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FOREWORD

The European Green Belt initiative (www.europeangreenbelt.org) is an ambitious project aimed at preserving and promoting ecological connectivity and biodiversity along the former Iron Curtain, which once divided Eastern and Western Europe during the Cold War. Spanning over 12,500 km, the Green Belt stretches across 24 countries, from the Barents Sea in the north to the Black Sea in the south.

The European Green Belt (Author: The European Green Belt Association)

The Central European section of the European Green Belt holds particular significance due to its rich natural and cultural heritage. It encompasses diverse landscapes, ranging from lush forests and rolling hills to wetlands and meandering rivers. The countries involved in this section, including Poland, Germany, Czech Republic, Slovakia, Austria, Hungary, Slovenia, Croatia and Italy, have been actively engaged in preserving this ecological corridor.

One of the primary objectives of the Central European Green Belt is to protect and

restore habitats for a wide range of plant and animal species. It serves as a vital migratory route for many bird species, making it crucial for bird conservation efforts. The wetlands along the belt are essential breeding grounds for waterfowl and support numerous endangered species. The initiative fosters international cooperation, bringing together neighbouring countries to work jointly on conservation projects and sustainable development. It encourages the establishment of protected areas, ecological corridors, and green infrastructure, all of which enhance ecological connectivity and support the free movement of wildlife.

In addition to its ecological significance, the Central European Green Belt is a symbol of unity and reconciliation. It serves as a living monument of the continent's history, reminding us of the division that once existed and the subsequent efforts to unite Europe. By transforming a former symbol of separation into a symbol of cooperation, the Green Belt promotes peace, understanding, and solidarity among European nations. Local communities are actively involved in the initiative, participating in conservation projects, ecotourism ventures, and educational programs. The Green Belt helps raise environmental awareness, fostering a sense of pride and responsibility among residents, and nurturing a culture of sustainable living. As the initiative continues to evolve, the European Green Belt stands as a testament to the transformative power of unity and nature's ability to heal the scars of the past.

The ReCo project, financed under the EU Interreg Central Europe programme, aims to address the challenges facing the Central European Green Belt (CE EGB). This unique network of ecologically important habitats and protected areas is under threat due to increasing land use pressure, habitat fragmentation, and climate change, leading to biodiversity decline and habitat degradation.

To improve the protection and conservation of habitats along the CE EGB, ReCo focuses on transnational cooperation, recognizing that ecological interconnectivity extends beyond national borders. Restoration measures are crucial to enhance ecological connectivity and support the EU's biodiversity strategy. The project will employ innovative geo-information and data processing systems to devise solutions. Additionally, ReCo will adopt a community-based development approach, encouraging communities to contribute funds and activities towards habitat restoration.

Key outcomes of the project include: (1) a Joint Transnational Restoration Strategy targeting disturbed or degraded ecosystems along the European Green Belt’s Central European section, promoting nature, biodiversity, and EU Green Infrastructure through improved habitat interconnectivity, (2) the development of six Joint Regional Restoration and Connectivity Plans, (3) enhanced transnational and cross-border cooperation among stakeholders along the Central European section of the European Green Belt, (4) creation of two practitioner guides to aid in the implementation of restoration efforts.

Beneficiaries of the project include local, regional, and national public authorities, sectoral agencies, infrastructure and service providers, NGOs, higher education, and research organizations. These stakeholders will gain expertise in promoting biodiversity and connectivity of valuable habitats.

The project's work is organized into three work packages, devoted to elaboration of a Joint Transnational Strategy, practical implementation of pilot actions and political mainstreaming and upscaling of achieved results. As the ReCo project progresses, it will significantly contribute to preserving the ecological integrity and biodiversity of the Central European Green Belt. By combining the strength of transnational cooperation with innovative approaches and community involvement, the project exemplifies a united effort to protect one of Europe's most valuable natural treasures, ensuring its conservation for generations to come.

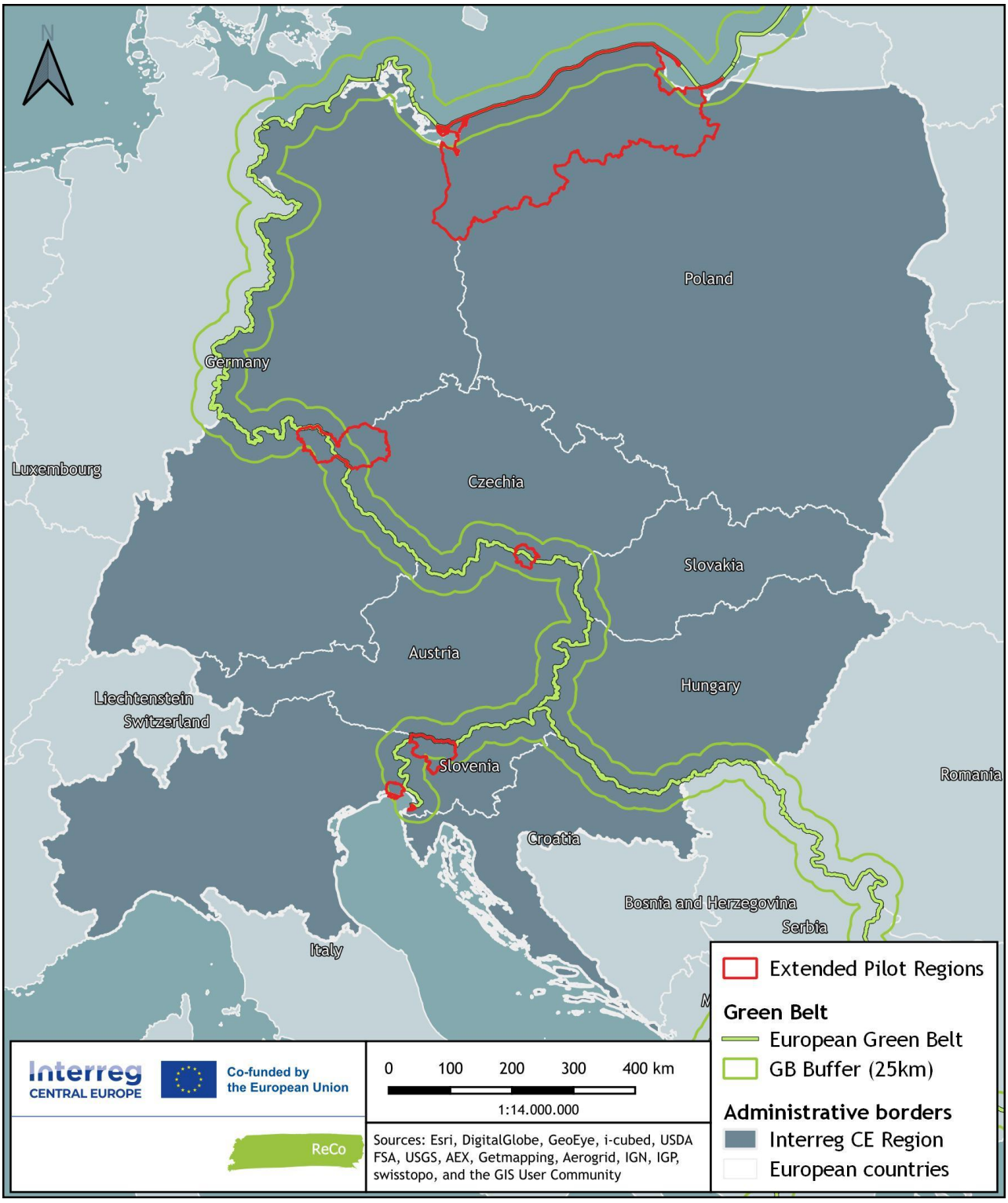
The ReCo project involves three key definitions:

- Joint Pilot Action, which refers to the restoration and connectivity plan implemented in the Pilot Regions of the ReCo project. This action aims to test or demonstrate innovative ecological restoration approaches, enhance ecological interconnectivity, and protect biodiversity. It specifically targets ecologically valuable habitats, including NATURA 2000 areas, that are endangered by climate change. Additionally, it focuses on priority species. The main objective of Joint Pilot Actions is to achieve community-based leverage effects.
- Pilot Investment represents a conservation measure with a demonstration, model, or pilot character, implemented on a small scale to ensure the successful implementation of Joint Pilot Actions. Examples of such investments include revitalization efforts for creeks, grasslands, and wetlands, as well as the planting of hedges or forest stripes in degraded areas. Innovative GPS collars may also be utilized as part of these investments.
- Pilot Region refers to one of the six designated areas within the ReCo project. These regions, including regions dedicated to habitats protection (Fichtelgebirge Mountains/Smrčiny Mountains, Gorenjska region, Isonzo Plain, Škocjanski zatok Nature Reserve) and regions dedicated to species protection (Ińsko Lakeland, Podyjí National Park/Thayatal National Park), are facing specific ecological problems that will be addressed through the implementation of Joint Pilot Actions.

The present brochure is dedicated to the description of six pilot regions, including two cross-boundary areas, within the Central European Green Belt as part of the ReCo project. It provides valuable insights into each pilot region's characteristics and ecological significance. It covers various essential topics, starting with a brief description of each pilot region, highlighting the form of protection in place and the ReCo project partners involved in the region. Additionally, the brochure delves into the unique value and ecological importance of each pilot region, shedding light on the conservation measures applied to safeguard its natural treasures. The biodiversity in each region is explored, emphasizing the conservation status of various species, with a special focus on the most valuable ones. Furthermore, the brochure provides insights into the challenges and risks faced by each pilot region in terms of future development. It concisely describes the obstacles that need to be overcome to ensure sustainable progress. The main stakeholders involved in the conservation efforts and development of each region are also introduced, emphasizing the importance of collaborative partnerships. Lastly, the brochure highlights the problems that each pilot region aims to tackle, offering a concise description of the reasons for their designation or establishment, the nature conservation goals and objectives, and the threats posed to protected species and habitats.

Key features of the ReCo Pilot Regions

Pilot Region		Country	Responsible Partner of the ReCo project	Targeted habitat or species		Main stakeholders
1.	Fichtelgebirge Mountains	Germany	Bavarian Branch of Friends of the Earth Germany & Hof county branch of Friends of the Earth Germany	Habitats	Wet meadows and moor	municipalities, water and soil protection associations, farmers, Bavarian State Forestry, nature conservation authorities (e.g. Lower Nature Conservancies of the rural districts Hof and Wunsiedel, Higher Nature Conservancy of Upper Franconia), nature and landscape conservation associations, spatial planning authorities
	Smrčiny Mountains	Czechia	Ametyst		Mountain streams and pools, Mountain mowed meadows	local government (i.e. regional authority of the Karlovy Vary Region, regional association of municipalities and towns Euregio Egrensis, Aš Region Association, municipalities of Cheb, Františkovy Lázně, Aš, Hranice, Skalná, Plesná, Luby, Hazlov), the Agency for Nature and Landscape Protection of the Czech Republic, state enterprise Povodí Ohře and Lesy ČR, administrators of church, municipal (e.g. Forestry of the City of Cheb) and private forests, farms (e.g. Farma Trojmezí a.s.)
2.	Gorenjska region	Slovenia	BSC – Business support organisation ltd., Kranj		Mountain hay meadows	Institute of the Republic of Slovenia for Nature Conservation (Unit Kranj), Public institution Triglav National Park, Municipalities of Gorenjska, Chamber of Agriculture and Forestry of Slovenia, Slovenia Forest Service, farmers, NGOs, general public
3.	Isonzo Plain	Italy	Municipality of Staranzano		Shallow marine tidal areas, salt & brackish marshes, mudflats, riverine woods, plain wood	farmers, port of Monfalcone, the territorial management authorities (i.e. Consortium for the „bonifica" of the Isontina Plain), villages neighbouring protected areas, tourists, nature photographers and birdwatchers
4.	Škocjanski zatok Nature Reserve	Slovenia	DOPPS – BirdLife Slovenia		Annual plants colonizing mud and sand, Mediterranean salt meadows, Mediterranean and thermo-Atlantic halophilus scrub, Mudflats and sandflats not covered by sea water at low tide, Coastal Lagoons	Municipality of Koper, Port of Koper d.d., University of Primorska – Faculty of Tourism, Tourism Cooperative "Treasures of Istria" and Primary school of Ankaran, tourists, bidrwatchers, NGOs and general public
5.	Ińsko Lakeland	Poland	Green Federation „GAIA"	Species	European bison	local governments, eNGOs, local communities, institutions responsible for nature protection, State Forests Service, hunting clubs, farmers' associations and managers of transport infrastructure in the region
6.	Podyjí National Park	Czechia	Podyjí National Park Administration		European wildcat	Podyji National Park administration, local communities, tourists, farmers, wine growers, foresters, administrative authorities, NGOs, political groups
	Thayatal National-Park	Austria	Thayatal National Park & University of Vienna			Thaytal National Park administration & Podyji National Park, the department of nature conservation of Lower Austria, legal representatives of the surrounding communities, local communities, academia, NGOs taking care of landscape & tourism



Pilot Regions of the ReCo project – an overview (Author: Stefan Fuchs)

WATER FOR PEOPLE AND NATURE: A TRANSBOUNDARY APPROACH TO WATER MANAGEMENT IN THE FICHTELGEBIRGE MOUNTAINS AMID CLIMATE CHANGE

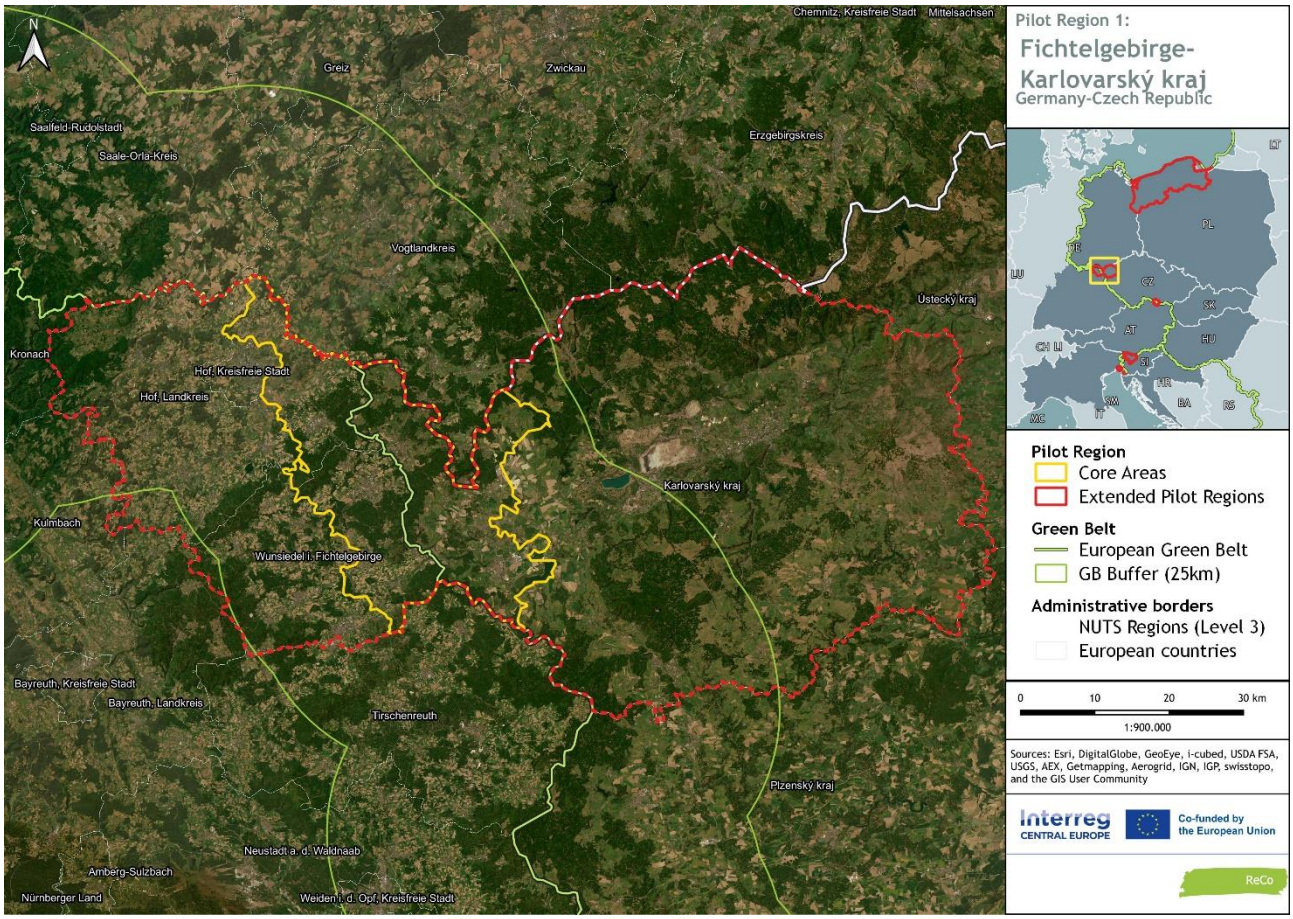
By Wolfgang Degelmann & Melanie Kreutz

In the ReCo-pilot region "Fichtelgebirge/Smrčiny" along the Green Belt Germany-Czech Republic, water plays a crucial role. Over 10,000 smaller springs emerge from the mountain slopes, converge into streams, and eventually flow out of the Fichtelgebirge through larger river systems. While the primary part of this low mountain range lies in Northern Bavaria (Upper Franconia), it also extends to a smaller area in the Czech Republic (Karlsbad region). During the remote era of the former Iron Curtain, numerous little creeks and watercourses remained largely undisturbed along the border, contributing to the preservation of vital habitats. Presently, this region harbors one of the most significant remaining populations of the freshwater pearl mussel *Margaritifera margaritifera* and a diverse range of other endangered animal and plant species, such as the marsh fritillary *Euphydryas aurinia* and the devil's-bit scabious *Succisa pratensis*. Several supra-regional, critical transboundary ecological corridors, which rely on flowing water systems or nature-related open areas and grasslands, also traverse the region. However, the area is confronting considerable changes due to the impacts of climate change. Persistent droughts in recent years have led to a substantial loss of water, resulting in declining water tables, poor agricultural harvests, forest infestations of bark beetles, and a severe threat to species adapted to wetlands and water bodies. Both people and biodiversity are at risk as the water balance undergoes a profound shift. In response to these challenges, the ReCo-project aims to develop a large-scale, cross-border concept for the ecological enhancement and restoration of smaller watercourses and streams. This endeavor will involve satellite data analysis and collaboration with municipalities and other stakeholders. The concept will identify critical hotspots where immediate action is necessary to protect biodiversity and restore the water balance by retaining water in the landscape. Additionally, the concept will serve as a recommendation tool for spatial planning by municipalities and other stakeholders.

A. General characteristics

The Fichtelgebirge is a low mountain range extending from the valley of the Red Main River in the district of Upper Franconia/Oberfranken, North Bavaria, Germany, to the Czech border, where it is known as Smrčiny. The Fichtel Mountains are characterized by phyllites, mica schists, and granites, which are highly resistant to erosion, leading to the formation of dome-like mountain shapes like "Ochsenkopf" and "Schneeberg," the highest mountains in Franconia, rising over 1000 meters. The region serves as the source for four major rivers: "Main," "Eger" (in Czech "Ohře"), "Naab," and "Saale," with the river Eger and its flood-plains playing a vital role as a German-Czech transboundary habitat network along the Green Belt.

