

NATURE CONSERVATION

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Hungary, by virtue of its geographical location, geological history, geomorphological diversity and biogeographical situation, is a country rich in natural assets. With regard to certain ecological associations, especially wetlands and grasslands, as well as to some plant and animal species and geomorphological features, the country’s heritage is unique.

As for the living natural heritage, the condition of Hungary’s natural environment evidently shows many of the features of the Carpathian Basin: the diversity and mosaic-like pattern of habitats, their endangered status and the strong influence of different social processes. The rich wildlife consists of a mix of Eurasian, European, Continental, Pontic (Steppic), Sub-Mediterranean and Sub-Atlantic floral and faunal elements. This heterogeneity is further diversified by certain Subalpine and Boreal elements as well as climatic relicts. The large-scale, latitudinal zonation of habitats across the East European Plain is fragmented here into mosaic-like landscapes each with an individual character and sustaining special complexes of habitats and associations. As a result of historical changes, migrations, economic and social processes, the plains and hills of the Carpathian Basin today are predominantly agricultural areas under anthropogenic influence, almost devoid of primeval forests or grasslands, but near-natural conditions have still been maintained in many localities.

Within the European Union, Hungary’s territory represents the majority of the Pannonian biogeographical region. This means not only that Hungary’s natural heritage is of the utmost importance to the preservation of the region’s natural assets, but also that Hungary shoulders the lion’s share of the responsibility for their protection. The Hungarian constitution says: ‘*Natural resources, in particular arable land, forests and reserves of water and biodiversity, in particular native plant and animal species, as well as cultural assets shall form the common heritage of the nation; it shall be the obligation of the State and everyone to protect and maintain them, and to preserve them for future generations.*’ In addition to the living (biotic) environment, the conservation of abiotic (geological, geomorphological, etc.) natural heritage is also important.

During its history, the Hungarian nation has always been closely tied to nature: first, due to nomadic hunting-gathering in the steppes, and subsequently (after conquering and settling in the Carpathian Basin), as a result of living from forestry, game and fish as well as agriculture. It is no accident that plant and animal species are often central in the mythology of Hungarians (e.g. world tree, totem raptor, miraculous hind). On the other hand, the natural environment was among the most important external factors acting on social progress: the most significant natural resources and how to access them have always been in focus. This necessitated legal regulations, which were originally confined to the acquisition, use and restriction of access to natural resources, while conscious regulation for the protection of nature, primarily species and natural habitats, for example the general prohibition on the hunting and trading of songbirds, or the establishment of soil protection, only appeared in certain legal acts in the last third of the 19th century. In 1901, the first decree providing legal protection to animal spe-

cies designated 132 bird species and a few mammal species with protected status. The Act on Nature Conservation drafted by KÁROLY KAÁN (1935) had a separate chapter on the designation and protection of plant and animal species as well as natural areas and habitats. In 1961, a statutory decree identified the objects of nature protection, the procedure of designation, provided for the *ex lege* (by force of the law) protection of all caves (*see below*) and established a national, independent body for the administration of nature conservation. In 1972, Hungary’s first national park, the Hortobágy National Park was established. In 1996, Act LIII on Nature Conservation was passed, which is, with minor amendments, still the cornerstone of nature conservation institutions and activities in Hungary. Legal harmonisation ensuing Hungary’s accession to the European Union has enriched the instruments of nature conservation with numerous new elements.

Protected natural areas in Hungary

Natural assets and natural areas are a particular and irreplaceable part of the national heritage. Their maintenance, management, enhancement and preservation for present and future generations, their economical and sustainable utilisation, the protection of living and inanimate natural heritage, the conservation of biological diversity, and finally, in line with Hungary’s international obligations, the establishment of harmonic relations between man and nature as a basic precondition of the survival of mankind, all require the creation and maintenance of an efficient nature conservation system.

Legal protection of natural assets (e.g. certain plant or animal species, springs, caves, etc.) or delineated areas is established by designating them protected, which can take place by force of the law *ex lege*, i.e. without an individual designation procedure, or by a separate legal act, following a designation procedure. Under the Act on Nature Conservation, the term *protected natural area*, which is a collective term for various designations, means any land designated protected or strictly protected, while some natural phenomena are protected by force of the law, regardless of where they are found. *In situ conservation*, which plays a primary role in the practice of nature conservation, means on-the-spot protection of ecological systems, natural habitats, geological and geomorphological assets as well as landscape features, the restoration and maintenance of viable populations of species in their natural environment (while domesticated or cultivated species are to be protected in the environment where their typical features have evolved).

The first protected site designated was the Debreceni Nagyerdő Nature Conservation Area (hereafter: NCA) in 1939. By the end of World War II, 219 smaller sites (forest compartments, solitary trees, groups of trees, clearings, historical and natural monuments, etc.) had been declared protected, with a total area of 2,738 ha (some of them lay in territories granted to Hungary by the Vienna Awards). The first Landscape Protection Area (hereafter: LPA), the Tihany LPA (1952) was only followed by the second, the Badacsony

LPA in 1965. During this period, 155 sites received protection, totalling an area of 13,163 ha. By the 1960s, the percentage of legally protected areas in the country had only reached 0.2%! It took 100 years after the establishment of the world’s first national park (Yellowstone NP, 1872) to establish the first Hungarian national park (Hortobágy NP), but this was followed by several large protected areas, including further national parks (Kiskunság NP 1975, Bükk NP 1977, Aggtelek NP 1985) and landscape protection areas.

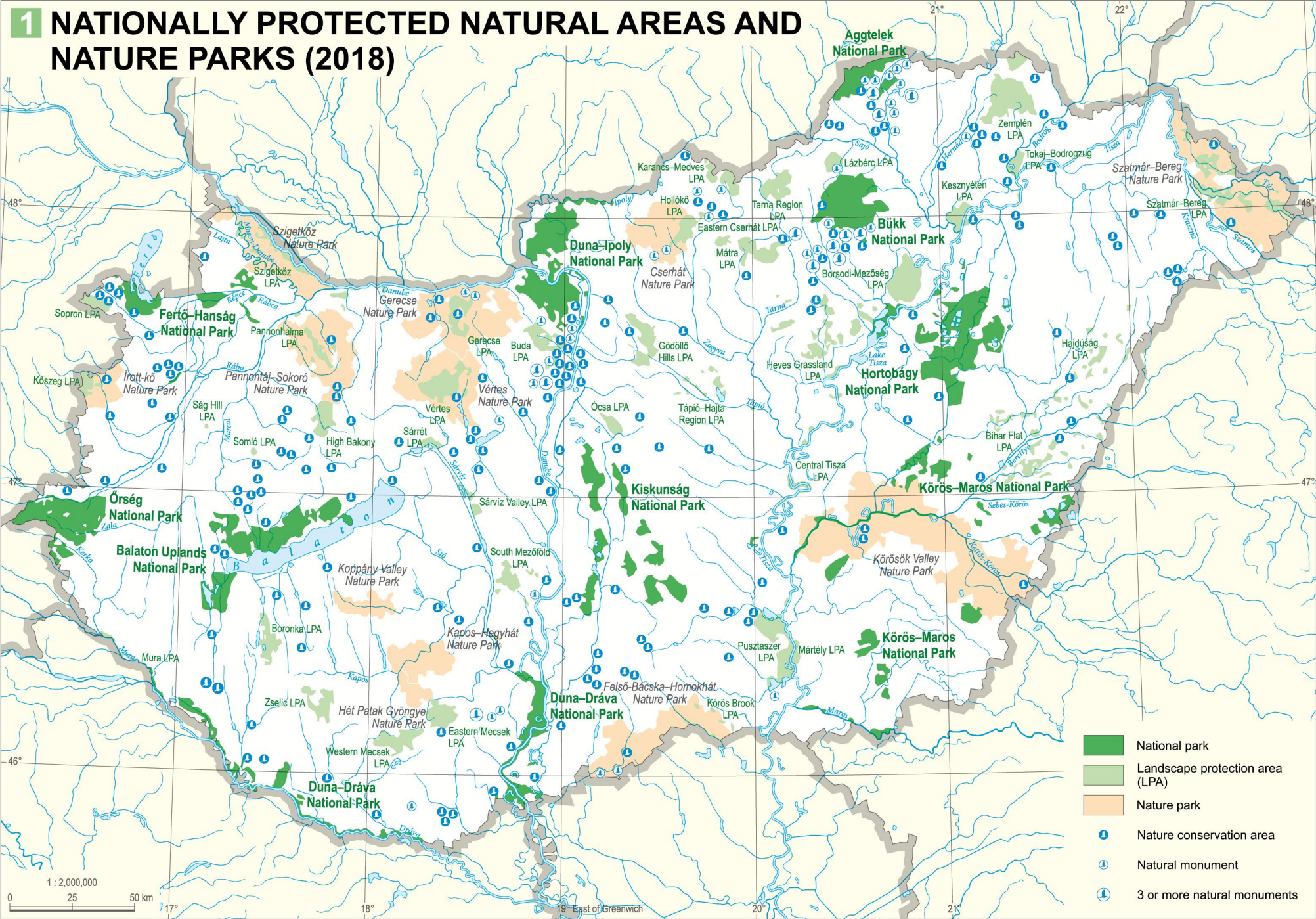
The pace of the designation process remained high from the early 1990s until the turn of the millennium, despite significant changes in the economic, social and political environment and expectations. This period saw the designation of 230,000 ha of new protected area, including the Fertő–Hanság, the Duna–Dráva, the Körös–Maros, the Duna–Ipoly and the Őrség national parks. In 2002, 9.2% of the country’s territory was protected (9.9% if one adds mires and sodic lakes protected by force of the law and registered by that time). Apart from some landscape protection areas, designations have been restricted in the 21st century, primarily to smaller protected areas that contain some special natural assets, totalling 36,671 ha between 2003 and 2014. However, Hungary’s rich natural heritage was underlined by the Natura 2000 network designated in the year of accession to the European Union and slightly extended later to accommodate further requirements, so that in early 2017 2,068,439 ha, i.e. 22.24% of the country’s territory was within a protected natural area and/or part of the Natura 2000 network. Of this, 848,716 ha belonged to the network of nationally protected areas.

