



WORKING WITH NATURE IN THE TRANSPORT SECTOR

 This document is part of the *“Working with Nature”* Quick Tips series, comprising 7 sectoral Quick Tips on [Agriculture and Livestock](#), [Cities](#), [Disaster Risk Reduction](#), [Forestry](#), [Renewable Energy](#) and [Water](#).



The links between transport and nature

This note addresses linear infrastructure for rail and road transport; aviation and shipping are not addressed because of their different characters.

Transport is one of the key factors driving economic development. At the same time, it also has significant negative impacts on biodiversity through ecosystem fragmentation and destruction, thereby negatively impacting ecosystem services. There are **four major adverse impacts of linear transport infrastructure** development on wildlife:

- ▶ **Habitat fragmentation.** New roads are dividing landscapes and its watercourses¹ into increasingly smaller fragments and create barriers for species living in such areas. Reduced ability to move around in search of food, mates and new habitat can lead to isolation, loss of genetic diversity and in the long-term regional extinction. This is especially the case with species depending on large areas. Habitat fragmentation is recognized as a major threat for populations of large mammals.
- ▶ **Loss of habitat** due to development along transport corridors. Transport networks can facilitate the spread of agricultural settlements, urban and other built-up areas into relatively rural and sparsely populated areas.
- ▶ **Traffic related fauna mortality** can cause wildlife populations, which already are under pressure, to drop below a critical population size.
- ▶ **Opening up of untouched areas.** New roads provide access into areas that used to be inaccessible, creating opportunities for legal or illegal roadside settlement and development, or exploitation of undisturbed areas (e.g. poaching, deforestation, land conversion for agriculture). Railways are far less damaging in this respect



How transport sector can contribute to and benefit from nature

The 2022 [Global Biodiversity Framework](#) requires us, by 2030, to ensure that all areas are **under participatory integrated biodiversity inclusive spatial planning** and/or effective management processes addressing land and sea use change, to **bring the loss of areas of high biodiversity importance**, including ecosystems of high ecological integrity, **close to zero** (target 1). It also requires us to ensure the **full integration of biodiversity and its multiple values into policies, regulations, planning and development processes**, strategic environmental assessments, environmental impact assessments, within and across all levels of government and across all sectors, in particular those with significant impacts on biodiversity (target 14).

¹ Together with diversion of rivers and streams, which can further alter the hydrology of an area.

The [Green Infrastructure Strategy](#) addresses the need to integrate Green Infrastructure (GI)² (see Quick Tips: Working with Nature) into the key policy areas, including transport as well as the need for consistent and reliable data which are essential for effectively deploying GI. It emphasizes that GI solutions can contribute significantly to the development of Green Transport Corridors.

Biodiversity enhancement can be achieved only if and when biodiversity concerns are taken into account and integrated from a very early stage – as early as possible, so that green and grey infrastructure are planned in a coordinated effort.

The crucial phases are scoping and planning! In these phases of developing the transport concept, and assessing the different corridor variants, biodiversity concerns can be integrated by, for example, engaging biodiversity experts in the initial design process. They can contribute with knowledge on animal movements, use of habitats, migration maps, and conduct biological surveys which will allow to timely recognize potential conflict areas and find win-win solutions. It is important to understand pre-existing threats that might be exacerbated and identify corrective measures. If the project/context calls for increased biodiversity ambition, “excess compensation” can be envisaged to achieve a net positive impact on nature, beyond the basic mitigation hierarchy.

Green Infrastructure can often provide more benefits at lesser cost than single-purpose grey infrastructure. The benefits of green transport corridors go beyond just biodiversity. They create benefits for regional economies, employment, tourism and recreation, public health, water management and climate change adaptation. For example:

- ▶ Green Infrastructure may enhance scenic value and connectivity resulting in increased **benefits from leisure and tourism**.
- ▶ Green walls along infrastructure function as **noise barriers** and **reduce air pollution** through particulate filtering. In urban environment the greening of roads contributes to a healthier city, adapted to climate change by **reducing heat stress**, (and increased property value).
- ▶ Green infrastructure provides nature-based solutions to mitigate **water run-off**, **reduce erosion** of road bodies, as well as **reduce stormwater flows** as part of a sustainable drainage system, when implemented at the level of stream catchments (e.g. restoration of wetlands with high water absorption capacity).
- ▶ Nature-Based Solutions along roads can further increase **road visibility** (dust control), **slow down desertification** (windbreaker, erosion control) and **stabilize slopes** adjacent to roads.

Priorities for action:

In order to best integrate biodiversity in the transport sector it is important to **have a strategic focus!**

- ▶ **Go beyond “do no harm”** at project level. Environmental Impact Assessment (EIA) is usually limited to mitigating the impacts. Yet, even at this final design stage it is possible to integrate biodiversity-positive measures into road design at very limited cost. For example, to facilitate animal migration it is possible to adapt the design of bridges, culverts and pipes that are needed anyhow, to provide underpasses for local fauna. Extending such measures beyond the boundaries of protected areas would enormously help to restore general ecological connectivity.
- ▶ However, at project level design with EIA stage, it is often too late to apply the full mitigation hierarchy to first AVOID, then MITIGATE, and if nothing else works to COMPENSATE impacts. To AVOID impact, biodiversity conservation objectives need to be **embedded in national transport master planning as well as in spatial planning**.
- ▶ **Use of strategic environmental assessment (SEA)**, carried out during the planning processes, to inform such planning processes at an early stage on, amongst many other things, opportunities for biodiversity enhancement (for example by overlaying alternative routes with sensitive wildlife migration routes to identify potential win-wins). This is a precondition for holistic infrastructure planning.
- ▶ **Start compiling data on animal movement and use of habitats as early as possible.** If there are no relevant data, most probably biological survey will be needed. Species occurrence databases (e.g. [Global Biodiversity Information Facility](#)) can provide easy-to-access information, although they must be complemented with ground data.
- ▶ Encourage partner financial institutions to **share biological surveys with collaborative open-source platforms**³.

