

Creating the European Nature Academy for applied Blended LEarning

# A2 | GAP ANALYSIS





Akademie für Naturschutz



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Creating the European Nature Academy for applied Blended LEarning

# A2 | GAP ANALYSIS

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## A2 Report "Gap analysis" in a nutshell

LIFE ENABLE - Creating the European Nature Academy for applied Blended LEarning (LIFE20PRE/DE/000009) is a preparatory project aiming to enable all Natura 2000 and protected area managers to become more effective, competent, and confident nature management professionals. The project aims to offer opportunities to Natura 2000 and other protected area managers to develop their capacities in core competencies for effective nature management to effectively address current and future challenges.

The project aims to establish an enabling framework to create a training system for professional development that contributes to ensuring progress toward realising the objectives and ambitions of the EU Biodiversity Strategy 2030 and underpinning policies. Therefore, the project will create a European training system called European Nature Academy (ENA) to develop further training projects and capacity-building programs at a Pan-European scale. The goal is to deliver widely accessible and tailor-made learning experiences for Natura 2000 managers. This will be done by developing, testing, and implementing innovative and accessible training activities that will support the delivery of EU policy by improving nature management practices in an extended Protected Area network incorporating Natura 2000 sites.

Multiple opportunities for increasing capacities and enhancing protected areas management are available in the EU. They are specially implemented by realising projects focused on nature and biodiversity. Nevertheless, insufficient advancements in Natura 2000 implementation and management, and consequently, in recovering and conserving protected species and habitats, demonstrate a capacity deficiency.

This document contains the steps produced for the gap analysis on capacity building in Natura 2000 management with a focus on activities related to forest and marine ecosystems as well as on managers of protected areas. This Gap Analysis, one important product of the LIFE ENABLE implementation actions, *aims to provide an overview of existing training experiences for Natura 2000 managers to identify gaps that need to be filled through new opportunities such as the European Nature Academy created through the LIFE ENABLE project, identifying relevant aspects to be taken in consideration when developing new training opportunities.* The analysis aims to determine the most popular and unpopular approaches, methods, and contents to understand the needs of managers and new efforts to implement effective and relevant training. In particular, this analysis focuses on forest and marine habitat management due to their strategic importance in meeting the EU Biodiversity Strategy goals.

The analysis is carried out by extracting online information and analysing online questionnaires and interviews to providers and participants of training experiences related to Natura 2000 and protected areas management. In addition, the analysis focuses on existing activities implemented in forest and marine habitats by studying the most recent LIFE projects to understand the most involved actors in their implementation and what protected habitat types are most benefitting from projects' activities. In this way, the analysis allows the identification of a set of experiences that can be considered good examples for identifying capacity-building needs in terms of contents and approaches.

Results obtained through the analysis of questionnaires highlight the importance of interactions between providers and learners during training experiences and the need to propose more practical courses to understand how to apply theory in a real context, favouring the replication of learned good practices in other contexts. Therefore, blended learning which combines online activities with in-presence exercises represents a good compromise to meet the necessities of both providers and participants. Additionally, the analysis of LIFE projects highlights the need to better involve local actors in implementing activities, supporting their proactive role in nature conservation, given their fundamental role where they live and work even after the projects' end. Finally, the analysis shows the reduced number of international experiences highlighting the need to sustain collaborations beyond national borders.

Consequently, from the Gap Analysis emerges some aspects that need to be taken into consideration for designing future courses: (i) the valorisation of blended learning which combines online activities and field and face-to-face experiences as an efficient approach to deliver competencies in nature management; (ii) the promotion of transnational collaborations through experiences that connect people from different countries; (iii) the importance of inclusiveness, involving especially local actors working and living in areas where conservation activities take place; (iv) the valorisation of a competencies-based approach aimed to empower managers.

## **1. Introduction**

# 1.1. Why a gap analysis on training for Natura 2000 managers?

In 2016, an evaluation study to support the Fitness Check of the Birds and Habitats Directives indicated that many gaps in the implementation of the two Nature Directives and the Natura 2000 network are related to deficiencies in capacities. Therefore, to achieve the conservation targets set by the Directives and the sectoral strategies, investment in building and developing capacity and in training is seen as crucial. Indeed, an analysis and overview of the existing learning available for managers of Natura 2000 sites would help characterise the state of the art in terms of training efforts and pinpointing gaps. To be beneficial, such an analysis should try to deepen our knowledge on approaches, methods, and contents. Furthermore, the identification of the most common training features and best practices can provide important information for future capacity-building actions and help to inform projects aiming to build and develop capacities to strengthen the implementation of Natura 2000.

The content of this document aims to fill this important gap by using different methods and tools to provide a first overview of the array of training experiences, the applied methods and specific content. Although much of the training experiences have generally targeted capacity development for managers of protected areas, a specific focus in this gap analysis is given to experiences related to Natura 2000 sites and to forest and marine ecosystems.

The focus on these two ecosystems is based on their role and the available knowledge about them in the EU. Forests are the major component of Natura 2000 sites and are a focus for biodiversity conservation. For example, it is expected that by 2030 at least 3 billion trees will be additionally planted respecting ecological principles. Indeed, there is still a need of identifying additional marine Natura 2000 sites to achieve biodiversity conservation targets. Although the area of marine sites has substantially increased in recent years, it is reasonable to anticipate the need for additional capacity on their management (e.g. development of management plans, implementation of management practices etc.). In general, a relatively high number of habitat types refer to forests (85), while few are marine habitat types (9).

This report includes a list of experiences that represent good examples both for identifying capacitybuilding needs and training methods as well as the content of training courses. The analysis was conducted taking into account the knowledge of the ENABLE project partners, the information available online in main training events, the LIFE project database and by carrying out a detailed online survey for both training providers and participants to training events accompanied by targeted interviews. This approach was used to discern and describe:

- → The content and training formats that have been offered;
- → Identify the degree of relevance for Natura 2000 managers and protected area practitioners;
- → Gather evidence based on current training offers that will help develop specific guidelines for public administrations.

# 2. Methodology

# 2.1. Desk-based research, partners input and analysis of the State of Nature in the EU

This approach was based on considering *previous experiences and well-known projects* related to *capacity building* as well as *providing useful content for training*, including an analysis of the stateof-the-art in the knowledge of habitat types and species.

We searched for information on training programmes and experiences of our knowledge, which were found through a specific search on the web. This enabled the identification of a number of training experiences related to Academias as well as examples of events by other public entities. This approach helps identify case studies and valuable material with specific content. Other projects and networks were considered because of their relevance for the purposes of this analysis, as stressed during project partners' meetings and based on the input of project partners. Projects were also considered based on the possible use of their outcomes for content production in training experiences.

Based on the experience of project partners, different projects were further investigated and have been reported in this Gap Analysis (for example, the "LIFE e-Natura2000.edu: Supporting e-learning and capacity building for Natura 2000 Managers"). Other cases are represented by projects that can provide important material for producing specific content related to the forest (e.g. Cost Action "BOTTOMS-UP" and "LIFE GoProFor") and marine (e.g. "MPA-Engage") ecosystems.

A further analysis identifies the main knowledge gaps regarding habitat types and species of community interest (both Annex II of the Habitats Directive and Art. 4 of the Birds Directive) for forest and marine ecosystems. An analysis of the main outcomes of the State of Nature in the EU (EC 2020)<sup>1</sup> permitted us to point out the main knowledge needs deriving from a lack of data or experiences. This analysis helped to point out also areas with a good health of practical experiences (e.g. implementation of conservation measures). This analysis allowed reporting on main pressures and most common applied conservation measures. Furthermore, the EU database was used to gather information on habitat types with unknown assessments of their conservation status and/or trends of their conditions.

## 2.2. Analysis of LIFE projects

#### 2.2.1. Network: project partners from the LIFE database search

The LIFE database search aimed to *identify LIFE projects that deal with forest and marine ecosystems* and *understand which are the management approaches and activities applied* to restore or maintain a good conservation status of the habitat types and condition of habitats of species related to forest and marine ecosystems.

Information related to LIFE projects focused on Nature and Biodiversity is available in the *LIFE Programme database* (<u>https://webgate.ec.europa.eu/life/publicWebsite/search</u>): this platform

<sup>&</sup>lt;sup>1</sup> EC (2020). The state of nature in the European Union. Report on the Status and Trends in 2013–2018 of Species and Habitat Types Protected by the Birds and Habitats Directives. Brussels, 15.10.2020 COM(2020) 635 Final (2020).

collects all LIFE projects data since 1992. Specifically, for every LIFE project, it is possible to visualise an informative spreadsheet with (i) project description (background, objectives, results), (ii) administrative data (projects code, acronym, start and end time, total budget, EU contribution, and project website), (iii) contact details of the coordinating beneficiary, (iv) environmental issues addressed (themes, keywords, target EU legislation, target habitat types, Species, Red List Species, Natura 2000 sites), (v) beneficiaries composing the partnerships (name and nationality), and (vi) other information like the link of the project website and additional documents.

Filters available in the LIFE Database enable selecting LIFE projects focused explicitly on forest and marine habitats. For this analysis, suitable LIFE projects are identified through their selection based on specific (i) *themes* and (ii) *keywords*. Specifically, the selection uses the following themes "forest or marine" and keywords "inventory, or reintroduction, or botanical conservatory, or carbon sequestration, or certification, or climate adaptation strategy, or climate change adaptation, or climate change mitigation, or climate protection, or climate resilience, or conservation of genetic resources, or damage prevention, or ecosystem-based approach, or emission reduction, or environmental management, or environmental monitoring, or environmental protection advice, or erosion control, or fire protection, or fishing industry, or forest management, or forestry, or hunting, or integrated management, or land restoration, or land use planning, or landscape protection, or landscape conservation policy, or management plan, or management planning, or marine conservation area, or mitigation measure, or monitoring, or nature conservation, or nature-based solutions, or noise monitoring, or pollutant elimination, or pollutant control, or pollution prevention, or preventive measure, or reforestation, or remediation, or renaturation, or restoration measure, or restoration, or resource conservation, or risk management, or site rehabilitation". An additional selection of LIFE projects is conducted through the selection of projects co-funded in the last programming period (2014-2020) and classified as LIFE-NAT projects (i.e., LIFE projects for Nature and Biodiversity) and through the *analysis of projects' objectives*. In this way, it is possible to identify LIFE projects that better fit this analysis' objectives.

In a specific database, information reported for every selected LIFE-NAT project is related to the **social and ecological contexts** in which activities occur; for every selected project, the information reported includes its location, year of financing, nationality of the coordinating beneficiary, website, budget, general objectives, specific objectives, expected results and policy priorities. In particular, concerning the social context, data are focused on *LIFE-NAT projects' partnerships*, identifying the coordinating beneficiary and the associated beneficiaries and adding their contacts, location, and information related to the typology of stakeholders and the jurisdictional level in which they act. Concerning the ecological context, *protected species and habitats* for every LIFE-NAT project are reported in the marine and forest categories that interventions are intended to protect or restore.

In particular, selected marine habitats are those reported for the marine regions, and selected forest habitats are selected following the "Natura 2000 and forests" document provided by the EU (https://ec.europa.eu/environment/nature/natura2000/management/docs/Final%20Guide%20N200 0%20%20Forests%20Part%20I-II-Annexes.pdf). Selected marine species are those linked with the concepts of "marine inlets, or shelf, or ocean" in the EEA Database, which links species with MAES ecosystems (https://www.eea.europa.eu/data-and-maps/data/linkages-of-species-and-habitat). Similarly, from the same database, forest species are those linked with the concepts of "woodlandForest". Some species are excluded from the selection using personal knowledge.

Therefore, through the identification of LIFE projects specifically focused on nature conservation and restoration of marine and forest habitats, it was also possible to identify what are: interventions focused on nature conservation and restoration implemented through LIFE; LIFE beneficiaries proposing and involved in the implementation of conservation activities; protected habitats and LIFE ENABLE - A2 REPORT GAP ANALYSIS 10

species preserved through LIFE projects. This will help in understanding who are the main actors in LIFE projects, therefore, identifying specific actors or stakeholders in strong need of training and identifying possible good case examples and producing possible content for training experiences.

### 2.2.2. Analysing LIFE Nature projects to identify main topics and issues for forest and marine ecosystems

To better understand what are the most relevant factors characterising EU biodiversity governance through LIFE projects, extracted data are elaborated and analysed using the Social Network Analysis (SNA) that is the study of relations among connected entities through edges that constitute the network (Borgatti et al., 2013<sup>2</sup>). This methodology is considered instrumental in analysing and clarifying relationships between social and ecological elements, disentangling intangible relationships within and between social and ecological elements (e.g., Bodin, 2017<sup>3</sup>). In particular, the Social-*Ecological Network* (SEN) framework (Bodin et al., 2019<sup>4</sup>) highlights the capacity of SNA to detect interactions between and within the social and ecological systems distinguishing social and ecological nodes and social-to-social, ecological-to-ecological, and social-ecological relationships. In this way, it is possible to identify what are the most relevant social-ecological relationships that could reflect conservation priorities in the selected LIFE-NAT projects.

Networks created for this analysis follow the SEN framework and are constituted by nodes representing (i) LIFE beneficiaries and (ii) protected habitats. LIFE beneficiaries are connected through edges representing undirected relations based on collaborative relationships between the coordinating beneficiary of every selected project, who is responsible for coordinating efforts to achieve the project's objectives and the other associated beneficiaries. Protected habitats are connected through undirected edges with other protected habitats that are involved in the same LIFE project, assuming geographical proximity.

SNA uses *network statistics* to detect tendencies in relationships composing networks clearly; in particular, this analysis uses (i) degree centrality, (ii) betweenness centrality, (iii) density, (iv) homophily (Borgatti et al., 2013).

**Degree centrality**: the degree centrality represents the number of relations that a specific node has, and it is normalised by dividing by the maximum number of possible ties. The degree centrality measure focuses on the local structure around the node by evidencing its level of influence on the surroundings, but it does not consider the entire structure of the network.

Betweenness centrality: the betweenness centrality refers to "the frequency with which a point falls between pairs of other points on the shortest or geodesic paths connecting them" (Freeman, 1978:

<sup>&</sup>lt;sup>2</sup> Borgatti Stephen P., Everett Martin G., Johnson., J. C., 2013. Analysing social networks. Sage Publications Ltd, London.