Water plays a crucial role in the Fichtelgebirge Mountains, with over 10,000 smaller springs originating from the mountain slopes, converging into streams, and eventually joining larger river systems. The region, particularly along the Green Belt, which was the former Iron Curtain between Germany and the Czech Republic, has retained many little creeks in their natural state due to their remote location along the border. Additionally, historic ponds created for fish farming now serve as important habitats for aquatic animals and plants.



The Fichtelgebirge landscape can be divided into two distinct natural areas: the "Hohe Fichtelgebirge" (High Fichtel Mountains) with its highest elevations of Schneeberg Mountain (1053 m) and Ochsenkopf Mountain (1024 m), and the "Inner Fichtelgebirge," which presents an almost inverse mirror image. Settlements in the High Fichtel Mountains were established primarily due to the mining industry, while the Inner Fichtelgebirge

saw increased settlement and agricultural development, with forests acting as islands within the cultural landscape.

The Fichtelgebirge Mountains are surrounded by larger cities such as Hof in the north, Bayreuth in the west, Cheb (Czech) in the east, and Weiden in the south. Despite the presence of traditional industries like wood processing, stone working, and porcelain production, the area is less industrialized compared to others. It has been classified as an "area with a special need for action" according to the Bavarian State Development Plan, indicating its structurally weak nature and the requirement for specific support.

The Fichtel Mountains house the Naturpark Fichtelgebirge, an important nature park covering an area of 1,020 square kilometres, along with other protected areas such as landscape protected areas, smaller nature reserves (NSG), Natura 2000 sites, and protected forest areas on both the German and Czech sides.

B. Ecological value

In the ReCo-pilot region Fichtelgebirge/Smrčiny, several supra-regional ecological networks intersect with the Green Belt, which forms itself as an ecological network in a North-South direction. All these ecological networks were identified by the German Federal Agency for Nature Conservation (Bundesamt für Naturschutz, BfN) as transboundary important habitat networks extending to the Czech Republic. The network of submontane and montane biotopes in the Vogtland region is part of the northern area of the pilot region. The Eger-Wondreb Valley represents a cross-border ecological axis that connects the Fichtelgebirge/Smrčiny with the large-scale protection area CHKO Slavkovský les on the Czech side. The Eger Valley comprises a wide range of different habitats, including flowing waters, floodplains, and slope areas. As a result, the floodplains are quite rich in nutrients due to the presence of river sediments, while the ascending shoulders are drier and less nutritious. In the past, the cultivated landscape's former use was in harmony with natural purification mechanisms, facilitated by the interconnectedness of animals and plants. However, with the transgression of the once-established use boundaries too close to the river course, erosion is increasing. Additionally, the natural nutrient gradients between different areas are being blurred by agricultural fertilization, leading to a reduction in species diversity.

Freshwater Pear -Mussel on the left and Breeding Station in Fichtelgebirge on the right (Author: BUND-Hof)

In addition to the large-scale floodplain system of the Eger river, the numerous small creeks, watercourses, wetlands (ranging from wet meadows to mires), and small water bodies hold exceptional ecological importance. These areas support a diverse range of rare and endangered species, such as the freshwater pearl mussel *Margaritifera margaritifera*, which is one of the last occurrences of its kind in Germany.

Furthermore, these habitats play a crucial role in regulating the regional and local water balance, making them essential for agriculture and forestry as they help maintain a stable water supply in the area. The presence of nature-related and species-rich grassland areas is particularly notable along the Green Belt, further contributing to the ecological significance of the Fichtelgebirge/Smrčiny region. These grasslands provide vital habitats for various plant and animal species, promoting biodiversity and supporting ecosystem health.

As for the conservation measures, the focus of BUND Hof is on classical species protection, purchase of areas, preparation of maintenance and development concepts, regular habitat protection/maintenance, and evaluation of the measures with regard to their effect on the species to be protected. BUND Hof currently cares for about 100 ha of valuable open habitat types such as wet meadows, nutrient-poor grasslands, and nardus grasslands with its own team of trained biotope caretakers and the corresponding machinery. Wet meadows and grasslands in general adjacent to creeks are of particular importance for the water quality. Together with land users and farmers, BUND Hof takes care to ensure that these grasslands are preserved and maintained in an adapted ecological form. Special measures are taken, particularly for the protection of the Freshwater Pearl Mussel along the creeks Südliche Regnitz and Zinnbach. Zinnbach (in Czech "Rokytnice") is the border river between Germany and the Czech Republic. Along the border river, directly in the Green Belt, a breeding station, the so-called Huschermühle, was set up directly in an old mill, to raise enough young mussels to secure the stocks in the long term. In addition, the mussels are actively relocated during acute drought phases (e.g. drought summer 2018-2020), when stream courses have dried up completely.

C. Biodiversity

The focus of the pilot region is on the water courses of the montane levels, particularly the little creeks and rivers along the Green Belt, including their alluvial systems and biocoenoses. Nature-related grasslands, especially wetlands, and alluvial forests play a crucial role as buffer and filter zones for the rivers, preventing the input of nutrients and other substances. Therefore, these nature-related grasslands are also significant aspects in the pilot region.

Wet meadow with *Succisa pratensis* in the Fichtelgebirge region (Author: Nora Sichardt)

Being situated in the border region and isolated from human activity during the times of the Iron Curtain, many smaller flowing waters in this area have retained their natural state and were not straightened. The constant meandering course of the streams and rivers is characteristic of near-natural flowing waters. Seasonal variations in water levels occur over small areas, and the water flows at different speeds in these spaces, creating a variety of forms and structures that serve as habitats for a diverse range of animal and plant species, including the alluvial forest for amphibians. The ecological interconnections and interdependencies of the animal and plant species in the flowing waters contribute to groundwater recharge, water retention, and the biological self-purification of the water. Moreover, they play a crucial ecological function by connecting different natural areas and facilitating the spread and exchange of species by transporting plant seeds and animals over long distances.

The nutrient content of streams and rivers typically increases from the source to the mouth. As a headwater region with over 10,000 springs, the Fichtelgebirge has the potential to provide important habitats, where the flowing waters can remain relatively nutrient-poor and thus support ecosystems for adapted and rare specialists, such as the Freshwater Pearl Mussel. Microorganisms, animal and plant plankton form the basis of the food chain for fish, mammals, and humans. Larvae of caddisflies and stoneflies, stream fleas, and dippers serve as bioindicators for healthy, clean waters. The protection of associated species, such as fish species like the trout, is especially important for the protection of the Freshwater Pearl Mussel.

On the German side, the courses of the creeks Südliche Regnitz and Zinnbach, and small parts of their floodplain system, are protected as a nature reserve (in German “Naturschutzgebiet”, NSG). Further south along the Green Belt, the area of the Northeast Bavarian stream valleys around the village Rehau is also protected as a Natura 2000 area Nordostbayerische Bachtäler um Rehau, which includes creeks like Perlenbach, Höllbach, and Mähringsbach. However, only smaller parts of the floodplains of the creeks are adequately protected. On the Czech side, the Rokytnice creek (Zinnbach) and its floodplains are protected as a National Nature Monument Lužní potok (in Czech “národní přírodní památka”).

The most valuable species in the region include the freshwater pearl mussel, listed in Annex II and IV of the EU-Habitats Directive and classified as Red List Germany 1 (threatened with extinction). It is considered a “responsible species” for Germany, as its conservation bears special importance due to its limited occurrence here or its global endangerment. The Freshwater Pearl Mussel is an umbrella species for well-structured, nature-related creeks with good water quality.

The marsh fritillary *Euphydryas aurinia*, listed in Annex II of the EU-Habitats Directive and classified as Red List Germany 2 (highly endangered), serves as a charismatic species for public relations work. BUND Hof has already developed a comic series called the Aurenees, where the butterfly's lifecycle is explained.

The devil's-bit scabious *Succisa pratensis*, classified as Red List Germany V (pre-warning list), prefers wetland and mire meadows in montane areas, serving as crucial habitat for many insects, including the endangered Marsh Fritillary. It can be considered an umbrella species for nature-related wet and nutrient-poor meadows in the montane areas, which are important as accompanying “buffer-habitats” for the Pearl Mussel creeks.

Marsh fritillary on the left and searching for the butterfly along the Zinnbach-Valley on the right (Author: Gregor Domanjko)

D. Challenges and risks for future development

One of the problems at the societal level is the decline in population and the structural changes in agriculture. These shifts have consequences for the landscape and natural balance. Traditional, smaller farms have vanished over the past decades, and agriculture has undergone industrialization. Consequently, areas dependent on farming, like open spaces and species-rich wet grasslands, have either ceased to be cultivated or are subjected to excessive intensity. Intensive arable farming near watercourses poses a significant issue as it leads to the transportation of nutrients and soil into the water during heavy rainfall, resulting in reduced water quality and sediment buildup that hinders the habitats of the Freshwater Pearl Mussel.

Finding ways to manage grasslands and floodplains in an eco-friendly manner, in collaboration with remaining land users and farmers, is one of the most crucial challenges, especially concerning water balance. With the increasing impact of climate change, marked by more frequent drought summers and declining groundwater levels, adaptive management methods are required. This also extends to forestry, where the prevalence of vulnerable spruce forests to bark beetle infestations necessitates transitioning to more site-appropriate mixed forests and drought-resistant tree species.

Within the ReCo project, BUND Hof will develop a comprehensive and cross-border concept for the ecological enhancement and restoration of smaller watercourses and streams, leveraging expert analyses. Supporting municipalities in their efforts to protect and maintain water bodies in line with the EU Water Directive Level III is another goal. The region, severely affected by severe drought during the summers of 2018, 2019, and 2022 as a consequence of climate change, will benefit from sustainable measures that address water scarcity not only in the watercourses but also throughout the countryside, where several ecosystem services are adversely affected, posing a threat to agriculture and forestry as well.

Impact of climate change – dried-up Südliche Regnitz creek (Author: BUND-Hof)

E. Problems to be tackled with

Climate change impacts and resulting drought periods have a negative impact on habitats and species, especially those dependent on springs, flowing water systems, and related wetlands, making it one of the main problems in the pilot region. The comprehensive negative impact on the water balance affects agriculture (resulting in insufficient fodder plant growth due to droughts) and forestry (leading to a surge in bark beetle infestations on spruce trees), as well as many endangered species associated with wetlands and water bodies. The declining water table also poses a severe problem for future water supply to the population.

Endangered species face a dramatic situation: in some cases, water bodies completely dry up during drought summers, necessitating the relocation of Freshwater Pearl Mussel populations. This process is not only costly but also weakens the already compromised populations due to deteriorating environmental conditions. The complete drying out of water bodies puts the entire biocoenosis at risk.

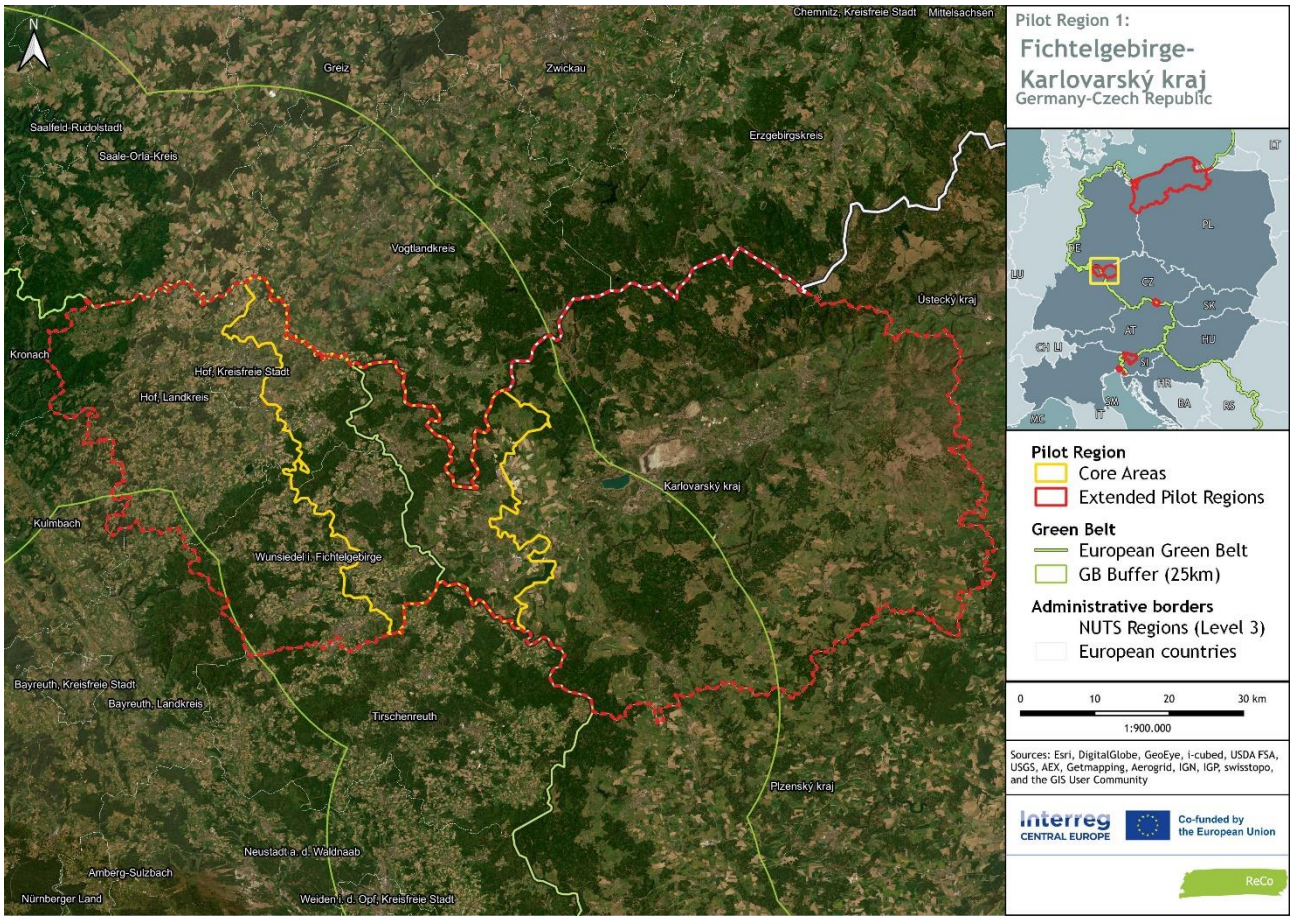
SMRČINY: IN THE LAND OF PEARL MUSSEL, MARSH FRITILLARY AND MOFETTAS

By Ondřej Volf

The Smrčiny Mountains Pilot Region represents a typical landscape that once formed part of the former Iron Curtain. This historically settled central European upland is densely populated with small settlements and comprises a mosaic of various habitats, including woodlands, fields, meadows, and pastures. The area's most precious natural phenomena have been conserved within and near the border zone. The region's clean watercourses serve as a habitat for rare species, such as the freshwater pearl mussel. Additionally, despite being preserved on a small scale, the wet meadows still host a rich diversity of plant and animal species. Another intriguing geological phenomenon found in Smrčiny is the so-called Mofetas. These are carbon dioxide seeps that emerge from fissures to the earth's surface, occurring in multiple locations throughout the area.

A. General characteristics

The Pilot Region is predominantly occupied by the Smrčiny Mountains (also known as "Fichtelgebirge" in German), situated at the border with Germany in the north-western part of the region. The Smrčiny Mountains form a rugged mountainous to hilly geomorphological unit, spanning northeastern Bavaria, southwestern Saxony, and western Bohemia in the Cheb region. In the Czech territory, it covers an area of 289 km^2 and has a mean altitude of 572.1 m above sea level. The diverse landscape comprises secondary coniferous forests, meadows, pastures, fields, and ponds. The region's most valuable areas consist of remnants of wet meadows, wetlands, peat bogs, and clean, untreated watercourses. The Smrčiny Nature Park (Ger. “Naturpark Fichtelgebirge”), covering an area of 1020 km^2, has been designated to protect this natural treasure.



The Ohře River serves as the axis of the area. Originating in Germany, the river enters the Czech territory near the town of Cheb. Within the Pilot Region, the river flows through a relatively natural channel with numerous meanders, passing through another geomorphological unit of the pilot area - the Cheb basin. Formerly a marshy area with many wetlands, only one significant remnant remains - the Soos peat bog, protected as a national nature reserve. Presently, much of the basin is devoid of trees and used for agricultural purposes. In the southern part of the Pilot Region, a small section of the Bohemian Forest forms the border with neighbouring Bavaria. This forested area has a sparse population.

The Pilot Region also encompasses a small part of the Slavkov Forest (also known as "Kaiserwald" in German), another mountain range situated in the south-east of Pilot Region. The area is abundant in mineral springs, peat bogs, and wet meadows and is protected as a protected landscape area.

Despite being densely populated, the number of settlements decreased after the Second World War due to the displacement of the German population and the existence of a closed border zone. The most prominent town in the region is Cheb, boasting a rich history and preserving numerous architectural monuments from different periods. Another significant settlement is the renowned spa town of Františkovy Lázně. Toward the north of the Pilot Region, near the border with Bavaria, lies the town of Aš, while other settlements mainly consist of small communities.

The primary transportation connections are provided by the international railway line and the D6 motorway, linking Prague with Karlovy Vary, Cheb, and further on to Hof in Bavaria.

Thanks to the presence of the Iron Curtain, many habitats have been preserved that have disappeared elsewhere. The area stands as one of the last strongholds where the river pearl mussel still thrives in small streams. Furthermore, many rare butterfly species, including the critically endangered Marsh Fritillary butterfly, can be found in the wet meadows.

Landscape on the border of the Bohemian and Slavkov Forests - Left, and the Valley of the Lužní Potok Stream, the Border Stream between Bavaria and the Czech Republic – Right (Author: Ondřej Volf)

B. Ecological value

The primary value of the Smrčiny Mountains lies in the preservation of its watercourses and catchment areas, serving as crucial biodiversity hotspots housing rare species like the freshwater pearl mussel, the brook lamprey *Lampetra planeri*, the bullhead *Cottus gobio*, and the common minnow *Phoxinus phoxinus*. Numerous measures are being implemented to restore and protect the natural form of these catchment areas. Sites like Lužní potok and Bystřina play a vital role in the pearl mussel action plan, where juveniles are released and nurtured to adulthood. Restoration efforts focus on natural channels of small tributaries and vernal pools, while grasslands are regularly mowed in a mosaic pattern to maintain species richness. Additionally, smaller peat bogs found within forest stands are designated as protected areas due to their high ecological value.

The Soos Peat Bog in the Cheb Basin represents a unique area with various intriguing geological phenomena. The landscape here comprises a mosaic of peat forests, peat bogs, and bogs with numerous mineral springs. Notably, the bubbling mud pools with so-called mofettes - gases erupting from deep within the earth's crust

- are exceptional features. An informative nature trail runs through this area, which includes an information center for visitors. Nearby, a similar region with mineral springs, gas seeps, and habitats of rare species can be found in the floodplain of the Plesná stream.

The natural and unregulated flow of the Ohře River, particularly in certain sections, is of immense value. Below Cheb, the Ohře River has been designated as a Natura 2000 site. In the Cheb basin, several wetlands are protected as natural reserves. For instance, at the outlet of the Ohře River into the Skalka dam, there is Rathsam, a mosaic of diverse wetland habitats. Moreover, other valuable areas include Studna u Lužné (the Well at Lužná), U sedmi rybníků (the Seven Ponds), and Amerika - a set of valuable ponds.

