# TERRA NOVA

## POLICY RECOMMENDATIONS FOR SUSTAINABLE LANDSCAPE MANAGEMENT STRATEGIES

WHITEPAPER 1 2020

TERRA NOVA

MARIE CURIE ACTIONS

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# TERRANOVA

## POLICY RECOMMENDATIONS FOR SUSTAINABLE LANDSCAPE MANAGEMENT STRATEGIES

WHITEPAPER 1

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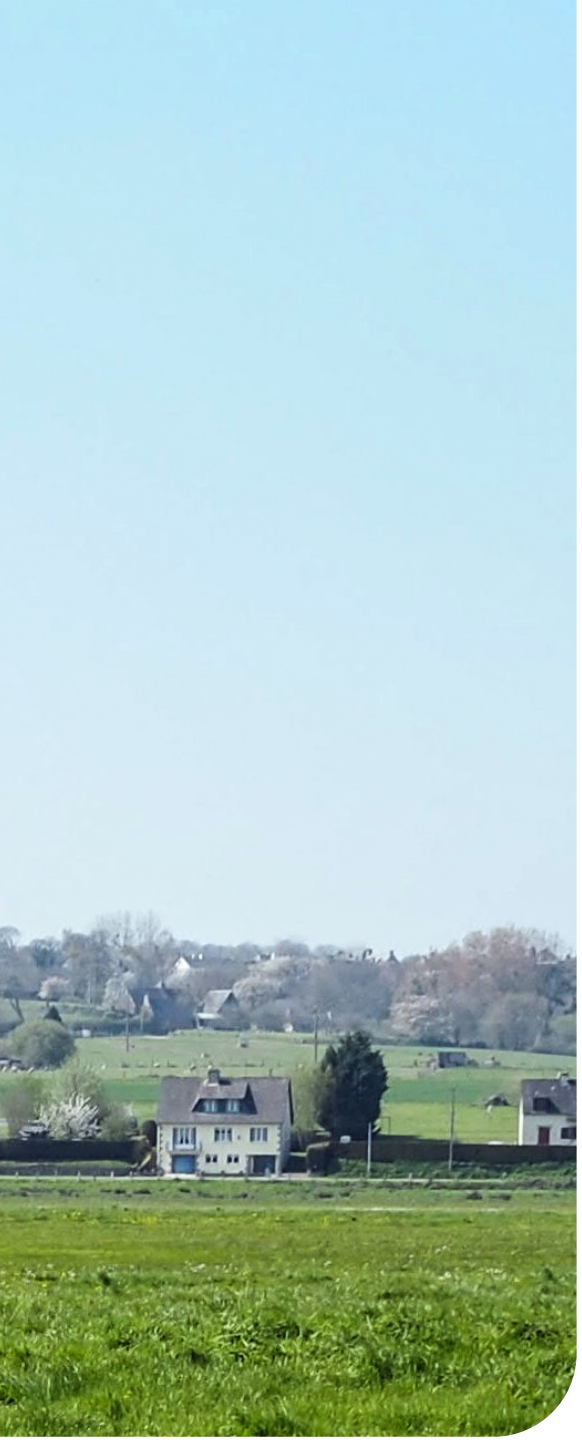

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# TERRANOVA: a landscape-based response to the main challenges of our time

