Mountain Environment Protection and Protected Mountain Areas in Slovenia

26

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Abstract

The conservation of the natural environment in Slovenia goes back to the late nineteenth century. The first nature protection program in Slovenia was drawn up in 1920. The current Nature Conservation Act was adopted in 1999. Today there are one national park, three regional parks, and twenty-three landscape parks in the Slovenian mountains; this chapter presents one example of each. The beginnings of Slovenia's only national park (i.e., Triglav National Park) hark back to 1924. It is rich in typical alpine features and full of alpine flora and fauna. Its cultural landscape reflects the connection between people and nature. It covers 840 km^2 and contains thirty-three settlements with over 2,300 residents. Logar Valley Landscape Park was established in 1987. It covers 24 km^2 and has only around forty residents. The beauty of this glacial valley is reflected in numerous natural features. Farms, which have shaped the cultural landscape over the centuries, have also left their mark. Efforts to preserve the predominantly forested Pohorje Hills region date back to the 1920s. Pohorje Regional Park was established in 2024. It covers 59 km^2 and has no residents.

Keywords

Mountains · Natural heritage · Cultural heritage · Nature protection · Nature conservation · Triglav National Park · Logar Valley Landscape Park · Pohorje Regional Park

26.1 Introduction

26.1.1 Development of Protected Areas in Slovenia

Protecting areas with abundant natural resources and diverse landscapes has been Slovenia's priority for over a century (Bizjak et al. 2008). The first nature protection efforts were directed toward forestry, which was a highly important industry in the nineteenth century. The Auersperg noble family, which was among the largest landowners in what is now Slovenia, ordered their forest manager Leopold Hufnagl to monitor its forests more closely. In 1892, he prepared his first forest management plan, in which he added a small note recommending that a specific area be conserved as virgin

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forest. In this way, he was the first in Europe and among the first in the world to exclude a virgin forest from commercial use (Pachschwöll 2011). Hufnagl is thus considered the father of Slovenia's planned nature protection.

The importance of the natural environment and the need to conserve it because of its beauty and uniqueness were increasingly acknowledged in the early twentieth century (Berginc et al. 2007). In 1920, the Section for Nature and Natural Monument Protection of the Museum Society for Slovenia submitted a memorandum (Spomenica ... 1920)—which was effectively the first Slovenian nature protection program—to the Slovenian provincial government (Slovenia was part of the Kingdom of the Serbs, Croats, and Slovenes at that time); in terms of its concreteness and comprehensiveness, this program was among the most significant nature conservation documents of that period overall. It contained the initiative to establish alpine, subalpine, and marsh conservation parks, prohibit the destruction of rare and characteristic flora and fauna, protect caves with interesting flora and fauna, and raise public interest in nature protection. Even though at that time nature protection still lacked any legal or organizational structure, the authorities took the memorandum very seriously, which was also evident from the 1924 official protection of the Triglav Lakes Valley (*Dolina Triglavskih jezer*) in the Julian Alps (Erhartič 2012; Sect. 26.2). The nature protection cause evolved over the course of the entire twentieth century (cf. Piskernik 1963–1964; Polajnar Horvat et al. 2017; Komac and Zorn 2022).

An important step in the efforts to introduce a comprehensive nature conservation system was the 1999 adoption of the Nature Conservation Act (Zakon ... 1999), which provides a legal framework for establishing protected areas in Slovenia, defines measures to conserve biodiversity, and establishes a system for protecting Slovenia's natural values. This act provides for the most comprehensive environmental protection, which helped society recognize the benefits offered by the natural environment.

Slovenia is among the European countries with the best-preserved natural environment, great biodiversity, and very diverse landscapes (Ciglič and Perko 2013). Natura 2000 sites encompass a full 38% (7,675 km^2) of the country, and over 14% (2,925 km^2) of its territory is designated as protected areas (Fig. 26.1). These sites partially overlap, so that nature protection areas cover a total of 40.4% of Slovenia (Nature ... 2022).

26.1.2 Protected Areas in Slovenia's Mountainous Areas

The data on Slovenia's mountainous areas are summarized from Chap. 3 of this volume. In Slovenia's mountainous areas, which cover 11,531.1 km^2 (or 56.9% of the country), Natura 2000 sites comprise 4,904.3 km^2 (42.5% of the mountainous areas) and protected areas cover 2,241.8 km^2 (19.4%). Because these sites partially overlap, nature protection areas in the mountainous areas comprise a total of 5,173.2 km^2 (44.9%; Fig. 26.1).

Protected mountainous areas include one national park (the only one in Slovenia), three regional parks (out of four in Slovenia), twenty-three landscape parks (out of forty-seven in Slovenia), twenty-five nature reserves (out of sixty in Slovenia), and 184 natural monuments (330 in Slovenia; Table 26.1).

Three protected mountainous areas in Slovenia are presented below (Fig. 26.1; Table 26.2): Triglav National Park as the only national park in the country (Sect. 26.2), which encompasses nearly the entire Slovenian Julian Alps, Logar Valley Landscape Park (Sect. 26.3) as a large protected area within the Kamnik–Savinja Alps, and Pohorje Regional Park (Sect. 26.4) as an example of a protected area in the Alpine hills. The history and origin of each is presented, along with their distinctive natural features, cultural landscapes, the conflicts between land use and protection efforts, and why they are considered unique landscapes.

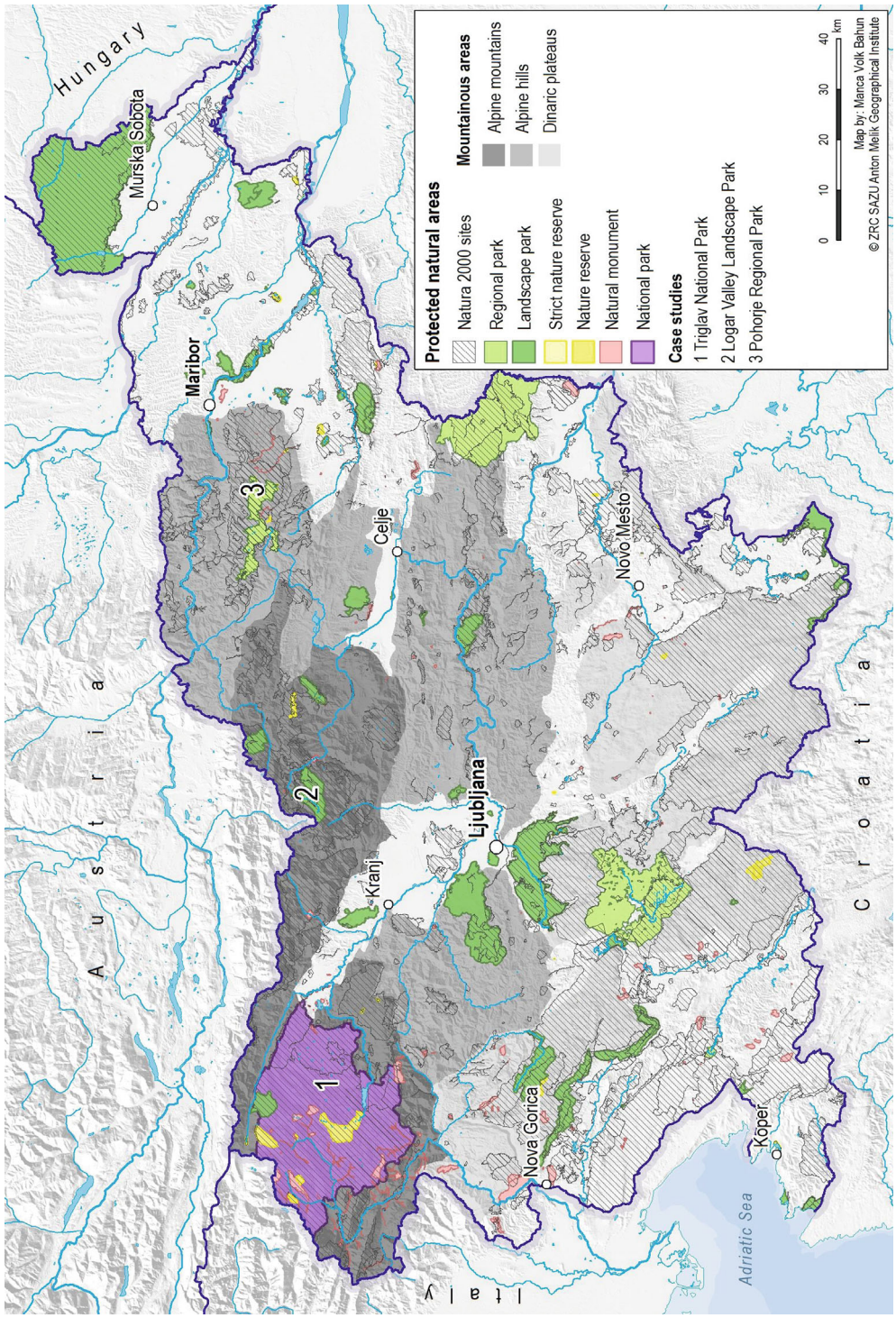

Fig. 26.1 Protected natural areas in Slovenia

Table 26.1 Protected areas in Slovenia. (*Source* Geoportal ... 2024)

Type	IUCN category	Mountainous areas (no.)	Mountainous areas (km^2)	Mountainous areas (%)	Slovenia (no.)	Slovenia (km^2)	Slovenia (%)
National park	II/V	1	839.82	7.28	1	839.82	4.14
Regional park	V	3	484.62	4.20	4	488.63	2.41
Landscape park	V	23	700.24	6.07	47	1,319.48	6.51
Nature reserve	I or IV	25	44.21	0.38	60	60.27	0.30
Natural monument	III	184	170.41	1.48	330	208.45	1.03
Natura 2000 sites			4,904.30	42.53		7,675.00	37.86

Table 26.2 The protected mountainous areas presented

Name (*original name*)	Type	IUCN category	Area (km^2)
Triglav National Park (*Triglavski narodni park*)	National park	II/V	839.82
Logar Valley Landscape Park (*Krajinski park Logarska dolina*)	Landscape park	V	24.31
Pohorje Regional Park (*Regijski park Pohorje*)	Regional park	V	59.11

26.2 Triglav National Park

26.2.1 History

The year 2024 marked one hundred years since the first site in what is now Triglav National Park was protected. At that time, when the area was part of the Kingdom of the Serbs, Croats, and Slovenes, Alpine Conservation Park (*Alpski varstveni park*) was established in the Triglav Lakes Valley in the Julian Alps (Piskernik 1962; Fig. 26.2). Ideas for protecting this area go even further back, to before the First World War, when the area belonged to Austria–Hungary. In 1907, the seismologist Albin Belar (1864–1939) produced a catalog of Carniola's natural monuments, in which he also presented reasons for protecting the Triglav Lakes Valley (Skoberne 2016a:32): "The area is exceptionally important in geotectonic terms (magnificent folds, full-breadth crevasses, grikes, and dolines like nowhere else in the Austrian Alps), and no less in geological and paleontological terms. … It is well known to landscape painters, whom the wild natural park offers magnificent views at every step (ancient trees, cirques, and lush flowers). The most appropriate area to protect would be the one around Double Lake by … the Triglav Lakes Lodge … where several hundred hectares of land could easily be protected because the area is infertile and owned by the Imperial and Royal Religious Fund. It should, by all means, be recommended that a protected area be established by the Seven Lakes, where any human intervention would be prohibited to preserve the last remnants of the exceptional high-mountain virgin forest, the habitat of ancient larches, for posterity." The preparation of this catalog was connected with the 1903 decree on collecting data on natural monuments and an initiative to prepare a monument protection and conservation law from two years earlier (Zorn et al. 2015; Skoberne 2016a).

