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GUIDELINES FOR

DEVELOPING MANAGEMENT PLANS FOR EMERALD SITES IN THE REPUBLIC OF MOLDOVA

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Abbreviations and acronyms

EEA	European Environment Agency
EU	European Union
EU4Environment	The “European Union for Environment” (EU4Environment) Action
FE	Forest Enterprise
GBF	Global Biodiversity Framework
GIS	Geographic Information System
NBSAP	National Biological Diversity Strategy and its Action Plan
NGO	Non-governmental Organization
OECD	Organisation for Economic Co-operation and Development
PA	Protected Area
SDF	Standard Data Form
SPNA	Special Protected Natural Area
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization

Executive Summary

Introduction

Moldova acceded to the Bern Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) on May 24, 1994, which entered into force in the country in the same year. In 2000, the country began the first projects that would lead to the creation of the Emerald Network in the Republic of Moldova. The Emerald Network itself was only legally established in 2017 through the modification of Law 94/2007 regarding ecological networks. In 2023, the law was updated with additional provisions provided by the Council Directive 92/43/EEC of May 21, 1992, on the conservation of natural habitats and of wild fauna and flora. The provisions include, among others, an appropriate assessment procedure definition, evaluation of the types of natural habitats and species of wild flora and fauna, an Emerald Network sites register, Emerald Network site management plan, monitoring the state of conservation of natural habitat types and wild flora and fauna species within the Emerald Network.

According to Article 124 of Law 94/2007, the Ministry of Environment needs to ensure the development of the management plans for all Emerald sites in Moldova within 10 years. The plans must be developed according to the guidelines for the Emerald site management plans and approved by the minister's order. The management plans can be set separately for each Emerald site or for those with similar natural characteristics. The Article also includes mandatory information that must be included in the management plans.

The guidelines for developing Emerald site management plans in Moldova derive from a reference framework developed by the World Bank in the frame of the EU4Environment project. It is recommended that each Emerald site adapt to this framework according to its specific characteristics, including the type and number of protected areas included in the site, available data, complexity, size, and conservation challenges. The document provides the methodological elements necessary for developing or revising the management plans for the bodies authorized and involved in Emerald site management. It includes the legal provisions of Moldova and the commitments undertaken through ratifying international treaties and conventions.

The document consists of two parts. The first part outlines the steps and approaches to ensure development and precede management plan approval. The second part provides a suggested framework of how the management plans should look regarding structure and content.

Based on best EU practices (namely, the Natura 2000 sites), the provided information considers the country's socioeconomic conditions and conservation priorities. Given that Moldovan environmental authorities plan to review the conservation agenda with particular emphasis on key biodiversity areas, this document can help in properly design and implement an effective Emerald Network management plan that will help achieve the desired level of conservation of species and habitats of European significance.

Key findings

Moldova authorities have plans to expand the Emerald network in Moldova. The PA system is expected to increase through the designation of new categories in parallel with the revision of the policy framework, primarily the central Law 1538/1998.

The national Global Biodiversity Framework (GBF) target is 8 percent of Moldova territory to be covered by protected areas by 2030 and, if expanded, the Emerald Network can reach an area of at least 365,536 hectares, or 10.8 percent of Moldovan territory.

Stakeholder engagement and public participation are crucial elements in the management plan development process and gaining public support is a prerequisite for success. It is vital to engage with local communities—including women and youth interacting permanently with local nature through livelihoods obtained from species use or harvesting—as it may affect their livelihoods and use rights.

Conservation biology expertise is crucial in management plan development for achieving conservation goals.

Conservation biology is a relatively new science that appeared as a response to a global loss of biodiversity caused mainly by humans. Such assessments and considerations are essential to understanding the effects of human activities on organisms, communities, and ecosystems and developing practical science-based approaches to protect and restore ecosystem health.

Information in the management plans should be accurate and grounded in reality. The proposed data collection framework and subsequent monitoring should be generic, flexible (which facilitates the incorporation of improvements without losing or diminishing its effectiveness), dynamic (for continuous monitoring and adjustment), and realistic (to achieve environmental and socioeconomic sustainability).

Pressure and threats are some core elements of management plans that can help develop proper conservation measures for the Emerald sites. Threat assessments should include the site's existing activities and their influence and impact on the species and habitats, and analyze tourism and existing routes as a potential pressure element on the Emerald site.

Capacity building, awareness raising, and educating multiple stakeholders will contribute to implementing and achieving the planned results, including the setup of conservation measures within the management plan. Management plans must contain proper budgeting and financial planning for all foreseen activities and actions.

Recommendations

The guidelines do not have specific policy recommendations but provide helpful tips for authorities to consider when elaborating on management plans, implementing them, and applying conservation measures to species and habitats of the Emerald Network in the country. The following recommendations are found throughout the document:

- To ensure proper conservation, expand the Emerald Network beyond the protected area system by encompassing additional areas. Continually investigate the Emerald Network to discover new areas suitable for conservation by species and habitats listed by the Bern Convention.
- Involve relevant stakeholders, including landowners, managers, users, local communities, and NGOs during the development, approval, and implementation of the management plans, in a fair and participatory way in line with the Aarhus Convention and in accordance with national procedures.
- Treat climate change as one of the core elements within the management plan and consider it when proposing conservation measures.
- Develop management plans for a realistic timeline with subsequent renewals and updates.
- Gather and include accurate data and information in the management plans and avoid purely theoretical descriptions.
- Basic information comes from the Standard Data Form (SDF) of the site in the Emerald Network. The newly collected data in the framework obtained during management plan development serves to update the data in the SDF, ensuring harmonization of the available data.
- Treat each Emerald site as an essential area for conserving species and habitats and developed according to its specific biota and local conditions.
- Monitor the conservation objectives, such as the biological components, number of animals, plants, and habitats, and conservation measure implementation, such as undertaken works and actions to achieve the conservation objectives.