## POLICY RECOMMENDATIONS FOR SUSTAINABLE LANDSCAPE MANAGEMENT STRATEGIES

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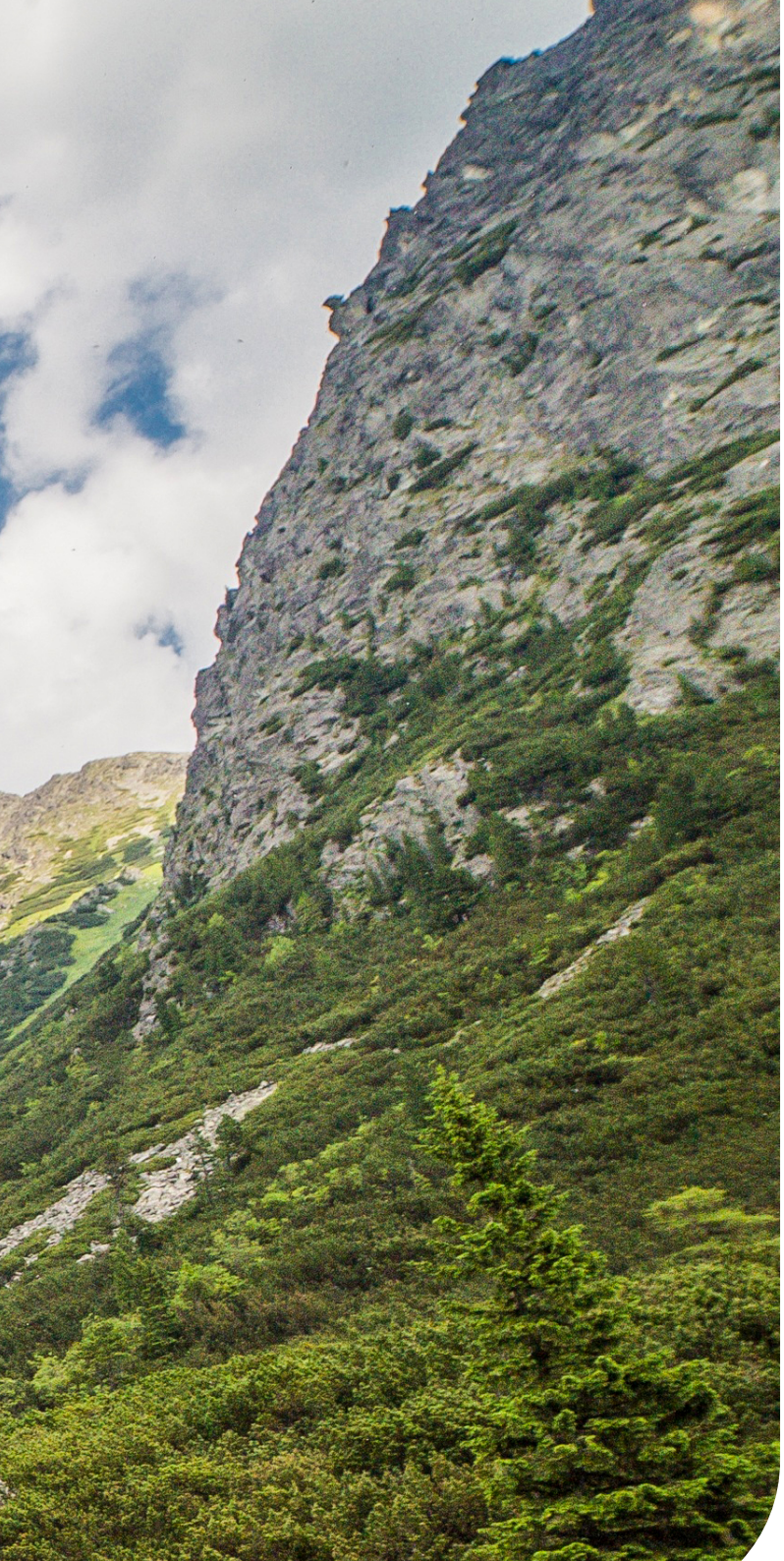


## EXECUTIVE SUMMARY

This is the first out of three white papers from the project TERRANOVA the European Landscape Learning Initiative an Innovative Training Network consortium of the European Union's Marie Skłodowska-Curie Actions.[1] TERRANOVA investigates the deep history of human-environment interactions and how these interactions have shaped European landscapes as a foundation to design sustainable environmental policies in Europe. In 2019–2023, fifteen PhD students will be trained to conduct interdisciplinary research around this topic in order to promote a long-term understanding of the structure and functioning of European landscapes to meet current challenges caused by reduced biodiversity and climate change. TERRANOVA seeks knowledge through landscape energy regimes and transitions, which will help in the transition to future low-carbon society. In this paper, we will present our starting point and briefly describe the project design and expected outcomes of the project.

