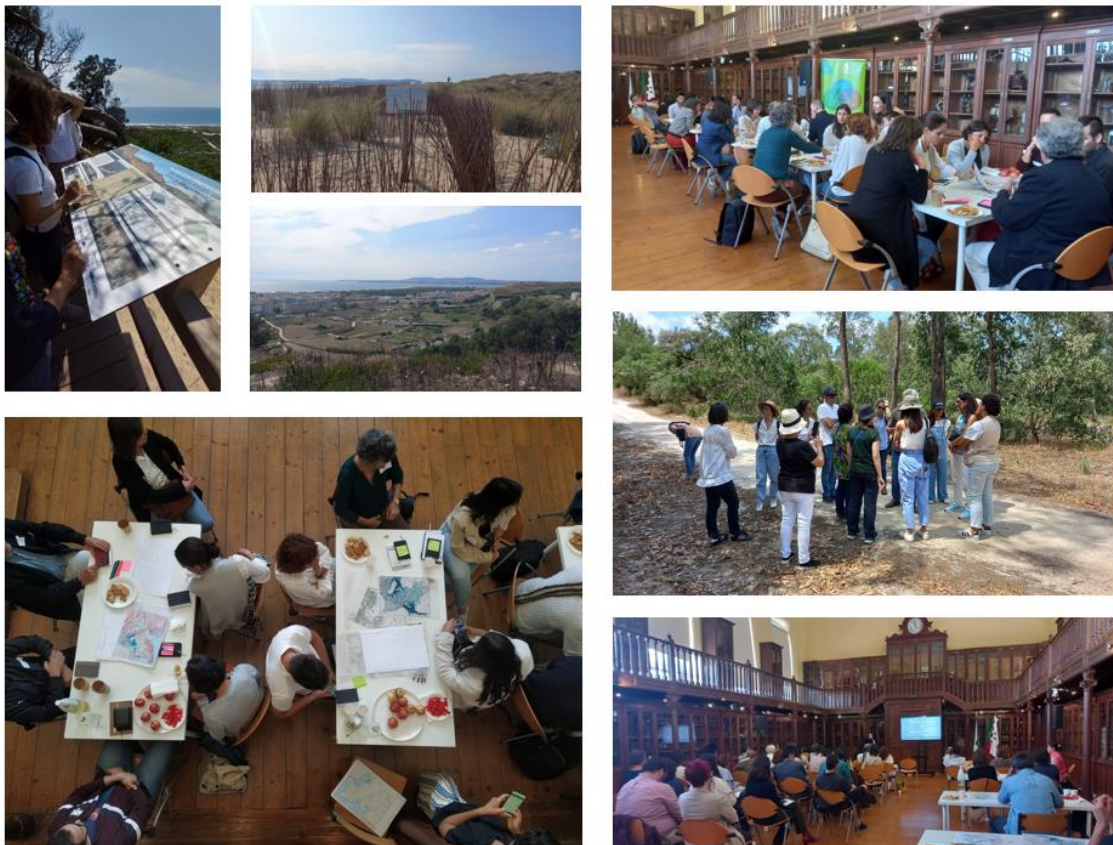


Report of the Natura 2000 Biogeographical Process networking event

Restoring Degraded Landscapes through Green Infrastructure

Lisbon, 10th May and 20th June 2023



LEAF/ ISA / Universidade de Lisboa



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1. Introduction

Natura 2000, a comprehensive network of nature conservation sites across Europe, faces a pressing challenge as the habitats are under threat in numerous locations. Addressing this problem requires proactive measures, with a collaborative approach to identify effective solutions. The EU Biodiversity Strategy to 2030 calls for significant improvements in the conservation status of species and habitats protected under the EU Birds and Habitats Directives. This underscores the need for a concerted approach to ensure sustained protection and increase of biodiversity within the Natura 2000 network.

In 2012, the European Commission launched the **Natura 2000 biogeographical** process (BGP) to help meet this target. This multi-stakeholder cooperation process includes seminars, workshops and cooperation activities aimed at enhancing the effective implementation, management, monitoring, financing and reporting of the Natura 2000 network at a biogeographic level. The process assists Member States and key stakeholders to manage Natura 2000 as a coherent ecological network. The key objectives of the biogeographical process are:

- collecting up-to-date information on threats and conservation needs for species and habitats;
- exchanging experiences, case studies and best practices;
- identifying common objectives, priorities and management actions;
- developing new management insights, (cross-border) stakeholder cooperation frameworks, networks of specialists and site managers, etc.;
- promoting Natura 2000 management that integrates socio-economic objectives.

Most of the Portuguese territory is included in the Mediterranean BGP region, together with Croatia, Cyprus, France, Greece, Italy, Malta and Spain (<https://biogeoprocess.net/>).

2. «Restoring degraded landscapes through green infrastructure» networking event

Reversing the degradation of ecosystems stands as a critical environmental challenge. Within the Mediterranean region, a host of issues, such as soil erosion, biodiversity loss, water scarcity, fire vulnerability and flood risks, underscore the significant problems arising from inefficient vision between land-use changes and lack of ecological landscape planning. The EU's biodiversity strategy for 2030 articulates an ambitious roadmap to counteract ecosystems degradation and safeguard the integrity of nature. Furthermore, aligning with the objectives outlined in the EU biodiversity strategy for 2020, the strategic deployment of Green Infrastructure emerges as a fundamental tool to reverse the trend of ecosystems degradation.

In this context, the networking event aimed to discuss the role of green infrastructure in restoring degraded landscapes, providing a pathway to expand Natura 2000 areas. It offered a forum for discussion and knowledge exchange, welcoming the feasibility of defining new ecological corridors connecting the existing Natura 2000 areas, thereby enhancing the broad protection of habitats at both local and regional levels. The proposal for this networking event materialized in response to a call for proposals that closed in February 2022.

