



Local Cross-Sectoral Operational Plan

Arad-Deva Pilot Area

Part of Output T2.2 “Local Cross-Sectoral Operational Plans”

Asociația Zarand
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Local Cross-Sectoral Operation Plan

Arad-Deva

Part of Output T2.2 “Local Cross-Sectoral Operational Plans”

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

Danube Transnational Programme, DTP3-314-2.3

December 2022



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.

www.interreg-danube.eu/savegreen

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CHAPTER 1 **General Introduction**

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The main objective of the SaveGREEN project was to develop concrete solutions to preserve, improve or restore the functionality of key ecological corridors in Carpathian, Alpine and Bulgarian mountain valleys, where human activities as well as critical points for wildlife migration concentrate and thus conflicts are the highest.

As the proposed approach is to foster cross-sectoral and transnational cooperation and building of knowhow for integrated planning at landscape level, general pressures or threats to be considered when landscape connectivity is of concern was paired with connectivity-specific objectives.

By screening each sector of interest, we highlighted the potential sectoral impacts - an important reference for managers to investigate present or future problems that needs to be addressed by targeted measures. At pilot area level, the local experts worked with stakeholders to identify and prioritize these problems and to propose measures to overcome them through concrete actions, informed also by the situations in the other project pilot areas and by constant collaboration with project partners and external experts.

This common logical framework which facilitates the logical path from pressures / threats to concrete actions forms the structure of the Cross Sectoral Operational Plans (CSOPs) which represents the original response of SaveGREEN to threats to connectivity and the basis for implementation of practical measures in the 8 pilot areas of the project.

Working directly with stakeholder groups in the pilot areas and involve them actively, in a participatory manner, in the development of the CSOPs of the pilot areas should create long-lasting ownership of the plans and ease the future implementation.

The CSOPs are addressing the complex issue of landscape connectivity and should be considering a medium to long term effort. While some of the actions have been (partially)

implemented during the SaveGREEN project, most of them need to be implemented in the future. Moreover, constant assessment and adaptation of the actions is needed in order to respond to the dynamic of the multitude of factors impacting the landscapes, as well as to the capacity, resources and available know-how of the stakeholders.

SaveGREEN proposed the CSOPs as an informal tool to foster inter-sectoral cooperation and synchronized concrete actions at landscape level. Working directly with stakeholder groups in the pilot areas and involve them actively, in a participatory manner, in the development of the CSOPs of the pilot areas should create long-lasting ownership of the plans and ease the future implementation, irrespective of the formal agreements.

At the same time, the logical framework of the CSOPs will ensure an easy integration within local / regional sectoral (management) plans while ensuring synergies between them, which is a significant lack at present. Basically, by filtering CSOPs by any of the sector of interest, one will have available a sectoral action plan for connectivity. Of course, whenever the case, the measures of CSOPs could be taken on board by protected areas management plans.

By identifying the specific problems and needed actions on the ground, CSOPs are a valuable instrument to pinpoint potential gaps and lacks at legislative, capacity of funding levels which should fundament adaptation at national or European level.

Coupled with the Multi-sectoral online datasets for the pilot areas, with the *On-line library of multi-sectoral solutions for ensuring functionality of ecological corridors available in the Carpathian Countries Integrated Biodiversity Information System (CCIBIS) and with the SaveGREEN's Handbook of best practices*, we hope that the CSOPs will become a significant resource easy to be adapted in the Danube Region and beyond, whenever the scope is to safeguard the connectivity at landscape level.

The background of the entire page is a high-contrast, black and white photograph of a muddy stream. The water is dark and turbulent, with visible ripples and splashes. The banks are composed of dark, wet earth and some dry, thin branches. A prominent yellow rectangular box is overlaid on the upper portion of the image, containing the chapter title. On the left side of the page, there are vertical bars in blue and green.

CHAPTER 2

Short description of the ARAD-DEVA pilot-area

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2.1. A short description of the Arad-Deva Pilot Area and its relevance:

- » A critical connectivity area (linkage area) within one of the most important bio-corridor for large carnivores at the whole Carpathian range, identified since 2004 and referred to in the European Action plans for large carnivore species, in the Romanian Management plans and regional action plans for bear and wolf;
- » Important local biodiversity with a range of protected areas pSCIs (some designated specially to support the functionality of that particular bio-corridor) and SPAs;
- » A natural river valley which acts as a green/blue corridor itself;
- » Intersected by a major European transport corridor (TEN-T: motorway, railway), and national and local roads; first dedicated mitigation solutions to new infrastructure in Romania;
- » The Catalogue of measures developed in TRANGREEN and actions from the regional and national management plans, the Natura 2000 management plans offer great fundament, but needs integration in operational plans to become efficient/functional;
- » Strong potential to complement the ConnectGreen project and to implement the BISON recommendations.

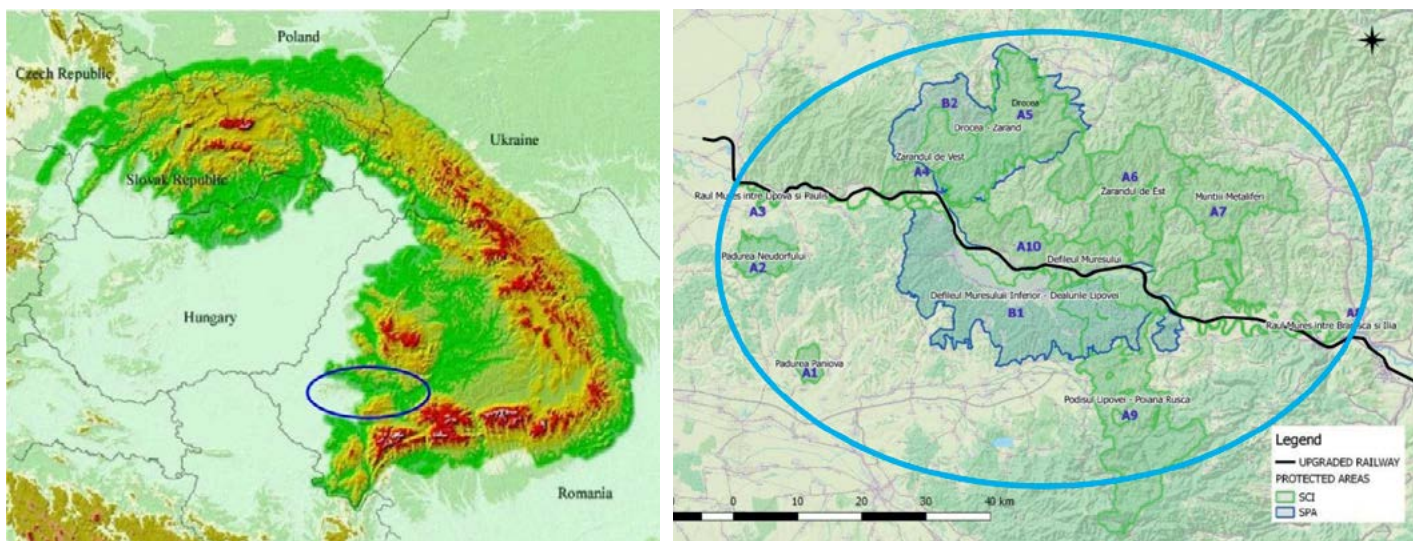


Figure 1 Left: General location of the Arad-Deva pilot-area in the Carpathians range; Right: the Natura 2000 sites in the pilot-area

2.2. The Natura 2000 sites in the pilot-area

NAME and CODE of protected area	Type	Code on Map 1
ROSCI0338 Padurea Paniova	SCI	A1
ROSCI0337 Padurea Neudorfului	SCI	A2
ROSCI370 Raul Mures intre Lipova si Paulis	SCI	A3
ROSCI0407 Zarandul de Vest	SCI	A4
ROSCI0070 Drocea	SCI	A5
ROSCI0406 Zarandul de Est	SCI	A6
ROSCI0325 Muntii Metaliferi	SCI	A7
ROSCI0373 Raul Mures intre Branisca si Ilia	SCI	A8
ROSCI0355 Podisul Lipovei-Poiana Rusca	SCI	A9
ROSCI0064 Defileul Muresului	SCI	A10
ROSPA0029 Defileul Muresului Inferior-Dealurile Lipovei	SPA	B1
ROSPA117 Drocea-Zarand	SPA	B2
Padurea Pojoga	National	-
Balta Soimos	National	-

2.3. Species which could be affected by transport infrastructure in the Arad-Deva pilot-area (Natura 2000 species in Romania)

Group/type of species	Species
Large carnivores	Brown bear (<i>Ursus arctos</i>), Grey wolf (<i>Canis lupus</i>), Eurasian lynx (<i>Lynx lynx</i>), Golden jackal (<i>Canis aureus</i>)
Large herbivores	Red deer (<i>Cervus elaphus</i>) Wild-boar (<i>Sus scrofa</i>)
Medium-size mammals	Roe deer (<i>Capreolus capreolus</i>), Red fox (<i>Vulpes vulpes</i>), European otter (<i>Lutra lutra</i>) , Eurasian beaver (<i>Castor fiber</i>), European badger (<i>Meles meles</i>), European wildcat (<i>Felis silvestris</i>), European hare (<i>Lepus europaeus</i>), beech marten (<i>Martes foina</i>), European pine marten (<i>Martes martes</i>)
Small size mammals	Red squirrel, polecat, hedgehog, stoat, least weasel, dormice, Common Vole
Bats	Greater mouse-eared bat (<i>Myotis myotis</i>), Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>), Barbastelle (<i>Barbastella barbastellus</i>)
Birds	Northern goshawk (<i>Accipiter gentilis</i>), Common kingfisher (<i>Alcedo atthis</i>), lesser spotted eagle (<i>Aquila pomarina</i>), Eurasian eagle-owl (<i>Bubo bubo</i>), common buzzard (<i>Buteo buteo</i>), European nightjar (<i>Caprimulgus europaeus</i>), White stork (<i>Ciconia ciconia</i>), Black stork (<i>Ciconia nigra</i>), Short-toed snake eagle (<i>Circaetus gallicus</i>), Western marsh harrier (<i>Circus aeruginosus</i>), Hen harrier (<i>Circus cyaneus</i>), Corncrake (<i>Crex crex</i>), White-backed woodpecker (<i>Dendrocopos leucotos</i>), Middle spotted woodpecker (<i>Dendrocopos medius</i>), Syrian woodpecker (<i>Dendrocopos syriacus</i>), Black woodpecker (<i>Dryocopus martius</i>), Merlin (<i>Falco columbarius</i>), Collared flycatcher (<i>Ficedula albicollis</i>), Red-breasted flycatcher (<i>Ficedula parva</i>), Booted eagle (<i>Hieraetus pennatus</i>), Common little bittern (<i>Ixobrychus minutus</i>), Red-backed shrike (<i>Lanius collurio</i>), Lesser grey shrike (<i>Lanius minor</i>), Wood lark (<i>Lullula arborea</i>), European honey buzzard (<i>Pernis apivorus</i>), Grey-headed woodpecker (<i>Picus canus</i>), Ural owl (<i>Strix uralensis</i>), Barred warbler (<i>Sylvia nisoria</i>), Wood sandpiper (<i>Tringa glareola</i>), Eurasian hoopoe (<i>Upupa epops</i>).
Reptiles and Amphibians	Great crested newt (<i>Triturus cristatus</i>), Smooth newt (<i>Lissotriton vulgaris ampelensis</i>), Yellow-bellied toad (<i>Bombina variegata</i>), Red-bellied toad (<i>Bombina bombina</i>), European pond turtle (<i>Emys orbicularis</i>), Fire Salamander (<i>Salamandra salamandra</i>), Rana temporaria, (<i>Salamandra salamandra</i>), common toad (<i>Bufo bufo</i>), green toad (<i>Bufo viridis</i>), common spadefoot (<i>Pelobates fuscus</i>), European tree frog (<i>Hyla arborea</i>), common frog (<i>Rana temporaria</i>), agile frog (<i>Rana dalmatina</i>), marsh frog (<i>Pelophylax ridibundus</i>), green lizard (<i>Lacerta viridis</i>), sand lizard (<i>Lacerta agilis</i>), common lizard (<i>Zootoca vivipara</i>), slow-worm (<i>Anguis colchica</i>), Aesculapian snake (<i>Zamenis longissimus</i>), grass snake (<i>Natrix natrix</i>), smooth snake (<i>Coronella austriaca</i>), adder (<i>Vipera berus</i>).
Fish	Danube whitefin gudgeon (<i>Romanogobio vladkov</i>), Sichel (<i>Pelecus cultratus</i>), Striped ruffe (<i>Gymnocephalus schraetser</i>), Danube ruffe (<i>Gymnocephalus baloni</i>), Asp (<i>Aspius aspius</i>), Romanian barbel (<i>Barbus petenyi</i>), Amur bitterling (<i>Rhodeus amarus</i>), Golden spined loach (<i>Sabanejewia balcanica</i>), Spined loach (<i>Cobitis taenia</i>), White-finned gudgeon (<i>Romanogobio albipinnatus</i>), Kessler's gudgeon (<i>Romanogobio kessleri</i>), Weatherfish (<i>Misgurnus fossilis</i>), Streber (<i>Zingel streber</i>), Common zingel (<i>Zingel zingel</i>).
Carabids	<i>Rosalia alpina</i>, <i>Cerambyx cerdo</i>, <i>Lucanus cervus</i>, <i>Morimus funereus</i>, <i>Carabus variolosus</i>
Mollusca	<i>Unio crassus</i>
Invasive species	<i>Amorpha fruticosa</i> etc.

2.4. Relationship with other EU-funded projects:

Project	Funded by	Status	Relevant Actions	Relation with SaveGREEN
TRANSGREEN	DTP2	Finished	Catalogue of measures	To be used in Operational Plans
			Monitoring	To be continued and extended
			Stakeholders engagement and capacity building	To be continued
COREHABS	SEE	Finished	Modelling and validation of corridors	To be used
			Barrier mapping	To be used
Connect Carpathians	EU LIFE Nature+	Finished	Sectoral objectives and conservation measures for bear and wolf, approved by the Ministry of Environment	To be operationalized > Operational Plans
			Monitoring	To be continued and extended
			Conflict mitigations with large carnivores	?
ConnectGreen	DTP2	On-going	Mapping of corridors for large carnivores	To be used
			Monitoring of Large Carnivores	To be used and extended
			Spatial planning	To be integrated
BISON	Horizon	On-going	Updated IENE Handbook Wildlife Traffic	To be used

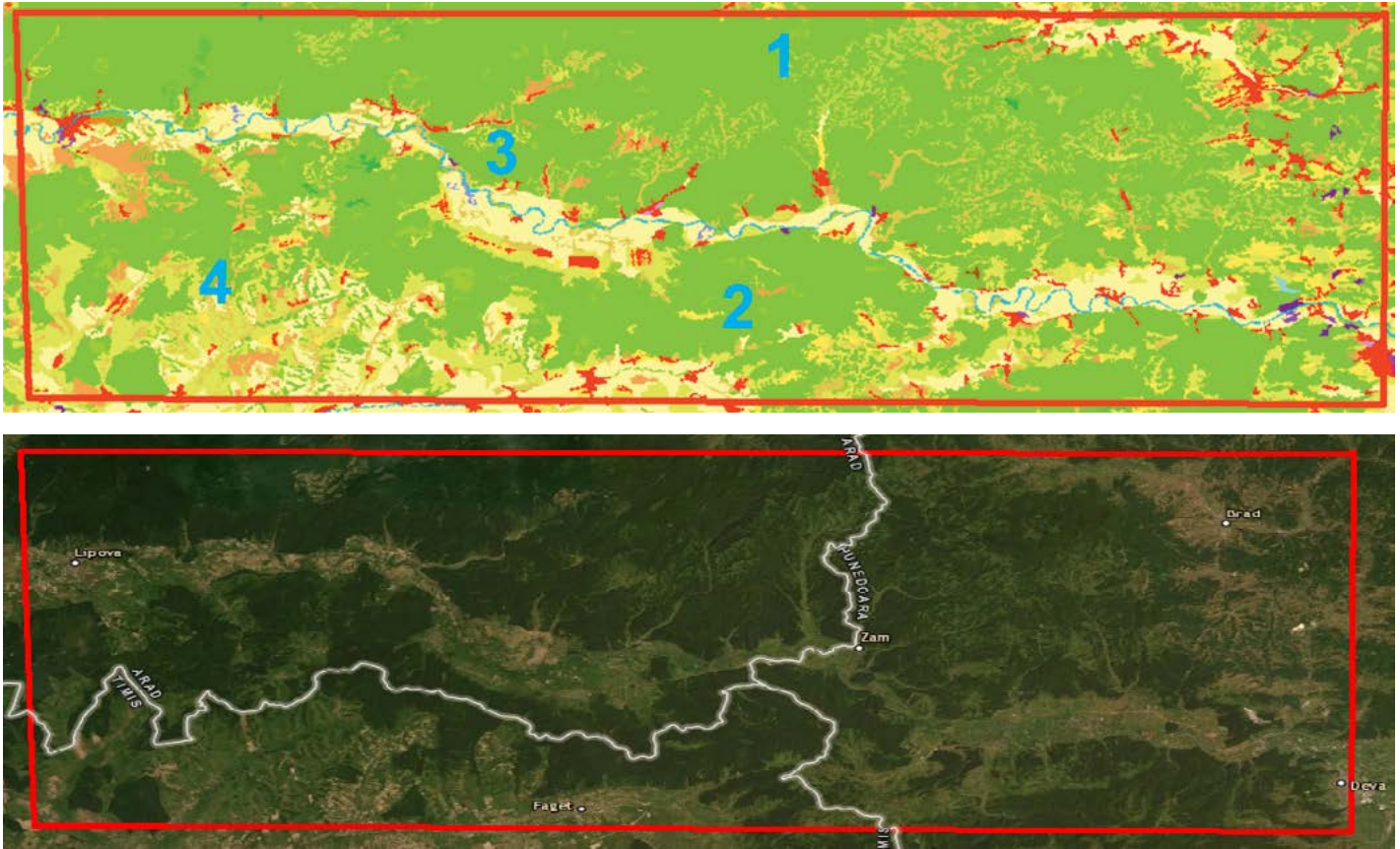


Figure 2 In the northern and southern (areas 1 and 2) part of the Rumanian pilot area, the CORINE LC class “31 – Forests” is the dominant land cover type and forms the landscape matrix in these parts of the Rumanian pilot area. These areas are very homogenous and only a few and small patches of CORINE LC class 23 – Pastures and 11 – Urban fabric occur. From the east to the south, these two large forest areas are crossed by a landscape (area 3) where the CORINE LC class “21- Arable land” is the characteristic land cover and defines the landscape matrix. Within this landscape area, larger settlements and land cover patches of the CORINE LC class 23- Pastures appear. Area 4 is characterized by CORINE LC class “23 Pastures” that are closely interlocked with arable land use classes (CORINE Class “21 – Arable land”). Pastures act as landscape matrix within this “grassland dominated agricultural complex landscape”.

