Recommendations

towards Integrating Mitigation Measures into the National and EU-level Policy Processes

Output T3.2 of the SaveGREEN project

December, 2022

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Recommendations towards Integrating Mitigation Measures into the National and EU-level Policy Processes

Output T3.2 of the SaveGREEN project

SaveGREEN “Safeguarding the functionality of transnationally important ecological corridors in the Danube basin”

Danube Transnational Programme, DTP3-314-2.3

December 2022


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About SaveGREEN

The SaveGREEN project, funded by the Interreg Danube Transnational Programme is focused on the identification, collection, and promotion of the best solutions for safeguarding ecological corridors in the Carpathians and further mountain ranges in the Danube region. Currently, ecological corridors in the region are under threat due to the lack of adequate planning of economic development initiatives. Therefore, basing its work on integrated planning, SaveGREEN will monitor the impact of mitigation measures in 8 pilot areas and derive proper recommendations for follow-up actions and policy design.

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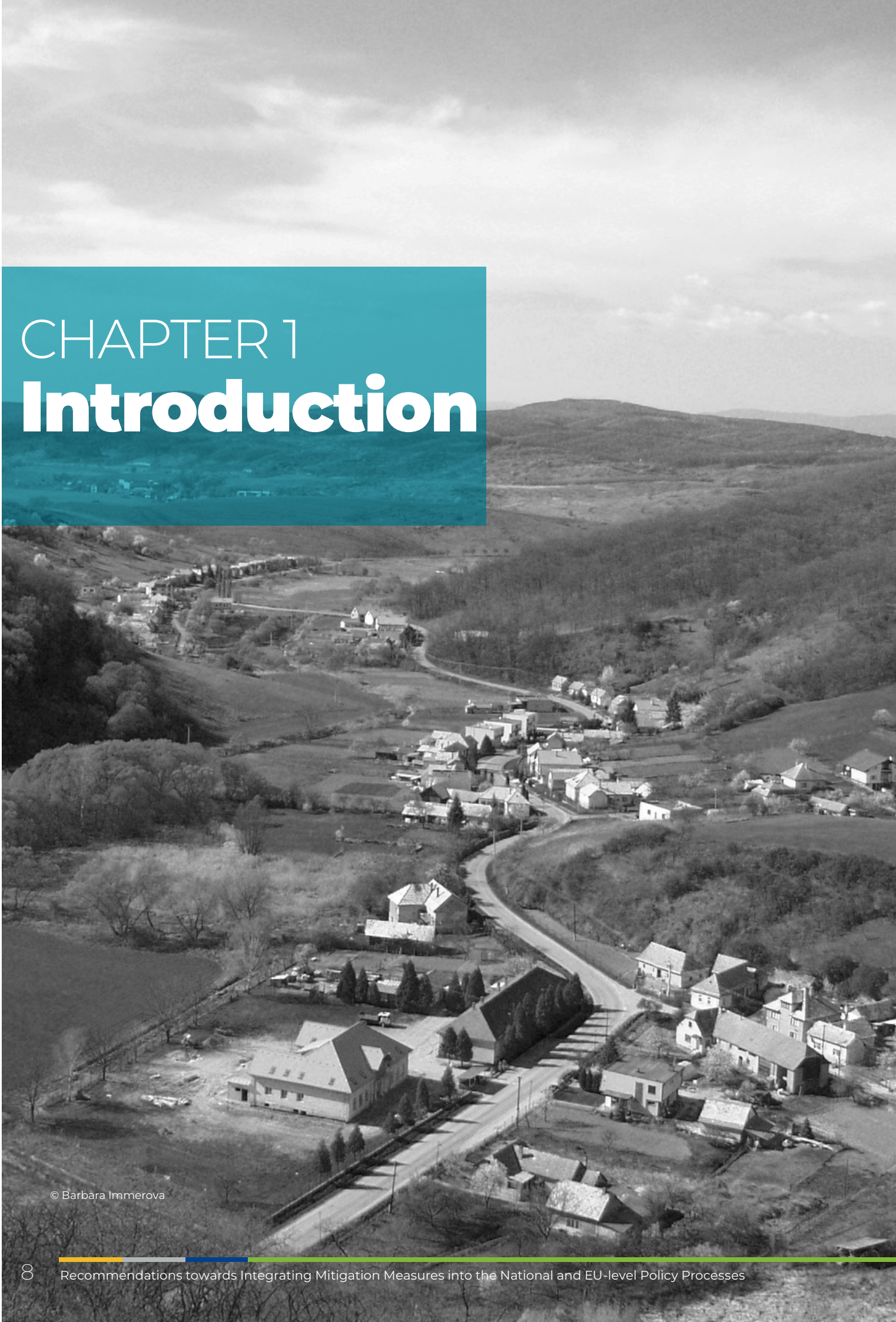
Introduction



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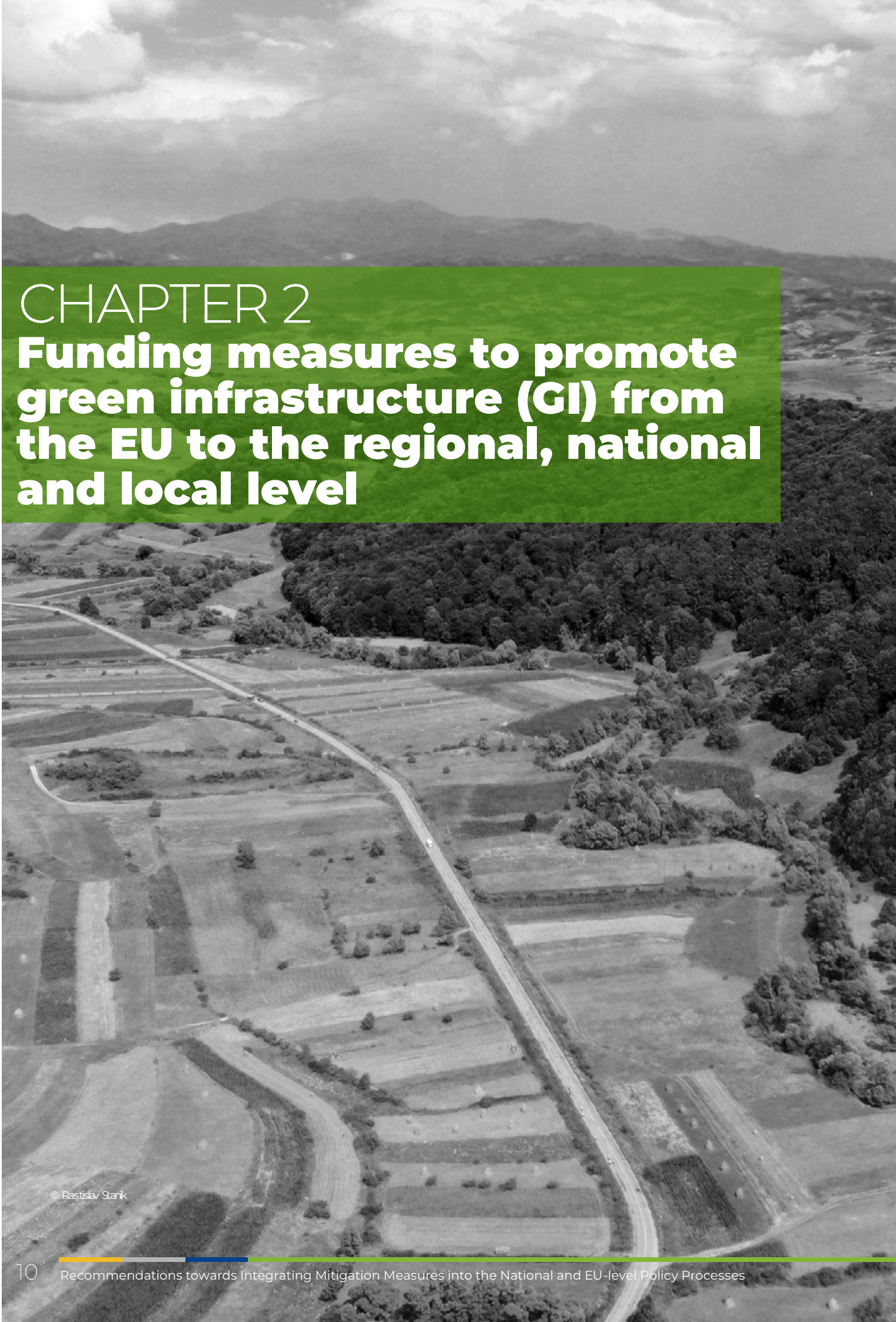
Output T.3.2 - Recommendations towards Integrating Mitigation Measures into the National and EU-level Policy Processes - elaborated at WWF RO coordination, is addressed to relevant bodies at national and EU-level. One of the main components, the Green Infrastructure funding measure, was developed and promoted to the relevant institutions at EU and national level with the aim to influence the relevant operational programmes for the programming period 2021-2027 in the project countries as well as other donors in Ukraine.

In addition, relevant policy recommendations at EU level regarding the role of ecological connectivity in the context of the EU Restoration Act and Member States' commitments towards the 30% target for protected areas were developed and integrated into this output.

Additionally, this output contains recommendations for future standard developments at EU and international level, developed by the SaveGREEN project consortium under the coordination of WWF RO.

All these recommendations contribute to the specific objective 3 "Strengthening international and national governance frameworks" as follows:



CHAPTER 2
Funding measures to promote green infrastructure (GI) from the EU to the regional, national and local level

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2.1 Scope

Within the framework of the project SaveGREEN "Safeguarding the functionality of transnationally important ecological corridors in the Danube basin", project number: DTP3-314-2.3, beneficiary of the contract: WWF Romania, Highclere Consulting was contracted to elaborate a Green Infrastructure funding measure (GI) and/or proposals for GI funding measures at transnational level, with input from the project experts. These will subsequently be adapted and used in national advocacy work to influence the integration of such measures into relevant funding programmes in partner countries.

2.2 Methodology

The proposed actions were developed based on the needs identified by 51 experts and policy makers with expertise in environmental protection and EU funds management and implementation in response to a questionnaire developed by the authors of this report. The proposals were also cross-checked with the EU legal framework for funding programmes for their relevance in this framework and adapted to meet the needs and scope of the project.

As the analysis of the questionnaire revealed, there is a need for a series of measures/ interventions rather than a single measure.

For this reason, the proposals listed below have been divided into two general categories. The first category concerns the programme mechanism - general provisions of the logical framework common to all EU funding programmes (e.g. the chapters for analysis, provisions for monitoring and evaluation, the technical assistance component, etc.), the second category contains proposals for specific measures/interventions under the main EU funds (CAP and Cohesion Policy).

In the case of Ukraine, a separate proposal has been prepared as it is not part of the EU budget estimates and quantification of indicators is not included as such estimates would require more detailed assessments for each country, which is beyond the scope of this report.

Furthermore, as this report is a purely technical document, the specific policy context and priorities in each of the countries presented have not been included in the assessment.

The report concludes with a set of recommendations for developing and adapting the actions/interventions identified in the previous sections to the national context and for promoting the actions/interventions at national and local levels.

2.3 Proposals at programme level - applicable to all EU-funded programmes/ plans/strategies

2.3.1 Analysis – including SWOT

The analysis (the description of the situation and the SWOT – "Strengths, Weaknesses, Opportunities, Threats" analysis) is an essential part of any funding programme as it forms the basis for any intervention.

The following information should be included in the analysis chapters of the programmes to ensure appropriate interventions:

- A description of ecological connectivity and migration corridors/ landscape fragmentation in the intervention area;
- Territorial priority areas (e.g. mountain areas, Danube floodplains);

- A presentation of available data (maps of core areas, migration corridors, etc.) and a description of what data are still missing;
- Arguments supporting the need to raise public awareness;
- A description of the threats associated with non-intervention.

As the analysis is formulated in response to specific objectives defined in the existing EU regulations, recommendations should target the relevant sub-chapter therein (e.g. for CAP the relevant specific objectives are: "Contribute to the protection of biodiversity, enhance ecosystem services and conserve habitats and landscapes").

2.3.2 Strategic Environmental Assessment

Any EU-funded programme/strategy must go through a SEA process in its initial phase. Consequently, any SEA should include mandatory provisions for assessing the impact of the programmes on ecological corridors/habitats and landscape connectivity, and include specific mitigation and compensation provisions, thereby supporting the streamlining of GI for all programmes to be assessed.

