

Output T2.3

Preparatory Actions for the Arad-Deva Pilot Area



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Foreword

Implementation of a series of actions included in the Cross-Sectoral Operational Plan (CSOP) for the Arad-Deva Pilot Area has been started already during the project period.

They are presented bellow as a section of the CSOP Logframe, followed by a short descriptive part.

Preparatory actions for the ARAD-DEVA pilot-area

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
<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>Classify the suitability of underpasses for different species-groups;</p> <p>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>

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



Fig 1. 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



Fig 2. 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

Objective 1.2. Ensure the functionality of overpasses

(potential) Problems	Proposed Measures/Targets	Actions
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	1.2.2. Green bridges (including tunnel-top surface) are being managed in order to maximize their functionality for wildlife	Produce suitability models for relevant species as support for management plans;

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 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.



Fig 3. 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



Fig 4. The surface of the green-bridge near Bastea is not attractive for wildlife as the land is eroded by grazing © Zarand

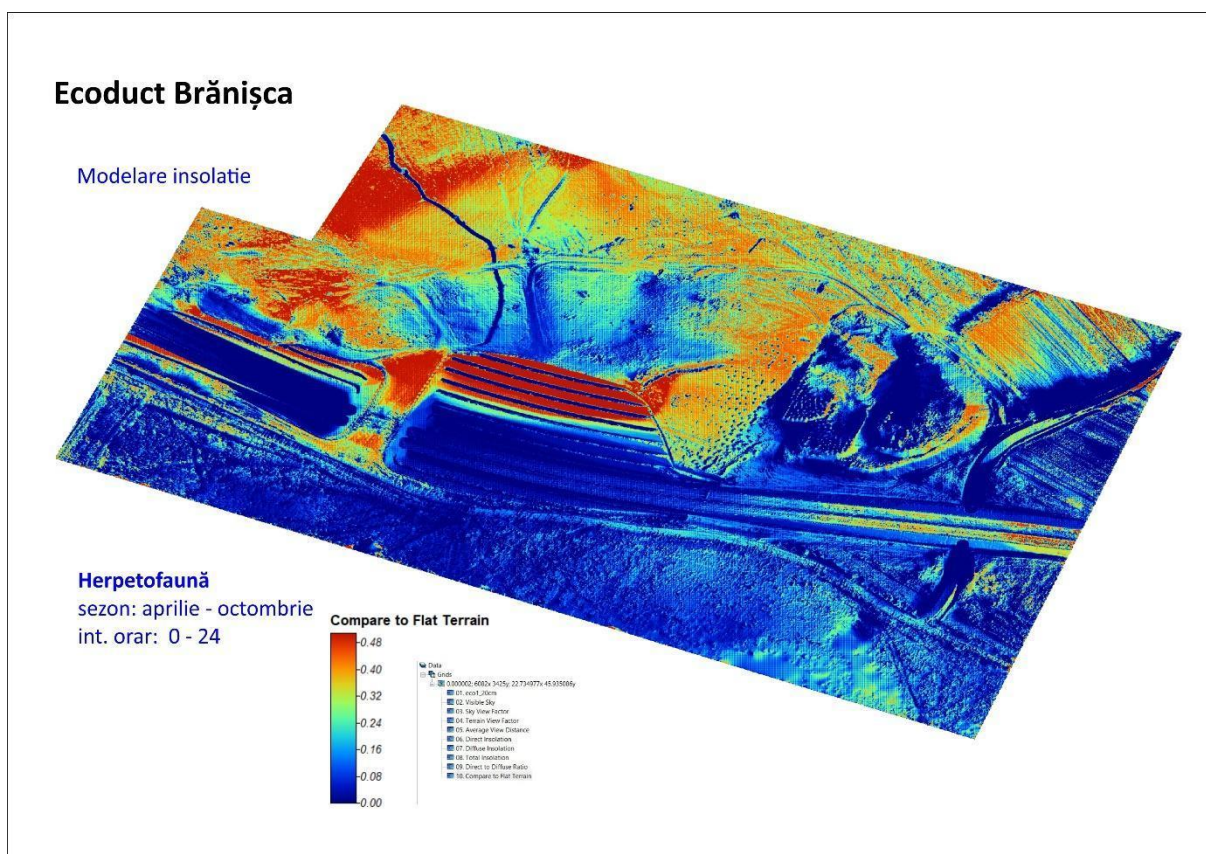


Fig 5. The suitability model for reptile species produced within the SaveGREEN project is to highlight the areas where specific microhabitats need to be installed/safeguarded along the green bridge and its surroundings as part of an ecological reconstruction project © Zarand