More than 40% of sites under some kind of nature protection is protected natural area, designated either nationally or by the municipality **1**, comprising on 1 January 2017 10 national parks, 39 landscape protection areas, 170 nature conservation areas, 88 natural monuments (including beehive rocks, geological type localities, etc.) and 1,785 sites designated by municipalities, as well as a number of natural areas protected by force of the law **2**.

Caves have been protected by law since 1961. 4,092 caves are known to exist in the country today, of which 304 enjoy special protection and 145 strict protection. The total length of all known passages is 246 km. In addition, since 1996, all *springs* (2,924), *sinkholes* (691), *mires* (1,193), *sodic lakes* (397), *tumuli* (1,863) and *earthen fortifications* (372) have been protected by force of the law (the above data refer to items located outside protected natural areas). The database of rock exposures qualifying as *type localities* contains 471 items, 220 of which enjoy special protection. Out of about 500 *mineral species* occurring in Hungary, 11 are protected.

The diversely structured, species-rich *forest reserves* (63) have been designated primarily for research and each consists of a core zone and a buffer zone. The total extension of core areas is 3,600 ha, which only accounts for 0.18% of the country’s forests. (The extension of natural and near-natural forests in Hungary was 448,156 ha in 2014.) The objective of establishing the national forest reserve network, which forms part of a European system, is to study the natural life, diverse structure, long-term processes and rich wildlife

1 NATIONALLY PROTECTED NATURAL AREAS AND NATURE PARKS (2018)



of forests, to establish and preserve forest stands typical of the locality, and to raise awareness to nature conservation and forest management.

Approximately one sixth of municipalities (531) collectively have designated 1,785 protected sites (known as locally protected natural areas), whose total extent amounts to 42,152 ha.

Protected natural assets

Approximately 2,200 *higher (vascular) plant species* and 42,000 *animal species* live in Hungary. In addition, the number of *macrofungi* living in Hungary’s forests,

meadows, wetlands and even in man-made environments is estimated at 3,000–3,500, one third of which do not belong to the ‘standard’ capped mushrooms, but to various groups of diverse appearances, such as cup fungi, earthstars, coral fungi, puffballs, truffles, etc.).

Out of all species living in Hungary, 1,901 are protected by law, including 58 fungus and 17 lichen species, 646 plant and 982 animal species; of these, 87 plant species and 186 animal species are strictly protected **3**.

Protected plant species occur in nearly every corner of Hungary, not only in primeval steppes, but even in roadside habitats, within as well as outside protected areas. They particularly abound in some habitat

types, such as southerly mountain slopes, bog meadows, sodic plains and dry sand dunes. In the 5.5×6.5 km grid botanical maps, some grids stand out with 100–120 protected plant species, moreover, in some places 15–20% of the entire flora consists of protected species **4** **5**.

The *inanimate natural heritage* comprises geological, geomorphological and hydrological phenomena, typical and rare soil type localities, relief forms, geological type localities, minerals, mineral associations, fossils and even entire landscape features, for example some scenic rock formations and rocky outcrops or stratigraphic rock series of scientific importance (most of which represent a significant landscape value too). These sites of geological interest are also known as *geosites*. In order to safeguard them, if necessary, from scientific, cultural, aesthetic, educational, economic or other public interest, these monuments have to be declared protected. All springs, mires, caves, sinkholes, sodic lakes, tumuli and earthen fortifications are protected by the force of the law.

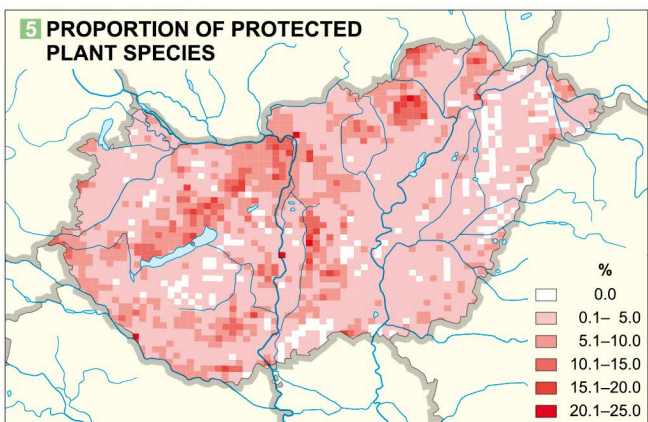
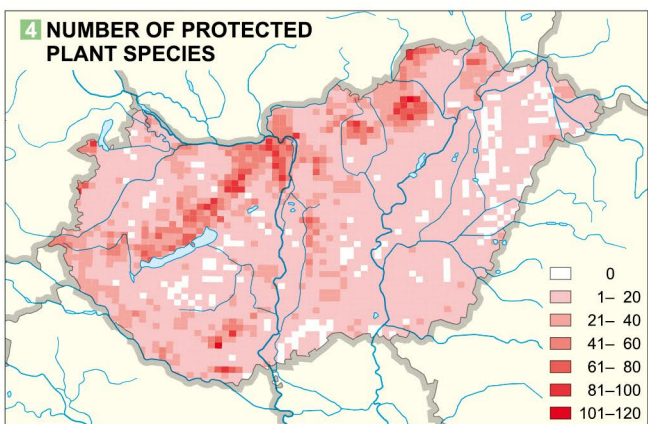
The types of protected natural areas

Hungarian *national parks* are extensive territories where the natural character has not been significantly altered, and whose primary function is to conserve the natural botanical, zoological, geological, hydrological, scenic and cultural historical assets of outstanding importance, sustain biodiversity and the sound functioning of natural systems and to promote education, scientific research and recreation.

The zonation of national parks **1** **6** is regulated by a ministerial decree. The *nature zone* is strictly pro-

3 CHANGES IN THE NUMBER OF PROTECTED AND STRICTLY PROTECTED SPECIES IN HUNGARY (1993–2017)

	1993			1996			2001			2009			2017		
	Pro- tected	Strictly protected	Total	Pro- tected	Strictly protected	Total	Pro- tected	Strictly protected	Total	Pro- tected	Strictly protected	Total	Pro- tected	Strictly protected	Total
Fungi	0	0	0	0	0	0	0	0	0	35	0	35	58	0	58
Lichens	0	0	0	0	0	0	0	0	0	8	0	8	17	0	17
Bryophytes	20	0	20	20	0	20	78	0	78	79	0	79	77	0	77
Ferns	38	1	39	38	1	39	42	1	43	43	2	45	37	7	44
Gymnosperms	1	1	2	1	1	2	0	1	1	0	1	1	0	1	1
Angiosperms	395	45	440	404	50	454	492	61	553	507	68	575	533	79	612
Total of plants	454	47	501	463	52	515	612	63	675	629	71	700	647	87	734
Invertebrates	397	0	397	396	0	396	450	32	482	483	32	515	635	57	692
Cyclostomata	2	0	2	2	0	2	0	2	2	0	2	2	0	3	3
Fishes	26	0	26	25	1	26	27	5	32	26	5	31	24	7	31
Amphibians	16	0	16	16	0	16	18	0	18	18	0	18	17	1	18
Reptiles	13	2	15	13	2	15	12	3	15	12	3	15	10	5	15
Birds	275	65	340	278	69	347	280	81	361	280	81	361	257	95	352
Mammals	49	9	58	48	11	59	41	14	55	41	14	55	39	18	57
Total of vertebrates	381	76	457	381	76	457	378	105	483	377	105	482	347	129	476
Total of animals	778	76	854	766	76	842	828	137	965	860	137	997	982	186	1,168
Total of all species	1,232	123	1,355	1,229	128	1,357	1,440	200	1,640	1,532	208	1,740	1,704	273	1,977



6 HUNGARY'S NATIONAL PARKS (2018)

National park	Founda- tion	Area (km²)	Head Office
Hortobágy National Park	1972	809.57	Debrecen
Kiskunság National Park	1975	506.41	Kecskemét
Bükk National Park	1977	422.83	Eger
Aggtelek National Park	1985	201.84	Jósvafő
Fertő–Hanság National Park	1991	238.91	Sárród
Duna–Dráva National Park	1996	497.52	Pécs
Körös–Maros National Park	1997	512.47	Szarvas
Balaton Uplands National Park	1997	570.19	Csopak
Duna–Ipoly National Park	1997	606.76	Budapest
Őrség National Park	2002	440.48	Óriszentpéter

tected and contains those parts of the national park whose exclusive function is to restore and maintain the natural processes and structure of the landscape and the ecosystem, and to uphold the conditions nec-

essary to this end. The goal of nature conservation management is to conserve natural processes and to provide the conditions they require.

In the *nature-friendly management zone*, conservation management and nature-friendly utilisation collaborate or co-exist in space and time; the primary goal within the zone is to ensure their harmony. In addition to management for conservation purposes, other, profit-oriented land uses that are not required by conservation or do not primarily aim to fulfil conservation objectives can be practiced if they are not in conflict with landscape and nature protection.

The *service zone* of national parks contains built-in areas and those sites whose function involves regular and intensive human presence.

Landscape protection areas (LPA) 1 are extensive and usually contiguous territories rich in characteristic natural and landscape features, where the interaction of Man and Nature has created a particular aesthetic, cultural and natural character and whose primary function is the conservation of landscape features and natural assets.

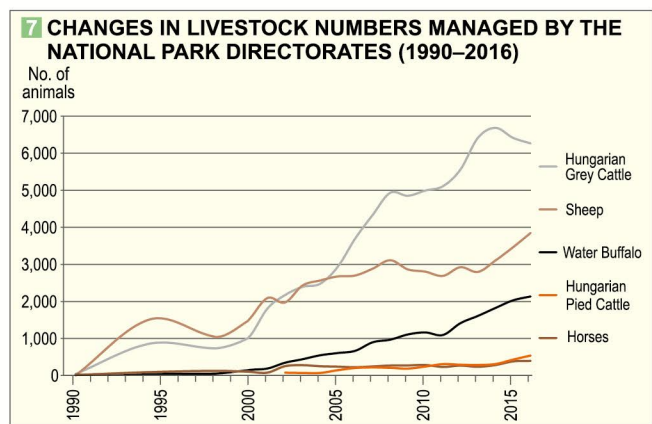
Nature conservation areas 1 are smaller, contiguous and characteristic territories rich in outstanding natural assets whose primary function is the protection of one or several natural assets or of the ecosystem. Mires and salt lakes declared protected by the Act on Nature Conservation exemplify nature conservation areas.

