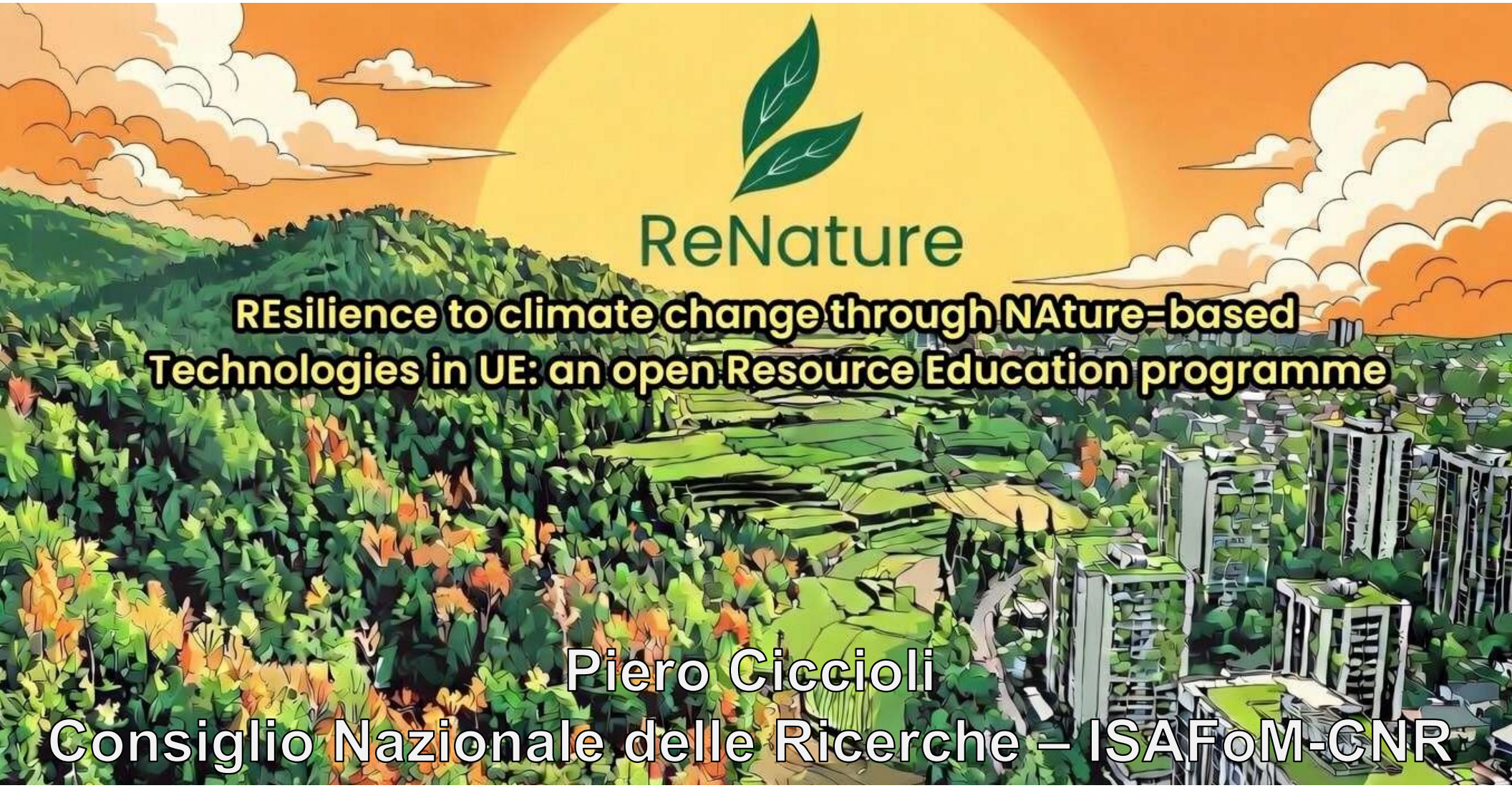

Piero Ciccioli
Consiglio Nazionale delle Ricerche – ISAFoM-CNR

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CNR - ISAFOM

Nature-based Solutions

Nature-based Solutions (NbS) are solutions inspired and supported by nature that enhance the resilience of ecosystems and communities to climate change by providing effective, sustainable, and often low-cost responses. They are characterised by being cost-effective, with low or no levels of engineering and entirely based on nature, which are particularly effective in fostering adaptation to climate change and the mitigation of its impacts.