<sup>&</sup>lt;sup>3</sup> Bodin, Ö., 2017. Collaborative environmental governance: Achieving collective action in social-ecological systems. Science 357, eaan1114. http://dx.doi.org/10.1126/science.aan1114

<sup>&</sup>lt;sup>4</sup> Bodin, Ö., Alexander, S.M., Baggio, J. Barnes, J., Berardo, R., Cumming, G.S., Dee, L.E., Fischer, A.P., Fischer, M., Mancilla Garcia, M., Guerrero, A.M., 10,11, Hileman, J., Ingold, K., Matous, P., Morrison, T.H., Nohrstedt, D., Pittman, J., Robins, G., Sayles, J.S. (2019). Improving network approaches to the study of complex socialecological interdependencies. Nature Sustainability 2, 551–559. https://doi.org/10.1038/s41893-019-0308-0 LIFE ENABLE - A2 REPORT GAP ANALYSIS 11

221<sup>5</sup>). The betweenness centrality evidences the capacity to act as a gatekeeper by facilitating the stream of what passes through the web of connections.

**Density**: the density represents the level of cohesiveness of the network. The graph density represents the proportion of observed connections between nodes to the maximum number of possible connections. It also reflects the degree of interconnectivity between nodes.

*Homophily*: Homophily refers to the tendency of actors to relate with actors having similar characteristics compared to others.

Network configurations and network statistics allow understanding of who are the most important LIFE beneficiaries, what social categories play the most relevant role in biodiversity governance, and what are tendencies in making relationships, and they allow verifying its effectiveness. Equally, considering the ecological context, network configurations, and network statistics can highlight species and habitats protected by LIFE projects and their interactions, showing those with a relevant role in making and ensuring connectivity.

#### 2.1.3. Main training from LIFE's projects

Using the same method used for selecting relevant projects working in marine and forest habitats through the selection of LIFE projects in the LIFE Programme database, the analysis deepens its attention to *LIFE projects aimed explicitly at proposing training on nature conservation* and restoration. Therefore, their identification is based on three queries using different selection criteria:

- Selection of LIFE-NAT projects (i.e., LIFE project specifically focused on nature and biodiversity) having in their text the words "capacity" AND "building" that are co-funded by the LIFE Programme from 2010. In this way, it is possible to identify where projects in the description of their objectives, proposed activities, and expected results specifically mentioning words like "capacity building", "capacity-building," or "building the capacity",
- Selection of LIFE projects with the theme "Environmental training Capacity building" cofunded by the LIFE Programme from 2010, and selected after the analysis of their objectives to identify projects focused on Natura 2000 management,
- Selection of LIFE-IPE projects (i.e., LIFE integrated projects for the environment) with the words "Natura" and "2000" in their description from their establishment. This type of project is assumed as intrinsically voted to capacity building because of the specific purposes of integrated projects.

After their selection, they are analysed considering their localisation, their themes, and the composition of their partnership. In particular, through the analysis of themes and keywords, it is possible to understand what are the main objectives and activities of such projects; through the analysis of their localisation, it is possible to identify if LIFE projects are implemented in geographical areas having particular features, and through the analysis of LIFE projects partnerships, it is possible to understand if projects foster transnational collaborations. Consequently, the analysis results are presented using histograms and word clouds (https://www.freewordcloudgenerator.com/).

<sup>&</sup>lt;sup>5</sup> Freeman, L.C., 1978. Centrality in social networks conceptual clarification. Social Networks 1, 215–239.

## 2.3. Online Surveys

Other data about training experiences focused on protected areas management are retrieved through online questionnaires. Questionnaires distinguish providers and participants of courses. After several meetings with the PCU to define relevant questions, two questionnaires are designed (one for providers and the other for participants) on Survey Monkey (https://www.surveymonkey.com/). Questionnaires ask for information about (i) respondents and (ii) courses. In both cases, questionnaires mainly consist of multiple-choice questions complemented with fewer open-ended questions.

Specifically, the questionnaire for providers asks for information related to respondents about their (i) nationality, (ii) role, and (iii) knowledge of the e-natura200 app. Additionally, after the identification of a maximum of five courses, for each course, respondents are requested to provide information about (i) references to Natura 2000, (ii) objectives, (iii) focused ecosystems, (iv) competencies addressed, (v) projects in which it is part, (vi) target audience, (vii) frequency, (viii) delivering ways, (ix) tools/approaches used, (x) delivering language, (xi) training costs, (xii) training assessment and certification and (xii) required improvements.

The questionnaire focused on participants asks for information related to respondents about their (i) nationality, (ii) previous studies on protected areas management, (iii) educational background and participation in other courses, and (iv) knowledge of the e-natura200 app. Additionally, after the identification of a maximum of five courses, for each course, respondents are requested to provide information about (i) references to Natura 2000, (ii) projects in which it is part, (iii) delivering language, (iv) year of participation, (v) duration of the training, (vi) delivering ways, (vii) course's objectives, (viii) competences addressed, (ix) focused ecosystems, (x) satisfaction, (xi) quality, (xii) recommendations to colleagues, (xii) positive aspects, (xiii) negative aspects.

Questionnaires are reported in Appendix 1.

Every LIFE-ENABLE partner spreads questionnaires to the contacts in their mailing lists and databases. Additionally, the two questionnaires were published on the EUROPARC website: <a href="https://www.europarc.org/news/2022/05/we-need-your-input-complete-a-survey-on-training-experiences-for-natura-2000-and-protected-area-managers/">https://www.europarc.org/news/2022/05/we-need-your-input-complete-a-survey-on-training-experiences-for-natura-2000-and-protected-area-managers/</a>.

Questionnaires were circulated in two periods: the  $18^{th}$  to  $31^{st}$  of May, and the  $15^{th}$  to  $30^{th}$  of September 2022.

Responses were elaborated and analysed after identifying double respondents to get unique results. Finally, for every question, all data from questionnaires were aggregated, and results were described using histogram charts to clearly evidence tendencies in previous courses about nature conservation related to aspects deepened by questionnaires.

### 2.4. Structured Interviews

Structured interviews with selected training providers enabled gathering deeper knowledge on past experiences of training courses about nature conservation and management and receiving additional inputs to improve future training activities.

After identifying respondents based on personal contacts of the LIFE project staff, and based on theri availability, structured interviews were conducted to go deeper into themes already investigated LIFE ENABLE - A2 REPORT GAP ANALYSIS 13

through the providers' online questionnaire. Selected respondents are considered experts in providing training experiences about nature management, as they represent public or private bodies which have as one of their main activities the provision of training courses. Questions composing the interview are reported in Appendix 5.2, *"Interview Guidelines on Natura 2000 and Protected Area Management Trainings"*. In particular, the interview added questions about (i) the importance of providing or participating in courses, (ii) the attractiveness of courses, (iii) the identification of challenges related to online/blended training activities, and (iv) the inclusion of all stakeholders.

# 3. Findings

# **3.1.** Main topics for training on forest and marine ecosystems

#### **3.1.1.** Key facts from the State of Nature in the EU<sup>6</sup>

In the following part, we have summarised the most relevant information related to forest and marine ecosystems reported in the latest State of Nature in the EU, including the analysis of the Results from reporting under the nature directives 2013-2018. Information refers to birds, plants and animals related to the Habitats Directive as well as habitat types. This part provides important information on the most recent species conditions and habitat types related to the two ecosystems.

#### **Bird species**

Among the most important pressures for bird species, a number are related to the use of forest ecosystems. Specifically, unsustainable forestry practices, which include reductions in old-growth forests, are important issues for forest-dependent breeding birds. Indeed, among bird species, those related to forests are not among the species recording the most important improvements. In fact, the share of improvements in marine and wetlands bird species is higher than those for farmland and forest bird species. Forest-related conservation measures commonly target forest dependent birds such as the Hazel Grouse (*Tetrastes bonasia*) or the Black Stork (*Ciconia nigra*).

Marine and wetland birds were the groups showing the majority of improving trends. Among the relevant pressures, bycatch and marine harvesting are important for island breeding birds and sea ducks, impacting their breeding success.

#### Plant and animal species

Forest management is an important pressure on animal and plant species, and in particular, they affect arthropods, mammals and non-vascular plants. Nevertheless, forest-related conservation measures commonly target mammals, insects and vascular plants.

In general, little is known about marine animal and plant species as, in many cases their conservation status was assessed as unknown (Fig. 1). Therefore, underlining an important data gap on marine species. This is particularly valid for marine mammals (cetaceans). Marine harvesting strongly affects fish, which, together with bycatch, represent an important issue for mammals. However, the most frequent measures for marine habitats aim at reducing the effect of outdoor sports, leisure and recreational activities.

<sup>&</sup>lt;sup>6</sup> European Environment Agency (2020). State of Nature in the EU Results from Reporting under the Nature Directives 2013–2018.EEA Report No. 10/2020. https://www.eea.europa.eu/publications/state-ofnature-in-the-eu-2020



Figure 1: Summary of the conservation status assessments for marine species (taken from European Environmental Agency, 2020<sup>7</sup>). Data derive from article 17 Member States' reports and EU assessments. The total number of assessments considered is 2825 (in parentheses the number for a single marine region). This figure is taken from the State of Nature in the EU.

#### Habitat types

Forest habitat types have a relatively high number of improving trends. However, overall their conservation status did not show consistent improvement. As expected, forestry activities are impacting these habitat types as well as species (Fig. 2). Interestingly, although invasive non-native species are not an important issue for forest habitat types, they are for broadleaved evergreen forests. In general, forests, in terms of area, are the most in need of restoration to improve their conservation status (20% of the area covered by forest habitat types).

Indeed, restoration actions frequently target forest habitats. Most common forest-related conservation measures aim to adapt and change forest management and exploitation practices that can be related to climate change adaptation. These measures include: adapting and changing management practices to secure or develop old stocks of trees, retaining dead and dying trees and stumps, preserving habitat continuity or preventing forest wildfires. Another important practice is that of applying 'close to-nature-management'. Interestingly, forest management plans can represent an important tool for implementing conservation efforts.

In the EU, there are nine marine habitat types that cover 0.4 million km<sup>2</sup> of EU waters. These habitat types are generally in bad conditions, with good conservation status reported only for the Marine Black Sea region. Furthermore, the conservation status of several marine habitat types remains unknown. Sports and leisure activities are an important pressure for marine habitat types, especially in the Mediterranean and Macaronesian regions.

<sup>&</sup>lt;sup>7</sup> European Environment Agency (2020). State of Nature in the EU Results from Reporting under the Nature Directives 2013–2018.EEA Report No. 10/2020. https://www.eea.europa.eu/publications/state-ofnature-in-the-eu-2020



Figure 2: A focus on the most important forest-related management activities as pressures for birds, plants and animals, and habitat types (taken from European Environmental Agency, 2020<sup>8</sup>). Data derive from article 12 and 17 Member States' reports and EU assessments. Darker colours and larger squares indicate higher percentages of pressure for birds, plants and animals, and habitat types.

#### The TOP 3 marine habitat types requiring further capacities

Marine habitat types have been analysed and selected based on the percentage of the area reported to have an unknown conservation status and unknown conservation trend based on the overall EU assessments (period 2013-2018).

#### 1170 Reefs

Reefs can be either biogenic concretions or of geogenic origin. They are hard compact substrata on solid and soft bottoms that arise from the sea floor in the sublittoral and littoral zones. Reefs may support a zonation of benthic communities of algae and animal species and concretions and corallogenic concretions.

#### 1160 Large shallow inlets and bays

Large indentations of the coast where, in contrast to estuaries, the influence of freshwater is

<sup>&</sup>lt;sup>8</sup> European Environment Agency. State of Nature in the EU Results from Reporting under the Nature Directives 2013–2018.EEA Report No. 10/2020. https://www.eea.europa.eu/publications/state-ofnature-in-the-eu-2020 (2020).

generally limited. These shallow indentations are generally sheltered from wave action and contain a great diversity of sediments and substrates with a well-developed zonation of benthic communities. These communities generally have high biodiversity. The limit of shallow water is sometimes defined by the distribution of the Zosteretea and Potametea associations. Several physiographic types may be included under this category providing the water is shallow over a major part of the area: embayments, fjords, rias and voes.

#### 1130 Estuaries

Downstream part of a river valley, subject to the tide and extending from the limit of brackish waters. River estuaries are coastal inlets where unlike 'large shallow inlets and bays', there is generally a substantial freshwater influence. The mixing of freshwater and seawater and the reduced current flows in the shelter of the estuary lead to the deposition of fine sediments, often forming extensive intertidal sand and mud flats. Where the tidal currents are faster than flood tides, most sediments deposit to form a delta at the mouth of the estuary. Baltic river mouths, considered as an estuary subtype, have brackish water and no tide, with large wetland vegetation (halophytic) and luxurious aquatic vegetation in shallow water areas.

#### The TOP 5 forest habitat types requiring further capacities

Forest habitat types have been analysed and selected based on the percentage values of the range reported to have an unknown conservation status and/or conservation trend based on the overall EU assessments (period 2013-2018).

#### 6310 Dehesas with evergreen Quercus spp

A characteristic landscape of the Iberian peninsula in which crops, pasture land or MesoMediterranean arborescent matorral, in juxtaposition or rotation, are shaded by a fairly closed to the very open canopy of native evergreen oaks (*Quercus suber, Q.ilex, Q.rotundifolia, Q.coccifera*). It is an important habitat for raptors, including the threatened Iberian endemic eagle (*Aquila adalberti*), the crane (*Grus grus*), the large insects and their predators and the endangered felid (\**Lynx pardinus*).

#### 9030\* Natural forests of primary succession stages of land upheaval coast

This type includes different types of deciduous, coniferous and mixed natural thickets and forests developed on land upheaval coasts of the Baltic Sea. Characteristics for these habitats are stages of primary succession from shore grassland vegetation to climax forests or various wetland types. Also, soil horizons are poorly developed, although podsol soils are otherwise typical for boreal forests. The youngest pioneer forests near the sea are often low or tall herb deciduous forests, thickets or swamps. Vegetation succession can also proceed from willow swamps through forest swamps to mires. Alder and birch dominate the tree layer, and willows are often common in the shrub layer. Grasses are abundant. Further inland, the influence of the sea is weakened, the soils are often poor in nutrients, and coniferous forests are typical. Pine, and often also spruce, dominates the tree layer, and dwarf shrubs dominate the field layer. In the ground layer, mosses

#### are common, but in many areas, lichens are abundant.

#### 9080\* Fennoscandian deciduous swamp woods

Deciduous swamps are under the permanent influence of surface water and are usually flooded annually. They are moist or wet, wooded wetlands with some peat formation, but the peat layer is usually very thin. Ash (*Fraxinus excelsior*) in the hemiboreal zone and black alder (*Alnus glutinosa*) reaching the middle boreal zone are typical tree species. Grey alder (*Alnus incana*), silver birch (*Betula pubescens*) and willows (*Salix* spp.) are also common. A mosaic of patches with different water levels and vegetation is typical for the type. Around the tree stems are small hummocks, but wet, flooded surfaces dominate. Deciduous swamp woods are most common in Finland in the southwestern archipelago and other coastal areas. On the mainland, they are rare. In Sweden, they are common throughout the whole region.