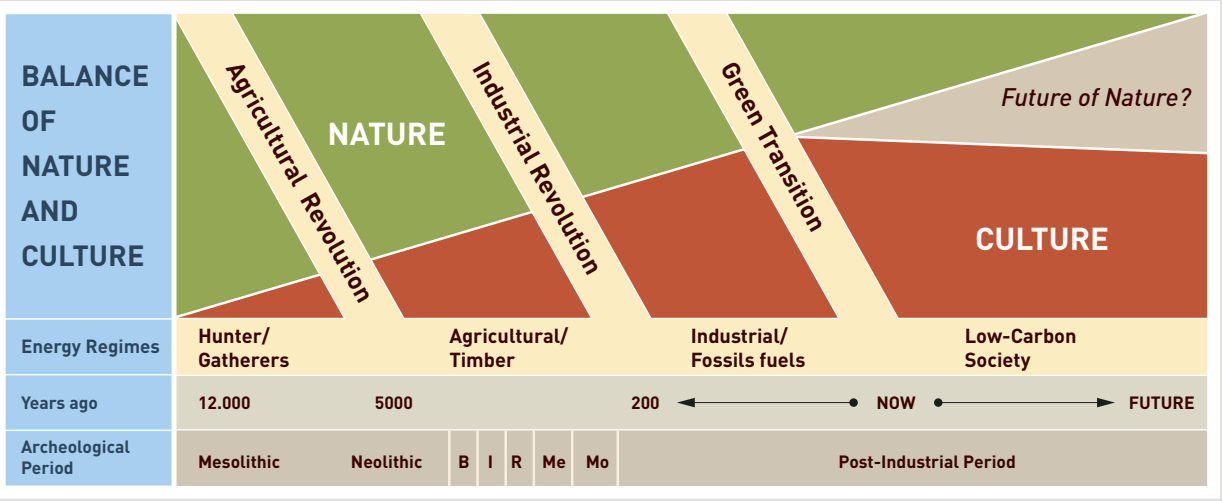
### RECOMMENDATIONS - POLICY MAKERS TO RECOGNISE AND SUPPORT:

- The importance for a nuanced understanding of the deep history of European landscapes and past changes in human-environment interactions that is required in order to address the climate and the biodiversity crises.
- Potential reservoirs of knowledge and experience that landscapes encompass, for nature conservation, landscape planning and sustainable livelihoods, which now remain unexplored.
- Sustainable research and training networks, like TERRANOVA, which means shifting academic curricula to demonstrate intelligent and innovative solutions for problems of land abandonment, landscape management and stewardship, rewilding and the process of transitioning to a low-carbon society.

## EUROPEAN LANDSCAPES

The European continent is bordered by numerous water bodies and is composed of many peninsulas, the four largest being the Scandinavian, Iberian, Balkan and Italian. Europe contains a number of broader zones in terms of climate and vegetation constituting a great variation in terms of the biophysical conditions within the region. A diversity of human societies has interacted with these landscapes over millennia, resulting in multiple different trajectories of change. Many of these trajectories resulted in cultural landscapes highly valued by contemporary Europeans and still retain high-value nature. Emblematic examples of these landscapes include for example the Thy coast in Denmark, the Douro Valley in Portugal, the Carpathian mountains in Romania, the Scandinavian and Dutch Rhine-Meuse river valleys, and the Oder delta between Germany and Poland. However, over the last centuries, intensified human activities and climate change have resulted in loss of biodiversity, degradation of some of the most beneficial ecosystem functions for humans, landscape homogenization and an overall impoverishment of the diversity of the European landscapes. If not mitigated or reversed, these degradation processes will constitute a serious challenge for the well-being of European societies in the near future, especially in light of the current climate crisis.[2]

