



# BIOREGIO

## Operational Manual for Data Collection

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### **Acknowledgement**

The EURAC Team wants to thank all the partners from BioREGIO Carpathians for their contribution and their engagement to support work package 5 actively with collecting and surveying geographical, socioeconomic and legal data.



# 1 Introduction - Data Collection and Analysis

The BioREGIO Carpathians Work Package on Continuity and Continuum (Work Package 5) focuses in its activity data collection and analysis (5.1) on surveying Carpathian wide data concerning the main natural, legal, social and economic barriers/possibilities having an impact on ecological connectivity of natural areas. The same collection of available data is carried out also in the pilot areas. The analysis of the collected data and the identification of principle core areas and dispersal paths for selected umbrella species (2.1 and Annex 2) in the Carpathians was developed on the basis of the methodology from the Alpine Space ECONNECT project. The analysis of the data collected in the pilot areas and identification of the barriers in these areas is done to elaborate recommendations to advance NATURA 2000 and ecological networks in the Carpathians on the basis of the analysis developed and the results of stakeholders meetings. A (Web) GIS-technology is elaborated as a tool for metadata, data storage and visualization of the regional and Carpathian wide data collected and outputs produced.

As briefly noticed in the introduction the main focus concerning ecological connectivity concentrates on the detection of:

- 1 physical,
- 2 legal and
- 3 socio-economic barriers

to derive the most probable dispersal paths for the selected umbrella species.

## 1.1 Continuity and Connectivity approach

The continuity and connectivity approach aims to give an answer to the following research questions: Which are the most suitable landscape patches for the selected umbrella species? Are there chances that they can reach another suitable patch for living or breeding? If yes, using which path? Are there are barriers in the identified routes? Are they surmountable? To reply efficiently to these questions it is fundamental to: (i) set a strategy of investigation based on a GIS model; (ii) set the parameters for the selected model for the umbrella species and their species-species relations, (iii) assess the connectivity via the visualization of core areas and least-cost paths between them, and (iiii) identify possible legal and/or socio economic barriers on connectivity highlighting potential ecological network gaps.

The approach followed to detect the core areas and ecological corridors is two-fold and is based on the application of a GIS model:

- 1- The Carpathian-wide approach aims at analysing potential corridors and core areas in order to identify the main structural and functional connectivity of the whole Carpathians mountain range
- 2- The Pilot Area approach, utilizes closer scale geo data for the identification of main corridors connecting the area with the main Carpathians ecological network

The necessary geo-data at different scales have been collected either by open databases or were requested directly from the project partners. Regarding the legal barrier approach, national legal experts were hired to analyse the legal issues having an impact on ecological connectivity. On the other side qualitative interviews with experts and local stakeholders are providing motives of socio-economic groups for enabling or hindering the dispersal of large carnivores and herbivores.

## 1.2 Study Area

According to the necessity of integrating physical with legal and social barriers, it is fundamental to apply our investigation on the Carpathian Perimeter following the administrative NUTS3 approach (**Error! Reference source not found.1**). This is due to the fact that “animals do not stop at borders” and that the protection of wildlife species with big home ranges necessities to be considered in trans-boundary policies. Additionally, the inclusion of socio-economic and legal barrier investigation needs the enlargement of the study area beyond the orographic units. For this reason, the approach on the orographic units from the Daphne project Carpathian Eco Region Initiative (CERI) does not fill all our requirements. For considering ecological connectivity and how it is hindered by physical and non-physical barriers, a broader territory needs to be covered that extends the Carpathian Convention Perimeter determined by orographic units in Daphne project of CERI. (**Error! Reference source not found.2**)

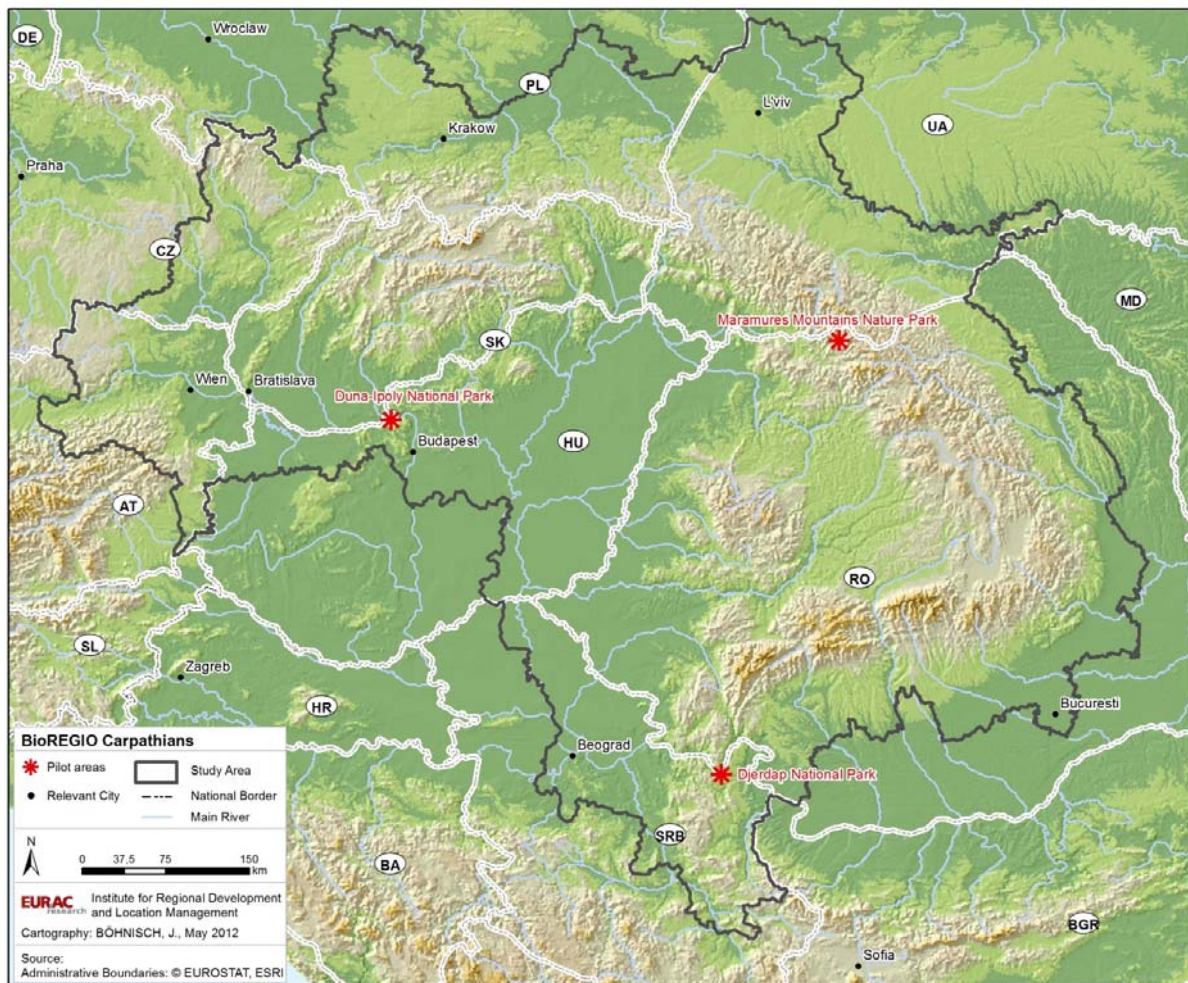


Figure 1 - Area covered by the connectivity investigation for WP5





**Figure 2 - Area considered in the Carpathians Eco Region Initiative (CERI)**



## 2 Physical Barriers/Possibilities

### 2.1 Umbrella Species

We follow the theory that a corridor, which is appropriate for large carnivores and herbivores to disperse, should also be adequate for many other species, too. Before this background, the selection of appropriate species either for Carpathians approach and Pilot Areas approach (ambassador or umbrella species) was done. For deriving ecological corridors they are most likely used, particular needs and requirements regarding continuity and connectivity of landscape of these species are hence assumed.

These umbrella species should be typical for the study area and should be characterized by:

- Their habitat and spatial requirement
- Their degree of protection in each of the studied countries
- Their relation with the human society and infrastructures
- Characteristics and reaction to the presence of barriers
- The relations predator-prey

Each umbrella species has been described and characterized by its ecological habits and requirements/needs regarding their core areas (habitats).