Their action is mainly expressed through the restoration of natural systems, the improvement of semi-natural ones, and the creation of biological processes in anthropised environments, with the aim of activating a wide range of ecosystem services that generate flows of benefits (benefit transfer) both for human beings and for natural habitats and their respective biodiversity.

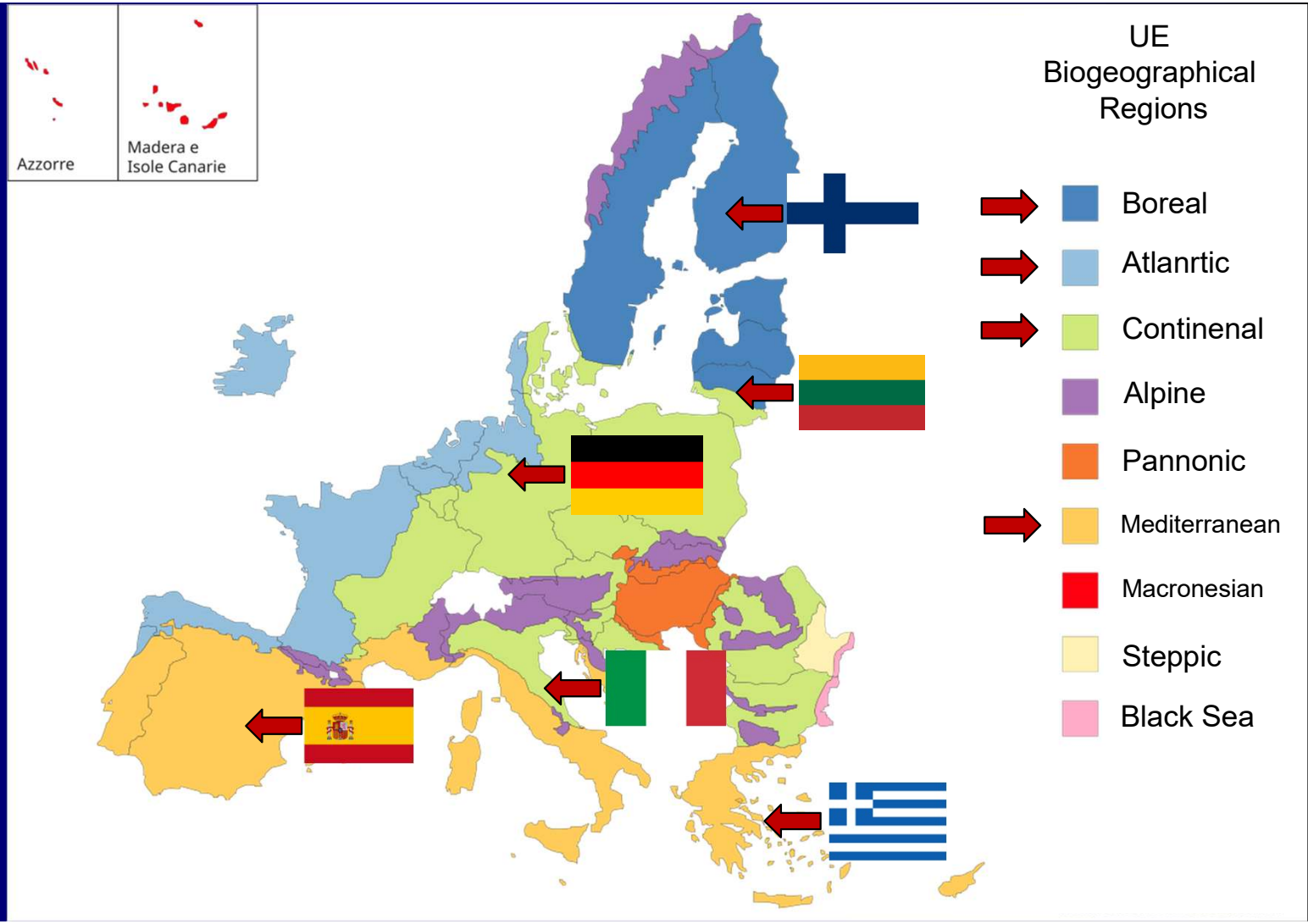
Aim of the Project

The RENATURE project is aimed at producing an integrated, interactive and multidisciplinary teaching program consisting a toolkit of Open Educational Resources (OER) designed to provide final beneficiaries with