This report provides a comprehensive document of the networking and knowledge exchange event entitled "Restoring Degraded Landscapes through Green Infrastructure" held in May and June 2023 in Lisbon, Portugal. The event was hosted by the R&D unit Linking Landscape Environment, Agriculture and Food (LEAF) at the Instituto Superior de Agronomia from the University of Lisbon. It was organized by Selma B. Pena and Natália S. Cunha, researchers from Green and Blue Infrastructures (GBI) Thematic Line of LEAF. The GBI team included additional researchers who actively contributed to the insightful discussions: Ana Müller, Inês Adagóí, Luísa Franco, Leonor Barata, and Pedro Xavier. Notably, the Networking Event received valuable support from the Portuguese contact point of the Natura 2000 biogeographical process, Rui Rufino and Sandra Mesquita. This collaborative effort ensured the event and fostered a rich exchange of ideas and expertise in landscape restoration and green infrastructure issues.

The GBI/ LEAF /ISA host team brings expertise in ecological-based planning, spatial planning, green infrastructure mapping, and habitat identification. Drawing from their coordination in national projects such as "National Ecological Network - a proposal of delimitation and regulation" (Magalhães, 2013; Cunha & Magalhães, 2019) and "Potential Land-Use Ecological Plan. Application to Portugal" (Magalhães, 2016), the team has successfully crafted an interactive spatial geographic data infrastructure on a national scale, known as EPICWebGIS. This resource (<http://epic-webgis-portugal.isa.ulisboa.pt/>) is open access and multiuser, including private owners and both private and public institutions, as highlighted in the work of Magalhães et al. (2018).

The team has recently directed their efforts towards rural degraded landscapes in the Centre region of Portugal through the SCAPEFIRE project (Pena & Magalhães, 2023) (<https://www.isa.ulisboa.pt/proj/scapfire/>). It focused on areas devastated by massive fires that have adversely destroyed vegetation, soil, and water resources, witnessing a population decline, where landscape planning methodologies have been crafted to strengthen resilience and healthy landscapes (Magalhães et al., 2021; Pena et al., 2021).

Simultaneously, the team is engaged in the LandGI Nexus project (Cunha & Magalhães, 2023) (<https://www.isa.ulisboa.pt/en/leaf/projects/leaf-funded-projects>), which seeks to establish a national green infrastructure map directly connected to ecosystem services provision and planning policies implementation. Their collaboration extends to the recent updating of habitat cartography for diverse Natura 2000 areas, showcasing their commitment to advancing the understanding, management in conservation, and restoration of ecosystems.

The Networking Event explored the linkages between land use planning, biodiversity conservation objectives, and landscape restoration through green infrastructures. The discussions delved into the strategic development of green infrastructure to foster ecological connectivity, shedding light on intervention priorities and their alignment with restoration plans. The objective was to foster collaboration among diverse stakeholders, including academia, central administration, municipalities, and local associations engaged in restoration and planning initiatives.

The event developed in two distinct parts over two days:

- 1. First Part (10th May): Workshop**

- This session featured presentations and interactive working sessions to facilitate in-depth exploration and understanding of the topics.

2. **Second Part (20th June): Field Trip and Local Discussion**

- Encompassing a field trip to the southern region of the Lisbon Metropolitan Area, participants had the opportunity to get involved in a few successful restoration projects. This experience offered a tangible context for discussing effective landscape solutions.

By incorporating theoretical and practical discussions, the Networking Event aimed to create a comprehensive dialogue on the detailed relationships between land use planning, biodiversity conservation, and landscape restoration, fostering a shared understanding among stakeholders with diverse expertise.

The Networking Event (NE) successfully brought together 47 participants spanning various sectors. The attendees represented entities such as the Territorial Directorate General (DGT), Nature and Forest Conservation Institute (ICNF), Portuguese Environment Agency (APA), and Municipalities including Almada, Palmela, Setúbal, Mafra, and Sintra. The academic sector was well-represented by institutions such as the School of Agronomy (ISA), the Institute of Labour and Business Sciences (ISCTE), and Évora University (UE), along with research centers like CEABN and CEF. Collaborative efforts extended to Associated Laboratories (TERRA), private practice exemplified by LoDo Arquitectura Paisagista Lda, global conservation organizations such as ANP|WWF, and the Forest Stewardship Council (FSC). Local Associations, including TERRA MONTIS - Associação para a Gestão e Conservação da Natureza and Dunas Livres, further enriched the diversity of perspectives and expertise present at the event.

3. **First Part: Workshop results**

The workshop held at ISA on May 10th (Figure 1) featured distinguished speakers addressing two key themes: "Landscape Planning: Green Infrastructure and Restoration" and "Landscape Practice: Restoration in Green Infrastructure" (Figure 2).

The workshop began with a first impression exercise to captivate participants. Subsequently, the event transitioned into insightful presentations covering the two topics.

Following each thematic presentation, interactive discussion sessions unfolded, encouraging participants to engage in group discussions. These sessions reached into important considerations, exploring where and how fundamental linkages within a green infrastructure could be strategically designed to connect with Natura 2000. Also, the participants delved into the difficulties of preparing a comprehensive nature restoration plan for the green infrastructure, identifying priority actions that could enhance the overall ecological framework. These collaborative discussions facilitated detailing concepts and practical strategies for restoration and planning the landscape.



Figure 1 - Workshop held at ISA.

NATURA 2000 BIOGEOGRAPHICAL PROCESS NETWORKING EVENT
Instituto Superior de Agronomia | Salão Nobre
10 de maio de 2023

PROGRAMA

9h30 Abertura
Selma Pena, Natália Cunha

I PARTE: Landscape Planning: Green Infrastructure and Restoration

APRESENTAÇÕES

9h45 The Biogeographic Process
Rui Rufino, Sandra Mesquita

10h00 The Biodiversity Strategy 2030: policy and strategy for biodiversity conservation*ONLINE
Gonzalo González Jurado, European Commission

10h15 Nature Restoration Law – Portuguese experience and difficulties
Diana Almeida, João Nunes, ICNF

10h30 Green Infrastructure and Land use planning Policies. The Landscape transformation Plan an the Land use planning status report
Fátima Bacharel, DGT

10h45 Ecological Network and Green Infrastructure
Manuela Magalhães, LEAF/ISA Researcher

11h00 Portuguese Natura 2000 mapping – past, present and future
Dalila Espírito Santo LEAF/ISA Researcher

11h15 Green Infrastructure, Ecosystem Services and Land Use Planning NEXUS. An application in the Portuguese rural landscape.
Natália Cunha, LEAF/ISA Researcher

SESSÃO DE DISCUSSÃO EM GRUPOS

11h30 – 12h30 Em grupos
 A infraestrutura verde, componentes da paisagem, sistemas de ligação e rede natura 2000.

