

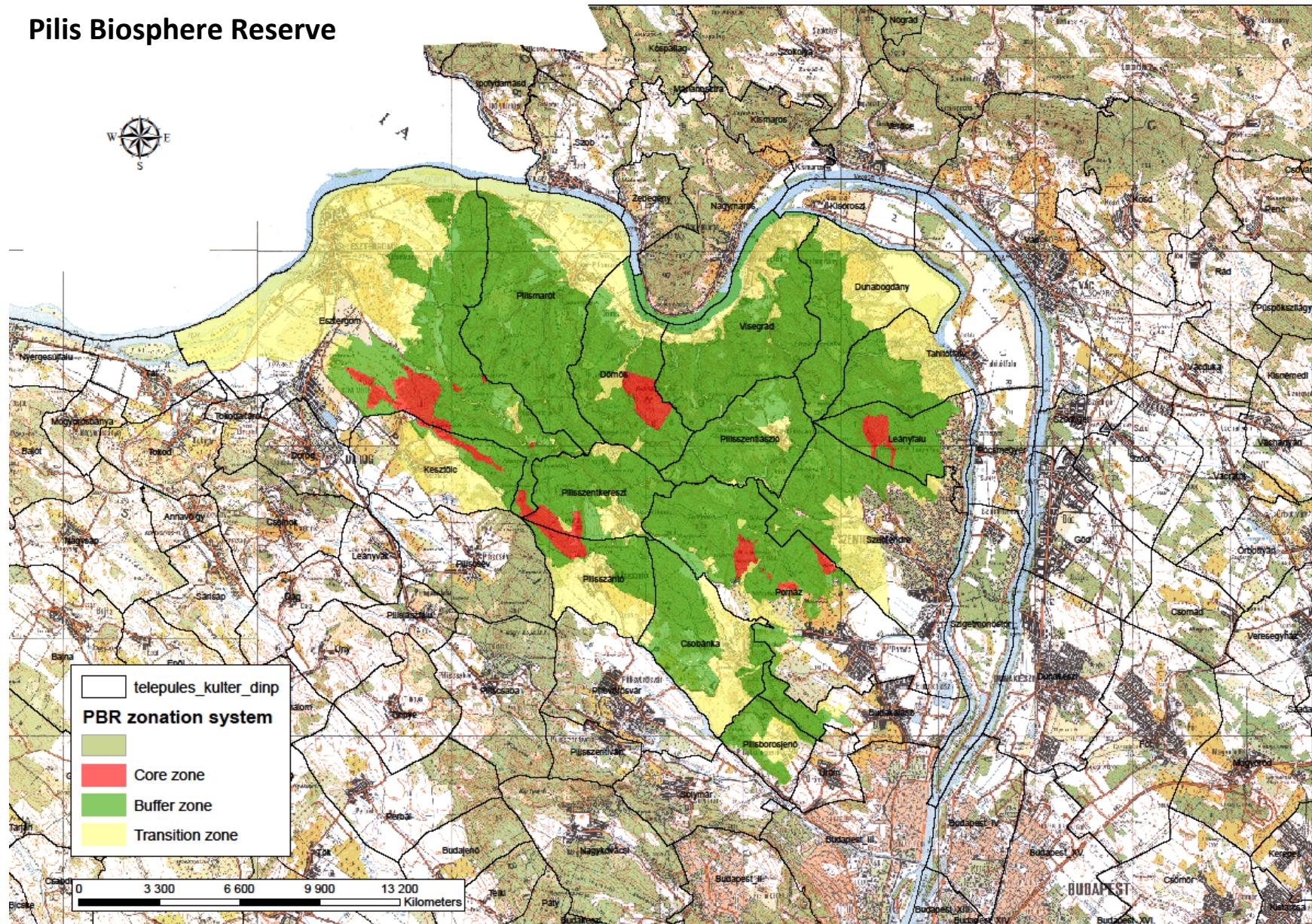


## Follow-up Progress Report

# PILIS BIOSPHERE RESERVE

Esztergom-Visegrád  
2017

## Pilis Biosphere Reserve



# **Pilis Biosphere Reserve**



## **GENERAL INFORMATION**

Northwest from Budapest, forced by the andesite block of Börzsöny and Visegrád Hills the Danube flows in a narrow, meandering valley – almost like a U-turn, called the 'Danube Bend'. The scenery was described by Bernard Newmann as 'one of the grandest' stretches of the 2000 miles long river.