In the southwest, significant forest complexes can be found on the slopes of the Slavkovský les (Slavkov Forest), which transition into meadows. The Těšovské pastures, known for harboring numerous rare plant species, are particularly valuable.

In the south of the Pilot Region, within the Bohemian Forest, there lies the very interesting Mechové údolí (Moss Valley). This Natura 2000 site safeguards a complex of peat bogs, vernal pools, and other wetland communities.

C. Biodiversity

One of the most threatened ecosystems in Central Europe, typical of the landscape in Smrčiny region, is the oligotrophic catchment of smaller streams. Fortunately, it has been preserved in a very representative form, thanks in large part to the presence of the Iron Curtain. Within the riverbeds, stands of aquatic macrophytes, such as the alpine pondweed *Potamogeton alpinus*, provide a crucial feeding habitat for the most important species in this environment, the freshwater pearl mussel. This is one of the few areas in Central Europe where this species occurs. However, the quality of the habitat is further evidenced by the presence of many other species, including the brook lamprey, the bullhead, the common minnow, the kingfisher *Alcedo atthis*, and the otter *Lutra lutra*.

Wetlands and Ponds in the Amerika Nature Reserve - Left, and General View of the Cheb Basin – Right (Author: Ondřej Volf)

The river basin houses numerous small tributaries, wetlands, and springs, where rare plant species such as the broad-leaved marsh orchid *Dactylorhiza majalis*, the bogbean *Menyanthes trifoliata*, and the creeping willow *Salix repens* flourish. In some areas, smaller peat bogs have formed, featuring typical species like the small cranberry *Vaccinium oxycoccos* or the common sundew *Drosera rotundifolia*, while the tiny orchid lesser twayblade *Listera cordata* has been recorded very rarely. In drier sections, wolf's bane *Arnica montana* and common lousewort *Pedicularis sylvatica* can be found. Moreover, in small pools and generally moist

environments, amphibians such as the alpine newt *Ichthyosaura alpestris* and the common newt *Lissotriton vulgaris* thrive. The second most important species in this region is the butterfly marsh fritillary *Euphydryas aurinia*, occurring in a mosaic of scrub, dry and wet meadows, particularly among stands of the devil's-bit scabious *Succisa pratensis*.

Within the water environment and meadows, the black stork *Ciconia nigra* is known to hunt, while the pygmy owl *Glaucidium passerinus* has been found in the forest. Additionally, in the wet meadows, the corncrake *Crex crex*, common snipe *Galinago galinago*, and the whin-chat *Saxicola rubetra* nest, contributing to the rich biodiversity of the area.

D. Challenges and risks for future development

The Pilot Region Smrčiny is currently confronted with the increasing intensity of car traffic, necessitating the construction of road infrastructure, particularly bypasses. The consequence of this phenomenon for nature and landscape conservation is the ongoing encroachment on the open countryside, which includes the depletion of remnant habitats.

Another obstacle to the development of Pilot Region is the complex demographic and socio-economic trends, characterized by a declining population in the region and an increasing proportion of older individuals compared to the younger generation. This shift is linked to changes in land use, with agricultural land and farming being taken over by large landowners and companies with no inherent connection to the land. This has resulted in intensive farming practices on vast areas, leading to a host of related problems. Conversely, less attractive areas are often abandoned and left to natural succession and overgrowth. For conservation activities, finding individuals capable of systematic and demanding work can prove challenging.

A major challenge for nature conservation in the region is climate change, which is associated with changes in rainfall distribution. In recent years, smaller streams have increasingly dried up due to drought, even those supporting endangered species. Tragically, this has led to significant mortality among these species.

E. Problems to be tackled with

The main problem in the Pilot Region is the loss of biodiversity resulting from intensive forestry and agricultural practices, as well as the abandonment of traditional forms of small-scale farming. Water pollution remains a significant concern for aquatic organisms. A general issue in the agricultural landscape of the Czech Republic is the broken connection to the land. Most of the land is not owned by farmers; rather, it belongs to large farms managing extensive areas.

The consequences of climate change for landscapes are difficult to predict, but they are expected to have substantial impacts. Changes in precipitation patterns have already led to the frequent drying up of smaller watercourses and damage to the entire aquatic ecosystem. This factor also greatly affects forests, and it is evident that the proportion of previously cultivated species such as spruce will need to be reduced.

Another ongoing problem is the increasing construction of warehouses and industrial complexes along roads in the border area, often encroaching on natural areas.

The spread of invasive plant species, such as giant hogweed *Heracleum mantegazzianum* or Sakhalin knotweed *Reynoutria sachalinensis*, poses a specific and serious problem for the region.

A specific conservation challenge is the lack of qualified staff or individuals willing to engage in landscape management.The aim of nature conservation must be to maintain and support populations of endangered

species in their habitats. In the Pilot Region, two so-called umbrella species play a crucial role, as their effective protection can ensure the preservation of many other species and their habitats.

The freshwater pearl mussel has two key localities on the Czech side - the Lužní potok stream and the Bystřina stream. Both of these sites are included in the approved conservation program, with specific management and artificial support of the populations planned. The marsh fritillary is considered a metapopulation species. It is necessary to provide sufficient sites with suitable habitats where the number of individuals changes dynamically. Ideally, however, the overall status of the species should be satisfactory. Therefore, it is essential to create more suitable areas with food plants such as *Succisa pratensis* and other characteristics that meet the requirements of the species.

Invasive plant spreading (Author: Ondřej Volf)

REVIVING ALPINE MEADOWLAND IN GORENJSKA: SUSTAINING VIBRANT BLOOMS AND SAFEGUARDING ENDANGERED SPECIES

By Mateja Korošec

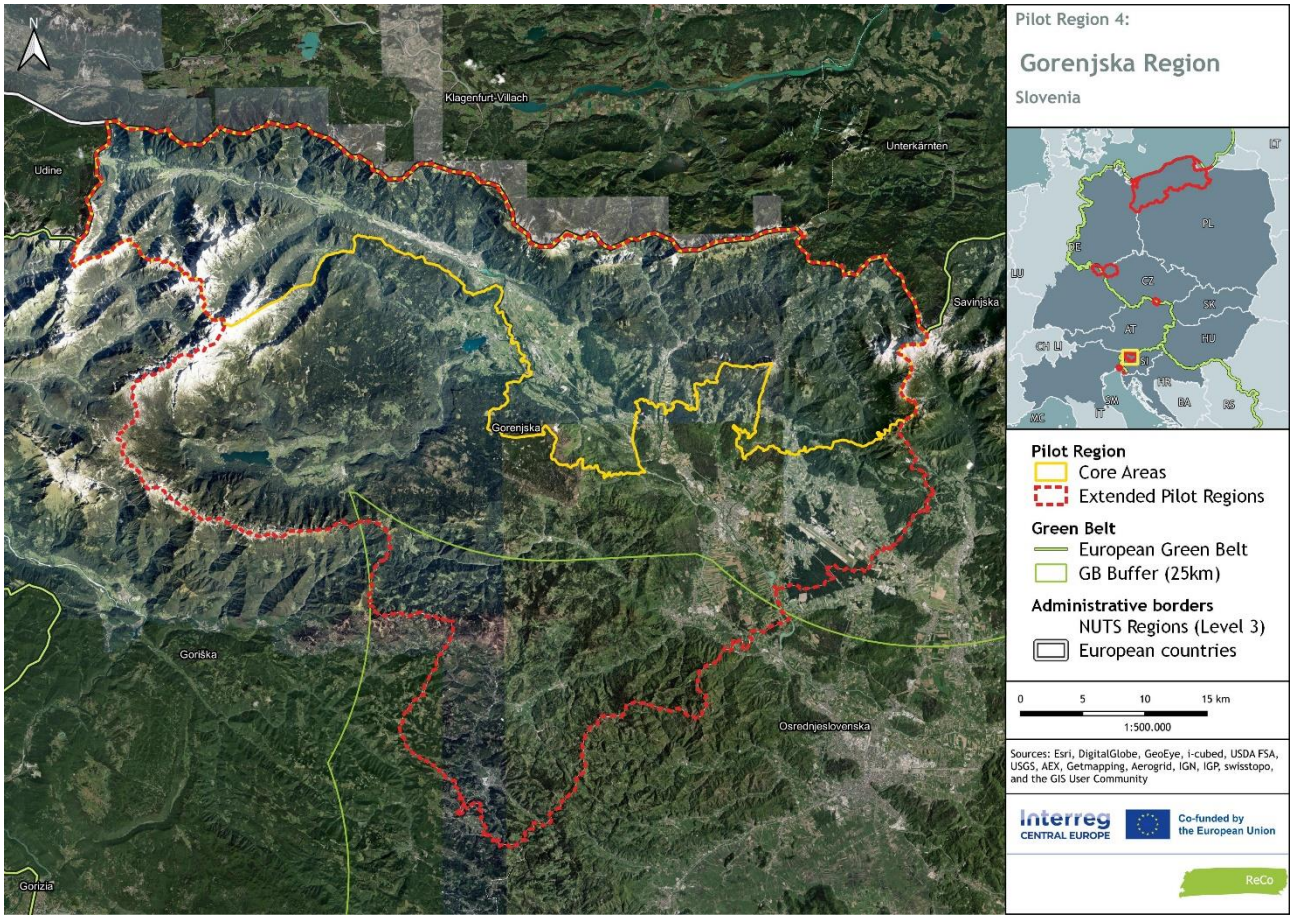
Gorenjska is situated in the northwest of Slovenia, bordered by Austria along the Karavanke mountain range to the north, Italy to the west, and opening up towards Ljubljana to the south. The region enjoys a favorable geographical and transportation position, making it easily accessible. It is characterized by a diverse mountainous landscape. With an alpine identity, Gorenjska is home to numerous protected natural areas, with Triglav National Park being the sole national park in Slovenia. Traditionally, the region has been a tourist destination, making significant contributions to Slovenian revenues. It is a popular spot for active holidays such as hiking, biking, and winter sports, offering a unique experience in a natural and culturally rich environment. In recent years, there has been a notable increase in tourist numbers, leading to a strong emphasis on sustainable tourism development. This includes a focus on nature protection and the preservation of cultural heritage. The area's rich biodiversity is supported by nearly 40 different habitat types, providing a habitat for over 70 qualifying species of plants and animals. However, the region faces challenges stemming from climate change, intensive forest management, and the growing influx of tourists, which particularly affects mountain areas. Unlike the Julian Alps, which are protected by the Triglav National Park, the Karavanke Mountains lack similar safeguards under government jurisdiction. The Gorenjska Regional Development Programme 2021-2027 is a pivotal regional document outlining development priorities, goals, and financially valued programs and projects for the future. Nonetheless, climate change and the region's gradual adaptation to it present unpredictable consequences and risks to the planned development. Unsustainable utilization of natural resources, reduction of land available for food production, uncontrolled spread of invasive species, and shifts in biodiversity could pose critical issues in the future. Despite these challenges, the region identifies opportunities for future development. Enhancing local self-sufficiency in food, energy, and consumer products, as well as promoting a circular and socially responsible economy in agriculture and forestry, hold promise. Furthermore, improving the efficiency of natural resource management (water, land, air) and fostering sustainable collaboration across various sectors are crucial for the region's sustainable growth.

A. General characteristics

Gorenjska is an Alpine region in the north-western part of Slovenia. It shares a border with neighboring Austria to the north, with Italy to the west, and with the Central Slovenia region to the south-east. The region is crossed by the 10th European motorway and railway corridor. The town of Brnik hosts Slovenia's central airport, named Jože Pučnik Ljubljana Airport.

The region's main feature is its high mountains, the highest of which is Triglav, the symbol of Slovene identity. The region comprises the eastern part of the Julian Alps, the western Karavanke Mountains, the western side of the Kamnik-Savinja Alps.

With 2,137 km^2 or 10.5% of the country's surface, Gorenjska is the sixth-largest statistical region in Slovenia and the fourth most populous, with 210,000 inhabitants. It includes 18 local authorities: Bled, Bohinj, Cerklje na Gorenjskem, Gorenja vas - Poljane, Gorje, Jesenice, Jezersko, Kranj, Kranjska Gora, Naklo, Preddvor, Radovljica, Šenčur, Škofja Loka, Tržič, Železniki, Žiri, and Žirovnica. Among them, the Municipality of Kranj is one of the larger municipalities in Slovenia in terms of population and serves as the administrative, economic, and cultural center of the Gorenjska region. It is also the fourth-largest city in Slovenia in terms of population.



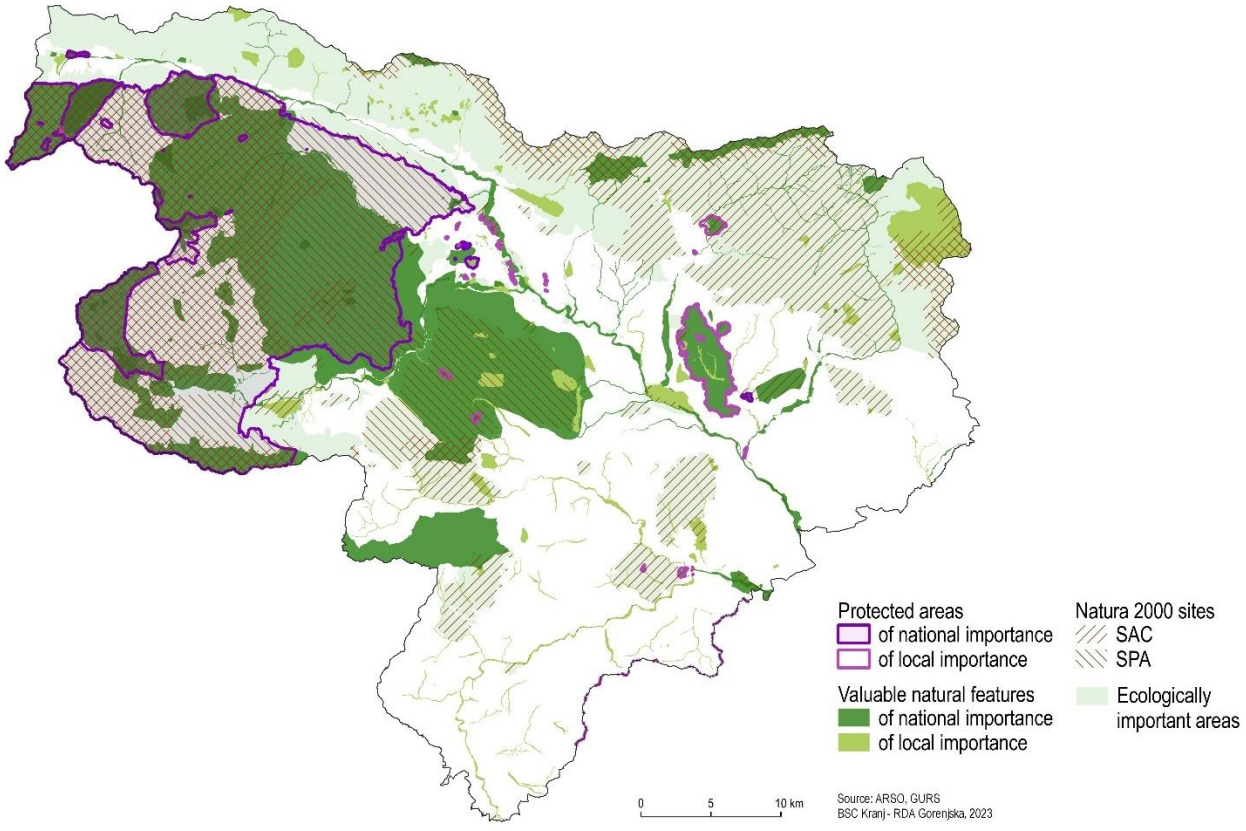
The population is concentrated in the central lowland area, which is part of the Ljubljana basin, with a population density of 98 inhabitants per km^2, which is below the national average of Slovenia (104 inhabitants per km^2). However, some parts of Gorenjska experience higher areas of densification and urbanization.

In terms of geography, 70% of Gorenjska is mountainous, while only 30% is in the valley-plain part of central Slovenia. As much as 40% of the region is above 1,000 meters above sea level, and 68% of Gorenjska is covered by forest land, with 19% consisting of agricultural land (farmland and grassland) and 4.5% designated as built-up land. In recent years, there has been an increase in the share of forests and built-up areas, while the proportion of agricultural land, including mountain meadows and pastures, has been decreasing.

Almost half of the region is covered by protected nature areas, which include Natura 2000 sites (44%), nature conservation areas (24%), areas of natural value (29%), and ecologically important areas (58%). Among the protected areas in Gorenjska is Triglav National Park (TNP), the only national park in Slovenia, along with other areas such as Martuljek and Mala Pišnica, Pokljuka Gorge, the wetlands of the Bled Angle, and Straža (Bled), Bled Castle, Za blatom marsh on Jelovica, lakes at Bobovek, Kokra Canyon, Udin boršt Memorial Park, Zelenci Nature Reserve, Brdo Castle Park, Obla gorica, Volčji hill, and Dovžanova gorge (Nature Conservation Atlas).

Gorenjska has traditionally been a tourist region, contributing significantly to Slovenian revenues. In recent years, the number of tourists has grown exponentially, with 3.6 million tourist overnight stays in 2022, accounting for 23% of tourism in Slovenia. It is primarily a destination for active holidays (hiking, biking, winter sports, etc.) and offers eventful relaxation programs in an authentic natural and cultural environment.

The region used to be one of the most industrially advanced in the country, and its present-day life is still strongly connected with its industrial past, shaping the vocational and social structure of the population. Many abandoned industrial areas represent the industrial heritage of the region, while several development-oriented industrial companies have successfully restructured. These companies maintain an industrial spirit and contribute to the modern industrial culture of the region. Today, Gorenjska is dominated by the production of electrical machines and appliances, the production of finished wood products, and the metal processing industry.



Protected areas of the Gorenjska region (Author: ARSO, GURS BSC Kranj – RDA Gorenjska)

Enchanting Gorenjska: captivating Alpine vistas of Preddvor and (Author: visitpreddvor.si/photo on the left, Primož Šenk/photo on the right)

B. Ecological value

Gorenjska, with its rugged topography and diverse ecosystems, holds significant ecological value. The region provides habitat for a wide variety of plant and animal species, while its central geographical location and proximity to forests create essential ecological corridors, enabling gene flow across a broader area of the Alps and Europe. The Gorenjska highlands also serve as a vital source of drinking water for Slovenia and influence the regional climate, impacting local weather patterns. However, these valuable natural assets face mounting pressures from climate change, intensive forest management, and increasing tourist arrivals, making the mountain areas particularly vulnerable. Among them, the Karavanke Mountains stand out as an area of concern, lacking protection under an act of the authorities - the Act of Protection. Furthermore, despite several smaller natural values within the region, they are not uniformly identified as such. Notably, the eastern part of the Karavanke Mountains faces limited Natura 2000 protection, unlike other high mountain areas. Preserving and safeguarding the ecological richness of Gorenjska is crucial, and concerted efforts are needed to address these challenges and ensure the sustainable development of the region.