Umbrella species were selected also according to their social impact, especially related to their impact on human activities and emotional feeling. Furthermore the protection level in the Carpathian countries was considered for their selection.

The final decision on Umbrella species' was taken within a Project Partners' discussion aimed at identifying the most suitable species for the detection of ecological corridors, considering also the available distribution/presence data from the partners themselves.

Species selected: Eurasian Lynx (*Lynx lynx*), Brown Bear (*Ursus arctos*), European Wolf (*Canis lupus*), European Otter (*Lutra lutra*), European Hare (*Lepus europaeus*), Carpathians Chamois (*Rupicapra rupicapra carpatica*), Capercaillie spp. (*Tetrao urogallus major* + *Tetrao urogallus ridolfi*).

### 2.2 Required basic Geographic information

#### 2.2.1 Land cover data (Raster and vector):

The data requested were chosen according to the GIS approach that was decided to follow. The GIS data were essential for the application of a GIS suitability model and linkage design, with the aim to identify barriers hindering the species' dispersal.

CORINE Land Cover, orthophotos and Classified Land Use satellite Images are essential to visualise the landscape structure and land use in order to adapt the GIS model to the ecological preferences of the selected species. According to the species' habits, the landscape can be classified in different preferential zones, showing the potential core areas and dispersal paths.

- Carpathian Approach: GIS application, visualization of data from all the Project Partners about Carpathians' land use (CORINE LAND COVER), topography (Elevation Model), main roads, urban areas, agricultural areas, hunting areas, private/public ownership, planned infrastructure at Carpathian level (e.g., 1:500.000, 1:1.000.000/2.000.000)
- Pilot Area approach: Visualization of the PA's landscape structure in GIS using satellite images (Landsat, Spot, Aster) and orthophotos considering scales of 1:100,000 or 1:50,000 or even 1:25,000 if possible.

### 2.2.2 Barriers (Linear Data)

Data on human infrastructures (i.e., settlements, roads, ski infrastructures, fenced hunting areas, planned roads, overhead power lines, water courses, railways etc) provide useful information on the current and future potential barriers hindering animals' dispersal. The knowledge about the location and the specifics of each of the mentioned barriers is for WP5 essential. Coupling detected core areas and ecological corridors with the location and the characteristics of the supposed barriers, enables us to perform a deeper analyses and to elaborate specific recommendations for their overcome.

The requested data have been chosen also because they are always included in studies concerning ecological connectivity in relation with the presence of human infrastructures.

### 2.2.3 Wildlife presence and distribution (points data):

knowledge about presence and distribution of selected umbrella species (and/or related species – like direct preys or predators) is of fundamental importance for the validation of the applied GIS model.

The model results are in the form of habitat maps based on the ecology of the species. But since every species selects its best habitat based on availability of resources, breeding opportunities and protection, rest, passage, the general species' ecology cannot justify local habitat selections which are due to local characteristics and human presence. That is why a punctual, reliable and recent data on animals' presence and distribution is needed. This kind of data, due also to the difficulties in obtaining them (through direct continuous observation, monitoring, labelling, signs identification and/or radio tracking) and to the monetary costs that they require, are often missing or incomplete.

The data about wildlife presence in a form that can be used to validate the GIS model, can be, anyhow, obtained from different sources.

Very broad distribution maps have been elaborated by IUCN but they give just a sort of habitat potential. They can be useful to know whether the species could live there and if there have been continuous signs of its presence.

Punctual presence, although sporadic, can be reported by hunting bag data based on National Game Management Databases.

Historic distribution of species can be found on the literature but they can be just partially used to validate the model.

## 2.3 Strategy for data collection

### 2.3.1 Free available datasets (public):

The data collection in the study area considers, in a first step, the free available public data for the Carpathians and the Pilot Areas approach (Table 1).

**Table 1** Free available datasets (public):

GIS available data	Source	Year	Scale	Geographic Extent
Rivers, Lakes	JRC	2008	1:500.000	EU
Forests	JRC	2008	25 m	EU
Landuse	EEA: CORINE land cover	2006	1:100.000	Car, except UA
Lakes	JRC	2008	1:500.000	EU
Rivers	JRC	2008	1:500.000	EU
NUTS2 - boundaries	EUROSTAT	2008	1:500.000	EU
NUTS3 - boundaries	EUROSTAT	2006	1:3.000.000	EU
Municipality Boundaries	Eurogeographics	2006	1:3.000.000	Car
large cities	ESRI	2001	1:1.000.000	EU
national borders	ESRI	2001	1:1.000.000	EU
landscape types	GISCO, EUROSTAT	2003		EU
elevation model	USGS	2000	90 m	Car
Relief (topography)	USGS	2000	90 m	Car
nationally designated areas	EEA	2008	1:100.000	EU
Wildlife species' distribution	IUCN	2009		Car
Habitats, orographic units	Carpat.es.org	2007	Shp-file	Car

*JRC...Joint Research Centre; EEA...European Environmental Agency; ESRI...Supplier of GIS software and geodatabases; USGS...U.S. Geological, Survey; IUCN... International Union for Conservation of Nature*

### 2.3.2 Free available datasets (Project Partners and Cooperation):

#### The Role of Project Partners to acquire data

The acquisition of necessary data for ecological connectivity and barriers analysis needs the cooperation among all the project partners. Geo-data are often not easily shared by local administrations and the presence of local partners to deal directly (also to overcome language barriers) is of great help for data collection. As stated in the Application Form, project partners are expected to contribute to this task contacting data owners and helping in collecting free data sets or in discussing for purchasing prices. The strategy followed was based on submitting specific questionnaires to the partners, either for the Carpathian approach and for the Pilot Area (**Annex 1**).

The questionnaire was sent to the project partners in order to get informed on the available GIS data concerning land use and human infrastructures in their national territories and in the Pilot Areas. The same questionnaire asked the partners to state the importance of each of the firstly selected umbrella species in their country / Pilot Area and whether a presence/distribution GIS database was available.

After the partners' agreement on the umbrella species, a new list with updated ecological information was developed and distributed among the partners (**Annex 2**).

A separated questionnaires was developed to evaluate the barrier effect of certain objects (**Annex 3**):

- Roads and motorways
- Fences
- Railways
- Water courses and water bodies

For each of the above mentioned barriers' category, the partners were asked to fill in a form stating the location of the supposed barrier effect and the main characteristics (i.e., Roads: one or two-lanes, traffic flows, road kills; Fences: type of fences, characteristics, distance between fenced areas; Railways: category, number of lanes, location; Water courses: location, width, banks, technical infrastructures).

**Table 2** List of project partners:

Partner role	Official name in English	Abbreviation	Country
<b>Lead Partner (LP)</b>	NFA (National Forest Administration) ROMSILVA Piatra Craiului National Park Administration	APNPC	Romania
<b>ERDF PP1</b>	UNEP REGIONAL OFFICE FOR EUROPE - Interim Secretariat of the Carpathian Convention, UNEP Vienna - ISCC	UNEP Vienna - ISCC	Austria
<b>ERDF PP2</b>	WWF DCP (Danube Carpathians Programme)	WWF DCP	Austria
<b>ERDF PP3</b>	Duna-Ipoly National Park Directorate	DINPI	Hungary
<b>ERDF PP4</b>	Szent István University	SZIU	Hungary
<b>ERDF PP5</b>	European Academy Bolzano/Bozen	EURAC Research	Italy
<b>ERDF PP6</b>	NFA (National Forest Administration) ROMSILVA Maramures Mountains Nature Park Administration	APNMM	Romania
<b>ERDF PP7</b>	NFA (National Forest Administration) ROMSILVA Iron Gates Natural Park Administration	APNPF	Romania
<b>ERDF PP8</b>	Regional Environmental Protection Agency Sibiu	REPA Sibiu	Romania
<b>ERDF PP9</b>	State Nature Conservancy of the Slovak Republic	SNC SR	Slovakia
<b>ERDF PP10</b>	National Forest Centre	NFC	Slovakia
<b>ERDF 20% PP1</b>	Agency for Nature Conservation and Landscape Protection	ANCLP	Czech Republic
<b>ERDF 20% PP2</b>	Polish Academy of Sciences, Institute of Nature Conservation	INC PAS	Poland
<b>IPA PP1</b>	National Park Public Enterprise Djerdap	JP NPDJ	Serbia
<b>EU ASP1</b>	Ministry for the Environment, Land and Sea	MATTM	Italy
<b>10% PP1</b>	The State Agency for Protected Areas	SAPA	Ukraine
<b>OP1</b>	Ministry of the Environment of the Czech Republic	CZ	Czech Republic
<b>OP2</b>	Ministry of Rural Development	HU	Hungary

