



MAINSTREAMING OF BIODIVERSITY IN THE TRANSPORT SECTOR

The Case of Large Mammals in the Alpine-Carpathian-Dinaric region

Case highlights

Biodiversity enhancement in transport development is possible when green (and blue) and grey infrastructure are planned in a coordinated effort. It is necessary to cross boundaries between sectors!

Availability of ecological information is of fundamental importance to identify optimal sites and measures for biodiversity enhancement. It takes time but technology is readily available.

Issue addressed

Infrastructure development introduces barriers to wildlife, currently recognized as one of the main threats for endangered species and a critical obstacle to species recovery. Transport networks divide natural habitats into small isolated patches threatening the survival of entire populations. “Habitat patches” are areas with favourable conditions for the species; these are separated by “barriers” which seriously hinder individuals from passing. Green infrastructure corridors can enhance ecological connectivity between habitat patches.

Species in the region most vulnerable to the impact of motorways and railways are large carnivores (brown bear, wolf, lynx) as well as large herbivores (species of deer, chamois, wild boar). Two projects looked at ways to enhance biodiversity in (planning for) transport and linear infrastructure (TLI) which affect the movement of animals between the Alps and two other mountain regions:

- The Alpine-Carpathian Corridor: This animal migration route is threatened by an increasing demand for built up land between Vienna, Bratislava and Budapest in the Danube and Morava valleys. Austrian and Slovak project partners from nature conservation, spatial planning and transport work together with diverse stakeholders to create a coherent 120 km ecological corridor from the Alps to the Carpathians, by mitigating the fragmentation effects of motorways.
- The LIFE DINALP BEAR project focusses on scientifically valid information of brown bear populations in Northern Dinaric Mountains and south-eastern Alps (Croatia, Slovenia, Austria, Italy) and experiments with measures to address high traffic-related mortality of bears, associated with the increasing fragmentation of its habitat by growing traffic infrastructure.

Approach followed

The exchange between populations of mammals such as brown bear, red deer and lynx along traditional migration routes between Alps, Carpathian and Dinaric mountains is increasingly blocked by traffic routes and areas of intensive land use. Re-colonization of the Eastern Alps through natural expansion of bears from existing populations is one of the priorities of bear conservation in Europe. Improving habitat connectivity is critical for establishing a viable bear population in the Alps.

Under the Alps-Carpathians Corridor a system of ‘Green Bridges’ has been constructed including suitable habitats to reconnect existing stepping stones which are needed as resting and feeding places for migrating animals. The first was constructed in Austria across the A4 Vienna-Budapest motorway. A similar wildlife overpass is introduced in Slovakia across the highway from Bratislava to Brno.



In Croatia, planning for wildlife crossing structures began over ten years ago when possible habitat fragmentation due to a planned motorway became a great concern. Several crossing structure projects have been put into practice, and guidelines on planning and suitability of different structures for animal crossing have been developed. Several highways now have animal crossings (tunnels, viaducts, bridges and green bridges). Some of these have been intensively studied. Animal tracks have been counted on crossings, with between 4 and 37 crossings per day per crossing structure by large mammals. Radio-tracked bear, wolf and lynx showed strong positive selection for tunnels and viaducts. Further measures included electric fencing of problematic motorway sections with frequent collisions, and dynamic traffic signs to alert and slow down drivers coupled to sensors capable to detect large animals approaching the road.

Benefits obtained

The Alps-Carpathian Corridor's project structure has created a forum for the managers of these regions to share ideas and develop solutions that can be applied within the entire region, instead of only per protected area. To ensure long-term continuity, key stakeholders are party to a Memorandum of Understanding. In addition, the relevant spatial development plans at regional and federal level will factor in the results and recommendations from this project. Public awareness campaigns and environmental education for schools within the region are part of the project.

Provision of correct information for planning and impact assessment is a priority. The understanding of habitat suitability and spatial connectivity of landscape for brown bears has been obtained by the observation of radio-collared bears. Based on the information, a bear habitat suitability model was developed aimed at identified potential corridors; this information is used in EIA for new projects but also for mitigating the impacts of existing infrastructure. All of this is translated into a [handbook for spatial planning](#), as a measure to prevent further fragmentation and to assess current barriers aimed at finding the best areas for corrective measures.

The measures already taken showed traffic collisions with large carnivores and other mammals to be reduced by 50%; radio-tracked bear movements showed clear avoidance effect of the 'treated' road sections.

Best practice lessons

Strategic focus: practice points towards the need to have biodiversity conservation as an objective in national transport master planning and where possible making a link to existing spatial planning frameworks.

Interdisciplinarity: Combined green and grey Infrastructure requires interdisciplinary and interagency cooperation. There is a need to share experiences as there still is little practical experience.

Data on animal movement and use of habitats has proven to be fundamental to identify the best location for ecological connectivity measures and to provide evidence of their concrete use.

Stakeholder involvement at all stages of project development is essential to make use of available knowledge and to avoid conflict.



