

Innovative Postgraduate Education in The Field of Environment Protection: Methods and Tools



Nature-based Solutions in urban and extra-urban environments

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BIO Presenter



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Modernized/New Developed Courses to which the method/tool is relevant

- Landscape Planning
- Urban Ecology

Method/tool prerequisites

- Natural and Environmental Sciences
- Environmental monitoring and measurement devices

Method/tool outcomes

- Knowledge on NbS global standards
- Competences in NbS benefit assessment methods and related framework

Global Climate Change

- Human emissions of heat-trapping gases (greenhouse gases – GHG) have already warmed the climate by nearly 1.1°C since 1750 (about 2°C at European level) (*IPCC 2021, Sixth Assessment Report*)
- Of the 20 warmest years, 19 have occurred since 2000. (*IPCC 2021*)

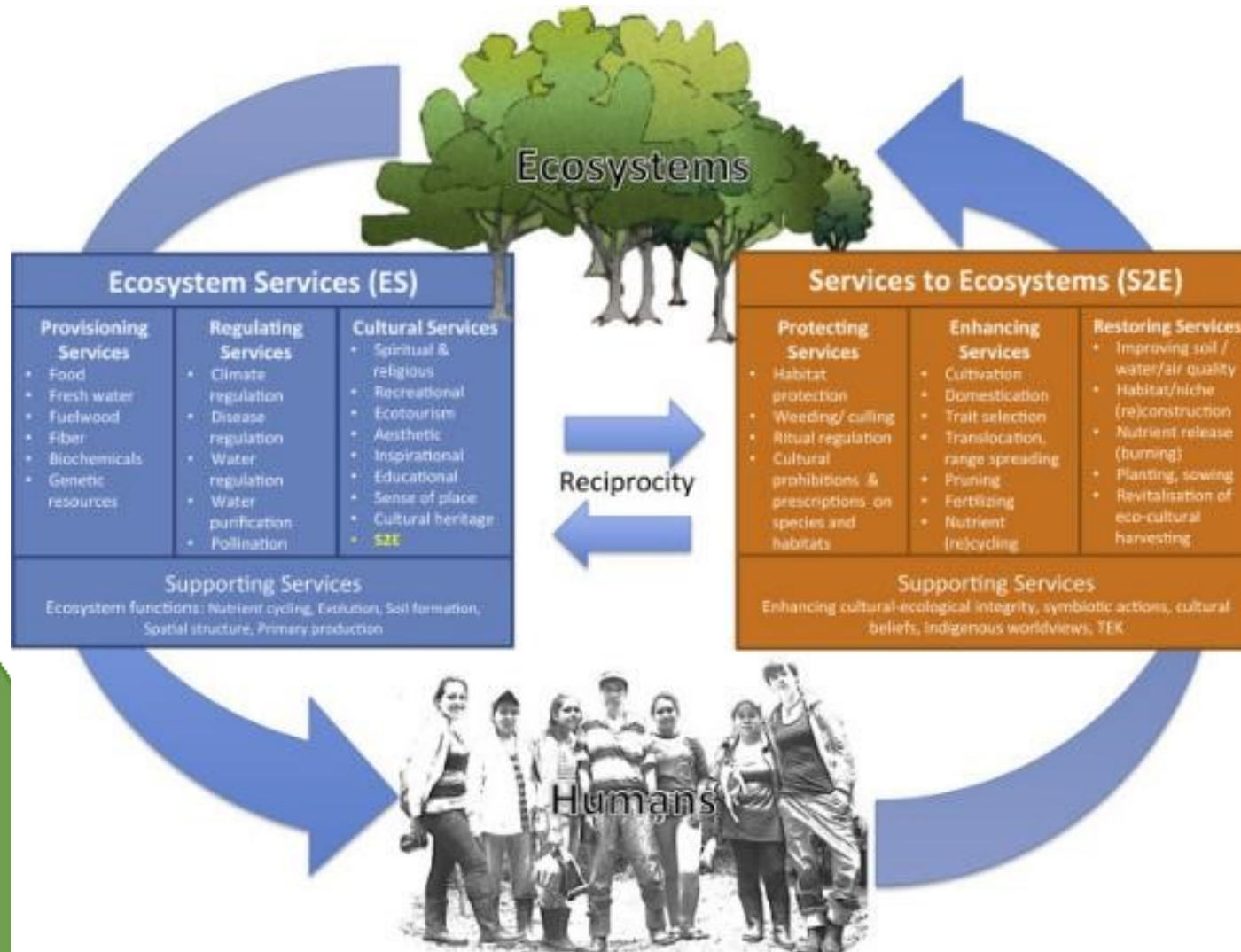
The Effects of Global Climate Change

- Loss of sea ice
- Melting glaciers and ice sheets
- Sea level rise