The Pilis and Visegrád Hill ranges on the west bank of the Danube – once a royal hunting ground – were designated a Landscape Protection Area in 1978 in order to conserve the landscape and its abundant natural values. Due to these values and the remarkable possibilities for environmental education it was recognized as part of the International Network of Biosphere Reserves by UNESCO in 1980.

An unique feature of this biosphere reserve its variability. The range of hills, cut across by valleys due to tectonic forces and erosion, is made up of more than ten types of rocks, involving Dachstein Limestone, Andesite tuff, etc. On this variable surface, according to the relief and aspect, several plant and animal communities have formed.

This Biosphere Reserve offers excellent facilities to escape from the polluted air of Budapest. It is easy to reach from the capital. The nature conservation takes the responsibility of making use of these advantages for environmental education. We are primarily engaged in teaching, pupils from the age of ten to fourteen but we also assist at the education of secondary school and university students. Such groups investigated the flora of Szamárhegy (near the town of Esztergom) and the stone crayfish population of Apátkút stream (next to Visegrád). Children in our holiday camps are given

opportunities both for on-site learning and for becoming involved with practical nature conservation projects in the field.

### **Topography of the region**

Medium height hills (average altitude 450-500 m), in between basins (mean altitude 250-300 m), deep valleys with streams, in the north and east bordered by the River Danube (Danube Bend). Considerable differences in relief is characteristic (mean relative relief 130 m/km<sup>2</sup>). Highest elevation above sea level is 757 m (Pilis tető); lowest elevation 106 m (Danube).

### **Climate**

Temperate warm, above altitude 600m moderately cool. The annual precipitation varies between 500-600 mm.

### **Geology, geomorphology**

The north-western units, the Visegrád Hills are built up of Andesite (Middle-Miocene, Badenien –Mátra Andesite Formation), the south-eastern units, the Pilis Hills are composed of Upper-Triassic sedimentary rocks: dolomite and limestone (Dachstein Limestone Formation, Hauptdolomite Formation).

### **Soils**

- forest soil,
- erubase,
- ranker.

## **Main areas of the BR**

### **1. Szamárhegy és Kerekto (Esztergom)**

The southern rocky slope of Szamárhegy-hill and its surroundings is a very good place to see rock and steppe vegetation. Different types of brush-forests, and dry oak-forests can be found here along with oak-hornbeam which occur in cooler and mistier valleys of the hill. An endemic plant, Horánszky's milfoil (*Achillea horánszkyi*) is only known from here. Besides this plant there are numerous species which are rare throughout the midlands. Many various protected vascular plants can also be found here (e.g. feather-grasses, irises, pasque-flowers, spring adonis – *Adonis vernalis*, Hungarian leopardsbane – *Doronicum hungaricum*, jurinea – *Jurinea mollis*. etc.). Kerekto is the only place in this area where moorland still exist surviving destructive human activities. It is a remnant of a disappearing – once rich – flora. But there is still a refuge for protected (e. g. early marsh orchid – *Dactylorhiza incarnata*, marsh helleborine – *Epipactis palustris*, bog orchid – *Orchis laxiflora* ssp. *palustris*, bogbean – *Menyanthes trifoliata*, marsh lousewort – *Pedicularis palustris*, *Thelypteris palustris*, etc.) and rare species (e. g. microspecies of purple moor-grass). Sporadic studies of insects have brought about some significant data (e. g. new species for the Hungarian fauna).