#### 9320 Olea and Ceratonia forests

Thermo-Mediterranean or thermo-Canarian woodland dominated by arborescent *Olea europaea* ssp. *sylvestris, Ceratonia siliqua, Pistacia lentiscus, Myrtus communis* or, in the Canary Islands, by *Olea europaea* ssp. *cerasiformis* and *Pistacia atlantica*. Most formations will be listed as arborescent matorral, but a few stands may have a sufficiently tall, closed canopy to qualify for this unit.

#### 92A0 Salix alba and Populus alba galleries

Riparian forests of the Mediterranean and Black Sea basins dominated by *Salix alba*, *Salix fragilis* or their relatives. Mediterranean and Central Eurasian multi-layered riverine forests with *Populus* spp., *Ulmus* spp., *Salix* spp., *Alnus* spp., *Acer* spp., *Tamarix* spp., *Juglans regia*, *Quercus robur*, *Quercus pedunculiflora*, *Fraxinus angustifolia*, *Fraxinus pallisiae*, lianas. Tall poplars, *Populus alba*, *Populus caspica*, *Populus euphratica* (*Populus diversifolia*), are usually dominant in height; they may be absent or sparse in some associations, which are then dominated by species of the abovementioned genera.

#### 3.1.2 Content-relevant projects for forest and marine managers

#### The TOP LIFE projects for biodiversity conservation in Natura 2000 sites

The identification of the TOP LIFE projects from the selection of projects analysed in this study highlights what LIFE projects are considered "Best projects" because they are candidates or winners of the LIFE Award. The LIFE Award recognises the most innovative, inspirational, and effective LIFE projects in three categories: nature protection, environment, and climate action. The winners are selected by an expert jury and announced on the day of the ceremony, which takes place during the EU Green Week (https://cinea.ec.europa.eu/programmes/life/best-projects-and-life-awards\_en).

In this case, the identified LIFE projects are projects pertaining to the category "nature protection". In addition, it is necessary to specify that the LIFE Award considers only concluded LIFE projects, so

only concluded LIFE projects included in this analysis can be considered because it is possible to assess their effectiveness and impact on the territory where they act.

The three best LIFE projects identified in this selection are all LIFE-NAT projects which are focused on forest habitats and aim to develop capacity building in nature management of institutions, managers, and stakeholders.

# LIFE12 NAT/BE/000596 - LIFE+SCALLUVIA. Habitat Restoration of alluvial forests and creeks within the flood controlled Scheldt estuary site Kruibeke-Bazel-Rupelmonde (from September 2013 to August 2018).

The main objective of the LIFE+SCALLUVIA project was to develop a sub-area of Kruibeke-Bazel-Rupelmonde (89.97 ha) as a high-quality site in a good state of conservation that functions as a flood-defence and recreational area. The project aimed to restore a total of 79.64 ha of alluvial forests and 10.23 ha of small lakes through diverse measures. Such restoration will have a beneficial impact on species of European importance, including European bitterling (Rhodeus amarus), spined loach (Cobitis taenia), bluethroat (Luscinia svecica), common kingfisher (Alcedo atthis), little bittern (Ixobrychus minutus) and purple heron (Ardea purpurea). The project also planned to introduce a specially-tailored forest management plan for Kruibeke-Bazel-Rupelmonde, to regulate recreation through an accessibility plan, and increase public support for these actions and involve local volunteers in participatory actions (https://webgate.ec.europa.eu/life/publicWebsite/index.cfm?fuseaction=search.dspPage&n proj id=4611).

# LIFE15 NAT/CY/000850 - LIFE-KEDROS. Integrated conservation management of priority habitat type 9590\* in the Natura 2000 site Koilada Kedron-Kampos (from September 2016 to January 2021).

The objective of the project is to ensure the medium and long-term preservation of the priority habitat type 9590\* Cedrus brevifolia forests in good conservation status at the only Natura 2000 site (CY2000008) where the habitat is found. The project's objective will be achieved by adopting specific conservation actions, both within (in situ) and outside (ex situ) its natural range. The project aims to contribute in: (i) the reduction of fire danger and the possibility of habitat loss or even its complete destruction as a result of a single large forest fire incident, (ii) the enhancement of the habitat's resilience and adaptation capacity to climate change and the competition by other forest trees and shrubs, (iii) the restoration and expansion of the habitat within the project site and the enhancement of the natural regeneration capacity of Cedar stands, (iv) improvement of other biotic and abiotic factors that are important for the health and vigorousness of Cedar stands/trees and stability of local ecosystems, (v) the preservation of the genetic material for habitat 9590\* core species Cedrus brevifolia, via the implementation of ex situ conservation measures, including storage of seeds in a seed bank and creating a new population of Cedar outside its natural environment, (vi) the implementation of public awareness activities and the dissemination of project results to local and overseas managers and scientists (https://webgate.ec.europa.eu/life/publicWebsite/project/details/4533).

This project is the winner of the LIFE Award - Nature Conservation in 2022.

LIFE16 NAT/BG/000856 - LIFE IAS Free Habitats. Collaborative management for conservation of forest and grassland habitats negatively affected by IAS in Bulgaria (from October 2017 to

#### October 2022).

The project's goal was to improve and maintain the conservation status of four (two of which are priority) of Bulgaria's rarest and highly vulnerable natural habitat types, as well as to improve the institutional capacity for addressing invasive alien plant species (IAS) related conservation issues. Thus, it contributed to implementing the Union nature and biodiversity policy and legislation, including the Union Biodiversity Strategy to 2020 and the Habitats Directive 92/43/EEC. The main conservation issues targeted were: (i) low natural regeneration of the Juniperus excelsa, (ii) overgrowing of competitive plant species including IAS, (iii) overgrazing of grasslands and illegal grazing in the forests, (iv) fragmentation and degradation, (v) lack of knowledge and experience of the land owners and managers for improvement of the conservation status and maintenance of the habitats control and of IAS (https://webgate.ec.europa.eu/life/publicWebsite/index.cfm?fuseaction=search.dspPage&n\_proj\_ id=6284).

To provide examples of valuable LIFE projects working on marine habitats, we identify three more recent projects that better fit the purposes of the LIFE ENABLE project. Obviously, they are not selected as "best projects", but they can provide examples of environmental activities placed in marine habitats that the LIFE Programme supports.

## LIFE17 NAT/IT/000565 - Coastal dune hAbitats, subLittoraL sandbanks, marine reefs: cOnservation, Protection, and thrEats mitigation (from March 2018 to September 2023).

The aim of LIFECALLIOPE was to protect coastal dunes, sublittoral sandbanks and marine reefs along the central Adriatic coast of Italy and the north-western coast of Cyprus, and especially to mitigate direct and indirect human threats (e.g. from conflicts with fishing and tourist activities). The project implemented integrated management for coastal and marine areas to conserve target habitats and species, in line with the European Integrated Coastal Zone Management (ICZM) strategy. The project aimed to enlarge Natura 2000 areas in Italy and improve monitoring effectiveness in Cyprus. Additionally, it aimed to improve the effectiveness of the management and monitoring of the Natura 2000 Network by preparing an Integrated Territorial Information System on a WebGIS platform (ITA-CYP-ENG). The project aimed to recover and enhance habitats through e.g., putting wooden walkways on beaches, planting seedlings of local species, and eradicating alien species. It also aimed to increase community awareness through environmental education activities in schools, public awareness-raising events, and training material (https://webgate.ec.europa.eu/life/publicWebsite/project/details/4983).

## LIFE18 NAT/UK/000039 - LIFE Recreation ReMEDIES: Reducing and Mitigating Erosion and Disturbance Impacts affecting the Seabed (from July 2019 to October 2023).

The LIFE Recreation ReMEDIES project aimed to reduce the negative impacts of recreational activities on the marine environment in Natura 2000 sites (Special Areas of Conservation -SACs), where pressure from recreational boating is greatest and has the most impact. The project beneficiaries plan to develop tools to deliver the conservation actions needed to move Annex 1 habitats of the Habitats Directive towards Favourable conservation status. The project's specific objectives were to: (i) protect from, and reduce, recreational pressures on 1285 ha of England's most important and at-risk seagrass beds; (ii) demonstrate successful large-scale restoration and

management techniques across the projects SACs and elsewhere; and (iii) promote awareness and inspire better care of the Annex 1 habitats by recreational users, and use networks of relevant stakeholders and the public at a local, national and trans-national level to maximise the longevity and sustainability of the project actions (https://webgate.ec.europa.eu/life/publicWebsite/index.cfm?fuseaction=search.dspPage&n\_proj\_id=7321).

# LIFE19 NAT/MT/000982 - Improving the conservation status of endemic Balearic and Yelkouan shearwaters by ensuring safe land and sea (*from September 2020 to August 2025*).

The LIFE PanPuffinus! project's overall aim is to improve the conservation status of two endangered shearwater species (Puffinus mauretanicus and Puffinus yelkouan) across the Mediterranean Sea and the Atlantic coast of Portugal by tackling two major threats on land and at sea through transboundary conservation efforts. The project's objectives are to: (i) quantify the scale and extent of fisheries bycatch and pilot-testing of GFCM data collection methodology, (ii) reduce fisheries bycatch of both species by using existing mitigation measures or developing new ones, (iii) decrease the rate of predation by rats by implementing non-native invasive predator management and biosecurity plans, (iv) drive changes in management through engagement with key stakeholders and by building awareness on seabirds with communities (https://webgate.ec.europa.eu/life/publicWebsite/project/details/5345).

#### The MPA-Engage project

The Interreg Mediterranean MPA-ENGAGE (https://mpa-engage.interreg-med.eu/) was led by the Institute of Marine Sciences of the Spanish National Research Council, aimed at supporting Marine Protected Areas in adapting and mitigating climate change impacts in the Mediterranean Sea. This project has developed a number of harmonised monitoring protocols and vulnerability assessments and produced climate change adaptation plans that will be crucial for capacity building for marine Natura 2000 managers.

#### LIFE Go.Pro.For

The project LIFE GoProFor - LIFE17 GIE/IT/000561 (https://www.lifegoprofor.eu/en/) (from September 2018 to March 2023) aimed to identify and spread the GOOD PRACTICES emerged from LIFE projects about forestry realised throughout the European Union between 1992 and 2018 and to disseminate forest management tools aimed at increasing the uses compatible with conservation issues within the Natura 2000 network. LIFE GoProFOR intends to encourage the exchange of experiences and best practices for the management of the biodiversity of forest habitats in the Natura 2000 network, with the aim of increasing the level of awareness both by the institutional managers of these areas and by all operators who carry out their influence with their activities on the conservation of habitats and species.

Specific objectives of the project are:

- Facilitate active forest management able to improve the conservation status of species and habitats;
- Increase awareness and knowledge of good forest management practices; develop an information and training activities aimed at the Italian forest sector, including that operating in the Natura 2000 network;

- Encouraging the use of Good Forest Management Practices also in the context of the future planning of Rural Development (2021-2027);
- Increase the adoption of Good Practices in forest planning tools;
- Increase citizens' awareness of the importance of proper forest management and the value of the Natura 2000 network.
- Form a national network of good forest practices to spread widely both inside and outside the Natura 2000 network.

To achieve project objectives the project has implemented the following actions:

- Establishment of the database of Good Practices (BP);
- Development of an IT platform of the BP with web-gis interface of the network of demonstration sites with multimedia sections;
- Production of a multimedia collection of the BP for forest management in the Italian Natura 2000 network;
- Development of training courses for the staff that working in the Natura 2000 network;
- Promotion of Good Practices, through the creation of a national network of the main stakeholders, establishment of a team of expert for every category, definition of a formal licensing for the operators who have carried out the training activities and identification of the administrative path for its insertion in the GPP procedures;
- Development of 3 planning laboratories in the partner regions of the project;
- Promotion of the project in the European context;
- Monitoring on the level of application of the tools developed with the project;
- Communication plan and its application.

#### **Bottoms-up COST Action**

Bottoms-up (from November 2019 to May 2024; <u>https://www.bottoms-up.eu/en/</u>) is a cooperation project to improve the sustainable management of multi-taxonomic forests, explicitly focusing on biodiversity needs and challenges. It is a COST Action supported by the EU to foster bottom-up collaborations which bring together researchers and other relevant stakeholders. Specifically, the project aims to investigate several taxonomic groups and how they respond to changes to understand drivers of forest biodiversity and, thus, the aspects which foster their sustainable management. In this way, it could expand scientific knowledge of forest biodiversity, which usually relies on limited sustainable forest management attributes and indicators focused on specific trees or the whole forest.

The action aims to **provide additional knowledge about multi-taxonomic forest biodiversity**, adopting a bottom-up approach through the collaboration of multiple research groups that collect data locally, stimulating synergies instrumental to enhancing knowledge on sustainable forest management. About 100 researchers and stakeholders from more than 30 countries are involved in project activities, with the opportunity to create a strong collaborative network for standardised broad-scale multi-taxon studies in Europe. This can certainly be a pool to identify possible trainers and content for capacity development experiences.

In particular, the actions aim to:

- Developing a standardised platform of multi-taxon data;
- Establishing a network of forest sites with baseline information for future monitoring;
- Designing shared protocols for multi-taxon sampling;
- Assessing the relationships between multi-taxon biodiversity, structure, and management;
- Creating a coordinated network of forest manipulation experiments;
- Evaluating indicators and thresholds of sustainability directly tested on biodiversity;

• Developing management guidelines defining sustainable management to be applied in forest certification and within protected areas.

Project outcomes will improve forest management sustainability, ecosystem functioning, and provision of services provided by forests.

Results will be achieved through activities that six different working groups (WGs) implement:

- 1- Towards common tools for forest multi-taxon research and monitoring
- 2- Effect of management on biodiversity based on observations
- 3- Effect of management on biodiversity based on experiments
- 4- Habitat structures: quantity and quality needed for the conservation of forest biodiversity
- 5- Definition of relevant SFM indicators and thresholds
- 6- Designing strategies of SFM

Bottoms-up project involves **98 participants** across **34 countries** who provide information from **3669 sampling units**. The action proposes multiple *networking activities* for scientists across Europe.

Bottoms-up proposes four **training schools** to provide participants with tools to comprehensively explore the multiple facets of diversity. In particular, it has organised the following trainings since 2021:

- "Assessing Multi-Taxon Diversity in Forest Ecosystems," which will be held in Arezzo (Italy) on September 28-30, 2021.
- "Field sampling for multi-taxon biodiversity studies in European forests," which will be held in Lisbon (Portugal) on June 20-22, 2022.
- "Innovative tools to analyse species-environment relationships," which will be held in Grenoble / Saint Martin d'Hères (France) on October 4-5th, 2022.
- "Interdisciplinary summer school on forest ecosystems Technologies-Biodiversity-Modelling" in collaboration with 3DForEcoTech and PROCLIAS, which will be held in Ljubljana (Slovenia) on July 10-14th, 2023.