This paper outlines *TERRANOVA: The European Landscape Learning Initiative*, a research program that aims to train a new generation of landscape researchers in order to address aspects of climate change, human-environment interactions, and environmental policies in Europe towards promoting more functional ecosystems and the transition to a low-carbon society.[3]




▲ The concept of energy regimes through time, the increasing magnitude of human in)uence and changing balance between nature and culture.
Training researchers to understand and negotiate the uncertain "future of nature" (variously grey shaded areas) is a major focus of TerraNova.
NB the time scale is nonlinear. B= Bronze Age, I= Iron Age, R=Roman Age, Me= Medieval, Mo= Modern Times.

## BIODIVERSITY CRISIS

Biodiversity is the foundation of life on Earth and it is essential to all ecosystem functions. Biodiversity composition shapes the composition of landscapes and the multiple contributions of nature to people such as provision of food, water, energy and health. Biodiversity and the ecological functions that it provides are also crucial for regulating climate and for the future stability of the biosphere's life-supporting systems, especially under current trajectories of increasing CO2 emissions and other pollution in land, water and the atmosphere.

Since the beginning of the Industrial era, the human capacity to transform nature has drastically increased, contributing to a shift in the driving forces of biodiversity and environmental change, from changes determined by natural

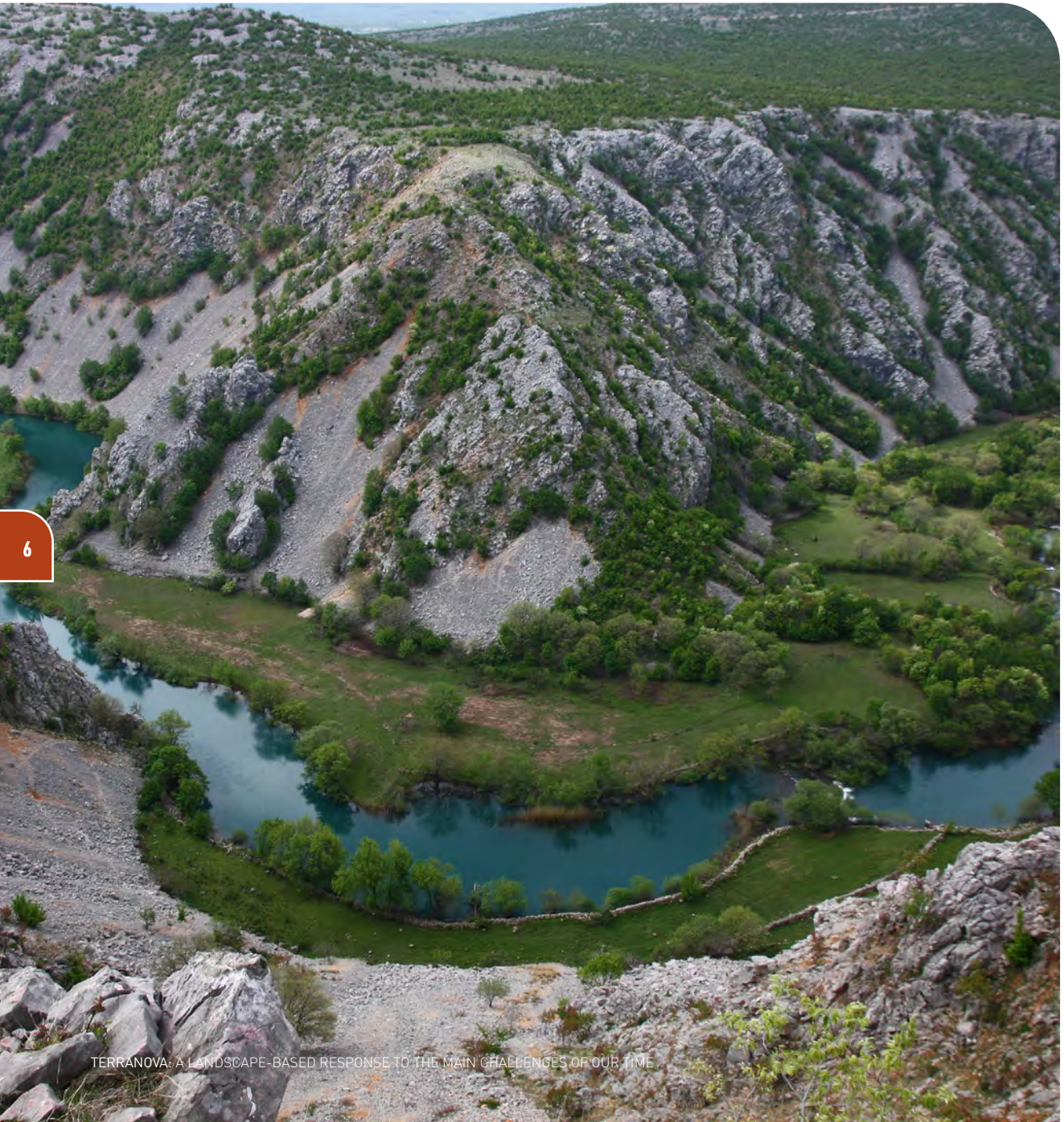
processes to changes highly determined by human actions.[4] While intensification continues to occur in most areas in Europe, a few cultural landscapes shaped low-intensity use are also changing due to land abandonment. Only in the last century, more than 90 percent of crop varieties have disappeared and up to half of the breeds of domestic animals have been lost.[5] Nevertheless, human impacts on landscapes are much older and include deep prehistoric to historical pre-industrial biodiversity and widespread selective loss of megafauna, globally and in Europe.[6] Human impacts on the natural world resulting from urbanisation, mining and industrial fishing, forestry and agriculture lead to a rapid loss of populations of species. It has been estimated that one million species are currently at risk of extinction.[7] The recent rapid socioeconomic changes, high societal demands and human-induced climate change constitute a threat to Europe's landscapes, biodiversity and ecosystems and to human well-being.