Introduction

Biodiversity generates indispensable benefits and ecosystem services. The protected area system is the cornerstone of biodiversity conservation but cannot protect valuable species and their habitats by itself. The Emerald Network is another instrument to ensure long-term conservation, going beyond the protected areas system to reduce threats to key species and their habitats. Agroecosystems dominate Moldova, where biodiversity must coexist with the continuous pressures from increased human activity. The EU4Environment program now funds the Emerald Network advancement into the country and its implementation process.

These guidelines aim to assist Moldovan stakeholders—primarily environmental authorities and designers of strategic biodiversity-related management documents—with necessary informational and technical support for developing Emerald site management plans. The first part of the document identifies the steps and approaches needed to ensure the development, and precede the approval, of management plans. The second part provides a suggested framework of how the management plans should look in terms of structure and content.

The provided information is based on best EU practices (namely with Natura 2000 sites) and considers the whole range of the country's socioeconomic conditions and conservation priorities. Given that Moldovan environmental authorities plan to review the country's conservation agenda with particular emphasis on key biodiversity areas, this document can help them properly design and implement an effective Emerald Network management plan to achieve the desired level of conservation of species and habitats of European significance.

Part I: Guiding the Preparation and Development of Management Plans for Emerald Sites in Moldova

Part I of the document addresses what an Emerald Network is, globally and locally, as well the considerations for management plan design before strategic documentation is developed and approved.

What is the Emerald Network

The Emerald Network is an ecological system of sites made up of Areas of Special Conservation Interest with the main objective of ensuring the long-term survival of species and habitats. It is a conservation tool launched in 1989 by the Council of Europe as part of its work under the Bern Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) that came into force on June 1, 1982.[1]

The Eionet Central Data Repository[2] contains the database and Geographic Information System (GIS) mapping of the boundaries for Emerald sites, habitats, and species. The SDF is a reference document for species and habitat coding and is available at the Emerald Network Reference Portal.[3] To assess the extent to which a list of proposed Emerald Network sites contributes towards this objective, an evaluation of the proposed sites on a biogeographic basis (or a country basis in the case of birds) has been carried out. Consolidated conclusions for each habitat and species listed in the Bern Convention Resolutions 4 and 6 respectively, are available from the Bern Convention website.[4]

The Emerald Network Barometer provides an overview of the Emerald Network in non-EU Contracting Parties to the Bern Convention regarding the number and area of terrestrial and marine sites. The barometer contains tabular and spatial data delivered by Contracting Parties and reflects the indicators of the monitoring framework of the Emerald Network, including the national coverage of all categories of sites, the sufficiency index, the national coverage of only adopted sites, and the proportion of sites with management plans.[5]

The Emerald Network Viewer[6] is a public online tool developed with the support of the European Environment Agency (EEA) and the European Union (EU), which enables users to locate and visualize—with different types of backgrounds—the candidate and officially adopted sites by 18 Contracting Parties or Observers to the Bern Convention that currently implement the network. It is a valuable tool for all stakeholders interested in ecological networks and biodiversity conservation but is also useful also for land-use planners, policymakers, scientists, and academics. The Emerald Network Viewer complements the Natura 2000 Viewer, which focuses on the conservation areas designated under the European Union's Natura 2000 Network.

The Emerald Network in Moldova

Moldova has made substantial progress by including 61 sites with a total area of 277,900 hectares into the Emerald Network, corresponding to 8.21 percent of the country's territory. A total number of 32 habitats and 167 Emerald species have been recognized present in Moldova's continental and steppic biogeographic regions.

The European Environment Agency - jointly with the Council of Europe and with financial support from the EU Neighborhood Partnership Program - supported Emerald Network development in the country between 2009 and 2016 as discussed on the Bern Convention's website.[7] The result was a national database for Emerald Network sites, species, and habitats protected under the Bern Convention. The habitats of European importance have already been identified based on the EUNIS Habitats Manual[8] and on the interpretation manual of the habitats listed in Resolution No. 4 (1996).[9]

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[1] See https://www.coe.int/en/web/bern-convention/emerald-network
[2] Eionet Central Data Repository. Available at: http://cdr.eionet.europa.eu/
[3] Convention on the Conversation of European Wildlife and Natural Habitats Emerald Network Portal. Available at: https://www.coe.int/en/web/bern-convention/emerald-network-reference-portal
[4] Conclusions of the biogeographical evaluation seminars. Available at: https://www.coe.int/en/web/bern-convention/conclusions-of-the-biogeographical-seminars
[5] The Emerald Network Barometer. Available at: https://www.coe.int/en/web/bern-convention/emerald-network-barometer
[6] The Emerald Network Viewer. Available at: https://www.coe.int/en/web/bern-convention/emerald-viewer
[7] Emerald Network of areas of special conservation interest. Available at: https://www.coe.int/en/web/bern-convention/emerald-network
[8] EUNIS (European Nature Information System) habitat database. Available at: https://eunis.eea.europa.eu/habitats.jsp
[9] Evans D. and Rockaerts, M. 2019. "Interpretation manual of the habitats listed in Resolution No. 4 (1996) listing endangered natural habitats requiring specific conservation measures." 4th draft version. Available at: https://rm.coe.int/interpretation-manual-of-the-habitats-listed-in-resolution-no-4-1996-/168098c68c

The Emerald Network's development in Moldova and in the region continues through the EU4Environment Result Area 4. These guidelines are only a part of the larger set of activities aimed at supporting Moldovan authorities and ensuring more considerable stakeholder involvement in this process.