- More intense heat waves
- More frequent wildfires
- More frequent extreme events
- Biodiversity loss
- Health risks
- Economic costs

The urban environment challenge: «The Glocal Problem»

- Urban areas represent the 0.5 % of land (*Schneider et al. 2009*)
- Cities host more than half of the world's population (75% by 2050) due to inhurbation process in the developing countries (*Anderson et al. 2014*)
- Urban areas are responsible for more than 40% of Green House Gases (GHG) emissions, with an important impact on climate change (*IPCC 2014*)
- Approximately 86% (2.5 billion inhabitants) of urban inhabitants lived in urban areas that exceeded WHO's 2005 guideline annual average PM_{2.5} (10 µg/m³) (*Southerland et al. 2022*)
- Urban areas are characterized by an increased mean temperature with respect to surrounding areas, called the Urban Heat Island (UHI) effect (*Phelan et al. 2015*), that further increases GHG and PM concentration (*Ulpiani 2021*)

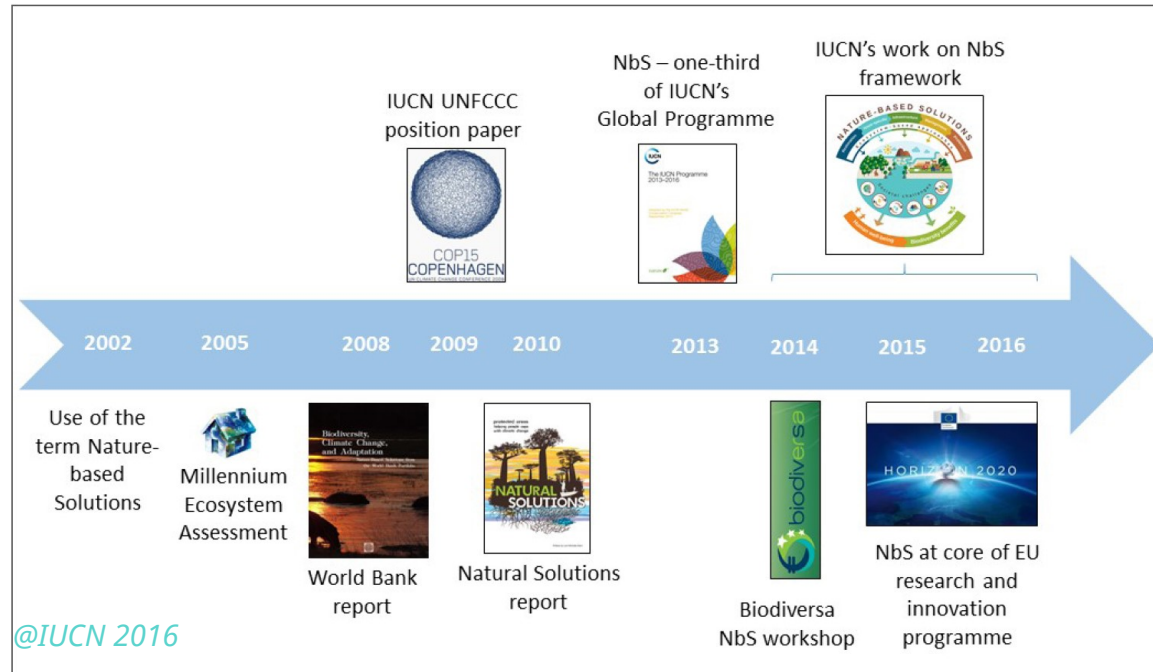
Go back to nature: Recovery the Ecosystem Services