In 1908, a year after the catalog was produced, Belar initiated a public debate to examine the conditions under which Komarča Natural Conservation Park could be established (*Komarča* is the name of an escarpment at the end of the Triglav Lakes Valley). The first

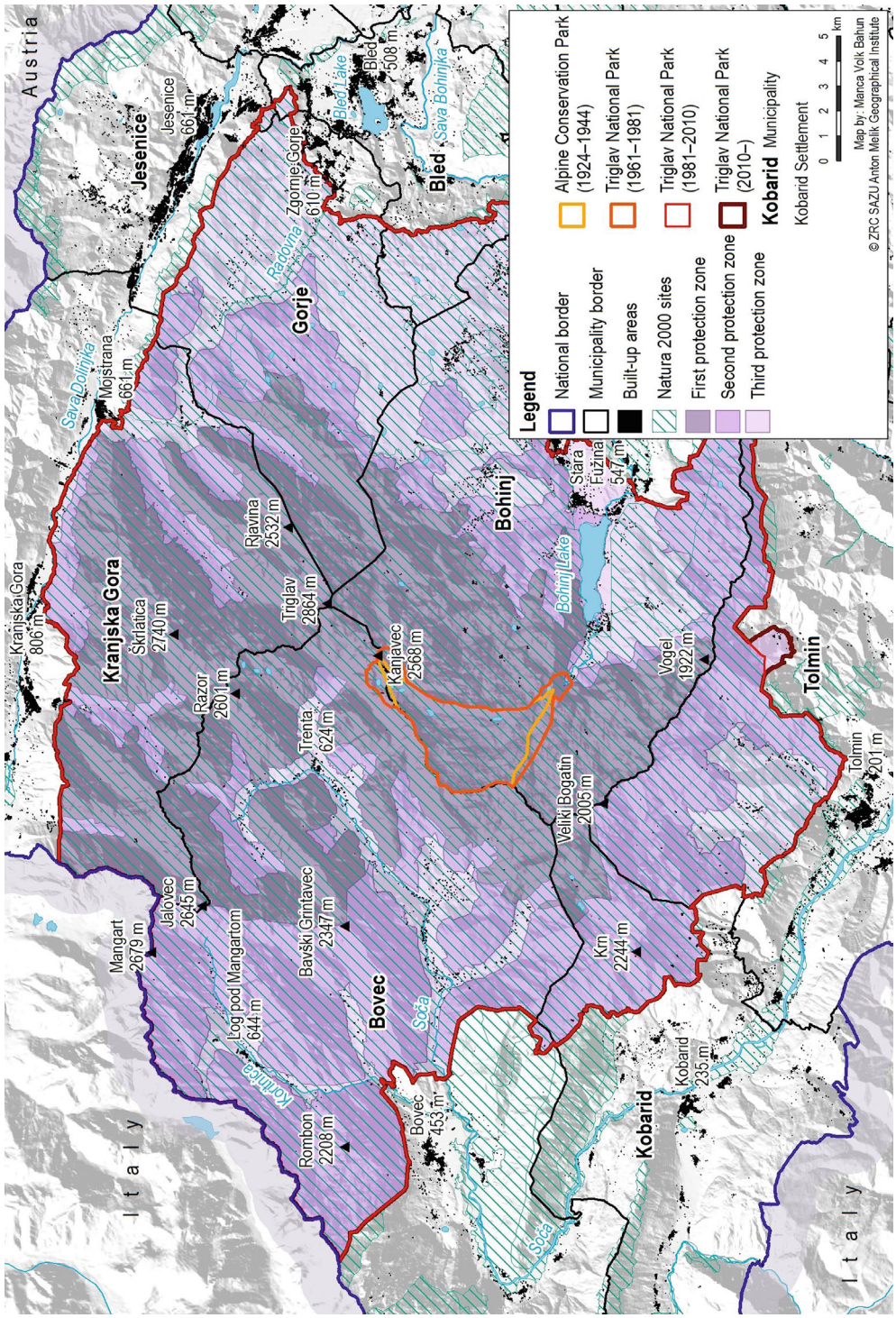

Fig. 26.2 Triglav National Park

meetings already showed significant differences in the views of the locals, who advocated grazing in the envisaged protected area (grazing rights were also protected by legislation; Bajuk Senčar 2013), and the park's proposers, who were strongly against it. The initial protection proposals were also regarded with suspicion by the members of Slovenian cultural circles because the Ljubljana branch of the German and Austrian Alpine Club was involved in the proposals, and they were afraid of the German dominance in Slovenian mountains. These initiatives were interrupted by the First World War. After the war and the formation of the new state (i.e., the Kingdom of the Serbs, Croats, and Slovenes), members of the Museum Society for Slovenia endorsed the initiative to develop a nature protection program introduced by the naturalist Ferdinand Seidl (1856–1942; Skoberne 2016a). The Section for Nature and Natural Monument Protection was established. In 1920, it produced the memorandum mentioned above, in which it also included the Seven Lakes Valley below Mount Triglav among the areas proposed for "high-mountain alpine parks," adding a note that this area was "highly important in geotectonic, geological, paleontological, zoological, and botanical terms. There the alpine flora and fauna have developed a wide range of special species and variants not represented elsewhere" (Spomenica ... 1920:71).

Because neither appropriate legislation nor a nature protection service were in place at the time, the requirements presented in the memorandum had very limited chances to be met. Hence, the area could only be protected based on an agreement between the landowner and the association, which wanted to set up a protection regime in this area. A twenty-year lease between the Directorate for Forest Protection, which managed the land that the Carniolan Religious Fund owned in the Triglav Lakes Valley, the Museum Society's Section for Nature and Natural Monument Protection, and the Slovenian Alpine Club, was signed on July 1, 1924. The lease prohibited all human activity in the Triglav Lakes Valley except hunting and tourist visits. Grazing was also forbidden, which left the fundamental dispute between the locals and the protected area's proposers unresolved (Zorn et al. 2015; Skoberne 2016a). The protected area covered approximately 1,400 hectares (Fig. 26.2; Piskernik 1962). The lease expired in 1944 (i.e., during the Second World War) and, due to changed ownership, it could not be extended after the war (Zorn et al. 2015; Skoberne 2016a).

After the Second World War, there were repeated attempts to protect the Triglav Lakes Valley again (Potočnik 1975), but the park's reestablishment was primarily hindered by grazing interests (Piskernik 1962) and lack of clarity about who had the authority to designate this area a park. A legal basis was only provided in 1959 through the adoption of the National Parks Act (Zakon ... 1959). The Triglav Lakes Valley was protected again as late as 1961 through the Ordinance Designating the Triglav Lakes Valley a National Park, referring to it as Triglav National Park, even though Mount Triglav was not part of it. The newly protected area was slightly larger than the initially protected site, covering approximately 2,000 hectares (Fig. 26.2; Piskernik 1962; Lukan Klavžar 2011; Zorn et al. 2015).

Mount Triglav (Fig. 26.3) only became part of the park in 1981 through the adoption of the Triglav National Park Act (Zakon ... 1981), which designated a major part of the Slovenian Julian Alps a protected area. The area protected covered 83,807 hectares or 4% of Slovenia (Fig. 26.2). The park was divided into two protection zones: a core zone (55,337 hectares) and an outer zone (28,475 hectares). A public institution was also established (*Javni zavod Triglavski narodni park*) to operate and manage the protected area (Bajuk Senčar 2013; Hazler 2013).

The park's current size (83,982 hectares; Table 26.2; Fig. 26.2) and protection zones were defined through the new (and still valid) Triglav National Park Act (Zakon ... 2010) adopted in 2010. The park is divided into three protection zones. The first protection zone (31,488 hectares or 37.5% of the park) is the core area with the strictest protection regime, the second zone (32,412 hectares or 38.6%) is still part of the core area, but with permitted traditional use of

Fig. 26.3 Triglav National Park is named after Mount Triglav (2,864 m), the highest peak in the Julian Alps and Slovenia, and an important Slovenian national symbol. (Photo by Matija Zorn)

resources. The third zone (20,082 hectares or 23.9%) has the most relaxed protection regime, which allows the promotion of sustainable development; it primarily includes permanently settled areas (Lukan Klavžar 2011; Načrt ... 2016).

Today "the primary aim is the protection of nature, conservation of outstanding nature and culture, protection of endemic, rare, and threatened plant species, natural ecosystems and elements of inanimate nature, as well as the conservation and maintenance of the cultural landscape" (Bajuk Senčar 2012).

26.2.2 Distinctive Natural Features

The Slovenian segment of the Julian Alps, which is protected as part of Triglav National Park, is predominantly composed of carbonate rocks, with a combination of karst and glacial landscapes. Karst features are especially prominent on plateaus, whereas valleys were reshaped by glaciers, either through glacial abrasion or accumulation (e.g., moraines). The park varies from 180 to 2,864 m in elevation. There is little surface running water, but there are many torrential streambeds and several glacial lakes (e.g., the ones in the Triglav Lakes Valley, the Krn Lakes, Lake Jezero na Planini pri Jezeru, Fig. 26.4, and Lake Bohinj), and peat bogs are a special feature. Rendzina is the predominant soil, followed by lithosol. The park is heavily wooded (forests account for 57% of its area), and it is characterized by great habitat diversity (Lukan Klavžar 2011; Načrt ... 2016). Beech forests predominate, and spruce is also common, along with larch at higher elevations, with alpine pine growing in the highest areas. Because of the past forest management practices (cutting down beech for charcoal and spruce afforestation at the end of the nineteenth and beginning of the twentieth century; Smolej 1984), spruce predominates in the park's central and northern parts. Forests are usually left to natural processes within the first protection zone and natural reserves, and sustainable and multifunctional forest management is common in the second and third protection zones (Načrt ... 2016).