12h30 – 13h00 Apresentação breve das conclusões dos grupo

II PARTE: Landscape Practice: Restoration in Green Infrastructure

APRESENTAÇÕES

14h00 Rural Landscape Transformation – planning for fire resilience, natural resources preservation and restoration
Selma Pena, LEAF/ISA Researcher

14h15 Farming-integrated measures to increase biodiversity. Experience inside and outside Natura 2000 areas *ONLINE
Christian Kupfer, University of Nürtingen, Germany

14h30 Rehabilitation of mining areas through integrated biotechnological approach
Manuela Abreu, LEAF/ISA Researcher

14h45 Restoring Landscapes under climate adaptation targets in Almada Municipality: 3 case-studies
Duarte Mata, Head of Department of Environmental Intervention, Climate and Sustainability (DIACS) Almada Municipality

15h00 Restore rivers and riverbanks - alluvial forests (LIFE Alnus Taejo)
Silvia Ribeiro, LEAF/ISA e Universidade de Évora, Researcher

15h15 Landscape restoration in practice – Nature Conservation Association
Teresa Gamito, MONTIS – Nature Conservation Association

SESSÃO DE DISCUSSÃO EM GRUPOS

15h30 – 16h30 Em grupos
 A degradação da paisagem e as principais ações a promover na Infraestrutura Verde para recuperar os ecossistemas degradados

16h30 – 17h00 Apresentação breve das conclusões dos grupos

17h00 Encerramento
Selma Pena, Natália Cunha

Restoring Degraded Landscapes through Green Infrastructure

Natura 2000 biogeographical process – Networking event



Organização | Green & Blue Infrastructures Thematic Line / LEAF
greenblueinfra@isa.ulisboa.pt

Participação gratuita
 sujeita a inscrição
Link>> t.ly/CZY9
até 5 de maio
 (lotação limitada)
 Em português
 Almoço incluído

Figure 2 - Networking Event workshop program.

3.1 First impressions

At the beginning of the workshop, participants were invited to engage with three thought questions using the Mentimeter platform:

1. Do you think that the Natura Network 2000 sites in Portugal are sufficient to meet the objectives of nature conservation?
2. What do you think of when you hear the word green infrastructure?
3. What are the benefits of green infrastructure beyond nature conservation?

In response to the initial question, 68% of participants considered that Natura Network 2000 sites in Portugal are not sufficient to meet the objectives of nature conservation (Figure 3)

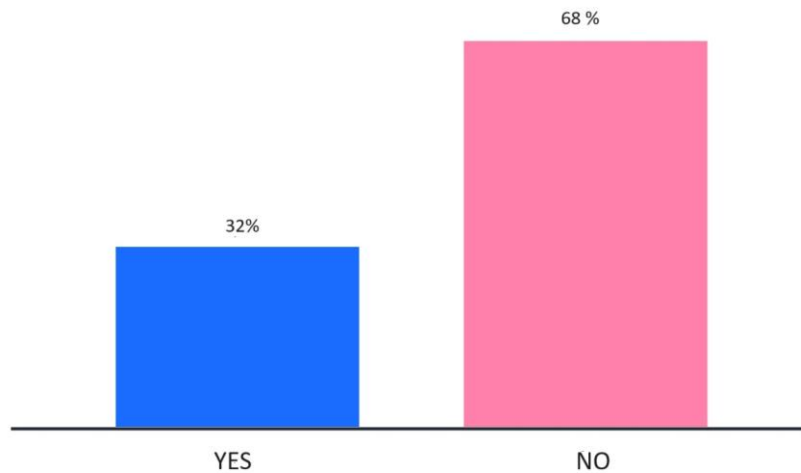


Figure 3 - Percentage of answers to the first question about Natura Network 2000.

For the second question, words associated with the concept of Green Infrastructure, the responses revealed a thematic alignment, with frequently mentioned words including "network," "connectivity," "biodiversity," and "nature." Additionally, participants associated the concept with terms such as 'conservation,' 'continuity,' 'corridors,' 'ecological corridor,' 'ecology,' 'national ecological reserve,' and 'vegetation.' In total, over 33 different words were identified. A visual representation presents the result of a word cloud analysis derived from responses to Question 2, capturing the diverse array of terms associated with the concept of green infrastructure (Figure 4).

Concerning the third question, which aimed to perceive the additional benefits of Green Infrastructures beyond nature conservation, a spectrum of 42 distinct words emerged from participant responses. The most recurrent terms included 'sustainability' and 'ecosystem services', underscoring the multifaceted advantages associated with green infrastructures. Following in detail were mentions of 'connectivity', 'environmental health', 'quality of life', and 'well-being', as illustrated in Figure 5. The visual representation shows the word cloud analysis derived, highlighting the broad scope of positive impacts attributed to green infrastructures beyond their fundamental role in nature conservation.