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

(potential) Problems	Proposed Measures/Targets	Actions
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	Map the Green Infrastructure elements and assess them in relation to land-use categories and sectoral plans; Assess wildlife passages/permeable sectors, assign ecological roles, and draft a dedicated register;
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	Develop guidelines and implement the Natura 2000 sites specific conservation measures and regulations in order to maintain/enhance functionality; Integrate conservation measures and regulations into the updated Natura 2000 management plans;

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.

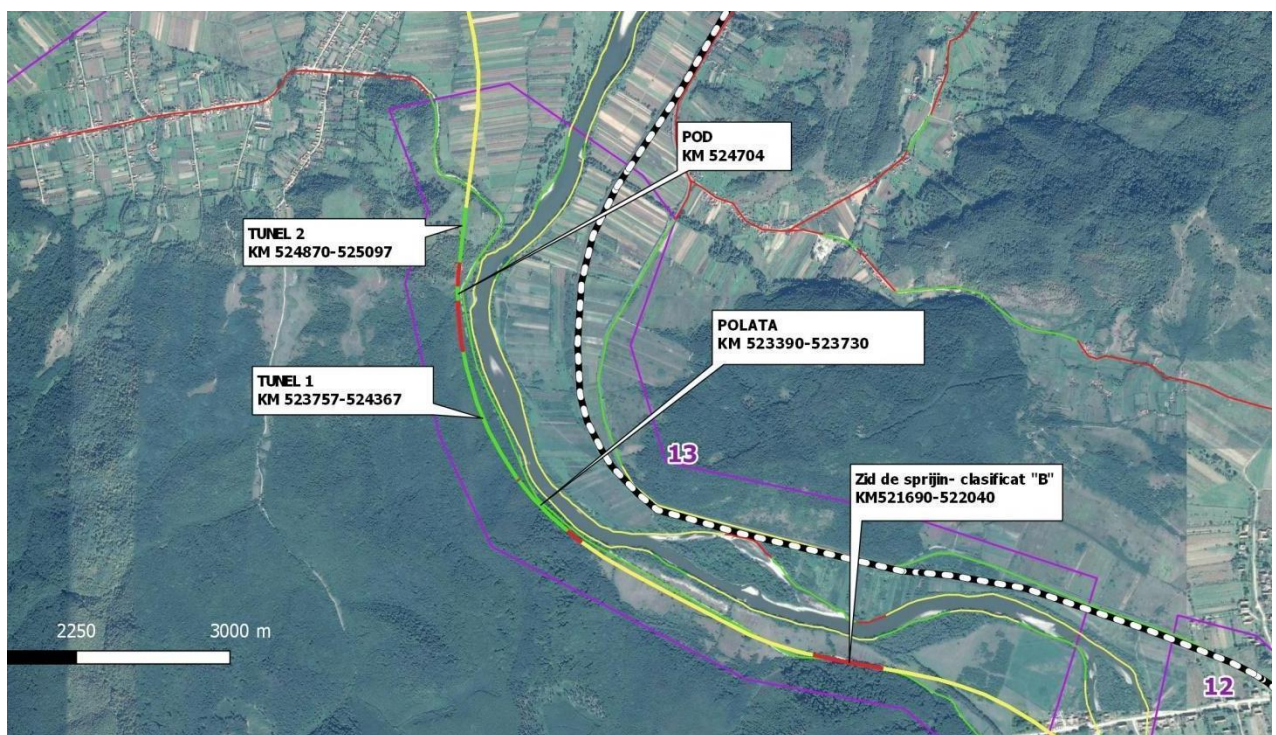


Fig 6. The Pojoga section is one of the two sectors where bored tunnels were designed on the Paulis –Deva upgraded railway. It is important that the permeability of adjacent features – roads and river banks be maintained/restored. Example of permeability assessment: green = highly permeable, yellow = medium permeable, red = barrier for large mammals; purple = priority study areas; © Zarand. Background © Google Earth