2.5. Description of the landscape elements

The Arad-Deva is a large pilot area with a mix of habitats and land uses.

A number of study-areas have been defined within the pilot area, in order to focus on the future activities in critical locations where transport infrastructure does already or will impact the functionality of the bio-corridor.

2.6. List of the main linear infrastructures that require attention during SaveGREEN

- » Lugo-Deva Motorway (A1)
- » Arad-Deva Upgraded railway
- » European Roads E68 & E68A
- » County roads
- » Mures River
- » Tributaries of Mures Rives
- » Power lines



Figure 3 Aerial view of the pilot area with the A1 motorway and the E68A road (© Zarand)

2.7. List of Sectors to be addressed in SaveGREEN

- » Transport (motorway, railways, roads)
- » Agriculture (wide range of aspects – intensification, abandonment, land-use change, degradation/invasive species, fire)
- » Forestry (state and private ownership)
- » Hunting and human-wildlife conflicts (different management types)
- » Water management (both major river and small tributaries but also important for agriculture)
- » Natura 2000 sites (different stages of management implementation)

2.8. Group of species relevant for SaveGREEN monitoring plan

- » Mammals (bats, ungulates, carnivores)
- » Reptiles
- » Amphibians
- » Fish
- » Invertebrates

CHAPTER 3

Logframe

CROSS-SECTORAL OPERATIONAL PLAN FOR THE ARAD-DEVA PILOT-AREA:



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THREAT/PRESSURE 1: New infrastructure projects may increase the barrier effect

Objective 1.1. Ensure the functionality of underpasses

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1a. The designed sizes of objects (culverts, bridges) are being reduced during the design & build approach, in order to reduce costs. As a result, in reality, the fragmentation impact becomes higher compared with the assessment based on the initial design plans.</p> <p>p1b: There is no overall monitoring programme addressing the functionality of all underpasses</p>	<p>1.1.1. All potentially-functional underpasses are included in the environment permits as wildlife-crossing structures</p>	<p>a. Assess and include all connectivity-relevant objects into the environmental permits;</p> <p>b. Specify this requirement within the EIA /EA procedures;</p> <p>c. Abandon design & build approach in favour of producing detailed final technical plans that will be followed by building contractors and monitored by environmental authorities;</p> <p>d. Classify the suitability of underpasses for different species-groups;</p> <p>e. Design and develop an overall monitoring plan (<i>standards, protocols, guidelines, responsibilities, tasks, infrastructure, budgets, database, reports</i>) for infrastructure which will include object-based monitoring protocols;</p> <p>f. Include the monitoring actions within the Natura 2000 management plans of ROSCI370 Raul Mures intre Lipova si Paulis, ROSCI0407 Zarandul de Vest, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0064 Defileul Muresului, ROSCI0373 Raul Mures intre Branisca si Ilia.</p>	-
<p>p2a. There is little experience in Romania in adjusting constructive details of objects in order to increase their functionality for wildlife.</p> <p>p2b. The main wildlife underpass on the missing motorway section is designed as a two-opening structure (not one);</p>	<p>1.1.2. Design and constructive specification are adjusted in order to maximize the functionality of underpasses</p>	<p>a. Develop guidelines on functionality of underpasses;</p> <p>b. Discuss the case of the wildlife underpass in the missing sector of the motorway for maximizing the Openness Index;</p>	-

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p3a. Many underpasses are blocked by fences and other elements;</p> <p>p3b. Many water passageways are acting as barriers or traps for aquatic and semi-aquatic species, at least over some periods of the year.</p>	<p>1.1.3. Structural barriers on objects, including for those not designed primarily as wildlife-crossing structures, are avoided/removed</p>	<p>a. Develop an intervention programme (linked with the monitoring programme) aiming to maintain/enhance the functionality of underpasses;</p> <p>b. Include the measure within the Natura 2000 management plans of ROSCI370 Raul Mures intre Lipova si Paulis, ROSCI0407 Zarandul de Vest, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0064 Defileul Muresului;</p> <p>c. Document the impact of the measure as part of the object-based monitoring protocol, included in the overall infrastructure monitoring programme.</p>	-
<p>p4. There is little experience in Romania regarding the integration of wildlife underpasses in landscape, in order to increase their functionality for wildlife.</p>	<p>1.1.4. Underpasses are included into the surrounding green infrastructure</p>	<p>a. Develop guidelines on landscaping and build capacity through know-how exchange;</p> <p>b. Include landscaping into EIA/AA procedures and environmental permits, including the request to connect the underpasses with the existing green infrastructure;</p> <p>c. Include the measure within the Natura 2000 management plans of ROSCI370 Raul Mures intre Lipova si Paulis, ROSCI0407 Zarandul de Vest, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0064 Defileul Muresului;</p> <p>d. Develop pilot-projects focusing on specific management/restoration of green infrastructure to maximize the functionality of underpasses on the Curtici-Simeria railway, Lugoj-Deva motorway and other infrastructure projects through landscaping.</p>	-
<p>p5. Noise and light pollution may impact the functionality of wildlife underpasses.</p>	<p>1.1.5. Design and constructive details are adapted to mitigate noise and artificial lighting impacts (if the case)</p>	<p>a. Develop guidelines on noise/light pollution mitigation and build capacity through know-how exchange;</p> <p>b. Include noise/light mitigation related to important objects within the EIA/AA procedures and environmental permits;</p> <p>c. Include noise/light mitigation related to important objects as a measure within the Natura 2000 management plans of ROSCI370 Raul Mures intre Lipova si Paulis, ROSCI0407 Zarandul de Vest, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0064 Defileul Muresului, ROSPA0029 Defileul Muresului Inferior-Dealurile Lipovei;</p> <p>d. Identify critical locations;</p> <p>e. Develop pilot-projects focusing on noise/light mitigation to maximize the functionality of objects on the Curtici-Simeria railway, Lugoj-Deva motorway and other infrastructure projects.</p>	

Objective 1.2. Ensure the functionality of overpasses

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1. During the construction phase, the functionality of the corridor may be impacted significantly</p>	<p>1.2.1. The permeability of the terrain on top of tunnels is maintained during the construction</p>	<p>a. Develop guidelines on functionality of overpasses – while maintaining the permeability of tunnel tops during the construction and build expert capacity through know-how exchange;</p> <p>b. Include specific requests (based on guidelines) concerning the permeability of tunnel tops into the EIA/AA procedures and environmental permits;</p> <p>c. Include the permeability of tunnel tops as a measure within the Natura 2000 management plans of ROSCI0064 Defileul Muresului, ROSCI0355 Podisul Lipovei-Poiana Rusca Natura 2000 sites;</p> <p>d. Include the monitoring of connectivity-relevant features as part of the tunnel-top management.</p>	<p>-</p>
<p>p2. There are no plans in place to manage the surface of the green bridges and tunnel-top surface in order to maximize their functionality for wildlife</p>	<p>1.2.2. Green bridges (including tunnel-top surface) are being managed in order to maximize their functionality for wildlife</p>	<p>a. Check the legal status of land parcels;</p> <p>b. Produce suitability models for relevant species as support for management plans;</p> <p>c. Produce management plans for overpasses;</p> <p>d. Develop guidelines on management of the green bridges and build expert capacity through know-how exchange;</p> <p>e. Include the green-bridges top-area management into the EIA/AA procedures and environmental permits;</p> <p>f. Include the management and monitoring as a measure within the Natura 2000 management plans of ROSCI0064 Defileul Muresului, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0373 Raul Mures intre Branisca si Ilia Natura 2000 sites;</p> <p>g. Develop procedures/legislation related to human access to the green-bridges and tunnels and enforce regulations, including the Natura 2000 regulations in ROSCI0064 Defileul Muresului, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0373 Raul Mures intre Branisca si Ilia Natura 2000 sites;</p> <p>h. Develop pilot-projects focusing on specific management/maintenance and monitoring on green-bridges and tunnels of the Lugoj-Deva motorway and Arad-Curtici railway as key elements of the green infrastructure, in order to maximize their functionality and expand local experience.</p>	<p>-</p>

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p3. There are no plans set to integrate the surface of the green bridges (including tunnel-top surface) within the surrounding landscape</p>	<p>1.2.3. Overpasses are included into the surrounding green infrastructure</p>	<p>a. Develop guidelines on landscaping and build expert capacity through know-how exchange; b. Include landscaping into EIA/AA procedures and environmental permits; c. Include landscaping as a measure within the Natura 2000 management plans of ROSCI0064 Defileul Muresului, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0373 Raul Mures intre Branisca si Ilia Natura 2000 sites; d. Develop pilot-projects focusing on specific management/restoration of green infrastructure to maximize functionality of green-bridges on Lugoj-Deva motorway through landscaping, including long-term lease/acquisition of land for conservation.</p>	
<p>p4. The Branisca motorway green-bridge leads wildlife into the DJ 706A county road, as there was no integrated solution being adopted</p>	<p>1.2.4. A solution to mitigate the DJ 706A county road at the Branisca motorway green-bridge is agreed and implemented</p>	<p>a. Discuss potential solutions for the DJ 706A, based on the existing know-how; b. Develop a project to implement the solution.</p>	
<p>p5. During construction of tunnels, embankments of the county roads became steeper and increased the overall barrier, making the tunnels on the railway less functional</p>	<p>1.2.5. The permeability of adjacent roads DJ 707A and DJ 63 is maintained during the construction of railway tunnels or restored afterwards</p>	<p>a. Develop an intervention plan with a railway company and railway constructors; b. Develop an intervention plan with county road companies; c. Develop a pilot-project to support adaptations/restoration work.</p>	
<p>p6. The Cosevita junction was built as a complementary solution for connecting the motorway with the existing European road (TBD)</p>	<p>1.2.6. A solution for the Cosevita motorway junction after completion of the motorway sector will be discussed</p>	<p>a. Agree on a plan to address the junction after the motorway completion; b. Develop a pilot-project to support potential decommissioning or restoration work, if the case.</p>	

Objective 1.3. Assign a legal status and develop coherent regulations for wildlife passages

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. The wildlife passing structures have no legal status in line with their critical ecological role – nor in the spatial planning, sectoral management or within the green infrastructure	1.3.1. The important passing structures (tunnels, green-bridges, bridges, viaducts, underpasses) are included in a dedicated register and into spatial and sectoral plans, mentioning their (primary or secondary) functions for connectivity	<ul style="list-style-type: none"> a. Map the Green Infrastructure elements and assess them in relation to land-use categories and sectoral plans; b. Assess wildlife passages/permeable sectors, assign ecological roles, and draft a dedicated register; c. Agree specific sets of measures included in the spatial planning and sectoral management plans. d. Implement demonstrative harmonization of Green infrastructure with land-use and sectoral plans and develop guidelines; e. Develop and implement upscaling projects. 	
p2. Wildlife passing structures or permeable sectors are not included in the Natura 2000 management as having a critical ecological role	1.3.2. Important passing structures (tunnels, green-bridges, bridges, viaducts, other large underpasses) and important permeable sectors of linear features are included in the Natura 2000 management plans with assigned measures for the land management, usage regulations and monitoring	<ul style="list-style-type: none"> a. Develop guidelines and implement the Natura 2000 sites specific conservation measures and regulations in order to maintain/enhance functionality; b. Integrate conservation measures and regulations into the updated Natura 2000 management plans; c. Integrate conservation measures, regulations and monitoring into coherent operational plans for regional action plans (i.e. the bear & wolf regional action plans of LIFE LCC); d. Develop projects to implement measures, regulations and monitoring in the Natura 2000 sites; e. Produce the EIA/AA guidelines related to permeability. 	

Objective 1.4. Increase the permeability of railway embankments

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. The environmental permit requires adaptation of rock-bed embankments for ungulates, by way of grass instalment. At this point it is unclear if and what kind of interventions are necessary, as the railway is not yet built, but respective sectors should be selected where to be used by species and where accidents could be easier to avoid (i.e. sectors with high visibility); complementary solutions may be implemented – signalling, detectors etc.	1.4.1. Railway embankments are adapted for ungulate passage, in sound-defined sectors and in conjunction with accident-avoidance measures	<ul style="list-style-type: none"> a. Identify the existing case studies and technological solutions; b. Identify and monitor potential sectors after railway construction has been completed; c. Implement embankment restoration solutions with natural/indigenous grass vegetation, in conjunction with... d. ... Accident-avoidance measures and monitoring procedures; e. Develop best-practice guidelines. 	

THREAT/PRESSURE 2: Structural interventions on the existing transport and other linear infrastructure (TLI)

(maintenance, upgrading without changing the category/class of the infrastructure etc.)

and on other linear features may increase the barrier effect at landscape level.

Objective 2.1. Maintain permeability of the existing transport infrastructure, including enhancement of permeability of existing features when possible

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1. Road and environmental authorities do not have access to a database/ map of important (permeable) road sectors and objects.</p>	<p>2.1.1. Transport and environmental authorities are aware of important (permeable) sectors</p>	<p>a. Continue the mapping of infrastructure, including sectors under construction; b. Develop classification formulas for other species groups and ground-proofing of results; c. Include the infrastructure permeability maps in the GreenWeb GIS database; d. Align GIS maps with road authority database; e. Facilitate authorities' usage of GreenWeb database and platform; f. Implement periodic mapping of infrastructure (with higher frequency in critical points), assess changes and inform responsible authorities (<i>as part of an integrated monitoring programme</i>).</p>	
<p>p2. Road and environmental authorities do not have access to guidelines on design and building of technical solutions to maintain or increase permeability of the existing infrastructure during upgrading/ maintenance interventions.</p>	<p>2.1.2. Responsible environment, road/rail authorities and designers/ constructors are aware of problems and solutions for mitigating fragmentation during upgrading/ maintenance interventions</p>	<p>a. Develop specific guidelines and build expert capacity through knowledge exchange.</p>	

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p3. There are examples when the upgrading/modernizations of transport infrastructure projects were not subject to the AA procedures and, as a result, the fragmentation impact was significant.</p>	<p>2.1.3. Structural interventions (upgrading/modernization etc.) are subject to the AA procedures</p>	<p>a. Include technical solutions into the EIA/AA procedures and environmental permits, inclusively as measures to restore the permeability of the existing barriers when new barriers could not be avoided;</p> <p>b. Include technical solutions linked with measures within the Natura 2000 management plans of ROSCI370 Raul Mures intre Lipova si Paulis, ROSCI0407 Zarandul de Vest, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0064 Defileul Muresului, ROSCI0373 Raul Mures intre Branisca si Ilia.</p>	
<p>p4. A series of underpasses of the existing roads are blocked by alluvial material, dense vegetation or anthropogenic debris/waste.</p>	<p>2.1.4. A maintenance programme is set in place to implement interventions aiming to maintain/restore/enhance permeability</p>	<p>a. Include connectivity-focused periodic maintenance of road/rail object;</p> <p>b. Develop pilot-projects focusing on concrete maintenance of the existing infrastructure in order to maintain or increase the permeability and to produce best-practices/procedures/standards in collaboration with road, rail, water, Natura 2000 administrations and NGOs;</p> <p>c. Develop a permanent monitoring programme linked with object-database (as part of an integrated monitoring programme).</p>	<p>In some cases, watercourses have eroded under the culvert beds and, therefore, the connectivity for aquatic species has been affected.</p>

Objective 2.2. Maintain the permeability of the Mures River banks at current level

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1. Water-management and environmental authorities do not have access to a database/map of the important Mures banks (permeable) sectors and objects.</p>	<p>2.2.1. Water-management and environmental authorities are aware of the Mures banks permeable sectors</p>	<p>a. Include the river permeability maps in the GreenWeb GIS database;</p> <p>b. Align the GIS maps with water authority database;</p> <p>c. Facilitate authorities' usage of GreenWeb database and platform;</p> <p>d. Implement periodic mapping of river banks (with higher frequency on critical points), assess changes and inform responsible authorities (<i>as part of an integrated monitoring programme</i>).</p>	

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p2. Water and environmental authorities have limited experience in designing and implementing nature-based flood-preventing solutions.	2.2.2. Water-management authorities/designers and constructors are informed about technical solutions for implementing nature-based flood-preventing solutions and other interventions; they are prioritising “green” alternatives	a. Map the permeability of tributaries; b. Develop guidelines on nature-based/“green” management solutions; c. Include technical solutions linked with measures within the Natura 2000 management plans of ROSCI370 Raul Mures intre Lipova si Paulis, ROSCI0407 Zarandul de Vest, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0064 Defileul Muresului, ROSCI0373 Raul Mures intre Branisca si Ilia. d. Develop pilot-projects to implement solutions as case-studies/good-practice experiences.	
p3. Transversal connectivity is not a topic addressed by the AA procedures, and structural interventions are usually linked to flooding prevention and considered as overriding biodiversity objective.	2.2.3. Structural interventions on river banks are subject of the AA procedures	a. Include technical solutions in the EIA/AA procedures and environmental permits; b. Include technical solutions linked with measure within the Natura 2000 management plans of ROSCI370 Raul Mures intre Lipova si Paulis, ROSCI0407 Zarandul de Vest, ROSCI0355 Podisul Lipovei-Poiana Rusca, ROSCI0064 Defileul Muresului, ROSCI0373 Raul Mures intre Branisca si Ilia.	