state-of-the-art knowledge of the various NbS types (Type 1, Type 2 and Type 3), their purposes (Ecosystem-based Adaptation, Ecosystem-based Mitigation and Green Infrastructures), fields of application (natural, semi-natural and anthropized environments), and methods of implementation and co-management (CDD, CBNRM and ICDP).

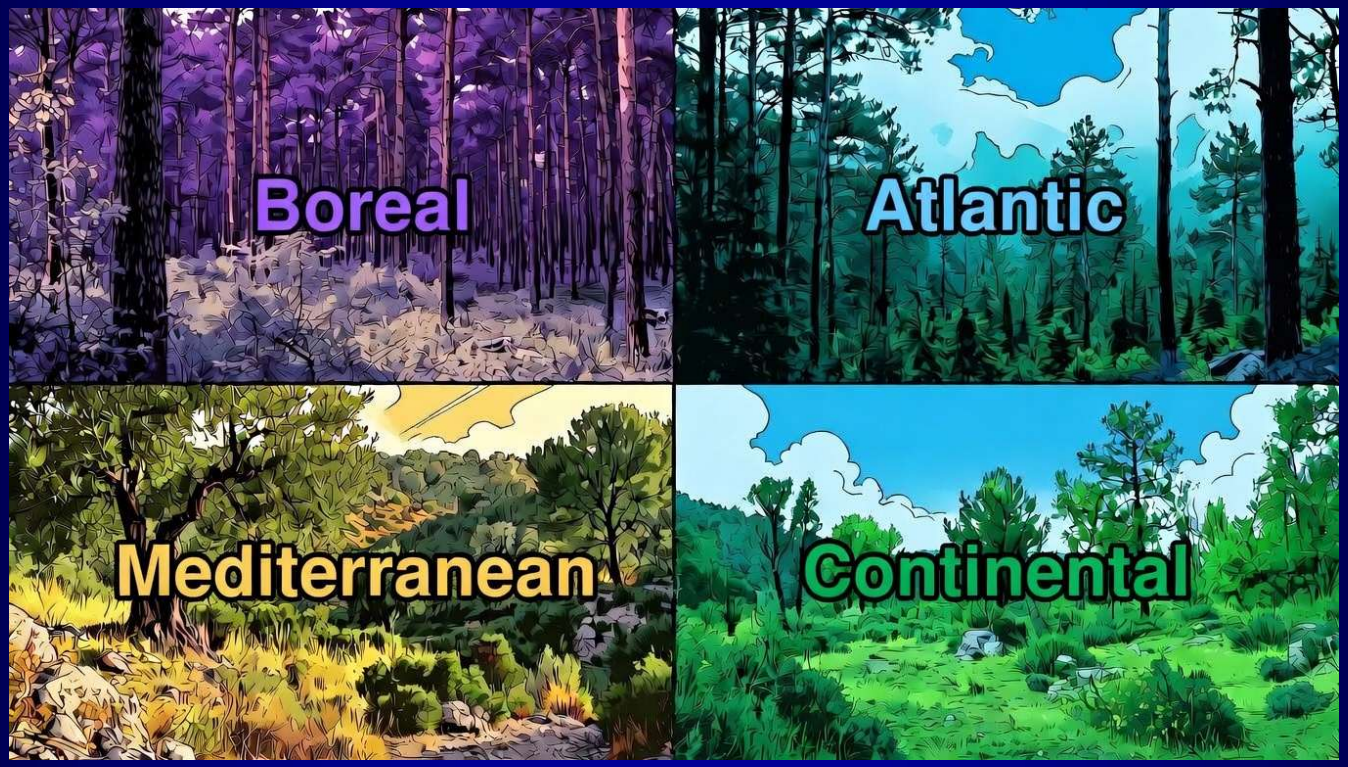
The project is structured as an integrated pipeline of interconnected Final Results (FR), designed to progressively transform state-of-the-art knowledge on NbS into operational educational tools and applied competences, following a transdisciplinary and practice-oriented educational design.