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

<i>(potential)</i> Problems	Proposed Measures/Targets	Actions
p1. Road and environmental authorities do not have access to a database/map of important (permeable) road sectors and objects.	2.1.1. Transport and environmental authorities are aware of important (permeable) sectors	Continue the mapping of infrastructure, including sectors under construction; Include the infrastructure permeability maps in the GreenWeb GIS database;

A methodology (AZ 2017) has been developed to classify important structural 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.

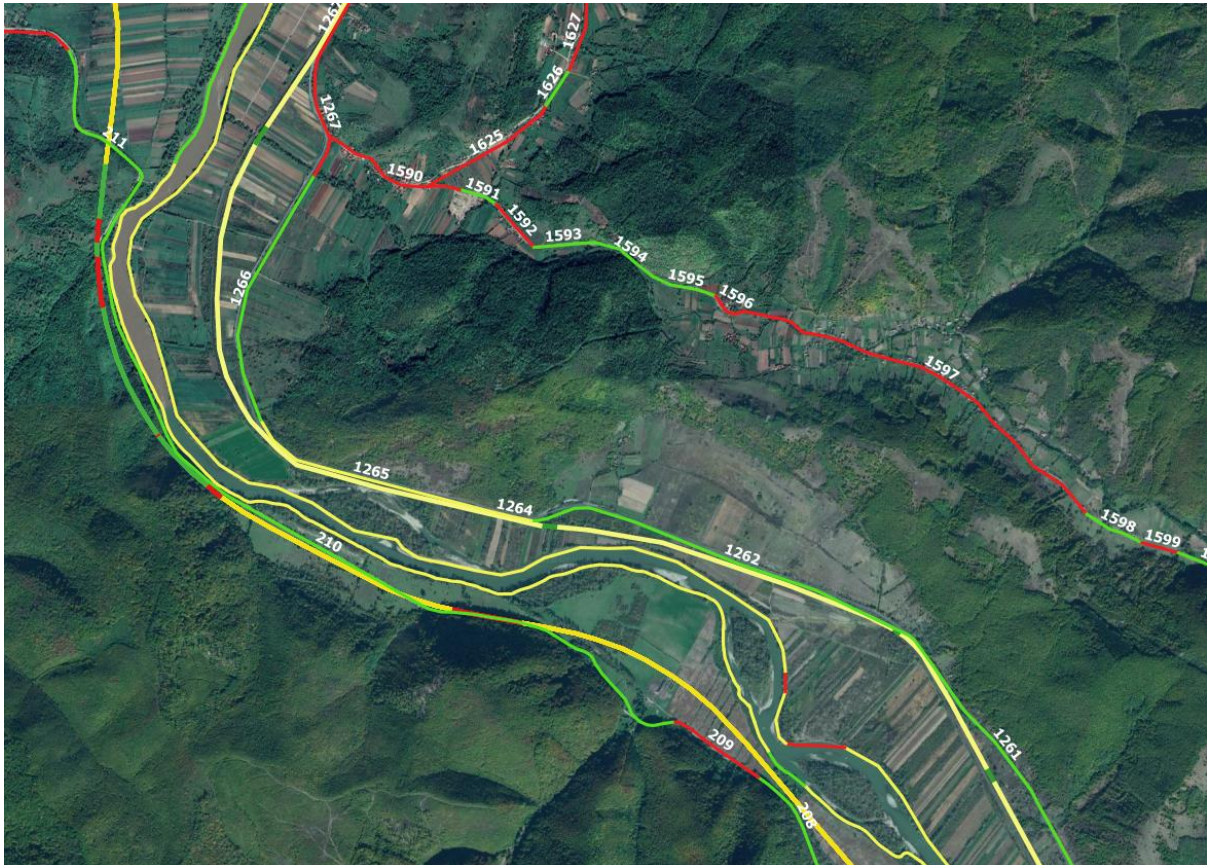


Fig 7. Permeability assessment of linear features (roads, railway, riverbanks): green = highly permeable, yellow = medium permeable, red = barrier for large mammals © Zarand/background © Google Earth