Objective 2.3. Maintain/increase longitudinal permeability of the Mures River and of its tributaries

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Longitudinal connectivity is becoming more critical in the context of climate-change effects – droughts and flooding –; therefore, the impact of potential barriers (dams, undersized culverts, bridges) needs to be assessed and an intervention/defragmentation programme needs to be designed.	2.3.1. All barriers are identified and an intervention/defragmentation programme is set in place	a. Map, document and prioritize intervention points; b. Develop guidelines on removing barriers and build the expert capacity through knowledge exchange; c. Develop pilot-projects to implement solutions as case-studies/good-practice; d. Monitor the impacts of the implemented solutions.	The Mintia dam is blocking the migration of fish on the Mures River and a mitigation solution needs to be agreed on and implemented.

Threat 3: Linear transport infrastructures (including electric power lines) cause wildlife mortalities

Objective 3.1. Implement an adequate fencing system on motorways & high-speed railways, including escape gates

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1. For some sections of the Lugoj-Deva motorway, the environmental permit requested special bear-proof fence; however, as the bear incidents on motorways have become more frequent, there is a need to assess the importance of a potential extension of the bear-proof fencing. In addition, it is important to add escape gates for mammals which entered the motorways.</p>	<p>3.1.1. An adequate fencing system including escape gates is implemented</p>	<p>a. Implement bear-proof fence solutions requested by environmental permit for the Lugoj-Deva; b. Assess other risk-areas and implement bear-proof fence solutions; c. Identify sectors which require fencing on railways (for increasing the usage of safe-passages and for preventing accidents) d. Develop pilot-projects to improve the fencing system, implement escape-gates solutions.</p>	
<p>p2. Due to degradation of the existing fences, there are a lot of incidents with wildlife and domestic animals entering the motorways.</p> <p>Other high-risk areas are the junction areas where animals can enter the motorways; therefore, the extension of proper fencing and escape-gates should be implemented here as well.</p>	<p>3.1.2. A regular programme of fences assessment and repairing is implemented</p>	<p>a. Collect data and make use of the database of accident/incidents/high risk-sectors; b. Implement a fencing assessment programme which will inform of regular repairing/upgrading/extension of fences; c. Assess other risk-areas and implement proper fencing solutions in junction areas; d. Develop pilot-projects to mitigate junction areas and affected fences.</p>	

Objective 3.2. Direct animals towards functional underpasses

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. For unfenced infrastructure (national roads, railways), the possibility for wildlife to cross embankments is still present. As discussed, the priority would be to make so many functional underpasses that the collision risk would be minimized. The fencing sectors where functional underpasses are located will increase the chance for medium/large-sized mammals to use those underpasses.	3.2.1. Fencing areas above the functional underpasses for medium/large mammals is being considered	<ul style="list-style-type: none"> a. Implement solutions requested by environmental permits; b. Map traffic kill sectors significant for amphibians and reptiles; c. Develop pilot-project to identify important areas for amphibians/reptiles/small-size animals and high mortality risk zones; d. Implement solutions on the railway, roads and motorway. 	
p2. A system of guiding elements for amphibians, reptiles and small mammals is not in place	3.2.2. A dedicated system of solutions to guide amphibians, reptiles and small mammals towards functional underpasses is set in place for motorway, railway and roads	<ul style="list-style-type: none"> a. Implement solutions requested by environmental permits; b. Map traffic kill sectors significant for amphibians and reptiles; c. Develop pilot-project to identify important areas for amphibians/reptiles/small-size animals and high mortality risk zones; d. Implement solutions on the railway, roads and motorway. 	

Objective 3.3. Warning drivers on road-kill-/accident-prone areas

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. The high-risk areas are not being regularly assessed and identified based on robust data collections. The completion of motorway will affect the traffic in the area and may affect the location of the road-kill/accident-prone sectors.	3.3.1. Efficient warning signs are installed in accident-prone areas on roads	<ul style="list-style-type: none"> a. Extend data collection and identification of high-risk areas on roads; b. Develop pilot-project to implement traffic signs in high-risk areas; c. Monitor the reaction of drivers to the classic traffic warning signs. 	
p2. The classic warning signs may not trigger the expected reaction from drivers as they get used to them in time. In this respect, new type of signs or detectors should be tested.	3.3.2. New types of warning devices, including automatic animal detectors on roads are being tested and implemented	<ul style="list-style-type: none"> a. Monitor the efficiency of classic and alternative traffic signs; b. Develop pilot-project to implement alternative traffic signs; c. Test and implement automatic animal-detectors. 	

Objective 3.4. Warning train conductors on rail-kill/accident-prone areas

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1. The potential high-risk sectors (low-visibility sectors, at entrances/exits of tunnels and long bridges) needs to be assessed and mitigated. Therefore, the measures under this objective correlate with the complementary ones addressing visibility etc.</p> <p>The signals may be classic (physical signs along the railway) or may be automatic warning signals inside the locomotive when approaching high-risk sectors.</p>	<p>3.4.1. Efficient warning signs are installed in accident-prone areas on railway</p>	<p>a. Develop pilot-project to collect data, implement warning signs based on expertise-exchange and monitor the impact of measures.</p>	
<p>p2. As the railway will not be fenced, the risk of collision with medium-/large-sized animals is present along the entire alignment.</p>	<p>3.4.2. New type of warning devices (i.e. automatic animal detectors) are being tested and implemented, if proved to be efficient</p>	<p>a. Develop pilot-project to test and implement new type of warning devices (i.e. automatic animal detectors) based on expertise-exchange and monitor the impact of measures.</p>	

Objective 3.5. Prevent accidents caused by mammals entering in railway tunnels or long bridges

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1. Large/medium-sized animals entering the railway tunnels or bridges on the Mures River represent a very high-risk situation, which can lead to rail accidents. To prevent this, fences with escape gates may have to be installed at entrances/exits of tunnels and bridges.</p>	<p>3.5.1. Fencing sectors at entrance/exit of tunnels/bridges with escape gates is being assessed and implemented, if needed</p>	<p>a. Design solutions and specifications for fencing, based on expertise exchange;</p> <p>b. Develop pilot-project to implement solutions on the railway.</p>	
<p>p2. As fencing (measure 3.5.1.) does not ensure 100% prevention, complementary solutions are necessary to alert either animals/people of approaching trains, or the train conductors of animals/people being inside tunnels or on bridges.</p>	<p>3.5.2. Automatic sound/light warning signals when trains are approaching tunnels or bridges are being assessed and implemented, if needed</p>	<p>a. Design detectors/automatic sound/light warning signals solutions based on the expertise exchange;</p> <p>b. Develop pilot-project to implement solutions on the railway.</p>	

Objective 3.6. Increase drivers/conductors visibility on roads/railways

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1. The role of the verges is important, complex and their functionality depends on the structure, type and frequency of interventions. Therefore, clear and coherent management measures should be designed and implemented.</p>	<p>3.6.1. An adequate management of verges in implemented on roads and railways</p>	<p>a. Develop guidelines and norms for verge management based on exchange of expertise; b. Include guidelines and norms in the sectoral policies, norms and practices (transport, agriculture, forestry, water, conservation); c. Develop pilot-project to implement verge management.</p>	

Objective 3.7. Implement special measures to avoid bird mortalities

(power lines, noise barriers impact)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1. Power lines represent a risk of bird mortalities, but the impact is not fully addressed in Romania. Railway electric lines are considered to have a lower impact; however, mitigation measures have already been implemented in different countries.</p>	<p>3.7.1. Bird mortalities avoidance solutions for power lines are implemented</p>	<p>a. Develop guidelines for power lines mitigation solutions; b. Include power line-related bird mortality in regular monitoring; c. Develop pilot-project to implement power lines mitigation solutions.</p>	
<p>p2. Suboptimal implementation of noise-barriers on motorways may lead to bird mortalities due to collision with transparent walls.</p>	<p>3.7.2. Adequate solutions for preventing collisions with motorway acoustic panels is being addressed</p>	<p>a. Develop guidelines for power lines mitigation solutions; b. Include power line-related bird mortality in regular monitoring; c. Develop pilot-project to implement power lines mitigation solutions.</p>	

Objective 3.8. Implement special measures to avoid bats mortalities

(artificial light impact)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Certain bat species have adapted to hunting for insects around artificial lights, and this may increase the risk of collisions on motorways. In Romania the impact was not studied.	3.8.1. Adequate solutions for safe for bats lighting is implemented on motorway	<ul style="list-style-type: none"> a. Identify critical areas on the Lugoj-Deva motorway and the technical specifications for bat-safe lighting; b. Include lighting-related bats mortality in regular monitoring; c. Develop pilot-project to implement lighting mitigation solutions and to develop good-practices. 	Several studies proposed changes in light spectrums as mitigation measures.

Objective 3.9. Implement special measures to avoid amphibians & reptiles mortalities

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Temporary water ponds associated with infrastructure gutter systems are attractive for some amphibians and reptile species but may become mortality traps as water quickly dries, is polluted or when gutters are cleaned during maintenance.	3.9.1. Sensitive water/gutter management is implemented	<ul style="list-style-type: none"> a. Develop and implement norms/standards for gutter construction and maintenance; b. Include gutter monitoring into the regular monitoring programme; c. Harmonize maintenance with species conservation/Natura 2000 management – in terms of resources allocated and solutions (safe ponds for relocation etc.); d. Develop pilot-project to implement conscious water/gutter management solutions and develop good-practices. 	

Objective 3.10. Collect and process data to identify incident-/accident-critical sectors on roads, motorways and railways

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Currently, there are no officially accepted coherent procedures of collecting traffic-kill data on railways and motorways and, thus, there is no assessment of black spots and investigation of causes in order to prevent further incidents.	3.10.1. A standardized mobile app for professional monitoring is developed, information is being collected and provides the relevant database with records regarding incidents on roads, motorways and railways	<ul style="list-style-type: none"> a. Develop methodologies, a mobile app and a support database for official data collection and assessment based on the exchange of expertise; b. Develop pilot-projects to implement data collection and to develop best practices; c. Support building a data-base and produce assessment results; d. Develop country/regional/European scale projects with coherent data input. 	

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p2. Currently, there are a number of project-based data reporting the cases which are open to general public, but there is no operational open mobile-application aiming to collect data related with road-kills.</p>	<p>3.10.2. A traffic-kill mobile application for citizen-science is available and linked with a managed database</p>	<p>a. Develop a mobile app and support database for data collection and assessment based on the exchange of expertise; b. Develop pilot-projects to test and implement data collection and develop best practices; c. Promote the mobile app to drivers; d. Support building a database and produce assessment results; e. Develop country/regional/European scale projects with coherent data input.</p>	
<p>p3. Currently, there are no coherent procedures of collecting traffic-kill data from accidents reported to the police or insurance companies or from other authorities such as protected area managers, agencies, and game managers.</p>	<p>3.10.3. Data from police, insurance companies and other authorities (game managers, different agencies, ...) are synchronized</p>	<p>a. Develop protocols of collaboration and exchange of data; b. Develop pilot-projects to implement data collection and develop best practices; c. Support building a database and produce assessment results; d. Develop country/regional/European scale projects with coherent data input.</p>	

Objective 3.11. Create and/or train specialized teams to deal with wildlife-related incidents on motorways, railways, roads, including emergency interventions

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p1. Large (and medium size – i.e. the wild boar) mammals entering the motorway may lead to accident-prone situations and needs rapid and specialized interventions in order to stop the traffic, drive the animal towards an exit, tranquilize and relocate or even kill the animal in order to prevent human casualties.</p>	<p>3.11.1. Specialized teams are operational</p>	<p>a. Create a working group with motorway company and stakeholders in order to identify working scenarios; b. Draft integrated standard procedures and identify needs – resources, training, equipment, collaboration protocols with other authorities/the responsible ones; c. Expertise exchange with other countries; d. Develop and implement pilot-projects to create best-practices; e. Address legislation updating.</p>	

Objective 3.12. Develop and use an integrated database as decision-support tool to address traffic incidents (for implementing/adjusting measures to prevent wildlife traffic-kills/damage/human casualties)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. There is a lack of integrated data collection and integrated assessment to identify and understand the causes, the favouring factors and to adjust the existing measures or implement new ones in order to reduce traffic-related incidents.	<p>3.12.1. Collect and input all relevant data into an integrated database</p> <p>3.12.2. Identify, monitor and assess causes favouring black-secters</p> <p>3.12.3. Assess the impact of adjusted/new measures being implemented to prevent traffic-kills</p>	<p>a. Develop and support an integrated database, data-collection and validation protocols;</p> <p>b. Support studies to understand the dynamic of traffic-related incidents;</p> <p>c. Develop pilot projects to assess the impact of adjusted/new measures being implemented to prevent traffic-kills.</p>	

Threat 4: Changes of the land-use category may reduce landscape permeability

Objective 4.1. Enforce/update legislation preventing changes of land-use category towards less permeable categories (including compensatory measures targeting connectivity)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Although there exists the legislation to prevent reducing the area of permanent grasslands, it seems not to be applied/enforced.	4.1.1. Efficient legislation protecting permanent grasslands is enforced	<p>a. Develop reference maps of grassland with land-ownership & spatial planning maps/cadastre;</p> <p>b. Model the dynamic of changes;</p> <p>c. Develop a tool using free resources (Sentinel);</p> <p>d. Assess the triggers of changes and propose solutions;</p> <p>e. Inform responsible authorities about critical areas;</p> <p>f. Develop and implement reference projects to create best-practices;</p> <p>g. Facilitate update of the legislation;</p> <p>h. Enforce the legislation.</p>	

(potential) Problems	Proposed Measures / Targets	Actions	Notes
<p>p2. Although there exists the legislation to protect the forested areas outside forest, it is rather weak and not applied.</p>	<p>4.1.2. Efficient legislation protecting forested areas outside forest is set in place and enforced</p>	<ul style="list-style-type: none"> a. Develop reference maps of forested areas with land-ownership & spatial planning maps/cadastre; b. Present the dynamic of changes; c. Develop a tool using free resources (Sentinel); d. Assess the triggers of changes and propose solutions; e. Inform responsible authorities about critical areas; f. Develop and implement reference projects to create best-practices; g. Facilitate update of the legislation; h. Enforce the legislation & update the forest cadastre. 	
<p>p3. Legislation to protect (temporarily) wetlands, riparian vegetation and islands is weak and not applied.</p>	<p>4.1.3. Efficient legislation protecting wetlands, riparian vegetation and islands is set in place and enforced</p>	<ul style="list-style-type: none"> a. Develop reference maps of wetlands, riparian vegetation and islands with land-ownership & spatial planning maps/cadastre; b. Present the dynamic of changes; c. Develop a tool using free resources (Sentinel); d. Assess the triggers of changes and propose solutions; e. Inform responsible authorities about critical areas; f. Include islands and their channels as special protection zones for their critical roles in reproduction and early stage development of aquatic organisms; g. Develop and implement reference projects to create best-practices; h. Facilitate update of the legislation; i. Enforce the legislation. 	
<p>p4. Legislation to protect marginal habitats and other green infrastructure elements (trees, bushland) in agricultural land is weak and not applied.</p>	<p>4.1.4. Efficient legislation protecting green infrastructure elements in agricultural land is set in place and enforced</p>	<ul style="list-style-type: none"> a. Develop reference maps of green infrastructure elements in agricultural land with land-ownership & spatial planning maps/cadastre; b. Present the dynamic of changes; c. Develop a tool using free resources (Sentinel); d. Assess the triggers of changes and propose solutions; e. Inform the responsible authorities about critical areas; f. Develop and implement reference projects to create best-practices; g. Facilitate update of the legislation; h. Enforce the legislation. 	
<p>p3. The EIA/AA procedure does not consider the connectivity-related impacts of rock queries.</p>	<p>4.1.5. Rock queries sites & activities are being assessed for connectivity-impact part of the EIA/AA procedure</p>	<ul style="list-style-type: none"> a. Include connectivity-related objectives into the EIA/AA procedure; b. Develop guidelines. 	

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p4. The EIA/AA procedure is not applicable for gravel extraction activities.	4.1.6. Gravel extraction sites & activities are being assessed for connectivity-impact before being granted with environmental permits	<ul style="list-style-type: none"> a. Include connectivity-related objectives into the EIA/AA procedure; b. Develop guidelines. 	
p5. The EIA/AA procedure does not consider the connectivity-related impacts of development projects, temporary buildings or agricultural roads.	4.1.7. Development projects, temporarily buildings and agricultural roads are being assessed for connectivity-impact before being granted with environmental permits	<ul style="list-style-type: none"> a. Include connectivity-related objectives into the EIA/AA procedure; b. Produce guidelines on minimizing the impacts of agricultural roads (planning, building, maintenance); c. Communicate critical areas where building should be restricted; b. Relate with the Natura 2000 sites management and local authorities. 	

Objective 4.2. Facilitate/support changes of land-use category toward more permeable categories (i.e. through agricultural/Natura 2000 payments sensitive to connectivity)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Connectivity-important areas are not eligible for special agro-/conservation measures	4.2.1 Corridors/linkage areas are eligible for special agro-measures sensitive to green infrastructure	<ul style="list-style-type: none"> a. Explore future inclusion of corridors as eligible for special agro-/conservation measures; b. Relate with responsible authorities. c. Develop case-study projects to evaluate cost-benefits; d. Develop new special agro-schemes and guidelines; e. Update legislation; f. Upscale to pilot projects and monitor efficiency. 	
p3. There are no incentives for voluntary transformation of agricultural land into (semi) natural habitats within connectivity-important areas	4.2.2. Voluntary transformation of agricultural land into (semi-)natural habitats is supported	<ul style="list-style-type: none"> a. Explore future inclusion of corridors as eligible for renaturation measures; b. Relate with responsible authorities. c. Develop case-study projects to evaluate cost-benefits; d. Develop guidelines; e. Update legislation; f. Upscale to pilot projects and monitor efficiency. 	