Emerald species and habitat representatives

The majority of the identified 167 species belong to the animal kingdom (Table 1).[10] Birds are the most representative taxa, followed by invertebrates where insects dominate. The complete list of species and habitats within 61 designated sites can be found at the Moldovan entry in the Eionet Central Data Repository.[11]

Table 1: Number of species listed in Resolution No. 6 (1998) and Habitats of Resolution No. 4 (1996) in the Emerald Network (by December 2023, further expansion may result in new additions)

Groups	Plants	Animals					
		Mammals	Birds	Reptiles	Amphibians	Fish	Invertebrates
Number of species	16	14	84	3	3	21	26

Many listed species are either endangered or threatened, including the lady's-slipper orchid (*Cypripedium calceolus*), the barbastelle bat (*Barbastella barbastellus*), the large copper butterfly (*Lycaena dispar*), and the black woodpecker (*Dryocopus martius*). Moldova has more than 257 species of resident and migratory birds, with more than 80 of them occurring in wetland areas still present along water bodies. In the Emerald Network, spatial data provides a tool to identify and monitor *in situ* conservation and to assess threats to biodiversity and ecosystems supported by the UN Biodiversity Lab.[12]

Below are two examples of the Emerald sites that provide habitats for several rare and protected species:[13]

- **Example 1:** The Etulia Protected Area protects the great egret (*Ardea alba*), a key Emerald species. It feeds mainly on fish, frogs, small mammals, and occasionally reptiles. Protecting its natural habitat is vital for the survival of its populations in the southern Moldova and in the bordering districts of Ukraine. [13]
- **Example 2:** The Canyon Vărăncău Protected Area is home to many key Emerald species, among them two large butterfly species, the old-world swallowtail (*Papilio machaon*) and the scarce swallowtail (*Iphiclides podalirius*). The site is a good indicator of relatively well-preserved grassland habitats within forest-steppe vegetation, all surrounded by agricultural fields, some of which are abandoned, with spontaneously vegetation spreading.[13]

Plans to expand the Emerald Network in Moldova

Moldovan authorities plan to enhance conservation efforts, including expanding the current protected area system and proposing new Emerald sites once a full assessment of available possibilities is complete.

The protected areas system should increase through new category designations in parallel with the revision of the policy framework, primarily the main Law 1538/1998. The national Global Biodiversity Framework (GBF) set a target of 8 percent of the territory of Moldova to be covered by various categories of protected areas by

[10] Conclusions of the biogeographical evaluation seminars: Convention on the Conservation of European Wildlife and Natural Habitats. Available at: Conclusions of the biogeographical evaluation seminars - Convention on the Conservation of European Wildlife and Natural Habitats (coe.int)
[11] Eionet Central Data Repository Moldovan Emerald Network sites. Available at: https://cdr.eionet.europa.eu/md/bc/emerald/envwkoxpg/
[12] UN Biodiversity Lab. The Moldovan Emerald Network. Available at: https://unbiodiversitylab.org/es/moldova-increases-protected-areas-in-the-emerald-network-2/
[13] UN Biodiversity Lab. Combatting Biodiversity Loss through the Emerald Network. Available at: https://app.mapx.org/static.html?project=MX-PCT-RJS-KW6-SGU-IP1&views=MX-TV4I8-4WE5P-FEP02&storyAutoStart=false&language=en&theme=color_light.

2030.

If expanded, the Emerald Network can cover an area of at least 365,536 hectares, or 10.8 percent of the country's territory.

Protected area system overlapping with the Emerald Network: key species

The current protected area system covers nearly 5.8 percent of Moldova's territory, consisting of 313 areas, 158 containing secular trees and 472 rare species of flora and fauna. The Emerald Network goes beyond the protected areas system to ensure proper conservation by encompassing additional areas needed for that purpose (the overlap between the protected areas system and the Emerald Network is now 27 percent). The Emerald Network expansion is subject to continuous investigation that can bring new areas suitable for conservation in accordance with species and habitats listed by the Bern Convention (see Figure 1 for the Emerald Network in Moldova, 2020 up to date).

As a small landlocked country that relies heavily on agriculture, Moldova harbors rich biota with edge populations of high significance for genetic conservation. Forest-type formations, composed of native populations of European beech (*Fagus sylvatica*) or oaks (*Quercus robur, Q. petraea, Q. pubescens*), are true refuges for biodiversity and can guarantee a range of social, economic, environmental, and climatic benefits. Such ecosystems still provide indispensable habitats for other interrelated, protected Emerald species, among them lady's slipper orchid (*Cypripedium calceolus*) and iconic insect species such as the Rosalia longhorn (*Rosalia aplina*) and the European stag beetle (*Lucanus cervus*).

Wetland remnants, such as the three Ramsar sites that comprise more than half of the current protected area system, are of significant concern for the country and an opportunity for Emerald Network development. Most wetlands are rapidly degrading but still offer shelter to extraordinary biodiversity in the country, from the nationally protected white waterlily (*Nymphaea alba*), water chestnut (*Trapa natans*), numerous invertebrates such as dragonflies (*Anax imperator, Leucorrhinia pectoralis, Erythromma lindenii,* and others), to internationally protected birds such as white pelicans (*Pelicanus onocrotalus*) and glossy ibis (*Plegadis falcinellus*).

Species survival in-situ depends on how secured habitats are for reproduction, resting, and feeding, as biodiversity can move or migrate from one site to another. The Emerald Network includes only parts of species' actual ranges, and any local conservation attempt can become a true preservation success for the entire region.

International policy context

The UN Convention on Biological Diversity establishes and maintains comprehensive, effectively managed, and ecologically representative national and regional systems of protected areas. The Kunming-Montreal GBF is a framework designed to ensure that, by 2030, at least 30 percent of terrestrial and inland water areas, and of marine and coastal areas—especially areas of particular importance for biodiversity and ecosystem functions and services—are effectively conserved and managed through ecologically representative, well-connected, and equitably governed systems of protected areas and other effective area-based conservation measures. The framework recognizes indigenous and traditional territories, where applicable, and integrates into broader landscapes, seascapes, and the ocean, while ensuring that any sustainable use—where appropriate in such areas—is entirely consistent with conservation outcomes, while recognizing and respecting the rights of indigenous peoples and local communities, including over their traditional territories.[14]

The Bern Convention promotes the conservation of wild flora and fauna species and their habitats. The convention pays special attention to endangered and vulnerable species, including endangered and vulnerable migratory species of European importance. It also establishes the Emerald Network of special conservation areas to ensure the survival of protected species and habitats as listed in Resolution No. 4 (1996) for habitats and Resolution No. 6 (1998) for species.