2.3.3 Common proposals to several interventions

EU-funded programmes usually include such a chapter (as required by EU funding rules). This chapter should contain:

- A mandatory provision that all EIA processes initiated for projects funded by the programme cover the issue of linear or spatial barriers to ecological corridors/habitats and landscape connectivity created by major investments such as motorways, railways, tourism infrastructure, land consolidation, etc.;
- A mandatory provision requiring that all project designs consider the potential benefits that the use of GI may represent to the viability of ecological corridors/habitats and landscape connectivity.

2.3.4 Monitoring and Evaluation

The monitoring and evaluation framework is provided by the European Commission and includes context, output, result and impact indicators. However, these indicators are not formulated in sufficient detail to be relevant to ecological corridors/landscape fragmentation and general environmental connectivity issues, although there are indicators for biodiversity.

As additional indicators can be included, the recommendations are:

- Establish specific indicators for monitoring, e.g. a set of measures to ensure habitat and landscape connectivity or to reduce wildlife mortality and injury on EU-funded roads/railways;
- Use (programmes') evaluation to assess the impact of funded investments on habitat and landscape connectivity to identify the needs for GI.

2.3.5 Technical Assistance

This fund should finance:

- Awareness-raising campaigns to promote GI both at national and local levels – in areas where the programme is implemented while focusing on core areas for ecological corridors.
- Studies to identify ecological corridors, especially the threatened habitats/small wildlife populations that are more vulnerable to disturbance from investments that may act as barriers.
- Consultancy services/studies on the

impacts of the existing investments that may act as linear or spatial barriers, corridor permeability assessments, identification of bottleneck situations based on structural connectivity, etc.

2.4 Proposals at measure/ intervention level for the Common Agricultural Funds

2.4.1 The baseline for area-based payments

Strengthen GAEC 9 standards: "Minimum share of agricultural area devoted to non-productive features or areas" and "Retention of landscape features". GAEC 9 still needs to be elaborated in detail by Member States as part of the commitments for the "conditionality" system (the requirements that each beneficiary of area-based payments must fulfil).

Thus, this GAEC may potentially have a major impact on the conservation of landscape and habitat elements important for connectivity, especially in areas affected by agricultural intensification, monocultures, drainage and intensive irrigation.

2.4.2 Eco-schemes

Introduce **eco-schemes** as an incentive to provide public goods through farming practises that benefit the landscape: Eco-schemes are voluntary for farmers and their provisions must go beyond the established system of conditionality. Although the concept of eco-schemes is still in its infancy, it seems clear that agricultural incentives could be used to combat monocultures or promote crop diversification and a reduction in the use of pesticides and fertilisers, thus preserving biodiversity.

2.4.3 Agri-environment

- **Support for extensive grassland management**: As the semi-natural grasslands already receiving support under agri-environment schemes are mostly areas of high nature value, maintaining these areas under extensive management contributes to the conservation of ecological corridors; the conservation/maintenance of permanent grasslands plays an important role in the conservation of many species at landscape level.

- **Ecological restoration of wetlands:** This measure is somewhat more complex as it involves land use change, but has a strong positive impact on wildlife migration along watercourses.

- **Support for agroforestry:** An attractive level of support and an increase in the area where agroforestry systems are supported should contribute significantly to the conservation and possible expansion of ecological corridors.

2.4.4 Non-productive investments

Assistance in avoiding conflicts with large carnivores and herbivores: Although non-productive investments, largely associated with fences, can create further barriers to migration. These investments, if used properly, can ensure a balance between agricultural activities and wildlife and reduce human-wildlife conflicts.

Fences and planted hedgerows could play a positive role for large carnivores/herbivores if they are designed to protect farmers' livestock and y separate them from wild habitats, thus reducing the risk of human-wildlife conflict

and mitigating anthropogenic pressure on animal migration routes.

2.4.5 Afforestation of agricultural land

Promoting **afforestation**: because this intervention can support a selection system, this type of investment should be prioritised for the agricultural land that can serve as ecological corridors for large carnivores, in areas where there is evidence of conflicts between farmers and large carnivores, or where species of fauna that may benefit from afforestation (with native species) are abundant.

2.4.6 Agricultural Knowledge and Innovation Systems - AKIS

AKIS - Agricultural Knowledge and Innovation Systems can and should play an important role in raising farmers' awareness of their role in preserving biodiversity and avoiding habitat fragmentation. Farmer discussion groups established in core areas are known to be important for wildlife migration.

2.5 Proposals at measure/intervention level for Cohesion Policy funds (CF and EFRD)

The Cohesion Fund and ERDF **provide an opportunity for financing investments in transport infrastructure, with the Cohesion Fund concentrating more on the Trans-European Transport Network (TEN-T), while the focus of the ERDF lies on lower category roads. Under Policy Objective 3 of Cohesion Policy "A more connected Europe by enhancing mobility and regional ICT connectivity", Member States may finance transport infrastructure investments under 2 specific objectives, respectively:**

> **"ii)** developing a sustainable, climate resilient, intelligent, secure and intermodal TEN-T".
>
> **"iii)** developing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility".

There is widespread evidence that transport infrastructure has a strong negative impact on wildlife and ecosystems, posing an important barrier for the natural movement and migration of wildlife species and representing a major driver of biodiversity loss. The most frequent negative impacts of transport infrastructure investments are related to habitat loss, isolation of populations, barrier effects, and fragmentation of nature networks or road mortality of wildlife species.

Within this context, there is a need to integrate GI into the transport infrastructure investments in order to minimize the fragmentation of ecosystems, preserve habitats and reduce noise levels. Thus, "biodiversity proofing" should be considered when financing transport infrastructure investments in order to minimize the negative consequences by planning and implementing actions, which could facilitate safe crossings of roads/railways by wildlife prior to construction, or upgrading the existing transport infrastructure:

- **Wildlife crossings** (tunnels, viaducts or green bridges, culverts, green roofs, underpasses, overpasses, landscape bridges etc.) for new or existing infrastructure – as both stand-alone investments (e.g. green bridges for the existing motorways) and investments within a larger project.
- **Other related investments (for new or existing infrastructure**): transport infrastructure verge management, creating

of natural guiding vegetation, installation of road signs, etc. could maximize the functionality of green infrastructure through effective management of the neighbouring land.

As these investments may be seen as an extra burden, the selection system should prioritize investments with the above components.

Reserving a dedicated budget for GI could be a solution; however, this proposal may face reluctance from managing authorities, as it may lead to blocked funds if projects are not planned in an integrated manner (transport-biodiversity) from an early stage.

Apart from these "hard" investments in GI, the cohesion policy funds may and should finance (either within the technical assistance priority or within the thematic priority) "soft" measures and activities in order to support addressing the knowledge gap regarding ecological corridors: educational actions, public awareness, capacity building and trainings related to green infrastructure.

2.5.1 For spatial planning

Naturally, EU funds are a strong driving force, especially in Central and Eastern Europe and each country has the duty to do its best in using this budget for sustainable development.

Nevertheless, the implementation of EU funds relies on the national regulatory framework on spatial planning. Integrating the issues of ecological corridors/wildlife migration/GI restoration/habitats fragmentation into the spatial planning policy and legal framework (as the Czech Republic has done) may, therefore, play a long-term role and have a wider positive impact. Furthermore, well-formulated spatial planning policies have the advantage of preserving the ecological corridors prone to land-use changes beyond the direct sphere of influence of the EU funds, such as the existent greenways and greenbelts near cities.

2.5.2 Specific recommendations for Ukraine

Being neither a non-EU Member State nor a candidate country, Ukraine has a different institutional set-up. Nevertheless, the country is a priority partner for the EU, having signed the **EU-Ukraine Association Agreement** (AA) in 2014, including a **Deep and Comprehensive Free Trade Area** (DCFTA). Under the main goal of supporting administrative reforms, the EU funds were made available mainly through the European Neighbourhood Policy (more than 200 million Euro) and Enlargement Policies (European Neighbourhood Instrument – Eastern Partnership) and provided by the European Investment Bank (13 billion Euro as loans and 2 billion Euro as grants).

Under the main priorities such as rule of law, democracy, and decentralization, Ukraine also has access to Twinning and TAIEX (state-to-state consultancy) instruments meant to build institutional capacity for all areas under EU prerogatives.

Thus, the recommendations are:

a) To make the best use of the foreseen public consultations on how to use the 2021 - 2027 EU funds, within the context of the announced funding mechanism for the Eastern Partnership.

This funding mechanism will include investments outlined in the TEN-T network, thus upgrading key physical infrastructure in road, rail, port, inland waterway and airport facilities, and logistics centres in order to further strengthen connectivity between Ukraine and the EU. On the other hand, as the EU seeks more ambitious environmental goals (and already proposed the following environmental objective for the Eastern Partnership: "together towards environmental and climate resilience"), this creates a good opportunity for promoting the following priorities through the public consultation processes and by participation in working groups:

- Setting-up a monitoring and evaluation framework that includes specific output and result indicators for ecological corridors that should be linked with investment needs for GI.
- A provision that all the technical designs for the funded investments should consider the required GI.
- Mandatory advantage through the scoring system for projects that take GI into account.
- A provision that all the investments conduct an EIA that includes an assessment of the possible impact of the projects regarding ecological corridors.
- Wildlife crossings (tunnels, viaducts or green bridges, culverts, green roofs etc.) for the new or existing infrastructure.

b) To encourage institutional capacity-building projects through Twinning and TAIEX, to further strengthen the local institutions (e.g. for the State Environmental Inspectorates) on their path in transposing and applying the EU directives on SEA and EIA, thus creating the basis for ensuring programmes/plans/strategies and projects will properly consider threats to biodiversity, and, specifically, the role of GI.

2.6 Recommendations concerning options for developing and adapting the measure/interventions to the national context

An analysis of the questionnaire results revealed that the assessed countries are in slightly different stages of readiness regarding further promotion of GI, while the hierarchy of their priorities also differs to some extent. Consequently, this chapter is meant to lay out the analysed countries' options for developing and adapting the measures/interventions to their national context.

Thus, for Austria, the Czech Republic, Hungary, and Slovakia, which have a stronger technical readiness and institutional capacity, increasing the level of awareness of the value of ecological connectivity and the need for sectoral integration has the potential of unlocking key decisions for the future funding of GI. Within this context, TA funds (under CAP and Cohesion Policy) and AKIS (in the case of CAP funds) should include broad awareness campaigns (e.g. through classic and social media and the education system), as well as specific campaigns targeting key official bodies, through dedicated events such as conferences and seminars.

Bulgaria and Romania, however, would firstly need to prioritize the official identification and designation of their ecological corridors. Nevertheless, the review of the existing studies (in those countries that already have them, such as the Czech Republic and Hungary) and methodologies for ecological corridor delineation should not be neglected.

Austria, the Czech Republic, Slovakia, and Hungary already have relatively strongly interlinked networks of motorways, making it a priority for them to promote wildlife crossings on the existing infrastructure. This highlights the need for specific studies and monitoring of the existing EU-funded construction projects that demonstrate the benefits of securing new GI investments for the existing transportation infrastructure.

On the other hand, Bulgaria and Romania are currently at the stage of expanding their motorway networks. In their case, it is, therefore, more important to ensure that new investments include wildlife crossings

from the beginning of their design. This means more rigorous environmental impact assessment processes and the need of having specific programme requests to push for technical designs addressing the topic. At the same time, the beneficiaries should be encouraged to propose GI measures (which may seem costly and extra-time-consuming) by implementing a selection system that provides the right incentives.

Bulgaria, Romania, and Slovakia have large populations of wild animals that are key to European conservation efforts, and thus have strong arguments to promote various types of GI. Awareness in this regard should be explicitly promoted in the relevant programme chapters (the chapter for analysis and the identification of needs).

Mountain areas – for establishing wildlife crossings and the Danube River Basin and nearby plains/other wetlands – for ecological restoration of wetlands should generally be considered as focus areas for all the CEE countries.