- Ecosystem restoration
- Ecosystem-based adaptation/mitigation/disaster risk reduction
- Ecosystem Management
- Green Infrastructure

Combetti et al., 2015 *Global Environmental Change*

Go back to nature: Nature-based Solutions to answer global and “glocal” challenges



A flooded rice paddy - Photo credit: Naoya Furuta



Part of the restored Kabukuri-numa wetlands - Photo credit: Naoya Furuta



Guidance for using the IUCN Global Standard for Nature-based Solutions

A user-friendly framework for the verification, design and scaling up of Nature-based Solutions
First edition

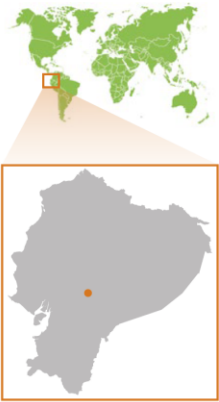


Example of extra-urban NbS from the IUCN portfolio

Ecuador: One landowner's approach to forest restoration and sustainable management

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ECUADOR



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General background

Ecuador has one of the highest deforestation rates in South America (Blaser et al., 2011). Between 1990 and 2015, the country's forest cover was lost at an annual rate of about 0.6%, due to expansion of agriculture (cropland and pastures), oil exploration, logging, mining as well as insecure land tenure, and weak public institutions (Blaser et al., 2011; FAO, 2015; REDD desk, 2016). Illegal and informal timber harvesting is widespread throughout the country. Furthermore, Ecuador is highly vulnerable to climate change, due to its economic reliance on resources that are affected by climate change, especially in its high-altitude ecosystems (including forests) (Blaser et al., 2011). Forest resources are especially important for those living in rural areas, many of whom rely on these resources for their livelihoods (e.g. timber products, hunting, land reserve for conversion to agriculture). Although Ecuador's overall poverty rate has declined from 37.6% in 2006 to 23.3% in 2015, rural poverty rose in 2015 to 39.3% (World Bank, 2016). Rural smallholder farmers have limited access to credit, markets and technology, and are strongly impacted by degradation of ecosystems and the effects of climate change (IFAD, n.d.).

To combat deforestation and invest in social and economic development, the government of Ecuador developed various policies and pieces of legislation, including its National Plan for Good Living (Buen Vivir), which set a target of a 30% reduction rate in deforestation, recognized the rights of nature and the state's role in conservation, and promoted the sustainable use and restoration of fragile ecosystems (National Secretariat, 2010; 2013). In 2008, the Ministry of Environment also launched its *SocioBosque* programme