[14] See https://www.cbd.int/gbf

National policy context

The National Development Strategy 2030 “European Moldova” was approved in 2022 and aims to increase forest coverage in Moldova by at least 16.3 percent and help protected areas reach at least up to 10 percent of the country’s territory by 2030.

Approved in 2023, the National Forest Extension and Rehabilitation Program for the 10 years from 2023 to 2032 provides a framework for both the extension of forest coverage and restoration of degraded forests, with the goal of achieving national targets through increased forest resilience to climate change and improved Moldovan population wellbeing.

The latest National Biological Diversity Strategy and its Action Plan (NBSAP) 2015–2020 provided the policy framework for further capacity building, biodiversity conservation measures, management improvements, and protected area extensions. The strategy aims to have 10 percent of the country under protection, including Emerald Network sites. The updated NBSAP examines the period of 2024–2030 and is now under development led by the Ministry of Environment aligned with the post-2020 GBF.

Specific amendments to Law 94/2007 (2023) on the Ecological Network, under Chapter III—Emerald Network, provide general legal provisions for establishing the Emerald Network in Moldova.

The main protected area-related law (Law 1538/1998) on so-called “state-protected areas”—which is now under thorough revision—establishes the legal basis of the creation and functioning of protected areas, biodiversity conservation principles, financial mechanisms, types and categories of preservation, and the attributions of central and local public authorities, NGOs, and citizens. The Government Decision No 803 of June 19, 2002, approved the regulations on the procedure for establishing natural protected areas.

Figure 1: Map of the Emerald Network in Moldova (2020)

Source: Republic of Moldova. Physical map. [1:400 000]. Chişinău: INGEOCAD, 2016. 1000 mm × 5000 mm. ISBN 9789975400879

Stakeholder engagement in the process

Stakeholder involvement is crucial in all stages, from the initial steps of management plan development to site management and monitoring. All relevant stakeholders, including landowners, managers, users, local communities, and NGOs shall be involved in a fair and participatory way in line with the Aarhus Convention and in accordance with national procedures. Past experiences in management planning regarding nature protection or species and habitat conservation in Moldova suggest that such plans can only succeed if local needs are considered. Local communities—including women and youth, who constantly interact with local nature through livelihoods obtained from species use or harvesting—should be engaged in decision-making, as it may affect their livelihoods and use rights.

Public consultation for agreed views on management plans

Broad public engagement is crucial to gaining support and is one the essential prerequisites for a successful process in management plans development. Consulting the public is mandatory, but also a helpful tool as public opinion can help to establish the nature of societal views on the Emerald sites and identify various issues around their management. The management plan draft should be evaluated through various methodologies (including expert views, opinion polls, or meetings with stakeholders). At the very least, follow Moldovan legislation, such as decisional transparency placement on websites to collect feedback.

Communicating the value of biodiversity

The Emerald Network has a specific technical approach to identify the most valuable species and habitats through concrete lists. Any planning efforts to conserve biodiversity require strong communication to gain the people's commitment, a lack of which would have a detrimental impact on conserving species and their habitats. The role of species and habitats in ensuring sustainable generation of ecosystem services, namely goods and benefits from nature, is another good consideration for what to communicate and who to address it to.

Considering climate change in management plans

Moldova's ecosystems are vulnerable to climate change scenarios, mainly through longer dry seasons and warmer periods. Considering these new realities—more droughts and fewer precipitations associated with rapid extremal phenomena—can allow for practical long-term decisions that result in more resilient outcomes for the ecosystems, implicitly for Emerald sites. Existing policy documents, such as the recently approved Moldova Climate Adaptation Strategy 2023 or others in preparation are the primary sources for climate-related information.

Timeline for preparing a management plan

Developing a realistic and detailed plan may take some time to complete. The recommended lifetime of an Emerald-related management plan is up to 10 years and includes updates every five years (or as needed), with subsequent renewal for the same period until its goals are met.

The whole process requires more steps, as presented in Table 2 below (for inspiration details as appropriate to the condition of protected areas in Moldova see also Stanciu and Appleton, 2013)[15].

Table 2: Approximate timeline dedicated to the development of management plans

No	Steps to take	Time (months)
1	Identify and establish the team (roles, tasks, expertise)	0.5–1
2	Describe the site, including data collection and information handling	3–12
3	Assess potential pressures and threats	1–2
4	Define the goal and objectives of site management	0.5–1
5	Develop an implementation strategy	1–2
7	Identify a set of measures (Action Plan)	2–3
8	Identify and plan monitoring activities	1–2
9	Conduct public consultations on the produced document	2–3
10	Finalize and approve the technical and regulatory document	3 or more
	TOTAL	14–18

How many pages is a management plan?

Generally, the length of a management plan does not matter. The final document should be as long as necessary to ensure the conservation of targeted species and habitats. Depending on site characteristics and

[15] Stanciu, E., Appleton, M.R. 2013. "Elaborarea planurilor de management pentru ariile protejate din Republica Moldova." ProPark. https://www.moldsilva.gov.md/public/files/publicatii/Ghid_Planul_de_Management_al_Ariilor_Protejate_2013.pdf

conservation needs, management plans can vary from more straightforward documents that are not too lengthy to highly detailed documents consisting of multiple pages.