2.7 Recommendations for promoting the measures/interventions at the country/local level

The recommendations featured in this report are prepared to be applicable for the 2021 – 2027 EU-funded programmes. Considering that it is more efficient to influence the content of the future funding programmes during their elaboration rather than to attempt to modify or adjust them in retrospect, the following recommendations are provided for the "promoters"/NGOs or other relevant representatives:

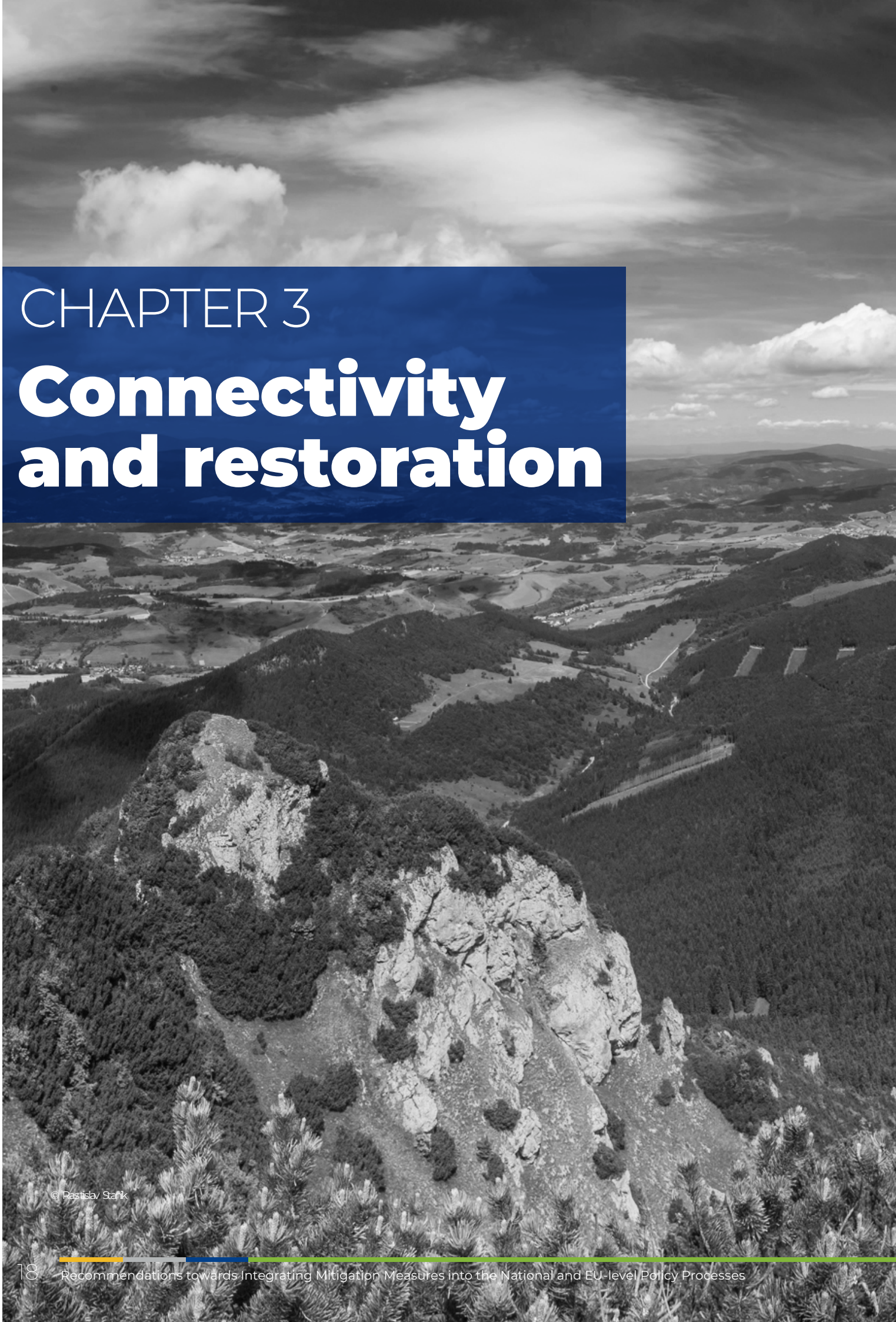
- Participate in the consultation process: this allows interested parties to express their interests (e.g. by sending a letter to the Managing Authority) and to present their experience/expertise on the specific topics.

- Participate in the established working groups/request a specific working group on the topic.

- Participate in the public consultations for both the Programme development and the accompanying SEA. Submit written proposals for all the Programme chapters (the analysis chapter should not be disregarded). However, the written communication should not come too late in the programme elaboration process or as a surprise; verbal communication, both formal and informal, may increase the chances of successful collaboration.

We have to highlight the fact that the 2021 – 2027 policies shifted towards a more flexible approach, with the Programmes/Strategies requiring that the Member States include fewer details on intervention mechanisms (of the eligibility and selection system), as the achievement of the set targets became more important. It is thus, expected that Member States further develop details for eligibility and selection systems within their national legislative frameworks and this process should be followed by an open consultation as well.

Nevertheless, a general recommendation for the promoters is to create trusting partnerships with the managing authorities' staff, thus adopting a constructive approach while blending positive criticism with clear and applicable proposals for preparing better EU-funded Programmes. In the end, the success of promoting these interventions will depend on when (good timing within the programming process) and how these proposals are delivered.



CHAPTER 3

Connectivity and restoration

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3.1 Scope and target audience

This paper complements the position paper 'Restoring EU's Nature'[1] released by a coalition of 20+ NGOs in October 2020. It presents elements to be considered as part of the new EU nature restoration law specifically related to the increased connectivity between habitats. Restoring a matrix of sustainably managed habitats, both inside and outside the Natura 2000 network, would increase its coherence and support the creation of a coherent trans-European protected area network. In addition to the SaveGREEN project Partners, these recommendations were also disseminated to the European Commission (DG ENV), together with WWF's feedback to Public consultation regarding the EU biodiversity policy initiatives.

The overarching aim of the EU Biodiversity Strategy for 2030 is that 'By 2030, significant areas of degraded and carbon-rich ecosystems are restored. Many valuable ecological corridors in Europe are impeded or threatened by economic development such as linear transport infrastructure construction or intensive agricultural, forestry, or water management practices. Thus, it is important that efforts be undertaken under this strategic policy to cover the restoration of ecological functions and connectivity of habitats and promote natural ecosystem dynamics, with the main focus on ecosystems of significant carbon storage potential and adaptation benefits.

1 https://wwfeu.awsassets.panda.org/downloads/ngo_position_paper_restoring_eu_s_nature.pdf

Unfortunately, most original migration routes for fauna have already been irreversibly interrupted in many parts of Europe. Thus, it is necessary to start with a strict protection and restoration regime for the remaining migration corridors[2]. Furthermore, in cases where the relevant policy and legislation do not foresee the implementation of restoration measures in areas where connectivity has been hampered by past interventions, amendments should be considered.[3]

The proposed legally binding restoration targets under the EU Biodiversity Strategy for 2030 will need to improve the connectivity of Natura 2000. Ecological connectivity consists of core areas (primarily protected areas), stepping stones, and corridors that do not have a protection status in most of the countries. This means that besides ensuring the official designation of ecological corridors by environmental authorities, spatial planners need to be involved in order to analyse the situation from a territorial planning perspective. Well-formulated spatial planning policies have the advantage of preserving the ecological corridors prone to land-use changes beyond the direct sphere of influence of EU funds, such as the existent greenways and greenbelts near cities.

Furthermore, ecological connectivity should be the basis to start the restoration process in certain areas where corridors have been destroyed. This would request the identification of the ecological network and assessment of the "health" status of such areas, mainly outside the protected areas. This includes a cross-sectoral approach starting with awareness-raising on the importance of ecological connectivity. Sectors to be involved at all levels are spatial planning, agriculture, forestry, water management, transport, tourism and others having an impact on land use (e.g. mining).

In the context of restoration and connectivity, we believe that the following streams of actions should be considered:

- Defragmentation as a kind of restoration measure - opening up ecological connectivity by removing barriers and building supporting structures for animals
- Removing alien invasive species along linear transport infrastructure
- Improving agricultural land for connectivity as such: field strips with flowers, hedgerows or ruderal sites without much management in agricultural land.
- Integrated planning/approaches are important. It cannot be nature conservation alone influencing other sectors
- The new law should support the use of the existing EU funds and the creation of a dedicated EU restoration fund (or a facility within some other fund) in the MFF

If the EU is consistent about achieving the goals set in the EU Biodiversity Strategy for 2030, then any proposed legally binding restoration will need to drive the restoration of ecological corridors and reverse the fragmentation. Moreover, detailed science-based national restoration plans are needed, and the Commission should assess and approve them in order to ensure their quality and consistency.

In relation to the funding of green infrastructure (GI), the SaveGREEN project – „Safeguarding the functionality of transnationally important ecological corridors in the Danube basin" has produced Recommendations for funding interventions to promote GI at transnational level with specific proposals on CAP and EU

2 Wildlife and Traffic in the Carpathians, Guidelines on how to minimize the impact of transport infrastructure development on nature in the Carpathian countries, April 2019

3 TRANSGREEN Policy Recommendations on integrated road and rail transportation planning in the Carpathians, April 2019

Cohesion Policy. One of the conclusions is that each EU-funded programme/strategy has to undergo a SEA process during its early stages. Consequently, each such SEA should include mandatory provisions for the assessment of the programmes' impact on ecological corridors/habitats and landscape connectivity, and include specific mitigation and compensation provisions, thus supporting the streamlining of green infrastructure across the Programmes under assessment.

The restoration law should include a mandatory provision that all the EIA processes launched for projects be funded from EU money to cover the issue of linear or spatial barriers to ecological corridors/ habitats and landscape connectivity created by large investments, such as motorways, railways, tourist infrastructure, land consolidation etc. Moreover, a mandatory provision requiring all project designs to consider the potential benefits that a deployment of GI may represent for the viability of ecological corridors/habitats and landscape connectivity, is also needed.

There is widespread evidence that transport infrastructure has a strong negative impact on wildlife and ecosystems, posing an important barrier for the natural movement and migration of wildlife species and representing a major driver of biodiversity loss. The most frequent negative impacts of transport infrastructure investments are related to habitat loss, the isolation of populations, barrier effects, and fragmentation of nature networks or road mortality of wildlife species.

In this context, there is a need to integrate green infrastructure into the transport infrastructure investments in order to minimize the fragmentation of ecosystems, preserve habitats and reduce noise levels. "Biodiversity proofing" should, thus, be considered when financing transport infrastructure investments in order to minimize the negative consequences by planning and implementing actions, which could facilitate safe crossings of roads/ railways by wildlife prior to construction, or upgrading the existing transport infrastructure:

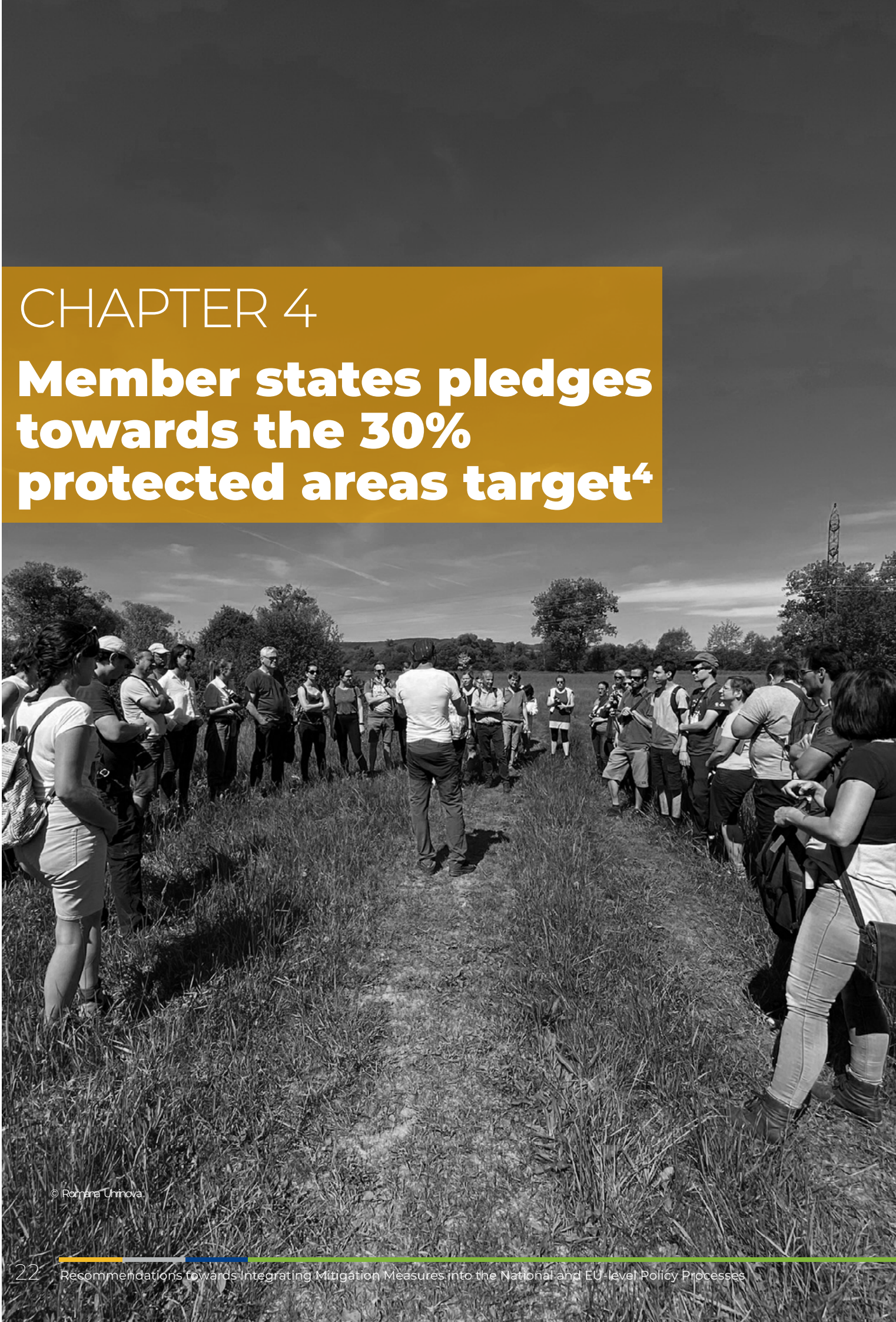
- **Wildlife crossings** (tunnels, viaducts or green bridges, culverts, green roofs, underpasses, overpasses, landscape bridges etc.) for new or existing infrastructure – as both stand-alone investments (e.g. green bridges for the existing motorways) and investments within a larger project

- **Other related investments (for new or existing infrastructure)**: transport infrastructure verge management, creating natural guiding vegetation, installation of road signs, etc., could maximize the functionality of green infrastructure through effective management of the neighbouring land

The only way to ensure a future for the planet, in balance with the richness of life it hosts, is to increase our efforts to preserve nature and, at the same time, reduce the impacts of our lifestyles. We must move to a positive nature system, where with commitment and vision we protect what has remained, we reconnect what we have fragmented, and we regenerate what we have degraded and destroyed.

CHAPTER 4

Member states pledges towards the 30% protected areas target[4]



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4.1 Scope and target audience

This paper aims to provide specific recommendations for decision-makers in regard to the role of ecological connectivity in MS pledges. Besides the partners of the SaveGREEN project, the target audience is composed of decision makers from national and regional levels (e.g. DG ENVI, MSs, EUSDR, and the Carpathian Convention).

A truly coherent Trans-European Nature Network, as stated in the 2030 EU Biodiversity Strategy[5], can only be achieved by enhancing ecological connectivity. The current distribution of the European protected areas is highly fragmented and embedded in a matrix dominated by intensive land use and high infrastructure density.

In 2022, a crucial step for driving the way towards better ecological connectivity across Europe is represented by the pledges that the Member States (MS) have to make to achieve the 2030 EU Biodiversity Strategy target to **legally protect at least 30% of the land, including inland waters, and 30% of the sea in the EU, of which at least one third (10% of land and 10% of sea) needs to be under strict protection.**

4.2 Enhancing connectivity

In order to effectively target connectivity perspectives, it is important to identify suitable or important areas or routes for species migration, as well as identify the existing gaps in the protected area systems or the existing barriers. This would mostly be done by means of spatial mapping[6]. Ecological connectivity is essential to strengthening the resilience of ecosystems and implies the design and implementation of local-specific land use measures and green infrastructures. In this sense, accurate connectivity assessments are needed, such as for example mappings of the priority areas for connectivity.

Furthermore, a Natura 2000 coherence check on the national and transboundary levels is needed. Also, the changing land use context, including changes in agricultural intensity, may either constrain or facilitate the establishment of such corridors and affect their resilience and adaptive potential to different climate scenarios.

4.3 Ecological connectivity fulfils many of the European Commission (EC) criteria for protected areas designations

Ecological criteria set out for the identification of special areas of conservation in Annex III of the Habitats Directive include the **degree of isolation of the species' population** and can be used for further designation of the protected areas. The Member States should build on the complementarity between the functional and structural connectivity approaches. Structural connectivity focuses on spatial proximity of landscape patches with high natural value, while functional connectivity focuses on the facilitation of movement of individuals of focal species between and across suitable habitats.

When drafting the pledges, it will be essential to ensure adequate long-term management of the connecting areas for a functional and coherent

4 https://environment.ec.europa.eu/publications/criteria-and-guidance-protected-areas-designations-staff-working-document_en

5 https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en#:~:text=The%20EU's%20biodiversity%20strategy%20for,contains%20specific%20actions%20and%20commitments.

6 Protected area management in the EU - Supporting the advancement of the Trans-European Nature Network, 2022, pg. 31

Natura 2000 network. There must be regulations in the field of biodiversity conservation that define, identify, and designate the ecological corridors and, finally, allow their smooth integration into the ecological network and territorial planning systems. Thus, additional designations should be done according to a harmonized methodology. This is important mainly because the deployment of ecological corridors will also take place on non-protected areas and privately-owned lands.

4.4 Completion of the Natura 2000 network & Designations under national protection schemes

According to the EC Guidelines, the completion of the Natura 2000 network represents the first step in achieving the protected area targets from the 2030 Biodiversity Strategy. It is important to identify gaps in the current protected area coverage, conserve ecological corridors and restore connectivity, namely, **identify sites that would need to be connected** in order to better fulfil their conservation objectives. Additionally, strong transboundary cooperation will be needed as the target set in the strategy is related to the biogeographical regions in Europe.

The EC Guidelines mention that in terms of priorities for the designation of national protected areas, *"Member States should start by identifying and designating areas which, while they are not and will not need to be included in Natura 2000, are important to increase the coherence of the Natura 2000 network and improve the connectivity among the Natura 2000 sites, including across national borders."* This is very important as it gives more flexibility on pathways for ensuring ecological connectivity, on a case-by-case basis.

4.5 Links to restoration and climate change

The overarching aim of the EU Biodiversity Strategy for 2030 is that by 2030, significant areas of degraded and carbon-rich ecosystems are restored. Many valuable ecological corridors in Europe are impeded or threatened by economic development such as linear infrastructure construction, settlement expansion, mass tourism, intensive agricultural, mono-cultural forestry, or artificial water management practices. Thus, it is important that efforts be undertaken by this strategic policy cover restoration of ecological functions and connectivity of habitats and that natural ecosystem dynamics be promoted, with a main focus on ecosystems of significant carbon storage potential and climate adaptation benefits.

The corridor system consists of core areas (primarily protected areas), stepping stones, and corridors that do not have a protection status in many EU countries. This means that besides ensuring the official designation of ecological corridors by environmental authorities, spatial planners need to be involved in order to analyse the situation from a territorial planning perspective, also embedding TEN-N and TEN-T requirements towards international cooperation. This should ensure the development of robust ecological networks presented on maps that need to be recognized by local authorities. Also, it is crucial to have support and a continued dialogue process among all the important actors (representatives from ministries and regional administrations, policymakers, local stakeholders, including civil society etc.) to prioritize nature protection, and connectivity protection in particular. More than that, political will is required to harmonize sectors with nature protection targets together with spatial development and improve the cooperation between the sectors.

4.6 Management effectiveness

It should also be noted that when we refer to

management effectiveness, we need to consider the following steps: 1) identifying an agreed set of standards, 2) developing a system of evaluation, and 3) establishing systems to monitor changes and trends.

The Guidelines mention the need for adequate management plans or equivalent management tools for protected areas, but connectivity enhancement measures should be considered when defining the management of protected areas. It will also be necessary to create financial instruments to support management plans, landscape changes toward improved wildlife connectivity, and defragmentation measures on the existing barriers.

Furthermore, it will be important to make use of the existing international or regional policies and guidelines when drafting the pledges, for example:

- at international level, the Convention on Biological Diversity (CBD' Targets), the Guidelines for Applying Protected Area Management Categories, IUCN (2008) or Recognizing and reporting other effective area-based conservation measures, IUCN (2019).

- at regional level, the "International Action Plan on Conservation of Large Carnivores and Ensuring Ecological Connectivity in the Carpathians", which was adopted by the Carpathian Convention Conference of the Parties in November 2021. It provides an important tool for adequately managing and protecting Carpathian natural heritage and restoring the ecological connectivity in the region, setting an innovative example of transboundary coordination. This can be an example beyond the region.

4.7 A coherent trans-European nature network (TEN-N)

In a nutshell, the EC Guidelines underline that a coherent TEN-N is a result of integrating ecological corridors. Thus, this is a key criterion to be acknowledged when developing the pledges. Moreover, the guidelines tie the existence of ecological corridors and their functionality to the assessment of coherence of the Trans-European Nature Network.

4.8 Conclusions

There is an urgent need to address the rapidly advancing process of habitat fragmentation and the emergence of barriers and gaps in connectivity between core habitats and protected areas. Thus, **planning for a connected TEN-N** is critical for ensuring that protected areas maintain their role in conserving biodiversity and resilient nature, including allowing species, ecosystems, and their services to adapt to climate change.

It is of high importance that the process of developing the pledges:

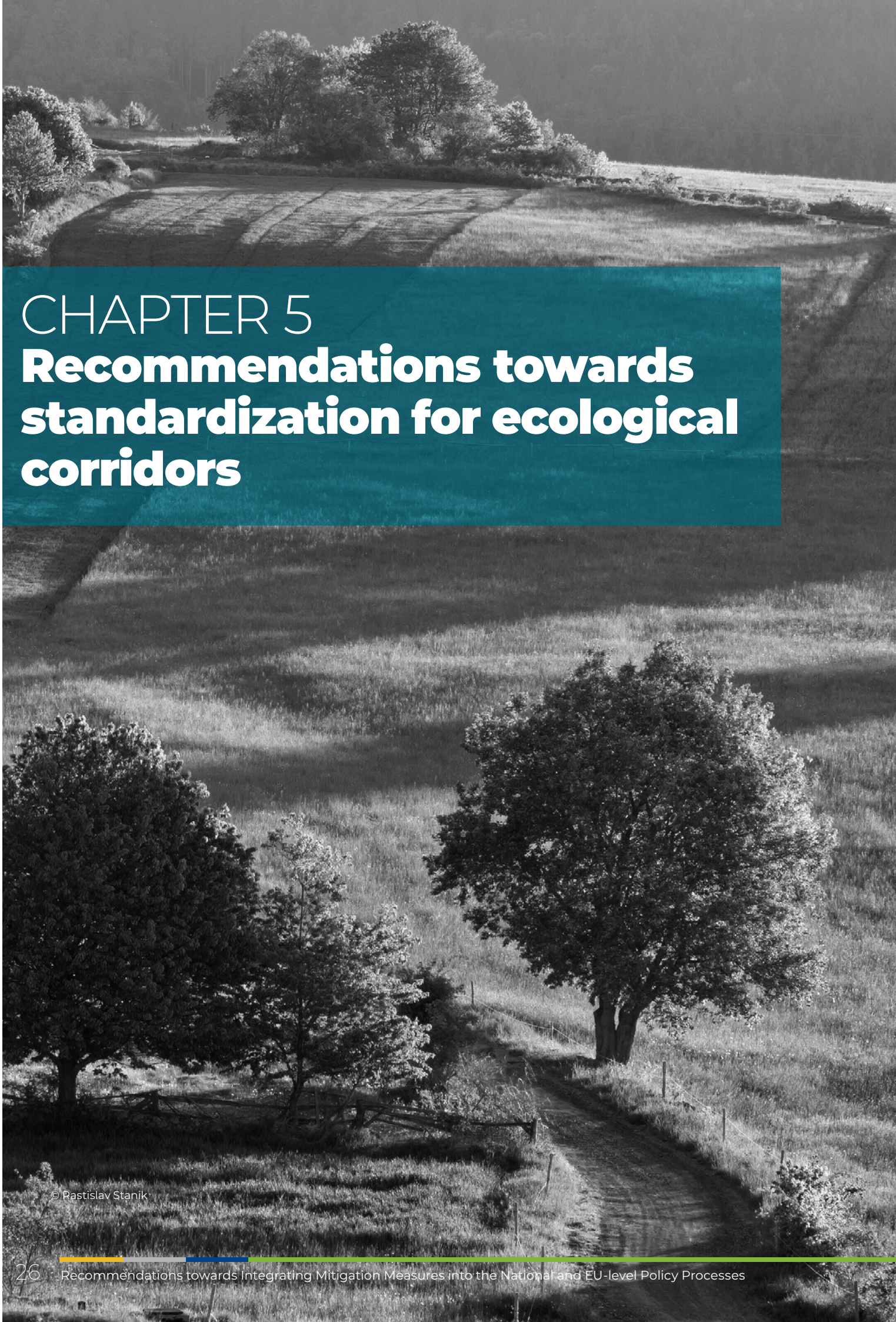
Consider ecological connectivity-focused documents and the already developed action plans.