Elsewhere: *Pench tiger reserve, INDIA*

As part of the India's National Highway Development Project, it was proposed to upgrade National Highway 44 from a 2-lane to a 4-lane highway. Approval was granted with the condition of provisioning of animal crossing structures to reduce animal-vehicle collisions/mortality and also to ensure habitat continuity in the landscape. Based on extensive research on animal movements and habitat use along the highway in Pench Tiger Reserve, Maharashtra, a 16 km section of the highway was identified for planning wildlife crossings to secure connectivity of habitats. Four minor bridges and five animal underpasses were constructed with spans ranging from 50 m to 750 m. They are the first of their kind in India, and perhaps the largest in the world. Camera trapping efforts showed the effectiveness of all nine crossing structures, with regular crossings recorded of 19 species of large mammals (including 89 tiger crossings!). Between the first and second year, a 195% increase was recorded, showing adaptation of animals to the crossings. The case shows that road upgrading can be used for this benefit of biodiversity and undo earlier damage.



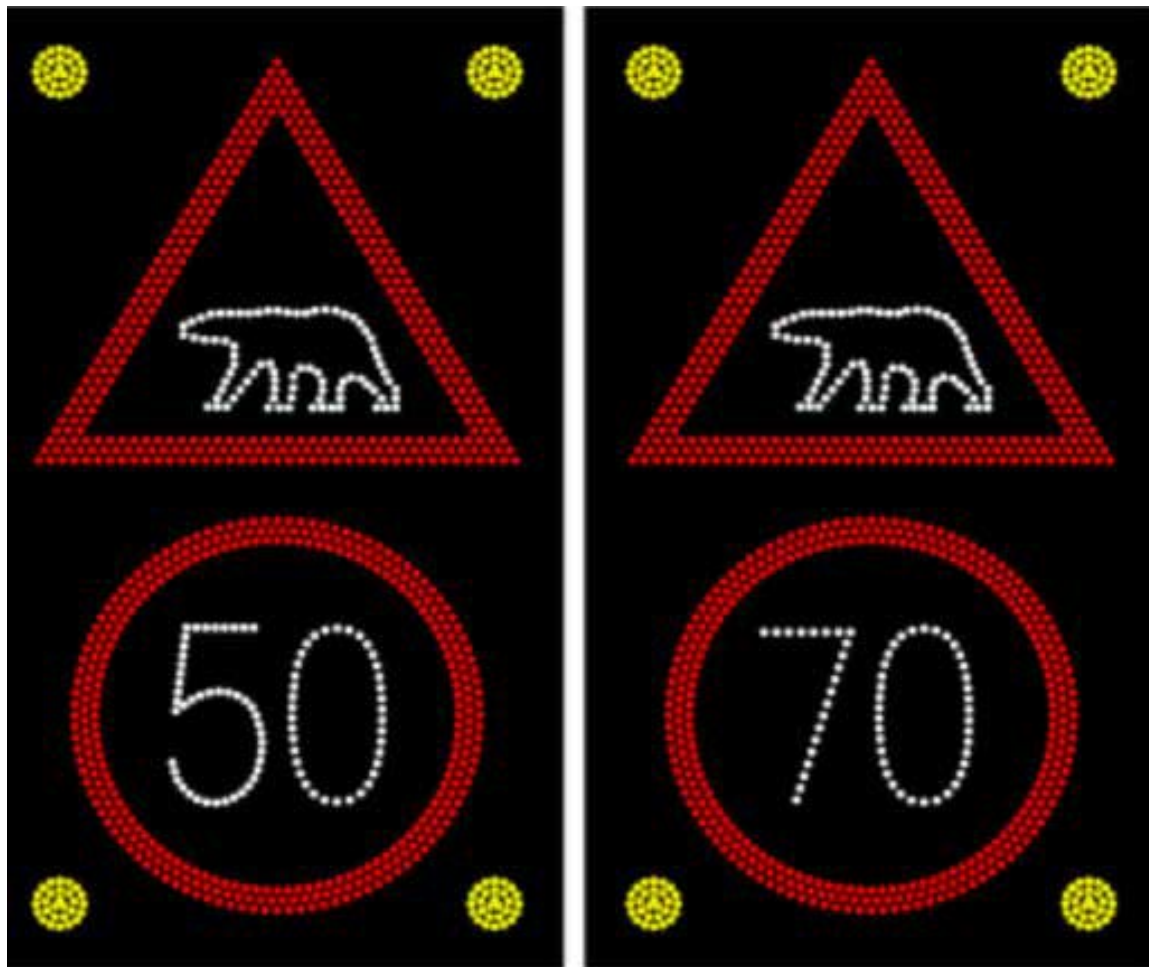
Source: Asha Rajvanshi and Vinod B. Mathur (in press)



The Green bridge on D2 motorway (Slovakia) to restore animal migration in the Alpine-Carpathian corridor.
<https://www.youtube.com/watch?v=VMPS86qJMxl>

Additional information

- *Innovative Alps-Carpathians Corridor re-establishes a major migration route for wild animals, Green Infrastructure for the Benefit of Both People and Nature*
- *Green Infrastructure and the Transport sector;*
- *Guidelines how to minimize the impact of transport infrastructure development on nature in the Carpathian countries*
- *A Global Strategy for Ecologically Sustainable Transport and other Linear Infrastructure*
- Quick tips on *Infrastructure* and *Green mobility*



Dynamic traffic signalization uses sensors to detect when animals are present near roads. As they are only activated when animals are present, drivers are more aware of them than with classical signalization.