At least 6,700 wildlife species live in the park (Fig. 26.5)—that is, at least 2,700 animal and 3,100 plant species, which include nineteen

Fig. 26.4 Lake Jezero na Planini pri Jezeru (1,453 m) covers 1.5 hectares and is up to 11 m deep (Dobravec and Šiško 2002). In 1951, fish were introduced to the lake, causing irreversible changes to its ecosystem. Today the lake is subject to eutrophication. At the end of summer, floating patches of filamentous algae spread along its shores. (Zorn et al. 2015; Photo by Matija Zorn)

Fig. 26.5 An abundance of bilingual signs raises visitors' awareness about the distinctive natural and cultural features of Triglav National Park. (Photo by Matija Zorn)

endemic plant species (e.g., Zois's bellflower), 163 bird species, thirty-six protected mammal species, and other protected species (e.g., the Soča trout; Načrt ... 2016; Nature ... 2018). Most importantly, though, the ecosystems in the park have been preserved contiguously from the valleys to the highest peaks (Skoberne 2016b).

The park also contains forty-six additionally protected areas, i.e., forty-three natural monuments and three nature reserves (which are also forest reserves), and over 1,070 natural values sites (including over seven hundred karst caves; Načrt ... 2016).

26.2.3 Cultural Landscape

The development of the cultural landscape in Triglav National Park is primarily connected with mountain pasturing, ironworking, and forestry, which created clearings within contiguous forests and hence contributed to the formation of a patchwork landscape. Iron ore mining in the area goes back to pre-Roman times. Due to a lack of economic viability, ironworking began to decline in the mid-nineteenth century but, because of its demand for charcoal, it led to extensive deforestation. Mountain pasturing is also associated with the first settlements in the area; many pastures were created (not all at the same time), especially where a water source was also available. These mountain pastures were primarily used for grazing cattle and horses, whereas sheep and goats grazed in more extensive higher and rockier areas. The demand for charcoal for the foundries led to planned forest exploitation. Deforestation caused the upper tree line to move from approximately 2,200 m down to approximately 1,800 m (Juvan 1975; Načrt ... 2016). Today, the process is reversed: the cultural landscape is being overgrown due to the abandonment of these activities (Sedej 1994; Načrt ... 2016; Fig. 26.6). This is changing the cultural landscape because the share of forest is increasing and grassland is disappearing. Changes in haymaking technology are causing traditional hayracks to disappear, and further changes in the cultural landscape are also resulting from the infrastructural needs of contemporary tourism (Skoberne 2016b). Nearly one-tenth of the park is agricultural land, of which four-fifths is meadows and pastures, whereas fields only account for 0.1% (Načrt ... 2016).

The cultural landscape is significantly shaped by immovable cultural heritage. There are nearly four hundred cultural heritage sites in the park, which are included in the national register of immovable cultural heritage (Lukan Klavžar 2011); these include fifteen sites classified as cultural monuments of national importance (Cultural ... 2024), over forty sites classified as cultural monuments of local importance, and several museum collections open to the public (Načrt ... 2016).

Immovable cultural heritage primarily includes architecture heritage. In this regard, stone construction in the southern part of the park can be distinguished from wooden construction in the northern part (Fig. 26.7). The herdsmen's settlements have different typological characteristics, based on which a distinction can be made between the mountain pastures in the Bohinj area, those in the Tolmin and Kobarid areas, and the sheep pastures above the Upper Soča Valley. In addition, the settlements and hamlets in the valleys also differ from one another, in which pronounced differences can be observed between the typical Bohinj, Tolmin, Bovec–Trenta, and Upper Sava houses (Zavarovana ... 2008). Active pastures are a significant part of settlement heritage in the cultural landscape; there are around fifty in the park (Hazler 2013).

An important part in shaping the cultural landscape is also played by numerous structures from the First World War (e.g., the remnants of barracks, dugouts, fire trenches, and cableways), when the Soča/Isonzo Front between Italy and Austria–Hungary ran across what is now Triglav National Park, and those from the interwar period, when various structures (e.g., barracks, fortresses, and boundary stones) were built on the border between the kingdoms of Italy and Yugoslavia, which also ran across the territory of today's national park (Kumer et al. 2020; Fig. 26.8). Consequently, many memorial structures (e.g., plaques, monuments, and military cemeteries) have been preserved in the park, along with various religious structures (e.g., churches, chapels, and shrines; Hazler 2013).

There are also numerous roads in the park (most of them are forest roads; national roads total 126.8 km), as well as hiking trails (826 km), mountain lodges (thirty-eight with approximately 2,800 beds), and ultimately the Aljaž Tower (Fig. 26.9), without which no Slovenian can imagine the summit of Mount Triglav (Lukan Klavžar 2011; Načrt ... 2016). There are thirty-three settlements within the park (twenty-one entirely and twelve partly) with a total population of over 2,300 (Triglav ... 2024). Compact clustered villages predominate in large valleys (e.g., the Soča Valley and the Bohinj area),

Fig. 26.6 Overgrown areas around Double Lake in the Triglav Lakes Valley in the 1920s (top; GIAM ZRC SAZU archive) and in 2014 (bottom). (Photo by Matija Zorn)

ribbon villages are less frequent (e.g., Strmec), scattered settlements are common in sunny areas at higher elevations (e.g., on the Pokljuka and Mežakla plateaus), and individual farms can be found in pocked valleys and on alluvial fans or higher terraces (Načrt ... 2016).

26.2.4 Conflicts

"To live in a national park means to accept and live with restrictions imposed by the Triglav National Park Act" (Fikfak and Bajuk Senčar 2015). A century ago, one of the main obstacles to protecting the area was the different views on the management of a potentially protected area: the locals were in favor of grazing, which together with milk production and processing provided a solid economic base, whereas the park's supporters advocated its prohibition because they believed it caused landscape degradation. The locals perceived the ban on grazing primarily as townsfolk's encroachment on their rights (Zorn et al. 2015; Skoberne 2016a).

Different views on how to manage this now protected area remain today; the locals in particular believe they need to deal with too many restrictions that have been imposed on them

Fig. 26.7 Architectural heritage in the mountain pastures of Triglav National Park: wooden construction predominates in the north (top: the V Lazu Pasture), and stone construction predominates in the south (bottom: the Prode Pasture). (Photo by Matija Zorn)

"from the outside." It needs to be added that, in the past decades, grazing has primarily declined as a result of economic changes (e.g., land use abandonment) rather than the park's restrictions (Bizjak 2001). Today, the traditional farming practices in the park (e.g., alpine pasturing) have heritage status (Bajuk Senčar 2013).

Every regulation that has been adopted in connection with the park's protection, however, reflects the interests of a specific period, including conflicting ones (Kmecl 2001). Hence, the 1981 law reflects the interests of tourism, agriculture, and hunting (Zorn et al. 2015). For a long time, hunting was the park's main source of finance, which is fundamentally at odds with the park's function (Kmecl 2001). Hunting was only prohibited in the park's core zone as late as 2000 (Bizjak 2001). Under the current regulation, hunting is not allowed within the first protection zone. It is allowed in the second and third protection zones, where it is planned according to the annual hunting management plans (Načrt ... 2016). Despite the different interests, the regulations have contributed to less dispersed development and fewer architecturally inappropriate structures in the park. Nonetheless, they have failed to prevent people from bending the rules on farming construction, such as converting stables into vacation houses or selling farmland and subsequently converting it into holiday villages (Zorn et al. 2015). It is estimated that there are over six hundred vacation units in the park, which are often associated with uneconomical use of space and other negative effects: inappropriate construction, demand for public infrastructure provision, a rise in property prices, seasonal pressures, and changes in the visual character of settlements and mountain

Fig. 26.8 The cultural landscape of Triglav National Park is shaped in part by First World War heritage (e.g., Holy Spirit Church on Javorca Hill, built by Austro-Hungarian soldiers in 1916 in memory of the soldiers fallen on the Soča/Isonzo Front; top) and the heritage from interwar period associated with the former national border between the kingdoms of Italy and Yugoslavia (e.g., the former Italian barracks in the Lepoč Valley; bottom). (Photo by Matija Zorn)

pastures, which often leads to loss of identity (Načrt ... 2016).

Illegal construction is a special issue. Development inside the park requires additional permits, especially nature conservation and cultural conservation permits, as well as permits from certain national authorities. However, acquiring these additional permits means that the entire process is more complex and longer, and it can be made additionally complex by potential lack of clarity among the stakeholders. It is estimated that there are between four hundred and six hundred illegally built structures in the park; most of them are found in the Bohinj area, which is also where most residents live (Bajuk Senčar 2013).

Fragmented land ownership is another challenge the park is dealing with, along with the fact that a great deal of land within the park is privately owned (i.e., over half, of which four-fifths of plots are smaller than five hectares; municipalities and the state each own less than a quarter of the land). The private owners, the municipalities, and the state have different views on where the public interest ends and where the private owners' rights begin (Bajuk Senčar 2013; Načrt ... 2016). Moreover, the park is divided among eight municipalities, and each has its own spatial plan and views on development (e.g., the development of tourism, which approximately a third of all business entities engage in; Načrt ... 2016; Žiberna 2016).

The role of the locals in creating and managing the protected area has gradually changed since the first idea of establishing a national park. Initially, they were excluded from the area through a lease agreement and a ban on grazing. During later expansions of the park,

Fig. 26.9 The Aljaž Tower at the summit of Mount Triglav is a cultural monument at the highest elevation in the country. (Photo by Matija Zorn)

they had more opportunities to participate in shaping the protection regulations, especially the park's management plan; the 1981 condition for expanding the park was prior consent from the locals, and the 2010 law provided for the local population's participation in the management plan (Bajuk Senčar 2013). Nonetheless, there has been historical mistrust among the stakeholders, and a feeling remains that the locals are in a subordinate position when it comes to shaping the conservation policy within the park and making decisions about its management. They are being heard, but not sufficiently considered. In the Bohinj area, which has the largest share of the population inside the park (more than half), there have been several (unsuccessful) initiatives so far to exclude settlements from the protected area. In this context, it is becoming increasingly clear that the fundamental problem is not their inclusion in Triglav National Park, but the lack of responsiveness from the relevant services and bodies. Consequently, the locals also resort to more extreme forms of drawing attention to issues (Zorn et al. 2015; Načrt ... 2016).