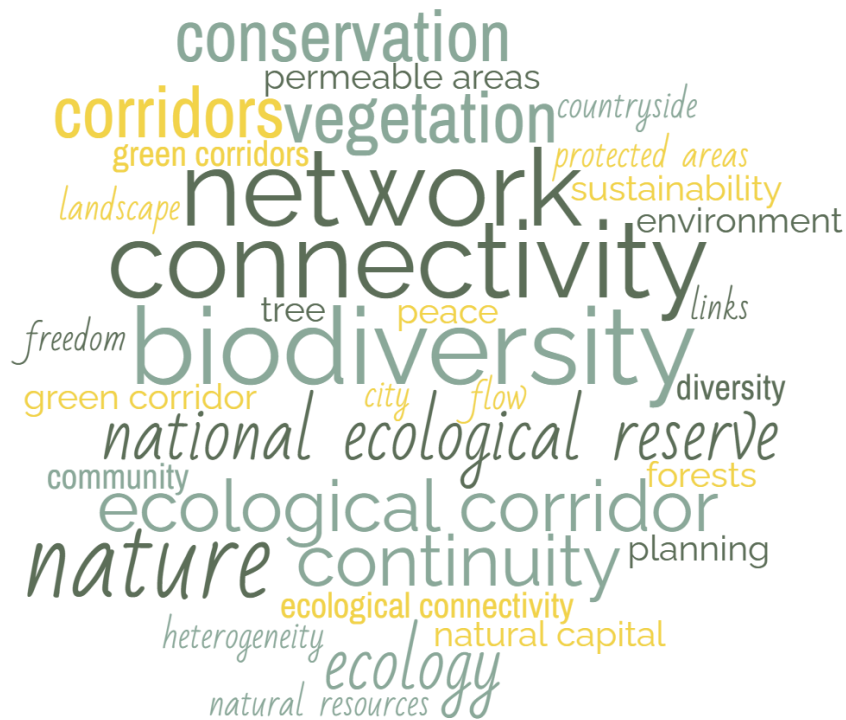


Figure 4 - Word Cloud Analysis - Green Infrastructure Associations (Question 2).



Figure 5 - Word Cloud Analysis - Benefits Beyond Nature Conservation (Question 3).

3.2 First working session: Landscape Planning - Green Infrastructure and Restoration

During the morning panel, the focus was on "Landscape Planning: Green Infrastructure and Restoration," featuring distinguished speakers (Figure 6) who explored key aspects of this overarching theme:

- Rui Rufino, Sandra Mesquita, Mãe d'Água: **The Biogeographic Process;**
- Gonzalo González Jurado, European Commission: **The Biodiversity Strategy 2030: policy and strategy for biodiversity conservation;**
- Diana Almeida, João Nunes, ICNF: **Nature Restoration Law – Portuguese experience and difficulties;**
- Fátima Bacharel, DGT: **Green Infrastructure and Land use planning Policies. The Landscape transformation Plan an the Land use planning status report;**
- Manuela Magalhães, LEAF/ISA Researcher: **Ecological Network and Green Infrastructure;**
- Dalila Espírito Santo LEAF/ISA Researcher: **Portuguese Natura 2000 mapping – past, present and future;**
- Natália Cunha, LEAF/ISA Researcher: **Green Infrastructure, Ecosystem Services and Land Use Planning NEXUS. An application in the Portuguese rural landscape.**

Following the conclusion of presentations, the first group working session took place. Groups composition was randomly assigned, fostering diverse perspectives and expertise within each team. Three tables were dedicated to exploring the case study of mainland Portugal, while the remaining three worked into the complexities of the southern region of the Lisbon Metropolitan Area (Figure 7).

Each group, guided by the following two questions, launched on a collaborative inquiry:

1. Apart from the Natura Network 2000 sites, do you identify other elements/components of the landscape/ecosystems of high conservation value? Which ones? Why?
2. Whereas green infrastructure is a "strategically planned network of natural and semi-natural areas, with other environmental characteristics, designed and managed to provide a wide range of ecosystem services" (GI Strategy definition). Based on the above results (question 1), how would you strategically design this network?



Figure 6 - Speakers from first working session.

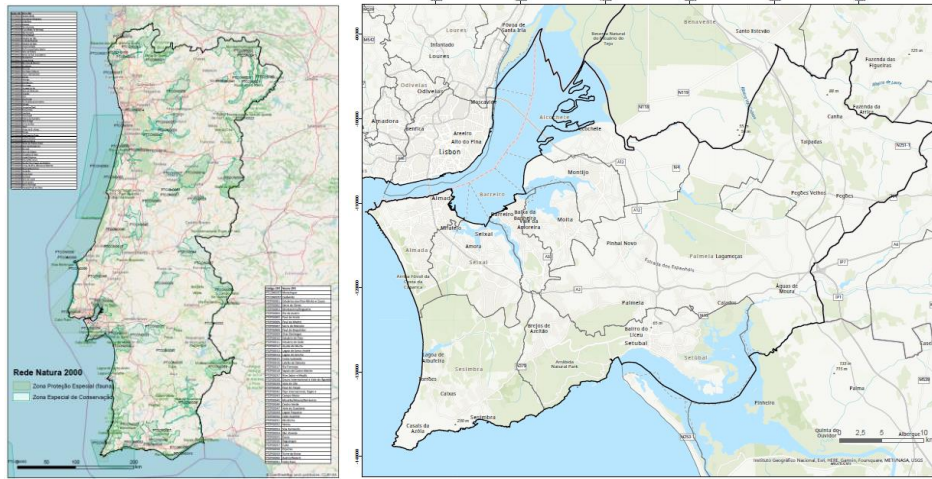


Figure 7 - Case Studies: Mainland Portugal (on the left) and South Lisbon Metropolitan Area (on the right).

Concerning the insights of the questions and collaborative mapping, the responses to the first question were answered in a table (Figure 8, left), while the second answer was drawn on tracing paper, layered over various printed maps, each tailored to the needs of the discussion topic table (Figure 8, right). Post-discussion, each table had the opportunity to articulate and share their findings with the larger group.



Figure 8 - Morning workshop session group.

National scale working groups analysis and key insights - Through collaborative exploration and discussion, several landscape components/ecosystems at the national scale were identified, besides the Natura Network 2000 sites.

The above list (Table 1) reflects the considerations and priorities in identifying ecosystems of high conservation value, emphasizing the relationship between ecological processes and their functions and the need for holistic conservation strategies.

1. **Rivers and Estuaries:** Recognized for their fundamental role in supporting diverse ecosystems and serving as critical habitats for numerous species. The maintenance of riparian vegetation is referred to as ecological significance, contributing to biodiversity and maintaining water quality.