Main Activities

1. Restoration
2. Economic Development
3. Collaboration and knowledge sharing

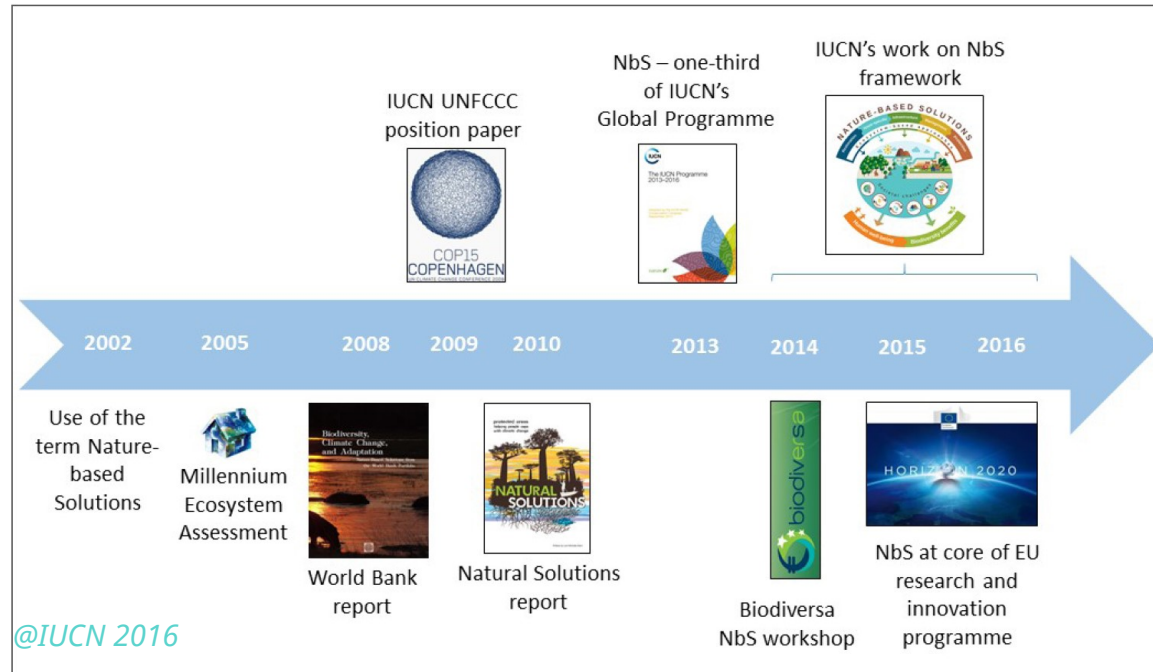
Results

1. Environmental benefits
2. Livelihood benefits
3. Biodiversity benefits
4. Policy alignment and institutional partnerships



Two plots in an 'analogue forest' - Photo credit: Liette Vasseur

Go back to nature: Nature-based Solutions to answer global and “glocal” challenges



A flooded rice paddy - Photo credit: Naoya Furuta



Part of the restored Kabukuri-numa wetlands - Photo credit: Naoya Furuta



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Example of urban NbS from an H2020 NbS Project

Urban carbon sink Valladolid Demo Site.

The Urban Carbon Sink is located in the eastern part of the municipality of Valladolid, in the neighbourhood known as Los Santos-Pilarica (Sector 50, "Los Santos 2").

The Urban Carbon Sink (UCS; Figure 5-2) is conceived as an urban forest in which species have been selected mainly for their ability to fix carbon. Therefore it is a nature-based solution for the over-accumulation of carbon dioxide in cities' atmosphere.

The design of the UCS is embedded into another projected NBS, the Floodable Park. It will consist in the installation of urban woodland (initially planned planting 1,500 trees in a 40,000 m² surface) with appropriate species adapted to temporary flood condition and with high capacity of carbon sequestration (*Fraxinus* spp., *Betula* spp., *Salix* spp., *Populus* spp., etc.). Trees of this forest will be allocated in specific arboreal series.

This area will be a new urban carbon sink and will form a new urban ecosystem to preserve the biodiversity. Likewise, this woodland will provide biomass to energy use with social and economic purposes.



Figure 5-2. Urban Carbon Sink conceptual design (URBAN GreenUP project)

Indicators of relevance

1.1 Total carbon removed or stored in vegetation and soil per unit area per unit time

- Temperature decrease
- Heatwave risk
- Green space distribution (m²/capita)
- Green space distribution (km cycle lane/capita)