Bottoms-up allows applying for a **Short-Term Scientific Mission**<sup>9</sup> between January and September 2023 to foster cross-country exchange between scientific institutions and organisations to learn new methods. In particular, proposals are encouraged to address the following topics:

- STSM1: Linking Forest dynamic models and multi-taxon forest diversity.
- STSM2: Testing the triad framework of forest zoning in Europe through multi-taxon field data.
- STSM3: Assessing the invertebrate diversity linked to Tree Related Microhabitats.
- STSM4: Sampling multi-taxon biodiversity in Mediterranean and thermophilous forests.
- STSM5: Exploring the effect of canopy opening interventions on multi-taxa forest biodiversity at the European level.
- STSM6: Alternative forest biodiversity indicators to document international monitoring programmes.
- STSM7: Methods for analysing taxonomic and functional metrics of saproxylic beetle assemblage in Mediterranean forests.

Bottoms-up action **supports attending** the meetings, symposia, and workshops linked to the COST Action CA18207 BOTTOMS-UP. The initiatives target young researchers from Inclusiveness Target Countries (ITC) or Near Neighbour Countries (NNC).

<sup>&</sup>lt;sup>9</sup> This is an interesting capacity development event that is common in the scientific community but could be extent to Natura 2000 managers.

Bottoms-up action also provides grants for virtual mobility for multiple different tasks related to WGs objectives.

Bottoms-up actions, at present, achieve several *results* which contribute to achieving project objectives.

The action develops a **Data Explorer**, which includes data about 2895 sampling units across 13 European Countries (i.e., Belgium, Czech Republic, Denmark, France, Germany, Greece, Hungary, Italy, Lithuania, Slovakia, Spain, Sweden, Switzerland). The platform allows the identification of projects inserted in the platform and the visualisation of the number of plots per forest category and taxon group. To identify projects, it is possible to select Countries, Forest Categories, Taxon Groups, Natura 2000 Habitats, Silvicultural Treatment, Silvicultural Government, and Vertical Structure.

WG 1 produced a main deliverable, the *platform description* titled "Towards Common Tools for Forest Multi-Taxon Research Monitoring" and https://www.bottomsup.eu/en/results/deliverables/working-group-1.html, which describes the Data Explorer reporting the framework and data used for its creation.

In addition, WG 1 publishes a handbook for field sampling in the Journal "Ecological Indicators" as a review which represents a pragmatic synthesis practical to direct monitoring of forest biodiversity within and outside the European territory. Therefore, resuming state-of-the-art, it proposes standard approaches for forest monitoring characterised by robustness and comparability<sup>10</sup>.

Working Group 3 produces a *main deliverable* that describes existing forest manipulation experiments titled "Effect of Management on Biodiversity based on Experiments" https://www.bottoms-up.eu/en/results/deliverables/working-group-3.html reporting the methodology and results obtained by the analysis of existing activities focused on forest management in Europe.

In addition, the following lines specify *publications* derived by the implementation of Bottoms-up Action, which is available at the link https://www.bottoms-up.eu/en/results/publications.html:

- Biodiversity Protocols;
- Stand Structure Protocols;
- A handbook for forest multi-taxon and structure sampling (different versions).

#### 3.1.3. Network analysis of ecological nodes from LIFE projects

The selection of LIFE projects focused on marine or forest habitats identified 41 out of 309 LIFE-NAT projects co-funded by the LIFE Programme in the 2014-2020 period. Protected habitats identified through the analysis of selected LIFE projects are 7 marine habitats (belonging to the category "Coastal habitats and Halophytic vegetation") and 85 forest habitats (of which 2 belong to the category "Maritime and Inland dunes," 2 belonging to the category "Natural and semi-natural grasslands" and the remaining to the category "Forests"). Among the selected habitats, 27 priority forest habitats and only one priority marine habitat are found.

Investigating project actions of the 41 selected LIFE projects, it is observed (Fig. 3) that forest habitats are chosen by 87.5% of the projects, while Marine habitats are only by 12.5%, evidencing that there is particular attention to the category of forests in the LIFE NAT projects launched in the 2014-2020 programming period compared to marine habitats.

<sup>&</sup>lt;sup>10</sup> Reference: Burrascano, S., & Trentanovi, G. et al. (2022). Handbook of field sampling for multi-taxon biodiversity studies in European forests. Handbook of field sampling for multi-taxon biodiversity studies in European forests, 1-114. https://doi.org/10.1016/j.ecolind.2021.108266 (this is also available as an online book: <u>https://www.bottoms-up.eu/en/results/publications.html</u>). LIFE ENABLE - A2 REPORT GAP ANALYSIS



Figure 3: Habitat distribution related to LIFE projects. Source: Personal data processing of the LIFE Database

Although most LIFE projects refer to a single Habitat, figure 4 shows that Categories **91E0\*** (Alluvial forests of Alnus glutinosa and Fraxinus excelsior - Alno-Padion, Alnion incanae, Salicion albae) and **9180\*** (Forests of slopes, screes and valleys of Tilio-Acerion) are those most involved in the different projects. The habitats most selected by the projects are forest type, and both are classified as priority habitats: 9180\* is present in 9 projects; 91E0\* is involved in 15 projects. About 33% of the selected habitats are classified as priority (\*). These habitats are more frequently involved in project actions. Therefore, results show that habitats classified as priorities are most included in activities of the LIFE-NAT projects related to forest-marine habitats.

#### **Degree Centrality**

Degree centrality measures the number of relationships established by each node, hence the level of ecological connectivity that each habitat has. Identifying the most central ecosystems allows us to understand which types of habitats can play a functional role in connecting habitats.

The graph below (Fig. 4) shows the centrality measure distribution for the degree centrality network statistic. The average value of the Degree Centrality index was equal to 10,471, meaning that the habitats belonging to the network are connected on average with the other 10 habitats in ecological relationships.



Figure 4: Graphical representation of the forest-marine LIFE NAT network with highlighted nodes with higher Degree centrality index value (2014-2020). Source: GEPHI processing of the LIFE dataset

In table 1 it is possible to notice that habitats 91EO\* and 918O\* are central in the network, meaning they play an important functional role in connecting habitats.

Habitat	Category	Туроlоду	Degree
91E0*	Forests of temperate Europe	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	50
9180*	Forests of temperate Europe	Tilio-Acerion forests of slopes, screes and ravines	34
9110	Forests of temperate Europe	Luzulo-Fagetum beech forests	18
91H0*	Forests of temperate Europe	Pannonian woods with Quercus pubescens	18
91AA*	Forests of temperate Europe	Eastern white oak woods	18
9410	Coniferous forests of temperate mountains	Acidophilous Picea forests of the montane to alpine levels (Vaccinio-Piceetea)	18

Table 1: Habitats with high degree values. Data Source Provider: LIFE Database Data Processing Using Gephi

#### **Betweenness Centrality**

The importance of these two habitats (91E0\*, 9180\*) in the network is also confirmed by the calculation of the Betweenness Centrality statistic, which indicates the strategic position of an ecological component to the others. In fact, the two highest values of Betweenness Centrality are 0.21758 and 0.06662, which correspond to the priority habitats 91E0 and 9180.

Habitat	Category	Туроlоду	Degree
91E0*	Forests of temperate Europe	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	50
9180*	Forests of temperate Europe	Tilio-Acerion forests of slopes, screes and ravines	34
9110	Forests of temperate Europe	Luzulo-Fagetum beech forests	18
91H0*	Forests of temperate Europe	Pannonian woods with Quercus pubescens	18
91AA*	Forests of temperate Europe	Eastern white oak woods	18
9410	Coniferous forests of temperate mountains	Acidophilous Picea forests of the montane to alpine levels (Vaccinio-Piceetea)	18

In table 2, the highest Betweenness values are in descending order.

Table 2: Habitats with high values of betweenness. Data Source Provider: LIFE Database Data Processing Using Gephi

Generally, the results that emerged from the calculation of Degree and Betweenness centrality show that priority habitats **91E0 and 9180 are functional in incentivising ecological connectivity**.

The priority habitat 91E0\* ("Alluvial forests with Alnus glutinosa and Fraxinus excelsior Alno-Padion, Alnion incanae, Salicion albae") includes forests of black alder (Alnus glutinosa), greater ash (Fraxinus excelsior) and white willow (Salix alba), which may be associated with black poplar (Populus nigra) and elms (Ulmus minor, U. glabra). These forests are mainly found along riverbanks and on alluvial deposits, periodically flooded by floods and the rising of the surface water table (ISPRA Manual 142/2016).

The main threats to this habitat derive from incorrect management of watercourses, interventions of artificialisation of the banks, or the modification of the water regime, which could constitute a severe risk to the vegetation types and, consequently, to the fauna that they host<sup>11</sup>.

<sup>&</sup>lt;sup>11</sup>https://forum.eionet.europa.eu/habitat-art17report/library/2001-2006-

reporting/datasheets/habitats/forests/forests/91e0-alluvial\_excelsiorp LIFE ENABLE - A2 REPORT GAP ANALYSIS

The importance of the priority habitat 91E0\* role also emerges from the fact that riparian forests are in catenal contact with other types of habitats, ensuring high ecological connectivity (Campagnaro et al., 2019<sup>12</sup>). This habitat is linked to the following habitats within the selected LIFE projects.

(i) Coniferous forests of the Mediterranean and Macaronesian mountains pertaining to

- habitat 9530 "Endemic (sub)Mediterranean pine forests with endemic black pines"

-habitat 9560 "Endemic forests with Juniperus spp".

(ii) Forests of temperate Europe pertaining to

-habitat 9130 "Asperulo-Fagetum beech forests";

-habitat 91D0 "Bogs woodland",

-habitat 9110 "Luzulo-Fagetum beech forests",

-habitat 91AA "Eastern White Oak Woods",

-habitat 91N0 "Pannonic inland sand dune thicket (Junipero-Populetum albae)",

-habitat 91G0 "Pannonic woods with Quercus petraea and Carpinus betulus",

-habitat 91F0 "Riparian mixed forests of Quercus robur, Ulmus laevis and Ulmus minor, Fraxinus excelsior or Fraxinus angustifolia, along the great rivers (Ulmenion minoris)"

-habitat 9160 "Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli"

-habitat 9120 "Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)"

-habitat 91M0 "Pannonian-Balkanic turkey oak –sessile oak forests"

-habitat 91V0 "Dacian Beech forests (Symphyto-Fagion)",

-habitat 9170 "Oak groves of Galio-Carpinetum",

-habitat 91K0 "Illyrian Fagus sylvatica forests (Aremonio-Fagion)".

(iii) In the mountains, they are in contact with:

- habitat 9180 "Forests of slopes, screes and valleys of Tilio-Acerion"),

-habitat 9410 (mountain spruce climax).

The priority habitat 9180\* "Tilio-Acerion forests of slopes, screes and ravines" is characterised by mixed broad-leaved trees (greater ash, lindens, maples, elms) that develop at detrital, coarse-sized, steep slopes, or on the bottom of valleys with colluvial contributions (gorge environments). Precisely, maples and ash prevail in cool and humid climates and limes in more thermophilic and relatively dry environments. The main threats to this habitat derive from upstream water catchments that would

124.https://doi.org/10.1093/biosci/biy153

<sup>&</sup>lt;sup>12</sup> Campagnaro T., Sitzia T., Bridgewater P., Evans D., Ellis E. 2019. "Half Earth or Whole Earth: What Can Natura 2000 Teach Us?" BioScience, Volume 69, Issue 2, February 2019, Pages 117–

make the environment too dry; therefore, correct management of this habitat requires the total prohibition of silvicultural exploitation<sup>13</sup>.

Within the ecological network, catenal relationships are observed, and, specifically, the forests referable to habitat 9180 are in contact with the following habitats.

(i) Coniferous forests of temperate mountains pertaining to

-habitat 9410 "Acidophilous Picea forests of the montane to alpine levels (Vaccinio-Piceetea)".

(ii) Coniferous forests of the Mediterranean and Macaronesian mountains pertaining to

-habitat 9530 "(Sub-) Mediterranean pine forests with endemic black pines".

(iii) Temperate European forests pertaining to:

-habitat 9110 "Luzulo-Fagetum beech forests",

-habitat 91AA "Eastern White Oak Woods",

-habitat 91H0 "Pannonian woods with Quercus pubescens"

-habitat 9170 "Galio-Carpinetum oak-hornbeam forests",

-habitat 91K0 "Illyrian Fagus sylvatica forests (Aremonio-Fagion)"

-habitat 91A0 "Old sessile oak woods with Ilex and Blechnum in the British Isles"

(iv) The habitat is also in contact with

-habitat 91E0 "Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)"

-habitat 9130 "Asperulo-Fagetum beech forests".

## **3.2.** Network analysis of social nodes from LIFE projects

The chosen LIFE projects involved a total of 184 different actors belonging to 23 different countries. In addition, 14 actors (or 7.60%) have benefited from the financial resources of the LIFE Programme more than once because they belong to other project partnerships.

Many LIFE-NAT project partnerships are composed of actors of different nationalities. Specifically, about half of the projects are characterised by transnationality (21 projects out of 41). The network is mainly composed of Italian beneficiaries (21.2%) but also involves actors from Spain (11.41%), France (4.29%), the United Kingdom (6.52%), Hungary (5.98%), Finland (5.98%), Belgium (5.43%), Romania (5.43%), Greece (4.89%), Portugal (3.26%), Czech Republic (3.26%), Sweden (2.72%), Slovakia (2.72%), Poland (2.72%), Bulgaria (2.72%), Germany (2.72%), Latvia (2.17%), France (1.63%), Slovenia (1.63%), Cyprus (1.63%), Malta (1.63%), Lithuania (1.63%), the Netherlands (1.09%), Estonia (1.09%) and Croatia (0.54%).

These data indicate that the LIFE Programme catalyses high cooperation between the European States and that collaborations based on implementing LIFE-NAT projects are more frequent among beneficiaries in the Mediterranean area and Eastern Europe.