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p4. Natura 2000 payments are not implemented	4.2.3. Natura 2000 payments sensitive to connectivity are set and implemented	<ul style="list-style-type: none"> a. Relate with responsible authorities. b. Develop case-study projects to evaluate cost-benefits; c. Develop guidelines; d. Develop Natura 2000 measures and payment schemes; e. Implement and monitor the schemes efficiency. 	

Threat 5a: Changes in land management – fencing* - may reduce landscape permeability

**This does not refer to fencing of transport infrastructures.*

Objective 5a.1. Set fencing regulations and promoting unfenced areas

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Permanent fencing is being constructed without permits or without environmental assessment	5a.1.1. Legislation on building permanent fencing is enforced	<ul style="list-style-type: none"> a. Develop a map with the existing permanent fences in critical areas; b. Inform responsible authorities; c. Assess permanent fencing impact during the EIA. 	
p2. There are no incentives for voluntary non-fenced zones within connectivity-important areas	5a.1.2. Voluntary unfencing zones are supported	<ul style="list-style-type: none"> a. Include in the guidelines for special agri-measures and renaturation in corridors with no permanent fencing. 	
p3. Regulation of fencing is not part of the Natura 2000 sites or corridor management or Natura 2000 payments	5a.1.3. Fencing-related measures are included into the Natura 2000 sites and corridor areas management & payments	<ul style="list-style-type: none"> a. Develop good practices and payment schemes; b. Assess permanent fencing impact during the AA. 	

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p4. Fencing of adjacent land to passageways on transport infrastructure is not considered as a problem to solve	5a.1.4. Agreements with landowners & compensatory payments are in place to secure non-fencing areas in close proximity of wildlife passageways (objects and sectors) on transport infrastructure	a. Develop guidelines of good practice; b. Include it as compensatory requirements on the EIA/AA procedures.	
p5. Small water courses are being fenced together with adjacent agricultural land	5a.1.5. The protection zones of water bodies are not blocked by fencing	a. Relate with water-management authorities;	

Objective 5a.2. Develop guidelines and impose fencing-related conditions linked with agriculture, forestry subsidies or other specific programmes

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. A per cent of unfenced areas is not imposed for cultivated land as a voluntary condition for agricultural subsidies	5a.2.1. APIA payment conditioned by a per cent of unfenced area in corridor zones	a. Relate with responsible authorities; b. Update legislation if needed; c. Impose legislation.	
p2. Specific legislation on wildlife damage prevention does not impose conditions to prevent significant barriers	5a.2.2. Large electric-fencing barriers are subject to environmental assessment on potential connectivity impact	a. Assess practices; b. Evaluate the potential impacts; c. Propose conditions to be included in specific legislation; d. Relate with responsible authorities.	
p3. Forestry legislation does not impose conditions to prevent significant barriers	5a.2.3. Fencing in forested or afforested areas are subject to environmental assessment on potential connectivity impact	a. Assess practices; b. Evaluate the potential impacts; c. Propose conditions to be included in specific legislation; d. Relate with responsible authorities.	

Threat 5b: Changes in land management – crop cultivation/natural vegetation management – may reduce landscape permeability

Objective 5b.1. Prevent large-scale monocultures and/or facilitate & support mosaic cultivation

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Cultivation patterns sensitive to connectivity are not attractive for farmers from the business perspective	5b.1.1. Subsidies for hay meadows in connectivity-areas are attractive for farmers	a. Relate with responsible authorities; b. Explore future inclusion of special subsidies for hay meadows in connectivity-areas; c. Monitor the impact.	
p2. Cultivation patterns sensitive to connectivity are not attractive for farmers from the business perspective	5b.1.2. Subsidies for mosaic-type of cultivations in connectivity-areas are attractive for farmers	a. Relate with responsible authorities; b. Explore future inclusion of special subsidies for mosaic-type of cultivation in connectivity-areas; c. Monitor the impact.	
p3. Options of funding to secure the land for connectivity are limited.	5b.1.3. Land-acquisition for ecological connectivity is supported	a. Relate with responsible authorities; b. Explore future inclusion of land-acquisition for ecological connectivity in funding programmes; c. Develop guidelines; d. Implement pilot projects and monitor the impact; f. Up-scale and monitor the impact.	

Objective 5b.2. Support adequate management of natural features & marginal habitats

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. The existing connectivity-conscious agriculture norms are not fully implemented	5b.2.1. The GAEC/SMR norms on protection of natural features and vegetation are being implemented and controlled	a. Relate with responsible authorities; b. Develop an overview of issues; c. Implement legislation.	
p2. The agricultural norms are not adapted to support the protection of green infrastructure elements	5b.2.2. Management norms in agriculture are harmonized with green infrastructure protection	a. Relate with responsible authorities; b. Implement pilot projects; c. Evaluate cost-benefits; d. Develop norms/guidelines of best practices; e. Implement updated legislation.	

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p3. Pastures with trees (coverage 30%) are not covered with any conservation-conscious legislation and therefore transformed either into pastures or forests	5b.2.3. Management norms for forested pastures (30% canopy coverage) are set in-line with conservation needs of these habitats	a. Relate with responsible authorities; b. Develop an overview of issues; c. Develop norms/guidelines of best practices; d. Develop specific legislation or update the agriculture one; e. Implement the updated legislation.	
p4. The existing connectivity-conscious forestry norms are not fully implemented	5b.2.4. Forestry norms on the protection of natural features important for connectivity are being implemented and controlled	a. Relate with responsible authorities; b. Develop an overview of issues; c. Implement legislation.	
p5. The forestry norms are not adapted to support the protection of green infrastructure elements	5b.2.5. Forest management best practices in the Natura 2000 sites and connectivity areas are available	a. Relate with responsible authorities; b. Implement the pilot projects; c. Evaluate cost-benefits; d. Develop norms/guidelines of best practices; e. Implement the updated legislation.	
p6. The water management is not fully conscious of the connectivity issues	5b.2.6. Water management best practices in the Natura 2000 sites and connectivity areas are available	a. Relate with responsible authorities; b. Develop an overview of issues; c. Implement the pilot projects; d. Evaluate cost-benefits; e. Develop norms/guidelines of best practices; f. Implement the updated legislation.	
p7. The existing norms are not considering forested windbreaks as multifunctional green infrastructure elements	5b.2.7. Guidelines for multifunctional (green infrastructure role) forested windbreaks are available	a. Relate with responsible authorities; b. Develop an overview of issues; c. Implement the pilot projects; d. Evaluate cost-benefits; e. Develop norms/guidelines of best practices; f. Implement the updated legislation.	

Objective 5b.3. Promote and support the development of good-practice examples of connectivity-sensible agriculture, water management and forestry practices

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. There are no incentives for farmers to conduct close-to-nature and connectivity-sensible agricultural management	5b.3.1. Close-to-nature and connectivity-sensible agricultural management is promoted and supported	a. Relate with responsible authorities; b. Set-up dedicated funding programmes; c. Promote new approaches.	

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p2. There are no incentives for foresters to conduct close-to-nature and connectivity-sensible forestry management	5b.3.2. Close-to-nature and connectivity-sensible forestry management is promoted and supported	a. Relate with responsible authorities; b. Set-up dedicated funding programmes; c. Promote new approaches.	
p3. There are no good-practice examples of close-to-nature and connectivity-sensible water management	5b.3.3. Close-to-nature and connectivity-conscious water management is promoted and supported	a. Develop and implement pilot-projects for restoring dead arms of the Mures into functional green infrastructure elements; b. Promote new approaches.	

Threat 5c. Land management causing degradation of natural habitats may reduce landscape permeability

Objective 5c.1. Prevent/control the spread of plant & animal invasive species and renaturation of invaded/degraded lands

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Prevention/control of invasive species is not fully considered in agriculture, forestry, water management, infrastructure building & maintenance	5c.1.1. Prevent/control the spread of plant & animal invasive species, and this is included in sustainable agriculture, forestry, water management, infrastructure building & maintenance	a. Relate with responsible authorities; b. Develop guidelines of best practices; c. Develop specific legislation or update the existing one; d. Implement updated legislation; e. Awareness campaign to inform public about the impact of releasing exotic species into the wild.	
p2. There are no incentives for renaturation of degraded/invaded land into natural habitats (grasslands/forested grasslands/forest)	5c.1.2. Dedicated programmes and funding for management of degraded/invaded land into natural habitats (grasslands/forested grasslands/forest) are set in place	a. Relate with responsible authorities; b. Develop guidelines of best practices; c. Set-up dedicated funding programmes; d. Promote new approaches.	
p3. Although the specific legislation exists, it has not been enforced.	5c.1.3. Waste and dumping sites management regulations are better controlled	a. Develop a monitoring tool using free resources (Sentinel), linked with land ownership data; b. Enforce the legislation.	

Objective 5c.2. Prevent field arsons/enforce legislation on fire occurrence

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Although there exists specific legislation, it is not enforced.	5c.2.1. Legislation on fire occurrence is enforced and field arsons are being reduced	<ul style="list-style-type: none"> a. Relate with responsible authorities; b. Increase efficiency of enforcement through correlation field controls and satellite imagery monitoring with APIA ownership databases b. Develop special trained teams to respond to major fire outbreaks d. Support the local-council based fire fighter teams 	

Objective 5c.3. Prevent alteration of water bodies, restore hydric system and support renaturation of wetlands

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Interventions on water bodies are altering their natural character	5c.3.1. Natural water bodies are not altered	<ul style="list-style-type: none"> a. Avoid the unnecessary regulations on Mures river and its tributaries; b. Promote green management for flooding prevention; c. Develop guidelines on close-to-nature interventions to prevent floods and bank erosion; d. Protect islands and their channels as important biodiversity areas; e. Restore connectivity between Mures and its tributaries as critical refuge zones for fish. 	
p2. Former interventions led to alteration of the natural hydric systems	5c.3.2. A programme for restoration of the hydric systems is set in place	<ul style="list-style-type: none"> a. Avoid sand/gravel extractions on river Mures minor bed; b. Implement the pilot-projects to monitor the impact of sand/gravel extractions on the river Mures minor bed; b. Promote the development of water reservoirs. 	
p3. Former interventions led to desiccation or alteration of wetlands	5c.3.3. A programme for renaturation of wetlands is set in place	<ul style="list-style-type: none"> a. Develop management guidelines; b. Gravel extractions in the river Mures major bed conditioned by renaturation into wetlands connected with the river; c. Support development of emigration reserves/refuges for aquatic/semi-aquatic species (invertebrates, fish, amphibians, and reptiles) – mapping of important areas and of land ownership; d. Implement renaturation projects. 	
p4. Specific guidelines in applying the EIA/AA procedures for water-related interventions are missing	5c.3.4. The EIA/AA guidelines for water-related interventions are available	<ul style="list-style-type: none"> a. Develop the EIA/AA guidelines for water-related interventions. 	

Threat 6a: Other anthropogenic activities

– game management – may reduce landscape permeability

Objective 6a.1. Develop coherent game management plans and apply the EIA/AA procedures

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Although requested by the existing legislation, game management plans are not being developed or implemented	6a.1.1. Develop and implement game management plans	<ul style="list-style-type: none"> a. Relate with responsible authorities; b. Develop guidelines of best practices; c. Develop and implement game management plans; d. Implement the updated legislation. 	
p2. Specific guidelines in applying the EIA/AA procedures for game management plans are missing	6a.1.2. The EIA/AA guidelines for game management plans are available	<ul style="list-style-type: none"> a. Develop the EIA/AA guidelines for game management plans. 	

Objective 6a.2. Facilitate data-collection on key-species

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. There is no system in place to integrate hunters' data into an overall database at landscape level.	6a.2.1. Data collected by hunters are incorporated into an overall database at landscape level	<ul style="list-style-type: none"> a. Raise awareness of hunters on non-resident (large carnivore or invasive) species; b. Clarify and regulate the reporting of implications of non-resident species, accidental and poaching-related mortalities; c. Develop and implement a data-collection procedures, application and database; d. Develop collaborative monitoring programmes, including for genetic and disease database. 	

Objective 6a.3. Harmonize game management with Natura 2000 and connectivity-related objectives

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Game management is not harmonized with Natura 2000 and with connectivity-related objectives	6a.3.1. Game management is harmonized with Natura 2000 and connectivity-related objectives	<p>a. Develop a good-practices guideline for game management in Natura 2000 areas and for corridors (correlated with other relevant sectors – conservation, agriculture, forestry, development, damage-prevention, tourism, ...);</p> <p>b. Adapt hunting management to include no-hunting zones and no-drive zones in critical connectivity areas.</p>	

Objective 6a.4. Implement poaching prevention and control

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Poaching represents significant pressure	6a.4.1. Poaching is reduced	<p>a. Develop and implement collaborative anti-poaching programme;</p> <p>b. Implement agreements on no-hunting or information on hunting on the border areas between different game managers;</p> <p>c. Develop and implement electronic hunting license database;</p> <p>d. Support specialized anti-poaching field-investigation teams;</p> <p>e. Develop specialized cross-sectoral specialized teams (prosecutors, police, gendarmes, forensic, intelligence).</p>	

Threat 6b: Other anthropogenic activities – human-wildlife conflicts – may reduce landscape permeability

Objective 6b.1. Facilitate the implementation of legislation on damage compensations

(potential) Problems	Proposed Measures / Targets	Actions	Notes
P1. Damage compensations are not fully efficient, as a result in some cases farmers are taking illegal retaliation measures against wildlife	6b.1.1. Damage compensations are better implemented	<p>a. Raise awareness, information and training for responsible bodies and farmers;</p> <p>b. Monitor the implementation of legislation and collect feedback;</p> <p>c. Assess and update the legislation.</p>	

Objective 6b.2. Facilitate implementation of traditional shepherding

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Intensive grazing is replacing sustainable traditional shepherding	6b.2.1. Traditional shepherding is encouraged	<ul style="list-style-type: none"> a. Develop guidelines and trainings on traditional shepherding techniques; b. Facilitate the usage of local breeds of shepherding dogs; c. Develop guidelines for sustainable/close to nature grassland management – including for the Natura 2000 areas; d. Adapt grassland management plans to incorporate the guidelines; e. Facilitate additional income from shepherding in Natura 2000; f. Facilitate traditional transient shepherding; g. Control and enforce the legislation on intensive shepherding and dogs. 	

Objective 6b.3. Facilitate the implementation of modern methods for prevention

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Traditional modern methods are not properly implemented for damage prevention	6b.3.1. Modern methods for prevention are properly implemented	<ul style="list-style-type: none"> a. Demonstrate the usage of integrated methods in critical areas; b. Developed the guidelines for electric fence usage as conditions for subsidies. 	

Objective 6b.4. Facilitate the increased subventions based on large carnivore conservation

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Husbandry/beekeeping in large carnivore habitats renders higher costs for farmers; therefore, a large carnivore conscious management should be supported by a relevant subsidy system	6b.4.1. A relevant subsidy system in large carnivore habitats and corridors is set in place	<ul style="list-style-type: none"> a. Produce maps for large carnivore distribution (including recolonization and corridor/linkage areas); b. Incorporate all the guidelines in a set of minimum measures conditioning increased subsidies/Natura 2000 payments; c. Include the new measure in agriculture/Natura 2000 payments funding. 	

Objective 6b.5. Regulate other anthropogenic activities that could increase the level of conflicts (waste management, unsustainable development & tourism activities etc.)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. A series of unregulated activities may increase the level of conflicts with wildlife.	6b.5.1. The level of conflicts with wildlife is decreased by regulating activities	<ul style="list-style-type: none"> a. Establish thresholds for re-generable natural resources quotas (forestry, hunting, mushrooms/wild fruits...) and linked them with guidelines/payments in Natura 2000 sites; b. Establish thresholds for artificial feeding for game species and linked them with guidelines/payments in Natura 2000 sites; c. Establish rules for transient beekeepers in the Natura 2000 sites or critical conflict points; d. Implement construction regulations; e. Develop and facilitate adequate garbage/waste management/pollution in Natura 2000/critical areas; f. Clarify and enforce the legislation on tourism in protected areas; g. Adapt and enforce the legislation on fishing. 	

Objective 6b.6. Facilitate rapid intervention in special situation related to wild animals

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Rapid interventions in special situation related to wild animals are not fully functional/efficient	6b.6.1. Rapid intervention in special situation related to wild animals are efficient	<ul style="list-style-type: none"> a. Clarify the legislation/responsibilities and procedures for wild animals in critical situations (distress/danger/threat to humans); b. Clarify the legislation/responsibilities and procedures for rapid interventions on wild animals according to classified situations; c. Train specialists and support logistics and funding for rapid intervention teams, wildlife clinics; d. Clarify the transport/relocation/release-into-the-wild procedures; e. Facilitate the development of education-focused sanctuaries for animals not fit to be released into the wild. 	