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

(potential) Problems	Proposed Measures / Targets	Actions
p1. Water-management and environmental authorities do not have access to a database/map of the important Mures banks (permeable) sectors and objects.	2.2.1. Water-management and environmental authorities are aware of the Mures banks permeable sectors	Include the river permeability maps in the GreenWeb GIS database;
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	Map the permeability of tributaries;

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.

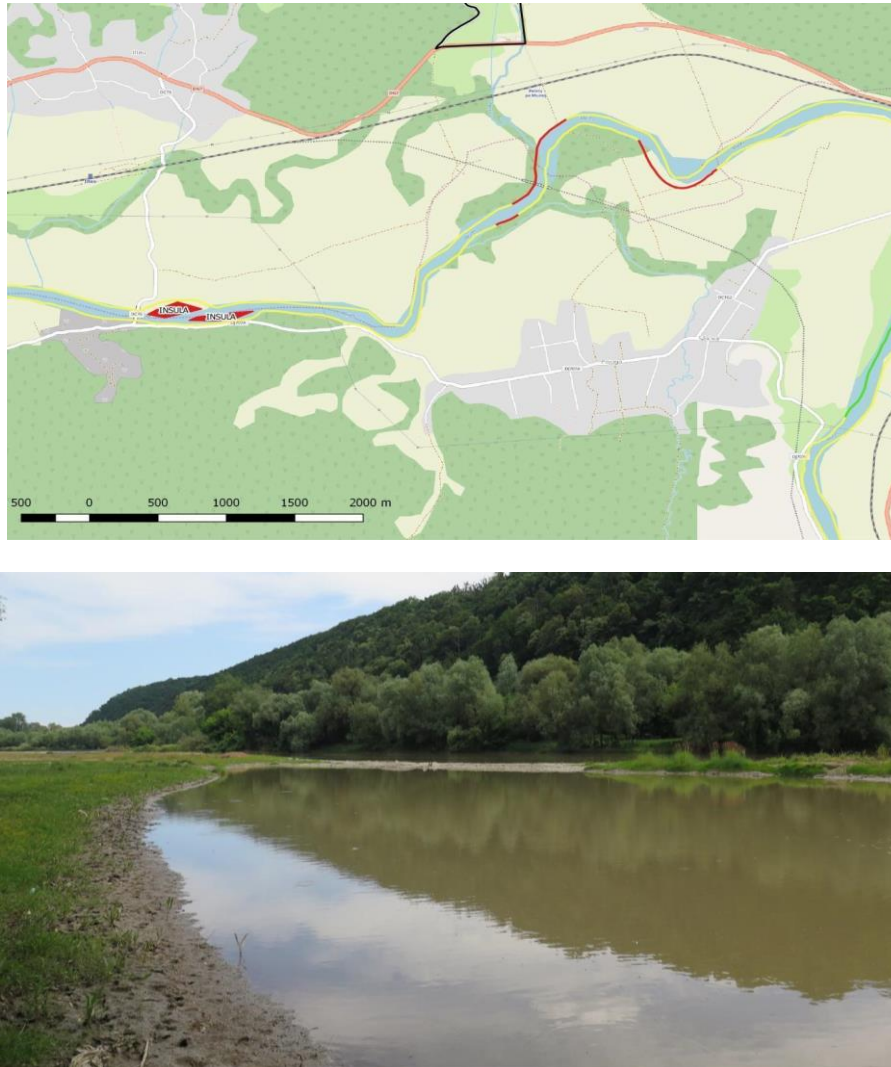


Fig 8. Example of permeability classification for the Mures riverbanks (top); example of a sector on the river Mures with permeable (F) natural banks (bottom) © Zarand

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).

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).