<sup>&</sup>lt;sup>13</sup>https://forum.eionet.europa.eu/habitat-art17report/library/2001-2006-

reporting/datasheets/habitats/forests/forests/9180-tilio-acerion LIFE ENABLE - A2 REPORT GAP ANALYSIS

Analysing the types of actors that make up the partnerships, it emerges that most of the beneficiaries of the selected projects are categorised as NGO-Foundation (47 nodes), corresponding to 25.54% of the actors, followed by University (28 nodes), corresponding to 15.22% of the actors, Park-reserve authority (22 nodes) representing 11.96% of the actors, Research institution (21 nodes) or 11.41% of the actors, Regional authority (15 nodes) 8.15%, National authority (14 nodes) 7.61%, SME – small and medium-sized enterprise (13 nodes) 7.07%, Public enterprise (10 nodes) 5.43%. A smaller number of nodes belong to the categories of Local authority (8 nodes) 4.35%, Large enterprise (5 nodes) 2.72% and Professional organisation (1 node), which corresponds to 0.54% (fig.5). Selected LIFE-NAT projects are mainly coordinated by NGO-Foundations (11), National authorities (7), Park-Reserve authorities (6), and Regional authorities (6).



Figure 5: Typology of beneficiaries for LIFE-NAT projects. Source: LIFE dataset elaboration

Beneficiaries of LIFE projects can also be divided according to the jurisdictional level in which they act. It is observed that most actors operate at the national (50.54%) and regional (24.46%) levels, while to a lesser extent, they belong to the international (20.65%) and local (4.35%) levels. On the other hand, considering the jurisdictional level of the coordinating beneficiaries, it emerges that most of the selected LIFE-NAT projects are mainly coordinated by actors operating at national (46%) and regional (37%) levels, followed by international bodies (17%). In comparison, there is no coordinator at the local judicial level (4%).

#### **Degree centrality**

The average value of the Degree Centrality index is equal to 1.707, which means that actors belonging to the network of LIFE-NAT beneficiaries create, on average, about 1.7 relationships each. In particular, 12 (6.5%) actors have a centrality value between 6 and the maximum value of 14 and are identified as central actors of the network. Such actors belong to the categories: NGO-Foundation (25%), University (25%), Park-Reserve authority (16.7%), Regional authority (16.7%), National authority (8.3%), and Research institution (8.3%).

#### **Betweenness Centrality**

The analysis of the network under analysis generally shows low values of Betweenness Centrality. In fact, only 41 actors (22.2%) out of 184 have a value higher than zero. Specifically, non-zero values

range from 0.00006 to a maximum of 0.46358. However, these results are expected due to the nature of LIFE projects composed of partnerships of actors that involve different beneficiaries to sustain and implement real collaborative governance following a bottom-up approach. Specifically, the actors with the highest betweenness values are mainly attributable to the category "NGO-foundation" and "University".

Such results highlight the **central role of NGOs, foundations, and universities having a national or regional jurisdictional level in proposing LIFE projects working in selected habitats.** In particular, it is possible to note that local private actors who effectively work and benefit from ecosystem services derived from the good quality of habitats are low. Therefore, there is a need to increase their involvement in LIFE project partnerships to foster community awareness and support for environmental activities.

#### **Network Density**

The Network Density index allows for measuring the extent of connections between the pairs of network nodes. The density value tends to zero and equals 0.009, indicating that the number of existing relationships equals 0.9% of all possible network relationships. Equally to Betweenness Centrality, the low value of Network Density could be explained by the nature of LIFE projects and their geographical extension, making it impossible for most LIFE project actors to relate with many other European actors constituting the network through specific project actions. Therefore, the LIFE NAT forest-marine project network could be considered a network with a very low density of relationships, which indicates the presence of polycentric governance that is composed of multiple interventions proposed and implemented across different EU territories.

#### Homophily

Finally, the last network statistic used to investigate multi-actor and multi-level governance is homophily. The EI index has been calculated considering the attributes related to the following scales: (i) nationality, (ii) types of actors, and (iii) jurisdictional levels.

It should be noted that the value of the El-index for the attribute "nationality" is equal to -0.51592, i.e., a negative value that indicates a greater distribution of ties between actors belonging to the same country and, consequently, the tendency of actors belonging to the same country to interact mainly with each other. On the other hand, the "type of actor" and the "jurisdictional level" have proved to be attributes that favour collaboration between heterogeneous actors for these characteristics. The values calculated for the El-index about the type of actor and the level of governance are respectively equal to +0.66879 and +0.38854, which indicate heterophily.

This result highlights that the willingness of the LIFE Programme to promote collaborations between different actors belonging to different jurisdictional levels to share capacities and information aimed at implementing synergistic actions for the resolution of complex environmental problems is effectively implemented in the case of the forest-marine network.

### **3.3.** Providers and participants to training on Natura 2000

#### The TOP 5 covered topics

The analysis of questionnaires about previous training experiences on nature conservation and management allows us to identify the most frequent topics addressed by previous courses. Generally, results show that courses frequently focus on *forest habitats* or *do not focus on specific* 

*habitats* and aim to improve the quality of managing Protected Areas by proposing new or best *management plans* and *monitoring tools*. In particular, the most frequently addressed skills are listed below.

#### Protected area policy, planning and projects.

Providing a strategic and rationally planned framework for Protected Area and Natura 2000 governance and management.

#### **Biodiversity conservation.**

Ensuring the maintenance of the ecological values of Protected Areas and Natura 2000 sites through management and monitoring of species, their habitats, ecosystems and natural resource use.

#### Awareness and education.

Ensuring that local stakeholders, visitors, decision-makers and the wider public are aware of Protected Areas and Natura 2000 sites, their purpose and values, and how they are governed and managed.

#### Local communities and cultures.

Establishing systems of Protected Area and Natura 2000 governance and management that address the needs and rights of local communities.

#### Tourism, recreation and public use.

Providing environmentally and economically sustainable tourism and recreation opportunities in and around Protected Areas.

#### Most popular training methods.

The analysis of questionnaires about previous training on nature conservation and management allows us to identify the most popular training methods preferred by providers and participants.

Both providers and participants indicate *webinars* and *seminars* as the most frequent methods to deliver training. Additionally, *blended learning* (online and face-to-face) and *single or multiple field trips* are popular with trainers and participants. A relevant difference between providers and participants is detected in the use of online self-learning courses, which is frequently mentioned by providers, but rarely used by participants.

Tools mainly used by providers in training are *presentations, practical workshops* and *work groups,* followed by *teaching videos* and *questionnaires*.

Generally, training experiences indicated by participants were included in a wide range, meaning that participants chose short courses (i.e., one-week duration) and long courses (i.e., from one month to one year).

#### Most unpopular training methods.

The analysis of questionnaires about previous training experiences on nature conservation and management allows us to identify the most unpopular (i.e. not applied) training methods for providers and participants. In this case, differences between providers and participants are more relevant than identifying the most popular methods. From the side of *providers,* the most unpopular methods are *academic courses* and *online-tutorized learning courses*; from the side of *participants,* the most unpopular methods are *online self-learning courses* and *full-study programmes*.

The less used tools indicated by providers are **online gaming**, **quizzes**, and **peer-to-peer evaluations**, followed by **interim assignments** and **role plays**.

#### 3.3.1. Online Surveys – Providers

Online surveys targeted to training providers collected answers from 75 respondents: 47 respondents in the first round of surveys of May 2022 and 28 respondents in the second round of surveys from September to October 2022. Respondents identified and gave information about 67 courses they delivered. In particular, 41 respondents referred to one course, 4 referred to two courses, and 6 referred to three courses.

#### **Characteristics of providers**

Providers reached by the two rounds of online surveys are mainly from the Mediterranean Basin, with 22 respondents from Spain, 13 from Italy, 7 from France, 4 from Portugal, 3 from Greece, 2 from Cyprus, and 1 from Croatia. Answers from Central-Western Europe are from 8 providers from Austria and 2 from the Netherlands. Finally, answers from northern Europe were collected from 3 providers from Sweden and 1 from Finland. Additionally, the online surveys reached providers outside EU countries, i.e, Guatemala, India, Kosovo, Montenegro, Oman, Tunisia, Turkey, and the UK (fig.6).



Figure 6: Country of providers

A total of 32 respondents answered the surveys as representatives of training institutions for Natura 2000 or Protected Areas management training and 18 were individual Natura 2000 or Protected Area management trainers. A total of 23 respondents are not able to identify themselves into one of these two categories because they are either representatives of public authorities directly managing protected areas or coordinating conservation efforts, scientists invited to provide insights into specific skills related to their research area, trainers in courses generally focused on nature conservation, etc. (fig.7).



Figure 7: Roles of respondents

Finally, most respondents (36) do not know about the smartphone eNatura2000 app. Only 12 respondents confirm they know what it is (fig.8).



Figure 8: Knowledge about the smartphone eNatura2000 App

#### Characteristics of the learning experiences

Courses considered by respondents related primarily to Natura 2000 management. Specifically, in 42 courses, Natura 2000 was part of the training and in 14 courses, the training focused on Natura 2000. Conversely, 9 courses do not cover Natura 2000 and, for two courses, information is not provided (fig.9).



Figure 9: Natura 2000 in courses

Courses mainly focus on the management of protected areas and Natura 2000 sites. In particular, they deal with tasks required for effective planning interventions and monitoring activities to ensure the effective conservation of biodiversity. Additionally, keywords like "communication," "educational," and "knowledge" provide evidence of courses related to environmental education and effective communication to foster the environmental awareness of stakeholders (fig.10).



Figure 10: keywords used by respondents to explain objectives of courses

A relevant number of courses did not focus on a specific type of ecosystem (29). Nevertheless, respondents indicated that 26 courses are focused on woodland and forests, 15 on marine habitats, 14 on grassland, 13 on wetlands, 10 on rivers and lakes, 8 on heathland and shrub, 8 on sparsely vegetated land, 7 on cropland and 4 on urban ecosystems (fig.11).


Figure 11: ecosystems considered by courses

As shown by fig.12, reported training mainly aims to provide skills to enhance biodiversity conservation through the management and monitoring of species, habitats, ecosystems, and use of natural resources (40) and protected area policy, planning, and projects providing strategic frameworks for governance and management of Protected areas and Natura 2000 sites (36). Additionally, skills provided by courses focus on local communities and cultures to develop management plans of protected areas able to meet the needs and rights of local stakeholders (27), tourism, recreation, and public use to identify and promote economically and environmentally sustainable tourism activities in protected areas (27), awareness and education to ensure that stakeholders, visitors, and decision-makers are aware on the value of protected areas and Natura 2000 sites and how to manage them (26), and communication and collaboration to identify effective strategies able to communicate and collaborate effectively (23). Fewer trainings provide skills related to upholding laws and regulations (17), the foundation of personal competencies (16), the use of technology in protected areas management (12), organisational leadership and development (11), human resources management (9), administrative documentation and reporting (9), advanced personal competences (9), financial and operational resources management (7) and field/watercraft and site management (5).



Figure 12: skills provided by training experiences

The survey attests that half of the training courses are developed and provided as a part of a project (34 out 67), as reported in fig.13.



Figure 13: courses embedded in projects

Training is designed especially for protected area managers (40), Natura 2000 managers (30), interested citizens (21), administrative staff (20), and practitioners such as rangers (20). Additionally, training experiences are addressed to NGOs (19) and students (18). Other target people specified by respondents are volunteers, tourism guides, diving clubs, teachers, public authorities, decision-makers, farmers, and private owners (fig.14).



Figure 14: target audience of training experiences

Training is provided both regularly (21) and once (24). In addition, 12 courses are provided on demand (fig.15). Answers highlight that some courses have changed how they are implemented over the years. This is also due to the Covid Pandemic, with training activities proposed through inpresence meetings in the first years and then had to be translated as online courses. Additionally, respondents highlighted the existence of training with and hybrid form (e.g., blended learning), proposing part of the course as online self-learning and then, a few meetings.





Training courses are mainly provided through seminars (27), followed by webinars (15), single or multiple field visits (15), blended learning (13), single academic course/module (10), networking events (9), as a part of an academic course (8), full-study programme (6) and online self-learning course (2) (fig.16). Additionally, respondents add other ways used for the provision of courses such as the use of a Moodle training platform, field exercises, scuba diving, and combined face-to-face and online meetings.



Figure 16: ways to deliver training experiences

Respondents use presentations (52), practical workshops (44), and group work (36) as the most recurrent tools in their courses. Such tools are followed by questionnaires (17), teaching videos (17), mentoring (12), personal essays (11), final exam (11), role play (8), interim assignment (7), peer-to-peer evaluation (5), quizzes (5) and online gaming as showed by fig.17. Additionally, providers add other tools used in their courses such as field visits and exercises, sub-marine practice, question & answers, discussion with stakeholders, internal discussions, and presentation of possible project proposals.



Figure 17: tools/approaches used in training

Most courses are delivered in the local language where they are placed. Conversely, 22% (15 trainings out of 67) are provided in English. Figure 3.1.13 highlights a relevant number of trainings delivered in Spanish (20), in Italian (10), and in French (9). In addition, the fig.18 shows the presence of 3 training delivered in German, 3 in Swedish, 2 in Greek, 2 in Portuguese, and 1 in Finnish.



Figure 18: languages used in training experiences.

The majority of trainings are free (63%), give a certificate for completion to address students' progress (58%), assess the participants' satisfaction (76%), and are still being offered (53%). Additionally, 44% of respondents declare the need to make some changes to improve the quality of courses. In particular, fig.19 indicates the necessity to increase practical activities in the field and to adapt the contents of training experiences to the needs of participants.



Figure 19: keywords from the answers related to change required in trainings.

# 3.3.2. Online Surveys – Participants

Online surveys targeted to participants of courses collected answers from 153 respondents: 124 during the first round in May 2022 and 28 during the second round in September – October 2022. 15 respondents responded twice to the online surveys, two adding information related to other courses they attend. In total, respondents gave information about 78 training experiences they attended.

# **Characteristics of respondents**

Respondents especially came from Romania (53), Spain (23), and Finland (23). They were followed by participants from Italy (9), Austria (4), Croatia (4), Greece (4), Portugal (3), and Hungary (2). Other EU countries like Cyprus, Estonia, Germany, Lithuania, Luxembourg, Malta, Poland, and Sweden were represented by unique online survey respondents. Outside the EU countries, respondents came from

the United Kingdom (2), Guatemala (1), Morocco (1), and North Macedonia (1). 9 respondents preferred not to indicate their nationality (fig.20).



Figure 20: Nationality of respondents

Half the respondents declared that their pre-work studies included training on Natura 2000 or protected area management (67). Conversely, 60 respondents did not experience such a topic during their studies, and 8 did not remember (fig.21).



Figure 21: Pre-work learning on Natura 2000 or protected areas management

Specifically, most respondents answered that pre-work studies cover Natura 2000 or protected area management practices for less than 30% of their total duration (96). 10 respondents estimated that studies included the topic between 30% and 50%, 5 between 50% and 70%, and 3 more than 70%. 17 respondents were not able to answer the question (fig.22).



Figure 22: Natura 2000 or protected area management practices in pre-work learning

Pre-work studies of respondents related to protected areas management, biodiversity conservation and restoration. Generally, they were based on biology and ecology, but also legislation. In addition, they covered topics such as habitat protection, forestry, monitoring practices, invasive species, etc., as shown in fig.23.