Threat 7: Lack of coherent monitoring at landscape level and adaptation of solutions

Objective 7.1. Facilitate the implementation of an integrated monitoring programme – procedures, database, indicators, and assessment

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Biodiversity- and connectivity-related indicators are not fully integrated into sectoral management (agriculture, forestry, water & game management, transports)	7.1.1. Biodiversity- and connectivity-related indicators are developed and integrated into sectoral management	<ul style="list-style-type: none"> a. Relate with authorities and stakeholders; b. Draft the sectoral indicators; c. Discuss cross-sectoral correlation; d. Adopt indicators within sectoral management. 	
p2. Sectoral database are not compatible/ synchronized and monitoring methods and tools are not shared	7.1.2. Monitoring is integrated at landscape level	<ul style="list-style-type: none"> a. Relate with authorities and stakeholders; b. Identify needs, gaps and resources; c. Develop compatible pilot-monitoring systems (methodologies, procedures, tools, indicators, database, evaluation etc.); d. Assess and upscale the results; e. Adapt the sectoral procedures. 	
p3. Monitoring results are not used to adapt the management or solutions	7.1.3. Strategies, programmes, plans, projects and activities are being assessed and adapted based on the monitoring results	<ul style="list-style-type: none"> a. Relate with authorities and stakeholders; b. Add success indicators/thresholds to monitoring plans; c. Integrate risk assessment and contingency plans into sectoral practices; d. Include the need to adapt the implementation of plans/ activities based on the monitoring results. 	

Threat 8: The support of stakeholders for a cross-sectoral & integrated approach at landscape level is reduced

Objective 8.1. Facilitate networking and develop a common platform and database

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. There is a lack of communication between stakeholders	8.1.1. A platform for regional stakeholders is available as support for interaction	a. Engage stakeholders and create local/regional networks of stakeholders; b. Develop a relevant database and an interactive platform.	

Objective 8.2. Facilitate information, awareness, education, communication

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Connectivity is a complex topic and hard to communicate with different type of stakeholders	8.2.1. A relevant outreach programme is set in place	a. Create and share content across stakeholders – including through innovative methods; b. Engage professionals in communications and train stakeholders in communication; c. Engage public opinion vectors and media; d. Engage with universities/schools/research centres/businesses/NGOs/public bodies.	

Objective 8.3. Support the research and applied studies focused on connectivity; facilitate inter-sectoral capacity building and development of new professional opportunities (mainstream biodiversity to other sectors)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Connectivity is not yet fully recognized as a major topic in research, applied studied or as an opportunity to support inter-sectoral capacity building	8.3.1. Connectivity is promoted as an important topic of research and applied studies	<ul style="list-style-type: none"> a. Facilitate integrated/inter-sectoral studies and research in environment, biodiversity, agriculture, forestry, hunting, tourism, transports, culture etc. b. Facilitate cross-sectoral capacity building and trainings based on the stakeholders'/local needs. 	

Objective 8.4. Facilitate the development of a regional identity and promote the area – nature, culture, services (connectivity as one of the topics)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
P1. The connectivity-important landscape is large and diverse and not recognized as such by local communities	8.4.1. A landscape identity is being build and promoted	<ul style="list-style-type: none"> a. Aggregate local values to develop a regional identity; b. Facilitate local/regional brandings aligned with regional identity; c. Create a coherent promotion programme. 	

Objective 8.5. Facilitate the development & alignment of local strategies into regional sectoral strategy (connectivity as one of the topics)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Connectivity as a topic is not yet recognized as being of significant importance to the region	8.5.1. Facilitate the development of local sustainable development strategies (at communes/ADI/GAL level, aligned with regional identity)	<ul style="list-style-type: none"> a. Facilitate inclusion of connectivity as one of the topic/objective within local sustainable development strategies (at communes/ADI/GAL level), aligned with regional identity; b. Include connectivity in the Natura 2000 sites conservation objectives. 	

Objective 8.6. Facilitate and support complementary initiatives (connectivity as one of the topics)

(potential) Problems	Proposed Measures / Targets	Actions	Notes
p1. Connectivity as a topic is not yet recognized as being of significant importance to the region	8.6.1. Connectivity-conscious initiatives are being implemented	<ul style="list-style-type: none"> a. Develop tailor-made funding facilities addressing local needs/opportunities aligned with local/regional strategies; b. Develop project-models and promote them as case-studies; c. Develop constant training and knowledge-exchange. 	



CHAPTER 4

CROSS-SECTORAL OPERATIONAL PLAN FOR THE ARAD-DEVA PILOT-AREA:

Descriptive part

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THREAT/ PRESSURE 1:

New/planned infrastructure projects may increase the barrier effect

The Mures lower floodplain is an important transport corridor, new major transport infrastructure projects are being implemented in the area are the **Lugoj-Deva motorway** and the **Curtici-Simeria railway**.

Aims:

» The first measure to address the permeability of new transport infrastructure

is to maximize the defragmentation role of objects (underpasses & overpasses) designed for construction reasons. For this purpose, these objects should be assigned an environmental role and any changes of building specifications should be subject to a revised environmental permit, as a decrease in permeability of these objects may require extra special solutions for wildlife. A special consideration during the designing phase should be given to adaptation to extreme phenomenon (flooding) due to climate changes.

- » Objects specially designed to ensure wildlife crossing should be build and managed in order to maximize their ecological function, including integration with adjacent land, which requires cross-sectoral measures.
- » As the upgrade railway line will not be fenced, it is expected that animals (both



Figure 4 A large rectangular passage included in the initial technical plan was changed into a semi-circular, reduced-in-size object, diminishing drastically its potential use for wildlife. (© Zarand)

domestic and wild species) will cross the railway embankment anyway. The most suitable sectors need to be adapted to rapid passing, in conjecture with proper measures to prevent traffic accidents.

Description of particular issues:

» **As the transport infrastructure projects have been assigned in a design & build approach and because not all underpasses are considered potential connectivity-relevant objects in the environmental permits, the constructors have often modified the specification of objects to reduce the costs. As a result, in reality, the fragmentation impact becomes higher compared with the assessment based on the initial design**

plans. The specifications of underpasses for Curtici-Simeria railway and Lugoj-Deva motorway within the study area have been collected from the project sketches and the GIS database has been created with Openness Indexes calculated for each object. Classes relevant for different groups of species have been categorized based on the existing literature (TRANSGREEN’s Guidelines on Wildlife and Traffic in the Carpathian Countries and the Romanian national guidelines). A database allowing a comparison between the technical projects specifications and the constructive details of the built infrastructure is available as a result of SaveGREEN for assessing the impact on infrastructure permeability, as a case



Figure 5 A culvert not yet integrated in the surrounding terrain (upper left); a culvert interrupting the water connectivity during a drought period (upper right); a culvert blocked by the fence of the motorway with badger diggings under the fence (bottom). (© Zarand)

study; *Priority areas* – All underpasses within permeable landscape.

- » **There is no overall monitoring programme addressing the functionality of all underpasses.** An object-based monitoring methodology and GIS tool has been designed and developed during the SaveGREEN project as a pilot approach for an integrated monitoring at landscape scale.
- » **There is little experience in Romania in adjusting constructive details of objects in order to increase their functionality for wildlife; many underpasses are blocked by fences and other elements; many water passageways are acting as barriers or traps for aquatic and semi-aquatic species, at least at some periods of the year.** The problematic locations have been documented during the SaveGREEN project to support a future intervention programme, linked to the monitoring programme, aiming to maintain/enhance the functionality of underpasses. *Priority areas* – Underpasses within reduced permeability.
- » **There is little experience in Romania regarding the integration of wildlife underpasses into landscape, in order to increase their functionality for wildlife.** Objects functional for wildlife passage are critical elements of the Green Infrastructure and therefore, there is a need for a focused and integrated approach in this matter. Although this requires a case-by-case approach, there is a need for guidelines, trainings and experience exchange steps on how to maximize the functionality of underpasses through design, construction and conscious land management. As the functionality of each object depends on the surrounding terrain, and is, therefore, beyond the jurisdiction/responsibility of the infrastructure administrators, landscaping/integration into the landscape should be part of the EIA/AA procedures and environmental permits, including the request to connect the underpasses with the existing green infrastructure.

- » **Noise and light pollution may impact the functionality of wildlife underpasses.** To minimize disturbance effects, light and noise associated with the traffic needs to be mitigated for objects important for wildlife passing. For the railway, as the traffic is less inconsistent, the impact of noise might be less relevant. There are no data on whether the bridges will be lightened, the impact needs to be checked and addressed if the case (with special attention paid to mammals, including bats). Light and noise mitigation solutions have been included into the environmental permit of the Lugoj-Deva motorway, but proper implementation of the measures needs to be assessed. *Priority areas* – long bridges on railway and motorway, green-bridges, viaducts, and large underpasses on motorway.
- » **There are no plans in place to manage the surface of the green bridges and tunnel-top surface in order to maximize their functionality for wildlife and integrate them into the surrounding landscape.** There is no practical experience in Romania in adapting constructive details of green-bridges and management of the area on top of green-bridges in order to increase their functionality for wildlife. Although this is a matter of case-by-case approach, there is a need for guidelines, trainings and experience exchange instances on how to maximize the functionality of green-bridges through design, construction and specific land management on the tops of green-bridges. The technical details should refer to constructive elements as fencing or noise/light barriers, but also to landscape elements – soil, water, vegetation, micro-habitats and elements like stones, wood etc. – important to enhance the functionality for the wildlife and deter from unwanted usage (vehicle use etc.). Another important topic related to the surface management is to properly incorporate monitoring equipment and to how the human access to the green-bridges will be regulated. As tunnels and green-bridges represent

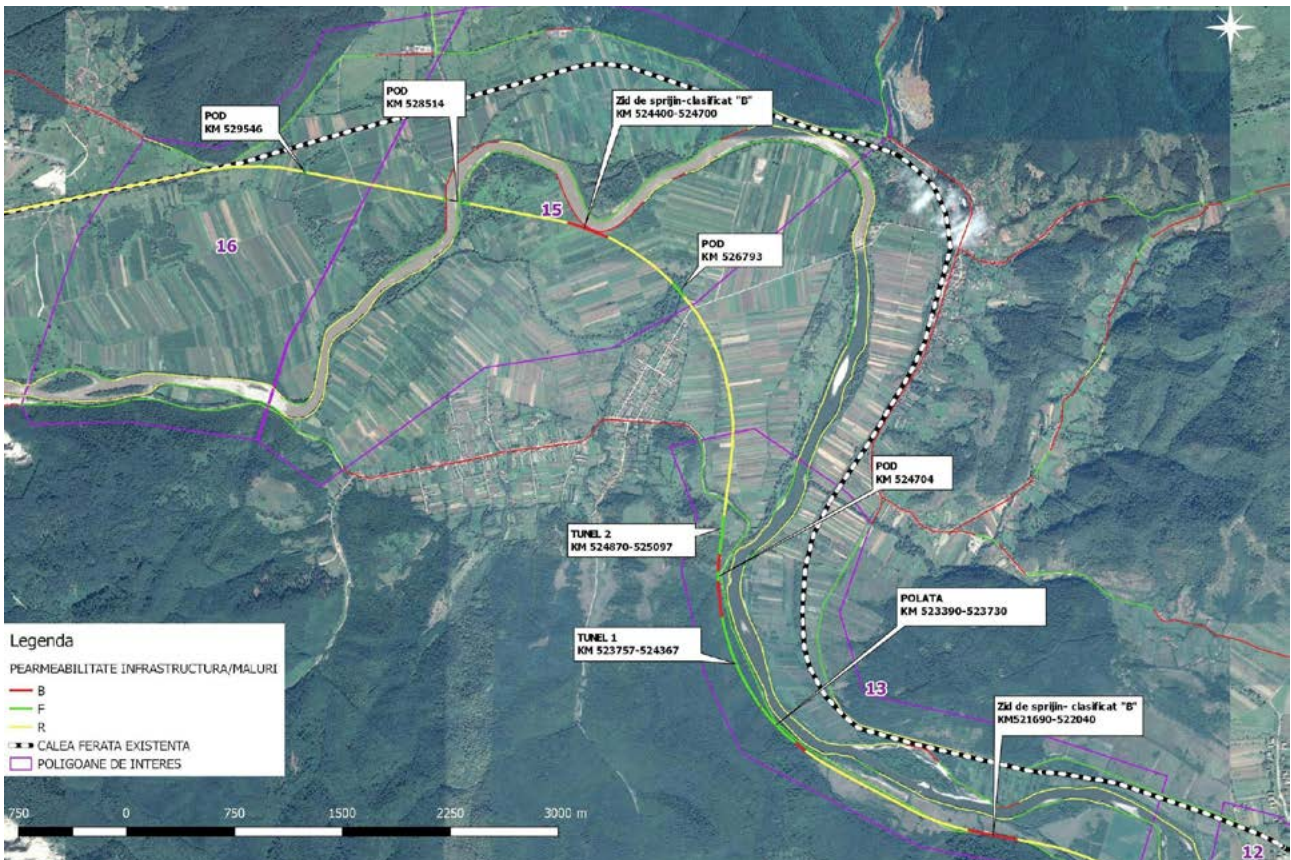


Figure 6 Large bridges over the river Mures should function as important underpasses along the upgraded railway (top); therefore, proper landscaping is required in order to maximize their function. Example of permeability assessment: green = highly permeable, yellow = medium permeable, red = barrier for large mammals; purple = priority study areas (bottom) (© Zarand/(background © Google Earth)

critical wildlife passages, they are also very important elements of the Green Infrastructure; therefore, there is a need for a focused and integrated approach to their management, considering relevant species within the particular landscape. Mapping and modelling the area of and around green bridges for suitability based on different groups of species is recommended in order to develop a functional mosaic of microhabitats aimed to attract species within the landscape that can use the passageways safely.

- » **The Branisca motorway green-bridge leads wildlife into the DJ 706A county road, as there was no integrated solution adopted.** A solution to mitigate potential vehicle-wildlife collisions on DJ 706A road

is needed. It could be implemented first by using warnings signs and potentially upgraded to an automatic warning system based on wildlife or vehicle detection at a later stage, if needed.

- » **During the construction of tunnels, the embankments of the county roads have become steeper and increased the overall barrier, making the tunnels on the railway less functional.** The railway upgrade project includes two tunnel sections in the hill areas in the vicinity of Bata and Tisa villages. The adjacent roads already have high slope embankments making the tunnel areas sub-optimal for medium-large size mammals. The adjacent roads are being used as access roads during the tunnel construction and some



Figure 7 The land-use on top of the Pojoga tunnels of the Paulis –Deva upgraded railway is complex; thus, adequate management regulations are mandatory in order to ensure functional connectivity (© Zarand)



Figure 8 The surface of the green-bridge near Bastea is not attractive for wildlife as the land is eroded by grazing (© Zarand)

Ecoduct Brănișca

Modelare insolatie

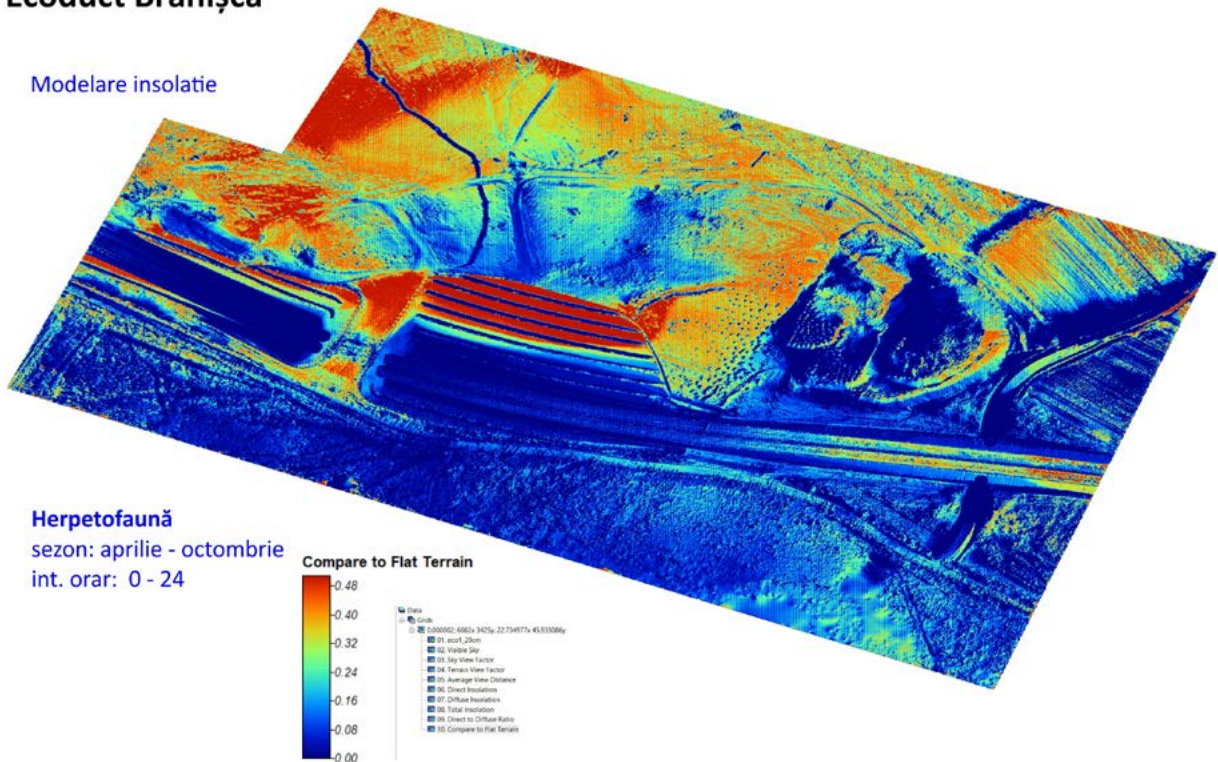


Figure 9 The suitability model for reptile species produced within the SaveGREEN project is to highlight the areas where specific microhabitats need to be installed/safeguarded along the green bridge and its surroundings as part of an ecological reconstruction project (© Zarand)

road platform enlargement is happening already, leading to a higher occurrence of physical barriers for wildlife movement. In order to maximize the functionality of tunnel areas, it is critical that the permeability of the roads be restored/enhanced after the construction, through intervention on adjacent slopes and adaptation of the traffic safety elements for DJ 707A. *Priority areas* – Road DJ 707A and 63 sections adjacent to railway tunnels.