## **2. Vaskapu-hegy (-mountain) (Esztergom)**

On the northern side of the mountain, 2-300 meters above sea level, plant species specific on the flatlands can be seen, e.g. dwarf almond (*Amygdalus nana*). On the hill-sides (the former Duna-terrace /plateau/) alternating spots of sand and loess form the bedrock, with *Cerasus fruticosa* bushes and dry oak forests on it. On the mountain top *Ceraso* - *Quercetum pubescens* forests and rocky grassland patches are located. *Pulsatilla grandis* is common (frequent) in the grass-layer, in some places *Aster amellus* can be found.

## **3. Nyírvölgy (Nyír-valley) és Hamvaskő (village of Pilismarót)**

Wide valley bottom encircled by steep hill-sides characterizes the area. Wild grape (*Vitis sylvestris*) can be found in the beech forests of the northern side, the *Morimus funereus* and the longhorn beetle (*Rosalia alpina*) species are common. Along the brook *Alnus incana* specimens (which are rare in the higher regions) are mingling into the communities formed by *Alnus glutinosa*. In the valley (Nyírvölgy) sound population of hart's-tongue fern (*Phyllitis scolopendrium*) lives on the limestone, which is unique in the Visegrádi-mountain formed by volcanic bedrock. In the forests of the valley-sides rare *Epipactis* species and other orchids can be seen.

## **4. The ridge of the Pilis (Esztergom, Kesztölc, Pilisszentkereszt, Pilisszántó)**

The northwest-southeast mountain ridge extends from the forests of the former military shooting ground in Esztergom through the Fekete- and Kétágú-mountain to the summit of the Pilis. This is the biggest core area of the BR, which represents almost all the habitats of the area, with rich fauna. The **summit of the Pilis** is the highest element of the range formed by limestone, with different vegetation than of the volcanic area. Due to the great altitudinal differences zonal and extrazonal located but same associations may occur. The most important value of the area is the rock vegetation with South-East exposure on that the most numerous population of the strictly protected endemic pannon ferule (*Ferula sadleriana*) can be found (the whole Hungarian population is seriously endangered). Many various protected plants can also be found here, e.g. *Stipa* spp., irises, *Pulsatilla* spp., snowdrop windflower (*Anemone sylvestris*), pallid orchid (*Orchis pallens*), spring adonis (*Adonis vernalis*), as well as rocky plant communities (*Crataego-Cerasetum fruticosae* and *Waldsteinio-Spireaetum mediae*) with an isolated population of ramsons here (*Allium ursinum*) (which is wide-spread throughout Transdanubia). Due to its numerous micro-habitats formed by dolomite surface many plant species can live here (e.g. common rockrose (*Helianthemum*