Figure 23: Keywords related to pre-work education of respondents

77 respondents have already participated in training experiences related to Natura 2000 or protected area management after they started their professional careers. Conversely, 26 never attended specific training experiences, and 6 respondents could not answer the question. In addition, most of the respondents did not know about the smartphone app eNatura2000 (73%).

## Characteristics of the learning experiences

32 courses assessed in the online survey were about Natura 2000 management, 31 were included as part of the course topics related to Natura 2000 management, and 6 were not about this topic. For 5 courses, this type of information was not available (fig.24). Additionally, most training experiences were developed and offered as part of projects (65%).



Figure 24: Natura 2000 management topic in courses

Courses reported by respondents were delivered in Romanian (27), English (18), Spanish (10), Italian (4), Finnish (2), French (2), Portuguese (2), Greek (2), Danish (1), Estonian (1), Latvian (1), Lithuanian (1), Swedish (1), and Polish (1) as shown by fig.25.



Figure 25: languages used in training experiences

As shown by fig.26, training experiences took place, especially in the last years: 5 in 2022, 10 in 2021, 19 in 2020, 5 in 2019, 6 in 2018, 4 in 2017, 7 in 2016 and 2015, and 2 in 2014. Few other courses were held in previous years: 2 in 2012, 1 in 2011, 2010, 2008, 2006, and 2005.



Figure 26: year of implementation of courses

21 training experiences were long between 1 month and 1 year, 17 courses from 1 to 3 days, 15 courses approximately 1 week, 9 courses between 1 week and 1 month, 6 courses more than 1 year and 5 courses less than 1 day (fig.27).



Figure 27: duration of courses

Training experiences were delivered primarily as seminars (30) and webinars (25). In addition, 19 courses used single or multiple field visits, and a full study programme constituted 13. 15 courses were online self-learning courses, 12 were blended learning courses, and 8 were online-tutorized learning courses. 5 courses were single academic courses or modules, and 3 represented a part of an academic course (fig.28). Other ways of delivering the training specified by respondents were workshops, mixed study methods with a combination of online and in-presence activities, and practical field exercises.



Figure 28: ways of delivery of training experiences

Most training experiences addressed competencies related to protected area policy, planning, and projects by providing a strategic and rationally planned framework for Protected Area and Natura 2000 governance and management (47) and biodiversity conservation through management and monitoring of protected species, habitats, and ecosystems (39). They were followed by courses aiming to give competencies about awareness and education (29), communication and collaboration (28), local communities and cultures (27), tourism, recreation, and public use (26). Other competencies addressed by training experiences are related to upholding laws and regulations (21), organisational leadership and development (15), administrative documentation and reporting (13), the foundation of personal competencies (10), use of technology (9), field/watercraft and site maintenance (8), human resource management (8), and advance personal competences (6) (fig.29).



Figure 29: competencies addressed by training experiences

As shown in fig.30, selected training experiences usually did not focus on specific ecosystems (33). Nevertheless, many trainings focused on woodland and forest ecosystems (24). Additionally, training experiences focused on marine ecosystems (10), grassland ecosystems (9), wetlands (7), rivers and LIFE ENABLE - A2 REPORT GAP ANALYSIS 46

lakes (6), heathland and shrubs (4), cropland (3), sparsely vegetated land (2) and urban ecosystems (2).



Figure 30: ecosystems focused on training experiences

Most respondents were satisfied with the contents of the courses, with 40 respondents strongly agreeing with the proposition *"The training content met my expectations"* and 26 agreeing. Only 1 person disagreed and strongly disagreed with the proposition, and 6 were neutral (fig.31).



Figure 31: satisfaction of respondents on contents of training experiences

According to the previous question, most of the respondents rated as excellent the quality of the courses (45), followed by 20 people who rated it as good, 8 as ok, and 1 as poor (fig.32).



Figure 32: quality of training experiences assessed by respondents

Consequently, 66 respondents affirmed they would recommend courses to their colleagues, 7 did not know, and 1 did not (fig.33).



Figure 33: recommendation of training to colleagues by respondents

Specifically, respondents highlighted as positive aspects of courses the practical activities implemented in the field proposed by the courses, the professional high-quality of teachers, the interactive nature of courses, and the clarity of communicating contents (fig.34).



Figure 34: positive aspects of training experiences identified by respondents

Conversely, respondents identified the necessity to increase practical activities in the field, to favour in-presence activities, to better allocate the time in presenting content, and to prefer the use of local language if attendants are all from the same country as points to be improved (fig.35).



Figure 35: points to be improved identified by respondents

# 3.3.3 Structured Interviews to experts in providing training

Additional inputs were obtained from 4 interviews to experts in the provisioning of training experiences on nature management. In particular, two respondents represented education centres, one a consultancy company and one a university. Respondents are from Austria, Italy, and Spain.

## Importance of training activities for the effective management of protected areas

All respondents confirmed the fundamental importance of training activities to ensure the effectiveness of protected areas management. They are especially important when referring to the management of Natura 2000 sites that non-experts often manage. In particular, respondents highlighted the role of training activities in clarifying the roles and responsibilities of every actor involved in managing protected areas. In this way, *training activities can prevent the emergence of conflicts between managers and actors* who live and work in the area. Training activities represent opportunities to *improve skills, update knowledge, and diffuse innovation* in a broader area. They offer occasions to *exchange knowledge, good practices and share problems and challenges* that must be addressed.

This is why training activities are relevant when they consider their target audience and address needs and problems that are considered relevant to them. Additionally, to be effective, they need to promote the establishment of synergies, interactions, and collaborations between managers and practitioners. Consequently, training activities need to be focused on providing and enhancing *transversal skills like communication, mediation, and group work* to avoid and resolve conflicts that often limit effectiveness in the management of protected areas. Additionally, relevant training activities must *use a practical approach, offering theoretical and practical knowledge* that must be applied in the field to enable learners to replicate what they learned in the protected areas they manage.

## **Characteristics of training activities**

Most of the respondents represented institutions that provide training activities in different forms and with different frequencies. Training activities could be provided once, regularly, and on demand. On-demand courses focus on specific training needs and cover a smaller public. Regular courses, normally proposed yearly, require resources, so they must be funded. If they rely on short-term projects like LIFE projects, they are provided regularly until the end of the project.

Courses could be online and in presence. All respondents provide training activities **using a blended approach**. They underlined the importance of integrating online activities with in-presence experiences such as field exercises allowing people to concretise what they learned and, consequently, replicate new practices in their contexts. They underlined that in-presence courses allow instructors to increase the quality of the training, and online courses enhance attractivity, so there is the need to find the equilibrium between these two aspects, and blended learning is considered a good compromise by all respondents.

*Group work and practical exercises* were considered essential for effective training. *Learning videos* essentially contributed to the attractiveness of courses. Additionally, it is fundamental to consider what is the *target audience* to identify the most suited tools in training. There are occasions in which a more formal style is appreciated (e.g., training activities for decision-makers), others where a more engaging approach is more suitable (e.g., training experiences delivered to the public or students). A respondent highlights that online tools can be used only if all participants can use new technologies because if they are not able, they could be frightened and could decide to avoid following the course, or if they attend, they could not be able to follow.

Respondents provide courses **both in English and national languages**. Using local languages is useful to reach all types of actors involved in managing protected areas. In certain cases it could be even more useful if courses are translated into other official languages (e.g., Catalan in Spain) to better reach people living in the most peripheral areas. On the other hand, providing courses in the English language influences the composition of participants, enlarging the target area of participants (i.e., from one country to all EU countries) but restricting the heterogeneity of actors. Using English does not automatically imply a better course quality, but it reflects the providers' target audience.

Training experiences offered by respondents are *free and paid courses*. Gratuitousness does not limit the quality of training experiences because courses are financed by other resources (e.g., national public resources, EU projects, etc.), but respondents highlighted that ensuring a training experience with periodical updates is difficult to be offered as a free resource. Additionally, they remarked that requiring a financial contribution from participants makes them more interested and involved in the experience.

Participants get a certificate of attendance for all courses provided by respondents. *Certificates help in enhancing the attractivity of the course*, but they are effectively relevant if they have a formal

value (e.g., credits for professionals) or if they give more opportunities to receive public funds (e.g., rural development resources).

# The target audience of training experiences

The target audience addressed by respondents is composed especially of *professionals in the conservation of nature* (e.g., biologists) and *protected areas managers* or *students* aiming to become natural resource managers (e.g., master students in conservation sciences). Respondents highlight the importance of enlarging their target audience by identifying more suitable forms and tools in training activities to include practitioners and the public. In fact, forgotten actors could be considered private local actors who live and work in protected areas. To increase their participation, training experiences need to address their interests by providing new working opportunities or increasing their possibilities of accessing public funding (e.g., rural development funds).

## Relevant themes enhancing training experiences

Respondents underlined the importance and the need to increase training activities aimed to *enhance transversal skills*, like the capacity to collaborate, communicate, and create synergies between managers and practitioners in different aspects such as tourism and recreation. Another important topic that must be addressed through training experiences is the *transmission and diffusion of innovations and best practices*, using practical exercises and the acknowledgement of the legal framework as the bases of the Natura 2000 network. Relevant courses need to *reach a wide audience or be targeted to decision-makers*. They need to be clear with defined objectives and aim to offer new perspectives and ways to see and manage nature conservation to participants.

# Factors contributing to the success of training activities

Respondents identified *several factors contributing to the success of a training experience*. Courses need to be composed of theoretical and practical parts; in this way, the learner can effectively understand and replicate the transmitted knowledge in the field. To be successful, courses are required to deal with relevant challenges, adapt formats and times to the target audience, ensure financial resources for the design and implementation of the training activities, and be provided by good teachers and communicators. They need to be adequately publicised and be clear in their objectives.

## Blended courses: pros and cons

Blended learning activities are becoming the new and main way to deliver training experiences. They represent a new opportunity to train people, reaching a *wider target audience* and *reducing logistic efforts* for participants and providers, but they also represent *new challenges* that require using new methods and tools. Respondents highlighted as a challenge the capacity to transpose courses that were effective in presence in the past as online courses without losing their quality. Online activities require meticulous design and scheduling of the course and technical skills in using new technologies. In addition, online activities need to be more engaging and stimulating because of the absence of physical interaction between learners and instructors. Additionally, they need to be designed considering learners' availability, and they have to respect scheduled times. Finally, another challenge pointed out by respondents is the need to ensure that participants have effectively learned; in this case, in-presence activities, such as field trips, are considered the most suitable tool helping in assessing new knowledge.

# Future challenges

Respondents highlighted future challenges that need to be addressed by future training activities. The first is related to the financing of training opportunities. If they are developed and implemented

as part of short-term projects (e.g., LIFE projects, Interreg projects), they must identify new financial resources to be maintained in the long term. This is not easy, and respondents highlighted the need to develop a network of institutions and bodies involved in training people on nature conservation to share knowledge and resources. Another challenge is related to social values and perception. It highlights the need to value environmental education's role in managing protected areas. Nowadays, managers seem to focus only on technical knowledge and topics without considering and valorising capacity-building aspects.

# **3.4.** Projects focused on training and capacity building

Indeed, at the international level there are a number of institutions that provide training programmes and platforms useful for protected area managers. Well-known examples of international partnerships towards improving capacity are the UN Climate Change Learning Learn" Partnership "UN CC: (https://www.uncclearn.org/), IUCN the Tech4Nature (https://tech4nature.iucngreenlist.org/), or the ConservationTraining.org by The Nature Conservancy and other partner organisations that is a is an open and free learning community that offers conservation-based training materials.

From a general perspective on learning in Europe, interactions and synergies with the EPALE (Electronic Platform for Adult Learning in Europe; https://epale.ec.europa.eu/en) - a European, multilingual, open membership community of adult learning professionals - could be important for capacity-building projects. This platform can help boost training projects and reach the wider public or targeted audiences.

Interestingly, in the Academic world, there are a number of experiences focusing on teaching specifically in protected areas. While few cases have focused on Natura 2000, for example, the Università degli Studi di Padova in the last years has provided a specific module called "Natura 2000 management" in the MSc course of Forest Science. More commonly, these experiences are provided as additional courses, modules or seminars (e.g. BOKU). Furthermore, there were multiple projects that have partially dealt with capacity building and/or provided training experiences (from seminars to platforms). The following lines report a list that is not intended to be complete but to provide examples and useful links for deepening different projects' specificities: MEET Network (https://www.meetnetwork.org/); MED Biodiversity Protection Community - Mainstreaming for biodiversity management efforts environmental sustainability (https://planbleu.org/en/projects/med-biodiversity-protection-community/#).

Through the analysis of the LIFE Programme database, it is possible to identify other projects focused on capacity-building for nature conservation. Specifically, the analysis highlights the existence of 32 LIFE-NAT/GIE/INF projects co-founded from 2010 to 2020. In particular, 27 projects are LIFE-NAT projects characterised by the presence of the words "capacity" and "building" (query 1), and 5 projects are LIFE projects having as a theme "Environmental training - capacity building", 4 are LIFE-GIE projects (i.e., LIFE projects for governance and information of the environment) and 1 is a LIFE-INF project (i.e., LIFE projects for information). Additionally, query 3 selects other 30 LIFE-IPE projects (i.e. Integrated LIFE projects for the environment<sup>14</sup>) focused on Natura 2000 from 2014, the year of their establishment.

Considering this selection of LIFE projects, the analysis of themes allows us to identify LIFE projects which are specifically focused on forest and marine habitats. Specifically, 34% (11 out of 32 projects)

<sup>&</sup>lt;sup>14</sup> Several are ongoing and will provide precious information and data in the future (e.g. LIFE IP GESTIRE 2020 "Nature Integrated Management to 2020"; LIFE14 IPE/IT/000018). LIFE ENABLE - A2 REPORT GAP ANALYSIS

of LIFE-NAT/GIE/INF projects are focused on forest habitats, and 3% (1 out of 32 projects) of LIFE-NAT/GIE/INF projects are focused on marine habitats. Regarding LIFE-IPE projects, 20% (6 out of 30) concern forest habitats, and 17% (5 out of 30 projects) concern marine habitats. Such results show that LIFE projects focused on capacity building tend to work in forest habitats compared to marine habitats, evidencing the higher importance given to forests instead of marine habitats in developing nature conservation and management competencies.