» **The wildlife passing structures have no legal status in line with their critical ecological role – nor in the spatial planning, sectoral management or within the Green Infrastructure. The wildlife passing structures or the**

permeable sectors are not included in the Natura 2000 management as having a critical ecological role. The Green Infrastructure elements are not included into the cadastre plans and the coherence of the Natura 2000 network is not reflected in measures addressing the permeability of the landscape/Green Infrastructure. Important passage objects or sectors on transport infrastructure are not addressed in the Natura 2000 sites management plans; therefore, there are no specific management/conservation/monitoring measures in place to ensure their functionality. The GIS database of objects and permeable sectors correlated with the Natura 2000 site limits are available as a result of SaveGREEN.

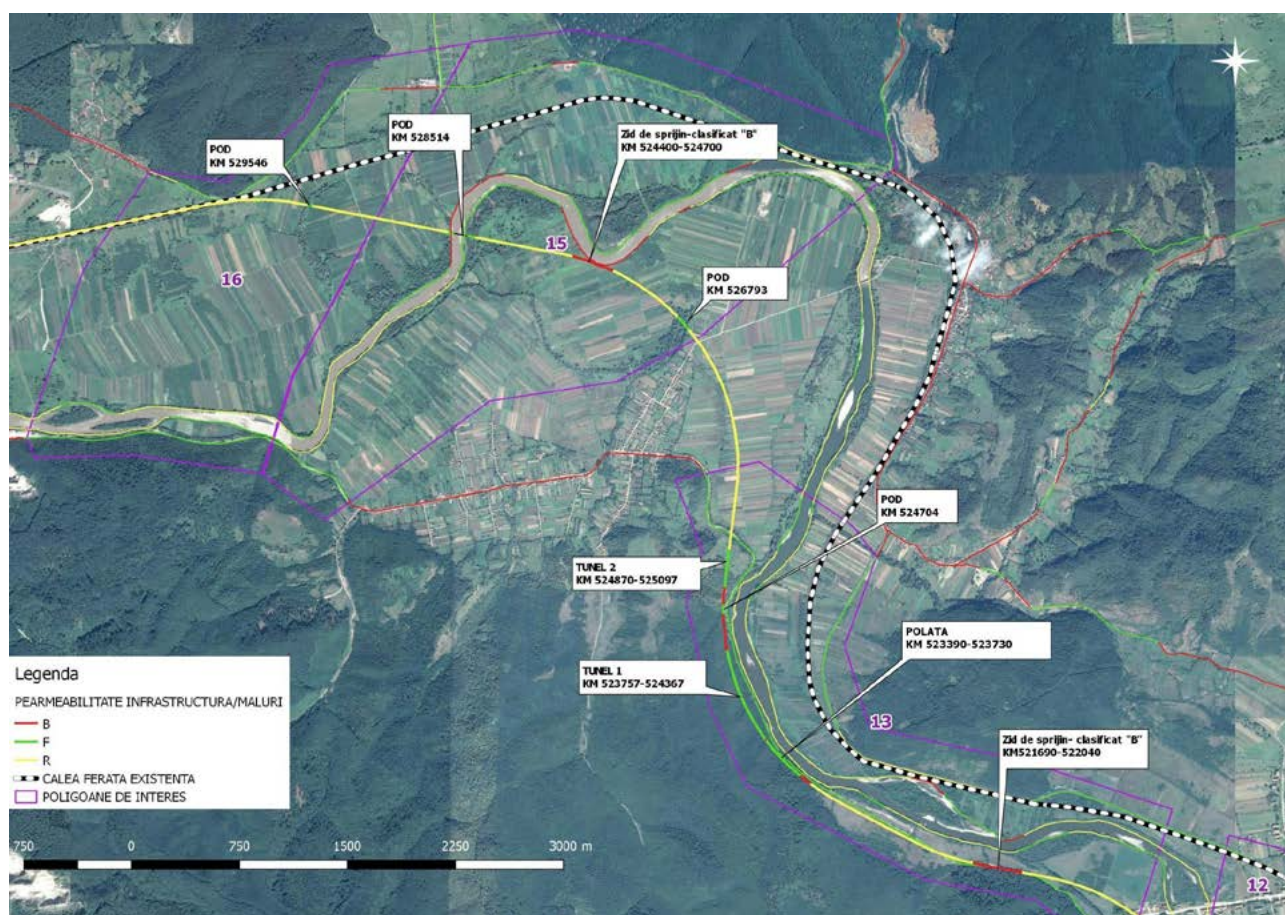


Figure 10 The Pojoga section is one of the two sectors where bored tunnels were designed on the Paulis – Deva upgraded railway. It is important that the permeability of adjacent features – roads and river banks be maintained/restored. Example of permeability assessment: green = highly permeable, yellow = medium permeable, red = barrier for large mammals; purple = priority study areas (© Zarand. Background © Google Earth)

» **The environmental permit requires adaptation of rock-bed embankments for ungulates, by way of grass instalment.** At this point it is unclear if and what kind of interventions are necessary, as the railway is not yet completely built, but respective sectors should be selected where to be used by species and where accidents could be easier to avoid (i.e. sectors with high visibility); complementary solutions may be implemented – signalling, detectors etc. Although the first aim is to ensure the functionality of underpasses and overpasses as safe passages for wildlife, since the railway will not be fenced it is expected for mammals to cross the railway embankments.

Objectives set to address the threat and proposed targets are:

Objective 1.1. Ensure functionality of underpasses

1.1.1. All potentially-functional underpasses are included in the environment permits as wildlife-crossing structures

1.1.2. Design and constructive specifications are adjusted in order to maximize the functionality of underpasses

1.1.3. Structural barriers on objects, including those not designed primarily as wildlife-crossing structures, are avoided/ removed



Figure 11 Original state of the county road DJ 707A., currently having steep slopes. Any increase in the barrier effect during the upgrade may make the tunnel area non-functional (© Zarand)

1.1.4. Underpasses are included into the surrounding green infrastructure

1.1.5. Design and constructive details are adapted to mitigate noise and artificial lighting impacts (if the case)

Objective 1.2. Ensure the functionality of overpasses

1.2.1. The permeability of the terrain on top of tunnels is maintained during the construction

1.2.2. Green bridges (including tunnel-top surface) are being managed in order to maximize their functionality for wildlife

1.2.3. Overpasses are included into the surrounding green infrastructure

1.2.4. A solution to mitigate DJ 706A county road at the Branisca motorway green-bridge is agreed on and implemented

1.2.5. The permeability of adjacent roads DJ 707A and DJ 63 is maintained during the construction of the railway tunnels or restored afterwards

1.2.6. A solution for the Cosevita motorway junction after the completion of the motorway sector will be discussed

Objective 1.3. Assign a legal status and develop coherent regulations for wildlife passages

1.3.1. The important passing structures (tunnels, green-bridges, bridges, viaducts, and underpasses) are included in a relevant register and into spatial and sectoral plans, mentioning their (primary or secondary) functions for connectivity

1.3.2. Important passing structures (tunnels, green-bridges, bridges, viaducts, and other large underpasses) and important permeable sectors of linear features are included in the Natura 2000 management plans with assigned measures for the land management,

usage regulations and monitoring

Objective 1.4. Increase the permeability of railway embankments

1.4.1. Railway embankments are adapted for ungulate passage, in sound-defined sectors and in conjunction with accident-avoidance measures

THREAT 2: **Structural interventions on existing transport and other linear infrastructure (TLI)** (Maintenance, upgrading without changing the category/class of the infrastructure, etc.) **and other linear features may increase the barrier effect at landscape level.**

The Mures floodplain represents an important transport corridor, with a European/national road and railway following the river course and with secondary (county/communal and local) roads connecting with the former. The ecological linkage role of the Mures floodplain is important for both transversal connectivity between the adjacent forested areas in the north and south for which the Mures tributaries and their riparian vegetation are important but also for *longitudinal connectivity* ensured by the Mures River and its riparian vegetation.

The existing infrastructure is already presenting barriers for the wildlife. The Mures

River has a meandering course with part of the banks being constantly eroded, which led to a variable and dynamic transversal permeability.

At present, the connectivity role is not fully acknowledged and not considered within the structural interventions with the existing infrastructure (modernization/upgrades) or with water courses (flood-prevention works). Environmental procedures are prioritising the connectivity topic.

The role of tributaries is extremely important for aquatic species at both the reproduction sites and refuges, but the longitudinal permeability of the Mures River and its tributaries is already affected by a series of engineering works that increase the impact of climate change-related phenomenon (drought).

Aims:

- » Maintain the current level of transversal permeability, prioritizing permeable sectors that allow for safe crossings for the wildlife between the northern and southern forested areas, granting reproduction habitats for aquatic and semi aquatic species at the same time.
- » Maintain/increase the longitudinal permeability of the Mures River and its tributaries and mitigate the existing barriers.

Description of particular issues:

- » **Road and environmental authorities do not have access to a database/map of important (permeable) road sectors and objects.** A methodology (AZ 2017) has been developed to classify important structural



Figure 12 Permeability assessment of linear features (roads, railway, riverbanks): green = highly permeable, yellow = medium permeable, red = barrier for large mammals (© Zarand/background © Google Earth)
Example of permeability of linear features for large carnivores being mapped (green – very good, yellow – good, red – barriers)

characteristics of roads and model the permeability for different groups of species. GIS maps showing 3 permeability classes for large carnivores are available for most of the road infrastructure. *Priority areas* – Road (European, national, county level) and rail network.

p2. Road and environmental authorities do not have access to guidelines on design and building technical solutions to maintain or to increase permeability of existing infrastructure during upgrading / maintenance interventions.

Develop specific guidelines and build the expert capacity through knowledge exchange is possible i.e. - European defragmentation programs.

Priority areas:

Preserving/increasing the existing permeability for large carnivore species is critical in the current permeable sectors (class F and R/green and yellow) and potential restoration in the current barriers (class B/red sectors).

- » **A series of underpasses of the existing roads are blocked by alluvial material, dense vegetation or anthropogenic debris/waste.** In some cases, the watercourses have eroded under the culvert

beds and therefore, the connectivity for aquatic species is (quasi-) permanently affected. *Priority areas* – all objects are included in the GIS database and could be linked with a connectivity-focused periodic maintenance or defragmentation on roads/ railway.

- » **Water-management and environmental authorities do not have access to a database/map of the important Mures banks (permeable) sectors and objects.** A methodology (AZ, 2017) has been developed to classify and model the permeability of riverbanks for different groups of species. GIS maps showing 3 permeability classes for large carnivores are available for the Mures River.
- » **Water and environmental authorities have limited experience in designing and implementing nature-based flood-preventing solutions.** Preserving/ increasing the existing permeability scope for large carnivore species is critical in the current permeable sectors (class F and R/ green and yellow) and potential restoration at the current barriers (class B/red sectors).
- » **Transversal connectivity of water bodies is not a topic addressed by the environmental assessment procedures; structural interventions are usually**



Figure 13 Example of a blocked small bridge/culvert on the old railway – Km 566+100 (© Zarand)

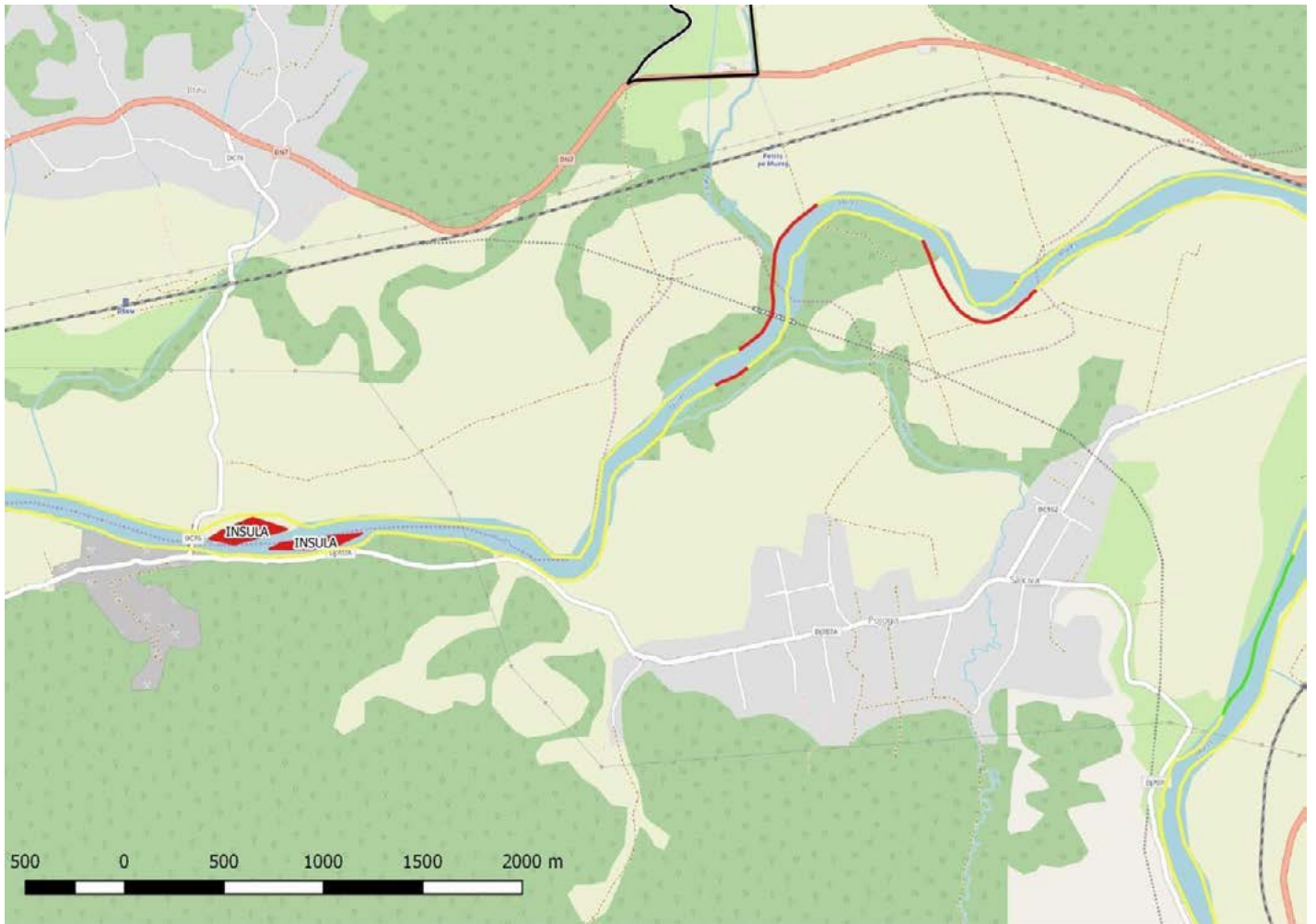


Figure 14 Example of permeability classification for the Mures riverbanks (top); assessment made by boat (middle); example of a sector on the river Mures with permeable (F) natural banks (bottom) (© Zarand)

linked with flooding prevention and considered as overriding biodiversity objectives.

» Another type of interventions is related to the **stabilization of banks within the immediate vicinity of a transport infrastructure.** In the case of railway upgrade, the length of these structural interventions is limited and with only insignificant overall impact. However, in other cases, the modernization of infrastructure has been done in conjuncture with watercourse regulation on significant lengths (i.e. European road E79) leading to a major decrease in transversal connectivity. Preserving/increasing the

existing permeability for large carnivore species is critical in the current permeable sectors (class F and R/green and yellow) and potential restoration in the current barriers (class B/red sectors).

» **Longitudinal connectivity is becoming more critical in the context of climate-change effects – droughts and flooding; therefore, the impact of potential barriers (dams, undersized culverts, bridges) needs to be assessed and an intervention/defragmentation programme needs to be designed.**

During the SaveGREEN project, mapping and assessment of barriers on the Mures tributaries started as a pilot-project.



Figure 15 Example of a barrier for local fish species on one of the Mures tributaries (© Zarand)

Objectives set to address the threat and proposed targets are:

Objective 2.1. Maintain the permeability of the existing transport infrastructure, including enhancement of permeability of the existing features, when possible

2.1.1. *Transport and environmental authorities are aware of important (permeable) sectors*

2.1.2. *Responsible environment, road/rail authorities and designers/constructors are aware of problems and solutions to mitigate the fragmentation process during upgrading/maintenance interventions*

2.1.3. *Structural interventions (upgrading/modernization etc.) are subject to the AA procedures*

2.1.4. *A maintenance programme is set in place to implement interventions aiming to maintain/restore/enhance permeability*

Objective 2.2. Maintain the permeability of the Mures riverbanks at current level

2.2.1. *Water-management and environmental authorities are aware of the Mures banks permeable sectors*

2.2.2. *Water-management authorities/designers and constructors are informed of the technical solutions to implement nature-based flood-preventing solutions and other interventions; they are inclined to “green” alternatives*

2.2.3. *Structural interventions on riverbanks are subject to the AA procedures*

Objective 2.3. Maintain/increase longitudinal permeability of the Mures River and its tributaries

2.3.1. *All barriers are identified and an intervention/defragmentation programme is set in place*

THREAT 3:

Linear transport infrastructures (including electric power lines) cause wildlife mortalities

Description:

Wildlife mortalities associated with linear infrastructure are considered to be one of the major anthropogenic impacts; however, in Romania, this issue is paid little attention. However, the implications do not only concern biodiversity, but are also related to traffic safety, damage and even human casualties; thus, proper mitigation should be taken seriously.

As new major infrastructure is arising and high traffic is swapping from the national roads towards motorways and trains will develop significantly higher speeds, wildlife-traffic dynamic is expected to change as well (number of incidents, locations, frequency, severity – damage and potential human casualties).

The impact of electric lines (power lines and railway electric lines) on birds should be considered as well.