<b>OP3</b>	Ministry of the Environment, Department of Nature Protection	PL	Poland
<b>OP4</b>	Ministry of Environment and Forest	RO	Romania
<b>OP5</b>	Ministry of the Environment and Spatial Planning	SR	Serbia
<b>OP6</b>	Ministry of Agriculture, Environment and Regional Development of the Slovak Republic	SK	Slovakia
<b>OP7</b>	Ministry of Environmental Protection of Ukraine	UA	Ukraine
<b>OP8</b>	Environment Agency Austria	EAA	Austria

**Data from Project Partners:**

*Lead Partner (LP):*

- Shape file of the habitat types distribution in the Carpathians

*IPA PP1 and ERDF PP7:*

- Jpeg image of the map of the borders of the pilot area Djerdap National Park (Serbia)
- Shape files of rivers and borders of the pilot area Iron Gate Nature Park (Romania)
- Carpathians Serbian Lynx and Otter distribution in the pilot area. Resolution 10km x10km
- Djerdap National Park and Iron Gate Nature Park orthophotos
- Shape files of zone under different protection of Iron Gate Nature Park

*ERDF PP3:*

- Shape file of extension of Ramsar site at pilot area Duna Ipoly National Park (Hungary)

*ERDF PP4:*

- GIS shape files of Red deer (*Cervus elaphus*) and European brown hare (*Lepus europeus*) hunting bag data based on the Hungarian National Game Management Database. The spatial basis of the study is the 10\*10km UTM net.

*ERDF PP6:*

- Orthophotos of pilot area Maramures National Park (Romania)

*ERDF PP8:*

- Description and list of roads present in 1990 and still in operation plus the foreseen intervention in 2013
- Shape file of distribution of NATURA 200 sites in the Carpathians

*ERDF PP9:*

- Shape files of orographic units of the Carpathians range
- Shape files of the Slovak distribution of European wolf (*Canis lupus*), European Otter (*Lutra lutra*), Brown Bear (*Ursus arctos*), European Lynx (*Lynx lynx*), Carpathians Chamois (*Rupicapra rupicapra tatraica*), European hare (*Lepus europeus*)
- Orthophotos of the Poipie Pilot Area (Slovakia)

*ERDF 20% PP1:*

- License agreement of The NCA CR's Finding/Occurrence Data Database, the Habitat Mapping Digital Vector Layer, both in original and updated format, written reports from projects funded by the NCA CR for the Czech republic layer of the Carpathians Convention

*10% PP1:*

Shape files of:

- Carpathians Biosphere Reserve borders
- Carpathians Biosphere Reserve botany
- Virgin Forest of Romania

***Memorandum of Understanding (MoU)***

Agreed between: EURAC; UNEP Vienna; Daphne - Institute for Applied Ecology; State Nature Conservancy of the Slovak Republic; The Environmental Information Centre GRID Warsaw; WWF Danube – Carpathians Programme; Slovak Forest Centre:

Memorandum of Understanding aimed at providing a durable basis for the collaboration among the above mentioned Partners in data collection and analysis in the field of biological and landscape diversity. The Partners agree to the principle of “open source” exchange of data elaborated during projects, including new data, for the purpose of implementation of the Protocol on Conservation and Sustainable Use of Biological and Landscape Diversity.

Collaboration will include addressing data management and access in the Carpathian region, i.e. better access to existing data, better knowledge of data quality and the generation of new data in a manner that allows data sharing among researchers and/or other interested persons. Contributing to the establishment of an interactive geo-referenced web based joint information system opened and accessible to all (Carpathian Integrated Biodiversity Information System) in the framework of the Carpathian Convention and under the coordination of UNEP Vienna – ISCC.

**2.3.3 Purchased data**

Due to the fact that requested and necessary data are not always available, or of easy sharing with the data owners, we decided to overcome this problem by purchasing the necessary data from an institution outside the Carpathians Convention area but active in the region of interest.

EURAC decided to purchase Land use and land cover maps for the entire Ukrainian Carpathians based on LANDSAT TM/ETM Images from the year 2000 from the **Humboldt Innovation GmbH (Technology Transfer Office of Humboldt University)** at the price of **Euro 3.000** (excl. VAT 19%) because it was the only provider that offered already classified Landsat-Images (Pixel data) with a resolution of 30m.

Regarding physical barriers information on street data is one of the most important issue to be considered in ecological connectivity. To deal with the cross-border character of the project and to apply reliable spatial data in the model on ecological networks, a harmonized dataset for the whole study is required. Therefore the data has to be acquired by purchase. The company “**WIGeoGIS**” from Munich was selected as they provide the street data for the whole study area without any restrictions within our web-GIS.



## 3 Socio-Economic Barriers/Possibilities

### 3.1 Background

The need to take in consideration the socio-economic dimension in the analysis of ecological connectivity stems from the consideration that “mitigation of pressures on biodiversity through the modification of their underlying socioeconomic drivers” (Haberl et al., 2009) is one effective way to foster biodiversity preservation. Therefore, fostering or improving ecological connectivity can be seen as a concrete intervention done to enhance biodiversity; nevertheless, different stakeholder groups – and their social and economic activities can contribute to foster or hinder biodiversity in different ways.

### 3.2 Definition of socioeconomic barriers and possibilities

The terminology used in the project refers to the terms of socio-economic “barriers” and “possibilities” against/for ecological connectivity and is taken from the physical approach to ecological connectivity, in which physical barriers or obstacles hindering or promoting ecological connectivity are identified. In the socio-economic approach, the barriers have been defined as the opinions, attitudes and concrete behaviors of specific stakeholder categories that have a negative effect on the implementation of ecological connectivity. On the contrary, opportunities are opinions, attitudes and concrete behaviors of specific stakeholder categories that have a positive effect on ecological structures, preventing landscape fragmentation and enabling ecological connectivity.

The research questions adopted for the socio-economic analysis are:

- Which are the main stakeholder categories affected by the topic of ecological connectivity in the Carpathians? And why are those the main ones (motivation, impact, etc.)?
- How can the specific socio-economic activities related to these stakeholder categories affect ecological connectivity (both in a positive – opportunity - and negative – barriers – way)?
- To which extent can the specific socio-economic activities related to these stakeholder categories affect ecological connectivity?
- Which are the actions that these stakeholder categories can undertake in order to enhance ecological connectivity?
- What recommendations can be given to the different stakeholder categories identified?

In order to investigate the issue, an adequate definition of the concept of stakeholder related to the topic of ecological connectivity has been developed. The identified concept should provide a basis for the identification and selection of stakeholder groups to be included in the analysis. The definition of stakeholder follows the indications given by ECNC (2009) and define stakeholders as [groups of] people:

- Directly involved [...] and who carry out practical decisions and actions in term of planning, design and implementation;
- Directly affected by plans and – or activities linked to the establishment/preservation of ecological networks;
- Whose permission, approval or [financial] support will be needed in order to implement ecological corridors;

- Who may participate in the implementation via community mobilization efforts or could represent a specific segment of society;
- Who can influence the opinion for or against the plan.

### 3.2.1 Data collection process

In order to collect information on socio-economic barriers in the Carpathians, a four-step approach can be adopted. This approach is specifically tailored to a multi-partner international consortium but can also be adopted by a single group of researchers with the condition of

STEP 1: identification of the most important stakeholder groups and the most relevant issues linked to ecological connectivity in the Carpathians.

STEP 2: discussion of the STEP 1 outcomes with the partner consortium.

STEP 3: case studies.

STEP 4: conclusive workshop.