7.1 Green space accessibility

- Green areas sustainability
- Elderly people life quality

9.1 Green infrastructure connectivity

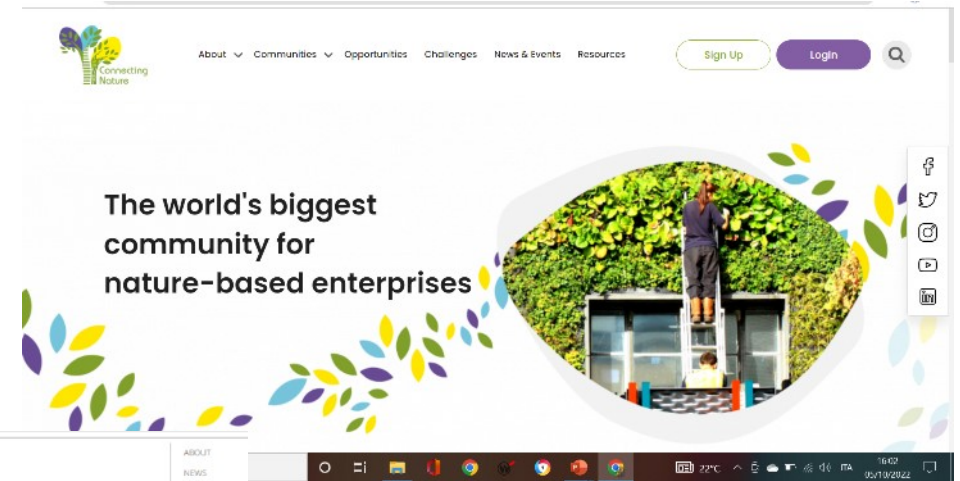
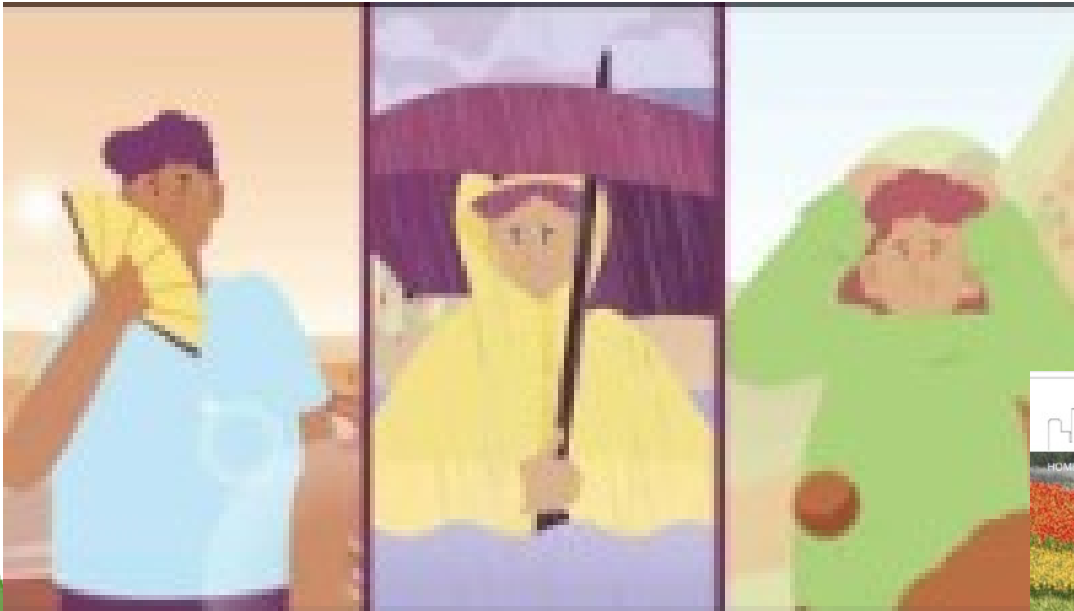
- Pollinator species increase

H2020 NbS Projects



Al Sayad et al., 2022 Urban Climate

NbS open databases: sharing experience, seeding the future!



Business Model Catalogue for Urban NBS – an overview of eight models
The Business Models Catalogue for urban nature-based solutions presents eight different business models for urban NBS. These were identified based on 34 in-depth case studies of urban NBS, both in- and outside of Europe. These models explain which values propositions can drive urban NBS funding. Importantly, by combining different models, the funding capacity for urban NBS can be increased. Download it by clicking on the picture to the left.



H2020 NbS Taskforces

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Task Force 1: Data and Knowledge Sharing

Task Force 1 will define and implement an effective approach to share, search and reuse data and knowledge related to nature-based solutions. Its main expected outcomes are an EU knowledge repository with contributions from each project stored within the Oppla web platform and a data management plan to ensure project contributions and inter-operable, open access and comparable data.

Task Force 2: Integrated Assessment Framework

Task Force 2 will enable all NBS projects funded under Horizon 2020 to collaborate on demonstrating the multiple benefits of NBS, using a coherent and integrated assessment framework based on common indicators. The projects develop and implement their own methodologies for assessing effectiveness of NBS within this framework.

Task Force 3: Governance, Business Models and Financial Mechanisms

Task Force 3 will promote the systemic integration of NBS into sustainable urban and land planning and management, adopting a co-management, co-design, co-development and co-implementation; and create new business opportunities, growth and jobs, and contribute to the development of a green economy, shifting public and private investments from conventional to nature-based or effective combinations of nature/grey solutions to societal challenges.