Conflicts are also connected with spatial disagreements between the interests and needs of individual recreational activities (Jeršič 2001). For example, in the late 1960s, winter sports (a project of building a ski resort with ski lifts around Mount Triglav; Mikša and Zorn 2017) was weighed against nature conservation. Efforts have also been made to tap into the sports potential of the valleys by developing the eastern shore of Lake Bohinj (Jeršič 2001).

Further challenges in the park have to do with inadequate spatial planning (especially prohibited spatial changes), inappropriate transport policy (especially constantly increasing car traffic; Fig. 26.10), increasing large-scale tourism in summer (e.g., an increasing number of daily visitors), a large number of people visiting specific points within the park (e.g., crowds flocking to Mount Triglav, which, at the peak of the hiking season, can be visited by up to three thousand hikers a day and around seventy thousand hikers a year), and soil and water pollution as a result of negligence (Bizjak 2001; Korsika 2012; Načrt ... 2016). The park is estimated to have over two million visitors per year and 1.3 million visitors in the summer season alone (Načrt ... 2016). The main pressures (Table 26.3) hindering nature conservation objectives are disturbing wildlife, a large number of hikers (Fig. 26.10), improper wastewater management, previous planned introduction of fish into isolated high-mountain lakes, abandonment of land use, afforestation of pastures or reduced landscape diversity, inappropriate spread of settlement, infrastructure development, and intensive forest management (Izhodišča ... 2013; Načrt ... 2016).

Table 26.3 Some pressures on and threats to the natural environment in Triglav National Park (Izhodišča ... 2013; Načrt ... 2016)

Pressure/threat	Description
Forestry	– Inappropriate mechanized logging (damage to the soil and vegetation) – Impact on animals – Pollution – Construction of a dense forest road network
Settlement	– Inappropriate land use – Settlements spreading beyond settlement areas – Illegal construction – Converting farm structures into vacation houses – Inadequate design and construction of new buildings – Changes in landscape and settlement patterns – Changes in local architectural heritage elements
Interventions in aquatic and riparian areas	– Water energy exploitation (small hydroelectric plants) – Changes for tourism and recreational purposes (clearing vegetation, reshaping banks, building new structures) – Water pollution
Abandonment of grazing	– Overgrowth, afforestation
Mechanized haymaking	– Tendencies to level specific landforms (e.g., hummocky meadows)
Disturbing animals	– Tourism and recreation outside intended areas – Uncontrolled pasturing – Air traffic – Riding snowmobiles and ATVs – Inappropriate feeding of animals
Gathering forest plants and berries	– Compromising and destroying habitats
Exploiting mineral resources	– Illegal extraction for use as construction material (sand and gravel)
Tourism and recreation	– Infrastructure development – Overtourism (a large number of people visiting certain mountain lodges, trails, and peaks) – Traffic – Hiking outside marked trails – Illegal overnight stays – Noise – Wastewater drainage and treatment – Light pollution – Shrinking habitats for animals
Waste	– Illegal dumps – Scattered waste along tourist routes
Invasive alien species	– Past intentional introduction (e.g., introducing fish into mountain lakes) – Planned spruce planting
Traffic	– Dense road network – Noise

(continued)

Table 26.3 (continued)

Pressure/threat	Description
Municipal infrastructure	– Not extensive enough, lacking in some places – Increasing demand for drinking water
Energy infrastructure	– Building small hydroelectric plants – Using electrical generators at mountain lodges (noise, emissions) – Fuel transport and storage
Public lighting and telecommunications	– Linear layout of mains changes landscape patterns – Light pollution – Installing mobile phone base stations
Natural disasters	– Damage to soil and vegetation – Threats to people, animals, and property – Damage

Fig. 26.10 At the peak of the tourist season, Triglav National Park is exposed to overtourism in certain areas: unregulated parking at the Vršič Pass (top; 1,611 m); overcrowded Mount Triglav (bottom). (Photo by Matija Zorn)

26.2.5 A Unique Landscape

Triglav National Park extends across the highest mountains of the Julian Alps, including their highest peak, Mount Triglav (2,864 m; Fig. 26.3)—which is also Slovenia's highest mountain and an important Slovenian national symbol—ridges, rockfaces, deeply cut glacial valleys, canyons, rushing streams, forests, mountain meadows, taluses, high-mountain (glacio)karst landscapes, and glacial lakes (Nature ... 2018). The park also contains Slovenia's highest lake (i.e., Upper Križ Lake (*Zgornje Križko jezero*); elevation: 2,150 m; median area: 0.662 hectares; Dobravec and Šiško 2002), largest and deepest permanent lake (i.e., Lake Bohinj; area: 318 hectares; depth: up to 45 m), deepest cave (Čehi II Cave; depth: 1,505 m), longest cave system (the Tolminski Migovec Cave System; length: 43 km), deepest canyon (on the Koritnica River at the Kluže fortress, which is over 70 m deep in places), and largest natural arch (the Prisojnik Arch; Skoberne 2016b). This is where the Sava, Slovenia's longest river, has its source, and this is where Slovenia receives the most precipitation (over 3,000 mm per year, especially in the southern and southwestern parts of the park; Zupančič 1998) and where the lowest temperature in the country has been measured (on the Komna Plateau; −49.1 °C; Dovečar et al. 2009). The highest mountain lodge (the Triglav Lodge on Mount Kredarica, 2,515 m) can be found in the park, along with the highest chapel and meteorological station next to it (Fig. 26.11), the highest elevation cultural monument of national importance (the Aljaž Tower at the summit of Mount Triglav, 2,864 m; Fig. 26.9), the highest alpine road pass (the Vršič Pass, 1,611 m; Fig. 26.10), and the highest elevation road in the country (the road to the Mangart Saddle, 2,055 m; Skoberne 2016b).

The initial establishment of an alpine conservation park in the Triglav Lakes Valley was primarily the result of the area's beauty (Fig. 26.12); as was written then, the park was established in "what is the most beautiful part of our country" (Hafner 1925:62). "By creating this alpine conservation park, we have fulfilled our cultural duty because, only in this way, can we conserve this beautiful area, which, in its entirety as well as in all its living and nonliving parts, is a true natural monument for our posterity in all its beauty and attractiveness" (Hafner 1925:65). The valley left a strong impression on both previous and later visitors. In 1795, approximately 130 years before the conservation park's establishment, Count Franz Hochenwart wrote the following when laying his eyes on Double Lake: "in all the Carniolan mountains we cannot find a prettier and more enchanting view than this" (Hochenwart 1838:52). Of course, there is much more to the Triglav Lakes Valley and all of Triglav National Park than just their esthetics: the area has been a research challenge for many disciplines (Zorn et al. 2015).

Fig. 26.11 The Triglav Lodge on Mount Kredarica (2,515 m) is the highest mountain lodge in the country, standing below Mount Triglav, with Slovenia's highest meteorological station next to it. (Photo by Matija Zorn)

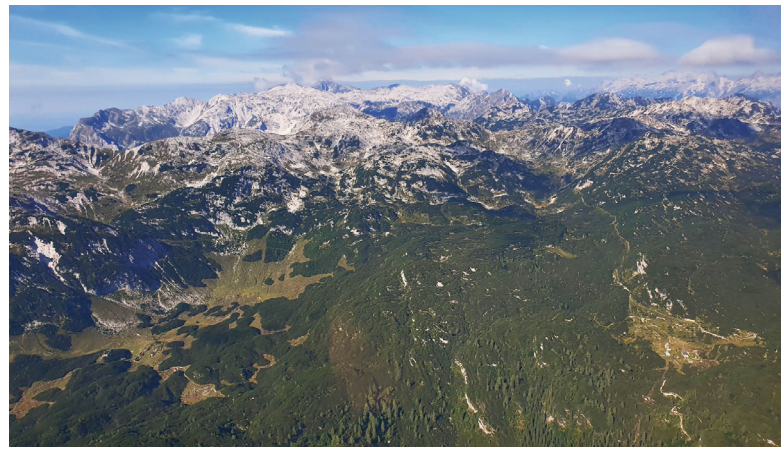

Fig. 26.12 Triglav National Park protects the unique mountain landscape of the Julian Alps as part of the Southeastern Alps: the Komna karst plateau covered in mountain pine (1,350–1,700 m; front), and the rocky limestone "desert" of the Krn Mountains with their highest peak, Mount Krn (2,244 m; back). (Photo by Matija Zorn)

Today, the park is part of the first UNESCO Man and the Biosphere Program (MAB) area designated in Slovenia and the Natura 2000 network, and it is a co-founder of Alparc, a network of protected areas in the Alps (Načrt ... 2016).

26.3 Logar Valley Landscape Park

26.3.1 History

The first ideas about safeguarding the natural environment in what is now the Logar Valley Landscape Park go back over a hundred years, when the Kamnik–Savinja Alps were proposed as an area suitable for conservation (Poličnik 2008) in the aforementioned 1920 nature conservation memorandum (Spomenica ... 1920). The memorandum suggested that the protected area extend "from Mount Lučka Baba near the Kamnik Saddle to the top of Mount Konj, and from there into the valley of Lučka Bela Creek, where it would include a small part of the high-elevation forest, then across Mounts Lastovec and Dleskovec to Mount Veliki vrh and from there along the foot of the northern steep slopes back to the Kamnik Saddle" (Spomenica ... 1920:70) (Fig. 26.13), but these conservation efforts failed. In 1932, the Savinja Branch of the Slovenian Alpine Club purchased the Okrešelj area above the head of the Logar Valley from the Ljubljana Archdiocese for nature conservation purposes (Kupna ... 1931). It is unknown who initiated the purchase of the Okrešelj mountain pasture in the Savinja Branch, but what is known is that the branch "intended to convert the Okrešelj area into a nature park" and that "the area extending from the tops of Mounts Ojstrica and Planjava down to Lučka Bela Creek would be very befitting for a nature park" (Orožen 1963:50). In 1934, the Okrešelj area began to be afforested to create a nature park (Orožen 1963). Just like with the protection of the Triglav Lakes Valley (Sect. 26.2), there were also problems in protecting the Okrešelj area and establishing a park because the Kingdom of Yugoslavia had no conservation-related legislation in place up until 1938, when the Decree on National Parks (Uredba ... 1938) was adopted. This decree stipulated that "in accordance with Article 100 of the 1938/1939 Financial Act and at the proposal of the Ministry of Forests and Mines, areas of extraordinary natural beauty, and research or historical importance, or those that allow people to enjoy nature, strengthen their physical and mental fitness, and serve the development of tourism may be selected and proposed for designation as national parks" (Uredba ... 1938). Hence in 1940, the Savinja Branch presented a proposal to establish Logar Valley–Okrešelj National Park (Meze and Ramovš 1978; Peterlin 1994). Everything suggested that the park would soon be established, and so the Savinja Branch had three signs made reading "Logar Valley–Okrešelj National Park, Protect