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



Fig 9. Example of a barrier for local fish species on one of the Mures tributaries © Zarand

THREAT/PRESSURE 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

<i>(potential) Problems</i>	Proposed Measures/Targets	Actions
<p>p2. Due to degradation of the existing fences, there are a lot of incidents with wildlife and domestic animals entering 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.</p>	<p>3.1.2. A regular programme of fences assessment and repairing is implemented</p>	<p>Collect data and make use of the database of accident/incidents/high risk-sectors;</p>



Fig 10. Existing fence is not bear-proof and is not being maintained regularly © Zarand

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 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.

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*).

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.



Fig 11. Existing data can inform authorities on high-risk areas on roads © Zarand

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

<i>(potential) Problems</i>	Proposed Measures/Targets	Actions
<p>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.</p>	<p>3.8.1. Adequate solutions for safe for bats lighting is implemented on motorway</p>	<p>Identify critical areas on the Lugoj-Deva motorway and the technical specifications for bat-safe lighting;</p>

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.



Fig 12. Using bat-detectors (top) helps to understand how the local species use the landscape elements (bottom) © Zarand

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

(potential) Problems	Proposed Measures/Targets	Actions
<p>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.</p>	<p>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</p>	<p>Develop methodologies, a mobile app and a support database for official data collection and assessment based on the exchange of expertise; Develop pilot-projects to implement data collection and to develop best practices; Support building a data-base and produce assessment results; Develop country/regional/European scale projects with coherent data input.</p>
<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>Develop a mobile app and support database for data collection and assessment based on the exchange of expertise; Develop pilot-projects to test and implement data collection and develop best practices;</p>

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 expanded country wide. Management and data validation will be needed to link the data with the GreenWeb integrated platform in order to support informed decisions.

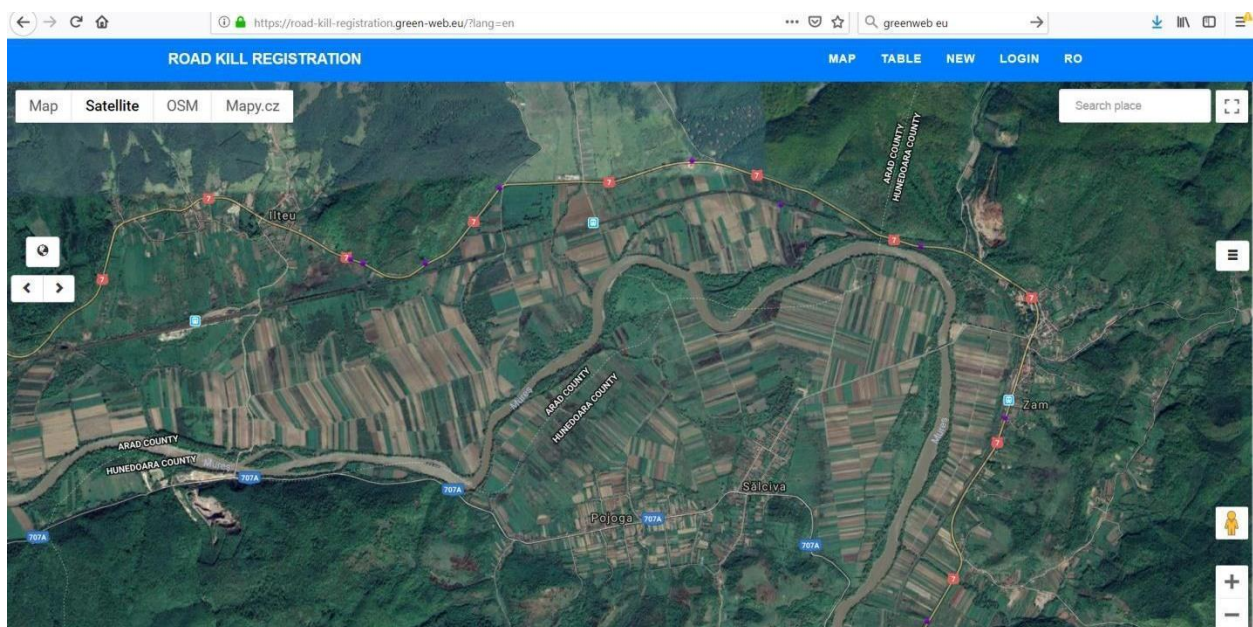


Fig 13. Print screen from the GreenWeb road kill registration app, developed under TRANSGREEN project