C. Biodiversity

The Alpine region of Gorenjska boasts a rich and diverse fauna and flora. The variety of species is intrinsically linked to the diverse ecosystems influenced by factors like climatic conditions, natural geography (such as altitudinal range, exposure, and geological structure), and anthropological influences (including impact on nature, farming methods, and urbanization). Particularly in the high mountains, where conditions are harsh, plants have evolved unique adaptations, displaying intense flower colors, dwarf and cushion-like growth, or fleshy and hairy leaves. Animals, too, have adapted to the challenges of long, cold winters, short summers, low temperatures, strong ultraviolet radiation, wind, and water scarcity.

Gorenjska's biodiversity thrives within almost 40 different habitat types, providing homes to over 70 qualifying species of plants and animals. The area encompasses typical Illyrian beech forests (Aremonio-Fagion), lowland extensive grasslands (*Alopecurus pratensis*, *Sanguisorba officinalis*), transitional bogs, and alpine and sub-alpine grasslands on carbonate soils (*Thlaspietea rotondifolii*), which are typical of the high mountains.

Some notable and noteworthy plant species include the Alpine eryngo *Eryngium alpinum*, which is almost extinct due to the encroachment of prickly plants, grassland encroachment, and grazing by small livestock. Zois' bellflower *Campanula zoysii* thrives in limestone rock crevices and is endemic to the south-eastern Alps, listed on the Red List of endangered species in Slovenia. Mountain daffodils *Narcissus poeticus radiiflorus* bloom in large numbers, symbolizing the beauty of the places in the Jesenice hinterland of Karavanke. However, they face threats from premature mowing, grazing, overgrowth, mechanized tillage, and intensive fertilization.

Lady's-slipper orchid *Cypripedium calceolus* thrives on bright forest edges and rubble among heath in the alpine world. It is generally threatened by mass visitation, harvesting, excessive nitrogen inputs to the environment, and natural succession causing increased shading. Carniolan lily *Lilium carniolicum*, also known as the golden apple, blooms in mountain meadows, among heather and on scree during summer. The species is protected, but its beauty makes it susceptible to human interference.

The Alpine region of Gorenjska is home to diverse tree species that play crucial roles in shaping the landscape and maintaining ecological balance. The European larch, mountain pine, and European beech, form an integral part of the rich biodiversity found in the Alpine region of Gorenjska. Their presence not only adds to the natural beauty of the area but also plays a vital role in maintaining the delicate balance of the ecosystem.

The fauna is equally remarkable with species like the capercaillie *Tetrao urogallus*, the largest representative of the Cetti's Cock, found in montane mixed and coniferous forests. The forest marten is adversely affected by disturbance of the site and its surroundings during the growing season and intensive forest management. Golden Eagle *Aquila chrysaetos*, the largest bird in Slovenia, used to live in lowland forests but retreated to higher and inaccessible areas due to human persecution. It preys on larger animals such as hares, grouse, marmots, and foxes.

Black Grouse *Tetrao tetrix* lives close to the forest boundary, mainly in the heathland belt, facing threats from disturbance during the growing season, overgrowth of alpine meadows, and other habitat destruction. Rock Ptarmigan *Lagopus muta*, a small bird belonging to the hen family, inhabits grassy slopes with rocks and small shrubs above the tree line. It is threatened by increasing tourism and growing unrest in the mountains, especially during the breeding season. Arran Brown *Erebia ligea*, a widespread butterfly species found in the mid-mountains, foothills, mountain valleys, scrub, and near forests. It occurs in the Karavanke Mountains along forest edges, pastures, and overgrown areas.

Representatives of the region’s flora (from left to right) - Carniolan lily, mountain daffodil and lady's-slipper orchid (Author: Mateja Dolžan)

The Karavanke Mountains in the Alpine region of Gorenjska host a variety of captivating butterfly species. Among them is the peacock butterfly *Inachis io*, a widespread beauty often spotted in the pastures of the region. Another enchanting sight is the Jersey tiger *Callimorpha quadripunctaria*, which seeks out deciduous to mixed shaded forests with gaps, clearings, and forest edges. Unfortunately, this delicate butterfly faces threats from artificial light disrupting its reproductive cycle. Adding to the remarkable biodiversity is the Alpine longhorn beetle *Rosalia alpina*, primarily associated with beech forests on carbonate substrates. As a relict primary forest species in Central Europe, its conservation is a significant concern due to unmanaged forest management practices.

Preserving the delicate balance of Gorenjska's biodiversity is of utmost importance. With the right conservation measures, we can ensure the continued thriving of these exceptional species and maintain the harmonious coexistence of fauna and flora in this magnificent Alpine region.

D. Challenges and risks for future development

The main priorities, goals, and financial plans for the region's future are outlined in the Gorenjska Regional Development Programme 2021-2027. One of the central areas of focus is adapting to climate change and safeguarding against natural disasters. Climate change can lead to unforeseen consequences, putting the region's planned development at risk. To address this, it is crucial to raise awareness about climate change, develop innovative solutions, and enhance public infrastructure, including flood defenses and earthquake protection.

The region also confronts challenges stemming from the unsustainable exploitation of natural resources, pollution of water sources, and the proliferation of invasive species. To counter these issues, efforts will be directed towards identifying and controlling the spread of invasive species across various sectors. Another challenge involves managing the impact of tourism and other activities on the environment and infrastructure. To address this, sustainable mobility options such as public transportation and cycling networks will be established to evenly distribute tourist flows.

Opportunities for future development encompass promoting local self-sufficiency in food, energy, and consumer goods, nurturing a circular and socially responsible economy in agriculture and forestry, and enhancing the management of natural resources. Initiatives will focus on rejuvenating degraded areas and optimizing the use of abandoned spaces while safeguarding green areas like forests and agricultural land. The region's abundant forests, timber, and water will be strategically utilized as raw materials to support sustainable and multifunctional forest management. The ultimate aim is to drive economic development while preserving the environment and ensuring a healthy living environment that fosters societal growth.

E. Problems to be tackled with

As mentioned above, in Gorenjska, almost half of the region's area is covered by protected nature areas, including Natura 2000 sites (94,661 hectares), areas of natural value, and ecologically important sites. These areas play a crucial role in nature conservation, biodiversity preservation, sustainable management of natural resources (agriculture, forestry, water management, etc.), cultural landscape maintenance, visitation and relaxation, nature education, and as a key component of the region's (sustainable) tourism offer. Biodiversity and landscape diversity are often the result of the harmonious interplay between natural features and the sustainable use of natural resources.

One distinctive characteristic of the region is that, apart from the Triglav National Park, the other protected areas lack dedicated managers and their own protection and management-development plans. Consequently, there is a lack of protection and development activities in these areas, resulting in missed

opportunities for successful sustainable development and ensuring the long-term viable conservation of nature and cultural landscapes.

Alpine landscapes of the Gorenjska region (Author: Jost Gantar)

To address these challenges, the project will focus on a narrow pilot area encompassing Alpine meadows and pastures in the Karavanke region, a 120 km long border mountain range with Austria. These meadows and pastures boast extraordinary plant diversity, primarily dominated by grasses and other herbaceous plants, and are rich in various animal species, particularly insects. They hold significant importance for humans as a source of food and medicinal herbs, play a vital role in water and nutrient circulation, and create the characteristic mosaic cultural landscape. Additionally, they prevent erosion on hillsides and provide essential habitats for numerous plant and animal species.

However, the area of species-rich alpine meadows within Natura 2000 sites is declining due to threats such as intensified agriculture and its abandonment, leading to shrub and forest overgrowth. Other main threats to species-rich grasslands include excessive fertilisation, use of artificial fertilisers, over-fertilisation with grass mixtures, improper mowing practices, inappropriate grazing, inadequate maintenance, and overgrowth due to mowing or grazing abandonment.

To combat these threats, the project will promote the appropriate use of manure for fertilisation, discourage the use of commercially prepared grass mixtures, and recommend mowing the meadows once or twice a year, with the first mowing at the end of June. Unfertilised meadows tend to maintain the greatest plant diversity, including the thriving mountain daffodil, fool's daffodil, or key lily *Narcissus poeticus* subsp. *radiiflorus*. The project will emphasize the importance of staggered mowing to protect meadow-dwelling animals. Drying grass on trestles has proven to be an effective solution in the unstable Alpine climate, as it allows plants to mature and shed seeds more efficiently, supporting the natural regeneration and rich species composition of meadows. Modern baling methods hinder the natural maintenance of meadows. Grazing should also be done moderately to prevent trampling, soil stripping, and depletion of the plant community.

The primary goal of the pilot project is to implement, monitor, and evaluate the effects of restoring abandoned Alpine pastures through measures such as mowing, pruning, land clearing, and temporary grazing. This approach will showcase the potential for conserving specific grass species, flowers, and consequently, influence the long-term diversity of flowering meadows. Additionally, the project aims to integrate and pool the efforts of various sectoral professional services and local authorities, contributing to the development of a regional restoration and connectivity plan. It will also prioritize raising awareness among the population of the Karavanke area and visitors about the importance of natural values and biodiversity conservation. Ultimately, the project will work towards establishing and improving the management of smaller nature-protected areas in the long run.

THE ISONZO MOUTH RESERVE: A KEY ELEMENT FOR SAFEGUARDING AND MANAGING BIODIVERSITY IN THE LOWER ISONZO PLAIN

By Matteo De Luca

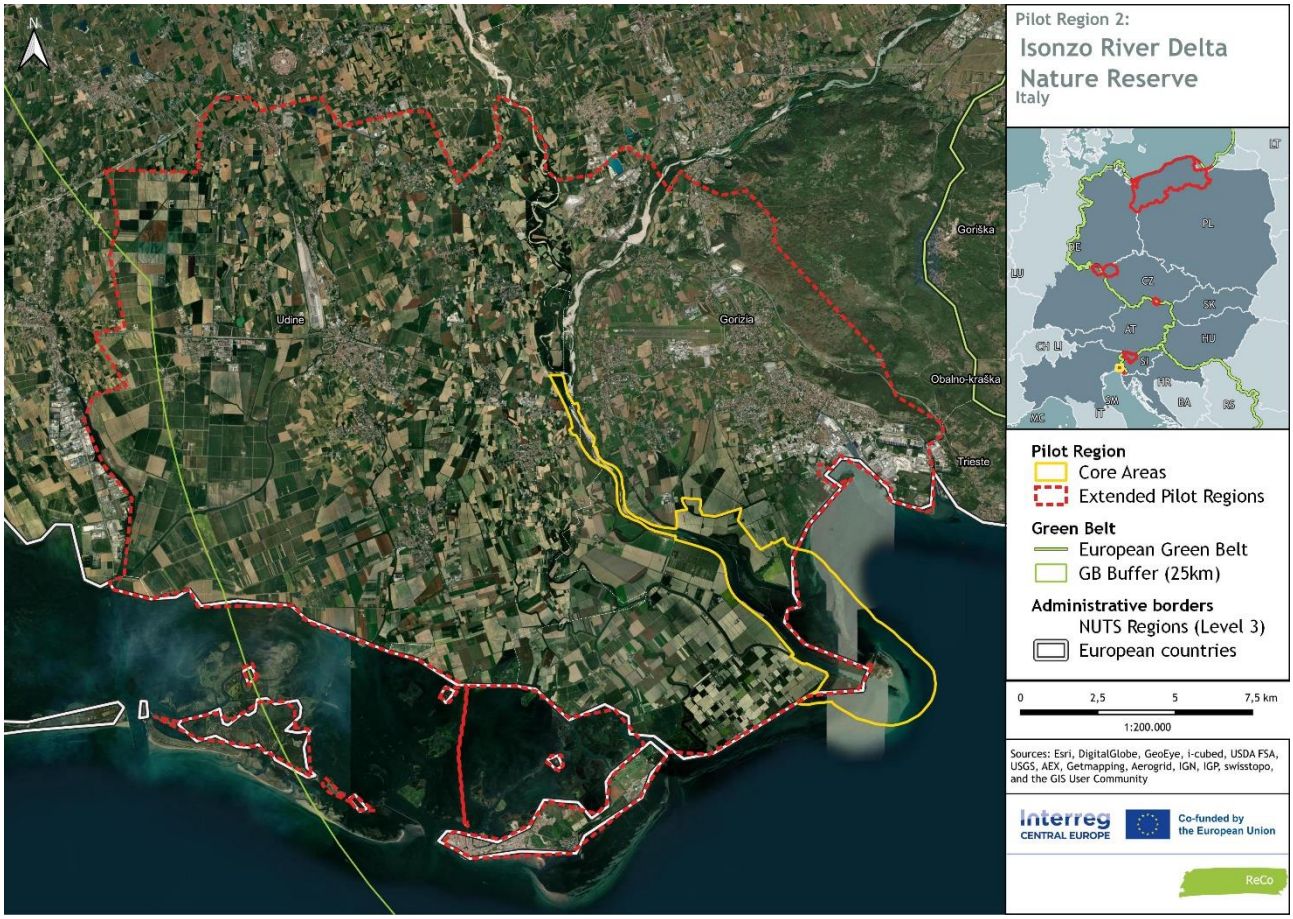
The project area is situated in the Isonzo plain, located in northeastern Italy. Despite being surrounded by intensive agriculture and anthropic infrastructures, the region still retains a significant level of residual biodiversity. A particular highlight within the area is the Foce dell'Isonzo Reserve, distinguished by its exceptional b,iodiversity and the successful naturalistic restoration interventions carried out over time. However, the region faces challenges concerning future territorial planning, agricultural development, and the impacts of climate change. These factors pose potential risks to the protection of biodiversity and the continued existence of natural habitats in the area.

A. General characteristics

Located in northeastern Italy, the Isonzo plain shares borders with the province of Udine to the west, the province of Trieste to the southeast, Slovenia (Litorale/Primorska) to the north and east, and the Adriatic Sea to the south. This region represents the easternmost part of the Po Valley but exhibits unique characteristics attributed to its own hydrographic system and its close proximity to both the alpine edge and the coastline. As one moves from the Karst plateau towards the sea, the distance between the two gradually diminishes until it disappears.

The area's urbanization follows a distinct pattern that balances agricultural and natural spaces. The portion between the Isonzo River and the Carso plateau features a widespread system of intensive urbanization, encompassing the regional airport and villages such as Ronchi, Turriaco, and Staranzano, connected to Monfalcone. The remaining settlements are organized into two sequences of inhabited centers with an east-west orientation, dividing the area into two bands. The first band is marked by a dense sequence of small towns situated on the alluvial foothills to the north of the plain, historically characterized by marshes. These towns are arranged along parallel routes that correspond to previous historical communication routes, including the former SP252.

The second band is defined by the SS14, crossing the central part of the area and connecting larger inhabited centers distributed along north-south axes, following the course of the resurgence watercourses that traverse the region. This unique geographical layout shapes the spatial structure of the Isonzo plain, providing a diverse landscape that encompasses urban, agricultural, and natural areas, all coexisting harmoniously in this captivating region.



Relict low land woodland in Staranzano region (Author: Matteo De Luca)

Restoration area Isola della Cona - Nature Reserve of Isonzo River-mouth (Author: Matteo De Luca)

B. Ecological value

The area is characterized by diverse fauna and flora communities that vividly represent the biogeographical transition between the Illyrian and Padanian regions. For several species, this region marks the outer limit of their natural range, and the biological communities here result from the unique mixture of elements from both areas. As a result, these communities hold significant value nationally and internationally, recognized in various conservation institutions and regional priorities.

Although the natural and semi-natural elements in the area are small, fragmented, and isolated amidst an intensive rural landscape, the lower Friulian and Isonzo plain still harbours precious natural features. These elements are included in two interconnected macro-ecosystems: the mosaic of resurgences with low alkaline bogs, wet meadows, and hygrophilous woods, and the alluvial plain with its lowland forests.

Various protected areas exist within the region, such as ZSC (Special Areas of Conservation) and SPAs (Special Protection Areas) established under the Habitats Directive 92/43/EEC. Additionally, there are two Regional nature reserves, natural biotopes, and municipal parks established according to Regional Law 42/96, along with permanently protected meadows under Regional Law 9/2005. These conservation efforts are vital in safeguarding the unique biodiversity and ecological richness of the lower Friulian and Isonzo plain despite the significant anthropic transformations the territory has undergone.

C. Biodiversity

The rarest natural and semi-natural plant communities in the area are those found within the system of resurgences. Once widespread along the transition strip between the high and low plains, this system has now greatly diminished and fragmented due to reclamation efforts in the last century. It comprises a complex environmental mosaic, where fresh wetlands, low alkaline peat bogs, pots, springs, and blades create the main resurgence rivers. Additionally, arid paleo bumps harbor different types of permanent lawns, both wet and dry. These cool and humid environments, characterized by water and Oligotrophic soils, provide a highly suitable habitat for specialized plants and animals, making them particularly vulnerable due to the reduction and fragmentation of their habitats.

The faunal biodiversity of the area is remarkable, featuring numerous species protected by regional, national, and international legislation. Many of these species are confined to the few remnants of intact forests and natural wetlands, further emphasizing their vulnerability as their habitats shrink. Within the strips of lowland forests, one can find various amphibians and reptiles, including the common frog *Rana latastei*, the yellow-bellied toad *Bombina variegata*, the Italian crested newt *Triturus carnifex*, and reptiles like the European pond turtle *Emys orbicularis* and the Aesculapian snake *Zamenis longissimus*. Among the mammals, species such as the common dormouse *Muscardinus avellanarius*, the polecat *Mustela putorius*, and the otter *Lutra lutra* thrive in this environment. Bats are also widespread, utilizing both forested areas and man-made structures.

The resurgences' environments, characterized by fresh and well-oxygenated water, host a fish fauna that includes species typically associated with mountainous or foothill sections, some of which are endemic and protected under the Habitats Directive.

The ornithofauna is equally fascinating, with diverse species inhabiting forest environments, such as woodpeckers and certain diurnal birds of prey, as well as those preferring shallow waters, including several species of herons, ducks, and waders. The Foce Isonzo Reserve boasts an impressive checklist of 344 different bird species.

Camargue horses, Isola della Cona - Nature Reserve of Isonzo River-mouth (Author: Matteo De Luca)

Sea eagle (left), and red breasted and withe fronted geese (right) feeding in the fields nearby the Nature Reserve of Isonzo River-mouth (Author: Matteo De Luca)

D. Challenges and risks for future development

The main risks affecting the environmental system of the low plain can be summarized as follows:

- Potential increase in settlement diffusion processes (residential, productive, commercial) in peri-urban areas and along road axes.
- Forecasting of new transport infrastructures with high landscape impact.
- Implementation of technological and energy systems and infrastructures that present critical issues from a landscape and naturalistic perspective, such as photovoltaic fields and power lines.

- Lack of supra-municipal planning for landscape protection and design, often neglecting the interaction with local contexts for residential, artisanal, and commercial expansions.
- Climate changes.
- Salinization of areas close to the coastlines.
- Conversion of agricultural land for energy purposes.
- Development of new roads and roundabouts without adequate consideration of the agricultural and natural context.
- Loss of identity elements that characterize the countryside and rural settlements in Friulian, like hedges, mulberry trees, ditches, and centuriation.
- New forecasts of building areas in municipal planning instruments.
- Abandonment of waste on the territory, particularly along watercourses.
- Intensive agriculture, monoculture, and consequent loss of small farmers.
- Eutrophication of soils, groundwater, and surface water due to agricultural intensification.
- In the beds of watercourses, management practices such as earthworks, gravel removal, and cutting of vegetation that favour the introduction and spread of invasive alien species to the detriment of native vegetation.
- New constriction, diversion, and water regulation interventions.