2. **Coastal Areas:** Noted for their unique ecosystems among their importance in preserving biodiversity in transition zones contributing to landscape stability and prevention of soil erosion.
3. **Retention Basins:** Recognized for their role in water management and flood control, emphasized for their significance in maintaining groundwater levels and aquifer recharge.
4. **Traditional agricultural systems** of high ecological value: their role in preserving traditional farming practices and associated biodiversity, in risk of abandonment or disappearance: Highlighted as areas facing potential threats, underscoring the importance of conservation efforts.
5. **Soils of High Ecological Value:** Recognized for their role in supporting diverse ecosystems and maintaining ecological balance, namely:
 - a. Biodiversity: consistently emphasized across various elements, underscoring its fundamental role in high conservation value.
 - b. Ecological Value: Stressed as a key criterion in identifying areas of high conservation value, indicating their ecological significance.
 - c. Carbon Retention: Acknowledged for their role in sequestering carbon and contributing to climate change mitigation.
6. **Urban Green Spaces** (Gardens, Parks, Including Informal Spaces) are recognized for their role in promoting biodiversity within urban environments.
 - a. Corridors: Emphasized for their function in connecting fragmented habitats, facilitating species movement.
 - b. Temperature Regulation: Acknowledged for their role in moderating temperature extremes and maintaining ecological balance.
 - c. Water Infiltration: Recognized for their contribution to groundwater recharge and sustainable water systems.
7. **Native Forest Areas** (Sustainably Managed): Highlighted for their importance in maintaining native biodiversity while supporting sustainable management practices.
8. **Compartmentalization hedges in agricultural areas:** Acknowledged for their role in promoting biodiversity within agricultural landscapes.
9. **Headwater system areas:** recognized for their role in regulating water flow and supporting aquatic ecosystems.

Table 1 - Compilation of the results of the three working groups dedicated to mainland Portugal.

	Other elements/components of the landscape/ecosystems of high conservation value towards GI	Why?
Working group 1	Rivers and estuaries	Riparian vegetation and streams
	Coastal area	Specific biodiversity Transition zones Erosion control
	Retention basins	Aquifer recharge
	Traditional agricultural systems of high ecological value	Risk of abandonment or disappearance
	Soils of high ecological value	Biodiversity Ecological value Carbon retention

	Other elements/components of the landscape/ecosystems of high conservation value towards GI	Why?
	Urban green spaces (gardens, parks, including informal spaces)	Corridors Temperature regulation Water infiltration
	Native forest areas (sustainably managed)	Biodiversity
	Compartmentalisation hedges in agricultural areas	Biodiversity
	Headwater system areas	Water regulation
Working group 2	Streams and valley bottoms	Integration of European policies Hierarchical approach to natural landscape Lines of natural continuity
	Soils of high conservation value	Conservation vs. ecosystem services Conflicts between production and conservation
	Natura Network (+ Protected Areas)	Management issues
	Vegetation with “conservation interest”	Classification
Working group 3	Natura 2000 areas vs land use without conservation interest (namely, pine forest)	Hillslope areas with dense shrubs
	Detailed areas to be included in Natura 2000	Salgados Beach - Dunes, lagoons, birds Juromenha and Caia rivers Alvorninha Forest Sarzedas Mountain

South Lisbon Metropolitan Area Analysis - Working Groups and Key Insights

Table 2 shows the result of the three working groups undertaking a detailed analysis of the questions concerning the southern region of the Lisbon Metropolitan Area. A summary of the key findings is outlined below:

1. **Water System Functionality:** All groups identified landscape elements intricately connected to the functioning of the water system.
2. **Connectivity Structure:** the imperative need to establish a connectivity structure resonated across all groups. This could be achieved through existing spatial planning instruments such as RAN or REN, or by leveraging biophysical systems like ridges and streams.
3. **Urban Green Spaces and Native Vegetation:** Two groups underscored the role of urban green spaces in delivering multiple ecosystem services. Additionally, the importance of safeguarding existing native vegetation emerged as a consistent theme.
4. **Social Component as a Transformative Agent:** highlighting its significance as a fundamental landscape component.

The synthesis of insights underscores the multifaceted approach adopted by the working groups, emphasizing the interconnectedness of water systems, the imperative need for connectivity

structures, the role of urban green spaces and native vegetation, and the transformative potential of the social component within the landscape of the South Lisbon Metropolitan Area.

Table 2 - Compilation of the results of the three working groups dedicated to the South Lisbon metropolitan Area.

	Other elements/components of the landscape/ecosystems of high conservation value	Why?
Working group 4	Steep slope areas	Erosion risks
	Valley bottoms and stream (wet system) and coastal systems	Sensitive systems
	Vegetation species - definition of "minimum" areas without human intervention	Ecosystem regeneration
	Areas of continuity - National Agriculture Reserve (RAN), National Ecological Reserve (REN)	Giving coherence to the structure
	Social component	Agents of transformation
Working group 5	Streams, wetlands, water levels, maximum infiltration areas	Hydrological system, basis of ecosystem functioning, promotes connectivity of all systems (matter and energy)
	Ridges, headwater areas, steep slopes > 25%	Dry system, in addition to the wet system, compartmentalises the landscape by structuring it, protecting sensitive areas
	High ecological value soils	Protection of soils with greater agricultural value for biomass production - <i>non aedificandi</i>
	Native vegetation of conservation interest (cork oak forests and <i>montado</i>)	protecting biodiversity and increasing ecosystem services
Working group 6	Streams	Connectivity Riparian galleries Water/atmospheric flows
	Soils	Biodiversity Water and nutrient regulation CO2 sink
	Urban green spaces	Regulation of the urban heat island Permeabilization/runoff
	Maximum infiltration areas	Water cycle regulation
	Non-artificialized areas	Connectivity between areas of ecological value urban/rural interface
	Vegetation of conservation interest	Provides many ecosystems services adapted to and enclosing natural values

Figures 9 and 10 visually encapsulates the sketches representing identified elements (Table 1 and 2) incorporated into a strategic green infrastructure plan. It is worthy that two group did not contribute with drawings to this exercise.

