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**DRAFT GUIDELINES ON MANAGING
THE EMERALD SITES, INCLUDING CLIMATE CHANGE ADAPTATION AND
MITIGATION**

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FOREWORD

The purpose of this document is to provide practical guidance to the national authorities of Contracting Parties to the Bern Convention working on the Emerald Network during the process of planning the management measures for the Emerald network sites on their national territory.

These Guidelines, through their step-by-step approach and the two checklists present in its appendix, aim to encompass a wide-ranging set of actions necessary to ensure the management planning for Emerald sites. Therefore they are as exhaustive as possible. However, the use of the guidelines can and should be adapted to the reality of each Contracting Party and each Emerald site and remains the prerogative and responsibility of the competent national (regional or local) authorities of a given country.

In addition, these Guidelines should be read in conjunction with the document “Towards management of Emerald sites: guidance document” [T-PVS/PA(2014)08], which provides assistance to national authorities on how to interpret the key provisions of the major legal documents framing the implementation of the Emerald Network of Areas of Special Conservation Interest (ASCIs)¹.

The present Guidelines equally take into account all Bern Convention Recommendations and Resolutions relevant to the management of Emerald sites², including the ones resulting from the work of the Group of Experts on Climate Change and Biodiversity³, as the long-term effectiveness of the Emerald Network in achieving its objectives also depends on its capacity to mitigate climate change effects on the Emerald sites biodiversity.

1. INTRODUCTION

According to the three Phases of the constitution process of the Emerald Network⁴, once the identification of potential sites is finished (Phase I), a new phase begins, consisting of the scientific assessment of the sufficiency of these sites to ensure the long-term survival of threatened species and habitats (Phase II). At a third and last stage (Phase III), the countries are supposed to designate the sites at national level, through national legislation or administrative measure and start planning and implementing management measures.

Climate change impacts on protected areas require to be addressed at the planning stage of the management and involve that adaptation is fully integrated in the priorities and objectives of the management measures. As agreed by the Group of Experts on Climate Change and Biodiversity in its new Draft Programme of Work on Climatic change and biodiversity, it is important that adaptive management practices are implemented without delay for protected areas in general and the Emerald Network specifically, and that the management plans for such areas take into account, and respond to, the expected consequences of climatic change and the need to facilitate the responses of species.

In this relation, the present document provides guidance for taking integrated action to plan the management measures necessary for each Emerald site, while addressing climate change mitigation and adaptation.

The management measures will therefore have two objectives:

¹ Recommendation No. 16 (1989) of the Standing Committee on the Setting-up the Emerald Network; Recommendation No. 25 (1991) of the Standing Committee on the conservation of natural areas outside protected areas proper; Recommendation No. 157 (2011) of the Standing Committee on the status of candidate Emerald sites and guidelines on the criteria for their nomination; Resolution No. 5 (1998) of the Standing Committee concerning the rules for the Network of Areas of Special Conservation Interest (Emerald Network) and revised Appendix to the Resolution (Adopted by the Standing Committee on 6 December 2013) and Resolution No. 8 (2012) of the Standing Committee, adopted on 30 November 2012 on the national designation of adopted Emerald sites and the implementation of management, monitoring and reporting measures

² Emerald Network Reference Portal : http://www.coe.int/t/dg4/cultureheritage/nature/econetworks/portal_en.asp

³ Group of Experts on Climate Change and Biodiversity under the Bern Convention:
http://www.coe.int/t/dg4/cultureheritage/nature/bern/ClimateChange/default_en.asp

⁴ Revised Criteria for assessing the National Lists of proposed ASCIs at biogeographical level and procedure for examining and approving Emerald candidate sites, Council of Europe (2013)

- i. *Increasing the available habitat* - to increase the available habitat for species and ensure the existence of suitable pathways for species dispersal; to underline the benefits from Emerald Network sites for mitigating the impacts of climate change, reducing vulnerability and increasing resilience for species and habitats;
- ii. *Enhancing the diversity and resilience of the network* - biodiversity depends on the protection and management of designated sites: these sites are central for ensuring that biodiversity is able to adapt to a changing environment.

2. MANAGEMENT PLANNING STEPS FOR EMERALD SITES

The planning of the management measures for each Emerald network site can encompass the following steps:

Step 1: Pre-planning: selection of the site subject to planning

Step 2: Data gathering

Step 3: Assessment of major climate change aspects and their impact on biodiversity

Step 4: Identification of key elements (habitats and species) within the site

Step 5: Adaptive Management Plan

STEP 1: PRE-PLANNING – SELECTION OF THE SITE SUBJECT OF PLANNING

All Emerald sites are subject to the implementation of management measures⁵. Therefore, a management planning has to be implemented for each of the officially adopted Emerald sites by the Standing Committee to the Bern Convention, preferably at the same time as the national designation of the Emerald site. One planning document can concern several sites, especially if the sites are part of one common green infrastructure or corridor.

If and where necessary, the planning document and relevant conservation measures can cover a bigger area than the Emerald site, for example to prevent external threats or to provide and guarantee sites connectivity.

STEP 2: DATA GATHERING

All Emerald sites adopted by the Standing Committee to the Bern Convention and subject to the present Guidelines, are already thoroughly described through their Emerald Standard Data Form including their borders. The information contained in the Emerald site SDF should be used and completed with the various data described below, compiled and used during the planning of the management measures.

1. Gathering additional general information

The *additional general information* to be gathered includes:

- The physical-geographical location of the site and its borders on the basis of its designation paper;
- The location of the site in relation to Europe and to the borders of the country in a suitable scale;
- The site's borders, the adjacent settlements, the main existing tourist sites, the road network around and in the site, the main water courses etc., in a suitable scale.