E. Problems to be tackled with

The vulnerability of the area can be summarized as follows:

- High fragmentation, resulting in small or insufficiently sized natural and semi-natural habitats that struggle to perform ecological functions effectively.
- Reduced populations of conservationist-interest species, leading to a decrease in genetic variability and putting local populations at risk of extinction.
- Sensitive natural and semi-natural habitats in direct contact with areas of intensive agriculture, causing a strong impact on these fragile habitats.
- Lack of mitigation bands and connectivity elements for peat bogs.
- Low surface area and elongated shape of lowland and riparian woods, causing a significant edge effect and a scarcity of species typical of more interior forest areas.
- Absence of buffer strips around relict patches of oak-hornbeam lowland and insufficiently wooded strips connecting them.
- Dominance of "intensive, semi-intensive, and other rural fabric" land use, with the highest percentage of intensive cultivation in the region.
- A pervasive water system (groundwater and dense surface water network) vulnerable to diffuse pollution resulting from agricultural intensification, including the use of pesticides and fertilizers (eutrophication).
- Presence of moisture-demanding habitats and species sensitive to modifications in the depth, quantity, and quality of water.
- Existence of habitats characterized by rapid natural evolution (secondary dynamism) due to lack of management, leading to the rapid depletion of endemic flora.
- Rarity and fragmentation, as well as mismanagement concerning connectivity, of riparian strips, banks, floodplains, and natural and artificial watercourses, affecting existing ecological corridors.

ECOLOGICAL VALUES AND IMPORTANCE OF THE MEDITER-RANEAN BRACKISH WETLAND FOR BIODIVERSITY AND NATURE PROTECTION: EXPERIENCES FROM THE SLOVENIAN COASTAL WETLAND ŠKOCJANSKI ZATOK

By Bojana Lipej, Borut Mozetič & Tina Kocjančič

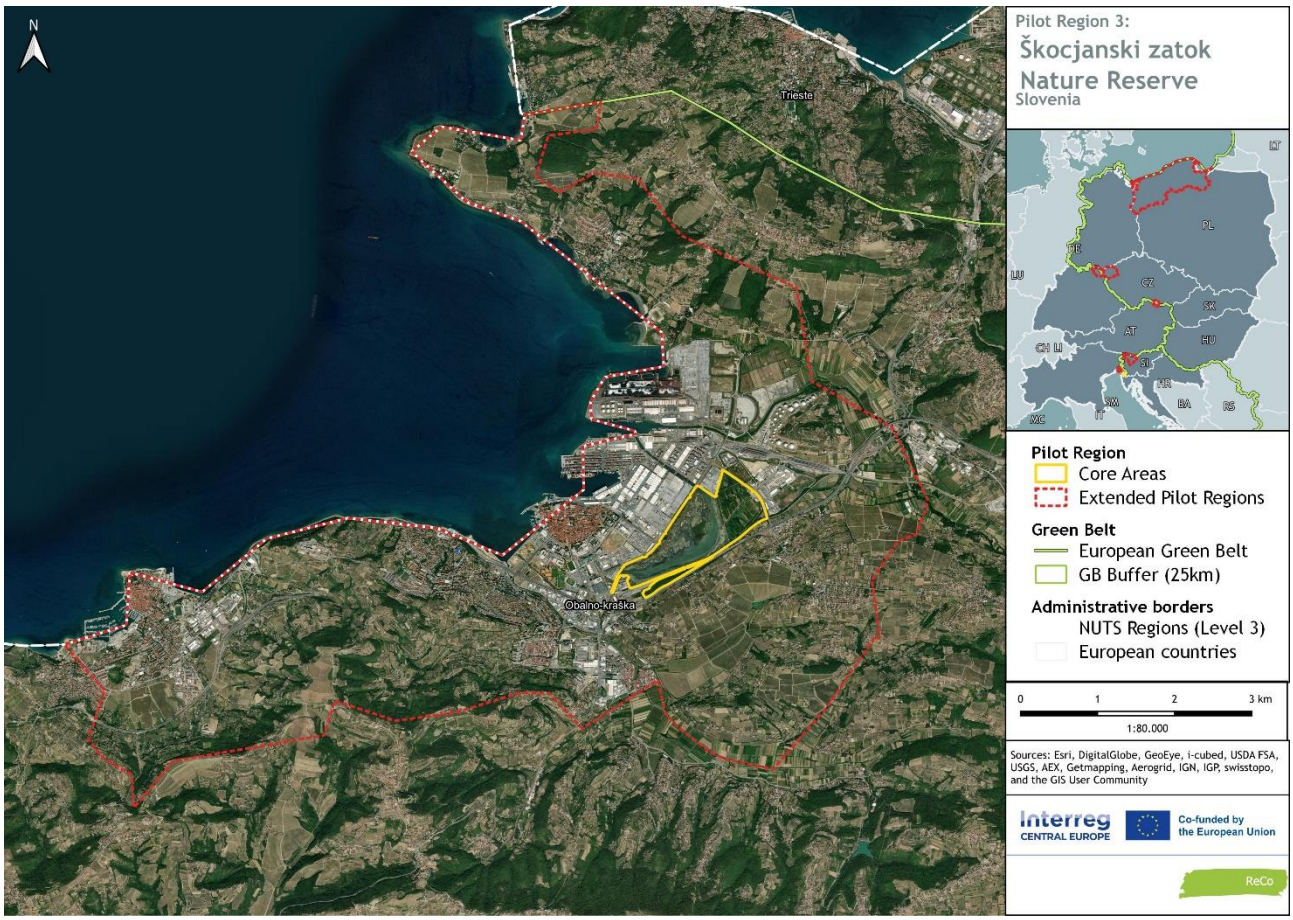
The Škocjanski zatok Nature Reserve is the largest brackish wetland in Slovenia, covering an area of 122.7 hectares. Situated near the city of Koper, this Mediterranean wetland serves as a vital refuge for diverse bird species and a plethora of other plants and animals. The reserve comprises a brackish lagoon surrounded by salt marshes and mudflats, as well as a freshwater marsh with wet meadows, reed beds, and thermo-philic shrubs in the Bertoška Bonifika area. Despite its relatively small size, the reserve boasts an impressive variety of habitats, resulting from the juxtaposition of brackish and freshwater environments. A unique aspect of the reserve is the presence of grazing cattle, contributing not only to the preservation of suitable vegetation but also evoking memories of a bygone era when human-animal coexistence was an integral part of daily life. In 2006 to 2008, the area underwent complete restoration after almost succumbing to urbanization, underscoring the significance of safeguarding and revitalizing fragile ecosystems amidst urban development. The Škocjanski zatok Nature Reserve serves as a poignant reminder of the importance of conserving and rejuvenating delicate ecosystems in the face of urban expansion. It exemplifies the need for sustainable practices and the protection of natural habitats, as they not only support wildlife diversity but also contribute to the well-being of humans and the broader environment.

A. General characteristics

The Škocjanski zatok Nature Reserve, situated in southwest Slovenia, stands as the largest brackish wetland along the Slovenian coastline, covering an expanse of 122.7 hectares. Once a remnant of Koper's insular past, it now finds itself embraced by the urban sprawl of the coastal town, including the nearby port, highway, railway, and other (sub)urban areas. This classification as an urban wetland, according to Ramsar, highlights the delicate balance between urban development and nature preservation.

Within the reserve, a rich variety of bird species find refuge, making it a significant nesting, wintering, and migration site of European importance. The reserve is divided into two main parts: a brackish lagoon with nesting islets, mudflats, and salt marshes influenced by tides, adorned with halophytes and other salt-tolerant plants; and a freshwater marsh boasting wet and marshy meadows, interspersed with open water areas of varying depths, enveloped by reed beds and thermophilic shrubs.

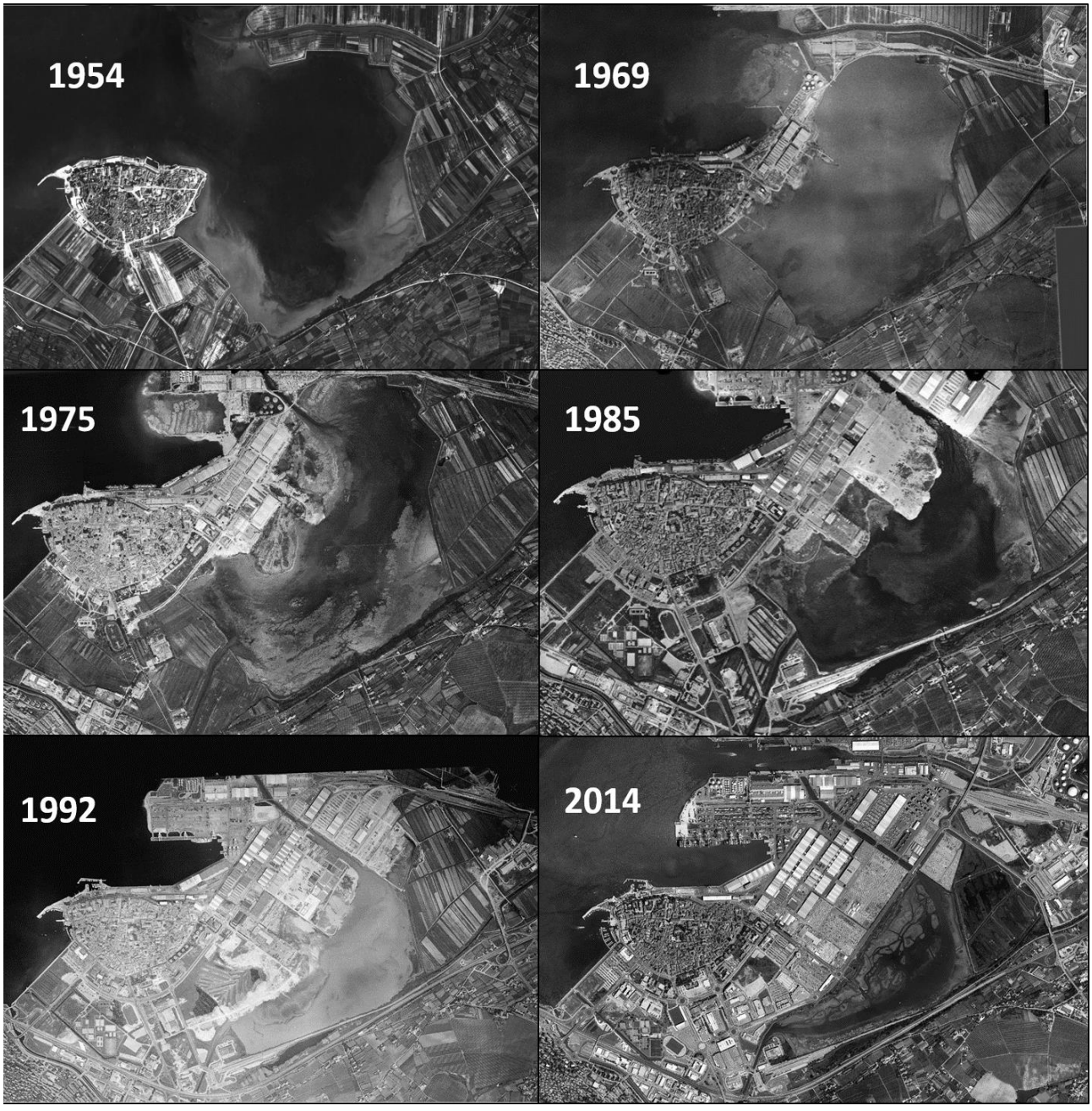
Remarkably, the Škocjanski zatok lagoon is a man-made creation, as natural lagoons do not exist in Slovenia. Its transformation began in the 1950s when urban expansion necessitated closing off the bay between Koper and the river Rižana outlet. This led to the loss of Koper's island-town character, and the Škocjan Bay slowly transformed into a lagoon.



Unfortunately, the area suffered further degradation in the 1970s and 1980s due to anthropogenic activities, with draining, filling, and waste disposal significantly reducing the water areas. However, the dedicated efforts of a civil initiative, inspired by ornithologists and supported by local inhabitants, led to the

establishment of the protected area. In 1993, the Škocjanski zatok was declared a Nature Reserve, marking the culmination of long-standing conservation endeavours.

Through subsequent restoration and renaturation, the modern Škocjanski zatok Nature Reserve emerged, expanding its habitat and attracting diverse marine and brackish flora and fauna. Today, it stands proudly as the "green heart of the town of Koper," a natural oasis providing vital sanctuary for a wide range of plant and animal species.



Stages of creation of the Škocjanski zatok Nature Reserve 1954-2014 (Author: Surveying and Mapping Authority of the Republic of Slovenia)

B. Ecological value

The Škocjanski zatok Nature Reserve and its surrounding areas boast a uniqueness not found in other Slovenian ecosystems. Its defining features include direct proximity to the sea, a Mediterranean climate, sub-Mediterranean vegetation, as well as its distinctive organization, size, and anthropogenic origin. Encompassing a diverse range of habitats, from freshwater wet meadows, reed beds, and shallows to saltmarshes, mudflats, brackish ponds, and deep-water areas, the reserve supports an exceptional biodiversity. Within its boundaries, numerous endangered and vulnerable species thrive, making it a critical habitat for 41% of all Slovenian amphibian species, 41% of all reptile species, over 60% of observed bird species in Slovenia, and 36% of mammals living in the country.

The significance of the Škocjanski zatok Nature Reserve is widely recognized, with a high status in terms of nature conservation at both state and national levels. It earned the designation of a Nature Reserve in 1998, acknowledging its unique geological, hydrological, botanical, zoological, and ecosystem characteristics. Additionally, it has been recognized as an Ecologically Important Area due to its contribution to biodiversity through its diverse habitat types and larger ecosystem units.

Upon Slovenia's accession to the EU, the reserve became part of the European Network of Protected Areas, known as Natura 2000 (SI 5000008). It is home to 15 bird species for which Special Protected Areas (SPAs) have been designated under the Birds Directive. Furthermore, the European Union has designated Škocjanski zatok as a Special Area of Conservation (SAC - SI 3000252), based on two qualifying animal species and five qualifying habitat types, covering the entire brackish lagoon area.

Between 2006 and 2007, a significant restoration project took place in the reserve as part of the LIFE-Nature project "Restoring and conserving habitats and birds in Škocjanski zatok Nature Reserve" (LIFE00NAT/SLO/7226). This project marked a major undertaking for Slovenia, requiring extensive planning and construction work, as no comparable experience existed in this field. The project aimed to preserve and enhance freshwater, marine, and brackish habitats within the protected area. Restoration efforts included the creation of a freshwater marsh and the removal of over 180,000 m^3 of sediment from the brackish lagoon, leading to the formation of peripheral lagoon habitats. The success of the restoration work is evident through the reserve's achievement of a good conservation status for the majority of Natura 2000 target species and habitat types. The project's impact has been positive, successfully restoring and conserving habitats and birds within the protected area.

Panorama of the Škocjanski zatok Nature Reserve (Author: Tilen Basle)

In 2015, new sustainable infrastructure was added to the reserve, including a visitor centre and a 12-meter-high central observatory offering panoramic views of the entire protected area. Inspired by the living world of the reserve, the architectural design of these facilities seamlessly blends into their natural environment.

The management of the Škocjanski zatok Nature Reserve falls under the responsibility of DOPPS-BirdLife Slovenia. They play a vital role in maintaining the reserve's environmental status by managing restored and newly created habitats. Their management practices focus on maintaining appropriate water regimes, controlling vegetation through extensive grazing and late mowing, removing non-indigenous species, and promoting the expansion of native species.

C. Biodiversity

The Škocjanski zatok Nature Reserve holds immense importance within Slovenia, the Mediterranean, and Europe, boasting a rich and diverse biotic community. As of 2023, researchers have documented over 1,600 different plant and animal species in the area, underscoring its ecological significance. This remarkable biodiversity stands as a testament to the successful habitat restoration and management efforts undertaken in the reserve. Among the observed species, a notable highlight is the presence of 264 bird species, making it particularly significant from an ornithological perspective. Many of these bird species rely on the reserve as a nesting ground, wintering location, or a vital stopover site during migration (since 2007, 17 new nesting bird species have been identified).

Designated as a Natura 2000 area under the Bird Directive, the reserve holds critical importance for 15 bird species, including the Kentish plover *Charadrius alexandrinus*, Eurasian bittern *Botaurus stellaris*, Little bittern *Ixobrychus minutus*, Squacco heron *Ardeola ralloides*, short-toed snake eagle *Circaetus gallicus*, little egret *Egretta garzetta*, water rail *Rallus aquaticus*, common tern *Sterna hirundo*, glossy ibis P*legadis falcinellus*, black-winged stilt *Himantopus himantopus*, great reed warbler *Acrocephalus arundinaceus*, purple heron *Ardea purpurea*, Eurasian reed warbler *Acrocephalus scirpaceus*, ruff *Philomachus pugnax*, and Eurasian curlew *Numenius arquata*. Particularly notable is the role of Škocjanski zatok as a crucial nesting site for the vulnerable little bittern *Ixobrychus minutus* in Slovenia, elevating its importance within the reserve.

Beyond its diverse bird population, the reserve also supports a wide range of other species. These include over 300 species of beetles (including 7 new species for Slovenia), 400 species of butterflies and moths, 45 species of dragonflies, 19 species of fish, 5 species of amphibians, 8 species of reptiles, and 13 species of mammals. The richness of habitats and plant species further contributes to the reserve's ecological wealth.

The reserve has earned the designation of a Special Area of Conservation (SAC) under the code SI 3000252, and within the Škocjanski Zatok, five qualifying habitat types have been identified, namely: Salicornia and other annual plants colonizing mud and sand - code 1310, Mediterranean salt meadows *Juncetalia maritimi* - code 1410, Mediterranean and thermo-Atlantic halophilus scrub *Sarcocornetea fruticosi* - code 1420, Mudflats and sandflats not covered by sea water at low tide - code 1140, and Coastal Lagoons - code 1150. The proper management of these habitats is paramount for preserving the reserve's biodiversity.

The abundance and variety of flora and fauna showcased in the Škocjanski zatok Nature Reserve emphasize its ecological value and underscore its critical role in conservation efforts.

D. Challenges and risks for future development

The Škocjanski zatok Nature Reserve is a unique coastal wetland, influenced by both marine and terrestrial habitats. However, like many other coastal wetlands situated on lower-lying sedimentary seashores, it faces

a significant threat from climate change, particularly sea-level rise. The rise in sea levels poses detrimental effects on the wetland's biodiversity and overall ecosystem functioning. Recent studies have specifically examined the impact of climate change, particularly sea-level rise, on this coastal wetland. These studies have highlighted potential habitat loss, decline of halophytes, and loss of nesting sites for birds and other animal species. To address these challenges, urgent adaptation measures are required.

Upgrading the existing infrastructure is crucial to regulate the water level in both hydrological-ecological units of the nature reserve and to reduce the risk of flooding during storms and high tides. Additionally, implementing habitat preservation and creation measures in the brackish lagoon is essential. These actions will help create new habitats and safeguard existing ones.

In tackling the effects of climate change on the Škocjanski zatok Nature Reserve, a combination of infrastructure upgrades and habitat conservation efforts is necessary. By implementing these adaptation measures, the reserve's vulnerability can be reduced, safeguarding its rich biodiversity for future generations.