Aims:

» The first aim will be to prevent wildlife from entering the motorway by implementing an adequate fencing system, including escape gates for animals that accidentally enter motorways. For unfenced infrastructure, the plan is to implement traffic safety measures, direct the wildlife towards safe passages and prevent animals from being trapped inside tunnels or on large bridges where accidents are difficult to avoid.

Special objectives should address bats, birds and amphibians that are impacted by light, noise and water management related to infrastructure. For birds, the mitigation of electric lines is very important.

- » A specialized intervention team should be available to respond to wildlife-related situations on motorways, especially as large mammals could cause incidents when trapped between fences when trying to cross the motorway.
- » A system of collecting data and assessment of situations is mandatory as a decision-making tool.

Description of particular issues:

- » **Fencing systems on motorways are not regularly maintained in order to prevent access of wildlife or domestic animals on the motorway. A special**

bear-proof fence is requested by the environmental permit, but has not been implemented yet in accordance with the best-practices (specifications regarding a bear-proof fence based on the EGNATIA highway and the experience on expanding bear-proof fencing are available in the TRANSGREEN guidelines); In addition, it is important to add escape gates for mammals which entered the motorways. Other high-risk areas are the junction areas where animals can enter the motorways; therefore, the extension of proper fencing and escape-gates should be implemented here as well (junction areas: Şoimuş, Gothatea, Coşevita, and Margina).

- » **For non-fenced infrastructure (national roads, railways), the possibility for wildlife to cross over embankments is still present.** The priority is to make so many functional underpasses that the collision risk would be minimized. Fencing sectors where functional underpasses are located may increase the chance for medium/large-sized mammals to use those underpasses. The measure is important on the new railway as the collision risks would



Figure 16 Incidents with bears on AI motorway are becoming more frequent. Assessment of situation, implementing adequate fencing and ensuring permeability in critical areas are important not only for connectivity but for traffic safety as well (photos from press)



Figure 17 Existing fence is not bear-proof and is not being maintained regularly (© Zarand)

be higher compared to the actual situation when trains are circulating at low speed and frequency. (Location of underpasses on the railway is available as the GIS database – Priority areas: Underpasses with $OI > 2$). For national roads, the traffic is expected to reduce significantly after the motorway is completely functional; thus, the opportunity of the measure should be assessed after the completion of motorway.

- » **A system of guiding amphibians, reptiles and small mammals towards passageways is not in place.** Locations of underpasses designed for amphibians were requested by the environmental

permit for the Lugoj-Deva motorway. Locations of common underpasses on the railway are available as the GIS database. Recommendations are available in the TRANSGREEN guidelines (*Priority areas: Underpasses for amphibians requested through the environmental permit for the Lugoj-Deva motorway; important areas for amphibians/reptiles identified through studies related to railway upgrade*).

- » **One solution to prevent roadkill/accidents/incidents related to the wildlife in traffic is to signal high-risk areas for the drivers.** These high-risk areas should be identified based on a robust data

collection. The completion of motorway will affect the traffic in the area and may affect the location of the road-kill/accident-prone sectors. High-risk areas have been identified based on road-kill records collected and are available in the GIS database. Locations of traffic signs have been proposed. Recommendations are available in TRANSGREEN guidelines. *Priority areas:* High-risk areas where traffic signs are not installed.

- » **The classic warning signs may not trigger the expected reaction from drivers as they get used to them over time.** In this respect, new type of signs or detectors should be tested. Other potential solutions are to implement automatic animal-detectors (either detecting the animals' presence and alerting drivers, or alerting animals about approaching cars). The efficiency of these solutions is still debatable

and depends on the local context. The LIFE Safe Crossing project is testing the implementation of the automatic warning solution in Romania. *Priority areas:* High-risk areas.

- » **The potential high-risk sectors on the upgraded railway (low-visibility sectors, at entrances/exits of tunnels and long bridges) needs to be assessed and mitigated.** Therefore, the measures under this objective correlate with the complementary ones addressing visibility etc. The signals may be classic (physical signs along the railway), or they may be automatic warning signals inside the locomotive when approaching high-risk sectors. The measure is important on the new railway as the collision risks with both wildlife and domestic animals would be higher compared to the actual situation when trains are circulating at low speed



Figure 18 Existing data can inform authorities on high-risk areas on roads (© Zarand)

and frequency. The potential high-risk sectors are on curves, at entrances/exits of tunnels and long bridges and in the vicinity of dense vegetation areas. Therefore, the measures under this objective correlate with the complementary ones addressing visibility etc. The signals may be classic (physical signs along the railway), or they may be automatic warning signals inside the locomotive when approaching high-risk sectors. *Priority areas* – Potential high-risk areas have been identified based on the alignment and habitat favourability for medium-large-sized mammals.

- » **As the railway will not be fenced, the risk of collision with medium-/large-sized animals is present along the entire alignment.** Warning devices may be installed to detect medium-/large-sized animals on or in the vicinity of the rail and to signal their presence to train conductors and/or to deter animals using acoustic signals. *Priority areas* – potential high-risk areas identified based on the alignment and habitat favourability for medium-large-sized mammals.
- » **Large/medium-sized animals and even people entering the railway tunnels or bridges on the Mures River represent a very high-risk situation, which can lead to traffic accidents.** To prevent this, fences with escape gates may be installed at entrances/exits of tunnels and bridges. The technical specification of fences should be discussed as it may not be necessary to install the full-specification bear-proof ones (with underground and top reinforced parts) if the animals still have a way to pass through the laterals. The solution should be implemented in conjecture with measure 3.5.2 (complementary solutions are necessary to alert either animals/people of approaching trains, or the train conductors of animals/people being inside tunnels or on bridges), as fencing does not ensure 100% prevention. *Priority areas* – Tunnel areas and the Mures bridges.

- » **The role of the verges is important, complex and their functionality depends on the structure, type and frequency of interventions.** Therefore, clear and coherent management measures should be designed and implemented. The management should aim to develop structures adequate for harmonizing the different roles of verges – prevent traffic accidents, ensure noise and light filter, prevent fire from spreading, barriers for snow, prevent invasive species from spreading and consider their habitat role. The standards/recommendations for verge management should also respect the land use – infrastructure, forest, pasture, agricultural, wetlands/riparian, afforestation etc. – and to align with sectoral management. The type (mechanical, chemical) of interventions and their frequency are also important for the local species.
- » **Power lines represent a risk for bird mortalities, but the impact is not fully addressed in Romania.** Railway electric lines are considered to have a lesser impact; however, mitigation measures are already implemented in different countries. *Priority areas* – power lines in the Mures Valley and the upgraded railway.
- » **Suboptimal implementation of noise-barriers on motorways may lead to bird mortalities due to collision with transparent walls.** *Priority areas* – Sectors where noise-barriers will be built along the Lugoj-Deva motorway.
- » **Certain bat species have adapted to hunt insects around artificial lights, and this may increase the risk of collisions on motorways.** In Romania the impact was not studied. Several studies proposed changes in light spectrums as mitigation measures. *Priority areas* – Favourable habitats of target-species intersected by the Lugoj-Deva motorway.



Figure 19 Power lines parallel with the A1 motorway in the Mures Valley (© Lazaros Georgiadis)

- » **Temporary water ponds associated with infrastructure gutter systems are attractive for some amphibians and reptile species but may become mortality traps as water quickly dries, is polluted or when gutters are cleaned during maintenance.** To avoid mortality, the gutters should be built in a way that water is not retained, and they should be cleaned outside reproduction periods or during dry periods. The measure needs to be correlated with verge management and implementation of tunnels for amphibians in important areas.
- » **Standardized and easy electronic data collection and reporting needs to be set in place.** In several countries, train conductors need to report every incident related to wildlife collisions. In Romania, there is permanent guarding patrolling on motorways which may present an opportunity for data collection. The data should be linked to an integrated platform

in order to support informed decisions. The GreenWeb platform was initiated to support such initiatives in SE Europe and the first data base and application is being built and tested as part of the TRANSGREEN - an application and a database was adapted from the Czech Republic by CDV and AZ/GreenWeb. The application could be expended country wide. Management and data validation will be needed to link the data with the GreenWeb integrated platform in order to support informed decisions.

- » **A lot of data are collected by professionals of different expertise (species, habitats) in different contexts (research, university, protected area management, impact studies etc.), but the data are not collated and available in a form that would benefit the professional community and support decision-making.** With the advances in mobile phones (GPS, camera,



Figure 20 Using bat-detectors (top) helps to understand how the local species use the landscape elements (bottom) (© Zarand)



Figure 21 Vegetated gutters represent good habitats for amphibians but also potential mortality risks if the maintenance is done during the active season (© Zarand)

storage capacity, and usage of online and customized maps), there is an opportunity to create mobile forms that can be used in the field and uploaded into a managed database. Such tool has been developed in the SaveGREEN project.

- » While rapid intervention teams for wildlife have been tested and operated without clear legal support, **wildlife entering motorways is a scenario new to Romania and needs a legislation update, clarification on jurisdiction (i.e. use of tranquilizing substances and fire arms on motorways), relocation procedures for protected species (i.e. the bear) and inter-organizational procedures and standards.**

Objectives set to address the threat and proposed targets are:

Objective 3.1. Implement an adequate fencing system on motorways, including escape gates

3.1.1. An adequate fencing system, including escape gates, is implemented

3.1.2. A regular programme of fences assessment and repairing is implemented

Objective 3.2. Direct animals towards functional underpasses

3.2.1. Fencing areas above the functional

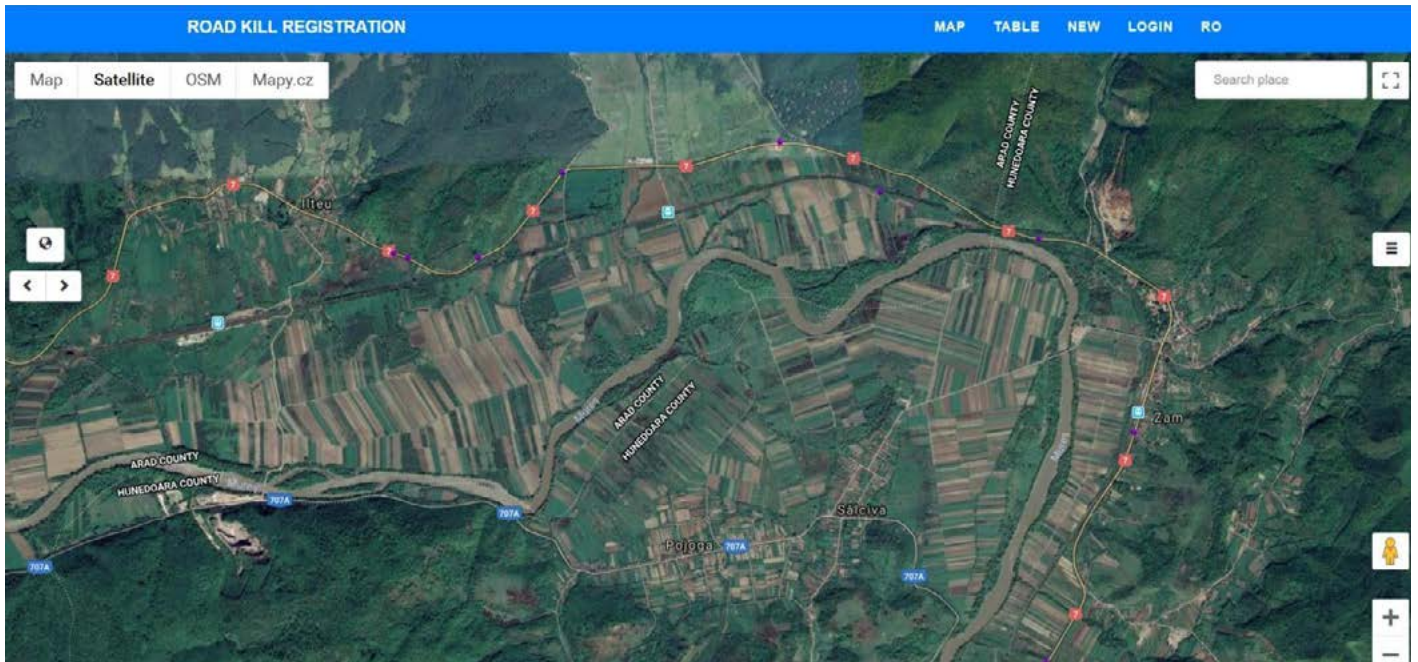


Figure 22 Print screen from the GreenWeb road kill registration app, developed under TRANSGREEN project

underpasses for medium/large mammals is being considered

3.2.2. A dedicated system of solutions to guide amphibians, reptiles and small mammals towards functional underpasses is set in place for motorway, railway and roads

Objective 3.3. Warning drivers on roadkill-/accident-prone areas

3.3.1. Efficient warning signs are installed in accident-prone areas on roads

3.3.2. New types of warning devices, including automatic animal-detectors on roads are being tested and implemented

Objective 3.4. Warning train conductors on railkill/accident-prone areas 3.4.1.

3.4.1. Efficient warning signs are installed in accident-prone areas on railway

3.4.2. New type of warning devices (i.e. automatic animal detectors) are being tested and implemented if proved to be efficient

Objective 3.5. Prevent accidents caused by mammals entering in railway tunnels or long bridges

3.5.1. Fencing sectors at entrance/exit of tunnels/bridges with escape gates is being assessed and implemented, if needed

3.5.2. Automatic sound/light warning signals when trains are approaching tunnels or bridges are being assessed and implemented, if needed

Objective 3.6. Increase drivers' / conductors' visibility on roads/railways

3.6.1. An adequate management of verges is implemented on roads and railways

Objective 3.7. Implement special measures to avoid bird mortalities (power lines, noise barriers impact)

3.7.1. Bird mortalities avoidance solutions for power lines are implemented

3.7.2. Adequate solutions for preventing collisions with motorway acoustic panels is addressed

Objective 3.8. Implement special measures to avoid bats mortalities (artificial light impact)

3.8.1. Adequate solutions for lighting systems safe for bats is implemented along motorways

Objective 3.9. Implement special measures to avoid amphibians & reptiles mortalities

3.9.1. Sensitive water/gutter management is implemented

Objective 3.10. Collect and process data to identify incident-/accident-critical sectors on roads, motorways and railways

3.10.1. A standardized mobile app for professional monitoring is being developed, information is being collected and provided to the relevant database with records regarding incidents on roads, motorways and railways

3.10.2. A traffic-kill mobile application for citizen-science is available and linked with a managed database

3.10.3. Data from the police, insurance companies and other authorities (game managers, different agencies,...) are synchronized

Objective 3.11. Create and/or train specialized teams to deal with wildlife-related incidents on motorways, railways, roads, including emergency interventions

3.11.1. Specialized teams are operational

Objective 3.12. Develop and use an integrated database as a decision-support tool to address traffic incidents (for implementing/adjusting measures to prevent wildlife traffic-kills/damages/ human casualties)

3.12.1. Collect and input all relevant data into an integrated database

3.12.2. Identify, monitor and assess causes favouring black-sectors

3.12.3. Assess the impact of adjusted/new measures being implemented to prevent traffic-kills

THREAT 4:

Changes of the land-use category may reduce landscape permeability

Changes to the land-use category may reduce the landscape permeability and, thus, the functional connectivity of the corridors for different species.

New infrastructure projects may trigger a cascade change. Related wildlife passages may become non-functional if adjacent lands are or become non-permeable.

Aims:

- » Identify the status-quo in terms of land-use and ownership;
- » Assess the triggers for land-use change and the existing solutions to prevent changes towards less permeable usage;
- » Model scenarios of land-use dynamics;
- » Identify and communicate critical areas within the landscape (micro-corridors, stepping-stones, core-areas etc.)
- » Identify special tailored measures to prevent detrimental changes and incentivise for changes towards more permeable usages.

Description of particular issues:

- » (Semi-) natural grasslands are important for a variety of species of plants and animals but are impacted by natural successions to forested areas or by

human interventions that convert them into arable land or even building plots or photovoltaic fields. A thorough analysis of the drivers and a purposeful action plan to safeguard the grasslands is urgently needed. A preliminary assessment for Romania started in the SaveGREEN project.

- » **Forested areas outside the forest cadastre are under a week´s protection as they could be easily clear-cut and, therefore, valuable habitats are being lost in a number of cases, especially in areas lacking forest cover.** A thorough analysis of the drivers and a purposeful action plan to safeguard the forested areas is urgently needed, complementing the afforestation efforts and plans addressing climate change and green infrastructure.
- » **Important wetland habitats are not being efficiently protected.** Reference maps of wetlands, riparian vegetation and islands with land-ownership & spatial planning maps/cadastre are needed to support a purposeful action plan to safeguard wetland areas, complementing the plans that address climate change and green infrastructure.
- » **Despite sectoral recommendations, the tendency is to maximize the “productive” surface of agricultural land by eliminating critical green infrastructure element from the agricultural landscape.** The corridor areas need to be addressed by a set of agro-environmental measures that will incentivise farmers to voluntarily convert crop fields into pastures of afforested land.
- » **Although the Natura 2000 Payments are a crucial instrument to support the implementation of biodiversity-sensitive measures, they have not been implemented in Romania.**

Objectives set to address the threat and proposed targets are:

Objective 4.1. Enforce/update legislation that prevents changes to the land-

use category towards less permeable categories (including compensatory measures targeting connectivity)

4.1.1. *Efficient legislation protecting permanent grasslands is enforced*

4.1.2. *Efficient legislation protecting forested areas outside forest is set in place and enforced*

4.1.3. *Efficient legislation protecting wetlands, riparian vegetation and islands is set in place and enforced*

4.1.4. *Efficient legislation protecting green infrastructure elements in agricultural land is set in place and enforced*

Objective 4.2. Facilitate/support changes to the land-use category towards more permeable categories (i.e. through agricultural/Natura 2000 payments sensitive to connectivity)

4.2.1 *Corridors/linkage areas are eligible for special agro-measures sensitive to green infrastructure*

4.2.2. *Voluntary transformation of agricultural land into (semi-)natural habitats is supported*

4.2.3. *The Natura 2000 Payments sensitive to connectivity are set and implemented*

THREAT 5A:

Changes in land management – fencing* - may reduce landscape permeability

**This does not refer to fencing of transport infrastructures.*

Fencing of land may reduce the landscape permeability and, thus, the functional

connectivity of the corridors for large/medium mammal species.