Use the macro-regional strategies (MRS) and conventions as platforms for advancing ecological connectivity in the pledges, especially considering that this was recognized as an area/topic of interest for MRS.

Furthermore, it is important that the Member States adopt a pan-European approach to design a Trans-European Nature Network (TEN-N) that:

- Expands the current protected areas system to cover under-protected habitats and species;

- Ensures the existing and proposed new protected sites will form a coherent network where sites are spatially complementary and connected to each other.



CHAPTER 5
Recommendations towards standardization for ecological corridors

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5.1 Scope and Target Audience

The SaveGREEN project "Safeguarding the functionality of transnationally important ecological corridors in the Danube basin", project number: DTP3-314-2.3, funded by the Interreg Danube Transnational Programme, focuses on identifying, collecting and promoting the best solutions for securing ecological corridors in the Carpathians and other mountain ranges in the Danube Region. Currently, ecological corridors in the region are under threat due to the lack of proper planning of economic development initiatives. Therefore, SaveGREEN has monitored the impact of conservation measures in 8 pilot areas based on integrated planning and derived appropriate recommendations for follow-up and policy design.

The project builds on the results of the previous DTP projects TRANSGREEN, ConnectGREEN and HARMON, including the Guidelines for Wildlife and Traffic in the Carpathians developed under TRANSGREEN[7].

Within the SaveGREEN project, the present **Recommendations for standardisation related to ecological corridors at transnational level** have been elaborated on the basis of project results and other relevant information at EU and international levels with the participation of project experts. The aim of the project was to reach out to relevant standardisation bodies at all levels: 1) at national level, such as the bodies involved in the ENgage project in Romania (ASRO), Bulgaria (BDS), Northern Macedonia (ISRM), Lithuania (LST), Latvia (LVS), Malta (MCCAA), the Czech Republic (UNM), and the Cyprus Standardisation Organisation (CYS), 2) at EU level, the Strategic Advisory Body on the Environment (SABE) of the EU Committee for Standardisation (CEN), and 3) at international level (ISO). In addition, the recommendations are propagated to other relevant stakeholders such as policy makers, NGOs and civil society associations such as the Environmental Coalition on Standards (ECOS), academics, experts and field experts, with the purpose **to support the future development of standards relevant for ecological connectivity.**

5.2 Favourable Context for Standardization of Ecological Connectivity

Ecological connectivity is a fundamental requirement for functioning ecosystems and for migratory species.

In 2020, the European Committee for Standardization (CEN) published a position paper entitled "Standards in support of the European Green Deal Commitments", recognizing among other aspects the importance of preserving and protecting biodiversity: *"the EU Biodiversity Strategy outlines key actions at the EU level, including measures that would help Member States improve and restore damaged ecosystems and proposals to green European cities and increase biodiversity in urban spaces" and highlights the fact that "standards can help to measure and assess the state of biodiversity but also the impact of practices (business) on biodiversity"*.

Also, according to the same position paper released by CEN, new standards on the following issues are considered helpful: data collection; reporting; data assessment and validation for Natura 2000; evaluation and validation for online mapping; citizen science data; **green infrastructures and nature-based solutions** (e.g. for climate change adaptation) including the guidelines for biodiversity impact assessment etc.

7 Available here: https://www.interreg-danube.eu/uploads/media/approved_project_output/0001/35/02caaafe3c1c1365f76574e754ddbdc4e1af4a7a.pdf..

Moreover, parties to the CBD recognised the importance of connectivity in Aichi Biodiversity Target 11 of the Strategic Plan for Biodiversity 2011-2020 and integrated it into the Kunming-Montreal Post 2020 Global biodiversity Framework[8].

A recent Report[9] based on consultations with CBD parties from 2022 concluded that:

- Currently, the proposed headline, component and complementary indicators in the draft monitoring framework for the post-2020 global biodiversity framework do not cover key aspects of connectivity. Important gaps include measuring the connectivity in relation to the connectivity for migratory species and coastal/marine and inland aquatic ecosystems;

- A headline indicator could be developed within the next two years and would be expressed as follows: "Status and trends in ecological connectivity: structural, functional, and migratory connectivity across terrestrial, coastal/marine, and inland aquatic ecosystems". The indicator could be developed drawing on available data from component and complementary indicators of the relevant goals and targets;

- the currently proposed component and complementary indicators should be supplemented with additional indicators to fill in some of the current gaps, including migratory species and coastal/marine ecosystems;

- Maintaining and monitoring ecological connectivity in relation to restoration under draft Target 2 of the Post-2020 Global Biodiversity Framework, and filling the existing data gaps for measuring connectivity is also important.

5.3 The ISO Technical Committee 331 on Biodiversity and its Working Groups

Also relevant for the international approach, in 2020 ISO established a committee of experts from all over the world dedicated to developing standards on the topic of biodiversity. ISO/TC 331 Biodiversity chaired by AFNOR, ISO's member for France, intends to provide a holistic approach by bringing together and expanding on the existing national and international expertise to address biodiversity issues with the aim to conduct standardization work in the field of biodiversity. Furthermore, the committee intends to develop requirements, principles, a framework, guidance and support tools in a holistic and global approach for all relevant organizations and enhance their contribution to sustainable development.

The International Standards developed by ISO are voluntary[10]. Despite the fact that they do not seek to establish, drive or motivate public policy, regulations, social or political agendas, they still provide valuable support to the implementation of public policy. While integrating the large diversity of viewpoints, methodologies already in use, themes and levels may be challenging, the standardization framework represents a valuable platform for sharing definitions as well as best practices and developing co-constructed tools and methodologies.

Voluntary standards in the field of biodiversity support exact priorities, for example: restoring specific ecosystems (i.e. wetlands), preserving species (i.e. birds), guiding organizations and land planners (guidelines).

Moreover, harmonizing practices is expected to provide reliable and comparable information

8 https://www.cbd.int/doc/c/abb5/591f/2e46096d3f0330b08ce87a45/wg2020-03-03-en.pdf

9 ECOLOGICAL CONNECTIVITY INDICATORS FOR MEASURING IMPLEMENTATION OF THE 2020 GLOBAL BIODIVERSITY FRAMEWORK - A Report of expert CBD Party consultations

10 More information can be found at: https://www.iso.org/about-us.html.

between countries and projects. As a consequence, the creation of ISO/TC 331 on biodiversity constitutes an important development opportunity for the world community.

ISO/TC 331 has been approved by 33 countries. Since then, new countries have joined ISO/TC 331 (58 countries to date), underlining the convergence of standpoints and the urgency of concerted actions in the protection of biodiversity.

The added value of the international standardization work carried out by ISO/TC 331 is to develop a holistic and global approach for organizations and communities, contributing to the implementation of the UN Sustainable Development Goals in a coherent and integrated way, in line with the post-2020 framework to address biodiversity loss.

Different working groups have defined their respective scope and confirmed the interest of developing the projects related to biodiversity under ISO/TC 331. The most relevant ones in terms of ecological corridors include:

WG1 Terminology

It consists in the standardization work to list terms and concepts, as well as their definitions, in the field of biodiversity, in order to have a common language in the conduct of ISO/TC 331 work, which constitutes an international reference. The existing internationally recognized terminology and standards will be respected and appropriately incorporated.

These terms refer to: those already defined and recognized within the framework of international organizations and related treaties and conventions (e.g. CBD, IUCN, IPBES, Cartagena Protocol, Nagoya Protocol, CITES, SER, FAO, UNEP), those from the existing ISO standards, new terms and definitions which are the expression of new needs and new practices, as also suggested by the HORIZON 2020 BISON project in the framework of updating of the IENE Wildlife and Traffic Handbook and its Glossary[11]. The Glossary will be updated in cooperation between IENE and PIARC, the World Road Association.

WG 2 - Measurement, data, monitoring and assessment

It consists in the standardization, harmonization and intercalibration work in the field of measurement, data, monitoring and assessment of biodiversity within the framework of ISO/TC 331.

The scope of work concerns any ecosystem, whether terrestrial or aquatic (freshwater and marine), at the biotic level and at the genetic level of organization (from genes to ecosystems), in order to:

- improve the effectiveness of biodiversity management;
- strengthen and fill in the gaps among indicators as well as;
- establish baselines, through the harmonization of protocols for the overall assessment.

WG3 - Protection, conservation and restoration

The Working Group focuses on protection, conservation and restoration of biodiversity in any type of terrestrial and aquatic ecosystems. The work includes **developing principles, frameworks, requirements, guidance and supporting tools**, in the pursuit of benefits as defined by the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES). These benefits are grouped in three broad classes:

- Nature for Society: Nature's benefits to people/ecosystem goods and services

11 https://handbookwildlifetraffic.info/annex-1-glossary/

- Nature for Nature: Intrinsic values of nature
- Nature as Culture: Human well-being

5.4 Towards standardization on Ecological Corridors based on outputs developed within SaveGREEN

Based on the input from the SaveGREEN project, there is a proposal (to be confirmed) to include a project in the WG (3) on the ECOLOGICAL CORRIDORS/ CONNECTIVITY.

Standardization of Ecological Corridors can take into account the standardization of specialized processes related to connectivity, e.g. a collection of standards. This is also true from the perspective of the entities that will assume the standard. For example: standardization of the identification of ecological corridors; standardization of functionality monitoring; standardization of management measures for different sectors; standardization of territorial planning, etc.

In this context, SaveGREEN aims to support such project establishment through the following recommendations:

- Raise awareness on the importance of integrating ecological connectivity/green infrastructure (GI) into the biodiversity and/ or sectoral standardization at the level of policy, implementation and maintenance;
- Understand the spatial dimension of biodiversity and consider the patterns of ecosystems at landscape level;
- Inform on the needs and gaps that could be addressed through new standards development;
- Share tools and insights related to ecological connectivity conservation, the experience regarding the monitoring and data collection, the problems/gaps and needs identified in the pilot areas;
- Provide guidelines in terms of biodiversity impact assessments based on the materials developed for the capacity-building programme, cost/benefit analysis, Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA) etc. developed in the project.

The recommendations in this paper are based on the main outputs developed within SaveGREEN which will be attached as Annexes to this document, as follows:

-Annex 1 - *A Methodology for Standardized Monitoring of Ecological Connectivity* - Guidelines for the Analysis of Structural and Functional Connectivity; the methodology was applied in eight pilot areas in a consistent way by testing the approach under different conditions across Central and Eastern Europe for significant indicator species. The guidelines include the development of a standardised field mapping application and generic data model as well as a decision matrix to specify parameters/measurements for the relevant species and the methods to be applied. In addition, these guidelines can be used in all biogeographic regions, except marine and coastal habitats. In addition, the document describes a standardized method for the monitoring of structural connectivity. Based on the recommendations for the potential data sources and selection of suitable input data in order to designate core areas and define resistance surfaces for umbrella species, standards are proposed for the spatial modelling of species (group) specific corridors and the identification of bottleneck situations.

-Annex 2 – *A report on collection and gap*

analysis of the existing methodologies/ best practices/training materials relating to avoidance and mitigation measures for Green Infrastructure, SEA and EIA, integration of environmental externalities into cost-benefit analysis.