On a positive note, due to its strategic location and existing infrastructure, the reserve holds great potential for environmental education. It can provide valuable opportunities for learning, exploration, and raising awareness about biodiversity, nature conservation, and hands-on learning experiences. Utilizing the reserve for educational purposes can foster a deeper understanding of the importance of conserving natural ecosystems and the need to protect and preserve the unique biodiversity found in the Škocjanski zatok Nature Reserve.

Restored natural landscape of the Škocjanski zatok Nature Reserve (Author: Tilen Basle)

E. Problems to be tackled with

The Škocjanski zatok Nature Reserve is a coastal wetland that is influenced by both, marine and terrestrial habitats. Like many other coastal wetlands, located on lower-lying sedimentary seashores, it is facing a significant threat from climate change, particularly sea-level rise. The rise in sea levels can have detrimental effects on the biodiversity and overall functioning of the wetland ecosystem. In recent years some studies were performed on the effect of climate change on this coastal wetland, especially from the standpoint of sea level rise. These studies have found that the wetland will be experiencing habitat loss, including the decline of halophytes and the loss of nesting sites for birds and other animal species. To address these challenges, adaptation measures are needed.

It is necessary to upgrade the existing infrastructure to regulate the water level in both hydrological-ecological units of the nature reserve and to reduce the risk of flooding in the event of storms and high tides, as well as additional habitat arrangements in the brackish la-goon with measures to create new and preserve existing habitats.

Overall, addressing the effects of climate change on the Škocjanski zatok Nature Reserve requires a combination of infrastructure upgrades, habitat preservation, and creation efforts. By implementing these adaptation measures, it is possible to reduce the vulnerability of the wetland and protect its biodiversity for future generations.

On the other hand, the reserve due to its location and infrastructure, has a great potential in environmental education by providing opportunities for learning, exploration, and raising awareness about biodiversity, nature conservation and providing hands-on learning experiences.

Visitors Centre in the Škocjanski zatok Nature Reserve (Author: Tilen Basle)

ENHANCING MIGRATION ROUTES FOR EUROPEAN BISON CONSERVATION IN IŃSKO LAKELAND

By Jakub Skorupski

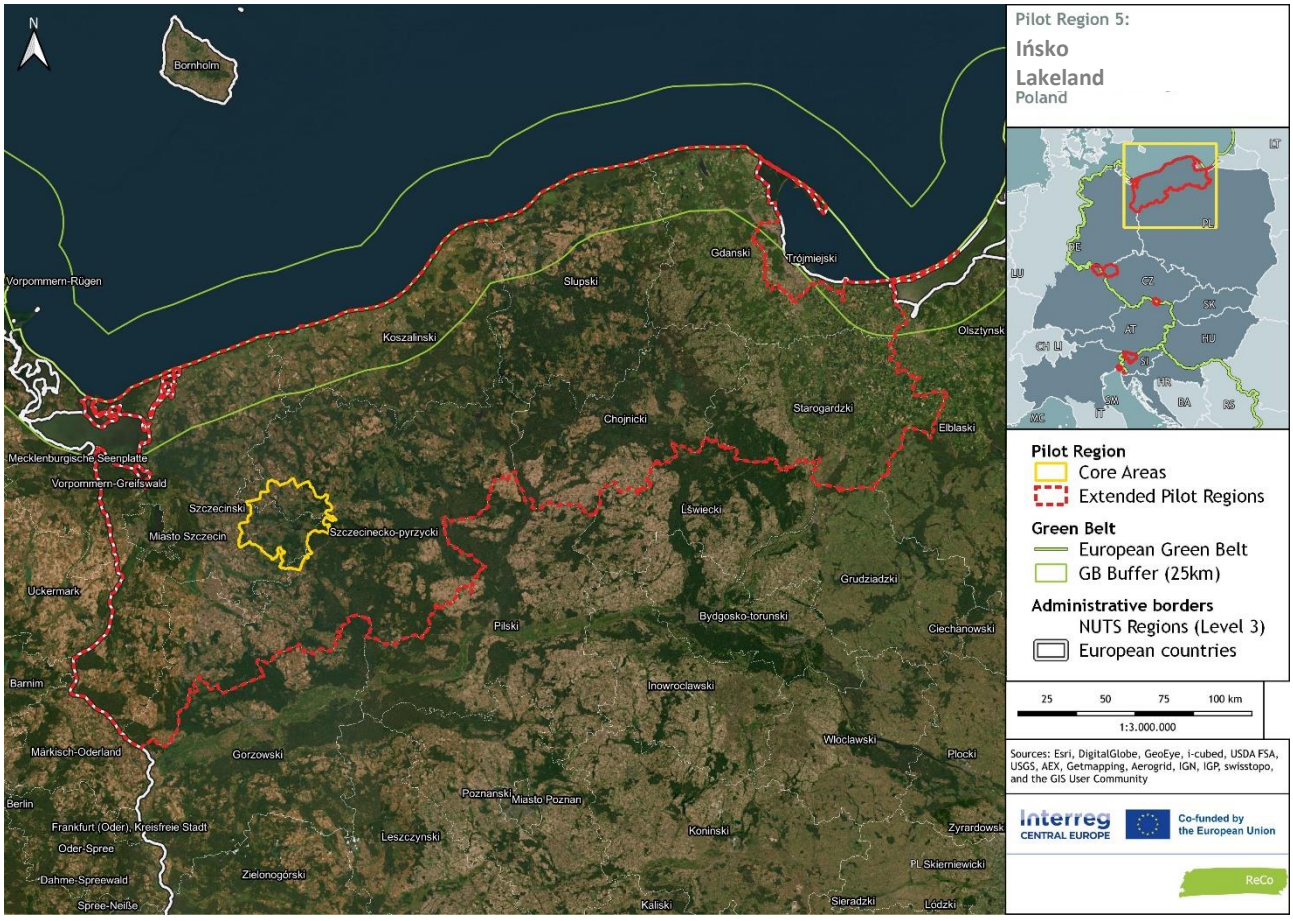
The Ińsko Lakeland, a 750 km² area in northwestern Poland, features diverse land-scapes with lakes, moraine hills, and river valleys. Its fertile soils and favorable climate support agriculture and forestry. Despite proximity to urban centers, ur-banization is modest, with small towns scattered throughout. The region is home to key lakes, Woświn and Ińsko, and significant rivers like Ina and Krąpiel. Pro-tected areas, including Ińsko Landscape Park and Natura 2000 sites, preserve unique biodiversity with over 700 plant species and a range of wildlife, including priority species like European bison. Challenges include the small size and isola-tion of bison populations, low genetic diversity, and rising poaching, hindering their growth. To address these issues, initiatives to enhance ecological connectivi-ty and overcome migration barriers are crucial. Such barriers disrupt natural bison movement, limiting gene flow and leading to isolated herds, affecting genetic di-versity and adaptation. Efforts to restore and maintain migration corridors are vital to mitigate isolation effects. Facilitating bison movement and promoting gene flow can increase resilience to environmental changes. Collaboration be-tween stakeholders, including local governments, NGOs, land administrators, and state forest services, is necessary to plan and implement measures ensuring free bison movement. Addressing declining social acceptance is vital too. Proactive measures are needed to minimize conflicts between bison and local communities, such as crop damage, and promote coexistence. Collaborative management, com-pensation or incentives for affected farmers, and raising awareness about bison conservation are essential. By addressing migration barriers, enhancing ecological connectivity, combating poaching, and ensuring social acceptance, a sustainable future for the West Pomeranian bison population can be secured.

A. General characteristics

The Ińsko Lakeland is an approximately 750 km² area located in northwestern Po-land, within the West Pomeranian province. It is situated between the Łobez Upland in the north and the Choszczno Lakeland in the south, bordered by the Nowogard Plain to the west and the Drawsko Plain to the east. The region boasts a diverse landscape featuring numerous lakes, moraine hills, and river valleys. The highest point in the area is Głowacz, standing at 180 meters above sea level. Forests dominate the southern and southwestern parts of Ińsko Lakeland.

The primary land use in the Ińsko Lakeland is oriented towards agriculture and forestry. The region's fertile soils and favorable climate make it conducive to cultivating various crops and raising livestock. Agriculture remains a significant contributor to the local economy. Despite its relative proximity to urban centres (Szczecin, Poznań), the Ińsko Lakeland is characterized by modest urbanization. The landscape is dotted with small towns, including Ińsko, Chociwel, Dobrzany, and Węgorzyno. The Ińsko Lakeland is administra-tively divided among ten communes, falling under the jurisdiction of Łobez, Drawsko, and Stargard districts.

The largest lakes within the Ińsko Lakeland are Woświn, covering an area of ap-proximately 8 km² with a depth of 28 meters, and Ińsko, spanning 5.9 km² with a maximum depth of 42 meters. Key rivers in the area include Ina and Krąpiel. The lakeland's name is derived from the river Ina, originating within its boundaries.



The region benefits from good transportation connectivity, with the national road no. 20 passing through Stargard, Chociwel, Węgorzyno, and Gdynia. Provincial roads no. 151 (Świdwin-Węgorzyno-Choszczno-Gorzów Wielkopolski) and 144 (Nowogard-Chociwel) also traverse the area, complemented by various local roads linking neighboring towns. Railway line No. 202 (Stargard Szczeciński-Gdynia) further enhances transport accessibility.

The intricate mosaic of waterways and wetlands adds to the region's ecological diversity and provides habitats for various plant and animal species. The natural beauty and varied terrain of the Ińsko Lakeland make it an attractive destination for tourism. Visitors can engage in various forms of recreational activities and appreciate the region's outstanding natural values. Whether exploring the scenic lakeshores, trekking through the moraine hills, or discovering the enchanting river valleys, the Ińsko Lakeland offers an alluring and engaging experience for tourists.

Typical landscape of the Ińsko Lakeland (Author: Aneta Kozłowska)

B. Ecological value

The urbanization of the Ińsko Lakeland is relatively modest, with the majority of settlements comprising small towns and villages scattered throughout the region. The area is not densely populated, and the human footprint is generally low. To safeguard the natural heritage and ecological integrity of the Ińsko Lakeland, several forms of protection were established to preserve its unique biodiversity, landscapes, as well as cultural heritage.

In 1981, the Ińsko Landscape Park was established in the central part of the region, covering an area of 17,763 hectares, with an additional buffer zone spanning 26,240 hectares. This protected area is an integral part of the Natura 2000 net-work, comprising two designated sites – "Ostoja Ińska" (PLB320008) and "Pojezierze Ińskie" (PLH320067).

The "Ostoja Ińska" (PLB320008) site, spanning 87,711 hectares, is specifically designated for the protection of bird species and their habitats. It boasts an impressive variety of wildlife, with over 140 bird species found within the refuge. En-compassing wetlands, forests, and lakes, "Ostoja Ińska" also includes areas of the Ińsko Landscape Park and part of its buffer zone. The landscape in this region is diverse, featuring hills, ravines, boulders, and lakes, creating a visually stunning and ecologically significant area.

Within the boundaries of the Ińsko Landscape Park, water comprises over 8.5% of the total area, highlighting the water-rich nature of the region. A remarkable feature of the park is the presence of 63 lakes, with 18 of them covering more than 5 hectares in surface area. The park's topography showcases numerous hills and lower elevations, often surrounding the picturesque lakes, contributing to the formation of beautiful valleys. Forests dominate over 50% of the park, primarily consisting of Pomeranian beechwood.

The Ińsko Landscape Park is home to an astonishing array of biodiversity, harboring over 700 species of vascular plants, accounting for one-third of all Polish species. The park plays a crucial role in safeguarding the moraine landscape of the Ińsko lakeland. The site is drained by the Ina River and its tributaries, as well as partially by the tributaries of the Rega River. The presence of numerous flow-lakes enriches the land-scape.

Pojezierze Ińskie (PLH320067), also part of the Natura 2000 network, covering area of 10,223 hectares. Its primary objective is the conservation of natural habitats and species of European importance. This diverse site comprises wet meadows, peat bogs, and forests, providing a suitable environment for a wide range of protected and endangered species. Among these are various fish, amphibian, reptile, and mammal species, as well as a rich flora, contributing to the ecological significance of the region.

There are 6 nature reserves within the park, i.e. "Bórbagno Małeka", "Głowacz", "Kamienna Buczyna", "Krzemieńskie Źródliska", "Wyspa Sołtyski" and "Źródliskowe Zbocza". In addition, there is a natural and scenic complex "Ostrowie", covering fragments of natural and cultural landscape that are worth protecting due to their scenic or aesthetic features, as well as several so-called ecological sites, a form of nature protection preserving a certain fragment of an ecosystem which is of im-portance to the protection of unique gene resources or habitats.

The Ińsko Landscape Park and the Natura 2000 sites are not only essential for preserving biodiversity but also serve as valuable locations for eco-tourism. Many are-as are accessible to tourists, offering several hiking trails and paths of varying difficulty, distance, and form of travel. However, certain areas, such as reserves, have limited or absolute restrictions on public admission to ensure the undisturbed protection of sensitive ecosystems.

C. Biodiversity

The Ińsko Lakeland provides diverse habitats that support a wide range of flora and fauna. The region hosts priority plant species, such as the floating water-plantain *Luronium natans*, listed in Annex II of the Habitats Directive. The region's flora is predominantly composed of beech forests, providing a rich environment for numerous endangered plant species, like shoreweed *Littorella uniflora*, globeflower *Trollius europaeus*, wood melick *Melica uniflora*, wild garlic *Allium ursinum* and marsh Labrador tea *Rhododendron tomento-sum*, orchids, and other plant species.

Regarding wildlife, the area is home to a diverse array of animals, including reptiles like the zig-zag adder *Vipera berus*, amphibians like toads and newts, and over 140 bird species, such as white-tailed eagle *Haliaeetus albicilla*, lesser spot-ted eagle *Clanga pomarina*, black stork *Ciconia nigra*, red-backed shrike *Lanius collurio* and eagle-owl *Bubo bubo*. The Ińsko Lakeland is particularly notable for being a significant habitat for cranes, with more than 1% of the country's total crane population recorded here. Additionally, mammals like hare, polecat, mar-tens, bats, otters, ermine, beavers, and bison inhabit the region. Notably, the region is home to lavaret *Coregonus lavaretus* and vendace *Coregonus albula* fish populations.

In summary, the Ińsko Lakeland is a region rich in biodiversity, supporting a variety of flora and fauna. Its diverse habitats provide a sanctuary for numerous plant and animal species, including protected, rare and endangered ones.

The priority species in the region for the ReCo project is the European bison *Bos bonasus*. The situation of the species' population in the world has indeed seen significant improvements, particularly over the past two decades. However, the total number of European bison worldwide remains below 10,000 individuals (as of the end of 2021, according to the Bison Pedigree Book, there were 9,554 individuals in the wild and in captivity), which falls short of the assumed minimum safe population size of 10,000 individuals.

The Polish population of European bison has also shown improvement, with the size of the population reaching 2,223 individuals in the wild and in captivity. However, their occurrence is limited to a few isolated areas, and the population is at risk due to the high relatedness of all individuals, stemming from a small number of founders. This relatedness makes the population vulnerable to decimation or even extinction, particularly under the influence of diseases like the blue tongue disease.

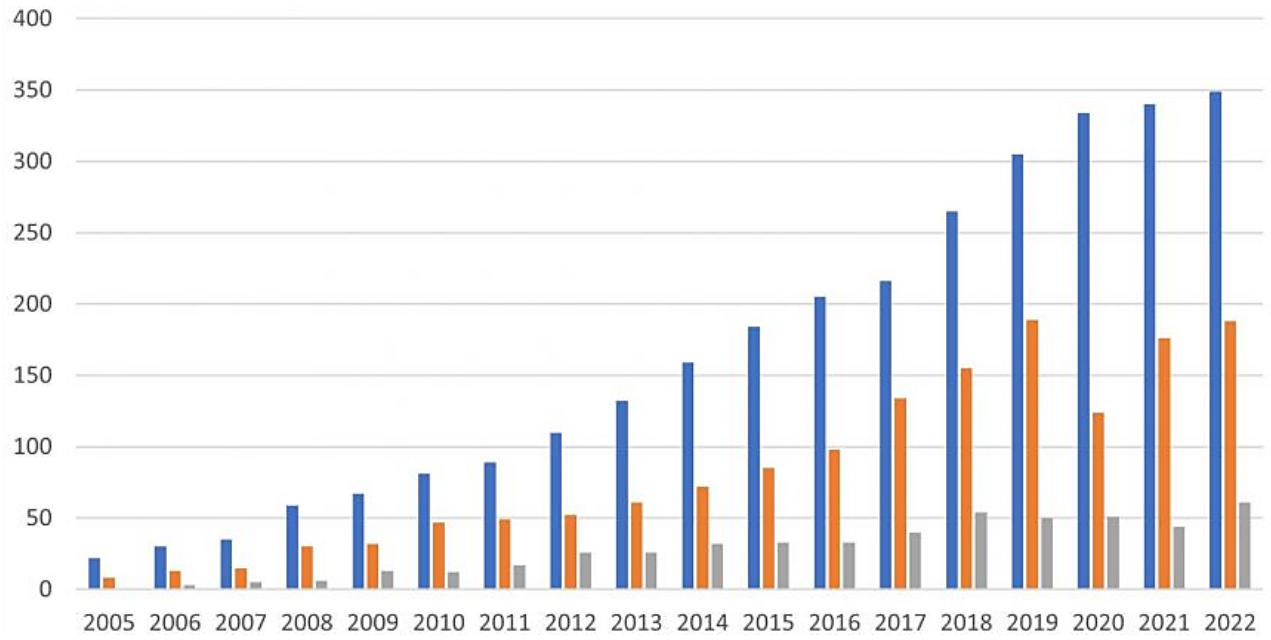
Free-living bison herd in Western Pomerania (Author: Aneta Kozłowska)

In Western Pomerania, the West Pomeranian Nature Society has been actively undertaking protective measures for the European bison since 2005. These initiatives include captive breeding, reintroduction, translocations, GPS monitoring (80 individuals are currently equipped with GPS-collars), interventions, winter feeding, and veterinary services. As a result of these efforts, the number of bison has in-creased, and natural diversification of herds has been initiated. The West Pomeranian population, currently consisting of nearly 350 bison (with 77 residing in Ińsko Lakeland), is dynamically growing and is distributed among 11 herds along the borders of Zachodniopomorskie, Lubuskie, and Wielkopolskie voivodeships. Since 2005, thanks to the activities of the West Pomeranian Natural Society, the population of this species in Western Pomerania has increased 15 times.

Until now, the main approach to European bison protection has been focused on controlling their movement to minimize conflicts with local communities (such as damage to crops) and to safeguard the bison from traffic accidents. Overall, while progress has been made in improving the situation of European bison populations, continued conservation efforts are crucial to ensure their long-term survival and genetic diversity.

D. Challenges and risks for future development

One of the most significant challenges in the protection of the West Pomeranian bison population is its relatively small size, not only globally but also within Po-land. By the end of 2021, there were only 7,753 individuals living in the wild, across free and semi-free herds, with just 2,223 of them residing in Poland. These numbers are alarming as they do not guarantee the long-term survival of the species. The isolation of individual herds, due to migration barriers, is a critical issue. Such isolation hinders the natural exchange of genetic material between different populations, leading to limited genetic diversity within each herd. Moreover, the overall population suffers from low genetic diversity resulting from the limited number of founding individuals (only 7) that were used for the reconstruction of the lowland line. Low genetic diversity can have severe consequences for the bison population. It increases the risk of inbreeding and makes the species more vulnerable to various threats, including diseases, environmental changes, and other factors that may impact their survival. A lack of genetic self-sufficiency could exacerbate the problem, as the population may struggle to adapt to changing conditions, making them less resilient in the face of challenges.



