changes

**Multifunctionality:** Provide environmental, social, and economic benefits, integrating disaster risk reduction, climate change mitigation and adaptation, with biodiversity and ecosystem restoration and protection.

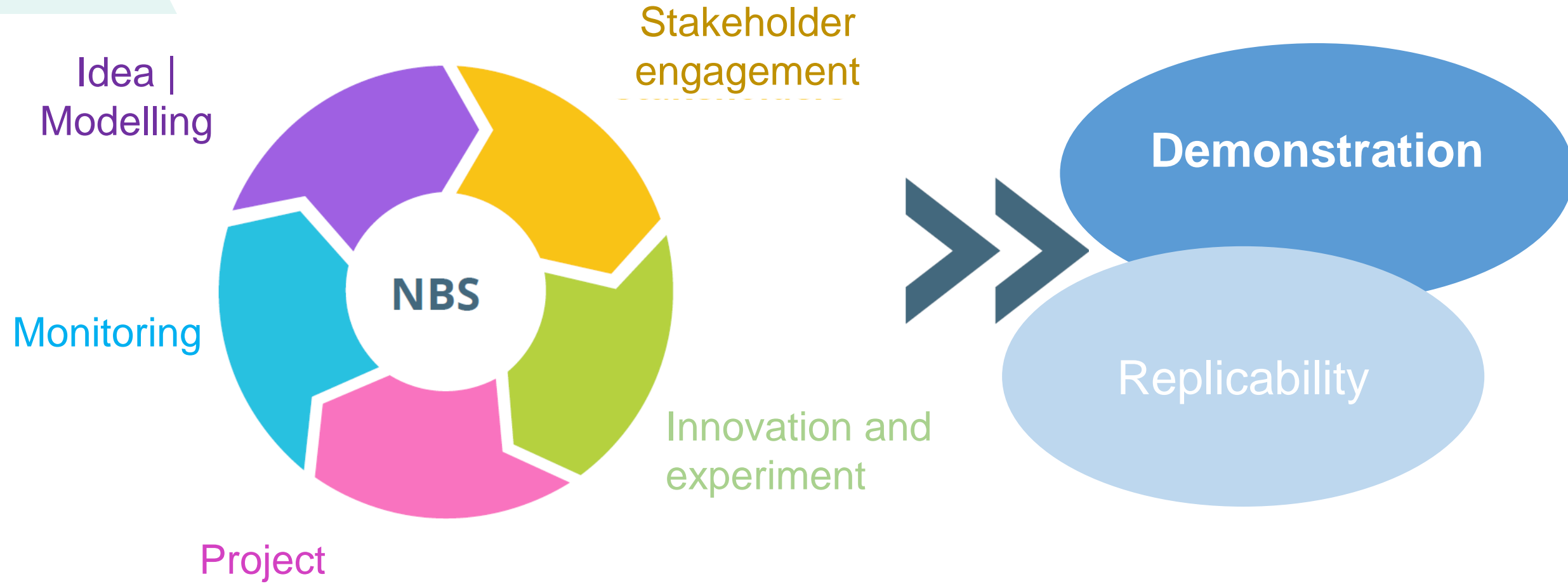
**Community Integration:** NbS often involves local communities, enhancing social and economic resilience.

**LOCAL Application >> GLOBAL Benefits.**





# Development of an NbS



# Examples in Coastal Areas

## Coastal Wetland Restoration

**Description:** Coastal wetlands are vital for protecting inhabited and agricultural areas from flooding and erosion while supporting biodiversity.

**Benefits:** Natural protection against storms and tides. Improved water quality and biodiversity conservation. More sustainable long-term impacts compared to artificial barriers.

**Examples:** Wetland restoration projects, buffer zones, phytoremediation, etc.



MITIGAZIONE DEI CAMBIAMENTI CLIMATICI



FUNZIONE PRODUTTIVA



DEPURAZIONE DELLE ACQUE



FUNZIONE IDROGEOLOGICA



FUNZIONE RICREATIVA ED EDUCATIVA



SERBATOIO DI BIODIVERSITA'



Marceddi (Terralba) Photo by Manuela Fa

# Examples in Coastal Areas

## Coastal Dune Restoration

**Description:** Sandy dunes are a crucial natural barrier against coastal erosion, and their restoration can strengthen coastal protection.

**Benefits:** Natural protection against erosion and tidal surges. Biodiversity conservation, particularly for plant and animal species in coastal areas.

**Case Study:** Dune restoration interventions (Valledoria).  
Project by Criteria srl. Funded by ERDF funds





# Examples in Coastal Areas

## Coastal Reforestation of *Posidonia oceanica*



**Description:** Restoring the integrity of the priority marine habitat 1120 *Posidonia oceanica* seagrass meadows through ecological engineering interventions to repopulate degraded areas.

**Benefits:** Protection against storms and floods. Increase in marine and coastal biodiversity. Creation of opportunities for sustainable fishing.

**Case Study:** MEDSEAGRASS - *Posidonia oceanica* restoration project in the Marine Protected Area "Penisola del Sinis, Isola di Mal di Ventre," (Cabras) including habitat protection through the development of a mooring management system in the Marine Protected Area.