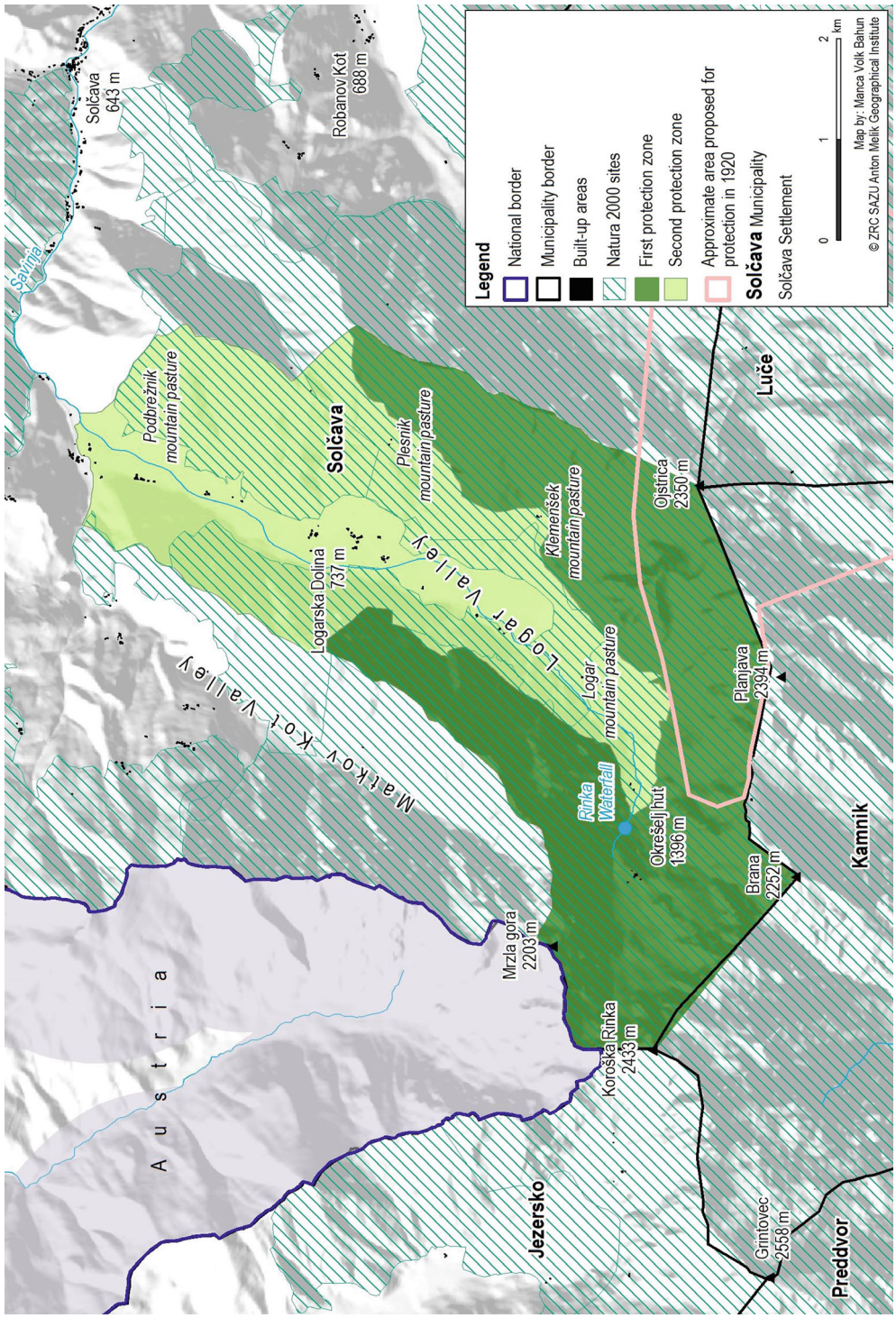

Fig. 26.13 Logar Valley Landscape Park

the Plants and Animals!" and put them up. Only a few months after it had submitted the proposal and received approval from the Provincial Nature Protection Committee, the Second World War began, preventing all further procedures (Peterlin 1994). After the war, there were no longer any perceivable efforts to formally protect the area, even though one of the signs mentioned above, which still stood at the entrance to the Logar Valley, continued to draw visitors' attention to these efforts for quite a while because the prewar signs had not been removed. The sign surely influenced the visitors and their environmentally friendly behavior because they did not think about whether the area was actually protected or not. Nature conservation became a common practice (Poličnik 2008). It was not until half a century later, in 1987, that the Logar Valley was declared a landscape park (Mencinger 2004; Fig. 26.13). The landscape park with an area of 2,431 hectares was established by the Municipality of Mozirje, but the municipal decree did not envisage that the municipality would also finance the park's operations. Therefore, the locals, mostly landowners within the park, agreed on development goals. In 1992, they founded the nonprofit private company Logarska dolina d.o.o. and obtained a license to manage the park from the municipality. Due to the need to provide a systemic solution for managing the entire Logar Valley–Solčava Region tourist destination, in 2017 the Municipality of Solčava began managing Logar Valley Landscape Park through its Public Utility Unit (Prelesnik 2022).

26.3.2 Distinctive Natural Features

Logar Valley Landscape Park is rich in natural heritage (Perko and Orožen Adamič 1998). It contains over forty registered natural values sites, ranging from waterfalls, rock towers, caves, and dolines to glacial boulders, trees of exceptional dimensions (Fig. 26.14), flora, and fauna (Prelesnik 2022). The geological base, glacial activity, and other external factors have gradually shaped the valley into its unique present form. The park comprises a glacially transformed valley in the Savinja Basin 7 km long and up to 0.5 km wide (Meze 1976; Hrvatin 2010). The Logar Valley is the largest glacial valley in the Kamnik–Savinja Alps. It runs in a southwest–northeast direction between mountain ridges that formed along tectonic faults. During the Ice Age, the valley was transformed by the movement of large volumes of ice, which extensively filled it. The glacier from the Logar Valley merged with the glacier from the Matkov Kot Valley below Mount Klemenčja peč, and together they extended as far as the entrance to the Socka Gorge (Hrvatin 2010; Stojilković et al. 2013). Glacial boulders and moraines indicate the extent of former glaciation. Locals divide the valley into three parts. The wet, clayey, grassy landscape stretching across the lower part of the valley is called *Log*, the central, mostly wooded part is called *Plest*, and the mostly wooded and rubble-strewn upper part of the valley is called *Kot*. In the valley head below the Okrešelj Cirque, at an elevation of 1,280 m, the Savinja River rises, its short course taking it over 90 m Rinka Falls (Fig. 26.15). Its waters then quickly sink into the gravelly valley bed of Kotovec Creek and reappear in Log, a former glacial lake that has gradually become silted up. The locals refer to this section as *Črna* (literally, "black"), because the water here flows on lacustrine clay and therefore has a dark color. The river is named Savinja below the confluence with Jezera Creek, which flows from the Matkov Kot Valley. During heavy rain, the waters of the Palenk Creek descend in falls and cascades from below the Mount Logarska peč (1,536 m), but the most beautiful part of the falls is not visible from the valley. The waters of Palenk Creek are partially impounded for a water pipeline and a small hydroelectric power plant. The valley is surrounded by peaks rising over 2,000 m. To the south and west, the highest are Mounts Ojstrica (2,350 m; Fig. 26.16), Planjava (2,394 m; Fig. 26.16), and Brana (2,252 m; Figs. 26.16 and 26.17), Mount Štajerska Rinka (2,289 m; Figs. 26.16 and 26.17), Mount Koroška Rinka (2,433 m), and Mount Mrzla gora (2,203 m; Fig. 26.17). The mountain ridge between the

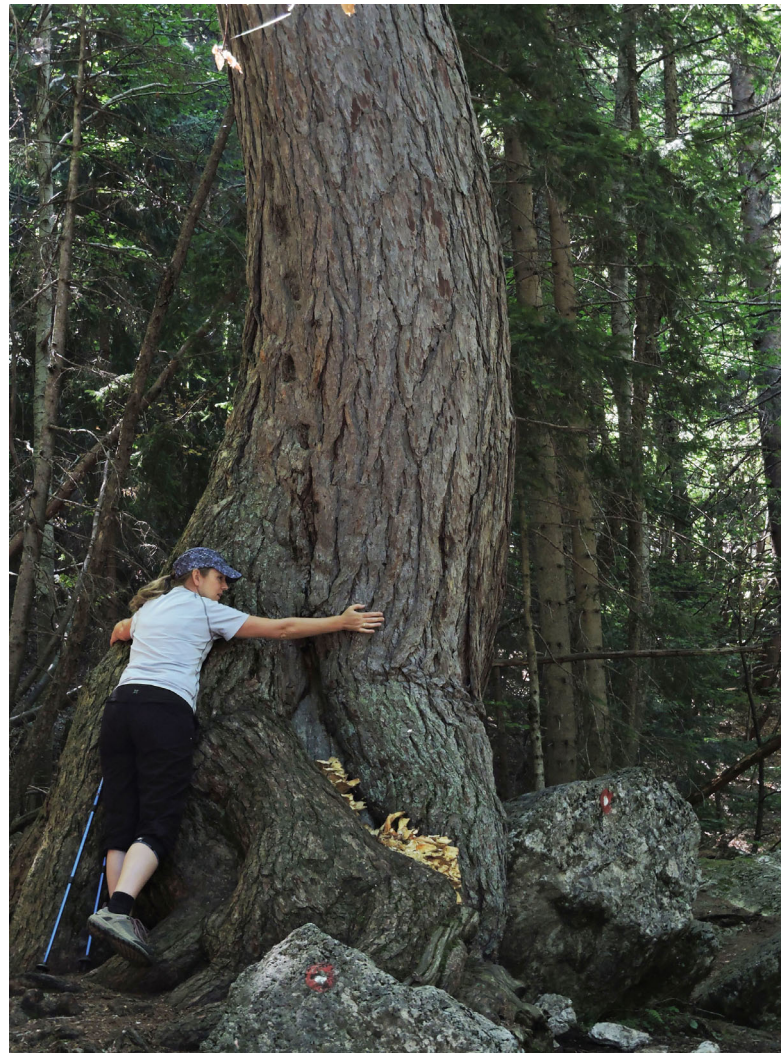

Fig. 26.14 Slovenia's largest larch, with a circumference of over 460 cm, a diameter of approximately 150 cm, and a height of 29 m, can be found in Logar Valley Landscape Park (near the Klemenča jama Lodge). (Photo by Matija Zorn)

Logar Valley and the Matkov Kot Valley to the north is slightly lower (Hrvatin 2010). There are extensive forests in the valley and on the slopes. Alpine beech forest with spruce predominates at lower elevations, and beech forest with larch predominates above 1,200 m. The Logar Valley is known for its beautiful meadows, rich in colorful flowers. This is the result of the traditional grazing practices in the region. The park is home to many plant and animal species, which have adapted to the Alpine environment. These include the chamois, the blackbird, the golden mountain flower, and the alpine lily (Logarska ... 2023).