Number of free-living European bison population in north-western Poland: blue - total number of individuals, orange - number of females, grey - number of calves (Author: the West Pomeranian Nature Society)

An additional challenge lies in the risk of low social acceptance, which can impede the development of the West Pomeranian bison population. European bison left without proper care and ongoing supervision tend to form numerous herds, some-times consisting of several dozen or even over 100 individuals. These herds often forage in fields, causing significant damage to crops. Such situations lead to pro-tests from farmers and local communities, hindering or even preventing the growth of the European bison population in certain areas. Maintaining high social acceptance is absolutely crucial for the successful protection and development of the European bison population.

The region of the Ińsko Lakeland faces a troubling increase in poaching, posing a significant problem for the protection of the European bison in the area. This rise in illegal hunting has had a detrimental impact on the development of the West Pomeranian bison population. Despite an average of approximately 40 calves being born each year, the population growth has virtually stagnated for the past two years. In 2022, a record number of 61 calves were born, but sadly, this has not translated into a considerable increase in the overall population size. The reason being that many animals are dying, increasingly falling victim to poachers. Between the years 2011 and 2020, the population experienced an average annual increase of about 27 individuals. However, in 2022, the bison population saw an increase of merely 9 individuals. This trend shows that the growth of the European bison population does not exceed 10 individuals year on year. The alarming fact is that the record number of births is unable to offset the devastating impact of poaching. In the preceding year, a staggering 24 bison fell victim to poachers, marking the highest poaching-related statistic since the implementation of protective measures in 2005.

E. Problems to be tackled with

Initiatives to protect and restore migration corridors can help mitigate the effects of isolation, allowing for the movement of bison and promoting gene flow between populations. By addressing these challenges, we can increase the chances of a sustainable future for the West Pomeranian bison and preserve this majestic species for generations to come.

Conservation Breeding Centre of European bison – “Dzika Zagroda” in Jabłonowo (Author: Jakub Skorupski)

To address the risk of a decline in social acceptance, proactive measures are necessary to minimize conflicts and promote coexistence between European bison and local communities. Strategies such as collaborative management involving stake-holders in decision-making, providing compensation or incentives to farmers for crop damage, raising awareness about the importance of bison conservation, developing sustainable land use plans, and implementing effective management practices are essential. It is necessary to optimize the spatial structure of the population, maintain low densities of European bison by increasing the number of herds and maintaining the density below 3 individuals per 1000 ha. By actively engaging with the local

communities and considering their perspectives, we can create a positive environment that fosters understanding and cooperation, ensuring the long-term survival and growth of the West Pomeranian bison population.

To combat the grave threat of poaching and ensure the proper functioning of the species in the region and the entire country, it is imperative to establish effective cooperation between non-governmental organizations (NGOs) and law enforcement authorities, including the police, prosecutor's office, and courts. This collaborative effort is vital in addressing the pressing issue of poaching and safeguarding the well-being of the bison population. Furthermore, the attitude and involvement of land administrators, such as communes, forest administration, and hunting clubs, are of paramount importance. Their active participation and support are essential in implementing successful conservation strategies, increasing public awareness, and imposing strict penalties for poaching. By forging strong partner-ships between NGOs and law enforcement agencies, a well-coordinated approach to combat poaching can be established. This includes sharing valuable information, conducting joint operations, and ensuring efficient communication channels to swiftly address poaching incidents.

ENHANCING LANDSCAPE RESILIENCE: CONNECTING VALUABLE AND PROTECTED HABITATS WITH AGRICULTURAL SURROUNDINGS

By Zdeněk Mačát

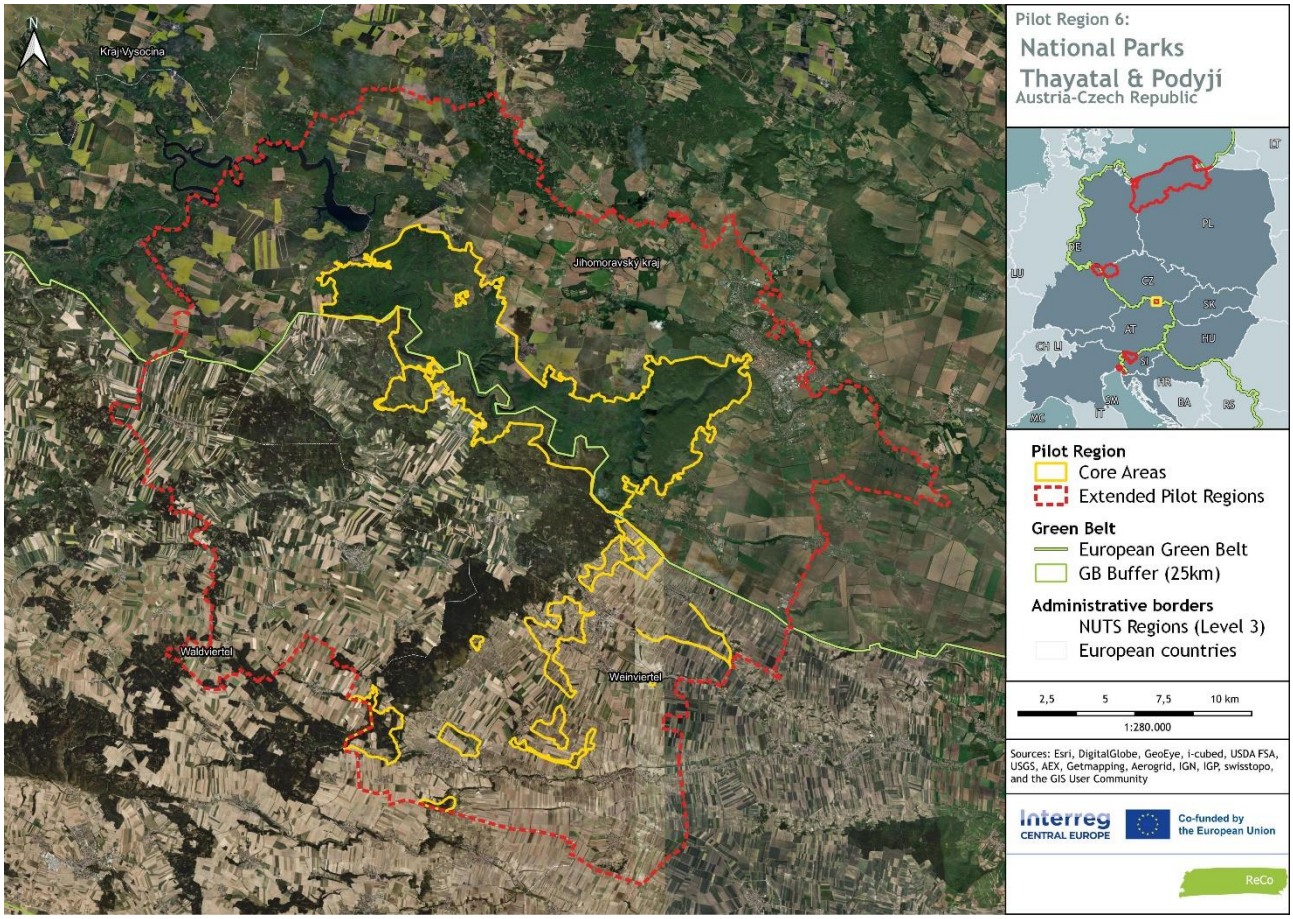
The region in Southwest Moravia offers a diverse and contrasting landscape. On one hand, there are vast flat agricultural terrains with extensive arable fields, but unfortunately, it lacks a varied mosaic of landscape elements. On the other hand, a deep river valley surrounded by forests and other high-value habitats hosts an impressive array of species, making it a national park with protected status. However, both landscapes face their unique challenges. The agricultural region is highly vulnerable to climate change impacts due to its lack of interconnected natural habitats that could mitigate these effects. Conversely, the national park contends with issues such as invasive species, excessive tourism, and nutrient overload from surrounding agricultural activities, leading to eutrophication. The absence of connectivity between the protected area and the surrounding landscape, predominantly composed of agrocenosis, poses a significant risk to the preservation of the park's natural habitats. In the face of ongoing climate change, this situation may jeopardize the stability of the protected area. With multiple stakeholders holding diverse interests, the primary challenge lies in finding a collective approach to address these issues, with a central focus on bolstering the region's resilience to climate change.

A. General characteristics

The Pilot region Podyji, which encompasses the Czech part of the transborder Podyji-Thayatal region, covers an extensive area of 309 square kilometers (30,918 ha). Situated in the southeast part of the Czech Republic, in Southwest Moravia, its name derives from the river Dyje (Thaya), which acts as a natural border between the Czech Republic and Austria.

The heart of the pilot region is the Podyji national park, covering 20% of the area (63 square kilometers). This national park stands as a unique example of a well-preserved river valley, while the remaining portion of the pilot region is primarily used for agriculture, focusing on cereal and wine cultivation. The region's warm climate, fertile soils (chernozems, brown soils), and extensive human influence throughout history contribute to its agricultural nature.

The administrative center of the region is the City of Znojmo, with approximately 34,000 inhabitants, while most other settlements are characterized by their village-like ambiance. Vranov nad Dyji, a market town with about 800 inhabitants, stands as one of the few exceptions, renowned for its castle and dam. Positioned at the upper part of the river Dyje, at the entrance to the national park (northwest part of the region), Vranov nad Dyji contrasts Znojmo, located at the lower end of the river (southeast part of the region). Both settlements feature dams on the Dyje River, which create protected sections within the national park. However, these dams also act as significant barriers, isolating and distinguishing the most preserved and least affected river valley in the Czech Republic, spanning a length of 42 km.



View of the Dyje River canyon in the heart of Podyjí National Park (Author: Zdeněk Mačát)

View to the river Dyje from a point of Sealsfield stone near Popice (Author: Petr Lazárek)

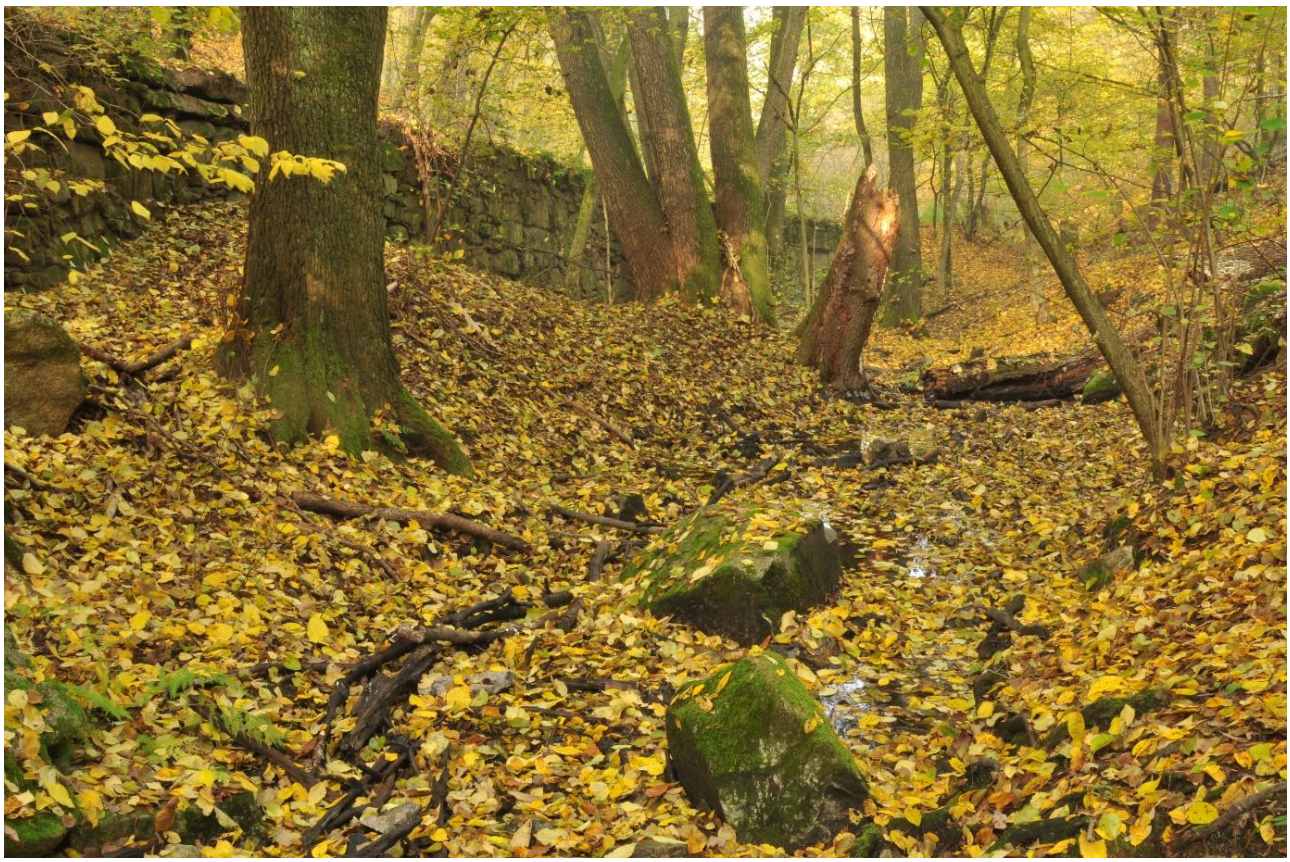
B. Ecological value

The ecological value of the region as a whole is undeniably high. However, on a local scale, there are variations across the region, as mentioned earlier. From an ecological perspective, the most valuable part of the territory is the protected area of the national park, which is reflected in the name of the entire pilot region, despite the larger size of the unprotected territory. The national park covers 84% of its area with

forests, but it also boasts numerous other valuable features, including rocky amphitheaters, cliffs, meanders, detritus fields, impervious ravines, various types of heathlands adorned with multi-colored layers of thermophilic plants, and alluvial plains along the river Dyje.

Unfortunately, it is necessary to acknowledge that many ecological values of the region have suffered in recent history, particularly during the second half of the 20th century, due to insensitive management methods, especially in agriculture, driven by the prevailing political regime. This impact is evident in certain forests that now consist of economically advantageous but less suitable tree species for the habitat. However, the most significant transformation is visible in the agricultural landscape. The original heterogeneous landscape mosaic, well-documented in available aerial photos from the 1950s, has been significantly homogenized.

To address these negative trends and protect the most valuable parts of the region, the declaration of the Podyji protected landscape area in 1978 and the subsequent establishment of the Podyji National Park in 1991 were crucial steps. These conservation efforts aimed to set an example of good practice, emphasizing considerations beyond mere revenue-generation, in order to preserve and enhance the landscape for future generations.



Historical remains of old settlement (mill) near Dyje River in the national park (Author: Petr Lazárek)

C. Biodiversity

The most significant biodiversity hotspot in the pilot region is undoubtedly the national park. Outside its boundaries, a relatively vague landscape dominated by agricultural and forestry activities can be found. Although the area would naturally be covered by oak-dominated forests, extensive deforestation and human impact have altered the species composition of the remaining forest remnants. Some valuable habitats, such as dry grasslands and forests, have been preserved in small protected sites.

However, the situation within the national park is different. The varying slope exposures in the river valley, coupled with the complex relief and diverse geological and pedological characteristics, result in a wide variety of plant and animal communities. Most of the forests in the national park, including thermophilous oakwood, oak-hornbeam forests, and sub-montane beechwoods, can be classified as near-natural. This area is home to endemic species like the Thaya rowan *Sorbus thayensis* and cone-leaved rowan *Sorbus cucullifera*, which are found only in this region.

On the marginal slope of the Bohemian Massif, a remarkable transitional zone between the Hercynicum and the Pannonicum can be found in a deforested area on siliceous bedrock. This area shares species from both phytogeographic regions, including cyclamen *Cyclamen purpurascens*, Hungarian Mullein *Verbascum speciosum*, great Pasque flower *Pulsatilla grandis*, Hungarian iris *Iris variegata*, greater meadow-rue *Thalictrum aquilegiifolium*, ox-eye *Buphthalmum salicifolium*, and 18 orchid species, among many others.

The Podyji National Park supports a rich and diverse wildlife population, including 65 species of mammals, 22 species of bats, river otters, and 17 species of rodents, including the European edible dormouse *Glis glis* and hazel dormouse *Muscardinus avellanarius*. The area is a nesting ground for over 150 bird species, with notable species such as hoopoe *Upupa eppops*, honey buzzard *Pernis apivorus*, and eagle owl *Bubo bubo*. Recently, white-tailed eagles *Haliaeetus albicilla* and peregrine falcons *Falco peregrinus* have also attempted to nest in the park.

Flowering heathland on the eastern edge of the National Park with a view of the agricultural landscape (left) and a famous Šobes Vineyard in the heart of the National Park (Author: Petr Lazárek)

The Podyji National Park hosts a diverse community of reptiles and amphibians, including 7 reptile species like the Aesculapian snake *Zamenis longissimus* and the European green lizard *Lacerta viridis*, and 13 amphibian species, including the Italian crested newt *Triturus carnifex*, which is exclusive to this region, and a strong population of fire salamander *Salamandra salamandra*.

The park is also home to numerous invertebrate species, including rare thermophilic species associated with different habitats. Iconic species found in Podyjí include the clouded Apollo butterfly *Parnassius mnemosyne*, great capricorn beetle *Cerambyx cerdo*, Moravian ladybird spider *Eresus moravicus*, Styrian praying lacewing *Mantispa styriaca*, predatory bush cricket *Saga pedo*, fairy shrimp *Eubranchipus grubii*, among many others. These diverse species highlight the ecological importance and richness of the Podyji National Park.

D. Challenges and risks for future development

The territory of the national park is effectively managed by nature conservation authorities, focusing on sustainable development interests. However, there remain several challenges to address in the surrounding landscape. The key to success lies in finding an all-around beneficial approach that is acceptable to local

stakeholders, including farmers, foresters, landowners, entrepreneurs, and others, while also aligning with sustainable landscape development goals.

Recent findings suggest that the reported problems from various interested parties mainly stem from communication issues, remnants of past habits that people have grown accustomed to without deeper consideration or opportunities to influence change. Fortunately, there is hope, as the interests of most stakeholders are actually quite similar – a healthy and productive landscape that provides diverse benefits.

Many of the challenges to overcome are rooted in conservation efforts. To improve the current state of the landscape, the main tools at our disposal are communication, education, and the creation of examples showcasing good practices. By engaging with and educating local stakeholders, we can foster a shared understanding of the benefits of sustainable landscape management and build consensus on how to address conservation challenges effectively.

Furthermore, implementing and highlighting successful case studies of sustainable practices can inspire and motivate others to follow suit. Collaboration and cooperation among all parties involved will be essential to achieve a balanced and thriving landscape that meets the needs of both nature conservation and sustainable development.

E. Problems to be tackled with

Apart from the national park, the region has a relatively small percentage of preserved natural features, which are unfortunately disconnected. The large fields with arable land are particularly vulnerable to the impact of climate change, leading to soil erosion, extended periods of drought, and an earlier growing season, which increases the risk of late frosts.