⁵ Resolution No. 8 (2012) of the Standing Committee, adopted on 30 November 2012 on the national designation of adopted Emerald sites and the implementation of management, monitoring and reporting measures (adopted by the Standing Committee on 30 November 2012)

- The legal status of the site, also according to international legislation, agreements and standards⁶.
- Ownership and relevant stakeholders: The available information concerning the ownership on the sites, i.e. existing buildings, equipment, infrastructure, should be updated. Thus, it is critical from the outset of the management measures that the ownership issue is addressed in a comprehensive manner. In addition, the various stakeholders have to be identified, considered and consulted in the planning process for the management measures.
- Management structure: The management body is of crucial importance for the implementation of the management measures. The management structure (administrations, institutions, consultative forums, scientific bodies, NGOs etc.), which could be responsible for the management of the site and for the implementation of the measures, should be clearly described. Information of the funding sources –state budget, the national funds for environmental protection and others- should be specified.
- Existing projects: Projects related to the use of resources and other activities on the site's territory, such as urban projects, municipal development plans, etc., should be presented in order to generate and realise greater synergies and integrated collaborative approaches. Policies and strategic projects, related to climate change management should be reviewed. In terms of adaptation of biodiversity to climate change the following policies are relevant:
 - Review of existing biodiversity strategies for relocation of species and habitats;
 - Review of existing policies for combating invasive species and diseases;
 - Incorporating green infrastructure concepts in spatial planning policies;
 - Review of existing fire prevention, management plans and policies.

The *information on the abiotic* features of the site to be compiled includes:

- The local climatic zone and the typical for the site climate conditions, including the specific climate changes affecting local climate, as well as how local relief, aspect and other landscape elements influence climatic conditions.
- Geology and geomorphology: The present tectonic status of the territory should be described, including the rising, sinking, seismic activity (seismic area – assessment and forecast) and the deep erosion intensity ratio. The geomorphology of the relief should also be presented, including the forms of the present relief and characteristic of relief-changing processes.
- Special attention should be paid to processes crucial for habitats creation and maintaining, such as eolic processes for dunes, erosion & sedimentation for river habitats, etc.
- Hydrology and hydro-biology: The basic hydrologic and hydro-graphic characteristics should also be gathered, including the quality of the surface waters should equally be done.
- Soils: The distribution and characteristics of the soils types and the soil processes like the erosion processes (kind, degree) could be checked and described, including newly emerged erosion processes.

2. Gathering information on the natural habitats in the site subject of planning

The *biological information* to be gathered includes:

- Information on natural habitats in the site, including an inventory of all natural habitats present in the site, belonging to the revised Annex I of Resolution 4 (1996) of the Bern Convention on endangered natural habitat types, which uses the EUNIS Habitat Classification.

⁶ A number of international conventions pay special attention to biodiversity problems and the need for its conservation and restoration. These Conventions are the reference points in defining the main goals and management measures.

- Other habitats, important for the site subject of planning due to their conservation, ecological or landscape value, can also be described.
- The mapping of natural habitats (see Box 1 below) should be made by carrying out field researches for collecting the data necessary for the identification of the habitats and their spatial boundaries, as well as their area of distribution.

3. Assessment of the conservation status of habitats identified in the site

The evaluation should be done for each habitat type for each of the criteria. The criteria for assessing the conservation status of habitats are the following:

- a. Size distribution of natural habitat;
- b. Its structure and specific functions;
- c. Status of its typical species

4. Determination of plant and animal species in the site subject of planning

The inventory of plant and animal species should include the species belonging to Resolution No. 6 (1996) of the Standing Committee to the Bern Convention and possibly Annexes I, II and III of the Bern Convention. It is advisable to perform inventory of all other important species of conservation value and to map them accordingly.

5. Assessment of the conservation status of species identified in the site subject of planning

The assessment should be made for each species/species group and against each of the criteria, which are the following:

- a. Population dynamics of species and number of species, including through regular monitoring;
- b. Size of the natural range of the species, including a systematic mapping of each of the localities of the species within the territory of the site is necessary;
- c. Size and quality of the habitat that ensures the survival of the species populations area, including, stability/ instability, vulnerability, specific structures and features presence, quality of the feeding base, human pressure, existing and future threats;
- d. Sex and age structure of the species populations.

STEP 3: ASSESSMENT OF THE MAJOR CLIMATE CHANGE ASPECTS AND THEIR IMPACT ON BIODIVERSITY

The assessment of the major climate change aspects and their effects on biodiversity is based on the impact on Emerald species and habitats resulting from: (1) sea level rise; (2) overall temperature increase; (3) changing precipitation patterns (changing atmospheric circulation regime, which may be followed by changes in thermal, precipitation and evapotranspiration regime); and (4) increase of extreme events. It is important that the landscape surrounding the Emerald site is included in the assessment of the vulnerability of species and habitats to climate change.

In order to assess the **vulnerability of species**, the following features are to be considered:

- Increased population fluctuations and local extinctions;
- Altitudinal and longitudinal movement of species;
- Changes in species relationships (mutualism, predator-prey, parasite-host, new pathogens and invasives);
- Loss of habitat;
- Increased physiological stress;
- Change in the ability to reproduce, leading to decreasing populations or change in sex ratios;
- Changes in competitive ability.

In order to assess the **vulnerability of habitats**, the following features should be considered:

- Erosion;
- Submersion;
- Salinity;
- Drought;
- Acidification;
- Nutrient balance / eutrophication;
- Higher groundwater tables waterlogging;
- Increased frequency and severity of fire, flooding, storms.