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, 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.**

THREAT/PRESSURE 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

<i>(potential)</i> Problems	Proposed Measures/Targets	Actions
p2. Sectoral database are not compatible/synchronized and monitoring methods and tools are not shared	7.1.2. Monitoring is integrated at landscape level	Develop compatible pilot-monitoring systems (methodologies, procedures, tools, indicators, database, evaluation etc.);

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.

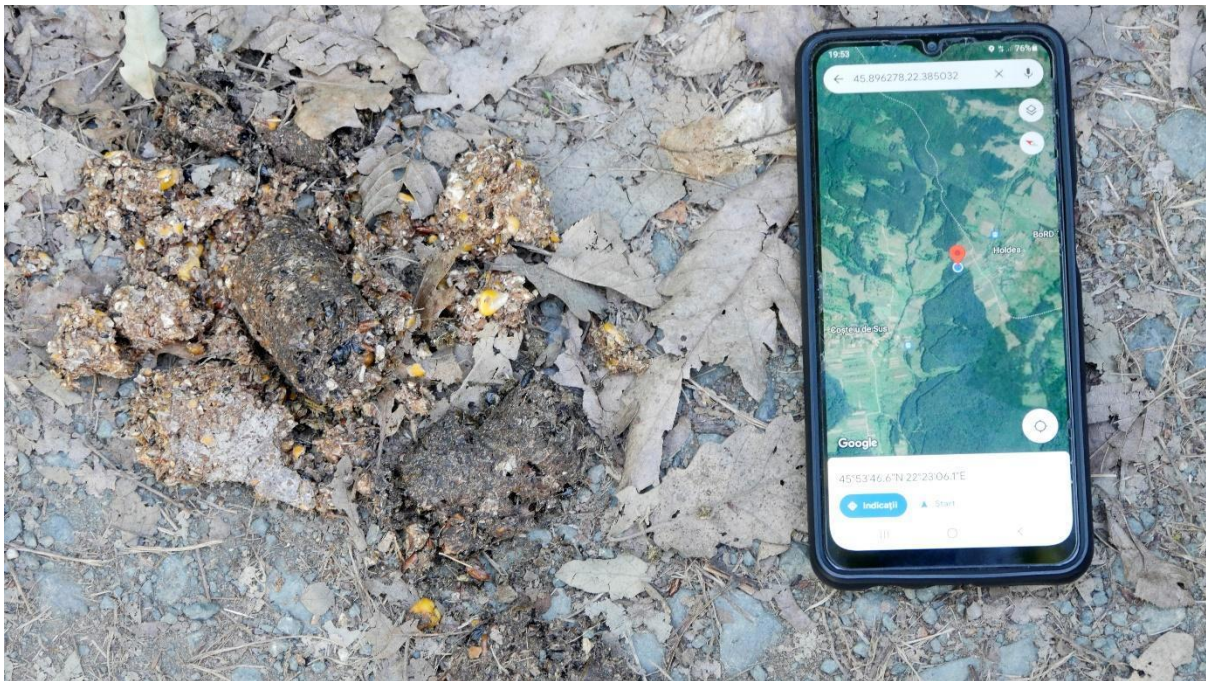


Fig 14. Monitoring activities that target different groups of species relevant at the landscape level - recording of activity signs of large carnivores on top of the future tunnels
© Zarand



Fig 15. Monitoring activities that target different groups of species relevant at the landscape level - insects near green-bridges © Zarand

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

The online library of multi-sectoral solutions for ensuring functionality of ecological corridors (*library*) was developed in order to offer relevant examples and resources for initiatives/projects/activities related to safeguarding connectivity at landscape scale.