² Green Infrastructure is defined as ‘a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services’ in both rural and urban settings.

- ▶ Use those data for **mapping Green Infrastructure** to connect and enhance nature beyond protected areas and across country borders. Mapping can be done on different scales. The **large-scale (and less detailed) mapping of GI** is appropriate over large regions on matters of national or trans-border relevance, such as defragmentation measures, planning of highways and territorial cross-border coherence to ensure the connectivity of protected areas or targeted ecosystems. **Local and regional mapping** require fine-grained, accurate and detailed data.
- ▶ In order to successfully combine green and grey infrastructure, an **interdisciplinarity approach and proper stakeholder engagement are key**.



Good practice examples of nature-friendly transport

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

The Green bridge on D2 motorway (Slovakia) to restore animal migration in the Alpine-Carpathian corridor. <https://www.youtube.com/watch?v=VMPS86qJMXI>

Issue addressed

The exchange between populations of mammals along traditional migration routes between Alps, Carpathian and Dinaric mountains is increasingly blocked by traffic routes and areas of intensive land use. 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). 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 of habitat connectivity is critical for establishing a viable bear population in the Alps. Two projects looked at ways to enhance biodiversity in (planning for) transport and linear infrastructure 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 allowing uninterrupted migration of animals.
- ▶ **The LIFE DINALP BEAR project** focusses on scientifically valid information of brown bear populations in Northern Dinaric Mts. 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

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.

³ For example, the [Data4Nature campaign](#) led by AFD aims to convince as many development banks as possible to systematically share the data collected through impact assessments and (pre) feasibility studies on the Global Biodiversity Information Facility.

In Croatia, planning for wildlife crossing structures began over ten years ago when habitat fragmentation due to a planned motorway became a great concern. Several crossing structures 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, green bridges, etc.). Some of these have been intensively studied. Animal tracks have been counted on crossings, with between 4 and 37 movements per day per crossing structure by large mammals. Radio-tracked bears, wolves and lynxes 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 with 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, beyond an individual protected area. To ensure long-term continuity, key stakeholders are parties in a Memorandum of Understanding. In addition, the **relevant spatial development plans** at regional and federal levels 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 identifying 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. Benefits thus include car safety and animal life.

Best practice lessons

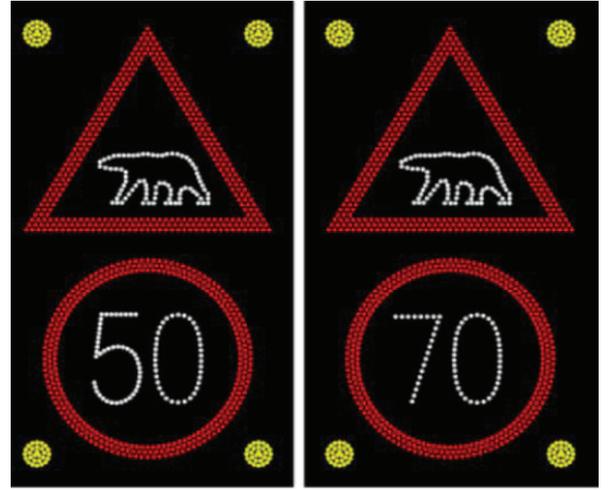
- ▶ Strategic focus: Practice points towards the need to have biodiversity conservation as an objective in national transport master planning and where possible making a link to existing spatial planning frameworks.
- ▶ Interdisciplinarity: Combined green and grey Infrastructure requires interdisciplinary and interagency cooperation. There is a need to share experiences where practical knowledge is limited.
- ▶ 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.

The Case of Pench tiger reserve, India

National Highway 44 (NH 44)⁴ in India has been associated with a high incidence of animal mortality due to road accidents. As part of the India's National Highway Development Project, it was proposed to upgrade NH 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 movements 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)

⁴ National Highway 44 is one of the longest highways in India which passes through several important wildlife habitats, including tiger reserves and elephant corridors.



Further information and support

- ▶ QuickTips on [Working with Nature](#)
- ▶ Quick tips on [Infrastructure](#) and [Green mobility](#)
- ▶ 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](#)
- ▶ [WWF \(2014\): Lifelines for Tigers, Status and Conservaton of the Kanha-Pench Corridor](#)
- ▶ A Global Strategy for Ecologically Sustainable Transport and other Linear Infrastructure
- ▶ [Tools to support Green Infrastructure](#)

All documents are available on capacity4dev (public group: [Environment, Climate Change and Green Economy](#))

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