



Ecological
Connectivity
and Nature-
Based Solutions
in The
Carpathian
Region

EXECUTIVE SUMMARY

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This report was commissioned by UNEP with the purpose of identifying the socio-economic benefits of applying Nature-based Solutions to enhance ecological connectivity in the Carpathian region. The findings of the 2014 BioREGIO project in the pilot area of the Djerdap National Park (Serbia) and the Iron Gates Natural Park (Romania), as well as interviews with local experts and secondary research of existing reports, were used as a case study to derive a Theory of Change (ToC). This ToC serves both as the theoretical framework and as a final output of the project. It focuses on the conservation and restoration of wetland and forest ecosystems to highlight how increasing ecological connectivity through nature-based solutions (NbS) fosters socio-economic benefits in the Carpathians. This report provides a comprehensive analysis of how nature can be used to restore and repair itself while benefitting society in terms of health, social well-being, and economic opportunities.

The first part of the research consisted in assessing how the causes of ecosystem fragmentation and biodiversity loss has evolved since 2014 in the case study area. One of the main findings of the BioREGIO project was that the threats to forest ecosystems such as invasive species, illegal logging, clear-cutting, single-stock plantations, uncontrolled increased tree cover, and fragmentation caused by roads, were still threats in 2022. Similarly, the threats identified by said pilot project in 2014, including flooding caused by hydroelectric dams, eutrophication, water contamination by plastic waste and fuel, land degradation caused by both air and water pollution, changes to sedimentation and erosion processes, disruptions to water flow and levels, and invasive plant and animal species were still threatening wetland ecosystems in the pilot area in 2022.

These threats to wetland and forest ecosystems were found to be triggered by anthropogenic factors. Among the identified threats to forest ecosystems, the primary root causes were found to be poor forest management practices, mining, urban development, insufficient monitoring of habitat health, and a lack of economic opportunity that pushes locals to resort to illegal tree cutting. In wetland ecosystems, root causes of ecosystem fragmentation and biodiversity loss were also directly prompted by anthropogenic activities such as unsuitable agricultural practices, improper waste management, mining waste dumping, adverse effects caused by hydroelectric plants, and the introduction of invasive species both accidental and deliberate. However, an indirect effect of anthropogenic activity which translates into a natural phenomenon in the form of climate change also threatens the existence of wetland ecosystems with changes in water levels linked to upstream flooding or prolonged droughts, changes in water temperature, and more.

The report found that ecosystem fragmentation translates into the loss of supporting, provisioning, regulating, and cultural ecosystem services offered by the area, which can have devastating socio-economic consequences for the local and Pan-European region. The loss of supporting ecosystem services has socio-economic consequences. Indeed, it would not only mean the disappearance of native and endemic plant and animal species, but it would also affect agriculture with the degradation of soil formation and nutrient cycling capacities. Moreover, wetland and forest ecosystems provide provisioning services that are essential to human survival such as water and agricultural goods for human consumption. Additionally, the provision of timber, agricultural goods, and hydroelectric power enable local communities to generate revenue. Moreover, fragmentation and biodiversity loss threaten cultural ecosystem services such as ecotourism or the appeal of historical tourist attractions such as medieval monuments, which also generate revenues for local communities. Lastly, the loss of biodiversity and fragmentation of wetland and forest ecosystems would intensify the release of carbon that had been sequestered in the past by those

habitats while simultaneously decreasing those same carbon sequestration capacities of the Carpathian region.

Research findings show that national governments, municipalities, and private actors can counteract the effects of ecosystem fragmentation by tackling the root causes of ecosystem degradation through an array of NbS. In 2014, one of the key findings of BioREGIO was that wetlands can be restored and preserved through NbS such as installations of water treatment facilities, restoration of proper hydrological regimes and river dynamics, floodplain recovery, changes to agricultural practices, and the introduction of buffer zones. NbS for forest ecosystems restoration and conservation included banning illegal logging through economic schemes directed at the population, species' introduction, replication of natural distributions for tree plantation, creation of ecological corridors, and implementation of financial tools aimed specifically at biodiversity conservation.

The research showed that in the pilot areas located in both Romania and Serbia, these NbS were not implemented and that the main barriers to such implementations of these NbS were legal, cognitive, and economic. Indeed, lack of legislation and transboundary agreements prevented the tackling of the threats to ecosystems and the facilitation of NbS employment. The lack of funds also explained the absence of implementation of the NbS. Finally, a lack of knowledge about the socio-economic impact of these solutions explained the deficiency of investment in NbS by both the private and public sector.

However, this investigation also demonstrates that although these NbS were not implemented in the pilot area, other areas have derived socio-economic benefits from the implementation of NbS. The main socio-economic benefits of implementing these NbS resulted in flood disaster risk prevention and reductions of monetary losses caused by flood damage, climate change mitigation through the increase of carbon storage capacities, creation of employment opportunities, improved health benefits through the improvement of water quality, and more.

The Theory of Change derived from the research of this report concluded that to **achieve the enhancement of ecological connectivity** as a long-term impact, the following outcomes need to be met: international cooperation for the implementation of Nature-based Solutions, continuous and proper monitoring of biodiversity, increased financing for ecosystem restoration and conservation, and improved sustainable management. The report generated some policy recommendations for each outcome.

The main policy recommendations for the realization of these outcomes were the following:

- Increasing knowledge production and quantification of the socio-economic benefits of Nature-based Solutions through ecosystem service assessments and more
- Introduction of transboundary agreements in terms of knowledge sharing, legislation, and funding in the Carpathian Convention, etc.
- Creation of financial tools to fund these solutions: establishment of markets with offset mechanisms