While a management plan has no page limits, a reasonable approach toward its length is to be concise and comprehensive. If tables, photos, or other additional information will help achieve its goals and objectives, then the management plan should provide them accordingly. Usually, maps highlighting the area of species distribution and areas of risks or threats are highly recommended.

Conservation biology expertise has a key role in achieving conservation goals

Conservation biology is a relatively new science that appeared as a response to global loss of biodiversity caused mainly by humans. The goals are twofold, to understand effects of human activities on organisms, communities, and ecosystems, and to develop practical science-based approaches to protect and restore ecosystem health. Biological conservation may occur in situ or ex situ. In situ conservation refers to biological diversity conservation in its natural environment, for example through legally protected areas or habitat restoration. Ex situ conservation refers to biological diversity conservation outside its natural environment, for instance in zoos or botanical gardens.

Taxonomic expertise and skills support conservation efforts of all kinds, from practice and sustainable management of natural resources to meaningful inventories of key species (native, alien, commercial, and threatened), or any experimental or development work.

Accurate information is important

All data provided should be accurate and grounded in reality. The proposed data collection framework and subsequent monitoring should be flexible (which facilitates the incorporation of improvements without losing or diminishing its effectiveness), dynamic (for continuous monitoring and adjustment), and realistic (to achieve environmental and socioeconomic sustainability). It can change over time depending on the available information, set objectives, Emerald site characteristics, degree of management, and available resources such as technical, logistical, budgetary, and human.

The SDF of the Emerald Network plays an important role and should be kept up to date according to the new information collected in the framework of the management plan.

Part II: Suggested Structure and Content of Management Plans for Moldovan Emerald Sites

Introduction

Brief description of the management plan

The specific management plan represents an official document setting out the management objectives for a ten-year period, including the conservation measures needed to ensure successful objective achievement. It shall be subject to review every five years of implementation, based on achievements or failures against set objectives. The management plan summarizes all existing information about species assemblages and habitats identified in Resolution No. 6 and Resolution No. 4 of the Bern Convention of European Wildfire and Natural Habitats (Bern Convention) along with their current conservation status, sets out the overall goal and specific management objectives, and proposes an action plan for the next five years.

As a strategic document for the planned activities, the management plan assists in building a successful framework for specific Emerald sites (or a group of smaller sites). It provides a comprehensive overview of the purpose, context, and importance of its objectives and treats each Emerald site as an important area for the conservation of species and habitat, developed according to its specific biota and local conditions.

It is important to acknowledge that the Emerald site (or group of smaller sites) has been designated for a purpose, which is clearly defined and well described by prioritizing species or habitats of high interest.

Legal framework

Emerald sites are formally designated through a legal procedure and receive a number or code, which should be clearly mentioned. Describe all the key provisions of the main legal documents related to the implementation of the Emerald Network necessary to develop management plans for specific Emerald sites. Also, provide the secondary legal framework and any other tools approved by the national authorities to support the Emerald Network as concise information with more specific details on how primary legislation should be implemented, for instance, forestry technical norms, or regulations on grazing and mowing.

Emerald site description

Basic information comes from the SDF of the site in the Emerald Network. The newly collected data in the framework of management plan development serves to update the data in the SDF to ensure data harmonization.

Location

Provide all relevant information (biophysical setting, geography) on the exact site location including GIS data with details if necessary. Boundaries can help locate the area and make general impressions about landscapes and administrative interferences, so a well-reasoned description of borders and zoning is important.

The outer border of the site is available from the official Emerald Network database.

Zoning

Zoning is the spatial definition of activities permitted within the delimited areas of the sites. In Moldova, most Emerald sites are multi-use areas and zoning is necessary to clearly define land units for specific purposes. In some cases, overlaps occur with existing protected areas or other key areas outside protected areas. Define critical areas for conservation and areas for recreation activities or economic development, such as agriculture and forestry. Name newly defined zones (for example, A, B, C, etc.) to clarify management objectives. As no classification system is perfect, a specific site's valuation greatly depends upon how much conservation effect can be ensured through wise land allocation and use.
A detailed map of the site with zoning is highly recommended (Figure 1). Zoning will also help the management of the economic activities occurring in the proximity of the site and emergence of new ones that could have a significative impact on species and habitats.

Land ownership

Any conservation effort greatly depends on acknowledging and integrating landowners into the scope of the

management plan. Emerald sites may comprise one, several, or numerous landowners. Generally, land ownership in Moldova can be categorized into publicly owned lands (state or communal) and privately-owned lands (by individuals or companies). It is important to present the most recent information on the degree of ownership fragmentation, size of plots, and the tenancy system for each site.

Provide a list or table of all landowners according to the cadastral data, including area held (in hectares) and the ownership type.

Present land use

Land use practices can vary from site to site and this information is crucial for achieving conservation objectives. The management plan must provide the following information, preferably structured in a table format for diversified land use:

- Category of land use (for example, arable land, forest, pastureland, roads, etc.)
- Land ownership type per land use category (for example, state public, community public, individual farmer, collective farmer, firm, private company, etc.)
- Area (hectares) per each type above
- Share (percent) of each in the whole.

Desired land use

Land use is central to addressing sustainability issues, including biodiversity conservation. Land use changes affect habitats and species by impacting their composition, structure in time and space, and multiple functions sustaining biodiversity. Moreover, the survival of species populations depends on the quality of the habitat, the amount of available habitat, spatial distribution, and matrix or landscape permeability.[16]

Consider some management requirements for specific land use types, such as agri-environmental measures. The management plan must highlight all these aspects to achieve the goals of the Emerald site through specific recommendations and measures that reconsider land-use practices within the site and, if needed, in the adjacent lands too.

Administrative framework

Briefly describe institutions, companies, or individuals engaged in nature resource management—either related to species and habitats directly or impacting landscapes and biodiversity within specific Emerald sites—against their administrative management and list them along with their available resources, such as:

- Personnel
- Consolidated equipment and machinery
- Infrastructure
- Investments (financial resources).