Natural monument means an individual natural formation or asset of outstanding importance and the territory needed for its conservation. The springs, sinkholes, tumuli and earthen fortifications declared protected by the Act on Nature Conservation qualify as natural monuments.

National park (NP) directorates are responsible for nature conservation management tasks. The operational area of the directorates comprises not only protected natural areas, but together the ten directorates cover the entire territory of Hungary. In addition to conservation management, ecotourism development and raising awareness (see further details below), the directorates are entitled to take punitive measures in instances of minor breaches of nature conservation legislation, and have authoritative rights to operate the Ranger Service. The task of the Ranger Service is to guard and prevent damage to protected natural ar-

reas, Natura 2000 sites, protected species as well as species of Community interest or those falling under the scope of other nature conventions (plant, animal and fungus species), protected geological formations, geomorphological, natural and landscape features as well as archaeological sites. The number of rangers was 251 in 2017, which means an average of 8,000 ha of protected natural areas and Natura 2000 sites for each ranger to defend.

National park directorates have other important tasks, too. A significant amount of state-owned land (298,700 ha on 31 December 2016) is in their management, consisting of protected natural areas and areas proposed for protection. Of this, 61% is grassland, 10% is arable land and 29% is in some other land use. In addition, the directorates are responsible for game management in a total of 155,000 ha. One of the key issues in the management of protected grasslands is grazing with the suitable animal species and breed and at an appropriate density. A lot of areas managed by nature conservation are grazed with native, mostly endangered breeds that represent a high intrinsic genetic value, such as significant populations of Hungarian Grey and Hungarian Pied Cattle, water buffaloes and certain sheep breeds (Racka, Cigája). Hucul horses roam in the Aggtelek NP, the Nonius studs are maintained by the Hortobágy NP, while Muraközi horses live in the Őrség NP, and the Furioso-North Star (half breed from Mezőhegyes) is maintained by the Kiskunság and the Bükk NPs 7. State nature conservation plays a key role in saving and enhancing these special Hungarian breeds. Quite extraordinarily, an endangered Asian wild horse, the Przewalski's horse is also bred in a vast enclosure within the Hortobágy NP and helps maintain its grasslands.



Natural areas and networks with international designations

The *European Diploma* is the most prestigious European award that can be granted to protected areas to recognise their outstanding biological, geological and landscape values as well as exemplary management. Established in 1965, the award is granted by the Council of Europe. The Council regularly reviews if management is in line with criteria, and if a site is seriously threatened, the Council may re-consider the designation. By the end of 2016, 74 sites from 29 countries have gained this accolade, among them 3 sites in Hungary: in 1995, the Ipolytarnóc Fossil Site NCA (509 ha; today, the site is the gate to the Novohrad–Nógrád Geopark), as well as the only site of the Dolomitic Flax (*Linum dolomiticum*), i.e. the Szénás Hills within the Buda Mountains (1,384 ha), while in 2003 the Tihany Peninsula (671 ha), rich in post-volcanic formations, received the award 8.

The UNESCO *Man and the Biosphere Programme (MAB)* has built a huge network of the world's *biosphere reserves* since 1972. These internationally recognised 'living laboratories' comprise such outstandingly valuable terrestrial and marine sites, whose main function is the conservation of landscapes, ecosystems and species (including their genetic diversity), the associated research and education, the harmonisation of ecological, social and cultural aspects through sustainable development and the preservation of local, traditional land use systems, management methods and cultural heritage. In each reserve, a contiguous zonation system is to be set up, consisting of a core area, a buffer zone and a transitional zone, which are in constant interaction with each other. In early 2017, 669 biosphere

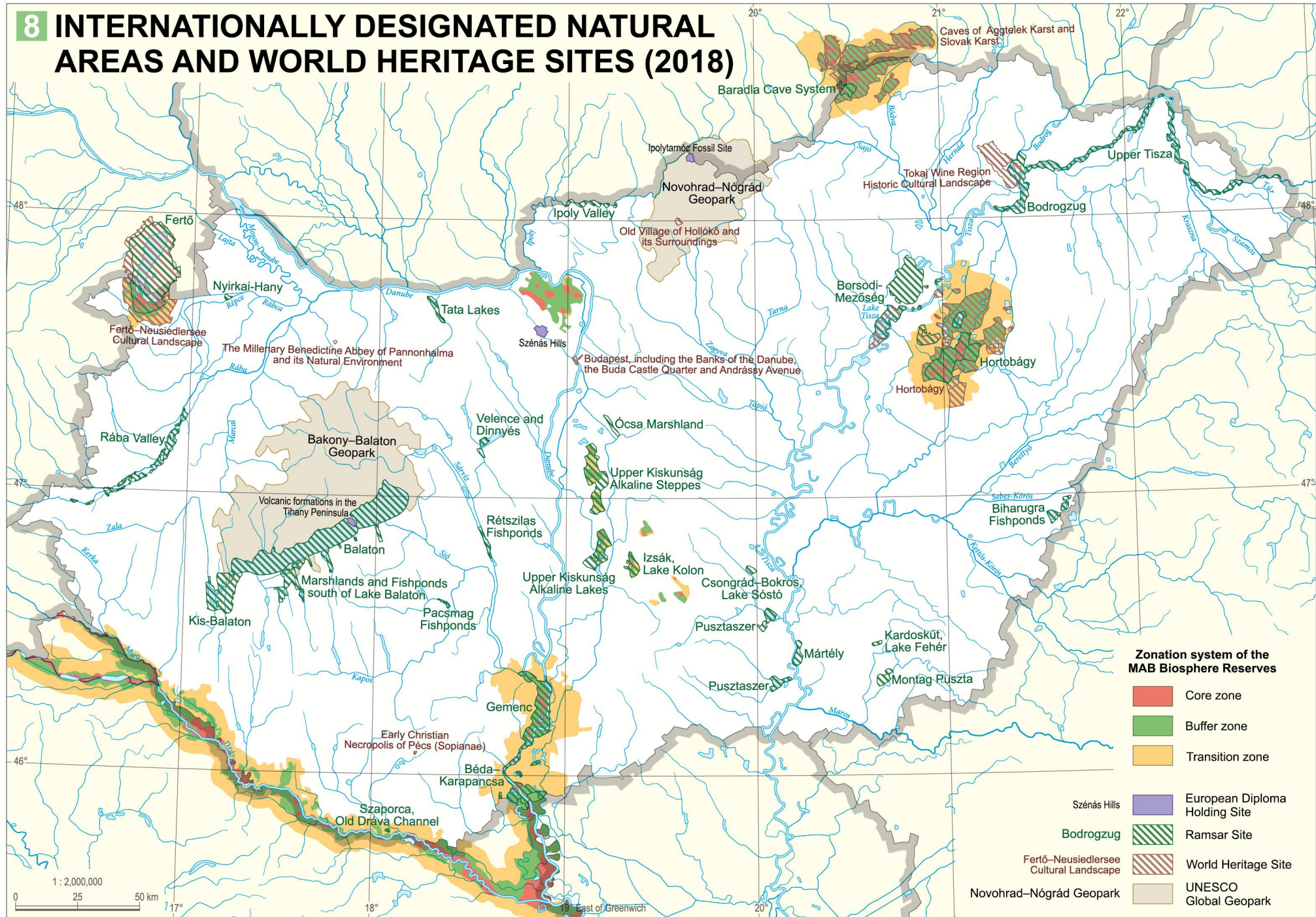
reserves were registered in 120 countries. 16 of these reserves were transboundary. Biosphere reserves perform an important ecological function, providing refuge to numerous plant and animal species, contributing significantly to the migration and dispersal of wildlife, and thus forming an organic part of ecological networks. The most important tasks and objectives of the UNESCO MAB Programme are set out in the MAB Strategy, emphasizing the achievement of sustainable development and harmonic relations between Man and Nature. In Hungary, a total of 500,000 ha belong to 6 biosphere reserves: the Aggtelek, Fertőtavi (Lake Fertő), Hortobágy, Kiskunság, Pilis biosphere reserves and most recently the Mura–Dráva–Duna Transboundary Biosphere Reserve established jointly with Croatia 3.

In February 2017, 169 countries were Contracting Parties to the Convention on Wetlands signed in Ramsar, Iran in 1971, and the number of wetlands of international importance designated by these countries reached 2,200, with a total area of 2.1 million km². Hungary joined the Convention in 1979, ratifying it with a decree, and in 1993 with an act. By 2017, Hungary had included 29 sites in the List of wetlands of international importance, also known as Ramsar sites, whose total area is approximately 243,000 ha. In addition to Lake Balaton that constitutes almost a quarter of this area, Hungary's large Ramsar sites include the Hortobágy, Upper Tisza, Gemenc, Kis-Balaton and Upper Kiskunság Alkaline Lakes Ramsar sites 8. Almost the total area of Hungary's Ramsar sites falls within a nationally protected area or Natura 2000 site. Subterranean wetlands (such as the Baradla–Domica cave system in the Slovak and Aggtelek Karst) were officially recognised by the Convention in 1999, at the

proposal of Hungarian experts, ÖDÖN RÁDAI and JÁNOS TARDY, and this special category was later amended to be more comprehensive.

Signed in Paris in 1972, the Convention Concerning the Protection of the World Cultural and Natural Heritage was ratified by Hungary by a statutory decree in 1985, and promulgated by an act in 2011. In December 2017, 1,073 sites designated by 167 countries were included in the List of World Heritage sites; of these, there were 832 cultural, 206 natural and 35 mixed (both cultural and natural) heritage sites; 37 sites were transboundary, and 54 sites were on the List of World Heritage in Danger. Out of the 8 World Heritage sites in Hungary 8 9, 5 have outstanding landscape and nature conservation importance.