After their identification and the assessment of their impact level, the threats should be prioritised according of their impact. In order to facilitate the process, it is advisable to make a matrix, which can be used by each expert involved during the evaluation of the corresponding threat on a given habitat/species.

***STEP 4: IDENTIFICATION OF THE KEY ELEMENTS
(HABITATS AND SPECIES) WITHIN THE SITE***

The selection of the key elements within the site follows the next three steps:

1. Prepare a list of all habitats and species of flora and fauna on the site belonging to Resolution No. 6 (1996) and Appendices I, II and III of the Bern Convention. Other habitats and species, considered as important for the territory of the site, can be included as well, on the discretion of the team.

It is recommended to include both the habitats and/or the species of flora and fauna that existed in the past and may be recovered, and those that can be pre-located.

2. Add to the list the ecological processes and other aspects (significant for the protection or recovery of the species or habitats), which can be considered as a key element of the site territory.
3. Remove from the list the elements that are not important to the site and for which it is not necessary to formulate management objectives.

The elements that form the list should be considered as key for the management and are the purpose for formulating management regimes and norms.

STEP 5: ADAPTIVE MANAGEMENT PLAN

Improving management strategies with respect to climate change should begin with a site-specific integrated management approach, addressed by adaptive management planning.

Adaptive management is a dynamic process where people of many talents and disciplines come together to make the right decision in the best interests of the natural resources. Adaptive management must be a social as well as scientific process. It focuses on the development of new institutions and institutional strategies just as much as it must focus upon scientific hypotheses and experimental frameworks. Adaptive management attempts to use a scientific approach, accompanied by collegial hypotheses testing to build understanding, but this process also aims to enhance institutional flexibility and encourage the formation of the new institutions that are required to use this understanding on a day-to-day basis.

1. Regulatory recommendations for the implementation of management measures

1.1 Management zones

The zoning is a key element in current protected areas management practices. Although not all Emerald sites will be protected areas *stricto sensu*, if the territory of the selected Emerald site needs different regimes for different parts, the zoning approach might be suitable for its management. The

functional zoning of the site, as well as the range of operational management decisions and constraints, related to the access, construction or use of resources in each of the zones should be decided. Any decision on the management zones should:

- Ensure that the analytical information and evaluations made in Step 2 are thoroughly considered, in a justified and logical way;
- Ensure or lead to (1) the achievement of the goals and (2) overcoming or limiting the impact of the threats identified in Steps 3 and 4;
- Guarantee as much as possible (1) the space to maintain of natural processes and the creation of habitats and (2) the space for species, i.e. - if and where appropriate - non-intervention zones, wilderness and roadless zones;
- Allow flexibility in the management decisions in case of potential or unexpected changes in the situation, e.g. calamities, etc.

1.2 Regimes and norms

The regimes and recommendations on the management of the habitats and species, (1) for the whole site territory, or for (2) part of its zones should be developed, taking into account the following features:

- Common management regimes should be established for the site, aiming to maintain or improve the conservation status of key habitats and species identified in Step 4;
- For each of the zones defined in Step 5 (point 1.1), the general and/or specific management regimes should be determined. Measures to prevent disturbance and to endanger species subject to protection should also be established;
- Specific restoration measures should be defined for each habitat, species and habitats of species assessed as being in bad conservation status under Step 3;
- Concrete measures for the maintenance of the habitats, species and habitats of species estimated as being in good conservation status under Step 3;
- Concrete steps to recover habitats, species and habitats of species that have existed in the past within the zone and could be restored.

2. Management measures at site level

When planning the management measures for the Emerald sites, responsible authorities need to take a **long-term vision** (20 to 50 years), the adaptation of species to climate changes. The exact period of planning depends on the speed with which ecosystem changes are expected. This long-term vision is important for ensuring the continuity of the Emerald Network management.

The measures decided should be bound with the defined long- and short-term objectives and should contain a number of tasks, which are realistic in time and in respect of budget.

The long-term vision could be developed in the form of a “management road map” which:

- Furthers local, national and international conservation principles and standards;
- Clarifies exactly what is to be conserved and shows how the status and qualities of the site will be safeguarded and improved;
- Is socially, economically and environmentally acceptable to all who use the area and is prepared in consultation with these users and other relevant stakeholders;
- Functionally links rather than isolates the property with its surrounding landscapes or seascapes;
- Shows how the site will contribute to the improved biodiversity;
- Include a set of the strategic management principles which are unlikely to change;
- Explains what the desired condition of the area should be in the future;
- Identify the main changes that need to take place to improve and protect the site in terms of adaptation of species to climate changes.

The relation between the impacts of climate change as described in Step 3 and the main measures proposed has to be identified: i.e. which measures are applicable at the site level depends on the habitat types and species as well as the local context of the site.

Annex 1 to these Guidelines presents examples of measures which can be identified as suitable for implementation at site level. These are just a sample of possible measures given for each of the following six management categories: (1) reducing existing pressures, (2) enhancing ecosystems and species resilience, (3) accommodating natural landscapes forming processes, (4) ensuring the required abiotic conditions, (5) managing extreme events and (6) the control of invasive alien species.

3. Management measures at the network level

If the site is large and connected to others then there is an opportunity for successful network management. On the contrary, small and isolated sites present a difficulty for the successful implementation of the Network measures.

3.1 Selection of priority habitats that would help species movement

On the basis of the results from the biodiversity evaluation in the sites, as well as the possibilities and limitations for species movement, natural habitats of key importance for securing species migration in and between the protected territories should be identified. The connection between the different habitats and their specific role for species migration has to be defined in order to establish better conditions for the free movement of species between protected sites.