Current management

Consider, list, and briefly describe any sectoral or land (other than Emerald) management documentation. This information can significantly help to adjust or correct current management and align future landscape and ecosystem development projects with conservation objectives.

In the case of forests—and partly for wetlands included in the forest estate—all state public forest lands have forest management plans which are strategic technical documents accompanied by detailed maps. As for the other forest owners, only a few community forest lands have forest management plans in place, while the few existing private forests do not.

Urban areas have their own planning documentation and maps. Some may consider biodiversity elements, usually through international projects for mainstreaming biodiversity in land planning. Although expanding urban areas are a threat to biodiversity, they sustain a large portion of important biodiversity, including Emerald

[16] Vanya Simeonova, Irene Bouwma, Edgar van der Grift, Carlos Sunyer, Lola Manteiga Mart Külvik, Monika Suškevičs, Stelian Dimitrov, Ana Dimitrova, 2017. Natura 2000 and Spatial Planning. Final report for the European Commission (DG ENV) (Project 07.0202/2015/716477/ETU/ENV. B.3). p.28 https://edepot.wur.nl/427755

species.

Agricultural owners of the lands (individually or collectively owned) have their own management planning, mainly driven by business interests and economic opportunities and less by ecological and environmental concerns. Agriculture is still a key polluter; most agricultural owners and farms still use chemicals and only a few come close to organic or ecological agriculture.

Abiotic characteristics

Describe the main physical and geographical features and split them into sub-chapters as necessary (see below).

Geology and geomorphology

Provide geology (mineral resources) and geomorphology (soils and their processes, including formation, erosion, contamination, salinization, compaction, and flooding) of the site.

Hydrology and hydrography

Both processes are important for ecosystem development. Hydrology studies spatial and temporal distribution of water and water availability in the atmosphere and in the earth's crust (rainfall, runoff, soil moisture, and evapotranspiration), while hydrography studies the physical features of water bodies and other land areas adjacent to those bodies of water.

Soils

Identify and present soil types, preferably in a table format. The table should contain soil group, types, sub-types, area covered, and attributed coding (should they have codes in national statistics). If possible, include a description of their current state and erosion trends.

Climate

Clearly describe climatic positioning according to eco-geographical zones, thermic regime, atmospheric precipitation, evapotranspiration data, and site microclimatic conditions based on existing data and projections or scenarios, if such exist.

Biotic factors

Biotic factors are key determinants for planning and designing the management plans. The way biological components interact among them and with the abiotic world around is critical in an ecosystem. Below is the breakdown of the biotic-related elements necessary for a management plan.

Biogeography

Briefly give all relevant information about the geographic distribution of species or taxa, including habitation patterns and factors responsible for variations in distribution. Any trends in distribution shift driven by global warming are important and any scientific statistics or substantiations for such trends are critical.

Ecosystems

Some sites can be dominated by one or two types of ecosystems, while others can contain a variety of ecosystems (from agriculture to forests, meadows, pastures, and wetlands). Describe all ecosystems (natural or anthropogenic, terrestrial or aquatic) present on a specific Emerald site (such as forests, wetlands, meadows, steppe patches, karst, and so forth) along with their current status and trends in development (such as forest expansion, wetland recovery) or ongoing or planned restoration activities (such as afforestation, reforestation, or rewetting).

Habitats

Moldova does not have a habitat-typed classification according to EU standards. However, all possible varieties of habitats present within ecosystems are well known and described in scientific and technical literature. Describe all of these in the table provided (Table 3) **according to the list of habitats listed in Resolution No. 4 (1996)**, and provide their area, in hectares. Clearly state if there is any difference between

the real area of the habitat and the desired one in the current compartment. Include GIS habitat location in the management plan to understand how species of key interest can survive under certain conditions of ecosystem development.

Table 3: General information on habitats found in an Emerald site

Resolution 4 Habitat type				
Code and habitat name	NP*	Cover (hectares)**	Caves (numbers)***	Data quality ****

Notes: *NP: in case that a habitat type no longer exists in the site enter: x (optional)

**Cover: decimal values can be entered

***Caves included in habitat types A1.44, A3, A4 and H1: enter the number of caves if estimated surface is not available

****Data quality: G = "Good" (for example, based on surveys); M = "Moderate" (for example, based on partial data with some extrapolation); P = Poor (for example, rough estimation)

Species of high conservation interest (Bern Convention)

List all species of interest found on or permanently present at a specific Emerald site—as listed in Resolution No. 6 (1998), which includes all the species of Annex II of the Council Directive 92/43/EEC of May 21, 1992, on the conservation of natural habitats and of wild fauna and flora—here according to the below "taxonomic" breakdown and to the summarized or generalized data on each species of interest (see Table 4 as an example).

- **Flora (Vegetation)**
  - Inferior plants
  - Superior plants
- **Fauna (Animals)**
  - Invertebrates
  - Vertebrates (Fish, Amphibians, Reptiles, Birds, Mammals)

Table 4: General data on species of high conservation interest present in a specific Emerald site

Species category data	Relevant information
Scientific name	Full Latin name (genus, species; subspecies if appropriate)
Popular name(s)	Most used or known names
Presence	For example, permanent, reproduction, migratory, wintering, etc.
Present population (size considered in the management plan)	It should be in numbers (individuals or pairs for animals) or area/m^2 (for plants) In case this information is different from the population in the SDF, the SDF should be updated accordingly
Localization	Where can species often be found or inhabited?
Protection status	Endangered, Vulnerable, National Red Book, etc.
Monitoring measures	Is it monitored, and how? Any equipment or methods used?