The UNESCO Section of Earth Sciences launched its *geopark* programme in 1997, and established the Global and the European Geoparks Networks in 2000 (GGN and EGN). The goal of geoparks is the protection of geo-diversity, the promotion and interpretation of geological heritage, as well as the implementation of a local sustainable development concept; geoparks are sites particularly rich in Earth science (geological, geomorphological, hydrogeological, pedological, palaeontological, etc.) assets, formations, features or mining monuments, that build on this heritage to represent the objectives of nature conservation, environmental education, research and spatial development, creating new opportunities for shaping the future of rural areas and for raising awareness to the importance of geological heritage. Geotourism in its complex and sustainable form works in partnership with local communities, based on a geopark that, in addition to geological heritage, holds a plethora of biological, archaeological, anthropological, ethnographical value as well



9 WORLD HERITAGE SITES IN HUNGARY (2018)		
Site name	Year of inclusion in the List of World Heritage sites	Character
Budapest, including the Banks of the Danube, the Buda Castle Quarter and Andrássy Avenue	1987	cultural
Old Village of Hollókő and its Surroundings*	1987	cultural
Caves of Aggtelek Karst and Slovak Karst*	1995	natural
Millenary Benedictine Abbey of Pannonhalma and its Natural Environment	1996	cultural
Hortobágy National Park – the ‘puszta’*	1999	cultural landscape
Early Christian Necropolis of Pécs (Sopianae)	2000	cultural
Fertő/Neusiedler See Cultural Landscape*	2001	cultural landscape
Tokaj Wine Region Historic Cultural Landscape*	2002	cultural landscape

* World Heritage sites with outstanding landscape and nature conservation importance

as other cultural and historical assets. Geoparks provide an opportunity to sustain rural areas and their populations in the long run, and represent an innovative instrument to exploit the opportunities provided by the combination of healthy patriotism and a rich geological heritage.

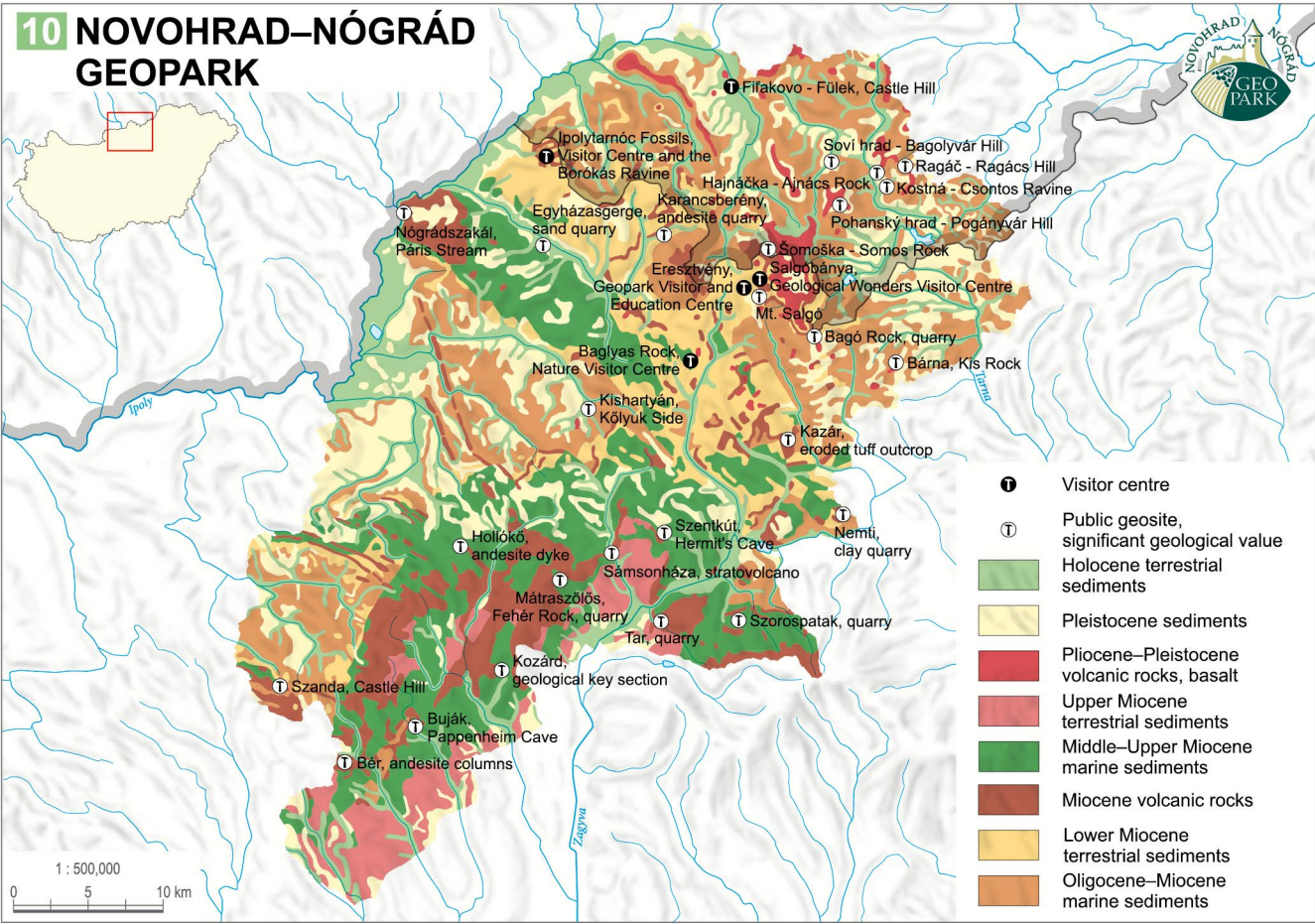
In January 2018, the Global Geopark Network consisted of 127 sites in 35 countries, including 70 sites in 23 European countries. Hungary boasts two UNESCO Global Geoparks **8**: since 2010, the world’s first international (transboundary) geopark, the Hungarian-Slovak Novohrad–Nógrád Geopark **10**, and since 2012 the Bakony–Balaton Geopark **11** are members of the network.

A key issue for today’s nature conservation in Hungary is to establish harmonic co-existence with agriculture, spatial policy, infrastructure development and tourism and a prerequisite for this goal is to provide support for traditional landscape management. It is for this purpose that the *High Nature Value Area* (earlier: Environmentally Sensitive Areas) scheme was launched over 120,000 ha **12**. Under the Act on Nature Conservation, these sites are extensively cultivated as part of a European Union subsidy scheme built on voluntarily undertaken farming restrictions that ensure the maintenance of nature-friendly management methods. The outcome of the scheme should be the protection of habitats and the safeguarding of biological diversity in tandem with conserving landscape features and sustaining and upholding cultural traditions and historical heritage. In ecologically sensitive areas, the agri-environment scheme introduced for the encouragement of nature-friendly management methods serves similar purposes with its subsidies available in zonal and horizontal sub-programmes.

The *National Ecological Network* embraces all protected natural areas and their buffer zones, Natura 2000 sites (see below), High Nature Value Areas and natural areas linked through ‘green’ corridors to enhance ecological connections **15**. Its planning began in 1993, and the network itself was incorporated in legislation in 2003, within the Act on Hungary’s National Development Plan. The network guarantees the protection of its core areas, ecological corridors and buffer zones and the maintenance of their ecological connections by integrating them into spatial planning at municipal, county and national levels.

Although as yet without an international designation, *nature parks* are nevertheless significant, being extensive sites rich in natural, landscape, cultural and historical heritage, and built on the partnership of municipalities, non-governmental organisations and local people to implement spatial development in harmony with the maintenance of natural resources. Through ecotourism development and the promotion of local attractions, natural resources, folklore and traditions, nature parks contribute to the conser-

vation of nature and landscape features, and to raising employment and the local standard of living. Presently, Hungary has twelve nature parks – Vértes (17 settlements, 35,838 ha), Pannontáj-Sokoró (29 settlements, 62,663 ha), Cserhát (22 settlements, 38,260 ha), Szatmár–Bereg (67 settlements, 103,791 ha), Hét Patak Gyöngye (8 settlements, 10,177 ha), Körös Valley (14 settlements, 207,247 ha), Gerecse (29 settlements, 79,651 ha), Koppány Valley (10 settlements, 16,421 ha), Szigetköz (26 settlements, 50,670 ha), Upper Bácska–Homokhát (12 settlements, 68,286 ha), Kapos–Hegyhát (14 settlements, 38,153 ha) and the Írott-kő (Geschriebenstein) Nature



Park shared with Austria (16 Hungarian settlements, 23,461 ha) operating in 7.8% (725,476 ha) of Hungary’s territory **11**.

An even more recent international initiative gives birth to *dark sky parks*. The mission of the International Dark Sky Association is to protect night skies from light pollution, to halt and reverse the rapid increase of light pollution to wildlife and landscape. In order to accomplish its mission, the Association has established the designations ‘*International Dark Sky Park*’, ‘*International Dark Sky Reserve*’ and ‘*International Dark Sky Community*’. The first two categories can be granted to sites where light pollution at night is minimal and natural conditions can be preserved. By 2017, a total of 52 sites gained this distinctive title, including three Hungarian sites, the Zselic LPA, the Hortobágy NP and since June 2017, the Bükk NP are International Dark Sky Parks.