ovatum), *Fumana procumbens*, silvery paronychia (*Paronychia cephalotes*), *Globularia punctata*). Prehistoric settlement (stone cabin at Pilisszántó) and unique rock formations (**Éles-kő, Vaskapu rock**) occur in the core area, with rare flora and fauna colonised on the latters. The unique *Seslerio sadlerianae-Fagetum* association in the Transdanubian region lives only on the rocky slopes of Vaskapu rock, in which the edifier Carpathian endemic Sadler's moorgrass (*Sesleriana sadleriana*) can be found and this is the habitat of many protected alpine species (e.g. nodding wintergreen - *Orthilia secunda*, three-leaved valerian - *Valeriana tripteris*). The western – south-western slopes of the **Kétágú-hill** are covered by karstic scrub and steppic grassland. There is zonal oak-hornbeam forest at the top and plant communities of sand vegetation occur at the bottom. The latter is a very special feature of this area. Protected and rare plant species are abundant (e. g. houseleeks, hen-and-chickens-houseleek – *Jovibarba hirta*, woolly milk-wetch – *Oxytropis pilosa*, Austrian milk-wetch – *Astragalus austriacus*, sand milfoil – *Achillea ochroleuca*, Venus' looking-glass – *Legousia speculum-veneris*, sand everlasting – *Helichrysum arenarium*, *Gypsophila paniculata*). This sandy area at the bottom of the hill is very important to conserve the species of the sand vegetation (this area can be considered as a genetic reserve). The large patches of former gardens have remained here between the foothill of Kétágú-hegy and the village of Kesztölc. They have to be conserved as important elements of the landscape. The forms of terraces made from loess and clay have interesting features from the point of view of geomorphology. They are the last stands of loess vegetation here. Beech forests (*Seslerio-Fagetum*) and forests of *Mercuriali-Tilietum* cover the northern slope and rock vegetation – with many fern species – do the same on the steep rock faces of **Fekete-hegy** mount, close to the **Háromszáz-Garádics**. A lode of andesite lies at the bottom of the limestone cliff and gives geological importance to this area. The group of Fehérszikla (near to this place) has the same feature too. The northern slopes on the rock-faces give the opportunity for formation of unique flora and fauna. The area of **Cserepes-valley** (where the latter limestone formation comes to the surface 200 meters below and 400 meters further) is situated on the border of sedimentary and volcanic formations, characterized by specific communities of *Luzulo-Quercetum subcarpaticum* and *Genisto piosae-Quercetum petreaeae* live here on the steep crumbling rocky slope with poor quality soil. The specialty of this area is its situation between the limestone and the volcanic ground, which enriched the biodiversity here. The **Feketekő** is the only formation of dolomite rocks which is situated on the northern slope in the Pilis range. Because of its isolated situation it is the only shelter for many species in the range e. g. *Dianthus plumarius* ssp. *regis-stephani*. The most important plant associations here are *Mercuriali-Tilietum*, *Tilio-Fraxinetum*, *Stipo-Festucetum pallentis*. The association of *Fago-Ornetum* is also significant and this is its northernmost stand. Common columbine (*Aquilegia vulgaris*), long-leaved hare's-ear (*Bupleurum longifolium*) and white sedge (*Carex alba*) live here. A northern relict fescue species (*Festuca pallens*) is also important to be mentioned, it's a Carpathian diploid taxon living in the opened or closed dolomite vegetation

## 5. Prédikálószék - Rám-hegy (village of Dömös)

This is the main model-site for PBR research where complex research has been going on. The vegetation map of this area was also completed during the 1950s so there is a remarkable possibility to do comparative research by using aerial photographs. The area has rich flora, fauna and diversified soil types. Because the great altitudinal differences, there is a place here for zonal, extrazonal and edaphic plant associations, too. One of the richest rock vegetation (*Minuartio-Festucetum pseudodalmatica et Poëtosum scabrae*) can be found here on the ridges of Vadállókövek. Important plant species (rare or protected) are pannon thistle (*Carduus collinus*), burning brush (*Dictamnus albus*) spring adonis (*Adonis vernalis*), a subspecies of Dame's violet (*Hesperis matronalis* ssp. *candida*), *Carex brevicollis*, feather-grasses and irises. Rarities and new species of soil-dwelling animals have been discovered in recent years. Here lives the biggest stock dove - *Columba oenas* population of the BR. In the northern side of the BR, in the valley of **Szőke-forrás** (spring) lives a little population of European fire salamander - *Salamandra salamandra* which is missing elsewhere in the ridge. In the local brook many protected fish species (e.g. European weatherfish - *Misgurnus fossilis*) and stone crayfish -*Austropotamobius torrentium* can be found. Besides this, new species of microscopic fungi have discovered here too.