The Partnership

- **CNR Institute for Agricultural and Forestry Systems of the Mediterranean (Italy)**
- **University for Foreigners of Perugia (Italy)**
- **National Institute of Biostructures and Biosystems (Italy)**
- **University of Applied Sciences of Darmstadt (Germany)**
- **University of Applied Sciences of Vaasa (Finland)**
- **Kaunas Science and Technology Park (Lithuania)**
- **General Foundation of the University of Salamanca (Spain)**
- **AllWeb Solutions S.A. (Greece)**



FR1: Comparative Report



The first result of RENATURE provides a comparative knowledge framework on the development, implementation, transfer, and co-management of NbS across the European Union, by covering the main biogeographical regions representing its most widely distributed ecosystems.

This is made possible by the composition of the partnership, since the six partner countries, taken together, cover four major European biogeographical regions: Mediterranean, Continental, Atlantic, and Boreal.

FR1: Comparative Report Methodology

critical points are, fundamentally: 1) lack of relevance that occurs in the way that its maintenance is approached; 2) insufficient political momentum; 3) non-preserved heritage; 4) little exploitation of industrial integration and nature.

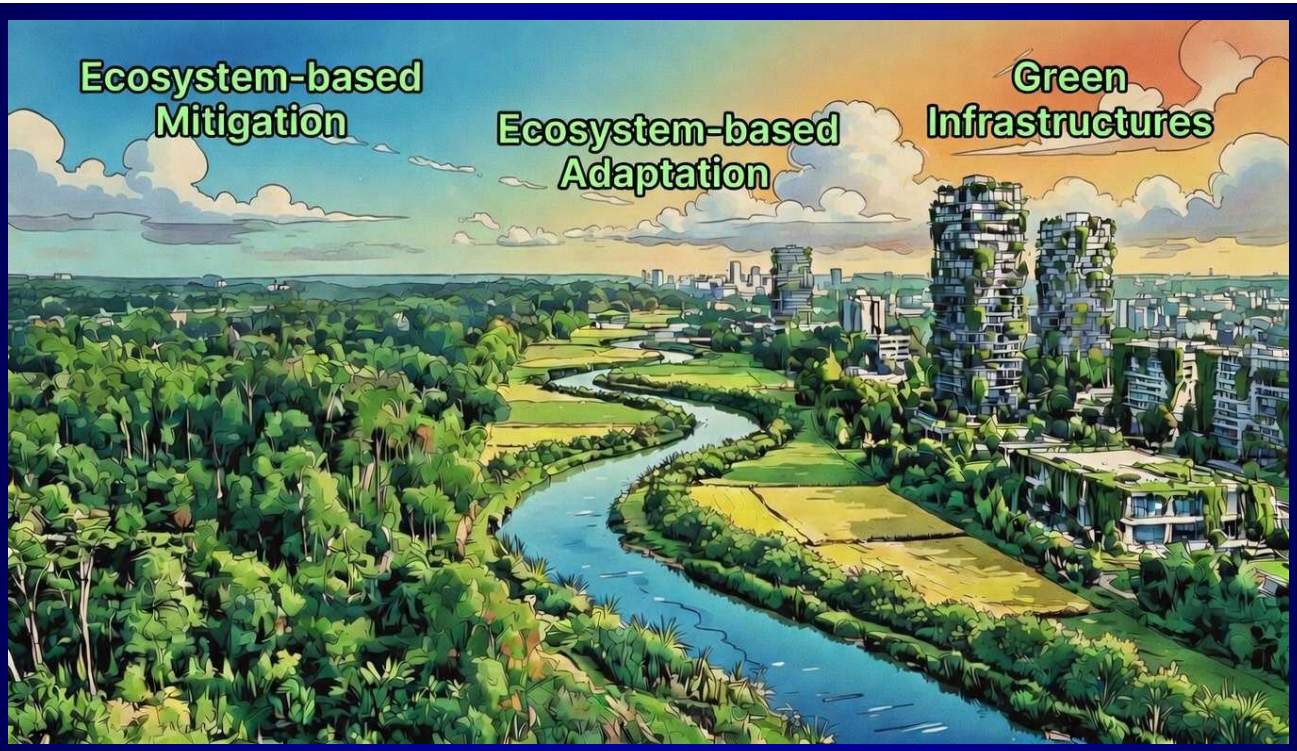
Bulgary		
• Critical issues	Cultural heritage	▪ Underdeveloped infrastructure and over-construction: out-dated infrastructure, chaotic construction and accommodation facilities that do not comply with the region-specific architecture and do not contribute to the authentic and uniform image of the cultural historical sites (SDG 15);
	Natural capital	▪ Lack of integration of nature and biodiversity policies into other sectorial policies, weak administration, lack of proper management plans and conservation objectives (SDG 17).
• Points of strength	Cultural heritage	▪ Bulgaria is among the first in EU in terms of cultural heritage sites, a great number of which included in UNESCO world heritage list - many efforts for their conservation and valorisation (SDG 9)
	Natural capital	▪ 3rd highest density of Natura 2000 sites in EU (number of sites VS national area) - relatively good preservation of areas crucial for biodiversity and ecosystem service delivery (SDGs 15).
France		
• Critical issues	Cultural heritage	▪ High rate of Co2 emissions > has a negative impact on the preservation of cultral heritage (e.g historical buildings) (SDG 13)