-Annex 3 – *A toolkit for Ensuring Sustainable Use and Management of Green Infrastructure in Strategic Environmental Assessments (SEA) and Environmental Impact Assessments (EIA).* The scope of this output is to propose a toolbox that can be used by SEA and EIA practitioners, environmental authorities, NGOs and other stakeholders when identifying and assessing, in a quantified manner, the impacts on GI caused by certain plans or projects, and when securing the maintenance of ecological connectivity in the area of implementation of these plans or projects. The final purpose of the Toolkit is to ensure that the future SEA or EIA will require the implementation of prevention, avoidance, mitigation or compensation measures, which adequately safeguard the maintenance or restoration of structural and functional ecological connectivity.

-Annex 4 – *A handbook of best practices for planning and implementation of mitigation measures on landscape connectivity.* The scope of the Handbook is to provide support to be used for the capacity building programme and to represent a basis for policy work for advocating the improvement of management practices in the corridor areas. The objectives of the Handbook are: to showcase a general presentation on the best practices for planning and implementing mitigation measures in the context of areas of ecological corridors, to analyse positive and negative case studies and identify the best solutions implemented in the positive examples and the unfavourable solutions from the negative ones and to identify and present the most effective measures for maintaining or restoring ecological connectivity in relation to linear infrastructure and other important domains.

5.5 A SaveGREEN framework of recommendations on ecological connectivity

5.5.1 Preliminary considerations on ecological corridors from a standardization perspective (definition, roles, threats)

As a preliminary step, future standardization work can address, in a unified manner, issues such as definition, roles, functions and threats of ecological corridors, in a holistic and global approach. This kind of work could be carried out within the **WG 1 of ISO/TC 331 - Terminology.**

5.5.1.1 Basic definitions

Definitions: Ecological connectivity is one of the most important components for the conservation of flora and fauna species. It is defined[12] as "the unimpeded movement of species and the flow of natural processes that sustain life on earth." It is also defined[13] as the *"binding or interconnection of eco-landscape elements (semi-natural, natural habitats or buffer zones) and biological corridors between them from the viewpoint of an individual, a species, a population or an association of these entities, for a whole or part of their developmental stage, at a given time or for a period given to improve the accessibility of the fields and resources for fauna and flora"*. Finally, an ecological network is *"a coherent system of natural and/or semi-natural landscape elements that is configured and managed with the objective of maintaining or restoring ecological functions as a means to preserve biodiversity while also providing appropriate opportunities for the sustainable use of natural resources"*[14].

12 Available at: https://www.cms.int/en/topics/ecological-connectivity

13 Available at: https://www.lawinsider.com/dictionary/ecological-connectivity

14 Hlaváč, V., Anděl, P., Matoušová, J., Dostál, I., Strnad, M., Immerová, B., Kadlečík, J., Meyer, H., Moţ, R., Pavelko, A., Hahn, E., and Georgiadis, L. (2019): Wildlife and traffic in the Carpathians. Guidelines how to minimize impact of transport infrastructure development on nature in the Carpathian countries. Danube Transnational Programme TRANSGREEN Project, The State Nature Conservancy of the Slovak Republic, Banská Bystrica, 2019, 228 pp. Available at: http://www.sopsr.sk/files/transgreen/Dokument_3_Executive%20Summary_Guidelines_EN.pdf

There are three main important roles at species level, of ecological corridors: **1) migration** (many species migrate for several reasons, such as breeding or feeding (interbreeding is also facilitated by allowing the individuals of different species to find new mates outside their regular home range, which supports the genetic health and diversity of populations); **2) daily and seasonal movements** for, e.g., feeding, defending the territory or other needs along corridors and beyond, through which species can move back and forth safely and effectively **3) colonization and dispersal** (eco-corridors enable animals to move and occupy new areas when, e.g., food, space or other natural resources are lacking in their core habitat or due to a high population density or competition in the source region).

Ecological corridors are impeded or threatened by **the impact of human activities** such as: linear transport infrastructure and its construction, housing and industrial area development, forestry or water management practices and intensive agriculture and the resulting economically optimized landscapes.

5.5.1.2 Pressures and threats to ecological connectivity

General pressures and threats to ecological connectivity are:

a) Increased barrier effect of the new transport and other linear infrastructure projects (roads, railways, navigable channels, waterways, canals, power lines, and pipelines)

b) Barrier effect of the existing transport and other linear Infrastructure (including increased barrier effect caused by structural interventions: maintenance or upgrading)

c) Changes in land use which can affect both structural and functional connectivity (towards a less-permeable land use category)

d) Change in land management and practices through:

- fencing
- changes in vegetation or crop type/ category
- degradation of natural habitats

e) Other anthropogenic activities:

- game management
- forest management
- human-wildlife mitigation

5.5.1.3 Factors and gaps to be addressed

These are enhanced by the following factors/ gaps which need to be addressed:

a) Lack of coherent monitoring at landscape level and adaptation of solutions

b) Reduced support from stakeholders at landscape level for an integrated eco-systemic approach.

The fragmentation of ecological connectivity has multiple consequences, such as: loss of wildlife habitats; fragmentation of habitat areas (creation of a barrier effect); mortality of fauna due to collisions with traffic (also important in regards to human road safety, accidents with wildlife being also a threat to human lives); disturbance and pollution; the spread of alien invasive plant species along linear infrastructure elements.

Additionally, negative perspectives on landscape ecology in broader geographical scales and over extended periods through permanent transport and other linear infrastructure interventions, especially in sensitive natural landscapes can determine an overall future framework of irreversible impacts.[15]

15 Georgiadis L. (Coord.), 2020. A Global Strategy for Ecologically Sustainable Transport and other Linear Infrastructure. IENE, ICOET, ANET, ACLIE, WWF, IUCN, Paris, France. P. 24

5.5.2 Standardization recommendations regarding the identification, maintenance and reconstruction of ecological corridors

A potential standardization project should also aim to conduct standardization work in the field of ecological connectivity, to develop requirements, principles, a framework, guidance and support tools for identification, mapping, designation, maintenance and monitoring of corridors in a holistic and global approach for all the relevant organizations, enhancing their contribution to sustainable development. This kind of work could be carried out in **ISO/TC 331 WG2 - Measurement, data, monitoring and assessment** and/or **WG3 - Protection, conservation and restoration.**

In doing so, future standardization could look into the critical topics described below.

5.5.2.1 Structural & functional connectivity

All structural elements that are planned and used in order to improve ecological connectivity have to be proven to work in practice, whether they can truly secure the effective and functional movement of species and the dispersal of all organisms. **Structural connectivity** indicates the part of the landscape that is actually connected through e.g. corridors. More precisely, it represents a measure of habitat permeability based on the physical features and arrangements of habitat patches, disturbances and other landscape elements presumed to be important for organisms to move through their environment[16]. In contrast, **functional connectivity** includes species-specific aspects and their interaction with landscape structures. Thus, functional connectivity is the actual connectivity from a species' perspective and their effective permeability within the landscapes.

The Methodology for Standardized Monitoring of Ecological Connectivity. Guidelines for the Analysis of Structural and Functional Connectivity developed in the SaveGREEN project (Annex 1 to this document) offers a baseline for planning structural connectivity from a landscape perspective and achieving functional connectivity from the perspective of ecosystems and species populations.

The mapping of corridors is a fundamental step for connectivity conservation through ecological corridors, followed by designation, management and continuous monitoring. **The modelling of structural connectivity** includes the following steps:

- Screening of potential data sources and selection of suitable input data in order to designate core areas and define resistance surfaces for umbrella species;
- Gathering information on species distribution as well as ecological corridors and defining target species (groups);
- Development and application of appropriate model to define core areas and resistance surfaces for the selected species (groups) depending on data availability and quality;
- Calculation of species' (groups) specific corridors;
- Identification of bottleneck situations and ecological connectivity conflict points;
- Conducted expert consultation on the model, invite people with local knowledge (hunters, farmers);
- Random verification of modelled corridors in the field to eventually adapt and improve the model.

The obtained and evaluated monitoring results ideally should show explicitly:

- Which ecological corridors are actually being used by wildlife;

16 https://islandpress.org/books/corridor-ecology-second-edition

- Which sections of these corridors are not (yet) functional for the migration and movement of wildlife;
- Where the migration axes are well structured and present appropriate landscape features; and
- Where the landscape lacks suitable structures and, therefore, should be a target area for ecological enhancement.

The following minimum landscape description requirements were identified as a basis for **monitoring structural connectivity:**

- Land cover/land use, setting the general framework describing the potential for suitable habitats that can be part of a core area and that also affects the resistance surface;
- Elevation/slope, influencing the suitability of a given area for species (groups);
- Rivers and streams, potentially having considerable barrier effects for many species (groups);
- Infrastructure (such as roads, railways, and buildings) displaying barrier characteristics but also serving to overcome barriers, such as crossing structures over or under highways, roads, rails or rivers.

The second major step in a comprehensive monitoring of landscape connectivity consists of **monitoring functional connectivity**, the assessment of whether species (or species groups) are able to reach their core habitat areas and use identified corridors between them. While significant monitoring work is on-going or has already been done to fulfil the requirements of different frameworks and directives, a standardized homogeneous approach is missing, specially to integrate the created information into larger databases (ecoregion wide) as well as the scientific community and to create an added value by combining the information from different sources. This standardization is highly complex simply because of the requirements of the highly diverse groups of organisms and the enormous variety of ecosystems and landscape types and contexts.

Thus, an important aim of monitoring functional connectivity is, besides collecting information on indicator species, to propose a technical backbone that allows, on the one hand, an efficient use in the field, and, on the other hand, an easy data integration into larger data collections.

The identification of bottleneck situations and conflict points based on the structural connectivity is crucial in the process of monitoring the functional connectivity of the ecological corridors especially when crossed with the transport corridors or other infrastructure.

In order to highlight the possible target areas for monitoring the functional connectivity of the ecological corridors identified, a **permeability and quality assessment of these corridors needs to be conducted.** For this reason, the ecological corridors have to be split into segments and assessed due to their different status of ecological permeability[17] and landscape structure. More details on this approach can be found in the *Methodology for Standardised Monitoring of Ecological Connectivity. Guidelines for the Analysis of Structural and Functional Connectivity developed in the project - Annex 1 to this paper.*

The monitoring of functional connectivity needs to take into consideration:

- The selection of **suitable indicators**, such as: animal species, which indicate a certain condition of the habitat through the characteristics of their occurrence (e.g. presence/absence, frequency, vitality) in a particular habitat.

  Good indicators (groups) need to be commonly present in the area, be recorded and evaluated relatively easy and

statements allowed to be made about the factors and/or cumulative effects that are otherwise difficult to measure. **The surrounding habitats need to be selected** in order to determine the suitable indicator groups, connected by the wildlife crossing.

Different methodologies are recommended **depending on the indicator species** such as: large and medium-sized mammals, including large carnivores, small mammals, amphibians and reptiles, birds, bats, fishes, aquatic macroinvertebrates, pollinators (including butterflies), ground beetles, terrestrial spiders and terrestrial molluscs.

- The **timeline of monitoring** following the seasonal lifecycles of the species, stationary monitoring devices, positioning of camera traps for large, medium and small mammals, the light and noise, as well as the landscape inventory and pilot area-wide evidence of species occurrence, but also the field mapping.

In order to complement stationary monitoring devices beyond their fixed locations, different field monitoring methods can be used to cover inaccessible places or areas that are difficult to record. These include, among others, the monitoring and recording of: direct species observations, tracks, other activity signs, road-kills, over & under- passes, landscape elements (linear/punctiform), and barriers.

Compared to the monitoring that uses stationary devices, **field mapping methods** can also be used over larger areas in the open landscape and between stationary sites. Additionally, this allows the identification of even more specific questions, but with significantly higher effort and costs per data point obtained. By considering the results for specific segments of the corridors studied, as well as the various indicator species, it is possible to formulate targeted measures for these areas: from the removal of possible barriers or obstacles, to the targeted enhancement with landscape features, near-natural elements or species-specific habitat requisites. Indicators of such an intervention are spatial discontinuities in the occurrence of different species along the studied section or areas that are selectively avoided by wildlife. All of these considerations, however, must always be regarded in relation to prevailing regional wildlife densities and the specific characteristics of a certain landscape.

