

# Planning and implementing strategic green and blue infrastructure networks for ecological connectivity

## Case study Goriška Statistical Region



### 1 Why act here? — Ecological connectivity in the Goriška Statistical Region

Located in western Slovenia, the Goriška Statistical Region spans 2,325 km<sup>2</sup> and bridges the Alps and Dinarides. It includes key protected areas such as the Triglav National Park, several Natura 2000 sites, and forest reserves. The region's ecological corridors, especially between the Trnovo Forest Plateau and Triglav National Park are vital for species migration. However, pressures from urban sprawl, intensive agriculture (notably in the Vipava Valley), and linear infrastructure (e.g. expressways) threaten the connectivity. The ongoing preparation of the regional spatial plans under Slovenia's Spatial Development Strategy 2050 is an opportunity to give more prominence to the topic of ecological networks and connectivity. Potentially, it enables integration of green infrastructure and restoration of fragmented habitats to ensure long-term ecosystem resilience.

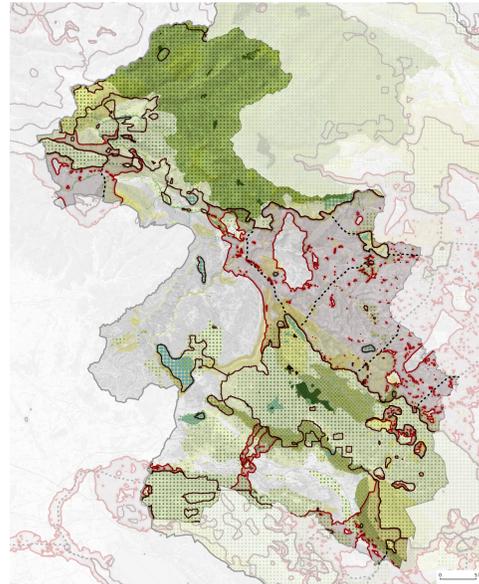


Figure 1: Protected natural areas in the Goriška Statistical Region

### 2 Case study objectives

The pilot aims to analyse ecological connectivity between the core areas such as the Triglav National Park, the Trnovo Forest Plateau, and the Karst Plateau, as well as highlight areas where there is a need to reduce fragmentation caused by infrastructure and intensive land use in valley bottoms. It focuses primarily on enhancing structural connectivity to support habitat connectedness and ecosystem resilience. Tangible outputs include a mapped green and blue infrastructure (GBI) network, guidelines on integrating connectivity measures into regional, municipal spatial plans and other planning documents as well as guidelines for mitigating development pressures, such as road network expansion and energy infrastructure development.

### 3 Methodological approach

In the Slovenian pilot region, the key connectivity areas and corridors were identified using GIS-based modelling and least-cost path analysis, supported by the Alpine-wide Structural Connectivity Model. This model distinguishes three types of areas: core areas, which are relatively undisturbed natural zones; intervention areas, where biodiversity is degraded and restoration is needed; and support areas, which present possible links between the core areas through semi-natural landscapes. The analysis integrated CORINE Land Cover (2018), the Ministry of Agriculture, Forestry and Food's land use registry (2024), forest function maps, Natura 2000 sites, and data on species movements, including brown bear, red deer, and griffon vulture. Nine corridors were delineated across transnational, inter-regional, and local scales, guiding planning interventions to restore connectivity and reduce fragmentation.



Figure 5: Detail of the corridor from the Trnovo Forest Plateau to Triglav National Park

### 5 From concept to statutory plans

Planning tier	GBI integration measures
Regional	Regional Spatial Plans integrate green and blue infrastructure through strategic mapping of ecological corridors and multifunctional areas. These plans are aligned with the Spatial Development Strategy of Slovenia 2050 and guide cross-municipal coordination and investment priorities.
Sub-regional and inter-municipal	Landscape plans incorporate green and blue infrastructure by identifying ecological functions and spatial pressures at a finer scale. They support targeted restoration, connectivity enhancement, and coordination across natural and administrative boundaries.
Municipal	Municipal land-use plans and building codes embed green and blue infrastructure through zoning regulations, protective designations, and incentives for preserving natural features. Pilot actions can be formalised through detailed spatial plans, enabling implementation of connectivity measures on the ground.

### 4 Pilot design

The spatial analysis in the Goriška Statistical Region could provide a basis for informed decision-making in the upcoming preparation of the regional spatial plan. It began with a systematic review of national, regional, and municipal legislation and development programmes, including the Slovenia's Spatial Development Strategy 2050 and the Slovenian Spatial Planning Act. This was followed by the compilation of relevant spatial data - land use, infrastructure, solar irradiance, and ecological features processed in QGIS to produce thematic maps. These maps visualize pressures and opportunities for renewable energy facilities and transport infrastructure in relation to ecological connectivity. The results offer planners a structured overview of spatial conflicts and mitigation options and can serve as an input for the regional spatial plan. The ecological network design enables the integration of green and blue infrastructure into national, regional and local planning frameworks. The concept of ecological connectivity is not yet present in the Slovenian legal system or planning documents. The case study results thus focus on presenting a potential path for its inclusion at various scales.