## 6. Apátkúti-bérc – Őrhagy – Kis- Pap-hegy (Visegrád, Pilisszentlászló)

The examined and mapped part of this area is much diversified. The area goes up to the oak-hornbeam belt. Different soil formations caused the formation of mosaic-like vegetation here. Almost all forest-associations of the Pilis range can be found. In the areas that are difficult to reach, old and diverse associations can be found which can be kept as experimental primeval-like forests set aside for research by reason of its settings and poor quality of the soil. Associations of *Meltti-Fagetum*, *Quercetum petraeae-cerris*, *Inulo-Festucetum pseudodalmatica*, *Mercuriali-Tilieturn*, *Tilio-Sorbetum* signify the main value of the site. Besides this, one can find planted pine forests and the Botanical Garden of Visegrád in the area. The most important protected plants are pannon thistle (*Carduus collinus*) and *Carex brevicollis*. There is a good example for *Mercuriali-Tilieturn* and *Corno-Quercetum pubescenti-petraeae* (this one has a continental character). The latter ones were recorded from here for the first time. There are excellent possibilities to examine the influence of man on native meadow vegetation and to make a comparison between zonal and extra zonal oak-hornbeam forests. The meadows among wooded areas are very important. On the **Kis-Paphegy** the *Quercetum pubescens* oak forests with Submediterranean character and - on the areas which are hard to renew after forest clearings - secondary steppe vegetation can be found. Remarkable values of the hill are pannon meadow-grass - *Poa scabra*, pannon thistle - *Carduus collinus*, feather grasses like *Carex brevicollis*, *Stipa* and *Iris spp.*, and new species of soil-dwelling insects (unknown to science up to now).

## **7. Tahi oldal – Vöröskő – Nagy-Berseg - Sztaravoda (Tahitótfalu, Leányfalu, Szentendre)**

The extensive core area can be separated into many small parts. A whole sequence of vegetations between places with different extreme microclimate is represented here in transition from the southern slopes to the northern ones. Besides extrazonal beech forests there are oak-hornbeam forest brushwood and Sorbo-Quercetum petraeae association, which lives on steep and rocky ridges in this area. Many protected vascular plants can find refuge here (e. g. irises, orchids, one subspecies of whitebeam – *Sorbus aria* ssp., spring adonis, etc.). Meadows of this hill are significant because a few species of plants live here which prefer acid soil (e. g. *Nardus stricta*, *Danthonia alpina*, *Ophioglossum vulgatum*) and plants that are rare in Hungary (orchids and marsh gentian – *Gentiana pneumonanthe*). Among wood-associations the most important one is the Caricetum humilis-Quercetum). The relict appearance of this association is rare not only here, but everywhere on volcanic soils. On the silicate rock vegetation of **Vöröskő** lowland species live on 500 meters above sea level, e.g. populations of *Achillea ochroleuca*. In the grass-layer of the forest pannon endemic species live like *Vicia sparsiflora* and *Lathyrus pannonicus*, and species with submediterranean character like burning bush - *Dictamnus albus*. *Hepatica nobilis* reaches here the eastern border of its spread. The eastern sides of the hills are ideal nesting place for birds of prey. According to previous historical data, all the bird species typical to this habitat have been nested here. Because the favorable conditions still exist, it is important to preserve this place undisturbed. On the ridges and at the foothills numerous natural and man-made lakes (size of several 10-100 square meters) offer habitat and reproducing possibilities for the amphibian fauna. Some species can be found here (e.g. common frog - *Rana temporaria* and spadefoot toad - *Pelobates fuscus*) that are primarily not specific in the medium-high mountains. In the south side of the core area, on the hill cone of the **Nagy-Berseg**, associations of Querco petraeae-Carpinetum and Quercetum petraeae-cerris can be found, that are giving way to Mercuriali-Tilietum associations on the steep northern hillsides and to Corno - Quercetum pubescenti-petraeae associations on the extreme habitat of the plateau. These forests are the best habitats for the beetles developing in large sized trees, especially the stag-beetle - *Lucanus cervus*, the great capricorn beetle - *Cerambyx cerdo*, or the rare violet click beetle - *Limoniscus violaceus*.