3.2 Improving the connectivity by developing stepping-stones and corridors.

Improving the connectivity between the Network sites can be supported as follows:

- Creating “stepping stones” for particular species;
- Land use planning and prevention of urbanisation in ecological corridors;
- Maintenance of pastures – habitats of small mammals, part of the food chain of predatory birds and orchids;
- Restoration and maintenance of wet meadows and water bodies – habitats of amphibians, food base of water-loving birds; habitats for hydrophilous and hygrophilous plant species, etc.;
- Maintenance of the passability of rivers and gallery riverine forests;
- Individual approach of forest management in regions with reported protected species;
- Implementation of management actions in the forests, keeping old trees and leaving dead wood;
- Declaring some forest stands for “Old growth Forest”

3.3 Implementation of appropriate management of the wider landscape and development of a green infrastructure.

With the purpose of building a green infrastructure between the Emerald sites, the possibilities to establish species migration corridors are to be analysed. Recommendations for the protection of habitats and landscapes should be made, in consultation and agreement with local municipalities, in order to ensure, among others, a place for the management of the sites in the regional economic development and planning. The analysis, justification and planning should include the Emerald sites, as well as the possibilities for their natural connections.

4. Implementation of the management measures

4.1 Spatial planning

Spatial planning has an important role in mitigation and adaptation to climate change for many sectors (Wilson & Piper 2010). Spatial planners at all levels need to adapt their existing plans to climate change. From the point of view of mitigation and adaptation to climate change, it is very important to see planning and management in the context of an integrated relationship between

ecological processes and the needs and perceptions of local population. Biodiversity protection, economic development, social development and the enhancement of public involvement are the basic prerequisites for sustainable development underlying the planning and management of the green infrastructure. The planning and management of the green infrastructure appear in the context of the spatial planning at four levels – *international, national, regional and local*. Effective planning at all these levels requires modern forms of institutional mutual help and social support in conformity with the following principles:

- 1) Treating each Emerald site as an *integrated system* of abiotic factors (land, air, water), biodiversity and human activity;
- 2) Taking into consideration that each system is affected by larger or smaller ecological, economic, social or political systems;
- 3) Accepting people as a central element of the system and assessing the social, economic, technical and political factors that will influence the way natural resources are being used;
- 4) Connecting, in a balanced way, the economic policy and the environmental opportunities;
- 5) Stimulating technologies that will help people use the resources more effectively.

4.2 Cross-border corridors

Networks' management requires the identification of international climate adaptation zones (Vos et al., 2010) and the establishment of cross-border corridors. Climate adaptation zones are defined as key zones for adaptation measures on the ecological network level. A cross-border ecological corridor is a '*geographical space containing a combination of ecosystems characterized by relief forms, plantation cover, determined on managerial and scientific basis, which are of importance for the protection of biodiversity and landscape*'. The cross-border ecological corridor must be sufficiently large to secure the preservation of habitats and valuable species. On the other hand, the corridor must be sufficiently small to be considered a 'home' by local population. The cross-border ecological corridor does not necessarily coincide with administrative boundaries and may be expanded beyond these, which is of great importance for its functioning.

4.3 Public involvement

It is recommended to organise better targeted campaigns regarding the goals, activities and expected results from Emerald Network, as well as the possibilities to participate and contribute to the Network and its objectives. The representatives at the discussions are the important connection between the protected territories and the municipalities located within the territory. Appropriate measures are:

- Training and expanding public involvement regarding the protection of endangered species in the Emerald site territories;
- Introducing the public to the recommended activities such as organic farming and other ecologically sustainable economic activities;
- Training and expanding public involvement regarding the alternative models for regional development.

In order to facilitate the practical implementation of the measures at the site, around the site and at the network level, two matrices are elaborated as a part of these guidelines - **Management Measures Matrix (Annex 2) and Time Management Matrix (Annex 3)**.

5. Monitoring and review of the measures' implementation

5.1 Monitoring guidelines and requirements

The long-term biodiversity conservation monitoring should be carried out on three inter-related levels:

- *Baseline monitoring of key biodiversity indicator elements*

This involves assessments of the status of important habitats and species according to protocols developed by the relevant national management body. The protocols will specify the methods to be

used, frequency of survey, data to be collected, analyses to be applied, and reporting format. The results from the monitoring is used to determine whether or not existing management tools have to be changed (and if so in what ways) as part of the periodic review process of the Management process (so-called adaptive management).

- *Monitoring of management interventions*

This involves evaluating the actual results of specific management actions against the expected outcomes for them. The actions may be specified in a Management Plan (for example, restoration of floodplain forests and wetlands) or arise from the results of baseline monitoring described above (e.g. translocating a species or removing a new threat), or from an event (see below). The monitoring may be carried out by Management body or external specialists as required.

- *Routine and Event Monitoring*

This involves the systematic reporting and logging of casual observations made by responsible management body and others, for example the occurrence of a rare migratory bird, unusual behaviour of an animal, or early flowering of a plant. For this purpose, a data form and special GIS layer will be developed. The other aspect of the routine and event monitoring is to report incidents that may have management consequences, for example floods, fires, storm damage in forests, dumping of waste and outbreaks of diseases.

5.2 Indicators for the effectiveness of the measures and their effects

The adaptive management includes reviewing the effect of management measures taken. Harley & Van Minnen (2010) propose which kind of indicators can be used for the monitoring process to show whether the adaptation measures are effective to reduce vulnerability of habitats and species. The review of the goals and measures achievement should consider the following:

- To what extent the goals and the expected results have been achieved;
- Which constraints and threats have been removed or their impact on the achievement of the goals has been decreased;
- Are the methods for measures implementation appropriate;
- Is it necessary to include new measures;

Conservation targets need to be regularly reviewed to ensure resources are directed towards conservation priorities as some species increase, others decline and habitats change in character as a result from climatic changes (Smithers *et al.*, 2008).