26.3.3 Cultural Landscape

Logar Valley Landscape Park has a rich and diverse cultural heritage combined with the natural beauties of alpine landscapes (Fig. 26.16). The bottom of the Logar Valley was attractive for settlement and farming very early on, but at the same time it had a very unfavorable climate, and it was very difficult to access. The valley began to be settled in the fifteenth century, when forests were cleared for agriculture. The initial inhabitants obtained land for cultivation and pastures through controlled burning. In the past, there was

Fig. 26.15 Rinka Falls, with a vertical drop of 90 m, is located at the head of the Logar Valley. (Photo by Matija Zorn)

significantly more such farmland than there is today; people grew potatoes, buckwheat, wheat, garden vegetables, turnip, flax, and rye (Acman 2019). Today there are no longer any tilled fields in the valley, and grassland predominates (GERK 2023). Farmland can be found in the lower and central parts of the valley, where there are three farms (the Logar, Juvanija, and Plest farms), and on a few mountain pastures and small patches of grassland at higher elevations (e.g., the Plesnik and Logar mountain pastures). In the past, agricultural production was self-sufficient and extensive, and mountain pasturing was an important part of animal husbandry. Three mountain pastures high up on the slopes of Mount Strelovec (1,763 m), the Movznik Ridge, and Mount Krofička (2,083 m) were important in terms of pasturing (i.e., the Klemenšek, Plesnik, and Podbrežnik pastures), along with the Logar Pasture at Kot in the valley. These pastures were used for cows, sheep (there is the well-known Jezersko–Solčava sheep breed), and goats. Because of poor road connections, the Solčava region used to be better connected with Carinthia to the north than with Styria to the east because two roads were built toward the north due to intensive forest exploitation for charcoal burning. The valley's transport connectivity only improved with the 1894 construction of the road between Luče and Solčava downstream from the Logar Valley (Acman 2019).

The beginnings of tourism in the Logar Valley go back to the second half of the nineteenth century, when the first inn (i.e., the Plesnik Inn) opened in the valley. The first mountain lodge in the Okrešelj mountain pasture was built in 1876. Hiking became popular with the 1893 establishment of the Slovenian Alpine Club and its Savinja Branch (Poličnik 2008). With newly built roads, the valley became accessible to increasingly more travelers and hikers, which led to the construction of several mountain lodges (Meze 1976).

Settlements in the park can be divided into traditional, rural, and tourist types. The traditional type includes isolated farms with their archaic character and herdsmen's huts on mountain pastures, the tourist type comprises mountain lodges (Fig. 26.17), bed and breakfasts, and inns, and the rural type includes characteristic rural settlements at lower elevations. A peak in tourist arrivals was recorded in the first half of the 1970s, when many visitors arrived in the valley by bus. In the 1980s, organized tourist groups began to decline and private excursions with their own cars began to increase. Unregulated, large-scale parking and burning wood led to environmental degradation, which resulted

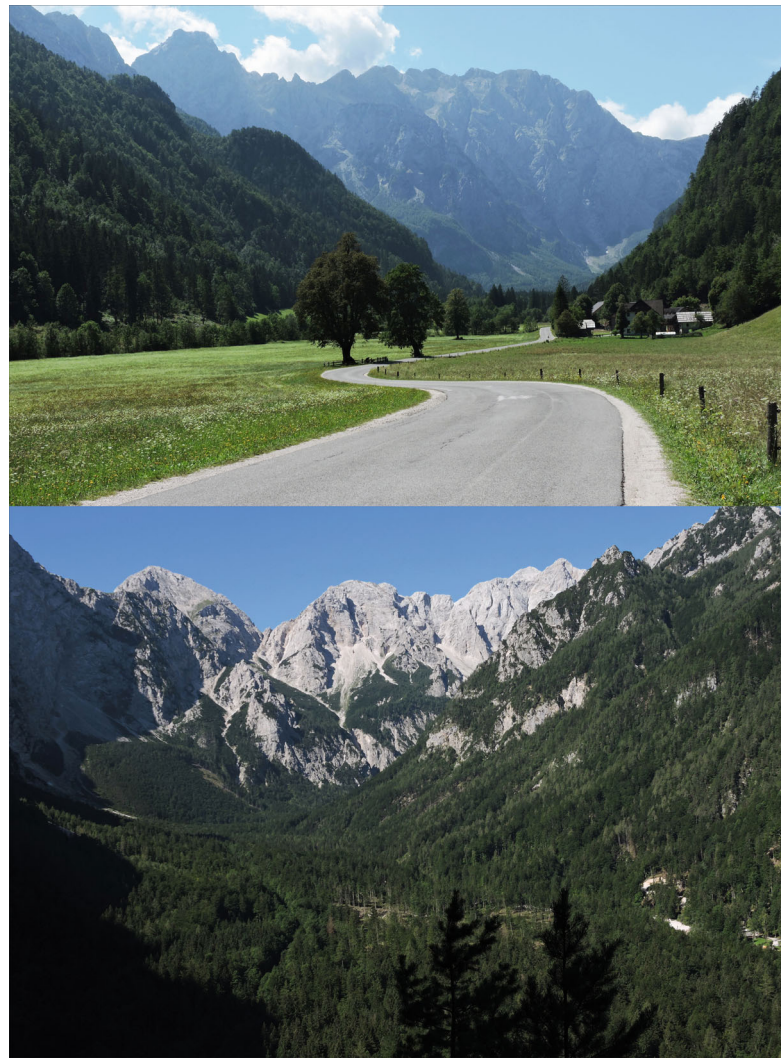

Fig. 26.16 The lower part of the Logar Valley is characterized by agricultural land use, especially meadows and pastures (top; the two prominent peaks in the background are Mount Ojstrica, 2,350 m, to the left and Mount Planjava, 2,394 m, to the right), and forests predominate in the upper part of the valley (bottom; the peaks in the background, from left to right: Mount Brana, 2,253 m, Mount Turska gora, 2,251 m, and Mount Štajerska Rinka, 2,374 m. (Photo by Matija Zorn)

in increasing awareness of the importance of the valley's value and the establishment of a protected area (Acman 2019).

Animal husbandry used to be a key economic activity in the park, but today forestry is coming increasingly to the fore, as is tourism. There are no farms on the eastern mountain slopes, but the farmers from the valley have converted some high-mountain level ground into pastures. In the past, forest was cleared for farmland in favorable areas, but now the process has been reversed: farms are being abandoned, and the steep pastures and meadows are being rapidly overgrown (Hrvatin 2010).

26.3.4 Conflicts

A great issue in Slovenian mountainous areas, including Logar Valley Landscape Park, is the abandonment of haymaking and pasturing, which leads to the afforestation of meadows and alpine pastures, and a consequent decline in landscape diversity. In some places, a trend of deforestation and meadow growth is present, but that is often merely the result of agricultural policy (i.e., direct payments or agricultural subsidies). On the other hand, such imprudent changes can disrupt the ratio between open land and forest, and hence lead to landscape degradation (Acman 2019).

Fig. 26.17 The Klemenšek Mountain Pasture with the Klemenča jama Lodge (1,208 m). In the background (from the left): Mount Brana, 2,253 m, Mount Turska gora, 2,251 m, Mount Štajerska Rinka, 2,374 m, and Mount Mrzla gora, 2,203 m. (Photo by Matija Zorn)

The negative trends of unplanned development of tourism facilities and converting agricultural and forestry structures into accommodation facilities after the Second World War primarily stopped, thanks to the establishment of a protected area. Similarly, the construction of individual vacation houses has never been permitted in the valley, and so the traditional settlement structure is well preserved despite some new tourism construction. Nonetheless, noncompliant and illegal development can be observed in places, along with development without required permits and approvals, failure to respect the characteristics of traditional architecture and cultural heritage, failure to observe the landscape configuration, inappropriate siting of facilities or activities, and so on. However, development is not the key environmental degradation factor in the park (Acman 2019).

One of the key degradation factors is most certainly tourism, and the associated traffic and infrastructure. On the one hand, it is an important source of income for the locals but, on the other, it has a significant impact on the environment and other activities in the valley, such as agriculture and forestry. Daily visitors predominate among the tourists, with long-stay tourists only accounting for about a tenth of all visitors. In terms of their reasons for coming, visitors can be divided into mountaineers, hikers, strollers, and transit or motorized visitors. Car arrivals in the Logar Valley have increased significantly since 1990. Because of unregulated traffic in the area, a need arose to create an entry point into the park and provide parking areas and traffic signs. In 1992, the park's manager introduced an entry fee for motor vehicles, achieving several effects: reducing the volume of motor traffic in the protected area, and informing, directing, and counting visitors. Nonetheless, during peak season the entry fee is an insufficient instrument to restrict entrance and regulate traffic; what is required is greater control, introducing stricter entry arrangements for motor vehicles or reducing their numbers, and building parking areas within and outside the park. There are still no alternative transport options (e.g., electric buses) available, even though they were already discussed in 1989 (Hazler Papič et al. 1989). It is vital to produce a comprehensive traffic regulation plan for the Logar Valley, select locations for parking areas, and ensure they are properly technically outfitted, taking into account the protected area's objectives (Acman 2019).