Aims:

- » Identify the status-quo in relation to land-use and ownership;
- » Assess the triggers for fencing and the existing solutions to prevent it;
- » Identify and communicate critical areas within the landscape (micro-corridors, stepping-stones, core-areas etc.)
- » Identify special tailored measures to prevent fencing and to incentivise for changes towards land usages that would not require fencing.

Description of particular issues:

- » Permanent fencing could significantly impact the landscape permeability, especially if they are being built over large areas or in critical connectivity zones, sometimes making even the related wildlife passageways affecting large infrastructure non-functional;
- » A special requirement to not fence the green infrastructure elements is needed to support its functionality. A similar condition should be imposed for electric fencing against wildlife damage, for large barriers;
- » Sometimes, large tracks of forests are fenced for different reasons without being subject to environmental impact assessment on the connectivity impact.

Objectives set to address the threat and proposed targets are:

Objective 5a.1. Set fencing regulations and promote non-fenced areas

5a.1.1. Legislation on building permanent fencing is enforced

5a.1.2. Voluntary non-fencing zones are supported

5a.1.3. Fencing-related measures are included into Natura 2000 sites and corridor areas management & payments

5a.1.4. Agreements with landowners & compensatory payments are in place to secure non-fencing areas in close proximity of wildlife passageways (objects and sectors) on transport infrastructure

5a.1.5. Protection zones of water bodies are not blocked by fencing

Objective 5a.2. Develop guidelines and impose fencing-related conditions linked with agriculture, forestry subsidies or other specific programmes

5a.2.1. APIA payments includes a per cent of unfenced cultivated area as a condition for voluntary subsidies

5a.2.2. Large electric-fencing barriers are subject to environmental assessment on potential connectivity impacts

5a.2.3. Fencing in forested or afforested areas is subject to environmental assessment on potential connectivity impacts

THREAT 5B:

Changes in land management – crop cultivation/ natural vegetation management – may reduce landscape permeability

Different crop patterns and improper management of natural vegetation may reduce the landscape permeability and, thus, the functional connectivity of corridors for different species.

Aims:

- » Identify the status-quo in relation to land-use and ownership;

- » Assess the triggers for changes in crop cultivation patterns;
- » Identify and communicate critical areas within the landscape (micro-corridors, stepping-stones, core-areas etc.)
- » Identify special tailored measures to prevent large-scale monocultures and incentivise for changes towards a more mosaic cultivation patterns with inclusion of natural features and marginal habitats.
- » Promote good practices that are also linked to supporting wild pollinators.

Description of particular issues:

- » **Cultivation patterns more sensitive to connectivity (i.e. pasture to hay meadows, uniform crops to mosaic farming) are not attractive for farmers from business perspective. Funding strategies focused on land acquisition to safeguard connectivity are not easy available.**
- » **Although sectoral norms/guidelines exist, the protection of important microhabitats/green infrastructure elements is not considered a priority in practice.** A guideline to harmonize forest management and Natura 2000 objectives are available.
- » **Forested pastures are not considered a specific type of habitat in sectoral management** (agriculture or forestry); therefore, this type of important habitat is transformed by existing practices either into pasture (with or without isolated trees), or to closed-canopy forests.
- » **Forested windbreaks are being planned and created without considering their important potential role as green infrastructure.**
- » **Close-to-nature sectoral management is not being encouraged as an alternative to business-as-usual practices.**

Objectives set to address the threat and proposed targets are:

5b.1. Prevent large-scale monocultures and/or facilitate & support mosaic cultivation

5b.1.1. Subsidies for hay meadows in connectivity-areas are attractive for farmers

5b.1.2. Subsidies for mosaic farming in connectivity-areas are attractive for farmers

5b.1.3. Land-acquisition for ecological connectivity is supported

5b.2. Support adequate management of natural features & marginal habitats

5b.2.1. GAEC/SMR norms on protecting natural features and vegetation are being implemented and controlled

5b.2.2. Management norms in agriculture are harmonized with green infrastructure protection

5b.2.3. Management norms for forested pastures (30% canopy coverage) are set in-line with the conservation needs of these habitats

5b.2.4. Forestry norms on protection of natural features important for connectivity are being implemented and controlled

5b.2.5. Forest management best practices in Natura 2000 sites and connectivity areas are available

5b.2.6. Water management best practices in Natura 2000 sites and connectivity areas are available

5b.2.7. Guidelines for multifunctional (green infrastructure role) forested windbreaks are available

5b.3. Support and promote the development of good-practice examples of connectivity-conscious agriculture, water management and forestry practices

5b.3.1. Close-to-nature and connectivity-conscious agricultural management is promoted and supported

5b.3.2. Close-to-nature and connectivity-conscious forestry management is promoted and supported

5b.3.3. Close-to-nature and connectivity-conscious water management is promoted and supported

THREAT 5C:

Land management causing degradation of natural habitats may reduce landscape permeability

Improper land management may reduce the landscape suitability for native species and favour the spread of invasive species.

Aims:

- » Identify the status-quo in relation to land-use and ownership;
- » Assess the triggers for improper land management;
- » Present the negative impacts;
- » Identify and communicate critical areas within the landscape (micro-corridors, stepping-stones, core-areas etc.)
- » Identify special tailored measures to reduce/prevent improper land management.

Description of particular issues:

- » **Invasive plant and animal species represent a serious problem for local**



Figure 23 Invasive plants along a county road (© Zarand)

biodiversity, having economic and/or social implications as well in a number of cases;

- » **For many species, connectivity is strictly related to habitats suitability as individuals are linked with specific habitat requirements; therefore, degradation of habitats will fragment the populations as well;**
- » **Dedicated programmes aiming for proper renaturation of degraded land are needed as along with better management of waste and dumping sites.**
- » **Illegal cases of vegetation arson are becoming a common practice that degrade the natural habitats, alter soil and hydrology, favour succession to other type of habitats including invasion of allochthones plant species and kill significant quantities of wildlife.** Arson

cases near roads/railways may pose risks to traffic as well.

- » **Natural water bodies are unprotected and artificial regulations are being conducted. There are no close-to-nature solutions or renaturation programmes to safeguard natural rivers, wetlands or restore hydric systems impacted by gravel extraction and/or desiccations.**

Objectives set to address the threat and proposed targets are:

5c.1. Prevent/control the spread of invasive plant & animal species and ensure renaturation of invaded/degraded lands

5c.1.1. Prevent/control the spread of plant & animal invasive species, which is included in sustainable agriculture, forestry, water management, infrastructure building & maintenance



Figure 24 Damping site created near a green-bridge (© Zarand)



Figure 25 Vegetation arson near a green-bridge (© Zarand)

5c.1.2. Dedicated programmes and funding for management of degraded/invaded land into natural habitats (grasslands/forested grasslands/forest) are set in place

5c.1.3. Waste and dumping management regulations are better controlled

5c.2. Prevent/enforce legislation on fire occurrence

5c.2.1. Legislation on fire is enforced and cases of field arson are being reduced

5c.3. Prevent alteration of water bodies, restore hydric system and support renaturation of wetlands

5c.3.1. Natural water bodies are not altered

5c.3.2. A programme for restoration of the hydric systems is set in place

5c.3.3. A programme for renaturation of wetlands is set in place

5c.3.4. The EIA/AA guidelines for water-related interventions are available

THREAT 6A:

Other anthropogenic activities – game management – may reduce landscape permeability

Game management and hunting may impact directly some mammal and bird species and indirectly others, due to changes inflicted on natural habitats either by high density of game populations or by human intervention to favour the target game species and hunting activities.

Aims:

- » Develop and implement game management plans aligned with biodiversity and connectivity objectives, and Natura 2000, if the case;
- » Collaborate with hunters and game managers in data collection and in data-based game management at landscape scale;
- » Reduce poaching and wildlife conflicts with local communities or other stakeholders.

Description of particular issues:

- » **Game management on hunting areas is not harmonized at landscape level;**
- » **Dynamic of fragmentation is changing the movement patterns of wildlife and the conflict patterns; therefore, game management needs to be adapted to this new context;**
- » **Adaptation of game management is needed to increase the functionality of new wildlife passageways and prevent poaching at mandatory crossings for wildlife;**
- » **Gama management is not addressing transient individuals as this does not fall within the local interest.**

Objectives set to address the threats are:

6a.1. Develop coherent game management plans and apply the EIA/AA procedures to avoid-mitigate-compensate for impacts

6a.1.1. Develop and implement game management plans

6a.1.2. EIA/AA guidelines for game management plans are available

6a.2. Facilitate data-collection on key-species

6a.2.1. Data collected by hunters are incorporated into an overall database at landscape level

6a.3. Harmonize game management with Natura 2000 and connectivity-related objectives

6a.3.1. Game management is harmonized with Natura 2000 and connectivity-related objectives

6a.4. Implement poaching prevention and control

6a.4.1. Poaching is reduced

THREAT 6B:

Other anthropogenic activities – human-wildlife conflicts – may reduce landscape permeability

Dynamic of fragmentation is changing the movement patterns of wildlife and the conflict patterns which may result in retaliation towards wildlife, thus reducing the functional connectivity. Anthropogenic activities related to natural resource usage (forestry, hunting, mushroom/wild fruit picking, livestock and transient beekeeping), if not properly regulated may increase the level of conflicts. Other activities related to waste management, unsustainable development & tourism activities may disturb wildlife or may attack habituated individuals, increasing human-wildlife conflicts.

Aims:

- » Understand and map the conflict zones and periods;
- » Understand the drivers and identify adapted methods to reduce wildlife conflicts;
- » Include corridor areas as priority zones to prevent and compensate for wildlife damage, supporting a reasonable level of tolerance;
- » Support a related subsidy system for farming and forestry in large carnivore habitats and corridors, which is set in place and correlates with adapted management practices;
- » Support fully functional/efficient rapid intervention in specific situations related to wild animals.

Description of particular issues:

- » **Intensive grazing is replacing sustainable traditional shepherding, while increasing the risk of conflicts.**
Related programs to support traditional shepherding coupled with modern damage prevention techniques have not been set in place. Damage compensations are not fully efficient; as a result, farmers are taking illegal retaliation measures against wildlife in some cases;
- » **Husbandry/beekeeping in large carnivore habitats renders higher costs for farmers; therefore, without a large a dedicated subsidy system, the tolerance for large carnivores will decrease abruptly;**
- » **Competition for natural resources and habituated individuals may increase the level of conflicts with wildlife;**
- » **In special situations related to wild animals, rapid interventions**

are needed, but capacity and procedures are not fully functional/efficient at present.

Objectives set to address the threat and proposed targets are:

6b.1. Facilitate the implementation of legislation on damage compensations

6b.1.1. Damage compensations are better implemented

6b.2. Facilitate implementation of traditional shepherding

6b.2.1. Traditional shepherding is encouraged

6b.3. Facilitate implementation of modern methods for prevention

6b.3.1. Modern methods for prevention are properly implemented

6b.4. Facilitate increased subventions based on large carnivore conservation

6b.4.1. A relevant subsidy system in large carnivore habitats and corridors is set in place

6b.5. Regulate other anthropogenic activities that could increase the level of conflicts (waste management, unsustainable development & tourism activities etc.)

6b.5.1. The level of conflicts with wildlife is decreased by regulating activities

6b.6. Facilitate rapid intervention in special situation related to wild animals

6b.6.1. Rapid intervention in special situations related to wild animals is efficient



Figure 26 Monitoring activities that target different groups of species relevant at the landscape level - recording of activity signs of large carnivores on top of the future tunnels (top); insects near green-bridges (bottom) (© Zarand)

THREAT 7:

Lack of coherent monitoring at landscape level and adaptation of solutions

Monitoring at landscape level is complex and different methodologies, tools and databases need to be aligned and synchronized in order to support coherent decision-making.

Aims:

- » Sectoral management to include biodiversity and connectivity related indicators included in monitoring plans;
- » Sectoral monitoring plans to be developed in line with the agreed best practices (i.e. before-after-control approach) and linked with risk assessments and contingency plans to be implemented based on monitoring results;
- » Monitoring methodologies to be compatible across sectors;
- » Monitoring tools to be adapted to the needs and support development of database
- » A coherent database management should be discussed and used as a transparent decision-making tool for adaptation/harmonization of sectoral strategies, programmes, plans and practices;
- » Develop a lesson-learned mechanism within stakeholders at landscape level.

Description of particular issues:

- » Although many sectoral plans and activities are subject to environmental assessment procedures, **there are no agreed sets of measurable indicators that should tailor the implementation of activities/current management based on the monitoring results**
- » **Different entities use different monitoring methodologies or tools,**

and the results are not available or compatible. SaveGREEN worked with specialists to identify the needs as for monitoring different species groups and introduce connectivity-related parameters into monitoring processes. A GIS tool – qField & qGIS – was tested and developed and the first version of the monitoring plan was tested and implemented during the SaveGREEN project to be further developed.

Objectives set to address the threat and proposed targets are:

7.1. Facilitate the implementation of an integrated monitoring programme – procedures, database, indicators, and assessments

7.1.1. Biodiversity- and connectivity-related indicators are developed and integrated in sectoral management

7.1.2. Monitoring is integrated at landscape level

7.1.3. Strategies, programmes, plans, projects and activities are being assessed and adapted based on the monitoring results

THREAT 8:

The support of stakeholders for a cross-sectoral & integrated approach at landscape level is reduced

The support of stakeholders at landscape level is either caused by lack of knowledge related to the connectivity related topics, lack of interest and/or resources, and reticence (personal, organisational) in engaging other entities.

Aims:

- » Increase the knowledge on connectivity topics and facilitate the communication between stakeholders, both within and between sectors;
- » Identify sectoral pioneers that are prone to developing pilot-projects and advertising these as good-practice; engage the research community;
- » Develop a landscape-level sense of identity based on connectivity topics and support complementary projects at landscape scale.

Description of particular issues:

- » **Although recognised as a critical issue, connectivity is not properly addressed by**

research or applied studies. SaveGREEN paired scientists with local managers in developing the monitoring tools; an international workshop paired with the IENE 2022 International Conference organized in Cluj-Napoca and supported by SaveGREEN aimed at a better knowledge transfer between experts and stakeholders;

- » **Landscape approach is not a major concern for stakeholders and they are unaware of the sectoral impacts on connectivity.** SaveGREEN developed a simple stakeholder engagement recommendation and some supporting information explaining these topics in order to facilitate the outreach effort (Stakeholder Analysis Report);



Figure 27 Studying natural succession on a landfill near a green-bridge in order to propose adapted ecological reconstruction measures (© Zarand)



Figure 28 Discussing landscape dynamics during the SaveGREEN international workshop in the pilot area (© Zarand)

Note: During the SaveGREEN project, we informed the stakeholders from the transport sector on the approach of the project and we focused on interactions with the local sectoral stakeholders who we consider crucial to ensure the functionality of the passageways along the transport infrastructure – agriculture, game management, forestry and local communities. In parallel, we engaged the media, both local and international, to explain the importance of the landscape approach.

Gaining trust of the stakeholders is a key element, and before explaining what the project “needs or aims for” it is important to learn to understand each stakeholder as much as possible and see what the project may bring them. As language should not pose a barrier, it is important to be accustomed with the specific terminology

used within each sector. We have discovered that engaging with some of the stakeholders leads to a multiplying effect, as they act as promoters of the concept within their own groups.

» **For collaboration at landscape level, a sense of community is required and a regional identity would support this.**

Local identity supported by sustainable products or services exists but needs to be up-scaled at regional level.

» **In order for connectivity to be mainstreamed into regional policies, it should be included in development strategies that further support connectivity-conscious initiatives.**

Objectives set to address the threat and proposed targets are:



Figure 29 Presenting the importance of the pilot area to a wider audience – filming for an Arte France documentary on Wildlife Corridors (© Zarand)

8.1. Facilitate networking and develop a common platform and database

8.1.1. A platform for regional stakeholders is available as support for interaction activities

8.2. Facilitate information, awareness, education, and communication

8.2.1. A related outreach programme is set in place

8.3. Support the research and studies focused on connectivity; facilitate inter-sectoral capacity building and development

of new professional opportunities (mainstream biodiversity to other sectors)

8.3.1. Connectivity is promoted as an important topic of research and applied studies

8.3.1. Connectivity is promoted as an important topic of research and applied studies

8.4. Facilitate the development of a regional identity and promote the area – nature, culture, services (connectivity as one of the topics)



Figure 30 SaveGREEN-branded honey was used to promote the connectivity topic in the pilot area (© Bianca Stefanut, WWF Romania)

8.4.1. A landscape identity is being build and promoted

8.5. Facilitate the development & alignment of local strategies with the regional sectoral strategy (connectivity as one of the topics)

8.5.1. Facilitate the development of local sustainable development strategies (at communes/ADI/GAL) level, aligned with the regional identity

8.6. Facilitate and support complementary initiatives (connectivity as one of the topics)

8.6.1. Connectivity-conscious initiatives are being implemented

Annexes

Annex 1

Local Monitoring Plan for the Arad-Deva pilot-area

Annex 2

Main sectoral stakeholders in the Arad-Deva pilot-area

Annex 3

Sectoral impacts and general threats or pressures to connectivity

Annex 4

Glossary

Annex 5

Online library of multi-sectoral solutions for ensuring functionality of ecological corridors

Annex 6

Multisectoral online datasets for the pilot area



PILOT AREAS:

Austria

- 1 Kobernausser forest
- 2 Pötsching (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 Sciences

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: National 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

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

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