#### **STEP 1: Identification of the most important stakeholder groups and the most relevant issues linked to ecological connectivity in the Carpathians.**

This phase involves the following activities:

1. Literature review on the topic of socio-economic barriers and opportunities related to different stakeholder groups in the Carpathians.
2. Review of analogous projects carried out in other contexts (Alps).
3. Interview with experts at alpine level in order to discuss in depth the alpine approach to socio – economic barriers and possibilities.
4. Interview with researchers at the Forum Carpaticum 2012.

The interviews are carried out in a semi-structured form, following the interview drafts of *Annex 5*.

The selected experts and researchers on the topic of ecological connectivity have been interviewed at the Forum Carpaticum (30 May – 2 June 2012).

The interviews have a duration of 30 - 45 minutes. They are recorded and transcribed and finally analyzed with the software Max QDA. The access to the recorded interviews is granted only to the researchers authorized in the project and all the information is treated according to the Italian privacy regulation (art.7 D. Lgs. 196/2003).

#### **STEP 2: discussion of the results of STEP 1 outcomes with the partner consortium.**

Step 2 includes the following activities:

1. Presentation to the partner consortium of first results from the interviews and discussion. During the WP 5/WP 3 meeting in Banska Bystrica on July 24 and 25, 2012, the results of the interviews with experts and researchers have been presented to the partner consortium and discussed, along with a preliminary list of relevant sectors to be analysed. Based on the inputs of the partners, a definitive list of sectors to be considered has been developed, including: nature parks and protected areas, public administration, agriculture, forestry, land use and linear infrastructure planning, tourism, water management, hunting and fishing, industry and energy. These sectors and their relationship with ecological connectivity will be analysed in step III.
2. Follow-up online questionnaire for the identification of most relevant stakeholder groups. Since the sectors can contain different stakeholder groups that can have different influences on ecological connectivity (i.e. tourism can include both hotel managers and local tourism associations), a follow-up questionnaire has been sent to the partnership in order to collect



The potential cases are identified on the basis of the results of the application of the physical barriers model and of a discussion with the local project partners.

***The case study foresees:***

- The development of a case study protocol, according to Yin (1992). The case study protocol is a document containing all the steps undertaken in order to analyse a specific case, along with the list of the documentation analysed. This ensures the possibility of replication and of checking the documentation.
- The collection of documentation regarding ecological connectivity in the selected area (including, if existing, inputs on the local regulation coming from the study on legal barriers).
- A series of semi-structured interviews (open-ended questions) with stakeholders at local level, combined, when possible, with participant observation.
- The triangulation of information (documents and interviews) and the interpretation of the documentation in the framework of the research questions formulated.

**STEP 4: conclusive workshop**

Finally, the results of steps 2 and 3 are discussed with the project partners in a workshop (organized in combination with one partner/WP meeting), where a series of recommendations for overcoming negative drivers and pressures and enhancing positive drivers and pressures are elaborated.

Specific moderation techniques are used in order to orient the group towards concrete results. The proposed approach, to be discussed with the partner consortium is:

- At the beginning, the moderators give a short presentation on the topic and on the results of the research carried out on socio – economic barriers and issues.
- The participants in plenary session attribute then different points to possible topics of discussion (proposed by the moderator), in order to select three/four main sectors (depending on the number of participants) to work on.
- Groups of 3-5 persons are formed. Group members are selected casually and each group names a group leader.
- Group work is then used in order to tackle in depth the selected topics. After this, each group has a plenum presentation of the outcome. It is possible at this stage in plenary session to use NGT (nominal group technique) in order to identify the most relevant impacts on ecological connectivity at intersectoral level.
- Finally, the groups use the brainwriting (collaborative writing) technique in order to identify possible recommendations in order to overcome the identified barriers. The outcomes of this action are explained in plenary session by the group leaders.
- The moderators send a photo-minutes document to the participants.

The results of all steps are integrated in a final document containing:

- A list of relevant sectors;
- The identification of possible positive or negative contributions from these stakeholder categories to ecological connectivity;
- The identification of the extent of these possible positive or negative contributions;
- The identification of possible actions that these stakeholder groups can undertake in order to enhance ecological connectivity;
- A list of recommendations formulated in order to overcome possible negative effects and foster positive effects to ecological connectivity in the Carpathians

## 4 Legal Barriers/Possibilities

The legal part considers in a first step a brief analysis of the supranational context. Therein relevant international and EU legislation regarding the protection of biodiversity, ecological connectivity and cross border cooperation instruments will be surveyed. Therefore a preliminary check on the implementation of the above mentioned legal foundations at the national legislation of the Carpathian countries participating in BioREGIO Carpathians follows.

With the support and input of the BioREGIO Carpathians Partners a guideline/questionnaire will be elaborated to advice national legal expert of the Carpathian Countries what kind of legal fields and acts they should analyse for establishing national reports on ecological connectivity. Therefore the tasks encompass:

- 1 the identification and selection of the national legal experts
- 2 the development of questionnaires, on which the experts elaborate the country reports on ecological connectivity that considers the analyses of:
  - national institutional framework
  - conflicts and issues to be improved for enhancing ecological connectivity and biodiversity
  - case laws on the national but also regional (sub-national) scale, including the particular status of protected areas and the therewith related cross boarder problems.-
- 3 the elaboration of a Pan-Carpathian synthesis report on ecological connectivity coping with the national legal fields, institutions and acts and compare them on the Pan-Carpathian level particularly focusing on the trans-boundary issues (problems).

### 4.1 Objectives

**1. Definition, identification of main “legal barriers” as:**

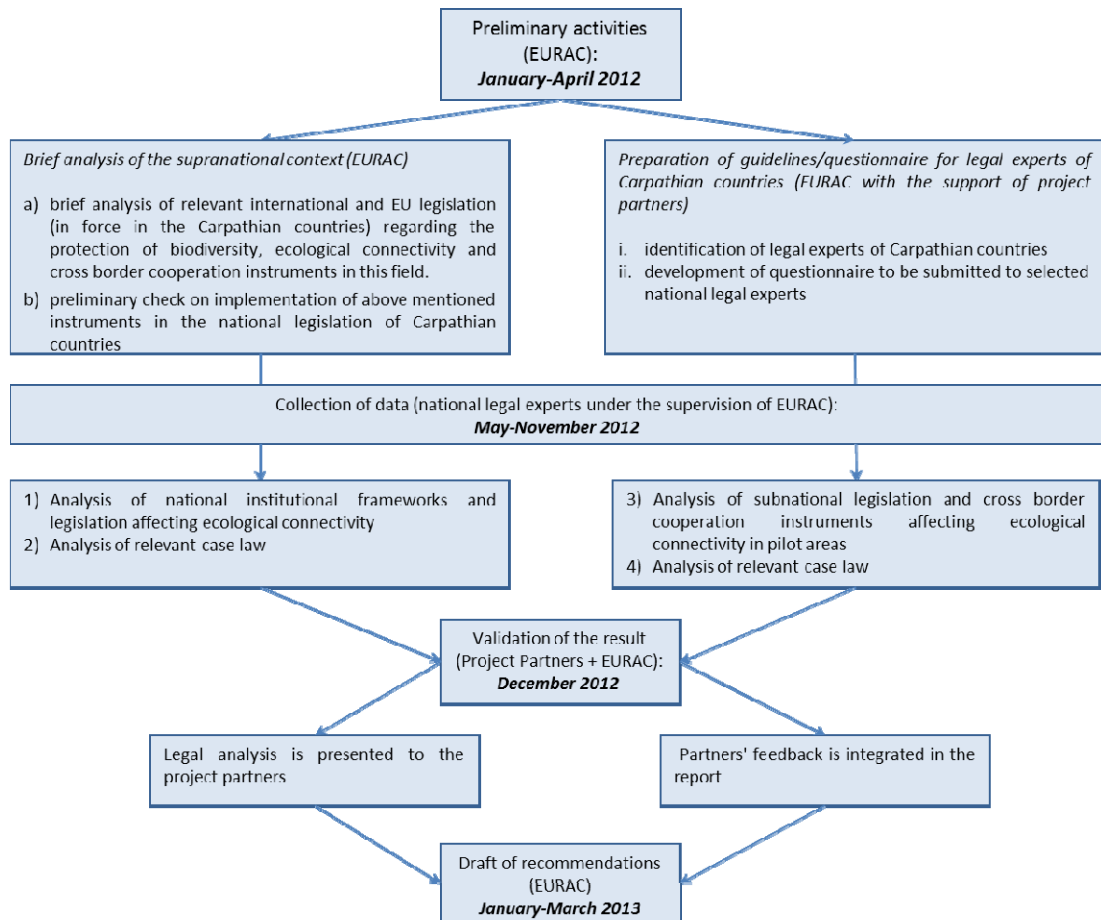
- Institutional frameworks and legislation that prevent/affect/hinder the maintenance or further improvement of ecological connectivity and the protection of habitats and species in the Carpathian countries.