Task Force 4: NBS Communicators

NBS Communicators synergises communication efforts of Horizon-funded nature-based solutions projects' work, and establishes connections with international actors and the European Union to communicate and disseminate the latest developments in the nature-based solutions field. The Task Force work centres around building avenues for collaboration in the form of joint messaging, events and communications campaigns to ensure visibility. The Task Force also builds capacity of communicators through knowledge sharing and training.

Task Force 6: Co-creation and Governance

Task Force 6 focuses on co-creation for nature-based solutions, which involves engaging citizens and stakeholders in assessing problems and issues, designing nature-based solutions, implementing them and monitoring their impact. The scope of the work of the Task Force extends to urban, peri-urban and rural areas. The Task Force will improve and promote co-creation and co-governance, including these two paradigms in current spatial planning practices for inclusive nature-based regeneration. It aims to co-develop joint guidelines on co-creation of nature-based solutions, promote the concept to the wider audience of stakeholders engaging in NBS, and support the greening of urban and peri-urban areas. TF6 has provided feedback to the Urban Green Plans, as included in the EU Biodiversity Strategy 2030, and corresponding guidance developed by DG Environment of the European Commission.

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Case studies

Displaying 1 - 446 of 446

EVALUATING THE IMPACT OF NATURE-BASED SOLUTIONS

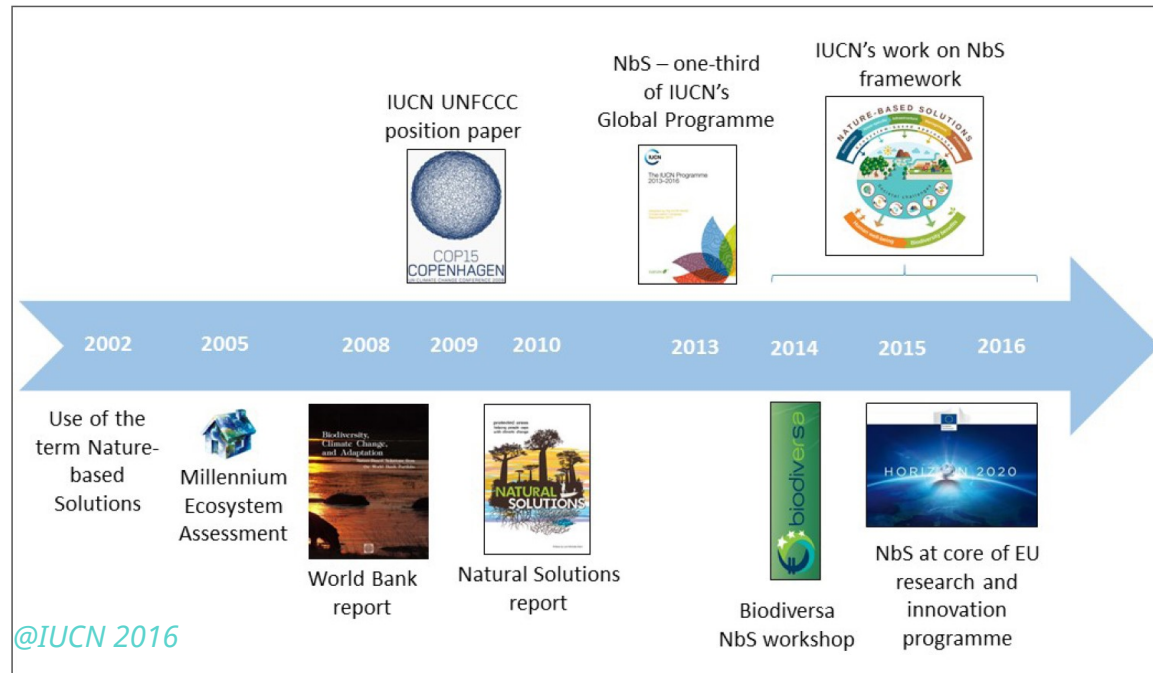
A Handbook for Practitioners

Independent Expert Report

THE VITAL ROLE OF NATURE-BASED SOLUTIONS IN A NATURE POSITIVE ECONOMY

Independent Expert Report

Go back to nature: Nature-based Solutions to answer global and “glocal” challenges