26.3.5 A Unique Landscape

Due to the valuable natural and cultural heritage it contains, Logar Valley Landscape Park is especially sensitive to various impacts of human activity. Its natural heritage is especially rich. The valley's size, shape, and landforms, and the presence of glacial traces rank it among the most beautiful Alpine valleys. The valley also features escarpments, waterfalls, creeks, and extensive forests and meadows, which contribute to the exceptional quality of the landscape. The Logar Valley is also known for its aesthetic appeal. Beautiful meadows, which abound in colorful flowers and offer picturesque views of the surrounding mountains, create spectacular scenes. This attracts many visitors and nature lovers to the park. The Logar Valley is home to a variety of plant and animal species, which have adapted to the Alpine environment. Its natural diversity is also reflected in a series of protection statutes; the park contains seven natural monuments and fifty-four natural values sites of national and local importance (Acman 2019). The natural monuments designated through government ordinances include the Savinja River, the source of the Črna River, Rinka Falls (Fig. 26.15), Palenk Falls, the Palenk Gorge, the Luknja natural arch, and the Matk natural arch (*Matkovo okno*) (Logarska ... 2023). The park is characterized by highly diverse flora and fauna, including the chamois, steinbock, peregrine falcon, golden eagle, and black grouse, and Jezersko–Solčava sheep in the mountain pastures. The typical flora includes yellow lady's slipper, Carniolan lily, auricula, Zois' bellflower, gentian, edelweiss, and many other species important for preserving biodiversity. In addition to natural heritage, the Logar Valley has a rich cultural heritage. Traditional livestock grazing practices, land cultivation methods, and preserved architectural heritage in the valley testify to past lifestyles and farming practices (Slapnik 2020).

26.4 Pohorje Regional Park

26.4.1 History

Nature conservation efforts in the Pohorje Hills also go back over a century; specifically, to 1920, when the aforementioned memorandum proposed that the virgin forest above Oplotnica near the village of Lukanja, which was owned by Count Windischgrätz, be designated a mountain or forest conservation park. It provided that this virgin forest should "continue to remain unexploited" (Spomenica ... 1920:71) and subsequently a conservation park. It no longer exists today; it is believed that it was cut down shortly after the Second World War, and so its precise location and size remain unknown (Jež et al. 2020).

In 1923, the idea emerged that "interesting parts of swamps should be protected as part of a marsh nature conservation park" (Kos 1923:64). Another call for protecting Pohorje's nature was made a few years later by Franc Dolšak (1877–1941), who, modeling on the protection efforts for the Triglav Lakes Valley, wrote that "certain parts of this mountain landscape should be protected, where flora and fauna appear before us in especially distinctive forms of their kind, which differ significantly from those below Mount Triglav and around the seven lakes [the Triglav Lakes Valley], where limestone and the rich flora of the southern limestone Alps predominate, and the rocks that form the mountain massif of all the Pohorje peaks are predominantly made of silicate" (Dolšak 1927:66). Thus, a well-grounded initiative was presented for protecting the Pohorje Hills, which could only be reproached for omitting the fauna. The next steps were only taken well after the Second World War. In 1987, the Monument Protection Institute produced the Expert Bases for Establishing Pohorje Nature Park, which were submitted to the responsible ministry a year later. The ministry requested certain modifications and additions. Hence in 1993, the report Pohorje

Nature Park: A Concept of Development with Guidelines for the Park's Establishment (Naravni ... 1993) was produced, followed by the formation of a committee consisting of representatives of all Pohorje municipalities, the Natural and Cultural Heritage Protection Institute, and the ministry, but the park was not yet established at that point. The third official proposal was produced in 1998 in the form of the Design Plan for the Future Park, but this also failed to result in the establishment of a protected area, primarily because of the disagreement between the municipalities and the ministry (Jež et al. 2020). In the process of joining the EU, by 2004 Slovenia adopted a series of measures to protect its natural environment, including in the Pohorje Hills (e.g., Natura 2000 sites cover around half of the Pohorje Hills; Fig. 26.1), but no new initiative was put forward to establish the park.

This was followed by several high-profile projects, which in 2017 led to the fourth initiative to establish Pohorje Regional Park presented by six Pohorje municipalities (Zreče, Vitanje, Mislinja, Ribnica na Pohorju, Lovrenc na Pohorju, and Slovenska Bistrica; Fig. 26.18); in 2021, the Municipality of Ruše also expressed its intent to join the initiative. In early 2024, the government adopted the Decree on Pohorje Regional Park (Uredba ... 2024), establishing a park covering 59.11 km^2 (Table 26.2).

The regional park is divided into two protection zones (Fig. 26.18) with protection regimes of various degrees. The first protection zone (11% of the park) is the core area with the strictest nature protection regime, and the second protection zone (89% of the park) is the area in which the traditional use of natural resources is permitted to facilitate sustainable farming, forestry, and wildlife management.

The explanation of the grounds for establishing the park provided that the highest parts of the Pohorje Hills (above 1,200 m) are characterized by an exceptional degree of natural conservation and landscape diversity, with frequent and exceptional natural features. The specific and diverse flora and fauna are the result of poorly permeable bedrock, rugged terrain, and an extensive network of surface waters (eUPRAVA 2022).

26.4.2 Distinctive Natural Features

The Pohorje Hills are the most distinct elevated landscape in northeastern Slovenia. They make up the southeasternmost part of the Eastern Alps and extend over 840 km^2 between the Drava Plain to the east, the Mislinja Valley to the west, the Drava Valley to the north, and the Vitanje Lowland to the south (Gams 1959). A distinction is usually made between the Eastern and Western Pohorje Hills (Žiberna and Zajc 2020).

The main surface landforms in the Pohorje Hills are ridges and valleys. Their ridge-like character, with rounded hill tops, comes most strongly to the fore in the Western Pohorje Hills, where the range is also the highest, with peaks extending above 1,500 m (the highest is Mount Črni vrh, which rises to 1,542 m). Toward the west, the dividing ridge descends in places down to the upper limit of former rural settlement, which was higher in the Western Pohorje Hills (extending up to 1,250 m) than in the Eastern Pohorje Hills (up to 1,150 m; Žiberna and Zajc 2020).

Within the Slovenian context, the Pohorje Hills have an unusual geological structure composed of igneous and metamorphic rocks. These create acidic soils and help shape ecosystems typical of the area. The poorly permeable bedrock led to the development of an extensive surface water network with many creeks and waterfalls (Nose Marolt and Gulič 2010). The terrain is wet and covered in many peatbogs with small lakes (Fig. 26.19). Ski resorts (Areh, Bellevue, and Tri Kralji) developed in the sections of the Pohorje Hills near Maribor and Slovenska Bistrica in the extreme east. In the Western Pohorje Hills, undulating terrain turns into a rounded ridge, which extends over 1,500 m but then starts descending to the northwest (Ilešič 1979). The main ridge descends so low in places that in the past it was possible to cross

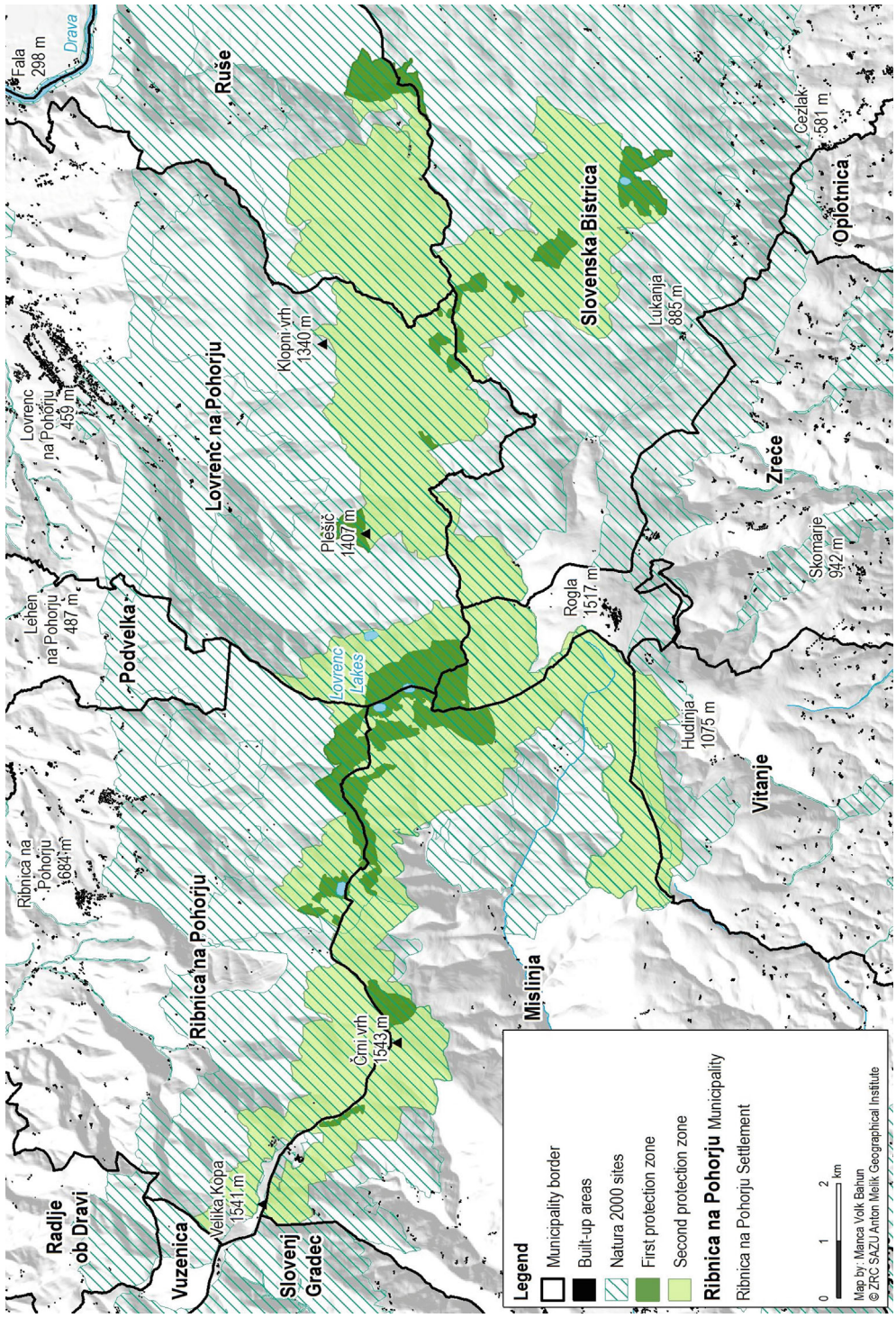

Fig. 26.18 Pohorje Regional Park

Fig. 26.19 Pohorje Regional Park has many peatbogs with small lakes, such as the Lovrenc Lakes. (Photo by Matija Zorn)

from the Drava Valley into the Mislinja Valley. Many gorges in the area were created by creeks, which carved them out in all directions, so that the water network there could be referred to as radial, with headwaters in the central part of the Pohorje Hills. Standing out the most is the 9 km long and 450 m deep Mislinja Gorge. The long ridges, which often extend from the top all the way down to the valley bottom, and the deep and steep gorges between them facilitated communication between a farm on the ridge and the valley more than between two farms on neighboring ridges (Gams 1959). That gave communications and life in general a radial character. The top part of the Pohorje Hills west of Mount Rogla (1,517 m) has a different character, with predominantly rounded peaks and more level terrain, which is dissected only by the channels of creeks with a gentle gradient. This area is the eastern Pohorje plateau, which extends between Mount Rogla and Mount Žigartov vrh (1,347 m), and whose northern and southern edges drop steeply into valleys (Žiberna and Zajc 2020).