TO ADDRESS THE CLIMATE AND THE BIODIVERSITY CRISES, A NUANCED UNDERSTANDING OF THE DEEP HISTORY OF EUROPEAN LANDSCAPES AND PAST CHANGES IN HUMAN-ENVIRONMENT INTERACTIONS IS REQUIRED.

## LANDSCAPE KNOW-HOW

Although our understanding of human contributions to environmental change and the associated threats have significantly increased in recent decades, present-day landscape management remains only loosely connected to knowledge on the history of landscape transformations. Policy makers, land managers and other stakeholders often manage landscapes in their current state with insufficient information on the physical, biological, social, historical and cultural characteristics of the landscapes. For example, it has been noted that the Common Agricultural Policy (CAP) of the European Union (EU), that recently has integrated instruments to support the environment, systematically supports harmful farming subsidies in marginal areas over nature restoration, despite considerable agreement among EU citizens that ongoing environmental degradation and climate change need to be prioritised.[8] Hence, a pressing challenge for sustainable land management policy is the appreciation of plurality and the complexity of the landscapes upon which we depend. Landscape history is interdisciplinary by nature and crosses several disciplinary boundaries and a number of spatio-temporal scales. Sustainable landscape management requires an increased understanding of the

▶ **TERRANOVA Academy Field School 1: Wouter Helmer (Rewilding Europe) demonstrating rewilding results to ESRs in the Millingerwaard, the Netherlands** © TERRANOVA.



deep evolutionary and ecological history through which our current species diversity has been generated and the important role of healthy ecosystems for the benefit of human well-being and sustainable economic development.[9]

THE POTENTIAL RESERVOIRS OF KNOWLEDGE AND EXPERIENCE THAT LANDSCAPES ENCOMPASS, FOR NATURE CONSERVATION, LANDSCAPE PLANNING AND SUSTAINABLE LIVELIHOODS, REMAIN UNEXPLORED.