3. FUNDING FOR THE MEASURES IDENTIFIED

Funding for both the planning and implementation of the management measures can come from a variety of sources according to the aspect covered: national government, local authority, university/institute, NGO or internal resources. For each of the identified measures, it will be useful to identify the relevant stakeholders that may be involved in the process of implementation. Very important for the stakeholder involvement is to stress the ecosystem services that will mitigate climate change or address impacts of climate change for other sectors and the wider society. Also, it is necessary to find out what (human) resources are needed for the different measures.

One method of addressing this issue is to identify and promote appropriate forms of financing for businesses that can either increase the positive ecological impact of small and medium enterprises (SMEs), or help to mitigate / reduce the negative impacts of their operations on biodiversity. In fact, the best way of addressing these issues is to encourage the establishment of intrinsically biodiversity-related investments.

An alternative approach is to engage landowners in conservation action. Incentives may be positive (payments for positive conservation actions, e.g., the agri-environmental measures) or negative (taxes or other fees imposed on actions that negatively affect biodiversity, e.g., fees paid for killing or destroying species or habitats of European concern). Positive incentives can provide full

compensation for conservation actions, or they can provide partial compensation, leveraging the willingness of landowners to engage in conservation for other reasons (Doremus 2003).

4. CONCLUSIONS AND RECOMMENDATIONS

In order to facilitate the implementation of the measures planned for the management of the Emerald sites, including managing climate change and its impacts, the following actions are recommended:

1. Policy and Regulatory Aspects

- Legal acknowledgment of Emerald sites is an important step towards simplifying the process of policy and regulatory development for Emerald network;
- It is essential to integrate policies and planning tools for Emerald network sites into mainstream planning practices and policies for local development;
- Effective inter-institutional governance should be assured by the creation of voluntary management partnerships.

2. Management Systems

- An independent management structure is the most effective at coordinating and implementing the Emerald sites;
- A long term, jointly agreed management strategy is a pre-requisite for successful management;
- Management strategies should include a system for monitoring and evaluating site management structures, in the context of continuous learning and improvement.

3. Environmental Aspects

- The Emerald sites must be part of an wider ecological network;
- Knowledge of the site and its surrounding area is a prerequisite for climate change mitigation and/or adaptation. Based on this knowledge, managers can make decisions on environmental priorities and environmental restoration within the site itself;
- The various ecological and land use features of the Emerald sites should be seen as an added value not as a limitation, but it requires significant work in ensuring that activities are orientated towards overall sustainable use and improvement of the environmental and landscape resources (e.g. organic agriculture, hedge reconstruction, planting, breeding and protection of endogenous species, volunteering).

4. Social and Communication Aspects

- Involvement of stakeholders is a key part of site creation and management, but one that requires careful evaluation of each group's different demands;
- The Emerald network is a tool for social promotion, for social capital, for involving social groups and inhabitants and raising levels of responsibility for the public space;
- Level of involvement can vary according to site's and territorial characteristics and to the specific theme in question;
- Periodic monitoring of site users and/or visitors is important, in order to gain feedback on their levels of satisfaction and on their demands and concerns.

5. Economic Aspects

- Emerald sites should highlight their unique ability to add social, environmental and economic value to the surrounding area. Emerald sites need greater financial independence, especially in the current situation of limited public funds;

- Emerald sites have a unique added value which need to be greatly stressed, providing ecosystems services, reducing risks from natural disasters, adapting to and mitigating climate change, health, water and other sectors, at all levels;
- Economic activities should not compromise the internal mission or role of the Emerald sites, particularly in terms of environmental protection.

6. Green infrastructure

- Emerald sites must participate in the design for urban infrastructure, in order to ensure minimum disruption to the site;
- Emerald sites must be part of an integrated green- infrastructure network, within and around the protected areas;
- The management structures can use existing infrastructure, including integration of existing systems to establish buffer zones, corridors and restored landscapes.