Invasive species (alien biota)

Alien invasive taxa, species, and hybrids are of a high concern as they may be responsible for many losses in native biota and habitats. While there are many records on penetrations of exotic and alien species into (or through) Moldova, many are yet unknown or dormant. List and describe all known information on those exotic species, especially on taxa with high potential for expansion or already categorized as invasive, using Table 5 below as an example.

Table 5: General data on invasive species present in a specific Emerald site

Species category data	Relevant information
Scientific name	Full Latin name (genus, species, subspecies, and author)
Popular name(s)	Most used or known names
Introduced	When recorded first in the area (if known) or since when (if any data)?
Presence	For example, everywhere, locally, permanently established, migratory, wintering, etc.
Population size	It can be in numbers (for animals) or area/hectares (for plants)
Localization	Where species can be often found or prefer to inhabit?
Threat status	How perilous or damaging it is so far in the area?
Control measures	If there are any or suggested ones? Local experience or eradication practice?

Main pressures and threats

Economic activity influencing key biodiversity

Many business activities, especially when done or conducted unsustainably, may cause severe damage to species, habitats, and ecosystems as a whole. It is important to identify and describe human economic activities that affect or may cause losses in key biodiversity. A breakdown of sectors or practices that can be used as an example of highlighting the pressures or possible threats according to the level of influence (negative or positive) on a specific Emerald site is provided below.

Agriculture

Agriculture is the key sector in the country. Both the area of agricultural fields (as a share of the total Emerald site area) and their management (chemical, mineral, organic, and ecological) are important considerations in the management plan. Importantly, biological and habitat diversity can maintain and increase soil fertility and mitigate the impact of pests and diseases—another reason to consider agrobiodiversity for food and livelihood security.

Hunting

Though regulated through several legal documents, abusive hunting is still an issue in Moldova. Emerald sites will likely provide refugial areas for game species, thus, it is highly important to provide statistics of game species and hunting operations that can help address the issue. On the other side, an overabundance of some game species, including introduced ones, in certain areas can have serious impacts on the forest cover or herbaceous layers harboring endangered plant species.

Forest management

Forest management can influence species and habitats in both positive and negative ways. According to Resolution No. 4 of the Bern Convention (1996), any activity must not have a negative effect on the forest habitat, nor produce changes affecting species' good conservation status. Even though biodiversity conservation principles are well represented in Moldovan forest legislation, actual forest management is poor and often associated with selective illegal logging of native species and promotion of exotic species that can threaten native forest ecosystems.

Tourism and recreation

Tourism in Moldova is steadily growing and placing pressure on ecosystems. Many reports have already highlighted the increased risks of direct pollution and habitat shrinking and identified the lack of proper infrastructure and organization as one of the key drivers of these increased risks. The management plan should describe tourism sector organization in a specific Emerald site (or group of sites), according to the principles of biodiversity conservation and sustainable development.

Threat identification

Properly identify, evaluate, and describe impacts, pressures, and threats. They are important in developing specific measures and management actions by providing additional information on each activity impacting species and habitats, including the intensity of impacts by location. Threat identification can help address the

adverse effects of potentially impacting activities, mitigate, eliminate, or offset these impacts, and prohibit any future actions that could have a significant impact on the site.
Table 6 below describes the threats to the species or populations of high conservation significance that affect their survival. Give special attention to the threats and pressures that affect species individually at the population level or at the habitat or ecosystem level.

Table 6: Threats and pressures per individual or population and habitat or ecosystem level

No	Species or Habitat	Threats	Pressures	Impacts
1				
2				

Threat and impact assessment

Threat and impact evaluation can serve as an important part of the risk assessment process, allowing authorities to better plan their response. Consider the following information while assessing the impacts posed by various threats:

- Activities impacting the site's general ecological character
- Activities impacting species of conservation interest
- Activities impacting habitat types of conservation interest.

Use Table 7[17] and complete it using the methodologies described below. Eventually, the management plan reader or implementer will have a better understanding of the potential impacts along with the degree and the source.

Table 7: Impact identification and assessment table

Negative impact				Positive impact			
Degree*	Threats and pressures	Pollution (optional)	Internal or external	Degree*	Management activities	Pollution (optional)	Internal or external

Notes: * Degree: H = high, M = medium, L = low

In terms of the time frame of activities, all potential impacts are divided into two categories, namely:

- Current pressure (P): activities with potential adverse effects on species or habitat that are currently occurring or have occurred in the past and persisting today.
- Future threat (T): activities that have potential adverse effects on species or habitat that are expected to occur in the future (a current pressure cannot be considered a future threat unless it is expected to increase significantly, or the location of the current pressure is expected to change).

When assessing the risk of soil and water pollution at the (sub)catchment level, supplement with the identified exceedances of pollutants (N = nitrogen inputs; P = phosphorus and phosphate inputs; A = acid or acidification inputs; T = toxic inorganic chemicals; O = toxic organic chemicals; and X = mixed pollution).

In case the table contains new information according to the data stipulated in the existing SDF data, transmit the new information for SDF review.

Mapping the threats to key species and habitats

Species and habit threat mapping is a key tool to support and guide effective threat management decisions. Threat maps can show where threats occur in relation to species or habitats they impact, including where

[17] Source: Threats, pressures, and activities with impacts on the site, Standard Data Entry Form Emerald Network, Resolution no 5 revised Appendix. Available at: https://rm.coe.int/1680746bfa

species-specific threat “hotspots” exist.

It is highly recommended to map the distribution of threats across the specific Emerald site and identify the areas with high threat concentrations. Using modelling or other techniques that simulate the potential future impacts of threats on the site and its components can be an advantage to conservation efforts.

Mapped threats can also help assess the site’s vulnerability to climate change and determine how key habitats and species will behave under each threat. It can help develop a timeline of threats and their potential to affect the site or network at different time periods.

Where available, provide maps and other visible information in addition to text and graphics. Any additional information such as the distribution of threats, vulnerability, and timeline will help readers and implementers understand threat trends and frequency.