**2. Analysis of legislation that**

- support the maintenance or further improvement of ecological connectivity and the protection of habitats and species in the Carpathian countries.
- is in place but not adequately implemented/enforced in the Carpathian countries.

**3. Elaboration of recommendations to overcome existing “legal barriers” to connectivity and improve the use of existing legal instruments**

With the support of legal experts from the participating countries, the multi-level of institutional and legislative frameworks and provide recommendations will accordingly be analysed.



**Figure 4 - Flow Chart to point out the procedure to survey legal barriers.**

## 4.2 Geographical and institutional level of analysis:

- Supranational (international and EU legislation relevant to ecological connectivity of the Carpathian countries): EURAC;
- Carpathian States (national frameworks and national legislation relevant to ecological connectivity): EURAC with selected legal experts;
- Pilot areas (cross-border cooperation and subnational legislation relevant to ecological connectivity) EURAC with selected legal experts.

## 4.3 Structure of the scientific activities:

### 4.3.1 Preliminary activities (WP 5.1)

#### a) Supranational context (EURAC):

- Analysis of relevant international and EU legislation (in force in the Carpathian countries) regarding the protection of biodiversity, ecological connectivity and cross border cooperation instruments in this field;

- ii. Preliminary check on implementation of above mentioned instruments in the national legislation of Carpathian countries.
- b) *Preparation of a guideline for the legal experts of Carpathian countries to fill out the questionnaire dealing with legal issues hindering ecological connectivity.*

This guideline should enable a deeper analysis of institutional frameworks and relevant national and if useful of sub-national (pilot areas) legislations.

- i. Identification of legal experts of Carpathian countries: EURAC with the support of project partners (WP4);
- ii. Development of a guideline to introduce the questionnaire focusing on legislation affecting ecological connectivity in the Carpathian countries. The guideline and the questionnaire will be submitted to selected national legal experts: EURAC in coordination with other project partners, having the need for legal information.

#### 4.3.2 Collection of information

- a) *Analysis of national institutional frameworks and legislation affecting ecological connectivity;*
- b) *Analysis of sub-national legislation and cross border cooperation instruments affecting ecological connectivity in pilot areas;*
- c) *Analysis of relevant case laws.*

Sectors included in the analysis (a, b and c):

- Legislation on protected areas;
- Legislation on landscape;
- Legislation on land use planning and control (spatial planning, land use and management within the transport sector);
- Environmental impact assessments and strategic environmental assessments;
- Legislation on agriculture and agro-environment;
- Legislation on forestry;
- Legislation on water;
- Legislation on hunting;
- Legislation on tourism.

#### 4.3.3 Validation of results

- a) *The legal analysis is presented to the project partners (in the form of report/ in a workshop). This enables the partners to give feedbacks on possible missing aspects.*
- b) *Partners' feedback will then be integrated in the national report and*
- c) *For the Carpathians a Pan-Carpathian synthesis report including all the recommendations from the national reports including also trans-boundary issues will be established.*





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## 6 Annexes

### ANNEX 1 – QUESTIONNAIRE SENT TO PARTNERS FOR DATA ACQUISITION (CARPATHIANS AND PILOT AREA)

#### BIOREGIO SURVEY EXISTING SPATIAL DATA

*The objective of this questionnaire is to obtain geographic data information about the land structure, characteristics, animal spatial data, existing corridors and barriers in your country or area of interest and in the Protected Area(s) in your country. The obtained geographic data will be harmonised and then used to define the landscape characteristics in order to identify potential animals' corridors. These information will be coupled with those regarding the characteristics of the selected umbrella species as to highlight through Web-GIS the ecological network within the Carpathians range; therefore the information we are asking you are essential for the analysis of Barriers and Corridors in the BIOREGIO Project.*

*Please feel free to forward the present questionnaire to known experts and/or data owner. Please provide us the contact details of the people you want to contact for the questionnaire compilation*

**Responsible Institution:**

**Responsible person:**

**Contact details (address, tel., fax, email):**

**Date of questionnaire compilation:**

BIOREGIO Project Partners (please tick the appropriate box)	LP	<input type="checkbox"/>
	ERDF PP1	<input type="checkbox"/>
	ERDF PP2	<input type="checkbox"/>
	ERDF PP3	<input type="checkbox"/>
	ERDF PP4	<input type="checkbox"/>
	ERDF PP5	<input type="checkbox"/>
	ERDF PP6	<input type="checkbox"/>
	ERDF PP7	<input type="checkbox"/>
	ERDF PP8	<input type="checkbox"/>
	ERDF PP9	<input type="checkbox"/>
	ERDF PP10	<input type="checkbox"/>
	ERDF PP11	<input type="checkbox"/>
	ERDF 20% PP1	<input type="checkbox"/>
	ERDF 20% PP2	<input type="checkbox"/>
	IPA PP1	<input type="checkbox"/>
10% PP1	<input type="checkbox"/>	

Protected Area(s) included (please name them and add more lines if needed)	1.) _____ _____	2.) _____ _____
	3) _____ _____	4.) _____ _____
	Name: Institution:	Email: Tel.:
	Name: Institution:	Email: Tel.:

In the tables below please fill in as much information as possible about existing data in your country, regarding the Carpathians range.

Please duplicate the tables for further protected areas and/or add lines for additional information.

### 1.1 Geographic Base line Data (Shape files, satellite images format)\*

Data Theme	Available		Data use? License		Scale/ resolution	Date of origin	Official Name of Data set and (if possible) link for download	Data Owner (Name, Tel., email)
	YES	NO	free	costs				
Classified Land Use Satellite Images	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Planned new infrastructures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Fenced hunting areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Ski Infrastructures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Planned extension of settlements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Fences around roads/railways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Planned motorways/ roads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Planned railways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Overhead Power Lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Wind turbines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					

Hydro-power infrastructures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Active mining areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Abandoned mining areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Dams/Weirs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Wind shelters (hedges)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Green Bridges – Width >50m	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Ownership map (public/private)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

\*:Please provide shape file at a scale of 1:100.000 / 1:500.000

## 1.2 Species data

Which kind of species are relevant for defining/describing the quality of ecological networks?

Please evaluate the suggested umbrella species as follows:

++: very important

+: important

0: neutral

-: not so important

--: not important

**Please provide explanation for your answer and add other species that may be important in your country and/or under special protection.**

Suggested Species	Evaluation	Explanation
Lynx ( <i>lynx lynx</i> )		
Brown bear ( <i>ursus arctos</i> )		
Wolf ( <i>canis lupus</i> )		
Wild Cat ( <i>felis sylvestris</i> )		
Wild boar ( <i>sus scrofa</i> )		
European bison/Wisent ( <i>bison bonasus</i> )		
Chamois ( <i>rupicapra rupicapra</i> )		
Red deer ( <i>cervus elaphus</i> )		

Golden Eagle (aquila chrysaetos)		
Black stork (ciconia nigra)		
European otter (lutra lutra)		
Additional species 1:		
Additional species 2:		

### 1.3 Data on the geographic distribution of wildlife

Suggested Species scientific name	Data (see definition below)*	GIS-Data		Can Data be used in Bioregio? License costs (in € ca.)		Date of origin	Contact Person (Name, email)
		YES	NO	Free			
Lynx (lynx lynx)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
Brown bear (ursus arctos)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
Wolf (canis lupus)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					

Suggested Species scientific name	Data (see definition below)*	GIS-Data		Can Data be used in Bioregio? License free / costs (in € ca.)		Date of origin	Contact Person (Name, email)
		YES	NO				
Wild Cat (Felis sylvestris)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
Wild Boar (Sus scrofa)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
Wisent (Bison bonasus)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
Chamois (Rupicapra rupicapra)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					

Suggested Species scientific name	Data (see definition below)*	GIS-Data		Can Data be used in Bioregio? License free / costs (in € ca.)		Date of origin	Contact Person (Name, email)
		YES	NO				
Red deer (Cervus elaphus)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
Golden Eagle (Aquila chrysaetos)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
Black Stork (Ciconia nigra)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
European Otter (Lutra lutra)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					

Suggested Species scientific name	Data (see definition below)*	GIS-Data		Can Data be used in Bioregio? License free / costs (in € ca.)	Date of origin	Contact Person (Name, email)
		YES	NO			
Additional species	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	No Data <input type="checkbox"/>	Alternative dataset				

**\* Data definition:**

*Natural range:* The population distribution within a particular geographical area (Pilot Region or the Carpathians).