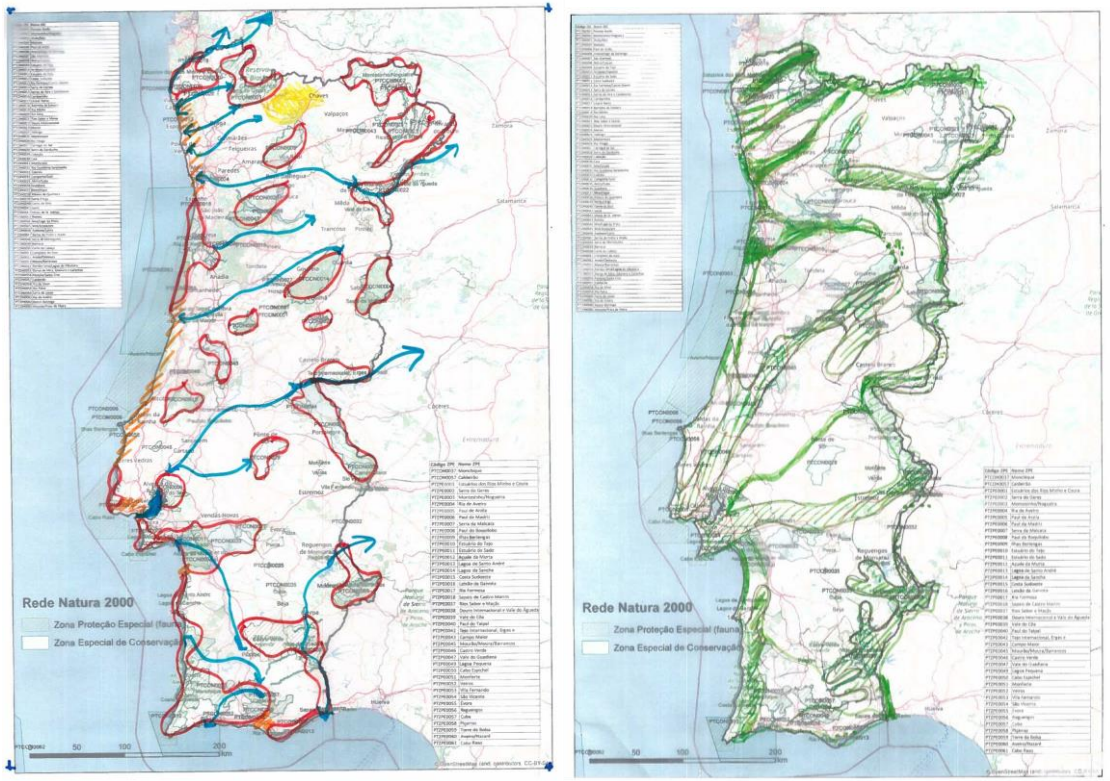


Figure 9 - Strategic Green Infrastructure Sketches: working group 1 on the left and working group 3 on the right.

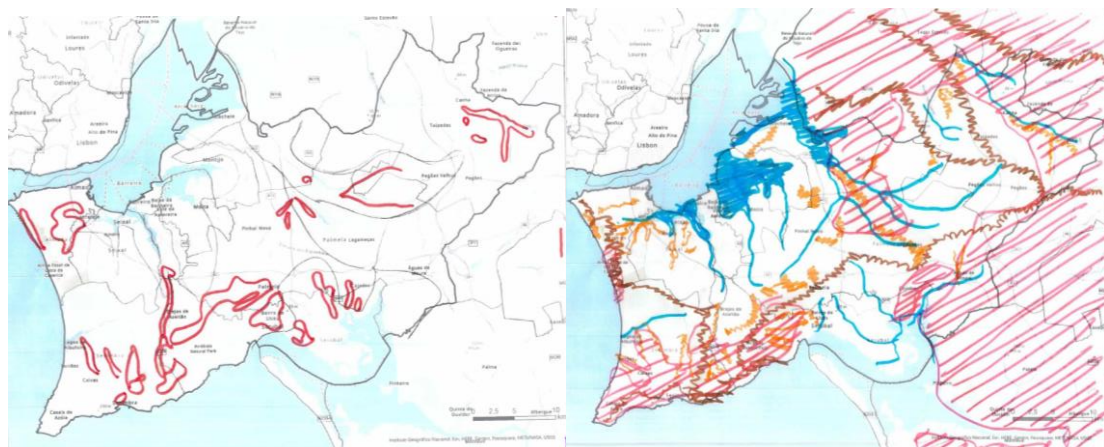


Figure 10 - Strategic Green Infrastructure Sketches - working group 4 on the left and working group 5 on the right.

3.3 Second working session: Landscape Practice - Restoration in Green Infrastructure

The afternoon session featured distinguished speakers (Figure 11) who shared insights on the topic of "Landscape Practice: Restoration in Green Infrastructure":

- Selma Pena, LEAF/ISA Researcher: **Rural Landscape Transformation – planning for fire resilience, natural resources preservation and restoration**
- Christian Kupfer, University of Nürtingen, Germany: **Farming-integrated measures to increase biodiversity. Experience inside and outside Natura 2000 areas (online)**
- Manuela Abreu, LEAF/ISA Researcher: **Rehabilitation of mining areas through integrated biotechnological approach**
- Duarte Mata, Head of Department of Environmental Intervention, Climate and Sustainability (DIACS) Almada Municipality: **Restoring Landscapes under climate adaptation targets in Almada Municipality: 3 case-studies**
- Silvia Ribeiro, LEAF/ISA e Universidade de Évora: **Restore rivers and riverbanks - alluvial forests (LIFE Alnus Taejo)**
- João Freitas, MONTIS, Nature Conservation Association: **Landscape restoration in practice – Nature Conservation Association**



Figure 11 - Speakers from second working session.

Following the afternoon panel, participants reconvened around different tables for a second round of questions. Each table was supplied with several cards featuring pictures of degraded landscapes to instigate discussions (Figure 12). The primary objectives were to collaboratively identify:

- **Types of Landscape Degradation:** Participants engaged in discussions to categorize and understand various types of landscape degradation
- **The main actions to be promoted in the Green Infrastructure in order to recover degraded ecosystems:** The focus shifted to delineating the primary actions that should be endorsed within the framework of Green Infrastructure to rehabilitate degraded ecosystems.
- **Who is responsible for the recovery action?** Deliberations centred on assigning responsibility to specific stakeholders for the implementation of recovery actions.
- **How to finance that recovery action?** Participants explored and proposed viable strategies for financing the identified recovery actions.