Project by MEDSEA Foundation. Associated partner MPA "Penisola del Sinis, Isola di Mal di Ventre"  
Funded by MAVA Foundation



Accumulation areas



Collecting cuttings



Preparation



Replanting

# Advantages and Disadvantages



- Climate risk reduction
- Nature conservation
- CO2 savings
- Biodiversity increase
- Reduction of air, water, and soil pollution
- Creation of spaces for sustainable mobility and social activities
- Low maintenance costs



- Competition with other urban uses
- Requires high expertise in planning and implementation
- Requires more space
- Sometimes high execution costs
- Takes longer to become effective
- Small-scale vs. large-scale implementation
- Extreme weather events can damage NbS
- Maintenance is necessary

# NbS vs. Traditional Solutions

**Traditional solutions** are often based on engineering technologies (e.g., concrete barriers, dams, levees), which are costly, require high maintenance, and can sometimes harm ecosystems.

**Advantages of NbS:**

**Long-term sustainability:** NbS are often less costly to maintain and more resilient to environmental changes than engineering solutions.

**Biodiversity enhancement:** NbS support the conservation of biodiversity and natural ecosystems.

**Community benefits:** Can improve quality of life by providing green spaces, recreational activities, and increasing communities' ability to adapt to climate change.



VS



VS



VS



# Why Are NbS Useful in Addressing Climate Challenges?

NbS options	NbS benefits	Climate impacts addressed
<p><b>Water management</b> (Section 3.6)</p> <ul style="list-style-type: none"> <li>Restoration of rivers and floodplains</li> <li>River buffers (e.g. vegetation strips)</li> <li>Water sensitive forest management</li> </ul>	<ul style="list-style-type: none"> <li>Regulation of water flows</li> <li>Reduction of floods and soil erosion</li> <li>Recreation and aesthetic appreciation</li> <li>Biodiversity</li> <li>Water quality</li> </ul>	<ul style="list-style-type: none"> <li>Droughts</li> <li>Floods</li> </ul>
<p><b>Forests and forestry</b> (Section 3.7)</p> <ul style="list-style-type: none"> <li>Protection and restoration of forests</li> <li>Sustainable forest management</li> <li>Integration of trees/forest into the landscape</li> </ul>	<ul style="list-style-type: none"> <li>Regulation of water flows</li> <li>Reduction of floods</li> <li>Control of disease and pests</li> <li>Slope stabilisation</li> <li>Carbon sequestration</li> <li>Biodiversity</li> <li>Recreation and aesthetic appreciation</li> </ul>	<ul style="list-style-type: none"> <li>Droughts</li> <li>Floods</li> <li>Fires</li> </ul>
<p><b>Agriculture</b> (Section 3.8)</p> <ul style="list-style-type: none"> <li>Improved soil and water management</li> <li>Crop type diversification and rotation</li> <li>Agroforestry</li> </ul>	<ul style="list-style-type: none"> <li>Retention of water and soil retention</li> <li>Mitigation of heat stress</li> <li>Control of disease and pests</li> <li>Carbon sequestration</li> <li>Soil fertility</li> <li>Biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>Droughts</li> <li>Floods</li> <li>Heat stress</li> </ul>
<p><b>Urban areas</b> (Section 3.9)</p> <ul style="list-style-type: none"> <li>Parks, forest, street trees</li> <li>Green buildings (e.g. green roofs, green walls)</li> <li>NbS for water management (e.g. bioswales, detention ponds)</li> </ul>	<ul style="list-style-type: none"> <li>Cooling air temperature</li> <li>Regulation of water runoff</li> <li>Carbon sequestration</li> <li>Biodiversity</li> <li>Human health and well-being</li> <li>Water quality</li> </ul>	<ul style="list-style-type: none"> <li>Floods</li> <li>Heat stress</li> </ul>
<p><b>Coastal areas</b> (Section 3.10)</p> <ul style="list-style-type: none"> <li>Rehabilitation and restoration of coastal habitats</li> <li>Barrier islands, beach nourishment</li> <li>Hybrid solutions (e.g. green dykes, vegetated levees)</li> </ul>	<ul style="list-style-type: none"> <li>Reduction coastal flooding</li> <li>Stabilisation of coast</li> <li>Carbon sequestration</li> <li>Biodiversity</li> <li>Recreation</li> </ul>	<ul style="list-style-type: none"> <li>Sea level rise</li> <li>Storm surges</li> <li>Coastal erosion</li> </ul>

NbS can provide services such as erosion control, drought and flood prevention, carbon sequestration, cooling, and wildfire prevention.

## Climate Impacts Addressed by NbS in coastal areas:

- Sea level rise
- Coastal erosion
- Storms
- Drought and heatwaves

## Specific Benefits in Coastal Areas:

- Coastal flood reduction
- Shoreline stabilization
- Carbon sequestration
- Biodiversity conservation
- Economic benefits (e.g., ecotourism)



# Thank You