## **8. Kőhegy (Szentendre-Pomáz)**

The tectonically emerged pieces of the rock formed by the Baden volcanism are characterized by steep sides, low plateaus and to the North deep, steep-walled valleys. In the foreground of the relatively low hill secondary steppes and Sorbo-Quercetum petraeae communities can be found with rich flora. In the vegetation one can still find

some Mediterranean weed species like sea barley - *Hordeum marinum*, brought here by the Serbians in the 18th century. The plant species of *Stipa longifolia* and *Campanula macrostachya* are common here. On the steep southeastern hillside unique rock formations dominates the landscape, formed by andesitic tuff and agglomerates. On the plateau *Quercetum petraeae-cerris* wood associations and *Festuco rubrae* – *Cynosuretum* hayfields can be found. On the rock wall archaeological monuments (carved niches in the rock towers, so called „beehive stones”) can be seen, which origin and function is still debated. At the lowest point of the plateau the rainwater forms little pools, which provide habitat for amphibians and for some water-based plant species (e.g. waterwort - *Elatine spp.*) that are rare in the mountains. The volcanic layers of the northern valleys enhance the geological importance of the area, on them species-rich *Inulo* - *Festucetum pseudodalmaticeae* rock vegetation can be found. Due to this area's marginal position the flora is very rich.

## 9. Messalia – Kartália (Pomáz)

The names of these places show the strong relationship between the history of this area and the immigration of Serbians in the 18th century, who – with the Slovaks and the Germans – play important role in the ethnical consistency of this region still the present day. All the names like these commemorate the remembrance of the settling Slavonics during the fights against Turkish army troops. The little island-like massif of Messalia is the easternmost part of the mountain range, its formation is similar as Köhegy's formation process described above. The place was an intensively cultivated area, covered with plantations until the infection of Phylloxera (or vine-pest), then it turned into grassland after the abandonment of the cultivation. The resettlement of the natural vegetation was helped by the building of so called „obalas” which means piling up the little rocks as stone walls on the land borders. This way the developing of the species-rich steppe meadows known today was relatively very quick. These meadows provide habitat for numerous protected plant species. In the wood associations of dry oak forests (*Quercetum petraeae-cerris* and *Quercetum pubescens*) *Orchis* and *Dactylorhiza* species are frequent, in the forest edges some elements of the Submediterranean flora – like *Campanula macrostachya* and burning bush - *Dictamnus albus* – can be found.

The steep, southern side of the hills of **Csikóvár** is covered by a thick layer of loess from the Pleistocene. To the quickly eroding mineral deep, north-south-running valleys were cut in, the surface is very fragmented. This makes the approach and traverse very difficult, so there's almost no human impact on this area, f.e. the planned afforestation could not be implemented. The valley bottoms are dominated by species-rich *Phyllitidi* – *Aceretum*-like forests, the ridges are dominated by shrubbing steppe meadows. Among the shrubs it's worth mentioning the snow pear - *Pyrus nivalis* and the sorb tree - *Sorbus domestica*, the meadows are dominated by *Stipa* species, among the protected ones

irises, pulsatillas and Adonis vernalis can be found. The peculiar andesitic lava formations enhance the geological importance of the area, on them the Inulo - Festucetum pseudodalmatica rock vegetation has significant botanical value.

## **10. Nagy-Csikovár – Holdvilág-árok – Salabasina (Pomáz)**

This core area was assigned on the highest part of the south-eastern range of the Visegrádi-mountain. On the steep slopes the series of zonal oak forests can be studied, on the mountain top and on the northern valley-sides beech forests can be found. As the effect of the bedrocks material, forests formed here which prefer acid soil. Their characteristics are the white wood-rush - *Luzula alba* and in some spaces the dyer's broom - *Genista tinctoria*. The two deeply cut epigenetic valleys of Salabasina and Holdvilág-árok show the geology of the early (dacite) and the second (andesitic) phase of the Baden volcanism. The mines that can be found here in several places preserve ancient relics of archaeological significance. On the rock walls rare moss and fern species live.