The vegetation period at the foot of the Pohorje Hills is five to six months, in Šmartno na Pohorju, at an elevation of 775 m, it is still around five months, but it shortens to only three months on the highest peaks. Up to an elevation of 900 m, the blossoming of cherry trees, haymaking, and grain harvest occur only a week later than at elevations between 400 and 500 m. Precipitation increases with elevation, with the highest peaks receiving 1,300 to 1,600 mm. Because of the sub-Pannonian climate impacts, the eastern parts of the Pohorje Hills receive less precipitation than the western parts, despite a similar elevation. It snows a few weeks earlier on the ridges than in the rest of the hills and the lowlands. The peaks are covered in snow for up to 150 days or even longer, especially on the northern slopes (Žiberna and Zajc 2020).

The Pohorje Hills are, first and foremost, characterized by extensive forest cover. In 2019, forests covered over three-quarters of the area. The second most frequent land use type is meadows (over 17%), due to farms that predominantly engage in animal husbandry. The shares of orchards, fields, and vegetable gardens are negligible (below 2%). Meadows and cultivated land are common especially on the edges of the Pohorje Hills and in the Ribnica–Lovrenc Lowland; meadows are also typical around farms at high elevations and in the highest parts of the hills, which are used as pastures in summer and as ski areas in winter (Žiberna and Zajc 2020).

26.4.3 Cultural Landscape

Human activity has primarily shaped the landscape of today's Pohorje Hills from the late Middle Ages onward. The first isolated farms up to an elevation of 1,200 m were reportedly already established in the area in the mid-twelfth century. Large contiguous estates, not divided into fragments, were required to sustain families. A typical cultural landscape of extensive forest complexes formed during feudalism, with isolated farms and cultivated clearings in the middle (Cenčič 2020). It was probably already back then that cattle were grazed up to the highest peaks; initially they were probably grazed in forest pastures and later in cleared areas. From the eighteenth to the first half of the twentieth century, ironworking, glassmaking, and clearcutting resulted in great quantities of wood being cut. In the second half of the eighteenth century, many forest glassworks were established, which required great amounts of beech wood for melting quartz, as well as softwood for buildings, flumes, glassware packaging, and so on (Cenčič 2020). At the peak of their production, some glassworks had several hundred people working for them (Gulič 2020). During the interwar period, up to a third of the population in the Pohorje Hills worked in forestry and the sawmilling industry, and around three hundred sawmills operated in the area at that time. Hence, extensive cleared areas were created in the Pohorje Hills. Reforestation involved burning the remnants of trees in the spring, after which potatoes and turnips were planted, and rye, barley, or oats were sown the year after that. The grain seeds were mixed with spruce seeds, along with some pine and larch seeds. In this way, extensive spruce monoculture areas developed in the former habitats of fir–beech forests and high-mountain beech forests (Fig. 26.20). In some places, the clearings were not even reforested, which led to the formation of extensive grassland or marshy areas (Cenčič 2020). At the peak of the glassmaking and ironworking industries, which used enormous amounts of charcoal, charcoal burning became widespread and wood was used in large quantities. At the end of the eighteenth century, deciduous trees predominated above the settlement limit, especially beech. Conifers were scarce, unlike today, when they account for over two-thirds of all trees above 1,000 m (Žiberna and Zajc 2020).

In the nineteenth century, harvesting the eggs or pupae of brown ants was also very widespread

Fig. 26.20 Spruce predominates in the Pohorje Hills today. It was planted after the intense clearcutting of predominantly beech forests in the second half of the eighteenth century and in the nineteenth century to produce charcoal required by the ironworking and glassmaking industries. (Photo by Matija Zorn)

Fig. 26.21 Educational tourism is developed in and around Pohorje Regional Park: the Treetop Trail next to the Rogla ski resort. (Photo by Matija Zorn)

in the Pohorje Hills. They were sold as bird fodder and incense or for use in medicinal baths. Especially in spruce forests, brown ants built enormous anthills, up to 2 m high, which were almost completely removed (Gulič 2020).

More intense development of transport infrastructure also stimulated the development of tourism. From 1872 onward, a climatic health resort at Pension Büttner was gaining prominence in Lovrenc na Pohorju (Občina ... 2022). In 1901, the Drava Branch of the Slovenian Alpine Club was established in Ruše, which began to mark the hiking trails. This did not take place entirely according to plan because, for instance, a fine had to be paid to Count Thurn because a trail had been marked without his permission (Teržan 1967). Thanks to its gentle slopes and open views, the Pohorje Hills also attracted winter skiing and hiking, which provided the impetus for building mountain lodges in the 1930s. In the late 1950s, the first ski lifts were installed, providing the basis for the development of ski resorts in the following decades (Guček 2009). Contemporary tourism services (Fig. 26.21) have been developing in the sections of the Pohorje Hills near Maribor and Zreče, at the Kope ski resort, in Ribnica na Pohorju, and at the Trije Kralji ski resort. With the exception of tourist trails, the protected area contains no tourism infrastructure.

26.4.4 Conflicts

Logging, charcoal burning, and glassmaking were the main motives for settlement in the Pohorje Hills. Colonization that began in the medieval period spread to higher elevations, where individual farms surrounded by forests were established (Horvat et al. 2000). Thanks to these farms, extensive meadows developed on acidic soil over the centuries. The meadows (Fig. 26.22) are the result of traditional land use (grazing and haymaking), and their existence depends on human management. Today, they are endangered especially because of the abandonment of land and consequent afforestation on the one hand and excessive meadow intensification on the other. In both cases, the result is the same: the loss of former meadows and the subsequent loss of their patchwork structure. To avoid this, activities are underway to reestablish meadows rich in species by removing shrubs and trees and reestablishing the green cover. The highest quality meadows in terms of maintaining a high biodiversity level are

Fig. 26.22 Meadows in the Pohorje Hills reflect traditional land use (grazing and haymaking). Today they are threatened by afforestation. (Photo by Matija Zorn)

those with alternating land uses between years, in which their use alternates between pastures for grazing traditional livestock (i.e., cattle and sheep), meadows with late first-crop hay, and unused meadows. This forms a patchwork landscape, which makes it possible for organisms to move between meadows of various stages (Gulič et al. 2016). Thirteen farms that own meadows in the park participated in the project Life to Grasslands (Sln. *Življenje traviščem*) between 2015 and 2020 (Vintar Mally et al. 2020). The farm owners recognized the importance of their conservation.

In the eighteenth and nineteenth centuries, charcoal burning and glassmaking caused intensive clearcutting, which, along with later afforestation, led to the formation of spruce monoculture forests (Fig. 26.20), which are not as resilient against various disturbances (e.g., pests, wind, and snow; Jakša 2007).

Today, certain areas of the Pohorje Hills are dealing with overtourism, especially in and around the winter sports resorts (i.e., at the peak ski season in winter and the peak hiking season in summer; Fig. 26.23). Among other things, a large number of visitors accelerate trail erosion, and, if hikers stray from the marked and reinforced trails, they also cause soil erosion outside these trails (Fig. 26.24).

26.4.5 A Unique Landscape

With its ridges, which offer scenic views, abundant meadows, extensive forests (Fig. 26.20), numerous springs, bogs, and lakes (Fig. 26.19), and a picturesque landscape, the Pohorje Hills are a rare mountainous area comprised of igneous and metamorphic rock, which is why its ecological systems differ from those in the predominantly carbonate areas of the rest of Slovenia.

The central idea behind the vision Pohorje 2030 is as follows: "Our beautiful, green Pohorje Hills are just as they used to be in the past. … But they are nonetheless very different! Pohorje Nature Park carefully preserves the heritage of forests, local people, and nature, while creating new opportunities for landscape development and a better life for the locals. Modern family farms focus on ecological farming and, together with tourist resorts, on sustainable tourism. Our local natural resources and work provide the basis for our future. We promote environmentally friendly traffic and ensure that economic activities and their appertaining infrastructure have an appropriate place within the landscape" (Lešnik Štuhec 2011).

Fig. 26.23 At peak tourist seasons the Pohorje Hills also experience overtourism; top: "car tourism" on Mount Rogla (1,517 m); bottom: the resulting overuse of hiking trails in the park around Mount Rogla. (Photo by Matija Zorn)

Fig. 26.24 Because many visitors to the park fail to stick to marked and reinforced trails, soil erosion is also common outside these trails. (Photo by Matija Zorn)

26.5 Conclusion

Being among the European countries with the greatest landscape diversity (Ciglič and Perko 2013; Perko et al. 2020), Slovenia has a rich and diverse natural environment. Its exceptional patchwork landscape character is primarily reflected in a large share of Natura 2000 sites, which cover 38% of the country's land area (compared to the European average of just above 18%). This share is even larger in Slovenia's mountainous areas (i.e., 42.5%).

With their diversity and uniqueness, protected areas contribute to the conservation of biodiversity and geodiversity, and they provide shelter to endangered plant and animal species (Smrekar et al. 2020). These are special areas that, along with their great environmental value, also have important potentials that are key to the sustainable development of all of Slovenia (Lampič and Mrak 2008). In addition, they have a significant impact on the local community, tourism, and economy. Protected areas, such as national, regional, and landscape parks, facilitate the conservation of natural ecosystems and their sustainable management. Carefully controlled use of resources and the conservation of natural and social processes make it possible to preserve the diversity of natural and cultural heritage.

The state and local communities work together in developing and implementing effective policies and measures to conserve protected mountainous areas. Unfortunately, Slovenia is also facing challenges in nature protection, including inappropriate management, insufficient funding, changes to the environmental policy, and the impact of human activities, such as intensive farming and tourism. Therefore, it is key to continuously monitor and improve the management of nature protection areas. Despite all the challenges, the state of protected areas in Slovenia is fairly good compared to the rest of Europe (Smrekar et al. 2023).

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