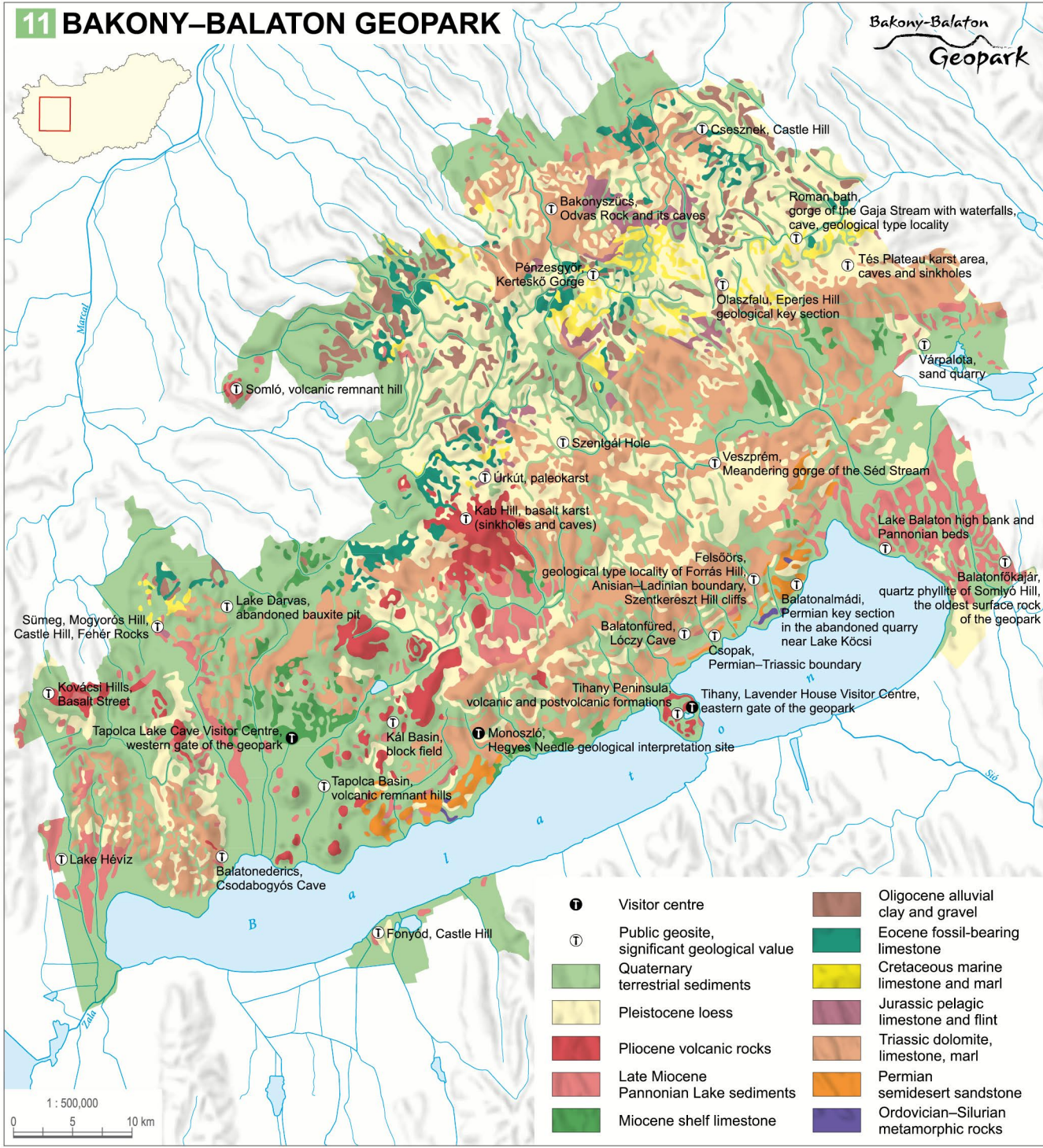
Novohrad–Nógrád Geopark

Novohrad–Nógrád Geopark. Established in 2010 on the initiative of the subregions and the Bükk National Park Directorate, this 16.19 km² geopark (1,284 km² of which lies in Hungary), comprising the territory of 64 Hungarian and 28 Slovakian communities, is the world’s first transboundary geopark, where the natural heritage of 30 million years of the evolutionary history of the Carpathian Basin unfolds in a diversity of volcanic formations (the dissected rhyolite tuff of Kazár, the bundle of arched andesite columns of Bér, the basalt columns of Somos Rock, etc.), extraordinarily rich palaeontological sites (foremost among these, the internationally renowned fossil site of Ipolytarnóc) and special habitats. The cultural heritage of the Palóc ethnic group survives in its traditions (spectacular, far-famed folk costumes), in historic monuments (members of a medieval chain of fortresses and the World Heritage site of the Old Village of Hollókő), as well as in shrines targeted by religious tourism (Szentkút and the stupa of Tar). The Geopark’s mission is to unite again the once torn-apart Nógrád region and its community and keep it among the highlights of Europe with the complex spatial development tools of geotourism.

Bakony–Balaton Geopark

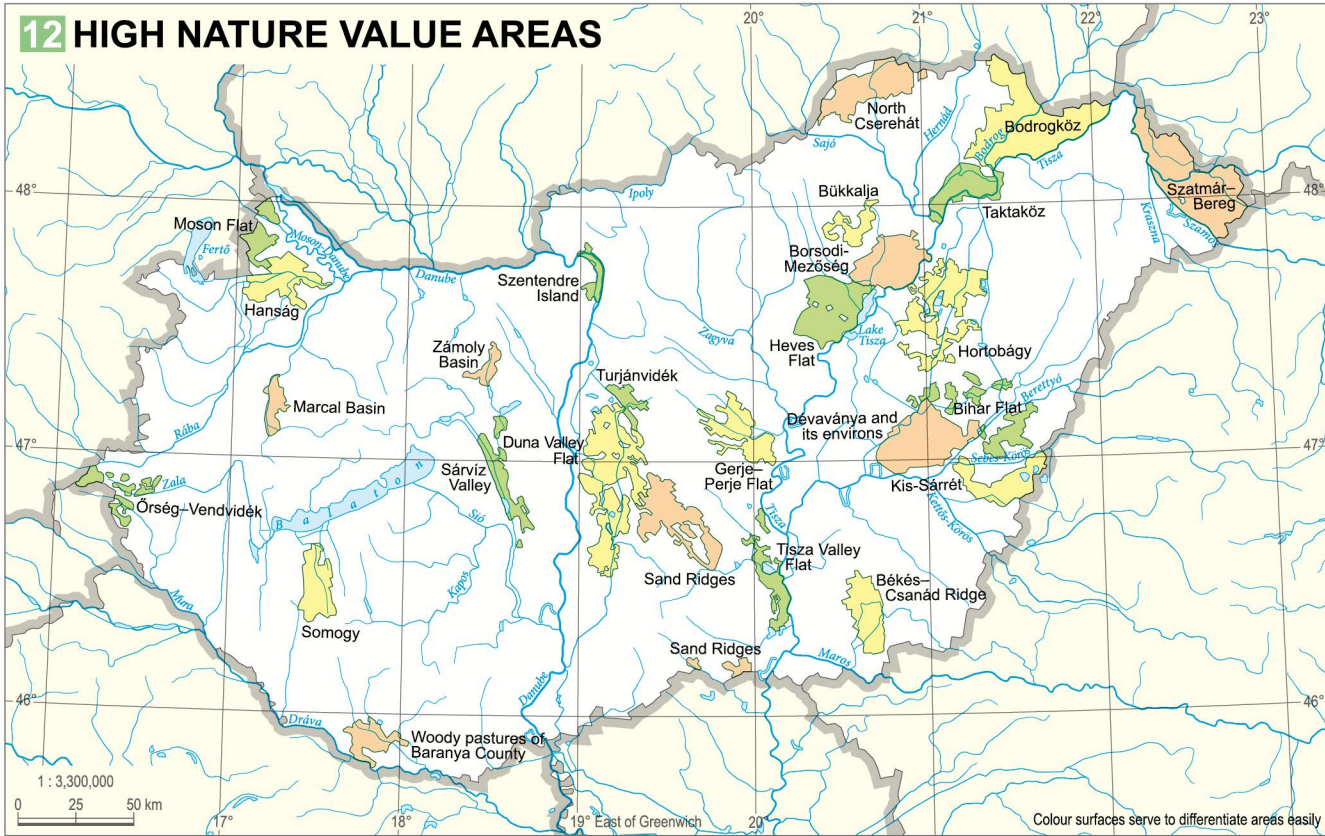
Founded by the Balaton Uplands National Park Directorate, the 3,244 km² Bakony–Balaton Geopark has been a member of the international geopark network since 2012. Extending over the territories of 151 communities, the site is remarkably rich in Earth heritage – with natural monuments exhibiting 440

million years of geological and geomorphological processes (remnant hills of basalt volcanism, boulder fields, surface and subsurface karst features, fossil-bearing rock beds, etc.), in historical and cultural treasures (medieval castles, folk and religious architecture, as well as the relics of a millenary wine culture) and holds a diversity of ecological habitats.



mixture of species and habitat types from neighbouring regions, distributed in a mosaic-like pattern and thus exhibiting a great diversity even within small lo-

calities. Covering about 125,000 km², the Pannonian biogeographical region is one of the smaller regions in Europe, equating to just 3% of the territory of the EU.



Conversely, it provides a home to 56 (25.7%) of the 218 habitat types listed in Annex I of the Habitats Directive within the territories belonging to the EU Member States (Czechia, Hungary, Romania and Slovakia). One habitat type, the Pannonic inland sand dune thicket can only be found in the Pannonian biogeographical region, and the majority of the occurrences of ten other habitat types are in this region. Out of approximately 1,000 species and genera listed on the annexes of the Habitats Directive, 212 are present with significant populations, of which 29 are species or subspecies endemic to the Carpathian Basin, i.e. they occur nowhere else in the world.

In order to protect its natural heritage of Community interest, the European Union has adopted legislation, most remarkably the *Birds Directive* and the *Habitats Directive*. Under these two directives, each Member State was required to establish its *Natura 2000 network*, to safeguard the habitat types, animal and plant species of Community interest, which are, of course, at the same time highly treasured national assets.

Under the Habitats Directive, the Member States that share the Pannonian biogeographical region have designated 851 Sites of Community Importance, whose total extent is 16,499 km². Under the Birds Directive, the number of Special Protection Areas designated in the region is 103, with a total extent of 19,221 km². Taking overlaps into account, the total area of the Natura 2000 network in the region is 25,767 km², i.e. 20.65% of the biogeographical region.