## **GENERAL INFORMATION ABOUT THE BIOLOGICAL DIVERSITY**

### **Habitats within the territory of the BR:**

- Turkey oak and sessile oak forest (*Querco petraeae-cerris*)
- Hornbeam and oak forest (*Querco petraeae-Carpinetum*)
- Extrazonal beech forest (*Melitti-Fagetum*)
- Mercuriali-Tilietum
- Phyllidi-Aceretum
- Karst scrubs on limestone and dolomite (*Orno-Quercetum*, *Corno Quercetum*)

## **ENDANGERED OR THREATENED PLANT SPECIES**

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| • <i>Amygdalus nana</i>          | • <i>Iris spp.</i>                |
| • <i>Campanula macrostachya</i>  | • <i>Orchideaceae</i>             |
| • <i>Dictamnus albus</i>         | • <i>Phlomys tuberosa</i>         |
| • <i>Digitalis lanata</i>        | • <i>Physospermum cornubiense</i> |
| • <i>Ferula sadleriana</i>       | • <i>Pyrus magyarica</i>          |
| • <i>Gentiana pneumonanthe</i>   | • <i>Pyrus nivalis</i>            |
| • <i>Gentianopsis ciliata</i>    | • <i>Sesleria sadleriana</i>      |
| • <i>Helleborus purpurascens</i> | • <i>Thlaspi montanum</i>         |
| • <i>Hepatica nobilis</i>        |                                   |

### **Other characteristic plant species of the BR:**

- |                                |                                |                                   |
|--------------------------------|--------------------------------|-----------------------------------|
| • <i>Acer campestre</i>        | • <i>Anemone ranunculoides</i> | • <i>Campanula persicifolia</i>   |
| • <i>Acer platanoides</i>      | • <i>Anthriscus sylvestris</i> | • <i>Carex pilosa</i>             |
| • <i>Acer pseudoplatanus</i>   | • <i>Asarum europaeum</i>      | • <i>Carpinus betulus</i>         |
| • <i>Aegopodium podagraria</i> | • <i>Asperula odorata</i>      | • <i>Cerasus avium</i>            |
|                                |                                | • <i>Chrysanthemum corymbosum</i> |

- *Cornus mas*
- *Corydalis cava*
- *Crataegus monogyna*
- *Crataegus oxycantha*
- *Cyclamen purpurascens*
- *Digitalis grandiflora*
- *Euonymus europaeus*
- *Fagus sylvatica*
- *Festuca heteropylla*
- *Fraxinus excelsior*
- *Galanthus nivalis*
- *Geranium lucidum*
- *Hepatica nobilis*
- *Isopyrum thalictroides*
- *Lathyrus niger*
- *Ligustrum vulgare*
- *Lilium martagon*
- *Lunaria rediviva*
- *Luzula albida*
- *Melica uniflora*
- *Mellitis grandiflora*
- *Mercurialis perennis*
- *Oxalis acetosella*
- *Parietaria officinalis*
- *Phyllitis scolopendrium*
- *Poa nemoralis*
- *Quercus cerris*
- *Quercus petraea*
- *Ribes grossularia*
- *Sambucus nigra*
- *Staphylea pinnata*
- *Tilia cordata*
- *Tilia platyphyllos*
- *Ulmus glabra*
- *Ulmus minor*
- *Urtica dioica*