REFERENCES

- CoE (2006-2011). Resolutions and Recommendations of the Standing Committee to the Bern Convention on the Emerald network of Areas of Special Conservation Interest. Available online at: http://www.coe.int/t/dg4/cultureheritage/nature/Bern/documentation_en.asp
- CoE (2008). Recommendation No. 135 (2008) of the Standing Committee, adopted on 27 November 2008, on addressing the impacts of climate change on biodiversity. Available online at: [https://wcd.coe.int/ViewDoc.jsp?Ref=Rec\(2008\)135&Language=lanEnglish&Ver=original&Site=DG4-Nature&BackColorInternet=a3b811&BackColorIntranet=a3b811&BackColorLogged=EDF4B3](https://wcd.coe.int/ViewDoc.jsp?Ref=Rec(2008)135&Language=lanEnglish&Ver=original&Site=DG4-Nature&BackColorInternet=a3b811&BackColorIntranet=a3b811&BackColorLogged=EDF4B3)
- CoE (2009). Recommendation No. 143 (2009) of the Standing Committee, adopted on 26 November 2009, on further guidance for Parties on biodiversity and climate change. Available online at: <https://wcd.coe.int/ViewDoc.jsp?id=1560549&Site=DG4-Nature&BackColorInternet=DBDCF2&BackColorIntranet=FDC864&BackColorLogged=FDC864>
- EC (2000). Managing Natura 2000 Sites, The provisions of Article 6 of the 'Habitats' Directive 92/43/CEE. Available online at: http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf
- CoE (2011). The Emerald Network, a Network of Areas of Special Conservation Interest for Europe - Explanatory document and compilation of relevant texts. Available online at: <https://wcd.coe.int/ViewDoc.jsp?id=1957737&Site=&BackColorInternet=B9BDEE&BackColorIntranet=FFCD4F&BackColorLogged=FFC679>
- CoE (2011). Recommendation No. 157 on the status of Candidate Emerald Sites and Guidelines on the criteria for their nomination. Available online at: <https://wcd.coe.int/ViewDoc.jsp?Ref=T-PVS/PA%282011%2912&Language=lanEnglish&Ver=original&Site=DG4-Nature&BackColorInternet=DBDCF2&BackColorIntranet=FDC864&BackColorLogged=FDC864>
- CoE (2013). Emerald Network Reference Portal. Available online at: http://www.coe.int/t/dg4/cultureheritage/nature/EcoNetworks/portal_en.asp
- Araújo, M. B. (2009). Protected Areas and Climate Change in Europe. Convention on the Conservation of European Wildlife and Natural Habitats, Standing Committee, 29th meeting, Bern, 23-26 November 2009.
- Belev, T., M. Dimitrov, H. Hubenov, S. Beshkov, B. Zlatkov, T. Stefanov, E. Tsankov, P. Shurulinkov, B. Petrov, S. Lazarov, N. Doncheva, D. Dimova. (2007). Guidance for planning activities in forests in Natura 2000 protected sites. Sofia, BER 2004: 70
- Thomas, L. & Middleton J. (2003). Guidelines for Management Planning of Protected Areas. Best Practice Protected Area Guidelines, Series No. 10.
- Harley, M. (2008). Review of existing international and national guidance on adaptation to climate change with a focus on biodiversity issues
- Berry, P. (2008). Climate Change and the Vulnerability of Bern Convention Species and Habitats
- Berry P., J. Paterson, M. Cabeza, A. Dubuis, A. Guisan, L. Jäätelä, I. Kühn, G. Midgley, M. Musche, J. Piper and E. Wilson, (2008). Mitigation measures and adaptation measures and their impacts on Biodiversity - Deliverables 2.2 and 2.3.
- European Environment Agency (2004). Impacts of Europe's changing climate : An indicator-based assessment. EEA, Copenhagen
- Smithers, R, N. Kent, M. Karen, J. van Minnen and M. Harley, (2011). Climate change adaptation indicators for biodiversity, ETC/ACM Technical Paper 2011/14
- Lucius, I., Dan R., Caratas, D., Mey, F., Steinert, J. and Torkler, P., (2011). Green Infrastructure; Sustainable Investments for the Benefit of Both People and Nature WWF
- EC (2008). Draft Guidelines on dealing with the impact of climate change on the management of Natura 2000' (ENV B.3./SER/2010/0015r)

UNEP (2009). The Natural Fix? The role of ecosystems in climate mitigation

WWF (2010). Natural solutions; protected areas helping people cope with climate change

EC (2009). White Paper. Adapting to climate change: Towards a European framework for action

Annex 1: Examples of on site management measures

1. Reduce existing pressures

Measures aiming to contribute reducing existing pressures, which can be considered for implementation within or around the site, could be:

- Restoration activities;
- Activities to minimise negative influences;
- Development of buffer zones around protected area, including in view of reducing internal and external human pressure;
- Control of invasive (alien) species and diseases;
- Development of ecological corridors, ecotunnels or greenbridges between the areas;
- Reduction or eradication of external pollution sources.

2. Enhance ecosystems and species resilience

The objective being to enhance biodiversity in and around the Emerald sites, some of the possible measures for eliminating or reducing the impact of the factors leading to the instability of the habitats or species are:

- Maintenance and/or restoration of ecosystems;
- Establishment of zones with strict conservation regime;
- Limiting access to the localities of species of conservation significance and allowing natural processes as much as possible;
- Protection of species in a critical status;
- Relocation of species as an adaptive strategy - re-introduction and/or translocation and/or conservation or assisted migrations;
- Maintenance of genetic diversity;
- Monitoring of the process in and around the Emerald site.

3. Accommodating the natural landscape forming processes

Possible measures aimed at accommodating the natural landscape forming processes could be based on:

- The implementation of management actions in the forests, keeping dead wood in;
- The conservation of the gene pool of native tree species;
- Meandering of rivers and freshwater-salt water gradients and maintaining and restoring natural hydromorphological processes and natural hydrological regimes;
- Maintenance of optimal open habitats for birds;
- Meadows and pasture habitats protection;
- Improving forestry practices;
- Integrated protection of the biodiversity in the agriculture;
- Sedimentation;
- Marshland development.

It should equally be considered whether the size of the sites can ensure the necessary prerequisites for achieving their conservation purposes, as well as their management objectives, or if

there is a need to establish new areas. The measures to remedy to eventual need for additional areas identification could be:

- Justifying the need of changes of boundaries of the site for protection of the habitats stands;
- Declare suitable territorial corridors if there are areas of high specific diversity outside the site.

The identification of existing and potential possibilities for species movement underlies the analysis of the need to form an ecological corridor, which will facilitate species migration.

4. Ensure the required abiotic conditions

The following measures could be considered:

- Increasing water retention within the site - for example, adapting the existing drainage system, restoring meanders of rivers and streams or reforestation, restoring peatbogs and alluvial grounds;
- Maintenance of the passability of rivers and gallery riverine forests - for example, increase in the total area of floodplain forests of native species;
- Restoration of the former hydrological network and wetland areas - for example, surface water inundation can be re-introduced to a site by allowing a river or lake to naturally flood the land;
- Ensuring water drainage from the site during excessive periods of rainfalls;
- Periodic mowing of vegetation or removal of the topsoil to avoid nutrient enrichment of the site.