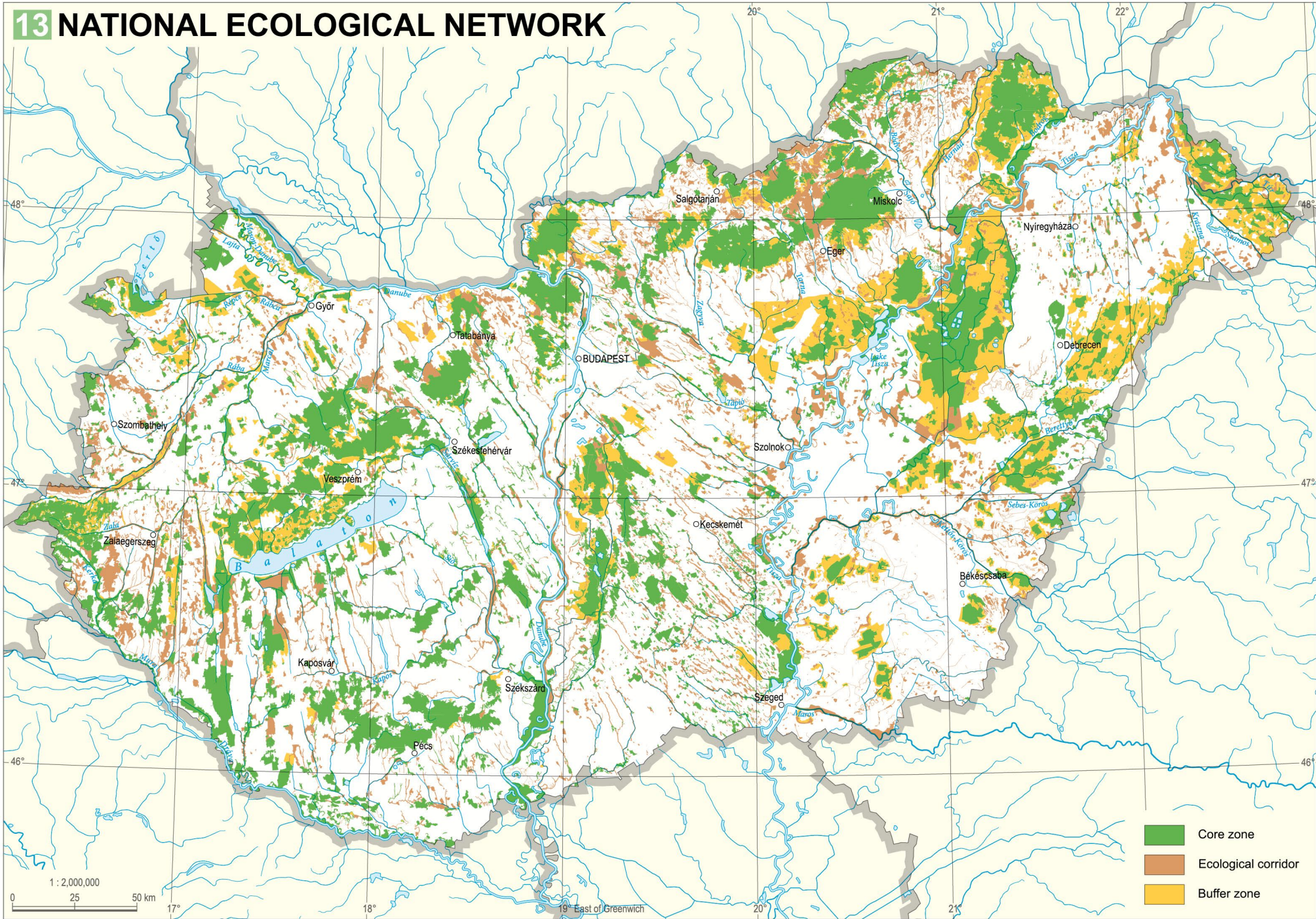
The new investments and more intensive land use that appeared in the wake of Hungary’s accession to the European Union (2004) often result in damages to the natural environment, even with the most careful planning and implementation. Partly in order to reduce this risk, EU legislation also provides a framework for the protection of natural assets of Community interest, and creates funding opportunities to support their enhancement (e.g. habitat restoration) and promotion (education, interpretation and ecotourism facilities, etc.).

In order to protect the most important occurrences of the habitat types and species covered by the two directives, Hungary designated 21.39% of its territory into the Natura 2000 network **15**, and the coverage has been declared sufficient (unlike many other Member States). The proportion of the network within the country’s territory is above the Western European average **16**, but it is even higher in some of Hungary’s neighbouring states (Romania 22.56%, Slovakia 29.57%, Slovenia 37.85%, Croatia 34.80%). This is due to the fact that the Pannonian and Mediterranean biogeographical regions still possess a considerably richer natural heritage than the western and northern parts of the EU.

The objective of the Natura 2000 network is to safeguard the natural heritage of the European Union for future generations. Like most such initiatives, it has been in conflict since its inception with those stakeholders that put short-term and primarily private interests ahead of the public interest of long-term, sustainable use of natural resources. However, Natura 2000 sites are not closed reserves, they are designated for the protection of certain species and habitats, so if a planned development does not threaten those resources, it may receive a green light.

The conservation status of habitat types and species

Annex I of the Habitats Directive lists 46 habitat types that also occur in Hungary **17**. Based on the 2013 na-



tional report, 9 habitat types (19%) were in *favourable* conservation status; 27 habitat types (59%) were in unfavourable – *inadequate*, and 10 habitat types (22%) were in unfavourable – *bad* status. There was sufficient information on the status of all habitat types, so none was listed in *unknown* category.

The annexes of the Habitats Directive contain 208 animal, plant and lichen taxa that are also found in Hungary, including 5 bryophyte, 7 dragonfly, 27 butterfly and moth, 21 fish, 12 reptile and 43 mammal taxa.

In 2013, the assessment of the conservation status of 76 (36%) of these species was *favourable*, 110 species (53%) of Community interest were placed in unfavourable – *inadequate* category, 18 (9%) in unfavourable – *bad*, and 4 (2%) were assessed as *unknown*.

Compared with an earlier assessment, the number of species on which the quantity and quality of information was insufficient to assess their status declined significantly. This is first and foremost the result of continuous data collection under the framework of the

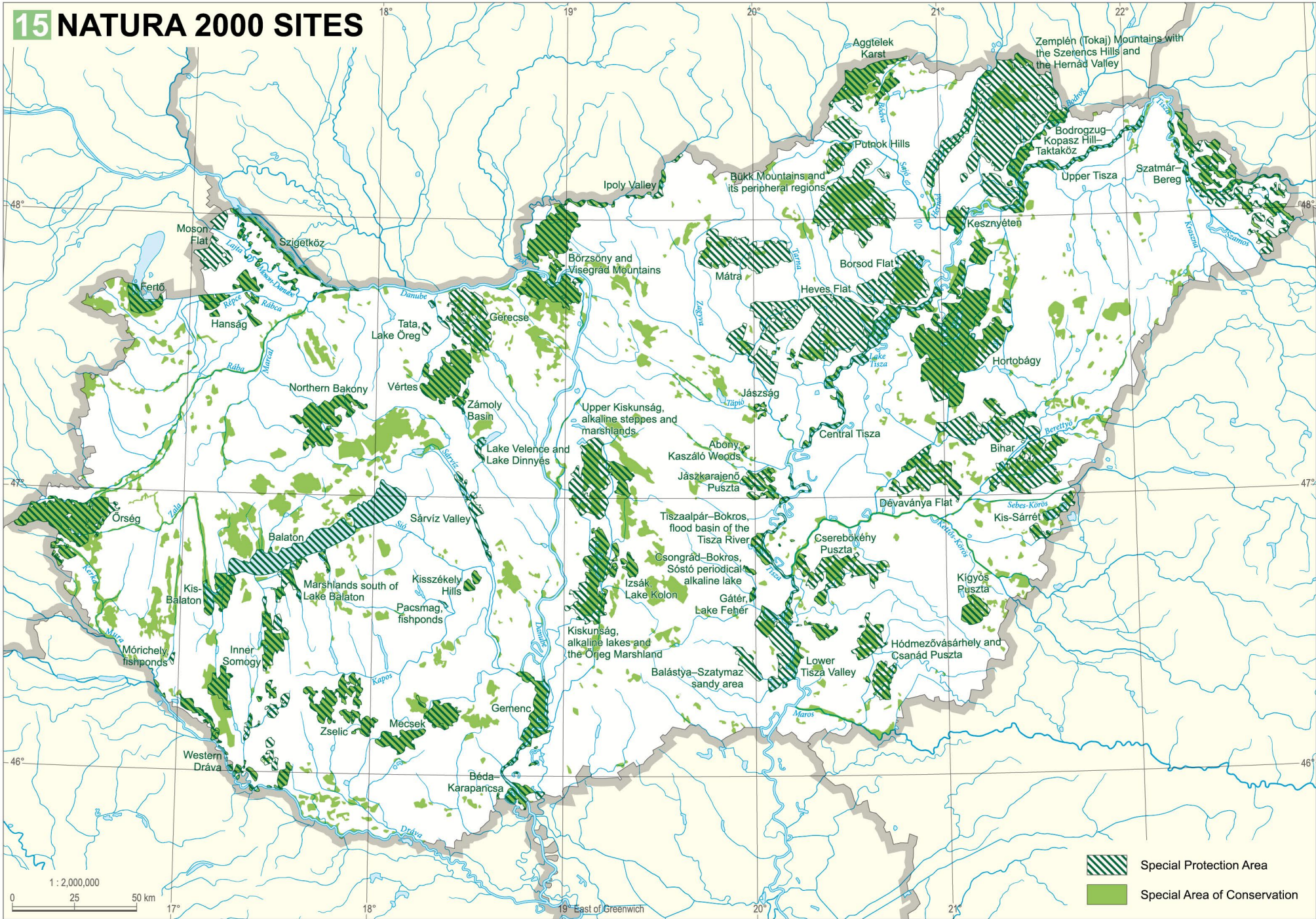
National Biodiversity Monitoring System. Also, slightly more species were placed in favourable conservation status category. Several among them, such as marsh gladiolus (*Gladiolus palustris*), a pink (*Dianthus diutinus*), and Rákos meadow viper (*Vipera ursinii rakosiensis*) (see *Animals chapter 22 10*) were placed in a better category to reflect an improving status due to recent conservation measures and projects.