Afterward, each group table shared the outcomes of their discussions. Before concluding the session, participants were asked to prioritize the identified actions by placing three stickers on the actions considered essential. This prioritization actions exercise highlighted the most important perceived ones to be included in a Nature Restoration Plan.



Figure 12 - Afternoon workshop group.

In the workshop, participants identified several types of landscape degradation from rural and urban environments. Table 3 presents a comprehensive overview of the collected data. Predominantly municipalities and landowners emerged as the primary entities responsible for executing restoration initiatives. Also, the regional and central administrations were mentioned, through the Portuguese Environment Agency, and other associated organizations. Regarding the financing restoration actions, the Common Agricultural Policy and the Environmental Fund were the most frequently mentioned sources. Participants also identified municipal property tax, contributions from tour operators, tourist tax, municipal funds, and European funds as potential financial support for restoration efforts.

Table 3 - Results of second working session.

	Types of landscape degradation	Main actions to be promoted in the Green Infrastructure in order to recover degraded ecosystems	Responsible for the recovery action	How to finance that recovery action
Working group 1	Rural Fires	Landscape compartmentalization (edges, etc) Diversifying land uses and vegetation	Regional administration Municipalities Land owners	Part of the Municipal Property Tax Environment fund
	Coastal Erosion	Dune restoration Removal of structures at risk Removal of obsolete river barriers	Portuguese Environmental Agency (APA) Municipalities Land Owners	Tour operators / Tourist tax
	Fluvial degradation	Protection and restoration of riparian galleries and valley bottoms/floodplains	Portuguese Environmental Agency (APA) Municipalities Land Owners	Environment fund Strategic Plan for the Common Agricultural Policy (PEPAC)
Working group 2	Rural Fires	Create a landscape mosaic Use less flammable species Control invasive species	Land Owners Municipalities	Common Agricultural Policy (PAC)
	Drought	Planting vegetation in the headwater areas and restoring riparian galleries	-	-
	Erosion	Dune restoration Plant vegetation on slopes	Municipality	Municipal Funding European funding
	Urbanisation in a coastal system	Protective structures Relocation of the building Limiting urbanisation	Municipality	-
	Urbanization in valley bottoms	Relocation (limit urbanisation) Restoration of water lines Resettlement	Municipality	-
	Environmental pollution	Phytoremediation Limitation of utilisation	-	-
	Invasive species and habitat destruction	Control of invasive species Habitat restoration with native species	-	-

	Types of landscape degradation	Main actions to be promoted in the Green Infrastructure in order to recover degraded ecosystems	Responsible for the recovery action	How to finance that recovery action
	Simplifying the landscape through monoculture	Creating a landscape mosaic Recovering linear habitats	Landowners Municipalities	Common Agriculture Policy (PAC)
	Overgrazing	Sizing the animal load Changing the animal species	Landowners Municipalities	Common Agriculture Policy (PAC)
Working group 3	Occupation of river banks	Increasing space Passive restoration (waiting) Active restoration Monitoring	Associations of landowners or irrigators	Common Agriculture Policy (PAC)
	Monoculture	Introduction of compartmentalisation hedges Regulating the extension of monoculture	Central administration Landowners European Union	?
	Urban sprawl and dispersed building	Urban containment Urban regeneration Access to housing - improving mobility	Administration	Financial support for urban regeneration
	Invasive species	-	-	-
Working group 4	Burnt areas	Management and monitoring of natural regeneration Control of invasive species	Landowners	Transformation Program (PRGP); Environmental Fund
	Mines/quarries	Bioremediation/phytostabilization Landscape restoration	Operating entities	Operating entities
	Invasive species	plantations with other species	Landowners who are responsible for implementing plans or programmes	Environmental Fund
	Degraded riparian zones	Restoration of water lines Recovery of riparian vegetation	-	-
	Overgrazing/monocultures	Define intensity/rotation	Landowners	Common Agriculture Policy (PAC); Environmental Fund

	Types of landscape degradation	Main actions to be promoted in the Green Infrastructure in order to recover degraded ecosystems	Responsible for the recovery action	How to finance that recovery action
	Coastal erosion	Nature based solutions Relocation of areas of greater pressure/risk	central or local government	Environmental fund; Execution of coastal programmes
	Urban pressure	Municipal master plans, execution units, detailed plans	Municipalities State-owned entities	-
	Drought	Correct management of water resources Crop adaptation Restoring landscape infrastructure	-	-
Working group 5	Contamination from mining activities	integrated biotechnology phytostabilisation and waste applications soil recovery	recovery plan	-

After sharing the results, all working papers were gathered in a table and, before leaving, the participants were invited to vote in the actions they believe to be a priority and which should be included in a National Restoration Plan. The outcomes, as detailed in Table 4, revealed the selection of 16 restoration actions. The most voted actions were:

1. **Landscape Mosaic Restoration in Monoculture Areas:** Encompassing the creation of hedges and the introduction of native species, this action seeks to restore diversity in areas dominated by monoculture.
2. **Restoration of streams and valley bottoms:** Recognizing the importance of water systems, this action emphasizes the restoration of streams and valley bottoms to enhance ecological balance and functionality, improve biodiversity and connect Natura 2000 areas.

Table 4 - Selected Restoration Actions and priority ranking.

Selected restoration actions	Votes
Landscape Mosaic restoration in monoculture areas (including the construction of hedges and the introduction of native species)	12
Restoration of water lines and valley bottoms	11
Relocating areas at risk on the coastline	4
Controlling invasive species	3
Restoring landscape structure	2
Use master plans to achieve restoration actions	2

Correct management of water resources to control drought (including vegetation along water lines and headwater systems)	2
Dune restoration	2
Recover slopes with vegetation	2
Phytoremediation/phytostabilisation in contaminated areas	2
Restoring habitats with native species	2
Regulating the extent of monoculture	1
Urban containment	1
Urban regeneration	1
Improving mobility in urban areas	1
Relocating built-up areas in valley bottoms	1

4. Second Part: Field Trip and on-site Discussion

The second part of the networking event, themed "Restoring Degraded Landscapes through Green Infrastructure," happened on June 20th. This session comprised a field trip to selected sites in the Southern Lisbon Metropolitan Area (refer to Figure 13) with a focus on ecological restoration solutions.