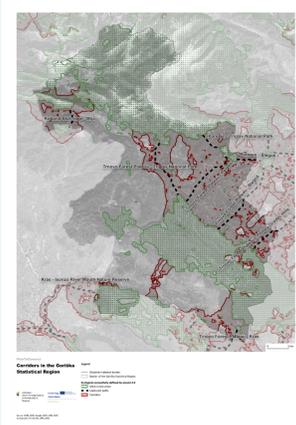


Figure 2: Corridors in the Goriška Statistical Region

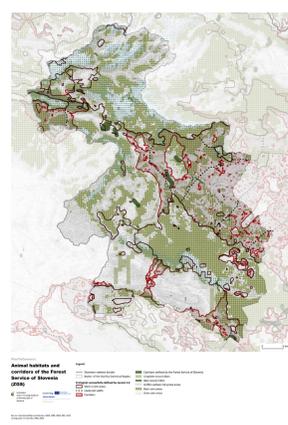


Figure 3: Wildlife habitats and corridors designated by the Slovenian Forest Service (ZGS)

### 7 Funding toolbox

Key funding instruments for implementing ecological connectivity in the Goriška Statistical Region include EU-level programmes such as the Rural Development Plan, specifically Measure M10 (agri-environmental and climate measures) and Measure M12 (Natura 2000 and Water Framework Directive payments). These support habitat restoration and riparian ecosystem improvements, with incentives for farmers in connectivity corridors. At the regional level, the Regional Development Programme 2021–2027 outlines strategic support for renewable energy and green infrastructure. Innovative mechanisms like Payments for Ecosystem Services (PES) and community solar projects are encouraged in municipal energy concepts, especially in the municipalities of Kanal, Tolmin, and Ajdovščina.

### 8 Key messages for planners

1. Integrate the expert-proposed mapped corridors and connectivity zones into Regional Spatial Plans as a formal planning layer.
2. Use municipal detailed spatial plans to implement pilot measures.
3. Align corridor planning with sectoral instruments (e.g. water, forestry, agriculture, energy, transport) to ensure cross-sectoral coherence and funding eligibility.
4. Linking spatial analysis to statutory planning tools ensures long-term implementation of green infrastructure.

### 9 Next steps/expected impact

The next step is implementation of ecological connectivity measures on site through targeted pilot projects, including smaller-scale initiatives funded by programmes such as LIFE. These projects should focus on corridor restoration and connectivity improvements in valley bottoms, and landowner engagement. In parallel, the concept of ecological connectivity should be formally integrated into the first generation of the regional spatial plans. Operational guidelines and corridor data produced during the PlanToConnect project can be used as an input. This will ensure that connectivity goals are translated into binding municipal planning instruments and supported by sectoral coordination.

### 6 Governance & stakeholder engagement

The coordination structure is led by the Ministry of Natural Resources and Spatial Planning, with support from the Urban Planning Institute of the Republic of Slovenia. A regional connectivity working group includes key actors such as environmental authorities, forestry service, municipalities, farmers, NGOs, and academic institutions. Stakeholder involvement is ensured through co-design workshops, consultations, and thematic events like the Mediterranean Coast Week. The process promotes dialogue across sectors and scales, enabling integration of ecological connectivity into regional spatial plans and future projects focused on corridor implementation and landscape-level restoration.

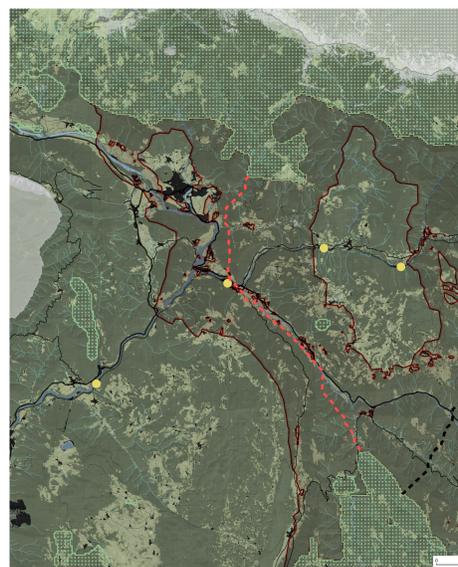
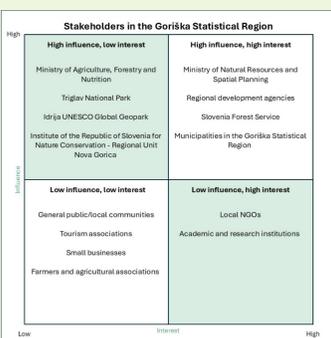


Figure 4: Selected corridor from the Trnovo Forest Plateau to Triglav National Park