## GIVE SPACE TO NATURE

The *EU climate action and the European Green Deal* point towards decisions that will have far-reaching positive consequences for Europe's people and nature.[10] However, large-scale restoration of nature, based on principles of *rewilding*, should also be recognized by the policy makers as a major opportunity for improved land management in Europe to address the current climate and biodiversity crises, as recently highlighted by a coalition of scientific, conservation and practitioner organizations.[11] These opportunities for

▶ **Central Apennines, Italy**
© Sandra Bartocha Rewilding Europe.

▶ **Vegetation mapping.** © Center for Biodiversity Dynamics in a Changing World (BIOCHANGE)/University of Aarhus, Denmark.

nature restoration are increasing as a result of multiple societal changes. For example, Europe's rural areas cover over 90 % of the EU's total land area, and in the most peripheral rural regions of Europe farmland is being abandoned.[12] These impoverished regions may benefit from restoring naturally-functioning ecosystems that can provide multiple services to society.[13] Biodiversity benefits from low intensive land-use, forest regeneration and rewilded ecosystems, and contributes to carbon sequestration, recreation values and the promotion of circular economies. For example, millions of hectares of land could be redeployed from agriculture and potentially be managed in ways that will *give nature more space* in previously human dominated ecosystems. Current biodiversity is a legacy from when the space for nature was 100 % and given the strong, pervasive species-area relations, there is a need in maintaining large areas for nature, in order to maintain high levels of biodiversity over the long-term.[14] More space for nature are key for making biodiversity more resilient to climate change. Biodiversity and functioning ecosystems are also crucial for mitigating effects of climate change, however for biodiversity and ecosystems to provide any meaningful impacts on the biosphere and the climate system, large areas are essential.[15] Giving more space to nature, combined with low

intensive land-use practices using a balanced approach between economic performance and a sustainable use of natural resources, is in harmony with the EU's proposed roadmap for a *European Green Deal*. It aims to turn current climate change and environmental challenges into opportunities across all policy areas, by providing novel opportunities for more nature-friendly socio-economic development.[16] However, in order to understand the effects and temporality of landscape transitions, as well as the associated challenges, it is essential to ensure a historical long-term perspective to protect natural and cultural values of European landscapes. *TERRANOVA* aim to contribute with knowledge of how landscapes and better functioning ecosystems may contribute to sustainable growth in the transition to a low carbon future.[17]



## TERRANOVA THE EUROPEAN LANDSCAPE LEARNING INITIATIVE

The challenges outlined above pose an urgent need in fostering a new generation of landscape managers, planners and scientists, who are able to integrate research questions and methods across natural sciences, humanities and social sciences. In addition, it is necessary to develop

▶ **Field walking Denmark.** © Center for Biodiversity Dynamics in a Changing World (BIOCHANGE)/University of Aarhus, Denmark.

good communication skills to convey *landscape knowledge* to policymakers and the public.