Within the national park itself, there are threats posed by invasive species, notably the black locust *Robinia pseudoacacia* and the tree of heaven *Ailanthus altissima*. Over-tourism has also emerged as a significant risk factor for the untouched areas of the park. The number of visitors has been steadily increasing, with an annual total of around 500,000 in recent seasons, exerting considerable pressure on the relatively small area of the park. Furthermore, the use of chemical substances and fertilizers in the surrounding landscape has negative effects on natural biotopes and the aquatic environment, contributing to the eutrophication of the area.

As the national park stands as an isolated island of natural habitats, it lacks connectivity with the surrounding landscape, except for sporadic connections. To preserve the region's natural wealth effectively, it is crucial to establish connections between the national park and the adjacent landscape by creating stepping stones of suitable biotopes and habitats. This connectivity will enhance ecological corridors and promote the exchange of species, ultimately contributing to the overall health and resilience of the entire region.

THAYA VALLEY: AUSTRIA`S GREEN CANYON

By Christian Übl, Julian Haider, Stefan Fuchs & Florian Danzinger

Some of the most biodiverse regions in Central Europe's protected areas can be found in Thayatal National Park and its neighboring Podyji National Park. The narrow valley, which separates northern Lower Austria from the Czech Republic, is surrounded by vast natural forests. This great biodiversity is a result of the valley's location at the confluence of two climate zones, diverse geology, and the unique shape of the river. Additionally, the area's history as part of the Iron Curtain during the European Cold War led to minimal anthropogenic disturbance for many decades. The European wild cat stands out as the undeniable star of Thayatal National Park's animal kingdom. Rediscovered in 2007 after being believed extinct in Austria, this species is now thriving in the park. During the summer, visitors can also marvel at majestic black storks, colorful green lizards, and rare river dwellers like the noble crayfish, which are uncommon elsewhere. The national park is not only a haven for wildlife but also harbors some rare or extinct plant species, playing a crucial role in the survival of at least nine moss species. However, despite being protected by law, intensified land use driven by rising demand for development land, roads, and intensive agriculture poses a threat to the preservation of the high biodiversity and various ecosystem services in the Thayatal National Park pilot region and its surrounding areas. In addition to maintaining landscape connectivity, the pilot area of Thayatal National Park faces the challenges posed by a fast-changing climatic regime. More intense weather events and prolonged dry seasons, along with changing intra- and interspecific dynamics and an increasing threat of non-native invasive species, require careful management and intervention. Without sensitive management, the pressure on ecosystems and landscape features will only increase in relation to these issues. To ensure robust pools of biodiversity, landscape management and connectivity play crucial roles in stabilizing habitats, species, and migration routes. The major objectives for environmental conservation in the area include addressing these issues, protecting one of Austria's biodiversity hotspots, and preparing the pilot area to withstand future challenges.

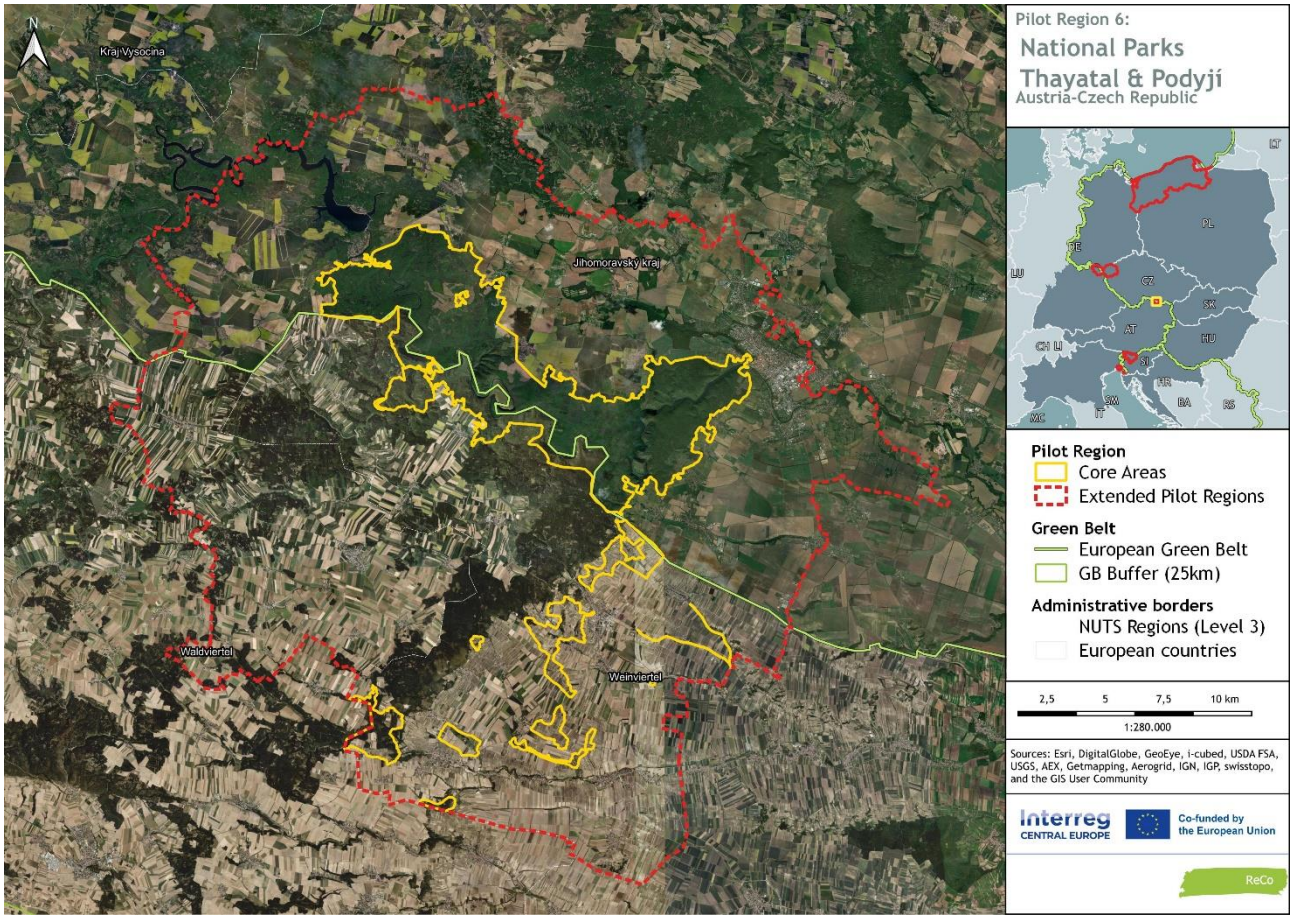
A. General characteristics

The Thayatal National Park and its neighbour, Podyjí National Park in the Czech Republic, contain some of the most biodiverse areas in Central Europe's protected regions. This steep valley is nestled within natural forests and is situated along the border of northern Lower Austria and the Czech Republic. The combination of diverse geology, river morphology, and the valley's location at the intersection of two climate zones has created conditions favourable for supporting high biodiversity.

The River Thaya has carved a 150-meter deep path through the geological formations of the Bohemian Massif, resulting in the characteristic valley meanders. Along these river bends, a diverse range of habitats interweave, including natural forests, dry grasslands, meadows, cliffs, and rock faces. These habitats provide homes to numerous rare animals such as the Black stork and the European Wildcat, as well as unique plants like the Siberian melic grass.

Despite its relatively small expanse of 7,660 hectares (Thayatal NP 1,360 ha, Podyjí NP 6,300 ha), the area holds immense value as a wildlife habitat in Central Europe and deserves protection. Its central location in an otherwise fragmented and intensively utilized landscape of the Waldviertel, the Weinviertel, and South Moravia makes it vital for wildlife conservation. The area's potential as a stepping stone for migrating wildlife, including the European Wildcat, the Lynx, the Wolf, and other species relying on interconnected movement corridors for migration and dispersion, further emphasizes its significance.

In addition to its impressive natural landscape, the region boasts a rich cultural history, with castles and ruins lining the riverbanks and renowned wineries that captivate both visitors and scientists alike.



River Thaya at the height of the Umlaufberg peak (Author: Ralph Mirau)

Forested slopes of the Thaya River Valley (Author: Marc Graf)

B. Ecological value

Together with the neighbouring Czech Podyjí National Park, the Thayatal National Park preserves one of the last remaining natural valley landscapes in Central Europe. In this relatively small area, the River Thaya has created diverse habitats and forest types, resulting in a surprising richness of biodiversity. Over 40% of all plant species found in Austria and numerous endangered animal species, such as the European wildcat, the black stork, and the noble crayfish, find refuge here. The meadows along the Thaya, covering about 40 hectares, were formed through grazing, and they host original dry grasslands with a variety of botanical rarities on steep slopes and rocky plateaus. However, the majority of the National Park, over 90 percent, consists of ancient oak and beech forests, forming unique forest communities.

The Thaya meanders gracefully for 23.3 km through this extraordinary valley landscape. Approximately 5 to 1.5 million years ago, it carved a deep path into the metamorphic rocks of the Bohemian Massif, creating one of the most beautiful breakthrough valleys in Central Europe. The 378 m high Umlauf-berg, nearly encircled by the Thaya, provides a vantage point to admire the charm of the Thayatal landscape. The geological bedrock with granite, gneiss, and schist, dating back up to 600 million years, is fascinating and makes the National Park exceptional, as these rocks belong to the oldest mountain range in Austria. Near Hardegg, one can also find alkaline stones like calc-silicate and marble.

The Thayatal National Park was established in 2000 as an institution of the IUCN Category II. Among its nature management tasks are transforming forests with non-indigenous tree species into natural habitats and preserving high diversity micro habitats like meadows and dry grasslands. It promotes the dynamic development of regional habitats rich in fauna and flora while providing protection for natural processes. Additionally, the park supports scientific research focused on describing natural processes and ensuring long-term studies. It also emphasizes recreational aspects and environmental education. The Thayatal National Park GmbH is a limited liability company, and its shareholder is the Austrian Government, represented by the Ministry of Environment and the Region of Lower Austria.

Thaya River Valley forest (Author: Petr Lazárek – left, Claudia Ebner – right)

The Podyjí National Park, existing since 1 July 1991, is the smallest national park in the Czech Republic. The Dyje (Thaya) River runs through the hilly terrain in the south-east of the Bohemian-Moravian Highlands, creating a canyon-like valley up to 220 meters deep over 40 kilometres. This area is home to 152 bird species, 65 mammal species, 77 specially protected plant species, and various other species. Similar to the Austrian side, beech, hornbeam, and oak trees dominate the landscape here. Unique to Podyjí are extensive heathland and steppe heath landscapes in the south-eastern part of the national park, representing the

largest of their kind in the Czech Republic. These spaces originated from deforestation of the original oak forests and subsequent grazing in the Middle Ages, now serving as vital habitats for many rare plant and insect species.

The Thaya River acts as the lifeline of both National Parks. With its striking meanders and deep cuts into the rock, it leaves its mark on the landscape, forming the border between Austria and the Czech Republic and connecting the two banks to create a large protected area. The Thayatal stands as one of the last semi-natural valley landscapes in Central Europe, adorned with steep banks, vertical rock slides, wide valley bottoms, and a rich mosaic of various habitats along its path through the National Park.

C. Biodiversity

With a current area of 1,360 hectares, the Thayatal National Park is Austria's smallest. However, it doesn't need to hide its significance, as it stands out as a leading player in terms of species and habitat diversity. This remarkable diversity is attributed, on one hand, to the diverse influences of the Pannonian climate from the east and the Atlantic climate from the west. On the other hand, the variation in the underlying rock, ranging from acidic to alkaline, creates different conditions for life. But it is the Thaya River itself that has the most significant impact.

Almost half of all native plant species in Austria occur within the cross-border conservation area. The spectrum ranges from magnificent representatives like Turk's-cap lilies, thriving in the cool penumbra of the forest under nutrient-rich conditions, to resilient plantain grass carnations, among the delicate and beautiful specialists of the dry meadows. The Thayatal National Park is also home to rare and endemic species. For example, the rare Feathergras species *Stipa dasyphylla* only occurs in a few dry meadows in the National Park. In an old, light-flooded, and rocky forest, the only natural occurrence of Sibirian melic grass *Melica altissima* is found, as well as the sole occurrence of Jersey thrift *Armeria arenaria* in one of the managed meadows along the river. Regarding mosses, the National Park plays a crucial role in the survival of at least nine species and harbors five species found nowhere else in Austria (*Riccia gougetiana*, *Ceohaloziella stellulifera*, *Pyramidula tetragona*, *Oxymitra incrassata*, *Riccia pillosa*).

Stipa dasyphylla in the Thayatal National Park (Author: Christoph Milek)

The undisputed star in the animal world of the Thayatal National Park is the European wildcat *Felis sylvestris*. The species, once thought to be extinct in Austria, was rediscovered in 2007. However, summer guests such as graceful black storks *Ciconia nigra*, reptiles like European green lizards *Lacerta viridis*, or river dwellers uncommon elsewhere, such as the noble crayfish *Astacus astacus*, also add to the sense of wonder.

European wildcat (Author: Dieter Manhart)

European green lizards, on the left (Author: Claudia Ebner) and black stork, on the right (Authors: Herfried Marek and Ewald Neffe)

Around the Thaya River, there are about 40 hectares of meadows that were once created through grazing. Original dry grasslands, hosting a wealth of botanical rarities, have also been preserved on steep slopes and

rocky plateaus. However, most of the National Park, over 90%, is characterized by pristine oak and beech forests and unique forest communities.

D. Challenges and risks for future development

By law, the area of Thayatal National Park is preserved on a long-term basis. However, intensified land use driven by increasing demands for built-up land, roads, and intensive agricultural practices has a negative impact on the maintenance of high biodiversity and various ecosystem services in the pilot region of Thayatal National Park and its surrounding areas. Protected areas and valuable landscapes in this region are becoming more isolated, leading to landscape fragmentation that hinders the migration of wildlife between natural habitats. To ensure the long-term security of these habitats, habitat networks like the European Green Belt are essential.

Habitat networks, in line with the EU strategy for a Green Infrastructure, offer additional possibilities for improving the landscape's permeability for wildlife, including foraging and genetic material exchange. Additionally, they provide recreational space for people, contribute to improved water management, enhance air quality, and support several ecosystem services. Promoting these features proactively in the pilot region is crucial to prevent further dissection of the landscape.

In addition to landscape connectivity, the pilot region of Thayatal National Park faces the ongoing challenge of a rapidly changing climate regime, characterized by more extreme weather events and prolonged dry periods. Without proactive measures, landscape elements and habitats will face increasing pressure from these issues. Landscape management and connection efforts can positively contribute to stabilizing habitats, species, and migration routes, thus securing resilient pools of biodiversity.

E. Problems to be tackled with

The common landscape area between Lower Austria's Eastern Quarter, Waldviertel, Weinviertel, and the counties of South Bohemia, Vysocina, and South Moravia is facing increasing dissection due to construction, roads, and intensive land use, which is interrupting wildlife migration corridors. Important protected areas and near-natural landscapes in the Waldviertel, South Bohemia, or the Thayatal and Podyji National Parks are becoming isolated, leading to impaired biodiversity caused by a lack of exchange of animals and plants. These factors are contributing to ecological stress on nature conservation target species such as the European wildcat *Felis silvestris* and other mobile and specialized rare species.

Besides protecting the designated area of Thayatal National Park, connecting and safeguarding the surrounding areas through specific management is a crucial task for enhancing habitat connectivity and species migration. Promoting habitat restoration in the surrounding area of the Thayatal National Park will foster connectivity. Connected landscapes play a vital role in preserving biodiversity and supporting healthy populations of various species. Within this pilot region, the Thayatal National Park serves as a biodiversity hotspot along the European Green Belt. However, it is essential to focus on restoring and connecting habitat patches in the surrounding area to provide stable habitats and migration routes for sensitive and highly specialized species.

As one of Austria's biodiversity hotspots, the ongoing threat of climate change is also evident in this region. Prolonged dry seasons and the occurrence of more extreme weather events pose threats to the existing ecosystems in the pilot region. Additionally, ecological pressure from invasive alien species and changing intra- and interspecific interaction dynamics can be linked to climate change.

Addressing these challenges and preserving one of Austria's biodiversity hotspots while preparing the pilot region to face future challenges are major goals for nature conservation in the area.

SUMMARY: COMMON CHALLENGES TO BE FACED

The Pilot Regions designated for conservation measures face a complex array of challenges that span both common and region-specific issues. These challenges collectively underscore the urgency and complexity of effective conservation strategies. Key challenges include:

- **Climate Change Dynamics**

  The regions confront the dual threats of climate change - characterized by droughts and intensified storms leading to increased torrential rainfall. These climatic shifts trigger profound alterations in natural resources, impacting vital ecosystems such as forests, grasslands, water bodies, and even causing sea-level rise. The resulting changes ripple through the fabric of biodiversity, prompting shifts in species distributions and behaviours.

- **Agricultural Transformation**

  Structural shifts within agriculture pose significant challenges. The abandonment of species-rich grasslands is causing rampant overgrowth, while intensively farmed areas contribute to habitat degradation. Balancing the needs of agricultural productivity with conservation imperatives remains a complex puzzle to solve.

- **Unsustainable Resource Utilization**

  Unsustainable utilization of natural resources, encompassing air and water pollution and over-extraction, poses a grave challenge. These practices erode the ecological integrity of the regions, threatening the delicate balance of their ecosystems.

- **Transport Infrastructure, Spatial Planning and Land Use Changes**

  The regions grapple with the delicate balance between road and transport infrastructure development and the preservation of agricultural land and natural environments. Inadequate or non-strategic spatial planning contributes to the erosion of valuable landscapes, impeding the harmonious coexistence of urban and rural spaces. The encroachment of infrastructure and land use changes, such as urban sprawl, intensified agriculture, and industrialization, threatens open countryside, natural habitats, and biodiversity. These changes can disrupt ecosystems and lead to habitat loss.,

- **Ineffective Natural Area Management**

  Some regions suffer from poor management of their natural areas, including meadows and forests. Fragmented landscapes are a concern, impairing ecosystem connectivity and diminishing the potential for species survival and migration. Communication gaps, educational deficits, and a lack of well-defined good practices further compound these issues.

- **Biodiversity Loss**

  Human activities like tourism, pollution, and habitat fragmentation contribute to the loss of biodiversity, endangering native species and habitats. Ecosystem degradation can result in reduced resilience to environmental changes.

In conclusion, these common challenges underscore the imperative for a comprehensive and collaborative approach to conservation. Additionally, each region faces its specific issues, ranging from infrastructure development to habitat fragmentation, and from genetic diversity concerns to poaching threats. Addressing these challenges requires a combination of conservation efforts, sustainable planning, public awareness, and collaboration among various stakeholders.

The ReCo project's (www.interreg-central.eu/projects/reco) consortium consist of:

- Bavarian Branch of Friends of the Earth Germany (Lead Partner, Germany),
- Hof county branch of Friends of the Earth Germany (Germany),
- DOPPS – BirdLife Slovenia (Slovenia),
- Ametyst, NGO (Czech Republic),
- Federacja Zielonych "GAJA", NGO (Poland),
- Municipality of Staranzano (Italy),
- Thayatal National Park (Austria),
- University of Vienna (Austria),
- Silva Tarouca Research Institute for Landscape and Horticulture (Czech Republic),
- BSC – Business support organisation ltd., Kranj (Slovenia),
- Podyji National Park Administration (Czech Republic),
- Ministry of the Environment of the Czech Republic (Czech Republic).