Potential difficulties to be considered: ensuring a sufficient number of cameras depending on the area analysed, risk of theft and damage, largest possible area coverage to be able to collect presence/absence data in addition to pure presence data, the acceptance of monitoring by stakeholders, especially by landowners and local hunters. This last difficulty should be tackled by starting with smaller supportive groups to reach more stakeholders later, being aware of the hierarchical structure of associations, creating good arguments for important stakeholders' concerns. Also, towards the standardization process, the fact that evolution on technology and innovations on devices and methods is a dynamic factor that has to be taken into account.

5.5.2.2 Securing ecological connectivity

Securing ecological connectivity depends on the status of ecological permeability in relation to the anthropogenic elements of landscapes. Baseline monitoring is necessary to assess whether an ecological corridor can be maintained as it is or needs to be improved, or prevented from losing its functionality. The maintenance of ecological connectivity in landscapes without artificial elements such as a linear infrastructure can be achieved through appropriate planning, before the construction of a linear infrastructure feature. Planning before the construction of projects can ensure the maintenance of ecosystem connectivity through the delineation and avoidance of constructions within areas important for wildlife movement, or in combination with the design of the appropriate mitigation or compensation measures, as described below.

Prevention and avoidance are preferable to the need to mitigate any ongoing impacts and/or the ones that may arise from further development of linear infrastructure or other type of intensification within a corridor.

In case of the existing infrastructure elements as a road, railway or a water way, the defragmentation approach has to be enforced. Defragmentation can allow the restoration of ecological connectivity through the implementation of a set of actions aimed at recovering or increasing ecological connectivity in territories affected by transport infrastructure in operation.

For ensuring ecological connectivity at landscape level it is necessary for both the linear infrastructure of the area to be permeable, as well as for the other activities to allow the movement of fauna as through the maintenance of the existing management measures in sectors such as agriculture, forestry, tourism, hunting, etc.

5.5.2.3 Mitigation measures

Mitigation measures aim to increase the ecological permeability of anthropogenic elements and features of the landscapes. Especially on linear transport infrastructure, mitigation measures as fauna crossings aim to support the movements of wildlife under or above the infrastructure through underpasses or overpasses as green bridges/ ecoducts. But, mitigation measures are often missing or dysfunctional because of inadequate design, location and inappropriate management of surrounding land use (e.g. poorly structured agricultural areas or mono-cultures in agriculture and forestry). Furthermore, wildlife crossings and corridors for migration represent bottlenecks for wildlife in the landscape.

Consequently, the use of connecting structures, such as green bridges and underpasses, by local wildlife and the functionality of corridors in general are highly important.

Some examples of the most important types of mitigation measures proposed in the SaveGREEN project for maintaining connectivity affected by linear infrastructure projects are the following:

- The construction of fauna passages (overpasses or underpasses) bypassing the infrastructure;
- The adaptation of the existing structures (e.g. bridges or viaducts) to be used by fauna for crossing underneath the infrastructure;
- The construction of fences and guidance structures for fauna;
- Integration of crossing structures in the surrounding landscape and the larger biotope network by providing landscape elements as guiding features and stepping stones;
- Other site-specific measures that can maintain ecological connectivity, including restoration of riparian areas or support of natural vegetation (bushes or tree strips) along the edges of agricultural fields.

5.5.2.4 Sectoral approach

The main purpose of supporting ecological connectivity is to ensure the functionality of wildlife corridors, the linkage zones and the overall permeability of landscapes with measures addressed to different sectors, and not only to the transport sector.

Transport

To achieve these objectives, the following actions should be considered:

- Recognize officially the ecological corridors and the ecological connectivity as vital for the conservation of biodiversity at national and local level.
- Establish the strategic planning and the designing of transport corridors in respect and support of the functionality of ecological corridors.

- Secure the funding for mitigation measures as a crucial part of the overall budgeting of the transport projects.
- Ensure effectiveness of underpasses/ overpasses (including green bridges/ ecoducts);
- Improve and maintain permeability of the existing transport infrastructure adopting defragmentation policies and practices;
- Implement special measures for linear infrastructures (including electric power lines) associated with wildlife mortalities;
- Develop an integrated monitoring programme – procedures, database, indicators, assessment in all three life cycles of the transport infrastructure (before construction, during construction, during operation and maintenance) establishing a permanent follow up process;
- Facilitate networking and gain the support of the stakeholders at landscape level for an integrated ecosystem approach.

Also, the basic Principles for Sustainable Transport and other linear infrastructure (TLI) are outlined in the A Global Strategy for Ecologically Sustainable Transport and other Linear Infrastructure[18], as follows:

1. Strong policy and legal framework: Safeguarding landscape connectivity as a primary concern for any project scale, and establishment/strengthening of a policy and legal framework of regulatory requirements for sustainable TLI development is necessary.

2. Strategic planning: Any major TLI should be based on an overall strategic plan, and designed and developed to guarantee ecological fluxes and well-connected wildlife populations before any implementation and funding decision is made. The "Mitigation Hierarchy" of 'Avoidance – Mitigation – Compensation' should also be implemented.

3. Ecosystem approach: TLI projects should combine habitat quality with healthy ecosystem functioning based on the "Precautionary Principle". The value of Natural Capital and ecosystems services should be included along with projects that acknowledge cultural diversity, as an integral component of ecosystems (www.cbd.int).

4. Any case is a unique case: Each TLI project is site-and species-specific and is, therefore, exceptional. Mitigation should be based on scientific and best available local knowledge without "copy and paste" from other projects.

5. Multi-disciplinary and cross-sector cooperation: To ensure integration and coordination, the establishment of multi-level governance and stakeholder engagement, with multi-disciplinary cooperation amongst different professionals (such as engineers, policy makers, economists, ecologists and environmentalists) as well as cross-ministerial agencies (such as, nature conservation, transportation, finances) should be applied.

6. Stakeholder involvement and public participation: Involvement of civil society and all the relevant stakeholders in the development of TLI projects.

7. Responsible polluter pays principle: Implementation of the "polluter pays principle" where the integration of environmental consideration is responsible for TLI investments, after clarifying the ethical and transparency concerns; this should include specific mitigation measures from the onset of the TLI planning phase, until the tendering and contracting, and finally to the building and operating phases.

8. Long-life effective maintenance: Inclusion of TLI maintaining mitigation measures in the budget for the life-cycle of the operation.

9. Resilience to climate change: TLI should be planned or adapted while considering their resilience to natural disasters and risks,

18 Available at: https://www.iene.info/content/uploads/2020Dec_TheGlobalStrategy90899.pdf

associated with extreme weather events and climate change. This is especially the case for TLI, where responses to stronger and intense precipitation with larger bridges and culverts, servicing are a critical requirement.

10. Adaptable infrastructure habitats: Habitats related to TLI should be planned and managed in a manner that fulfils their potential as positive biodiversity refuges and ecological corridors.

11. Environmental supervision: Inclusion of environmental supervision that monitors the effectiveness of TLI features and the habitat and wildlife populations in all phases of programmes, plans and projects; this falls within the Strategic Environmental Assessment, Environmental Impact Assessment to the design of full operation and maintenance.

12. Culture of learning: Establishment of a culture of learning to develop and support continuous evaluation and exchange of knowledge and experience between the interested, relevant and authorised organisations and state services.

Agriculture

Regarding agriculture, the following general recommendations for management have been identified as good practices for maintaining ecological connectivity at landscape level: maintenance of scattered trees on agricultural plot edges; preservation of linear landscape elements such as hedges, windbreaks or embankments; maintenance of roadside corridors in areas of agricultural roads.

To maintain the functionality of agriculture landscape especially close to roadside corridors and mitigation measures, the following actions should be taken into consideration:

- avoid fencing in critical areas;
- build guidelines and impose fencing-related conditions linked with subsidy programmes;
- facilitate/support changes of land-use to high permeable categories;
- support and promote the development of good-practice examples of agriculture and forestry practices sensible to connectivity;
- incentivise landowners to maintain the existing strips of woody vegetation;
- identify the critical areas for connectivity and creation of vegetation strips through planting and prioritizing native species where possible;
- implement measures for illegal cutting of vegetation strips;
- maintain small habitat patches (e.g. small wooded areas, small grassland areas, etc.) for different fauna species;
- maintain hedgerows edges on agricultural plots.

Forestry

Regarding forestry practices, the following general recommendations for management have been identified as good practices for maintaining ecological connectivity at landscape level:

- maintenance of old non-commercial (biodiversity) trees within forest bodies,
- maintenance of hedgerow trees and riparian trees,
- maintenance of special conservation regime areas of forests in which to prioritize non-intervention or very low levels of intervention is necessary.
- Support of forest glades and adding dynamics of natural succession are an important habitat for wildlife.

Water

Regarding the management of water resources, the main recommendations identified are the following:

- maintenance of riparian habitats, preferably species-rich riparian woodland (e.g. a width of more than 30 meters should be maintained to ensure ecological functionality),

- re-establishment of aquatic connectivity in fragmented and channelled rivers.

- Implementing special and evidenced-based mitigation measures on infrastructure that fragment the water continuity.

- Support the nature-based solutions and use of vegetation on flood control and anti-flooding measures.

Urban development-spatial planning

In relation to urban development and spatial planning, for maintaining ecological connectivity, it is recommended that the following management measures be imposed:

- addressing ecological connectivity issues in urban development by including them in Urban Spatial Planning;

- inclusion of ecological connectivity issues into national legislation;

- identification of problems related to large-scale habitat connectivity and creating a set of measures to mitigate the impacts of urbanization;

- maintenance of scattered trees within the urbanized landscape;

- maintenance of empty lots (no-building areas) within urban landscapes. These areas should be covered with natural vegetation and free from any constructions (including fences).

5.5.3 Standardization recommendations regarding assessments of impacts (SEA, EIA, AA)

In regards to assessments of impacts and monitoring of measures established to mitigate or compensate the impacts on ecological connectivity, standardizing work could be conducted in order to develop requirements, principles, a framework, guidance and support tools for monitoring of mitigation or compensation measures in a holistic and global approach for all the relevant organizations, enhancing their contribution to Sustainable Development. This kind of work could be carried out in **ISO/TC 331 WG2 - Measurement, data, monitoring and assessment** and/or **WG3 - Protection, conservation and restoration.**

5.5.3.1 Assessments of impacts - necessary actions and recommendations for filling in the gaps

In regards to evaluation of impacts on ecological connectivity within the SEA and EIA processes, based on a preliminary analysis elaborated within SaveGREEN project by EPC Consultanță de Mediu, several gaps have been identified which can also be acknowledged in terms of standardization:

1. Lack of a clear understanding of the ways in which ecological corridors should be integrated in the SEA/EIA procedures.

2. Stakeholders generally do not have a high level of knowledge in regards to the SEA/EIA legislation and the methodological guidelines for considering ecological corridors within the context of the SEA/EIA.

3. It is not very well known to the stakeholders whether ecological corridors are regarded in the project design or if the impact is analysed at landscape level.

4. Lack of knowledge regarding the legislative requirements and the existence of technical guidance for impact avoidance and mitigation measures.

5. Lack of knowledge regarding the costs and benefits of mitigation or restoration measures to maintain or restore ecological connectivity.

6. Lack of knowledge regarding the inclusion of ecological corridors in the SEA/

EIA procedures and a low likelihood that the procedures take into consideration cumulative impacts.

7. Lack of knowledge regarding compensatory measures.

5.5.3.2 Tools for designing prevention, avoidance, mitigation and/or compensation measures in relation to assessments of the impact on ecological connectivity

The identification of a significant impact on ecological connectivity implies the need to propose avoidance, mitigation and/or compensation measures. The proposed measures must be specific and applicable to the significant impacts identified.

For the identification of appropriate measures, the following steps should be taken following the Mitigation Hierarchy principle:

1. Identification of **avoidance measures** (or changes to the alignment of linear infrastructure). These measures do not prevent the occurrence of an impact, but they avoid a significant level of the particular impact. If prevention is not possible, these are the preferred types of measures and should be implemented whenever possible.

2. Identification of **prevention measures**. These have the role of preventing the occurrence of an impact, by eliminating the cause of its occurrence. A prevention measure can mean the elimination of a certain intervention in a project, thus eliminating the impacts that the mentioned intervention would have led to.