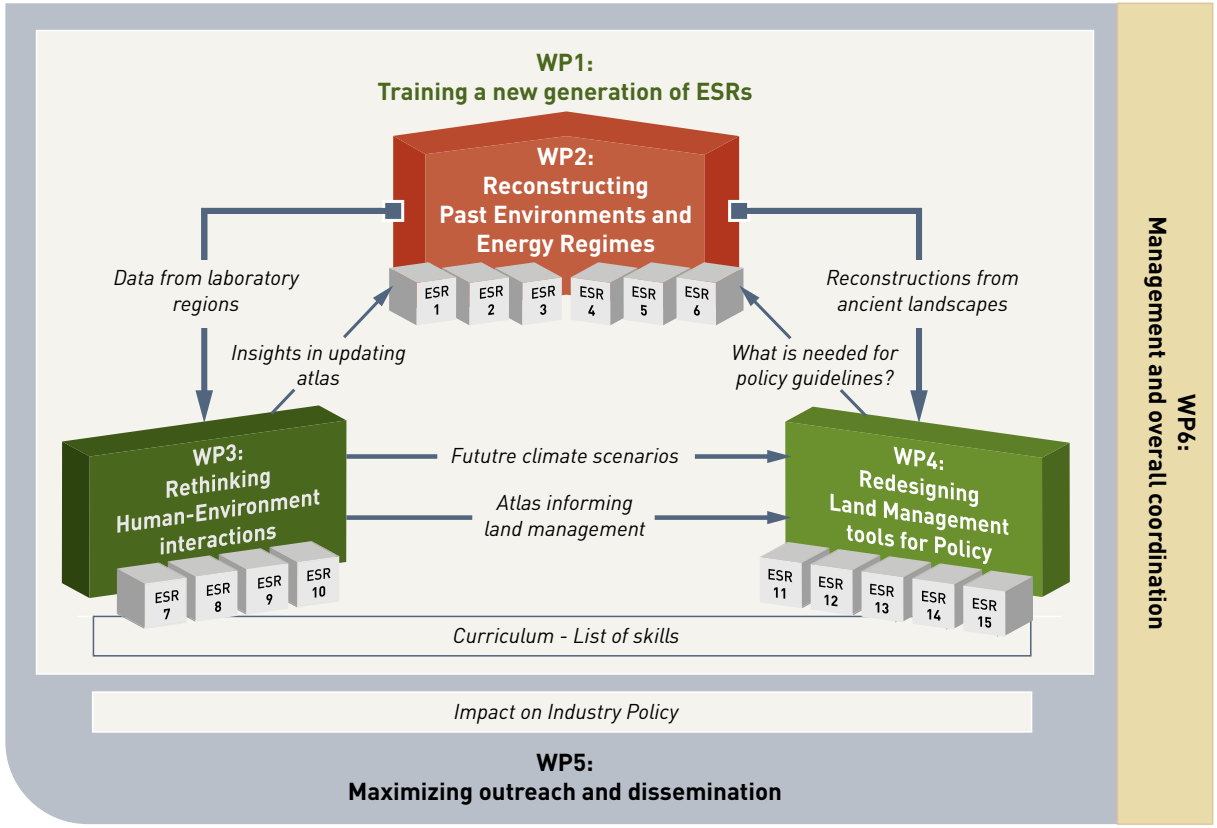
*TERRANOVA: the European Landscape Learning Initiative* aims to fill this urgent need by giving Early Stage Researchers the opportunity to undertake integrative environmental-social research and increase their knowledge of European landscapes and their long-term histories in order to design future sustainable land uses and the conservation of landscapes with high nature value.

*TERRANOVA* aims to envision principles for a *nature-based* landscape development. These include positive and negative lessons – past unsustainable pathways, alternative low-intensity and zero carbon land uses, as well as overcoming shifting baselines to help identify the ecological/ biodiversity potential of European landscapes.

*TERRANOVA* engages fifteen Early Stage Researchers (ESRs) and their supervising teams divided over nine beneficiaries and fourteen partner organisations.

*TERRANOVA* undertakes research through three Work Packages, which will:

1. Reconstruct the deep history of Europe's cultural landscapes and corresponding changes in coupled human-nature interactions.
2. Rethink the outcomes of human environmental interactions on the present-day landscapes in Europe.
3. Inform the future Europe by designing sustainable landscape management strategies, including those based on the principles of rewilding.




▶ **TERRANOVA work package structure, ESRs and workflow: training, dissemination and management.** © TERRANOVA.

Rewilding is considered a land management option favouring climate mitigation and adaptation, energy and ecosystem objectives. Rewilding will be tested against the local concepts of landscapes and alternative development trajectories, such as the transition to a future low carbon energy phase. TERRANOVA will link the developed knowledge to practical applications and impact in the landscape and aimed to be a part of current policy processes and developments (e.g. the European Green Deal, EU's common agricultural policy (CAP), Biodiversity Strategy, Regional Development)[18] to make it relevant and applicable for policy makers.