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A common standard definition framework is crucial to mainstream the concept and exchange experiences worldwide

A common impact evaluation framework is needed to compare and improve the effectiveness of NbS



Both aspects are required to boost NbS knowledge and implementation, facilitating dissemination and improving stakeholders' consciousness

Conclusions

- Knowledge of the NbS global standard, assessment frameworks, and business models will endow students with the needed competences to deal with the only reasonable approach to fight climate change and its impact on earth, nature, humans and society
- Such competences are priority for the next generation of scientists, technicians, policy makers, urban and landscape planners, and economists
- Such competences will allow students to participate to the next steps in NbS research and innovation

Next steps in research and innovation

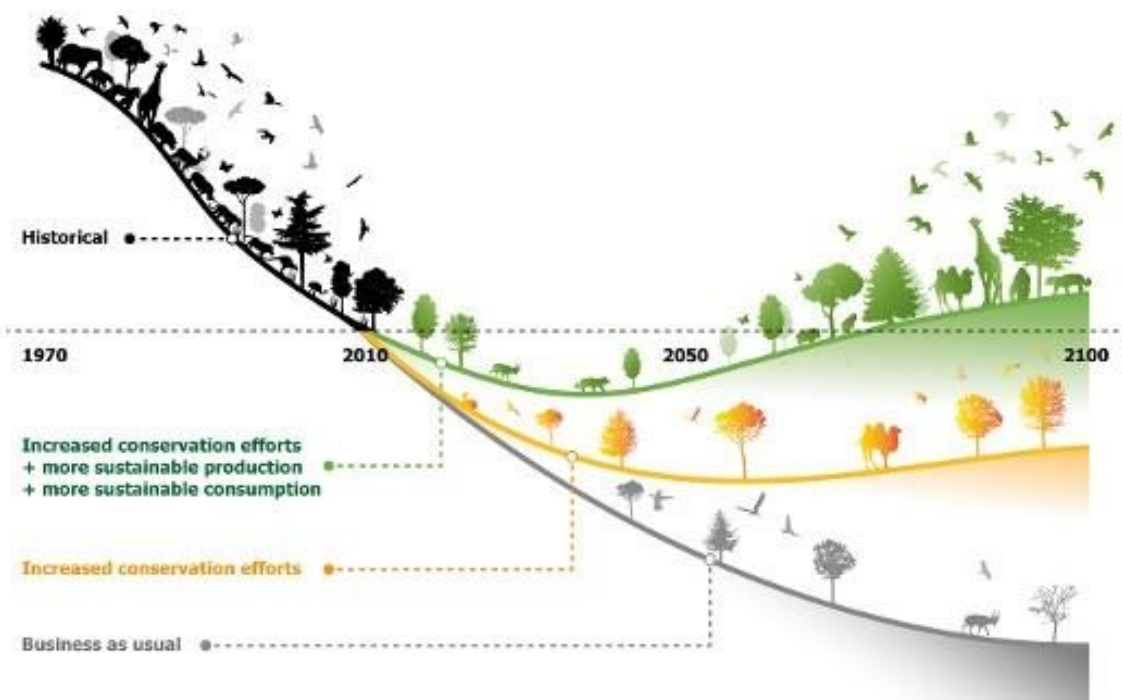
1) building a common, fully comprehensive, framework

2nd March 2022- the agreed UNEA5 definition:

«Nature-based Solution are actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits.»

Next steps in research and innovation

2) focusing the NbS framework on BIODIVERSITY



©“Bending the curve of biodiversity loss” by David
Leclère and Ansa Heyl, IIASA, 10 September 2020
Data from Leclère et al., Nature, 2020



National Center for Future Biodiversity

- 300 MEuro
- 25 partners
- 1200 researchers



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Next steps in high education

University of Tuscia newly introduced International MS Courses



- **Forestry and Environmental Sciences**
- Food Science and Human Nutrition
- Applied Biology and Bioinformatics
- **Marine Biology and Ecology**
- **(Conservation of Nature and Biodiversity)**
- **Circular Economy**
- **Mechanical Engineering**

THANK YOU !

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