5. Management of extreme events

In relation to the protection and conservation of biodiversity there is always a risk of anthropogenic disasters e.g. major pollution spill, fire, point source pollution in the site and adjoining areas. To a lesser extent, there is the risk of natural disasters e.g. catastrophic windblown, pests and disease, pests and flooding. Possible measures are described below:

- Identifying the main risks (natural and anthropogenic);
- Collaborating with local authorities and other relevant bodies in identifying and combating risks and in co-ordination of resources;
- Ensuring procedures are developed to manage and monitor all known risks in the site and adjoining areas; It should be stressed that prevention measures may also be destructive for ecosystems and biodiversity and their effects should be carefully considered.
- Ensuring safety is an integral component in undertaking works programmes and capital developments within the protected area;
- Providing information to local population and visitors that highlights potentially hazardous areas and activities, as well as appropriate preventative actions and emergency procedures;
- Preparing Contingency Plans for each of the main identified risks including as a minimum contingency plan for (a) pollution, (b) major flooding, (c) fire, (d) storms;
- Putting in place any necessary equipment and facilities needed for implementing a Contingency Plan.
- Providing any necessary training for the implementation of the Contingency Plans.
- Minimising the occurrence or the impact of uncontrolled fires. Nevertheless, in the case the disaster took place, it should be considered to give the area to restoration by natural processes/natural succession.

The FAO's handbook on Forest Fire Protection provides a large number of technical measures to reduce the occurrence and impact of fires:

- *Storms* - These measures are relevant for coastal habitats and forests:

- Ecological enhancement of existing forests - improve the proportion and range of native species in existing forests while enhancing forest structure and age class distribution;
- Individual approach of forest management in regions with reported protected species;
- *Flood-control* - These measures are more technical, taken from the perspective of overall flood protection of the area:
 - Allowing a river or lake to naturally flood the land. This can be achieved by removing the flood defence embankments. If this is not appropriate then surface water can be routed from rivers, ditches or lakes via pipes and drains. Water control structures such as dams, sluices or weirs can be used to control the input and output of water to mimic the natural water level fluctuations within the area;
 - Restoration of riverine forests;
 - Maintenance of the passability of rivers and gallery riverine forests.

6. Control of invasive alien species

Invasive alien species (IAS) are species whose introduction and/or spread outside their natural past or present distribution threaten biological diversity. IAS occurs in all taxonomic groups, including animals, plants, fungi and microorganisms, and can affect all types of ecosystems. For a species to become invasive, it must successfully out-compete native organisms, spread through its new environment, increase in population density and harm ecosystems in its introduced range.

Possible measures for control such invasive alien include:

- Determination of the distribution and abundance of known invasive species within the site and surround areas;
- Assessment of which invasive species have the potential to impact on overall site management goals;
- Detection, prevention and eradication of new alien species;
- Enhancement of knowledge and capacity to deal with invasive species;
- Evaluation of the effects of management measures on targeted plant species and the ecosystems that they have invaded;
- Determination of the status and trends of species invasions over time and space and develop predictive capabilities to better guide future monitoring and management efforts.

Species expanding their range as a natural response to climate change should not be considered as alien species. Acceptance of new species compositions and a good consideration for the need of species specific measures are part of climate change adaption.

The Bern Convention, with the technical support of the IUCN SSC Invasive Species Specialist Group, has developed a series of voluntary instruments (codes of conduct and guidelines) covering a number of industries, activities or contexts potentially responsible for the introduction of alien species (horticulture, hunting, pets industry, botanical gardens, zoological garden and aquaria, protected areas).

Recommendation No. 167 of the Standing Committee to the Bern Convention, adopted in 2013, recommends to Contracting Parties to implement the European Guidelines on Protected Areas and Invasive Alien Species. These Guidelines were prepared again in cooperation with the IUCN SSC Invasive Species Specialist Group.

All the above mentioned instruments can be consulted on the webpage of the Bern Convention Group of Experts on IAS: http://www.coe.int/t/dg4/cultureheritage/nature/bern/IAS/default_en.asp

Annex 2: Guidance for practitioners on climate change and effective management of ecological networks, with a particular focus on managing climate change

Management Measures Matrix

	TYPE OF MEASURES	On site	Around site	Network level
H	1. Reduce existing pressures:			
	Restoration activities	X		
A	Increase the size of the protected area to minimise negative influences		X	
	Development of buffer zones around protected area		X	
B	Development of green infrastructure - ecological corridors, ecotunnels or greenbridges between the protected areas			X
I	Reduce or eliminate external pollution sources		X	
T	2. Enhance ecosystems resilience:			
	Maintenance and/or restoration of ecosystems	X		
A	Establishment of zones with strict nature conservation regime	X		
	Monitoring of the process in and around Emerald site	X	X	
T	Implementation of management actions in the forests, keeping dead wood in	X		
S	Meandering of rivers and freshwater-salt water gradients	X	X	X
	Maintenance of optimal open habitats for birds	X		
	Meadows and pasture habitats protection	X		
	Improving forestry practices	X	X	
	Integrated protection of the biodiversity in the agriculture	X	X	
	Sedimentation	X		
	Marshland development	X	X	
	Justifying the need of changes of boundaries of the site for protection of the habitats stands	X	X	
	Declare suitable territorial corridors if there are areas of high specific diversity outside the site		X	X
	Maintenance of pastures – habitats of small mammals, part of the food chain of predatory birds and orchids;	X		
	Restoration and maintenance of wet meadows and water bodies – habitats of amphibians, food base of water-loving birds; habitats for hydrophilous and hygrophilous plant species, etc.	X		
	3. Ensure required abiotic conditions			
	Increasing water retention within the site	X		
	Maintenance of the passability of rivers and gallery riverine forests	X	X	
	Restoration of the former hydrological network and wetland areas	X	X	
	Ensuring water drainage from the site during excessive periods of rainfalls	X		
	Periodic mowing of vegetation or removal of the topsoil to avoid nutrient enrichment of the site.	X		
	4. Management of extreme events			