1. **Siderurgia Nacional (National Steel Industry):** Guided by Prof. Manuela Abreu, this visit centred on the intricacies of soil contamination and recovery strategies for degraded areas.
2. **Machado National Forest:** Joana Gonçalves from the Machada Forest Environmental Centre led discussions on innovative methods for reclaiming areas invaded by *Acacia* sp., providing valuable insights into restoration techniques.
3. **Medos National Forest:** Eng. Ana Fernandes from the Costa da Caparica Fossil Cliff Protected Landscape, with Prof. from ISA Pedro Arsénio, clarify the historical context and management practices in the Medos National Forest.
4. **Capuchos Viewpoint:** Landscape Architect Duarte Mata guided discussions on the challenges related to restoring agricultural areas, using Terras da Costa as a case study.
5. **REDUNA Project at S. João Beach:** The field trip concluded with a visit to the REDUNA project on S. João Beach, showcasing visible and positive outcomes in dune systems restoration.

This comprehensive field trip provided participants with first-hand experiences and in-depth insights into diverse ecological restoration practices across distinct landscapes.

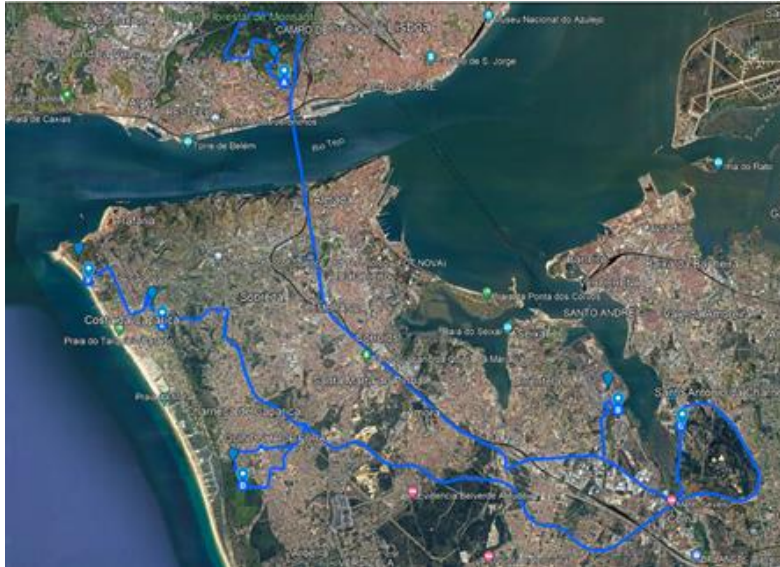


Figure 13 - Field trip map.

This visit brought together researchers, local and central government, creating unique moments for sharing experiences. The programme of the visit was as follows:

09h15 – Departure from the ISA (A)

10h00 – Proximity to the National Steel Industry (Contamination and recovery of degraded soils), *guided tour by Prof. Manuela Abreu, ISA/ULisboa (B)*

11h15 – Machada National Forest (Forest management and innovative projects to combat acacias), *guided tour by Joana Gonçalves (C), Biologist at the Machada Forest Environmental Centre.*

12h45 – Medos National Forest (management and interventions in the forest, Costa da Caparica Fossil Cliff Protected Landscape), *guided tour by ICNF technician Costa da Caparica Fossil Cliff Protected Landscape (D)*

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14h45 – Capuchos Viewpoint (Recovery of agricultural areas, Terras da Costa, and coastal system), *guided tour by Landscape Architect Duarte Mata (Director of Municipal Department - Environmental Intervention, Climate and Sustainability Department) (E)*

15h45 – S. João beach (Visit to the REDUNA project, recovery of the dune system), *guided tour by landscape architect Duarte Mata (Director of the Municipal Department - Environmental Intervention, Climate and Sustainability Department) (F)*

Regrettably, it was not permitted to take photos at the first stop due to the request of the National Steel Industry. The following photos were captured during the following field stops for documentation purposes.



Figure 14 - Machada National Forest



Figure 15 - Medos National Forest



Figure 16 - Capuchos Viewpoint



Figure 17 - S. João beach

5. References

Cunha, N.S. & Magalhães, M. R. (2019). Methodology for mapping the national ecological network to mainland Portugal: A planning tool towards a green infrastructure. *Ecological Indicators* 104C: 802-818. <https://doi.org/10.1016/j.ecolind.2019.04.050>.

Magalhães, M. R. (2013b) *Estrutura Ecológica Nacional – uma proposta de delimitação e regulamentação*, ISApres, Instituto Superior de Agronomia, Universidade de Lisboa, ISBN: 978-972-8669-53-9

Magalhães, M. R. (2016). *Ordem Ecológica e Desenvolvimento. O futuro do território português*. Lisboa, ISApres. ISBN 978-972-8669-53-9.

Magalhães, M.R.; Cunha, N.S.; Pena, S.B.; Müller, A., 2021. FIRELAN—An Ecologically Based Planning Model towards a Fire Resilient and Sustainable Landscape. A Case Study in Center Region of Portugal. *Sustainability* 2021, 13, 7055. <https://doi.org/10.3390/su13137055>

Pena, S.B., Franco, M.L., Magalhães, M.R., 2021. Contributing to Healthy Landscapes by Sustainable Land Use Planning [Online First], IntechOpen, DOI: 10.5772/intechopen.99666. Available from: <https://www.intechopen.com/online-first/78391>

Magalhães, M.R., Pena, S.B., Müller, A., Cunha, N.S., Silva, J.S., Cardoso, A.S., Barata, L.T., Franco, L. 2018. EPIC WebGIS - A partilha de conhecimento como ferramenta de integração da paisagem nas políticas de ordenamento do território. *Revista Cartográfica* Nº 96. Instituto Panamericano de Geografia e História. Disponível em https://www.ipgh.org/assets/rca_96_digital.pdf