	Natural capital	▪ High waste production > has a negative impact on natural resources, environment, as well as on non-renewable resources (e.g. plastic waste) (SDG 12)
• Points of strength	Cultural heritage	▪ High density of land Natura 2000 sites in EU good conditions for cross-sectorial preservation of both natural and cultural heritage (SDG 11-SDG 15)
	Natural capital	▪ Highest surface of marine protected areas under Natura 2000 many efforts for the conservation of marine biodiversity (SDG 14)
Greece		
• Critical issues	Patrimonio cultural y natural	▪ Lack of spatial recognition of existing natural and cultural heritage features. (SDG 11 & SDG 15)
• Points of strength	Patrimonio cultural y natural	▪ Combination of natural and cultural landscape with cultural – historical traditions. (SDG 11 & SDG 15)
Italy		
• Critical issues	Cultural heritage	▪ Highest number of landslides in European Union and a high number of floods negative impact on the preservation of Cultural Heritage (SDG 13.1)
	Natural capital	▪ Highest exposure to desertification in EU negative impact on preservation of biodiversity (SDG 13.1)
• Points of strength	Cultural heritage	▪ One of the most impressive cultural wealth in the European Union and an international leading role in the field of conservation of Cultural Heritage positive impact on the sustainable management of Cultural Heritage (SDG 11.4)
	Natural capital	▪ National forest area subject to environmental restrictions and protection increase good preservation of areas crucial for biodiversity and ecosystem service delivery (SDG 11.4)
Spain		
• Critical issues	Cultural heritage	▪ A lot of heritage not conserved since the country has a lot of heritage
	Natural capital	▪ Maximum exploitation of some natural resources
• Points of strength	Cultural heritage	There is a clear regulation of cultural heritage management and many actions are carried out
	Natural capital	▪ Inclusion in the objectives for the development of Spain of sustainable and sustained exploitation of its natural resources

Particular emphasis have been given to the analysis of the impacts of NbS on the three dimensions of sustainable development, by highlighting the positive effects detectable in the environmental dimension (e.g. number and types of reactivated ecosystem services), the economic dimension (e.g. types of green jobs and related number of job opportunities created), and the social dimension (e.g. what co-benefits have been produced and how they have improved citizens' quality of life).