Based on the feedback of potential users and representatives of the Carpathian Convention, the agreed solution was to integrate the library in the [CCIBIS](#) platform (the Carpathian Countries Integrated Biodiversity Information System), an information portal for spatial data and notable publications related to environmental conservation in the Carpathian Ecoregion.

The Library mainly consists in resources made available by SaveGREEN partners, but integrates best practice examples derived from other DTP projects – TRANSGREEN, ConnectGREEN, BioREGIO Carpathians and Centralparks.

In order to integrate the up-to-date reference solutions for the **transport sector**, the library is including and referring to the sectoral library developed in the [Horizon2020 BISON](#) project (note that several SaveGREEN partners are involved also in the BISON project).

The main internal connection is with the **Handbook** (part of Output T1.3) as it is built on resources of good (or bad) practices and with the Cross-Sectoral Operational Plans that identified at pilot-area level resources available to support the implementation of local plans. Additionally, it is a living platform with possibility to add other documents (prepared currently or in the past) and update the existing materials. There is an option to extend its focus to other sectors in accordance with the decision of the key stakeholders (the Carpathian Convention etc.).

CCIBIS features two main interrelated components:

- **The library - a Data Catalogue, which serves as a searchable repository for spatial data and publications on the Carpathian region;**
- **Multisectoral online datasets - a Geoportal, which allows the user to navigate through specialised thematic maps that combine particular datasets stored in the Data Catalogue.**

Multisectoral online datasets for the pilot areas

Data resulted from SaveGREEN has been collected based on standardized templates / matrix at project level. The process involved all project partners and was coordinated by EEA, CDV and SPECTRA (linked to D.T1.2.1) with the support of the WP Leader, AZ.

The collected data was included /synchronized with the CCIBIS portal (the Carpathian Countries Integrated Biodiversity Information System), an information portal for spatial data and notable publications related to environmental conservation in the Carpathian Ecoregion), based on the already existing structure incorporating data from former projects like TRANSGREEN or ConnectGreen. For the SaveGREEN pilot areas overlapping partially with areas addressed by these projects, the database has been updated and extended and used as examples for the other pilot areas.

The main categories of datasets produced / updated during the project are:

- **Land use types**

- **Biodiversity data such as species distributions** (species occurrence data as developed by VUKOZ during the ConnectGREEN Project covering the area of whole Carpathians and partial data are available in more detail for some pilot areas);
- **GI elements such as protected areas including Natura2000 sites, Protected areas (WDPA), Old growth forests and Wetlands;**
- **Identified ecological corridors or models of landscape permeability (Modeled ecological corridors as developed by EEA in SaveGREEN pilot areas or by VUKOZ in ConnectGREEN Project);**
- **Natural (micro)habitats or passageways;**
- **Barriers including grey infrastructure and fences** (in SaveGREEN pilot areas, the Map of barriers for the ecological connectivity as developed by VUKOZ during the ConnectGREEN Project);
- **Monitoring data resulted from fieldwork (Activity T2.3): species presence, road/rail kills etc.**

At the end of the project, the database is available [HERE](#) to all stakeholders.



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

Objective 8.2. Facilitate information, awareness, education, communication

(potential) Problems	Proposed Measures/Targets	Actions
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	<p>Create and share content across stakeholders – including through innovative methods;</p> <p>Engage public opinion vectors and media;</p>

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;



Fig 16. Studying natural succession on a landfill near a green-bridge in order to propose adapted ecological reconstruction measures © Zarand



Fig 17. Discussing landscape dynamics during the SaveGREEN international workshop in the pilot area © Zarand

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);

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.



Fig 18. Presenting the importance of the pilot area to a wider audience – filming for an Arte France documentary on Wildlife Corridors © Zarand

**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
<p>P1. The connectivity-important landscape is large and diverse and not recognized as such by local communities</p>	<p>8.4.1. A landscape identity is being build and promoted</p>	<p>a. Aggregate local values to develop a regional identity; b. Facilitate local/regional brandings aligned with regional identity; c. Create a coherent promotion programme.</p>

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



Fig 19. SaveGREEN-branded honey was used to promote the connectivity topic in the pilot area © Bianca Stefanut, WWF Romania