*Habitat:* Environmental area that is inhabited all season, seasonally (summer/winter habitats) or temporary (stepping stone habitats, Floodplain Forests, etc.) by a particular species - it is the natural environment in which organisms (species, plants) live.

*Migration trails:* routs on which species move due to their individual behavior and/or due to the ecological habit of the population. Trials between breeding and/or feeding grounds as well as winter areas.

*Observation data:* Point-information, where rangers/hunters have observed any of the umbrella species or tracking-information of animals from an umbrella species, who are equipped with a sensor. Include also findings of dead umbrella species

## 1.4 National Institutions owing raster/vector data highlighting issues asked in the questionnaire

If you think that National institutions have additional information on that issue, please name them to allow us to contact them

Institution Name	Contact Person (Name, Tel., email)

Already existing wildlife connections (e.g., Over/Underpasses; Culverts; Green Bridges):

Known wildlife diseases (e.g. feline leukaemia virus):

Main Stakeholders (Public/Private Ownerships):

Livestock killed (where/when/how many), last 10 years:

Road kills (species, where, which road) last 10 years:



Dead umbrella species found in the environment (last 10 years) + observation points + causes of death (if identified):

Additional information:

COMMENTS:

## ANNEX 2 – UMBRELLA SPECIES

### 2.1 Data on the geographic distribution of wildlife

Species scientific name	Data (see definition below)*	GIS-Data		Can Data be used in Bioregio?		Date of origin	Contact Person (Name, email)
		YES	NO	Free	License costs (in €ca.)		
<b>Lynx</b> (lynx lynx)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
<b>Brown bear</b> (ursus arctos)	natural range	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
<b>Wolf</b> (canis lupus)	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					

Species scientific name	Data (see definition below)*	GIS-Data		Can Data be used in Bioregio? License		Date of origin	Contact Person (Name, email)
		YES	NO	free	cost		
<b>Otter</b> ( <i>lutra lutra</i> )	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
<b>European hare</b>	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
<b>Capercaillie</b> ( <i>tetrao</i> )	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					

Species scientific name	Data (see definition below)*	GIS-Data		Can Data be used in Bioregio?		Date of origin	Contact Person (Name, email)
		YES	NO	License free	cost		
<b>Chamois (Rupicapra rupicapra)</b>	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					
<b>Additional species</b>	natural range <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	habitats <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	migration trails <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	observation data <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	No Data <input type="checkbox"/>	Alternative dataset					

## 2.2 Special data on corridors/barriers

Which impact have the following barriers, if they exist, on the continuity of the ecological network in your area for the selected species?

Value the level of threat of the existing barriers by adding values: 1 (low) --> 5 (high)

Add reasons and details why this decision was made.

Please continue on additional sheets if necessary

### 2.2.1 FENCES

Please provide information about the presence of fences filling in the lines with information regarding:

Impact value (high 5 – low 1) for each umbrella species + those you want to add

Main fenced areas,

Fenced hunting areas

Why are these fences a barrier (e.g., interrupt a corridor, fragment the habitat, animals found-dead etc.)

Umbrella species	Impact Value Low 1-->5 high	Reason and Details
Lynx		
Brown bear		
Wolf		
Otter		
European hare		
Capercaillie		
Chamois		
Add. species 1:		

### 2.2.2 ROADS

Please provide information about the roads network filling in the lines with information regarding:

Impact value (high 5 – low 1) for each umbrella species + those you want to add

Main roads

Roads known to act as a barrier

Why are these roads a barrier (e.g., it cuts an eco-corridor, high-frequency, animals found-dead etc.)

Umbrella species	Impact Value Low 1-->5 high	Reason and Details
Lynx		
Brown bear		
Wolf		
Otter		
European hare		
Capercaillie		
Chamois		

### 2.2.3 RAILWAYS

Please provide information about the railway lines:

Impact value for each umbrella species (high 5 – low 1)

Location

A single- or two-lanes railway

Whether it acts as a barrier and why

Umbrella species	Impact Value Low 1-->5 high	Reason and Details
Lynx		
Brown bear		
Wolf		
Otter		
European hare		
Capercaillie		
Chamois		
Add. species 1:		

## 2.2.4 WATERCOURSES AND WATERBODIES

(water bodies, rivers, dams, weirs)

Please provide information about the water bodies:

Impact value for each umbrella species (high 5 – low 1)

Location

Kind of water body

Why it acts as a barrier

Umbrella species	Impact Value Low 1-->5 high	Reason and Details
Lynx		
Brown bear		
Wolf		
Otter		
European hare		
Capercaillie		
Chamois		
Add. species 1:		



### 2.2.5 ADDITIONAL BARRIERS:

Please insert additional barriers, their impact value, their location and reason for your choice (e.g., bridges, overhead power lines, hydropower plants, ski infrastructure, oil/gas pipelines etc.)

Add additional lines if necessary

Umbrella species	Impact Value Low 1-->5 high	Kind of barrier, Location, Reason and Details (e.g.)
Lynx		
Brown bear		
Wolf		
Otter		
European hare		
Capercaillie		
Chamois		
Add. species 1:		

National Institutions owing raster/vector data highlighting issues asked in the questionnaire

If you think that National institutions have additional information on that issue, please name them to allow us to contact them

Institution Name	Contact Person (Name, Tel., email)

Already existing wildlife connections (e.g., Over/Underpasses; Culverts; Green Bridges):

Known wildlife diseases (e.g. feline leukaemia virus):

Main Stakeholders (Public/Private Ownerships):

Livestock killed (where/when/how many), last 10 years:

Road kills (species, where, which road) last 10 years:

Dead umbrella species found in the environment (last 10 years) + observation points + causes of death (if identified):

Additional information:

COMMENTS:

## ANNEX 3 – QUESTIONNAIRES ON PHYSICAL BARRIERS

Categorization of barriers

The main objects causing a barrier effect that need to be subjected to an evaluation are the following:

- (A) roads and motorways
- (B) fences
- (C) railways
- (D) watercourses and other water bodies

Barrier strenght:

It defines the resistance of a certain barrier. It may range from entirely impermeable (100%) to minimum or no resistant (0%)

Barrier assessment:

Each barrier has to be assessed individually according to the site and to the species it may interfere with  
Individual barriers may have a cumulative effect (i.e., high density of semi-impermeable barriers may result in a total impermeable environment) to calculate the resistance value of the environment they are in  
Resistance = 100 – Suitability

### 3.1 ROADS AND MOTORWAYS

Please provide information about the roads characteristics with information regarding :

**Number & Specification:**

European road (i.e, E68 Deva – Braşov)- Motor way and express ways

National Road - Multi-lane road

First class Roads

Local Roads

**Location of the barrier effect:**

which geographical location of the road can actually be a barrier – add sites' names (if known)

**Traffic flow:**

> 30,000 vehicles /d

10,000 – 30,000 vehicles/d

5000 – 10,000 vehicles/d

< 5000 vehicles/d

**High traffic period:**

day/night/season/year round

**Barrier impact of the road:**

A) Unsurmountable physical obstacle and lacking of any migration object / mitigation structures (resistance 75-100%)

B) Significant technical obstacle (high banks and cuts), partly unsurmountable (resistance 50-75%)