The evaluation and report on the implementation of the Birds Directive concerned 231 bird species in Hungary, most of which breed in the country. Among the *species with a declining trend*, two groups stand out: long-distance migrants (e.g. all three Hungarian swallows and martins), that have to face a number of threats even during migration (e.g. illegal hunting along flyways and in wintering grounds and the use of agricultural pesticides already banned in Hungary, etc.) and farmland birds (e.g. skylark, corn bunting). A relatively stable or increasing population trend has been detected in numerous forest birds (e.g. robin, chaffinch, collared flycatcher), as well as in some species that declined earlier, but were saved from extinction by serious conservation measures, although their population is still small: for example, eastern imperial eagle, saker falcon and red-footed falcon (see *Animals chapter 3 4 5*).

Among the most typical species of Community interest in the Pannonian biogeographical region, the ones endemic to the Carpathian Basin are to be highlighted as specialties of the flora and fauna occurring only or mostly in this region, and within that, primarily or exclusively in Hungary **18**.

Beyond those species endemic to Hungary or to the Carpathian Basin, there are taxa whose range extends outside the Pannonian biogeographical region,

but which were first described in Hungary (usually by Hungarian scientists). Figure **18** shows the distribution of several such species within the country, but this overview is not complete due to space limitations. The species not presented there include *Onosma tornensis*, a plant endemic to the Aggtelek and Slovak Karst, and the cave-dwelling species of the same region: the arachnid *Eukoenaenia vagvoelgyii*, the crustacean *Niphargus aggtelekiensis* and the carabid beetle *Duvalius hungaricus*; a relative of the latter, *Duvalius gebhardti* is endemic to the Bükk Mountains. Such specialties can even be found around the capital city: for instance, the dolomitic flax (*Linum dolomiticum*) can be found nowhere else in the world but in the Kis- and Nagy-Szénás Hills, while the moth *Glyphipterix loricatella* was first described in the Buda Mountains that belong to Budapest today (although it has since been found in Serbia and in Albania). Amongst other moth species, *Cucullia mixta lorica* is restricted to the Vértes Mountains, while the only occurrence of *Polymixis rufocincta isolata* is in the Villány Hills; different subspecies of these species occur only outside the country. The geometrid moth *Phyllometra culminaria* (see *Animals chapter 15*) only occurs in some sites in Transdanubia, while *Bythiospeum hungaricum* is a snail that is restricted to subterranean waters in the Mecsek Mountains. The protected flora of the latter mountain range is famous for the endemic *Paeonia officinalis ssp. banatica*; the majority of the world population is held there. Hungary supports most or all of the wild populations of *Vincetoxicum pannonicum*, *Seseli leucospermum* (see *Vegetation chapter 7 4*), *Armoracia macrocarpa*, *Thlaspi jankae* (see *Vegetation chapter 7*), *Dianthus diutinus* (see *Vegetation chapter 7*), *D. serotinus* and *D. plumarius ssp. regis-stephani*,



16 STATISTICS OF THE NATURA 2000 NETWORK IN SOME EU MEMBER STATES

	Natura 2000 sites		
	Number of sites	Total area (km ²)	Proportion within the territory of the Member State (%)
Slovenia	354	7,683.96	37.85
Croatia	780	25,954.21	34.80
Slovakia	514	14,441.54	29.57
Spain	1,807	148,002.41	27.21
Greece	419	42,947.05	27.10
Romania	531	55,675.46	22.56
Hungary	525	19,949.74	21.39
Poland	983	68,296.37	19.53
Italy	2,585	6,384.11	18.96
EU 28	27,308	1,039,332.05	18.36
Estonia	568	14,832.28	17.86
Germany	5,253	80,746.43	15.44
Austria	219	12,559.48	14.98
Finland	1,839	55,986.26	14.45
Czechia	1,116	11,061.53	14.03
Sweden	4,072	66,738.57	13.84
Netherlands	199	1,7370.8	13.40
Belgium	458	5,153.81	12.72
France	1,758	110,807.84	12.59
United Kingdom	924	94,966.63	8.53
Denmark	350	22,646.38	8.32

subtilis) (for decades at that time, the fact that this tiny rodent still survived in Hungary had only been known from remains in owl pellets), and next, the description of this animal as a species new to science, the Pannonian birch mouse (*Sicista subtilis trizona*) (see *Animals chapter 10*) and endemic to Hungary. The other extraordinary event was the revelation that mole rats (see *Animals chapter 10 3*) living in Hungary belonged to several species. Among them, the South Pannonian mole rat (*Nannospalax montanosyrmienis*), one of Europe's most endangered vertebrates, only occurs in some sites along the Serbian border in Hungary, and in Vojvodina, Serbia (see *Animals chapter 10*), and its world population is just a few hundred individuals.

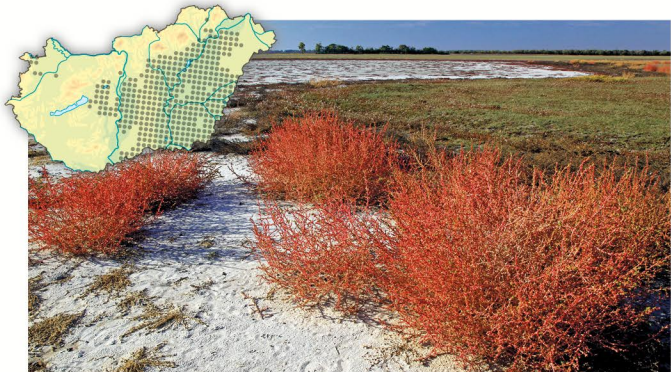
Ecotourism, environmental education and awareness-raising in protected areas

According to the definition given by the International Union for Conservation of Nature (IUCN), ecotourism means environmentally responsible travel to and visiting of relatively undisturbed natural areas, in order to enjoy and appreciate nature and culture, that safeguards those resources by having low visitor impact and provides for beneficially active socio-economic involvement of local populations. Sustainable tourism development addresses the needs of visitors and destinations on the one hand, and on the other, protects and increases future opportunities, managing resources at such a level that the economic, social and aesthetic needs of mankind are met, but at the same time fundamental ecological processes and biological diversity as well as the cultural identity of the

peoples and ethnic groups concerned are preserved. Sustainable tourism is not a type of tourism, but an approach that should be applied to all forms of tourism (WTO).

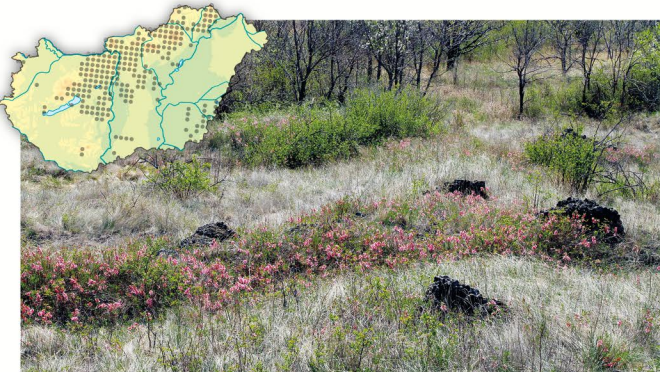
Therefore, Hungarian state nature conservation also includes among its priorities the *ecotourism development* of national park directorates, activities such as education, awareness-raising and promotion of organised nature trekking, as well as the establishment of visitor centres, interpretive sites and nature trails in all national parks and other protected areas, thereby raising the attractiveness and population-retaining capacity of rural areas. In 2015, the institutions of state nature conservation operated 31 *visitor and education centres*, 15 *forest schools* (with a total capacity to enhance the knowledge and skills of 500 pupils), 53 *thematic interpretive sites* (focusing on themes such as natural sciences, natural history, geology, forestry, fishery, traditions and ethnography, agriculture and arts, and including village museums, craftsmen's yards, game parks, traditional inns, bird centres, memorial houses, etc.), 169 *nature trails* featuring geological and geomorphological formations and phenomena and biological, cultural and historical highlights, 3 *arboreta*, 7 *village museums* and a total of 319 facilities serving tourism as well as environmental education **19**. Thirty-one *caves* have been opened to tourism by national park directorates: 12 show caves for popular access, and 19 caves for adventure tourists. The number of visitors to the educational, training and tourism facilities established and operated by the directorates exceeds one and a half million annually.

17 THE MOST TYPICAL HABITAT TYPES OF THE PANNONIAN BIOGEOGRAPHICAL REGION IN HUNGARY



PANNONIC SALT STEPPES AND SALT MARSHES

This group includes diverse primary and secondary habitats from Artemisia and Achillea salt steppes through salt pans and sodic barrens to sodic marshes and lakes. They are all characterised by saline soils, which is due to the enrichment of salt in groundwater and intense evaporation of groundwater in summer.



SUBCONTINENTAL PERI-PANNONIC SCRUB

These small surviving patches of rock and steppic scrub occur in scattered localities in the hills and plains of Hungary, with a total area of merely 300 hectares, holding relicts of the cool-continental forest-steppe climate.



PANNONIC ROCK GRASSLANDS

This habitat type occurs on rocky outcrops in the lower mountains, hills and on a great diversity of substrates in the upper regions of mountain slopes, ridges and rocky slopes. Relict plant species can be found on slopes with northern exposures. The species richness has been maintained by centuries of extensive grazing and occasional mowing.



SUBPANNONIC STEPPIC GRASSLANDS

Widespread in Hungary's mountains and foothills, slope steppes and rocky grasslands are mosaic-like habitats with rocks protruding among patches of grass and more closed swards dominated by taller grasses. Their character is very varied according to the influence of differing site factors.



PANNONIC LOESS STEPPIC GRASSLANDS

This group contains loess banks covered with Artemisia steppe-like vegetation, as well as zonal loess grasslands found in lowlands and in lower foothills, surviving in small refuges today. Their species richness depends on various natural, moderate disturbances (e.g. spontaneous fires, grazing), and climatic fluctuations.



PANNONIC SAND STEPPES

Both closed and open sand steppes belong to this group. The latter habitat type covers the largest area among the habitat types endemic to the Pannonian region. With origins going back to the ice ages, sand grasslands are found where climatic conditions are suitable for wooded steppes.