	Technical measures, such as the development of dams, or sand suppletion	x		
	Allowing a river or lake to naturally flood the land.	x	x	
	Removing the flood defence embankments.	x		
	Route surface water from rivers, ditches or lakes via pipes and drains.	x	x	
	Water control structures such as dams, sluices or weirs to control the input and output of water to mimic the natural water level fluctuations within the area.	x		
	Maintenance of the passability of rivers and gallery riverine forests.	x	x	
S	1. Reduce existing pressures:			
	Restoration activities	x		
P	Increase the size of the protected area to minimise negative influences		x	
	Development of buffer zones around protected area		x	
E	Development of ecological corridors, ecotunnels or greenbridges between the protected areas			x
C	Control of invasive (alien) species and diseases	x	x	
	Reduce or eliminate external pollution sources		x	
I				
	2. Enhance species resilience:			
E	Limiting access to the localities of species of conservation significance	x		
	Protection of species in a critical status	x		
S	Relocation of species as an adaptive strategy - re-introduction and/or translocation and/or conservation or assisted migrations	x	x	
	Maintenance of genetic diversity	x		
	Conservation of the gene pool of native tree species	x		
	Creating “stepping stones” for particular species			x
	Declare the some forest stands for “Old growth Forest”	x	x	x
	Maintenance of pastures – habitats of small mammals, part of the food chain of predatory birds and orchids;	x		
	3. Management of extreme events			
	Improve the proportion and range of native species in existing forests while enhancing forest structure and age class distribution	x		
	Individual approach of forest management in regions with reported protected species	x		
	Restoration of riverain forests	x	x	
	4. Control of invasive (alien) species			
	Determination of the distribution and abundance of known invasive species within the site and surround areas.	x	x	
	Assessment of which invasive species have the potential to impact on overall site management goals.	x		
	Detection, prevention and eradication of new alien species.	x	x	
	Determination of the status and trends of species invasions over time and space	x		

This matrix provides an overview of the various measures you might consider. The main categories of measures are:

- Reduce existing pressures
- Increase ecosystem resilience

- Ensure abiotic conditions
- Manage impact of extreme events

If national information of the expected impacts for species and habitats is available, it should certainly be used. Once the main impacts have been determined, we can begin with formulating measures to mitigate or adapt to climate change. A good way to quickly combine all available knowledge is organising a workshop (with stakeholders and experts) to address the impacts of climate change on your site.

As each Emerald site is different, an assessment of the local context is required.

- For extreme events: are refuge areas for species available.
- For altitudinal ('up the mountain') and longitudinal movement of species: is the area embedded in a network of green infrastructure.
- For sea level rise: Are there coastal defences, roads or urban areas in the vicinity or coastal barriers that prevent habitats from moving inland.

Based on the outcomes of the relevant questions a provisional listing of the measures which help to address climate change can be prepared.

Except for the measures mentioned in this matrix, it remains important to think of any additional adaptation measures, which might be relevant based on national, regional and/or local knowledge. For each of the identified measures, it will be useful to identify the relevant stakeholders that we may want to involve in the process of appointing adaptation measures, as certainly some of the stakeholders will gain benefits (ecosystem services) from the adaptation measures and are therefore willing to contribute to set and realize the targets.

Annex 3: Guidance for practitioners on climate change and effective management of ecological networks, with a particular focus on managing climate change

Time Management Matrix

European and national information sources, are available that provide spatial scenario of the expected climate changes (e.g. EEA, 2004, Ciscar et al., 2009, Clearing House Mechanism on climate change impacts, vulnerability and adaptation.). This base information of changes in seasonal climatic conditions, will allow to better assessing how the specific Emerald site can contribute to the adaptation and mitigation of some of the expected climate change impacts which will affect other sectors.

Based on the outcomes of the information above an indicative list of measures can be prepared which help to address climate change and a first prioritization can be done. The matrix below helps to the protected areas managers to focus on two main ingredients of **Time Management**: importance and urgency. Identifying each measure that have to be implemented the practitioners can see what they really need to be doing and what can be ignored, and what needs to be done first, and what can wait.

	URGENT	NOT URGENT
IMPORTANT	<p>I Measures, related to climate changes, serious impediment that will be likely to act long time.</p> <p>Measures, related to constraints / threats can be remove by the management of the site and it must take urgent adaptation and mitigation in this regard. Measures, related to potential climate changes within the site have an impact over the whole territory of the site.</p>	<p>II Measures, related to the climate changes with potential impact of the site and its removal is important but can be reduced or controlled over time by the protected area management. Measures, related to potential climate changes within the site have an impact on discrete small areas, habitats and/or species in the site.</p>
NOT IMPORTANT	<p>III Measures, related to potential climate changes within the site have an impact, generally or locally, under certain conditions. Measures, related to the removal of potential climate changes impacts not only by the Management body of the site, but it should take the initiative in this respect.</p>	<p>IV Measures, related to climate changes with low potential impact – require additional research and involvement of more institutions and partners in order to undertake the necessary measures.</p>