C) Roads with surmountable physical obstacle (central/side guardrails) (resistance 25-50%)

D) No technical barrier (resistance 0-25%)

**Documented Road Kills**

**Fenced road (yes or no)**

**Future roads routes**

Road number and Specification	Location of barrier(s)	Traffic flow	High traffic period	Barrier impact	Documented Road kills	Fenced road	Future roads routes

Please add, if known, the references for relevant studies about noise and pollution impact

**3.2 FENCES**

Please provide information about the presence of fences with information regarding :

**Location of potential high-density fences areas:**

i.e., settlements, pastures, state borders with site's name

**Type of fences:**

Wire fencing

Pasture fences

Highway fences

Electric fencing

Game-proof fencing

Wooden cattle pens

Hunting areas

**Height**

0-1.5 m

1.5-3 m

3-4.5 m

> 4.5 m

**Lenght of the fenced area**

**Distance between fenced areas**

< 10 m

10 – 30 m

30 – 100 m

No fences

**Technical parameters of the fences:**

Stable, tall fencing (over 2 m); wire, concrete, sheet metal; insurmountable for dispersing animals (resistance 100%)

Stable, hardly surmountable electric fencing (resistance 75%)

Stable, non-electric fencing difficult to surmount (resistance 50%)

Surmountable fencing (e.g., wooden fence) and temporary fencing (resistance 25%)

No fence (resistance 0%)

Location of potential high-density fenced areas	Type of fence	Height	Lenght	Distance between fenced areas	Technical parameters

### 3.3 RAILWAYS

Please provide information about the railway lines:

Category:

High-speed trains

Backbone network

Complementary network

Other railways

Location: Routes

Number of lanes

Traffic: medium time between subsequent trains

Barrier effect:

Railways lined with steep slopes and cuts, other technical obstacles; physically insurmountable(resistance 75-100%)

Railways with significant physical obstacles, which may be partly surmountable (resistance 50-75%)

Railways with minor modifications of terrain (resistance 25-50%)

Railways at the level of the surrounding terrain, no obstacles (resistance 0-25%)

Planned future railways: location and characteristics (if known)

Category	Location	Number of lanes	Traffic	Barrier effect	Planned future railways

### 3.4 WATERCOURSES AND WATER BODIES

Please provide information about the water bodies:

**Location**

Specification

Water course

Water body

**Width:**

> 500m

200 – 500 m

100 – 200 m

< 100 m

**Technical measures on banks:**

Watercourses with modified banks that entirely inhibit access

Watercourses with significant technical obstacles that may be partly surmountable

Watercourses and reservoirs with minor modifications of banks

Watercourses and reservoirs with natural banks

**Technical infrastructures (specify location):**

Hydropower plants

Fish production facilities

Dams (add flooding area)

Weirs

Location	Specification	Width	Technical measures on banks	Technical infrastructures

## ANNEX 4 – QUESTIONNAIRES FOR LEGAL EXPERTS

Legal part for all national legal experts coordinated and supervised by Dr. Mariachiara Alberton

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### 4.1 Introductory questions:

- Provide brief information on the form of constitutionalized division of power of your country (i.e. federal/unitary model)
- Describe briefly how are the legislative and administrative competences in the field of environmental/landscape protection/ land use and spatial planning/water/hunting/agriculture/transport/tourism/energy?/mining? divided among different government levels
- Describe briefly what are the bodies in charge of nature protection (for legislation, implementation and enforcement). At what level (state/regional/local) are monitoring and controlling authorities been established for nature and forest protection? How are they financed? (Public, e.g. state, funds?)

#### 4.1.1 Questions on legislative/administrative frameworks relevant for biodiversity and ecological connectivity

##### Protected areas:

- How have European directives (i.e. Habitats directive, Birds directive, Water framework directive, Environmental liability directive, EIA and SEA directives) been implemented in your country? (For non EU countries: have legislation similar to the mentioned directives been approved in your country?) Draft laws?
- What are the provisions for the implementation and management of Natura 2000? (See in particular artt. 3 and 10 of the Habitats directive and national reports on implementation)
- Who is in charge of establishing protected areas (i.e. strict nature reserves, wilderness areas, national parks, national natural monuments, habitat/species management areas, protected landscapes, managed resource protected areas. See IUCN categories of protected areas)? What is the procedure for designating such areas? What is the legal basis? What is the different protection regime of those categories in your country? List existing categories of protected areas in your country and compare them with IUCN categories.
- Are protected areas mostly established by State/Regions/local governments/administration?
- Have local communities the right to designate protected areas? Is this an autonomous right or dependent on province/regional/state authorisation? If not, how can local communities participate in the setting up of protected areas? In which phase (initiative, project definition, project approval, ex post information) and with what powers (ex. voluntary consultation, mandatory opinion, mandatory and binding opinion etc.)?
- Are protected areas in the process of being established in your country? What is their regime? (See IUCN categories of protected areas)



- Do national laws contain specific provisions concerning the surroundings of protected areas? (Thus ensuring that critical areas are buffered from the effects of potentially damaging external activities). What is the legal regime therein provided?
- Have management plans for protected areas been established at state/regional/local level?
- Who is in charge of administering and managing protected areas (see IUCN categories of protected areas)? Public enterprises, state controlled institutions, private organisations?
- On what basis are protected areas financed? (state/regional/local funds?)

#### **Ecological connectivity and related sectors:**

- Are ecological networks/connectivity mentioned as concepts in the Constitution?
- Are ecological networks/connectivity included in other national legislative acts? (please consider the following sectors: environmental protection, i.e. nature and biodiversity, water management and protection; hunting and fishing; forest; landscape; land use and spatial planning; agriculture; transport; tourism).
- Which are the specific (national) tools mentioned therein for implementing ecological networks? (For example: develop sustainably managed agricultural landscape; promote sustainable forest management and prevent deforestation/degradation; develop spatial plans that reduce habitat fragmentation and destruction; address ecosystem issues in the river basin management plans for river districts; achieve good ecological status of waters; sign cooperation agreements with other management authorities)
- Are ecological networks integrated in key processes and sectors? (E.g. In the agriculture sector, priority given to agricultural management, connectivity, land abandonment; in the transport sector a balance is assured to green and grey networks; in climate change policies, priority is given to adaptation measures and connectivity; in water management, the principles and objectives of the Water Framework Directive 2000/60/EC are implemented, etc.).
- Does national legislation include provisions on conservation of cultural landscape and historic sites? Provide reference and examples
- Does national legislation include provisions on compatible forms of land use (with the conservation of biodiversity)? Provide reference and examples
- Is legislation on ecological forestry management, afforestation enacted? Describe briefly contents
- Are forest management plans obligatory?
- Are illegal harvesting and logging punished in your country? Who may issue fines/sanctions in these cases? Are there penal or administrative sanctions?
- Do provisions on restoring damaged sites and ecosystems exist? Are they enforced?

Who is under such an obligation?

- Is illegal construction sanctioned in your country? Are there penal or administrative sanctions? Who may issue these sanctions?
- Are plans or projects having a significant effect on the environment subject to

EIA/SEA (or equivalent) procedures?

- Is public participation prescribed as part of the procedure?
- Is ecotourism promoted in the legislation?

**Hunting:**

- At what level are hunting laws approved (state/regional)?
- Can hunting sub-national laws contain exemptions from national laws?
- Are hunting laws in compliance with the bird directive?
- Are bans on hunting imposed for the following species: European Lynx (*Lynx lynx* L.), Brown Bear (*Ursus arctos*, L.), European Wolf (*Canis lupus*, L.), European Otter (*Lutra lutra*, L.), Chamois (*Rupicapra rupicapra*, L.), Western Capercaillie (*Tetrao urogallus*, L.), European Hare (*Lepus europaeus*, Pallas)?

**Cross-border cooperation:**

- Do provisions on cross-border cooperation for the management of bordering protected areas exist in your country? If yes, have any cross-border cooperation agreements been concluded? Please describe their scope and purpose
- Who is in charge and what are the legal tools/procedures to designate a transboundary protected area?
- Have cooperation been developed in your country on the basis of the “European Outline Convention on Transfrontier Co-operation between Territorial Communities or

Authorities” and related Protocols?