## MAJOR OUTCOMES OF TERRANOVA

- TERRANOVA will produce an unprecedented atlas with layers of reconstructed human-environment relations, land use dynamics, climate change, fauna history and species pools from the Eemian time-period up until the present day. This information will be integrated in a separate layer outlining scenarios of future landscape management, which will include areas of Europe with potential for ecological restoration based on rewilding principles. Our approach to rewilding focuses on key components of natural ecosystem dynamics, such as trophic complexity, stochastic disturbances and dispersal among habitats. Rewilding actions resulting in restoration of these processes, and their dynamic interactions, we consider crucial for promoting functioning and sustainable ecosystems.[19]

- TERRANOVA will develop a new research and management platform, Integrated Landscape Analysis (ILA), combining knowledge from the social and natural sciences, drawing on the knowledge of landscape histories and management to assess future prospects. The ILA-approach will function as the main framework for a TERRANOVA Massive Open Online Course (MOOC) aimed at advanced students and landscape managers who will assist in the transformation of the European landscape in the coming decades.[20]

- TERRANOVA undertakes communication activities, such as organising public events, monthly blogs by ESRs and active social media presence. In order to ensure wide societal participation and impact, events at TERRANOVA consortium meetings will target key audiences, such as landowners and managers, governments, local communities, investors and policy makers. The aim of these events are to explore and implement future pathways to sustainable landscape management. TERRANOVA will also organise a series of key communication events; in 2021, local and regional stakeholders will be addressed in Rennes, France and in 2022, national and international stakeholders in landscape management will be addressed in Bruxelles, Belgium concerning landscape management also based on rewilding principles. In 2023, a final conference on sustainable landscapes for experts and the public will be organised in Uppsala, Sweden.

One of the novel approaches of TERRANOVA is to overcome the typical disciplinary divide between curiosity-driven science and applied research. Our collaborative research and training design builds upon *landscape energy regimes*, which entail human-environment interactions and key transitions based primarily on the energy source(s) used in the society. This novel approach will allow enhanced cooperation and transfer of knowledge between disciplines and sectors within the project. Seven network-wide training events (called TERRANOVA Academy Field Schools or TAFS) will deploy a conceptual framework based on landscape energy regimes and three transition periods as themes to educate the fifteen young ESRs in sustainable landscape management practices.

ONE OF THE NOVEL APPROACHES OF TERRANOVA IS TO OVERCOME THE TYPICAL DISCIPLINARY DIVIDE BETWEEN CURIOSITY-DRIVEN SCIENCE AND APPLIED RESEARCH. OUR COLLABORATIVE RESEARCH AND TRAINING DESIGN BUILDS UPON *LANDSCAPE ENERGY REGIMES*, WHICH ENTAIL HUMAN-ENVIRONMENT INTERACTIONS AND KEY TRANSITIONS BASED PRIMARILY ON THE ENERGY SOURCE(S) USED IN THE SOCIETY. THIS NOVEL APPROACH WILL ALLOW ENHANCED COOPERATION AND TRANSFER OF KNOWLEDGE BETWEEN DISCIPLINES AND SECTORS WITHIN THE PROJECT. SEVEN NETWORK-WIDE TRAINING EVENTS (CALLED TERRANOVA ACADEMY FIELD SCHOOLS OR TAFS) WILL DEPLOY A CONCEPTUAL FRAMEWORK BASED ON LANDSCAPE ENERGY REGIMES AND THREE TRANSITION PERIODS AS THEMES TO EDUCATE THE FIFTEEN YOUNG ESRS IN SUSTAINABLE LANDSCAPE MANAGEMENT PRACTICES.

## ENDNOTES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▶ **Wild horses** © Center for Biodiversity Dynamics in a Changing World (BIOCHANGE)/University of Aarhus, Denmark.

## COLOPHON

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→ View at Mount Ochi from the peninsula of Karystos, Greece.
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