The following word clouds represent themes and keywords used to describe the objectives and activities of LIFE projects. In particular, fig.36 shows themes of selected LIFE-NAT/GIE/INF projects focused on capacity building. It is possible to clearly note the importance of the concept of "forest," evidencing that selected projects work mainly in forest habitats. Additionally, it is possible to understand that such LIFE projects are mainly aimed at developing skills to improve the management of nature (see words like "management" and "public training"), specifically protected habitats, like "forests", "grasslands" and "coasts" or species, like "birds" or "invertebrates". In particular, it is possible to note the importance of inclusive, participatory approaches as indicated by the words "participation" and "stakeholders".

compliance forest coherence ecological grasslands ecological free coastal public training coastal enforcement farmland high fores reduction capacity invertebrates scrublands instruments resources plants Species fisheries stakeholders boss protected DI participation ager ma nature environmental invasive forestry mammals value building

## Figure 36: Word cloud the LIFE projects focused on capacity building

Similarly, fig.37, which highlights keywords used to describe LIFE projects, confirms the tendency of selected LIFE projects to work in forests, to develop capacities able to improve the management and conservation of nature, especially in protected areas, as indicated by the words "protected area", "ecosystems", "forest", "management", "restoration". Also, in this case, keywords highlight the importance of participatory approaches, which can stimulate public awareness and support, reducing conflicts between the local population and protected area managers.



Figure 37: Word cloud with keywords of LIFE projects focused on capacity building.

Thus, the analysis of themes and keywords of selected LIFE-NAT/GIE/INF projects reveals that training activities supported by the LIFE Programme are especially focused on forest habitats and aim to foster inclusive, participatory processes involving not only specific categories of actors (e.g., managers or public institution), but all stakeholders, to stimulate public and shared environmental responsibility.

# Localisation of projects

Fig.38 indicates the numerosity of LIFE-NAT/GIE/INF projects that are implemented in EU countries. It is possible to note *that countries with the most selected projects are especially localised in the European biodiversity hotspots* (e.g., the Black and Mediterranean Seas). In fact, 5 projects are located in Bulgaria, 4 projects are located in Greece and Spain, and 3 are located in Italy, France, and Portugal. Additionally, most Southern European countries are characterised by a reduced number of national resources allocated for nature conservation, so actors proposing environmental actions necessarily use European funds like the LIFE Programme, and consequently, over the years, they have developed skills and capacities in project design which increase probabilities of co-financing.

Considering LIFE-NAT/GIE/INF projects focused on forest and marine habitats, the unique LIFE-NAT project working in marine habitats is located in Spain, projects working in forests are placed in Bulgaria (3), Greece (2), Belgium, Denmark, Germany, Hungary, and Spain (1).



Figure 38: Localisation of LIFE-NAT/GIE/INF focused on capacity building. LIFE ENABLE - A2 REPORT GAP ANALYSIS

Fig.39, which shows the numerosity of LIFE-IPE projects implemented in EU countries, reveals a stable number of 1-2 projects for most EU countries, in accordance with LIFE guidelines which aim to allocate resources equally across European countries for the support of LIFE-IPE projects.



Figure 39: Localisation of LIFE-IPE projects focused on Natura 2000

# Partnerships composition

Selected LIFE-NAT/GIE/INF projects involve 158 partners across EU territories. Some nationalities are more recurrent than others. For example, 18 beneficiaries are Spanish and Greek, 14 are Italian, 13 are French, and 12 are Bulgarian and Swedish (fig.40). Generally, most of the beneficiaries are from South Europe, as already evidenced by the analysis of the localisation of projects.



Figure 40: Nationalities of selected LIFE-NAT/GIE/INF projects beneficiaries.

Selected LIFE-IPE projects involve 320 partners across EU countries. Also, in this case, the numerosity of actors categorised through nationality is very heterogeneous (fig.41). But this result is explained by the relevant differences in the composition of LIFE projects partnerships which could be composed both by a reduced number of partners and by multiple actors.



Figure 41: Nationalities of selected LIFE-IPE projects beneficiaries

Regarding establishing transnational collaborations, the composition of partnerships could help identify what LIFE projects are characterised by the presence of beneficiaries having different nationalities, which could potentially implement or replicate activities broadly increasing the project's impact. The 33% (11 out 32 projects) of selected LIFE-NAT/GIE/INF projects make transnational collaborations. Consequently, 67% (21 out of 32 projects) of their partnerships comprise actors from the same country.

Selected LIFE-IPE projects are composed of 13% (4 out of 30 projects) of transnational partnerships and 87% (26 out of 30 projects) of partnerships characterised by all actors from the same country.

Such results highlight the tendency to confine LIFE project activities focused on capacity building and nature conservation within the national boundaries, revealing the need to foster and support transnational collaborations to diffuse broad impacts and outcomes of activities.

**LIFE e-Natura2000.edu: Supporting e-learning and capacity building for Natura 2000 Managers** The project (https://www.europarc.org/tools-and-training/life-e-natura2000-edu/) explored the potential of building new approaches and methods to improve knowledge and capacity for Natura 2000 site managers in both public and private land. The project has looked at both the knowledge and skills required (what a manager needs to know and be able to do) and tackled methods that can influence the attitude of staff/persons involved in Natura 2000 management, thus promoting a competence-based approach.

A specific mobile App (<u>https://www.europarc.org/news/2020/09/e-natura-2000-app/</u>) connects Natura 2000 managers. One relevant outcome is producing a scientific open-access article delineating success points in developing capacity development projects (Campagnaro, T., McIntosh, N., Trentanovi, G., & Sitzia, T. 2022. Capacity development challenges and solutions for Natura 2000: an approach through blended learning. Oryx, 56(5), 764-773. https://doi.org/10.1017/S0030605322000679).

# 4. Main outcomes

# 4.1. Crucial gaps to be addressed

Results of questionnaires, interviews, and LIFE projects allow for identifying needs or gaps related to training in nature protection and protected areas management.

In particular, participants of training who responded to the questionnaire highlighted the need for deepening topics like the *adaptation to climate change* and the *use and application of technology* in multiple tasks of protected area management, like monitoring and administrative procedures. Participants highlight the need to propose more *practical courses* which offer practical tools to improve the management of protected areas, explain case studies and past experiences and propose field trips and works to apply theory in a real context concretely. In this way, managers could get *references* that could be useful *for replications* in their specific contexts of action.

The need to value courses adopting a practical approach is also confirmed by expert interviews. They underlined the importance of providing practical knowledge that could be replicated in another context, *spreading innovations* through training experiences. Additionally, they remarked that competence-based courses focusing on *transversal skills* like the capacity of communication, mediation, working in groups, and resolving conflicts are fundamental to effectively improving the management of protected areas in Europe.

In addition, participants' answers highlight the need to make training experiences more *inclusive* and involve not only protected area managers but also interested citizens or volunteers. This is why it is important to complement the more technical courses specifically targeted for managers with other courses open to all citizens using local languages (i.e., not only English) and communicating content in a simple and clear way.

From interviews with experts emerges that often "forgotten actors" are the local and private actors working and living in protected areas. This requires new efforts for providers that must identify new ways to propose training activities that private actors could consider attractive. For example, people working in protected areas could be more attracted if they get new work opportunities or priority access to public funding.

**Online methods and tools** are becoming increasingly popular over time, but participants, even if they recognise the strengths of online courses (e.g., time and money saving in travelling), they highlight the *importance of in-presence moments* to discuss and effectively communicate, doing networking and exchanging information and experiences with each other. Accordingly, even if course providers mention the availability of online self-learning courses, participants do not consider them a relevant way to train in nature management. Conversely, they underline the importance of *interaction* during courses which stimulates their active involvement and effective learning. This is why it is important that new training experiences use innovative teaching methods that are not so much utilised (e.g., online gaming, role play) as complementary tools able to enrich the educational experience. Experts remarked on the fundamental role of in-presence activities to assess if participants learn effectively but recognised *blended learning* as a good compromise to reduce logistical efforts and propose high-quality training activities. Online activities are seen as more suited for providing theoretical knowledge, which needs to be complemented by in-presence practical exercises.

Competences less addressed by courses assessed in the questionnaires are related to enhancing personal skills for effective performance and leadership and to efficiently using financial resources or identifying financial opportunities.

Analysing selected LIFE projects working on marine and forest habitats or focusing on capacitybuilding highlights gaps that need to be addressed in the future.

Firstly, most LIFE projects aim to stimulate awareness and active participation of local communities, but very often, *local stakeholders are not included as beneficiaries in LIFE projects*, meaning they risk being only a target group for communication and dissemination campaigns despite their fundamental role in managing areas where they live and work even after the end of the project, and their knowledge on local specific needs, traditional practices, and culture.

Additionally, the analysis of LIFE project partnerships highlights the tendency to make collaborations, especially within national borders, evidencing a *reduced number of transnational projects*. Specifically, beneficiaries are especially from the Mediterranean countries (e.g., Italy, Spain, France, Greece, Portugal) and from Eastern Europe (e.g., Bulgaria, Romania), which propose multiple, sparse, and independent LIFE projects around the EU territory.

Focusing on habitat addressed by selected LIFE projects results make clear that in the last programming period, the attention was concentrated more on forest habitats than marine habitats. In fact, it is possible to identify *more projects focused on forests than on marine habitats*. This trend is also confirmed by considering that some marine regions' conservation status is already unknown.

Finally, capacity development is needed to favour the production of management plans and appropriate conservation objectives and measures, as well as implementing restoration and conservation actions.

## TOP 5 topics currently lacking capacity building but merit attention

The analysis of questionnaires about previous training experiences on nature conservation and management allows missing topics that would not have been sufficiently addressed by previous courses to be identified. Generally, answers to open questions by both providers and participants highlighted the need to deepen topics like the *use and application of technology* to enhance the effectiveness of nature management and to focus more on *new challenges due to climate change*. Providers and participants also express the need to propose field trips/works to make the course *more practical*. Specifically, below are listed the 5 less addressed skills.

# Field/watercraft and site maintenance.

Conducting fieldwork and site maintenance tasks correctly, safely and securely.

# Advanced personal competencies.

Personal skills and behaviours required for effective performance and leadership.

# Human resource management.

Establishing an adequate, competent, well-managed and supported workforce for Protected Areas and Natura 2000 sites.

# Financial and operational resources management.

Ensuring that Protected Areas and Natura 2000 sites are adequately financed and resourced and that resources are effectively and efficiently deployed and used.

# 4.2. Synergies and opportunities

Findings evidenced by these multiple analyses allowed us to detect synergies and opportunities to improve future training experiences.

Results show the important role of *new teaching approaches*, which increase and sustain an active involvement of participants during courses. Blended learning appears to be the most suited way to combine the need to save time and resources and expand the target area of the audience without compromising opportunities to exchange ideas and have discussions with providers and other participants. Nevertheless, they imply new challenges like identifying methods able to replicate effective in-presence activities in the past as online courses, and they require new skills in managing new technologies. New online tools like shared boards or online quiz platforms could be useful to enhance interactions between participants during online sessions that need to be complemented with in-presence activities like field trips. Showing best practices and proposing new concrete ways to deal with challenges could be useful to increase the effectiveness of courses, especially if proposed tools/approaches could be replicated in the contexts where participants work. In this way, spreading best practices identified in previous experiences in a wider area is possible, making the course more practical and useful. Field activities could be a valuable tool to support such a process. Consequently, *blended learning, combining online sessions and field trips, represents an interesting opportunity for effectively addressing the training needs of protected areas managers*.

Focusing on *participants' personal skills* is a key aspect that needs to be considered in training experiences. At present, training experiences focused on the development of transversal skills are considered the most relevant to improve nature management. Empowering participants by offering opportunities to enhance their competencies is required to support the improvement of protected areas management. Personal skills include, e.g., the innovative and effective use of technology, identifying financing sources and their management, effective communication and mediation in resolving conflicts, and team building. Accordingly, deficiency of capacities in managing protected areas is considered one of the drivers of biodiversity degradation in the EU, as well as unsustainable forest practices which affect forest-dependent breeding birds and other species like arthropods, mammals, and non-vascular plants.

*Inclusiveness* is another factor that needs to be considered and valorised when proposing training activities. Results about typologies and jurisdictional levels of LIFE beneficiaries highlighted that local stakeholders are not sufficiently involved in the active design, proposal, and implementation of LIFE projects, even if they have a fundamental role in achieving the effectiveness of interventions because they are directly positively or negatively affected by project outcomes, and because of their knowledge on local needs, culture, and activities. Expert interviews also confirm this tendency. The reduced involvement of local actors is probably due to low capacities, which limit their participation in European projects, evidencing the need to empower local actors by offering opportunities to develop their personal skills, allowing them to be more actively involved in European projects like LIFE or Interreg projects. Additionally, training activities must be more attractive for local private actors offering new working opportunities or giving preferential access to public funding (e.g., rural development fund).

Training experiences are requested to valorise the *transnational collaboration*, which is currently low. LIFE project partnerships are often composed of beneficiaries from the same countries and implement activities only within the national borders. Proposing training activities that bring together multiple and different actors from different countries and geographical areas could be seen as a catalyst for future transnational collaborations. Proposing spaces for discussion and exchanging ideas or experiences between people working across the EU territory could be useful for broadly diffusing best practices and project results or for identifying innovative solutions that emerged from the combination of different perspectives. Additionally, transnational projects could better address the need to improve the ecological connectivity of the Natura 2000 network across the EU territory.

*Marine and forest habitats are two key types of habitats* that need to be considered when dealing with protected areas management and, consequently, with the proposal of training experiences for protected areas managers. In previous years, nature protection activities did not sufficiently consider marine habitats. In fact, at present, the conservation status of some marine regions and species (e.g., marine mammals) is unknown, calling for additional efforts to enhance knowledge on marine habitats and, consequently, to propose to protected areas managers an effective framework for their protection and management. On the other hand, forest habitats are very often the context of intervention of environmental activities like LIFE projects, but, at present, the conservation status of forest habitats and species covered by EU nature legislation shows no significant signs of improvement. Conversely, forest practices are considered important pressures for biodiversity quality in forests, revealing the need to continue to enhance the skills of managers who, at present, are generally unable to protect and restore forest habitats.

# Appendix

# App.1. Online questionnaires template

# **QUESTIONNAIRE – PROVIDERS**

#### **Contact Information**

Name and Surname

- Organisation
- •Job Title
- •Gender (optional)
- •Country
- •E-mail

## Respondents' data

I'm answering these questions

- As an individual Natura 2000 or Protected Area management trainer (.e.g. holding one lecture within a larger course)
- As representative of a training institution for Natura 2000 or Protected Area management training
- Other (please specify)

#### Courses' data

Please provide the name and web link (if available) of the latest five training(s) in Protected Area / Natura 2000 management you offered in the past five years. List them from the most related to the least related to Natura 2000:

- ➤ Training 1
- ➤ Training 2
- ➤ Training 3
- ➤ Training 4
- ➤ Training 5

I will answer the following questions for

- ➤ Training 1
- ➤ Training 2
- ➤ Training 3
- ➤ Training 4
- ➤ Training 5

How much was Natura 2000 part of the training?