Likewise, the main critical issues found in each dimension that currently limit the diffusion of NbS have been analyzed as well.

A distinctive feature of this result is its multi-level structure, organised along a progressive scaling approach. The methodology follows a multi-scalar logic (micro–meso–macro) combined with desk research and grounded theory, applied through the development of national reports and case studies.

FR2: Introductory Teaching Programme



FR2 will be an introductory teaching programme on the potential offered by NbS in mitigating the impacts produced by climate change and adapting to them.
To this end, the programme will consist of a toolkit of digital Open Educational Resources (OERs) organized into three modules, each dedicated to present the topic in light of one of the three dimensions of sustainable development, while identifying the specific group of NbS designed to counteract the effects of climate change in the environmental, economic, and social dimensions.

FR2: Introductory Teaching Modules

Module 1: NbS and Environmental Impacts
It will consider natural events triggered or exacerbated by climate change (e.g. floods, desertification) and present the main features of the group of NbS aimed at mitigating them ("Ecosystem-based Mitigation").

Module 2: NbS and Economic Impacts
It will present the general features of the NbS aimed atg adapting activities of economic interest that are connected to nature (e.g. agriculture, forestry) to the effects of climate change ("Ecosystem-based Adaptation").

Module 3: NbS and Social Impacts
It will illustrate the impacts of climate change on the quality of life of urban populations (e.g. urban heat island) and present the general features of the NbS designed to counter them ("Green Infrastructures").

FR3: Advanced Teaching Programme

FR3 will be an advanced teaching programme designed to present the functionalities, implementation methods and co-management of selected NbS, particularly suitable for promoting green youth employment.

The programme will be organised into three modules, each presenting the features of a group of 10 NbS specifically intended for application in one of the three main environmental contexts where these solutions are relevant: natural (e.g. forests), semi-natural (e.g. agricultural systems), and anthropized (e.g. urban areas).

The main approaches through which each of the selected NbS can be co-managed by active citizenship (CDD, CBRNM, ICDP) will be described as well.

FR3: Advanced Teaching Modules

Module 1: NbS and Natural Systems
It will present a selected group of 10 NbS that can be implemented in natural systems, aimed at enhancing the sustainability of human activities carried out in these environments (e.g. forestry, aquaculture).

Module 2: NbS and Semi-natural Systems
It will show the potential of a selected group of 10 NbS in improving the sustainability of human activities carried out in semi-natural systems (e.g. agriculture, livestock farming).

Module 3: NbS and Anthropized Systems
It will introduce a selected group of 10 NbS that can be implemented in anthropized systems to enhance urban sustainability and resilience (e.g. green roofs, rain gardens).

FR4: Digital Application for Exercises

The fourth result of RENATURE will consist of a digital application designed to support the practical application and assessment of the competences developed through FR2 and FR3, while also providing learners with a competence-based orientation tool. Within the overall project architecture, FR4 will represent the transition from structured learning to interactive and personalised learning experiences.

FR4: Digital Application for Exercises

The application will be based on interactive exercises that will allow learners to assess their knowledge and competences in relation to NbS and will be designed in coherence with European competence validation systems, including principles derived from ECVET.

The application will also include self-assessment tools to compare pre-training and post-training knowledge levels, as well as feedback questionnaires to collect users' perceptions of the quality and effectiveness of the educational content.

FR5: E-book and Guidelines

The objective of WP-6 is to produce an e-book presenting, in an organized way, the philosophy, methodological approach, results, products of RENATURE and guidelines for using the latter. In this way, the document aims primarily to serve as the "user manual" of RENATURE for the primary target group.

FR5: E-book and Guidelines

Particular attention will be paid to present how the offered OERs can be used as "practical and reusable resources for the practitioners," providing pathways for content customization that teachers may follow.

Through practical examples, it will stimulate opportunities to upscale the training programs, to implement them into MOOCs and/or adapt them to other educational and needs, also based on the feedback collected from six Public Authorities' Reference Groups that have progressively followed the development of the project outputs.

Thank You for Your Attention