Scope and objectives

The scope and objectives are the most important parts of the management plan. Clearly define and describe overall goals and site-specific objectives, including targeted species and habitats for the conservation, connectivity vision, and other management priorities.

Main goal

The main goal (or goals) is normally broader in scope and assists in creating a vision and direction for specific actions resulting from it.

It should state “what is to be accomplished” in the future through the implementation of the management plan.

Specific objectives

Specific objectives are smaller targets that describe tangible actions to achieve the main goal.
Specific objectives are the aims of the management plan intervention that achieve the overall goal. Thus, they facilitate expected results within a specific timeframe. With regards to conservation, specific objectives should be species or site specific for every species and habitat listed in the SDF; expressed in population size and habitat area that needs to be maintained or restored; and measurable to allow for monitoring. Elaborate and directly relate the measures to the achievement of the set-up objectives.

Activity planning

Detailed action plan

Clearly present all actions and measures necessary to achieve the objectives, along with their duration and periodicity and involve implementation partners. The indicators of achievement should be measurable and based on benchmarks and thresholds. The overall timeframe for a detailed action plan is five years from its approval. Such a detailed action plan should be concise but long enough to include all the key details.

See Table 8 for an example of building a detailed action plan. Conservation measures and activities will contain not only passive activities such as protection through non-intervention, but also proactive measures that are compatible with species and habitat conservation such as grassland maintenance.

Table 8: Detailed action plan for the specific Emerald site

No	Activity	Indicator	Timing					Implementation partners
			Y1	Y2	Y3	Y4	Y5	
	Specific Objective 1							
	Activity 1.1.							
	Specific Objective 2							
	Activity 2.1.							

Financial and human resources

Carefully estimate both financial and related human resources and, when needed, differentiate human resources per labor and time to carry out the work, as well as per other related investments, such as training, visits, or specific analyses.

A budgeted action plan will provide reasonable estimates of required costs including estimates for outcomes and revenues, preferably broken down by categories, time periods, or funding sources. See Table 9 for an example of how to populate needed conservation actions against financial considerations.

Table 9: Budgeted action plan for the specific Emerald site

Activity	Due date	Responsible institution	Financial touchstone		
	year		Total (currency)	Source of funds	
				national	external
Overall goal(s)					
Specific Objective 1					
Activity 1.1[18]					
Activity 1.2					
Specific Objective 2					
Activity 2.1					

Monitoring

Monitoring is essential to assess management success in time. Take the two following aspects into account when developing the management plan:

- Monitoring the conservation objectives including biological components, number of animals, plants, and the size of habitats
- Monitoring the implementation of conservation measures such as undertaken works and actions to achieve the conservation measures.

Consider combining both items into one monitoring table against set monitoring indicators (Table 10).

Table 10: Monitoring plan for the specific Emerald site

Monitoring type or theme	SO match	Frequency*	Monitored indicator
For example, mapping key species and habitats	1.2	P	Species presence in new area (new location)
For example, observing new bird species	2.3	C	Annual report on species status

Notes: * Frequency of monitoring: C = continuously, P = periodically, N = when needed, and E = emergency

The whole monitoring process is largely based on professionalism and dedication that influences not only data collection or keeping protocols, but also sharing results with all those interested. Therefore, it is very important to practice participatory monitoring (for example in case of simple monitoring indicators) when stakeholders directly engage in monitoring and evaluation activities that adjust or reorganize resources.

Capacity building

Ensure proper budgeting and financial planning for all activities and actions foreseen under the management plan. Complete the cost in table 9 above, entitled “Budgeted action plan for the specific Emerald site.”

[18] Include a list of identified measures (activities) foreseen for the management plan of a specific Emerald site. Number and title the activities. The above table is just an example.

Awareness raising

It all starts with awareness. Education follows. Consider both awareness and education as important domains that improve site management through engagement or participation, and minimize the impact caused by human intervention. A separate awareness and education plan can be a solution in instances when sites face critical issues or conflict situations, such as illegal logging, poaching, or pollution.

Training

Internal capacity building should focus on improving and maintaining skills and competencies for those involved in managing the specific Emerald site, such as administrators and rangers.

Educating multiple stakeholders

Orient external capacity building towards external players and interested parties, private landowners, local authorities, and consultants. This is necessary to ensure they incorporate their commitment to implementing the conservation goals of the whole Emerald Network in their everyday operations. This can consist of targeted educational activities that involve all interested parties.

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Appendixes

This section should include supplementary or supporting materials for understanding and applying the content of the management plans, such as:

- Annexes: documents, tables, charts, or other detailed information that supplement and support the content of the main guidelines with more specific information.
- Maps: these can help readers visualize the data and better understand the spatial aspects of the topic.
- Geospatial data: which can be used for analysis, visualization, or other specific purposes.
- Other resources: depending on the specifics of the Guidelines, this section may also contain other types of relevant resources, such as links to relevant websites, guides, reports, etc.

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Guidelines for Developing Management Plans for Emerald Sites in the Republic of Moldova

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"Guidelines for Developing Management Plans for Emerald Sites in the Republic of Moldova" aim to support the Moldovan authorities in developing effective management plans for Emerald sites. These plans are crucial for protecting species and natural habitats and achieving satisfactory conservation levels.

The report provides a methodology and structure for developing Emerald Management Plans and offers guidance for different scenarios, including sites within special protected natural areas (SPNAs), forest enterprises (FEs), and other lands. It also emphasizes the importance of regular monitoring, review, and updates of management plans to ensure their effectiveness and alignment with evolving conservation practices. The guidelines aim to streamline the preparation and approval process of Emerald management plans, benefiting both the authorities and the conservation efforts in Moldova.

By implementing these recommendations, Moldova can enhance its conservation efforts and protect its valuable species and natural habitats.

Programme website:

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