- > The training focused on Natura 2000
- Natura 2000 was part of the training
- > The training did not cover Natura 2000

➤ I don't know

On which ecosystems did the training focus?

- Woodland and forest
- ≻ Marine
- ≻ Urban
- ➤ Cropland
- Grassland
- Heathland and shrub
- Sparsely vegetated land
- ➤ Wetlands
- Rivers and lakes
- > The training did not focus on a specific ecosystem or ecosystems
- ➤ I don't know

What did the training focus on? (for example general historical or policy contexts of Natura 2000 and/ or Protected Areas etc.)

Open-Ended Response

What were the competencies (see Natura 2000 competencies) addressed by the training?

- None of the above
- Protected area policy, planning and projects (PPP) [Providing strategic and rationally planned framework for Protected Area and Natura 2000 governance and management.]
- Organisational leadership and development (ORG) [Establishing and sustaining wellgoverned, managed and led organisations for Protected Area and Natura 2000 management.]
- Human resource management (HRM) [Establishing an adequate, competent, well-managed and supported work force for Protected Areas and natura 2000 sites.]
- Financial and operational resources management (FRM) [Ensuring that Protected Areas and Natura 2000 sites are adequately financed and resourced, and that resources are effectively and efficiently deployed and used.]
- Administrative documentation and reporting (ADR) [Establishing and implementing procedures for information management, documentation and reporting.]
- Communication and collaboration (CAC) [Building and using the skills required to communicate and collaborate effectively.]
- Biodiversity conservation (BIO) [Ensuring the maintenance of the ecological values of Protected Areas and Natura 2000 sites through management and monitoring of species, their habitats, ecosystems and natural resource use]
- Upholding laws and regulations (LAR) [Ensuring that laws, regulations, and rights affecting Protected Areas and Natura 2000 sites and biodiversity are upheld.]
- Local communities and cultures (COM) [Establishing systems of Protected Area and Natura 2000 governance and management that address the needs and rights of local communities
- Tourism, recreation and public use (TRP) [Providing environmentally and economically sustainable tourism and recreation opportunities in and around Protected Areas]
- Awareness and education (AWA) [Ensuring that local stakeholders, visitors, decision makers and the wider public are aware of Protected Areas and Natura 2000 sites, their purpose and values, and how they are governed and managed.]

- Field/water craft and site maintenance (FLD) [Conducting field work and site maintenance tasks correctly, safely and securely]
- Technology (TEC) [Using technology to support Protected Area and Natura 2000 management]
- Foundation personal competences (FPC) [Fundamental personal skills and behaviours required for day-to-day protected area work]
- Advanced personal competences (APC) [Personal skills and behaviours required for effective performance and leadership]
- ➤ I don't know
- Other (please specify)

Was the training developed and provided as part of a project?

- > Yes (If yes, please provide a web link or other reference to the project)
- ≻ No
- ➤ I don't know

Who was the training designed for? [Tick all that apply]

- Administrative staff
- Protected Area managers
- ≻ Natura 2000 managers
- Practitioners such as rangers
- Interested citizens
- ➤ Students
- ≻ NGOs
- Other (please specify)

The training is/was provided

- ➢ On a regular basis
- ≻ Once
- ➤ On demand
- ➤ I don't know
- Other (please specify)

How was the training delivered? [Tick all that apply]

- ≻ Webinar
- ≻ Seminar
- Networking event
- Single academic course/module
- Online self-learning course
- Online-tutorized learning courses
- Blended learning (online and face-2-face)
- Single or multiple field visits
- Full study programme
- As a part of an academic course
- Other (please specify)

What tools/approaches were used during the training? [Pick all that apply.]

▹ Presentations

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- ➤ Online gaming
- ≻ Role play
- ➤ Group work
- Practical workshop
- Questionnaires Mentoring
- Personal essays
- Peer-to-peer evaluation
- ➤ Teaching videos
- ≻ Quizzes
- ➤ Final exam
- ➤ Interim assignment
- ≻ Other (please specify)

In which language was the training provided?

- ➤ I don't know
- ≻ Bulgarian
- ≻ Croatian
- ≻ Czech
- ≻ Danish
- ≻ Dutch
- ≻ English
- ≻ Estonian
- ≻ Finnish
- ≻ French
- ≻ German
- ≻ Greek
- ➤ Hungarian
- ≻ Irish
- ≻ Italian
- ≻ Latvian
- ≻ Lithuanian
- ≻ Maltese
- ≻ Polish
- ➢ Portuguese
- ≻ Romanian
- ≻ Slovak
- ➤ Slovenian
- ➤ Spanish
- ≻ Swedish

Was the training free?

- ≻ Yes
- > No (If not, how much did it cost?)
- ➤ I don't know

Was there a certificate for completion to address students' progress?

- ≻ Yes
- ≻ No
- ➤ I don't know

Was the participants' satisfaction with the training assessed?

- ≻ Yes
- ≻ No
- ➤ I don't know

Is the training still being offered?

- ≻ Yes
- ≻ No
- ➤ I don't know

Are you considering any change/improvement?

- > Yes (If yes, please specify the types of changes planned)
- ≻ No

Have you heard about the smartphone App eNatura2000?

- ≻ Yes
- ≻ No

•Yes, I agree to being contacted by the project team by e-mail to talk about the other Protected Area and/or Natura 2000 management trainings offered.

•Yes, I would like to receive updates by e-mail about the LIFE ENABLE project.

•Anything else you would like to tell us about or ask?

#### **QUESTIONNAIRE – PARTICIPANTS**

**Contact Information** 

- Name and Surname
- Organisation
- •Job Title
- •Gender (optional)
- •Country
- •E-mail

#### Respondents' data

Did your academic studies (pre-work learning) somehow include training on Natura 2000 or Protected Area management practices?

- ≻ Yes
- ≻ No
- I don't remember

How much of your studies (pre-work learning) did include training on Natura 2000 or Protected Area management practices?

- ▹ Less than 30 %
- ≻ Between 30 and 50 %
- ▹ Between 50 and 70 %
- ▹ More than 70 %
- ➤ I don't know

Which subjects related to Natura 2000 or Protected Area management were included?

> Open-Ended Response

Have you participated in any training(s) regarding Protected Area or Natura 2000 management after you started your professional career?

- ≻ Yes
- ≻ No
- ➤ I don't know

#### Courses' data

Please provide the name of the training(s) in Protected Area or Natura 2000 management you participated in [if you participated in more than one training, please list the trainings from the most recent and relevant to the least recent and relevant to Natura 2000]:"

- ➤ Training 1
- ➤ Training 2
- ➤ Training 3
- ➤ Training 4
- ➤ Training 5

Please provide a web link (if available) of the training(s) in Protected Area or Natura 2000 management you participated in:

- Training 1
- Training 2
- ➤ Training 3
- ➤ Training 4
- ➤ Training 5

I will answer the following questions for ...

- ➤ Training 1
- ➤ Training 2
- ➤ Training 3
- ➤ Training 4
- ➤ Training 5

How much of the training was related to Natura 2000?

> The training focused on Natura 2000

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- Natura 2000 was part of the training
- > The training did not cover Natura 2000
- ➤ I don't know

Was the training developed and provided as part of a project?

- > Yes (If yes, please provide a web link or other reference to the project)
- ≻ No
- ➤ I don't know

In which language was the training provided?

- ➤ I don't know
- ≻ Bulgarian
- ≻ Croatian
- ≻ Czech
- ≻ Danish
- ≻ Dutch
- ≻ English
- ≻ Estonian
- ≻ Finnish
- ≻ French
- ≻ German
- ≻ Greek
- ➤ Hungarian
- ≻ Irish
- ≻ Italian
- ≻ Latvian
- ≻ Lithuanian
- ≻ Maltese
- ≻ Polish
- ➢ Portuguese
- ≻ Romanian
- ≻ Slovak
- ➤ Slovenian
- ➤ Spanish
- ≻ Swedish

In which year did the training take place?

- ≻ 2022
- ≻ 2021
- ≻ 2020
- ≻ 2019
- ≻ 2018
- ≻ 2017
- ≻ 2016
- ≻ 2015
- ≻ 2014
- ≻ 2013

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- > 2012
- ≻ 2011
- > 2010
- ≻ 2009
- ≻ 2008
- ≻ 2007
- ≻ 2006
- > 2005
- ≻ 2004
- ≻ 2003
- > 2002
- > 2001
- > 2000
- ≻ 1999
- > 1998
- ≻ 1997
- ≻ 1996
- > 1995
- > 1994
- > 1993
- ≻ 1992
- ➤ I don't know

How long was the training experience?

- ➤ Less than 1 day
- ➤ 1 to 3 days
- ≻ Approximately 1 week
- Between 1 week and 1 month
- Between 1 month and 1 year
- ▹ More than 1 year
- ➤ I don't know

How was the training delivered?

- ≻ Webinar
- ≻ Seminar
- Networking event
- Single academic course/module
- Online self-learning course
- Online-tutorized learning courses
- Blended learning (online and face-2-face)
- Single or multiple field visits
- ➤ Full study programme
- > As a part of an academic course
- Other (please specify)

What did the training focus on? (for example general historical or policy contexts of Natura 2000 and/ or Protected Areas, conservation measures, monitoring, participatory approaches, use of communication tools etc.)

Open-ended Response
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What were the competencies (see Natura 2000 competencies) addressed by the training?

- None of the above
- Protected area policy, planning and projects (PPP) [Providing strategic and rationally planned framework for Protected Area and Natura 2000 governance and management.]
- Organisational leadership and development (ORG) [Establishing and sustaining wellgoverned, managed and led organisations for Protected Area and Natura 2000 management.]
- Human resource management (HRM) [Establishing an adequate, competent, well-managed and supported work force for Protected Areas and natura 2000 sites.]
- Financial and operational resources management (FRM) [Ensuring that Protected Areas and Natura 2000 sites are adequately financed and resourced, and that resources are effectively and efficiently deployed and used.]
- Administrative documentation and reporting (ADR) [Establishing and implementing procedures for information management, documentation and reporting.]
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- Awareness and education (AWA) [Ensuring that local stakeholders, visitors, decision makers and the wider public are aware of Protected Areas and Natura 2000 sites, their purpose and values, and how they are governed and managed.]
- Field/water craft and site maintenance (FLD) [Conducting field work and site maintenance tasks correctly, safely and securely]
- Technology (TEC) [Using technology to support Protected Area and Natura 2000 management]
- Foundation personal competences (FPC) [Fundamental personal skills and behaviours required for day-to-day protected area work]
- Advanced personal competences (APC) [Personal skills and behaviours required for effective performance and leadership] I don't know
- Other (please specify)

On which ecosystems did the training focus?

- Woodland and forest
- ≻ Marine
- ≻ Urban
- ➤ Cropland
- ➤ Grassland
- Heathland and shrub
- Sparsely vegetated land
- ➤ Wetlands
- Rivers and lakes

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- > The training did not focus on a specific ecosystem or ecosystems
- ➤ I don't know

The training content met my expectations.

- Strongly disagree
- ≻ Disagree
- ≻ Neutral
- ≻ Agree
- ➤ Strongly agree

How would you rate the overall quality of the training?

- ➤ Poor quality
- ≻ Ok
- Good quality
- ➤ Excellent quality

Would you recommend the training to colleagues?

- ≻ Yes
- ≻ No
- ➤ I don't know

Can you rank three aspects of the training that you liked most?

- ➤ Aspect 1
- > Aspect 2
- > Aspect 3

What would you change about the training if you could?

> Open-ended Response

Have you heard about the smartphone App eNatura2000?

- ≻ Yes
- ≻ No

•Yes, I agree to being contacted by the project team by e-mail to talk about my experience as a participant in the other Protected Area and/or Natura 2000 management training(s).

•Yes, I would like to receive updates by e-mail about the LIFE ENABLE project.

•Anything else you would like to tell us about or ask?

#### Introduction

The aim of this series of interviews is to gather information on existing training programmes, modules or seminars on topics relevant to Natura 2000 or other protected area managers, as well as

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on the prerequisites for successful training offers in general.. It is part of the three-year LIFE ENABLE project designed to build practical nature management capacity.

#### About the project: Creating the European Nature Academy for Applied Blended Learning

Within <u>LIFE ENABLE</u>, a multinational team from seven European countries led by the EUROPARC Federation is collaborating to create the European Nature Academy for Applied Blended Learning, an online learning and networking platform. The Academy aims to empower all Protected Area and Natura 2000 managers to become more effective, competent and confident nature management professionals.

#### Your contribution

We greatly appreciate your input since it helps us shape the European Nature Academy and will allow us to identify potential gaps that need to be addressed by the European Nature Academy. The Academy's aim is to build links and create synergies to existing training programmes. Reported training events will be listed in the project's report on existing experiences.

#### **Data protection**

Data collected through this interview will be treated confidentially and anonymously for the purposes of LIFE ENABLE project research, in compliance with the General Data Protection Regulation (GDPR), Regulation (EU) 2016/679.

# App.2. Interview Guideline on Natura 2000 and Protected Area Management Trainings

Hereafter the main questions are reported. These were given as an indication to carry out the interviews.

What do trainings on PA management mean to you? Do you offer trainings on Protected Area management? Do you participate in trainings?

Are trainings relevant to your employees?

Which trainings on Protected Area management do you know?

Which do you think are the most relevant? Why?

Regarding the single trainings: which role does N2000 play there?

the focus lies there – is part of it – is not relevant – I don't know

Does the training focus on certain ecosystems? (list)

Does the training focus on certain competences? (maybe list)

Does the training focus on special issues?

Does the training take place regularly/once/on demand? Does this impact the quality of the training?

In which form does the training take place? For example, as a webinar, ... (maybe list). Does this impact the quality of the training? Does this impact the attractiveness of the training?

Which tools/approaches are used in the training? (list) Do they impact the quality of the training? Do they impact the attractiveness of the training?

In which language is the training held? Does this impact the quality of the training? Does this impact the attractiveness of the training?

Is the training for free? Does this impact the quality of the training? Does this impact the attractiveness of the training?

Do participants get a certificate of completion? Does this impact the quality of the training? Does this impact the attractiveness of the training?

Is the training assessed by the participants? Does this have consequences for the design of the training?

Does the training target certain target groups? Does it attract them successfully?

Are there any target groups who have been "forgotten" so far who would be important for a successful implementation of N2000?

Which topics and issues regarding N2000 / protected area management are currently missed out on
and would require more attention?

More general speaking: Which trainings are most valuable for you? Why?

What are criteria for successful training?

What is the most important thing to be considered when offering online training(s)?

What are your struggles / challenges offering online training? Would you like to add something for the research team?