3. Identification of **mitigation measures**. If neither prevention nor avoidance measures are applicable, mitigation measures should be proposed to ensure the reduction of the significant impacts identified;

4. Identification of **compensatory measures**. If, after the application of the previously mentioned measures, the level of impact cannot be reduced to a non-significant level, compensatory measures have to be proposed to offset the significant impacts.

The measures proposed have to be formulated using a **SMART** methodology. They have to be **S**pecific, **M**easurable, **A**chievable, **R**ealistic and **T**ime-bound, addressing the parameters considered to be affected by the analysed project.

After the proposal of the appropriate measures for each possibly significant impact caused by the analysed project, their applicability to each group of habitats and species has to be established, as well as their efficiency. The proposed measures should have a very clear aim: to reduce the residual impact of a project-related intervention to a non-significant level.

5.5.3.3 Tools for monitoring

Monitoring has to be carried out to ensure:

a) The collection of all the necessary information and data for biodiversity and the ecological connectivity status before any artificial intervention

b) the effectiveness of the proposed measures for maintenance of ecological corridors as well as for assessing the residual impacts.

It should also be noticeable whether there is a need for any adjustments to the already implemented measures or if any further additional measures are needed. Monitoring should cover all the biodiversity components, as well as the parameters for which measures have been proposed. It is preferable to do the monitoring based on the parameters established for each habitat or species.

The monitoring activities should be done to prove that the aims of the measures have been reached. In the monitoring programme, it is recommended that the associated aims be quantified through the use of specific indicators and associated targets, which can show if, when and how a measure is most

effective. For example, the implementation of a reinforced fence along a new motorway should be monitored through monitoring of fauna mortality, with an indicator for the number of collision victims but also through the effectiveness of the wildlife permeability of the crossing structures where fences are supposed to lead the animals.

Monitoring should involve three stages:

1. Before construction (data of the baseline condition analysis);

2. During construction;

3. After construction and during operation and maintenance.

5.5.3.4 Guidelines and already developed standards

In regards to linear infrastructure, there are a variety of guidelines which can be used to promote the maintenance or re-establishment of ecological connectivity, such as:

- Research and Innovation Needs Expressed by Stakeholder elaborated in BISON project and available at https://bison-transport.eu/wp-content/uploads/2022/03/BISON-Deliverable4.1_Final234900.pdf

- COST 341, elaborated by IENE and available at https://www.iene.info/content/uploads/2013/09/COST341_Handbook.pdf (initial) and https://handbookwildlifetraffic.info/ (online updated)

- TRANSGREEN Guidelines: Wildlife and Traffic in the Carpathians. Guidelines on how to minimize the impact of transport infrastructure development on nature in the Carpathian countries. Available at: http://www.interreg-danube.eu/uploads/media/approved_project_output/0001/35/02caaafe3c1c1365f76574e754ddbdc4e1af4a7a.pdf

- Guidelines for conserving connectivity through ecological networks and corridors, elaborated by IUCN and available at https://portals.iucn.org/library/sites/library/files/documents/PAG-030-En.pdf;

- Maintenance of ecological assets on transport linear infrastructure, elaborated by CEDR and available at https://www.cedr.eu/download/Publications/2020/CEDR-Contractor-Report-2020-02-Maintenance-of-Ecological-Assets.pdf;

- Edgar A. van der Grift et al. (2013) Evaluating the effectiveness of road mitigation measures https://link.springer.com/article/10.1007/s10531-012-0421-0

- Hlavac V. (2005) Increasing the permeability of the Czech road network for large mammals. Gaia 14(2):175–177

In addition, various other standards have been developed at national level. Such standards exist in the Czech Republic, Germany, Austria etc.

5.5.4 Bibliography

The recommendations in this paper are based on the main outputs developed within SaveGREEN which will be attached as Annexes to this document, as follows:

-Annex 1 - *A Methodology for Standardized Monitoring of Ecological Connectivity - Guidelines for the Analysis of Structural and Functional Connectivity.*

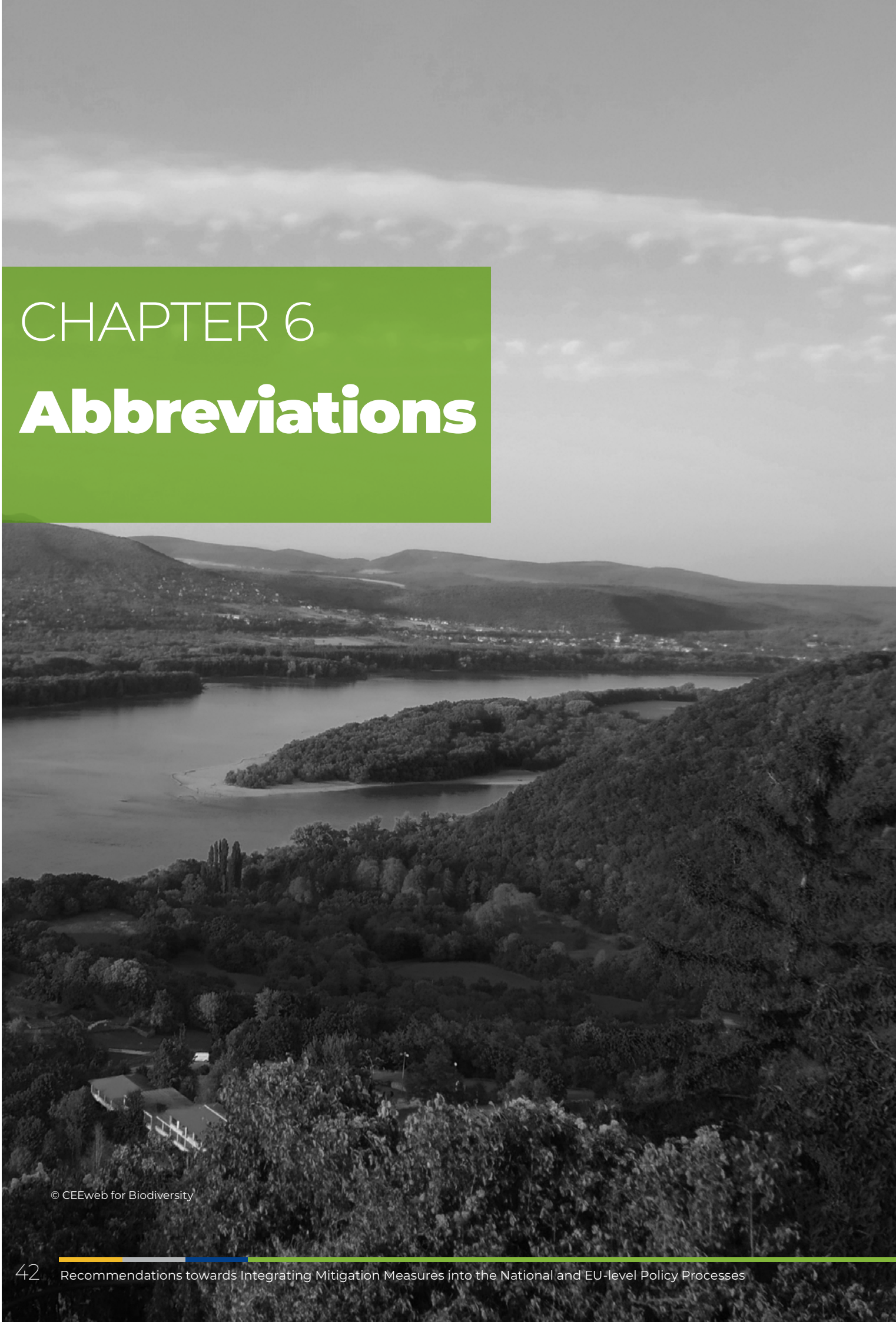
-Annex 2 – *A report on collection and gap analysis of existing methodologies/best practices/training materials relating to avoidance and mitigation measures for Green Infrastructure, SEA and EIA, integration of environmental externalities into cost-benefit an alysis.*

-Annex 3 – *A toolkit for Ensuring Sustainable Use and Management of Green Infrastructure in Strategic Environmental Assessments (SEA) and Environmental Impact Assessments (EIA).*

-Annex 4 – *A handbook of best practices for planning and implementation of mitigation measures on landscape connectivity.*

CHAPTER 6

Abbreviations



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AA	Appropriate Assessment
AFNOR	French Standardization Association (Association française de normalisation)
AKIS	Agricultural Knowledge and Innovation systems
ASRO	Romanian National Standardization Body (Asociația de Standardizare din România)
BDS	Bulgarian Institute for Standardization
CAP	Common Agriculture Policy
CBD	Convention on Biological Diversity
CEN	The European Committee for Standardization
CF	Cohesion Fund
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CYS	Cyprus Organization for Standardization
DCFTA	Deep and Comprehensive Free Trade Area
DTP	Danube Transnational Programme
EC	Ecological Corridors
EC	European Commission
ECOS	Environmental Coalition on Standards
EIA	Environmental Impact Assessment
EMFF	European Maritime and Fisheries Fund
ERDF	European Regional Development Fund
ESF	European Social Fund
ETC	European Territorial Cooperation
EU	European Commission
EU	European Level
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GAEC	Good Agricultural and Environmental Conditions
GI	Green Infrastructure
IENE	Infrastructure & Ecology Network Europe
IPBES	Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services

ISO	International Organization for Standardization
ISO/TC 331	Biodiversity Standard
ISRM	The Standardization Institute of the Republic of North Macedonia
IUCN	International Union for Conservation of Nature
LST	Lithuanian Standards Board
LVS	Latvian Standard
MCCAA	Malta Competition and Consumer Affairs Authority
MFF	Multiannual Financial Framework
MRS	Macro-Regional Strategies
MS	Member States
NGO	Non-governmental organization
PIARC	The World Road Association
SABE	the Strategic Advisory Body on Environment
SEA	Strategic Impact Assessment
SWOT	Strengths, Weaknesses, Opportunities, Threats
TA	Technical Assistance
TEN-N	Trans-European Nature Network
TEN-T	Trans-European Transport Network
TLI	Transport and other Linear Infrastructure
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNM	National standards of the Czech Republic
WG	Working Group

PILOT AREAS:

Austria

1 Kobernausser forest

2 Pöttsching (Alpine-Carpathian Corridor)

Czech Republic/Slovakia

3 Beskydy-Kysuce CZ-SK cross-border area

Hungary/Slovakia

4 Novohrad-Nógrád SK-HU cross-border area

Ukraine

5 Zakarpattia region

Romania

6 Mureş valley (Arad-Deva)

7 Mureş Valley (Târgu Mureş – Târgu Neamţ)

Bulgaria

8 Rila-Verila-Kraishte corridor

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Project partners:

Austria: WWF Central and Eastern Europe (Lead Partner), Environment Agency Austria

Bulgaria: Black Sea NGO Network, Bulgarian Biodiversity Foundation

Czech Republic: Friends of the Earth Czech Republic – Carnivore Conservation Programme, Transport Research Centre Czech Republic

Hungary: CEEweb for Biodiversity, Hungarian University for Agriculture and Life Sciencis

Romania: Zarand Association, EPC Environmental Consultancy Ltd., WWF Romania

Slovakia: Slovak University of Technology in Bratislava – SPECTRA Centre of Excellence of EU

Associated Strategic Partners:

Austria: Ministry for Climate Action, Environment, Energy, Mobility, Innovation, and Technology

Bulgaria: Ministry of Agriculture, Food and Forestry – Executive Forest Agency, Southwestern State Enterprise SE – Blagoevgrad

Czech Republic: Ministry of the Environment, Nature Conservation Agency

France: Infrastructure and Ecology Network Europe (IENE)

Germany: Bavarian State Ministry of the Environment and Consumer Protection

Greece: Egnatia ODOS S.A.

Hungary: Natinoal Infrastructure Developing Private Company Ltd. (NIF Ltd.), Ministry of Agriculture, Danube-Ipoly National Park Directorate

Romania: Ministry of Environment, Waters and Forests, Ministry of Public Works, Development and Administration, Ministry of Transport, Infrastructure and Communications

Slovakia: State Nature Conservancy, Ministry of Environment, Ministry of Transport and Construction, National Motorway Company

Ukraine: M.P. Shulgin State Road Research Institute State Enterprise – DerzhdorNDI SE, Department of Ecology and Nature Resources of Zakarpattia Oblast Administration

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