- Has legislation similar to the European Regulation 1082/2006 on Grouping of Territorial Cooperation (EGTC) been implemented in your country (for non EU countries)? Have initiatives related to nature protection and ecological connectivity been promoted through this tool (For EU; and through similar tool for non EU countries)?

**4.1.2 Case laws**

Is there any case law in the above-mentioned sectors concerning ecological connectivity/networks? Please quote and summarise existing cases

***On the basis of the questionnaire above, write a report explaining both national institutional and legal frameworks affecting biodiversity protection and ecological connectivity in your country, highlighting institutional and legal gaps and identifying legal tools (also cross border cooperation tools) that could be improved or better implemented/enforced to assure biodiversity protection and ecological connectivity in your country.***

## 4.2 PILOT AREAS

(Only for national experts of Slovakia, Romania, Serbia, Ukraine)

<b>PILOT AREAS:</b>
• <i>Duna Ipoly National Park/Poiplie Ramsar Site (Hungary - Slovakia)</i>
• <i>Iron Gates Nature Park/Djerdap National Park (Romania - Serbia)</i>
• <i>Maramures Nature Park/Carpathian Biosphere Reserve (Romania - Ukraine)</i>

Analysis of regional and local institutional framework and legislation (beside the national institutional framework and legislation) affecting the biodiversity protection and ecological connectivity of selected pilot areas (for specific guiding questions see above: 3.1 General Part of the Questionnaire):

- a) Analysis of regional/local institutional frameworks and legislation affecting biodiversity protection and ecological connectivity in pilot areas;
- b) Analysis of cross-border cooperation instruments affecting biodiversity protection and ecological connectivity in pilot areas;
- c) Analysis of relevant case law related to biodiversity protection and ecological connectivity in the pilot areas (if any)

### Sectors of analysis:

- Protected areas and biodiversity;
- Landscape;
- Land use planning and control (spatial planning, land use and management within the transport sector);
- Environmental impact assessments and strategic environmental assessments;
- Agriculture and agro-environment;
- Forestry;
- Water;
- Hunting;
- Tourism.

***On the basis of this specific analysis, write a second part of the report (i.e. case study) explaining both sub-national institutional and legal frameworks affecting biodiversity protection and ecological connectivity in your pilot area, highlighting institutional and legal gaps and identifying legal tools (also cross border cooperation tools) that could be improved or better implemented/enforced to assure biodiversity protection and ecological connectivity in your pilot area.***

## **ANNEX 5 – QUESTIONNAIRES FOR STAKEHOLDERS ON SOCIO-ECONOMIC BARRIERS**

Part A: Interview draft for experts at Alpine level

From your experience in the Alpine Arc] Which are the main stakeholder groups related to the issue of ecological connectivity?

What is their main role in the protection/enhancement of ecological connectivity?

In which way can they contribute to ecological connectivity?

In which way can they hinder ecological connectivity?

Which practices are currently carried out by these stakeholder categories to enhance ecological connectivity? Do some best practices already exist?

What are concrete ways of cooperation between these stakeholder categories and how can the public authority positively intervene for the promotion of ecological connectivity?

Part B: Interview draft for experts/researchers at Carpathian level

The questions have been draft for seven sectors relevant for ecological connectivity, preliminarily identified through a literature review:

1. Agriculture
2. Forestry
3. Water management
4. Land use planning
5. Hunting and fishing
6. NGOs
7. Nature parks/protected areas management

### **5.1 AGRICULTURE**

How are agriculture and biodiversity related?

Which is the role of farmers (inclusive land owners) and agriculture workers in:

- The preservation of ecological connectivity
- The damaging of ecological connectivity

What are the main changes in the agricultural system in the Carpathians that can affect ecological connectivity (refer to future trends and the shift from the socialist system to the current) ?

How are these changes linked to rural landscape changes?

What can farmers, land owners and workers actively do in order to enhance ecological connectivity?

What is the level of awareness of farmers (in the country/case study you are working on) with respect to ecological connectivity? How much do you think that the adviced farming and agriculture practice are used by farmers? To which extent is the use of these practices linked to the

What can be done in order to effectively address farmers and agricultural land owners towards the topic of ecological connectivity?

## 5.2 FORESTRY

How are forest management and biodiversity related?

Which is the role of forest management bodies in:

- The preservation of ecological connectivity
- The damaging of ecological connectivity

What are the main changes in the forest management system in the Carpathians that can affect ecological connectivity (refer to future trends and the shift from the socialist system to the current)?

How are these changes linked to landscape changes?

What can forest management authorities, forest management firms and forest owners actively do in order to enhance ecological connectivity?

What is the level of awareness of farmers (in the country/case study you are working on) with respect to ecological connectivity? How much do you think that the advised farming and agriculture practice are used by farmers? To which extent is the use of these practices linked to the

What can be done in order to effectively address farmers and agricultural land owners towards the topic of ecological connectivity?

## 5.3 WATER MANAGEMENT

How are water management and ecological connectivity related?

Which is the role of water management bodies (public and private) in:

- The preservation of ecological connectivity
- The damaging of ecological connectivity

What are the main changes in the water management system in the Carpathians that can affect ecological connectivity (refer to future trends and the shift from the socialist system to the current, also taking in account planned projects, for example for energy production) ?

What can water management bodies (both private and public) actively do in order to enhance ecological connectivity?

What is the level of water management bodies (both private and public) with respect to ecological connectivity? Are there some practices already in act in the Carpathians (or the areas you survey) How much do you think that the advised farming and agriculture practice are used by farmers? To which extent is the use of these practices linked to the

What can be done in order to effectively address water management bodies (both private and public) towards the topic of ecological connectivity?

## 5.4 LAND USE PLANNING (INCLUDING MOBILITY PLANNING)

How are land use planning and ecological connectivity related?

Which is the role of land use planning authorities in:

- The preservation of ecological connectivity
- The damaging of ecological connectivity

What are the main changes in the land use system in the Carpathians that can affect ecological connectivity (refer to future trends and the shift from the socialist system to the current, also taking in account planned infrastructural projects) ?

What can land use planning authorities (both private and public) actively do in order to enhance ecological connectivity?

What is the level of awareness of land use planning with respect to ecological connectivity? Are there some practices already in act in the Carpathians (or the areas you survey)? How much do you think that these “recommendable” land use practices are spread? To which extent is the use of these practices linked to the awareness regarding ecological connectivity?

What can be done in order to effectively address land use planning authorities (both private and public) towards the topic of ecological connectivity?

## 5.6 HUNTING AND FISHING

How are hunting and ecological connectivity related?

Which is the role of hunters in:

- The preservation of ecological connectivity
- The damaging of ecological connectivity

What can hunters and hunters associations actively do in order to enhance ecological connectivity?

What is the level of awareness of hunters with respect to ecological connectivity? Are there some practices already in act in the Carpathians (or the areas you survey)? How much do you think that these “recommendable” hunting practices are spread? To which extent is the use of these practices linked to the awareness regarding ecological connectivity?

What can be done in order to effectively address hunters towards the topic of ecological connectivity?

## 5.7 NGOs

Which is the role of NGOs in:

- The preservation of ecological connectivity
- The damaging of ecological connectivity

What can NGOs actively do in order to enhance ecological connectivity?

What is the level of awareness of citizens in general and stakeholders with respect to ecological connectivity? What are the stakeholder categories that are most affected by the topic and how do they operate concretely?

Are there some good practices already in act in the Carpathians (or the areas you survey)? How much do you think that “recommendable” practices are spread? To which extent is the use of these practices linked to the awareness regarding ecological connectivity?

What can be done in order to effectively address hunters towards the topic of ecological connectivity?

## 5.8 NATURE PARKS / PROTECTED AREAS MANAGEMENT

Which is the role of protected areas in:

- The preservation of ecological connectivity
- The damaging of ecological connectivity

What can protected areas actively do in order to enhance ecological connectivity?

What is the level of awareness of protected area managers with respect to ecological connectivity? Are there some practices already in act in the Carpathians (or the areas you work in)? How much do you think that these “recommendable” practices are spread? To which extent is the use of these practices linked to the awareness regarding ecological connectivity?

What can be done in order to effectively foster of ecological connectivity among protected areas?