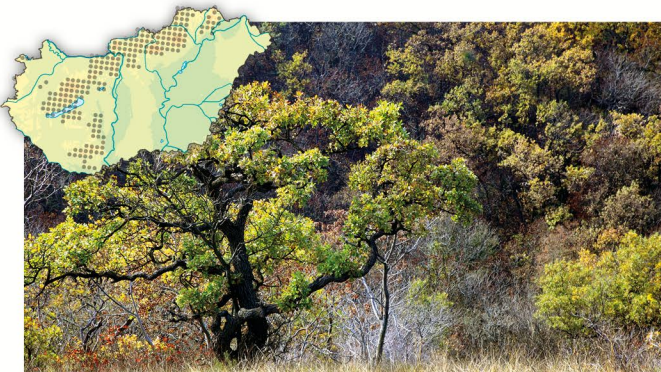
RIPARIAN MIXED FORESTS

These forests are situated at higher altitudes within the flood plain, in the zone intermediate to softwood gallery forests towards the river, and oak-hornbeam and closed lowland oak woodlands at greater elevations. They have survived on only 15–20 thousand ha, due to the expansion of flood plain hay meadows and arable lands.



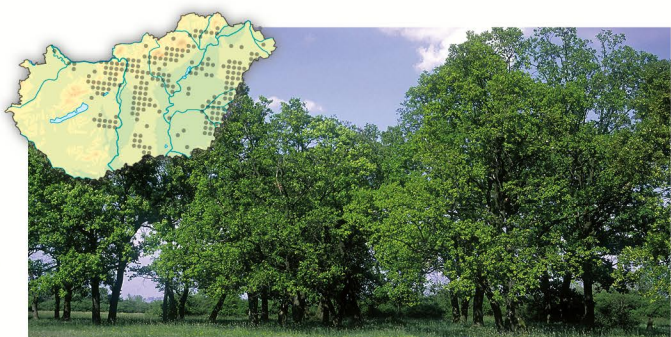
PANNONIC OAK-HORNBEAM WOODS

Dominated by common hornbeam and oaks (generally Sessile Oak in the hills and pedunculate oak in more lowlands situations), this humid forest type is present from the plains to the lower altitudes of mountains on about 150 thousand hectares. It is characterised by a closed canopy layer and a sparse shrub layer and develops on brown forest soil.



PANNONIAN WOODS WITH PUBESCENT OAK

These woods are distributed within the oak zone, occurring on calcareous, south-facing, dry slopes and foothills and are of limited extent; a total of 23 thousand hectares of the forest type exists in Hungary. They comprise a slow-growing scrub-woodland with a rich shrub layer, open canopy and scattered patches of grasslands.



EURO-SIBERIAN STEPPIC WOODS

Some of Hungary's most endangered habitats, including oak woods on loess, sand and sodic soils, mixed oak woodlands of foothills and lower lying hills, as well as closed lowland oak woodlands, with a total surface cover of 3,500–5,000 ha. They are characterised by a low and mixed-species canopy layer, and by a mosaic-like structure.



PANNONIC TURKEY OAK – SESSILE OAK WOODS

It includes Turkey Oak – pedunculate oak woods of wet foothills and lower elevation hills, as well as drier, zonal Turkey Oak – sessile oak woods. The moderate to tall canopy is generally of a relatively closed character with a moderately mixed species composition and variably developed shrub and field layers. Their total surface cover is 130,000–140,000 ha in Hungary.



PANNONIC INLAND SAND DUNE THICKET

Restricted to the Pannonian biogeographical region, this pioneer habitat develops on sand in primary succession. It has a parkland character, ranging from scattered single trees through copses to closed woodland, covering 1,300 hectares in total. The understorey is sandy grassland or wooded steppe vegetation.

18 SPECIES OF COMMUNITY INTEREST OF THE PANNONIAN BIOGEOGRAPHICAL REGION IN HUNGARY



SCALY SNAIL OF DOBOZ (*Kovacsia kovacsi*)
A 3.5–5 mm snail endemic to the Carpathians. Its shell is covered with minute scales. It is a relict species occurring in forests, wooded steppes and gallery woodlands in Békés County and in the Tokaj Mts. An omnivorous inhabitant of the forest litter, it is threatened by floods and changes in the forest microclimate.



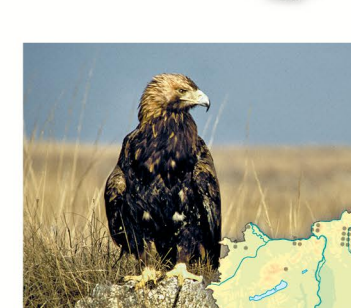
EUROPEAN MUD-MINNOW (*Umbra krameri*)
This species evolved in the Danube catchment, and its main distribution is in the Carpathian Basin. The draining of marshlands resulted in a drastic decline, and the remaining populations became isolated. It feeds on tiny animals, spawns in a nest constructed on the bottom of its breeding waterbody.



PIED AVOCET (*Recurvirostra avosetta*)
In Western Europe, the pied avocet occurs chiefly in coastal salt marshes, while in Hungary, it finds suitable habitat in saltwater sodic lakes, similarly to several species that are otherwise coastal. Scything its upturned bill from side to side, it filters out zooplankton from shallow waters between its mandibles.



RED-FOOTED FALCON (*Falco tinnunculus*)
Hungary holds the single biggest breeding population of this small falcon in the EU. Red-footed falcons nest colonially in abandoned corvid nests (mainly those of rooks), but they also occupy nest boxes. They feed primarily in pastures, and so the decline of grazing has severely affected the red-footed falcon population.



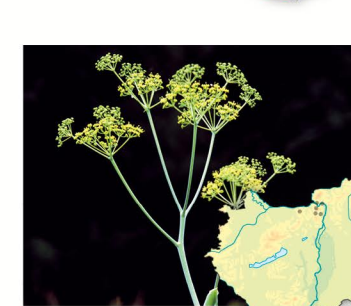
EASTERN IMPERIAL EAGLE (*Aquila heliaca*)
This majestically gliding or soaring bird pounces down with great speed on its prey that consists chiefly of small mammals, e.g. souslik and hamster. Intensive agriculture threatens its prey species, but the illegal killing (e.g. poisoning) of raptors also necessitates active conservation measures.



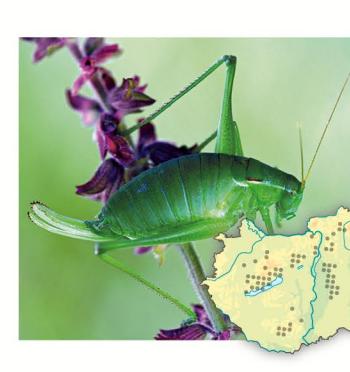
GREATER NOCTULE BAT (*Nyctalus lasiopterus*)
A Central European–Northern Mediterranean, sporadically distributed species. In Hungary, it is associated with the mature beech forests of the North Hungarian Range. Modern forestry often does not tolerate large numbers of the old, hollow trees which are required for the survival of this bat.



HUNGARIAN PASQUE FLOWER (*Pulsatilla flavescens*)
Endemic to the Nyírség, the survival of this species is fundamentally Hungary's responsibility. It is threatened by habitat degradation, especially the spreading of invasive species, inappropriate land use and genetic decline due to the low number of individuals.



PANNONIC FERULE (*Ferula sadleriana*)
The nearest relatives of this glacial relict and Carpathian Basin endemic occur in Central Asia. Four sites are known in Hungary and two abroad. Its habitat ranges from dry rocky grasslands with a southern exposure to open rocky scrubs.



KEELED PLUMP BUSH-CRICKET (*Isophya costata*)
A medium-sized orthopteran with white streaks decorating the head, prothorax and wing edges that is subendemic to the Carpathian Basin. It is patchily distributed in semi-humid grasslands. The species overwinters in egg clusters, and has one generation per year.



STRIPED RUFFE (*Gymnocephalus schraetser*)
Endemic to the Danube catchment, the habitat of this rheophilic fish is the riverbed of medium-sized and large rivers with a constantly high water discharge. Its strongholds are the larger tributaries of the Danube. Its diet consists of tiny benthic (bottom-dwelling) animals.



SAKER FALCON (*Falco cherrug*)
This globally endangered species almost became extinct in Hungary, but was saved by active conservation measures. Hungarians knew the species already in their ancient homeland and it has played an important role in their culture; it was probably the legendary Turul bird they revered as their ancestor or protector.



GREAT WHITE EGRET (*Egretta alba*)
This snow white heron is the logo of nature conservation in Hungary. A hundred years ago, it was on the verge of extinction in the country because of relentless human persecution for its plumes. Thanks to conservation efforts, its population has boomed in this area, and even spread out to large parts of Europe.



GREAT BUSTARD (*Otis tarda*)
Originally, the great bustard is a bird of steppes, but today it lives mostly in extensive farmland habitats. During the 20th century, its population declined drastically due to intensification of agriculture and hunting. Its numbers are now rising again in response to conservation efforts but only slowly.



ROOT VOLE (*Microtus oeconomus*)
It can be considered a glacial relict in Central Europe. It lives in the marginal zone of tall, sedgy vegetation of former freshwater marshes that have silted up but still have adequate water supply. Root voles are able to move and adapt to normal scale water fluctuations, but floods or droughts will threaten their survival.



STOOL IRIS (*Iris aphylla hungarica*)
This Carpathian Basin endemic subspecies occurs in clearings of sandy oak woods, in the slope steppes of low hills and rocky grasslands. It has declined with the disappearance of oak woods in the Nyírség, and is further threatened by natural succession. The 20-forint coin features this plant species.



MARSH GLADIOLUS (*Gladiolus palustris*)
A rare species of humid meadows, clearings, bog and steppe meadows. Its main threats include droughts, afforestation, natural succession and the spread of invasive alien species. Its main populations are increasing, but the smaller ones remain at risk of becoming isolated.

19 VISITOR CENTRES AND INTERPRETATION SITES OF NATIONAL PARK DIRECTORATES



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