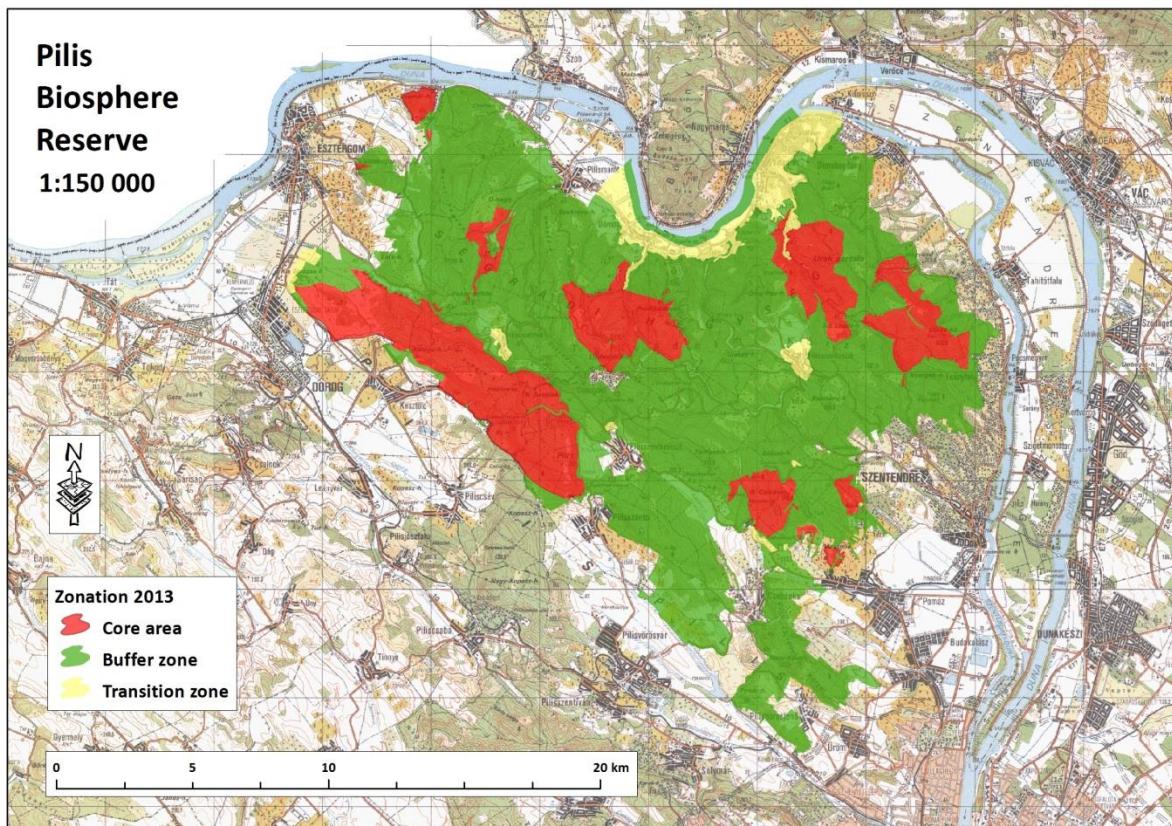
#### **ENDANGERED OR THREATENED ANIMAL SPECIES**

- *Ablepharus kitaibelii*
- *Accipiter gentilis*
- *Alcedo atthis*
- *Athene noctua*
- *Arctia festiva*
- *Asio otus*
- *Austropotamobius torrentium*
- *Barbastella barbastellus*
- *Barbus meridionalis*
- *Bubo bubo*
- *Calopteryx virgo*
- *Cerambyx cerdo*
- *Certhia brachydactyla*
- *Certhia familiaris*
- *Chiroptera species*
- *Cinclus cinclus*
- *Coronella austriaca*
- *Corvus corax*
- *Cucujus cinnaberinus*
- *Dorcus parallelipedus*
- *Falco cherrug*
- *Falco peregrinus*
- *Falco subbuteo*
- *Felis silvestris*
- *Isophia costata*
- *Jolana jolas*
- *Limoniscus violaceus*
- *Lucanus cervus*
- *Lullula arborea*
- *Maculiena alcon*
- *Mantis religiosa*
- *Martes martes*
- *Megopis scabricornis*
- *Miniopterus schreibersi*
- *Milvus migrans*
- *Morimus funereus*
- *Motacilla cinerea*
- *Myotis bechsteini*
- *Myotis blythii*
- *Myotis dasycneme*
- *Myotis emarginatus*
- *Myotis myotis*
- *Neomacheilus barbatulus*
- *Papilio machaon*
- *Paracaloptenus caloptenoides*
- *Parnassius mnemosyne*
- *Pernis apivorus*
- *Phoxinus phoxinus*
- *Rana dalmatina*
- *Rana temporaria*
- *Rhinolopus ferrum-equinum*
- *Rhinolopus euryale*
- *Rhodeus sericeus amarus*
- *Rosalia alpina*
- *Saga pedo*
- *Stenobothrus eurasius*

- *Synodendron cylindricum*
- *Tyto alba*
- *Vanessa atalanta*
- *Vertigo angustor*
- *Zerynthia polyxena*

## ZONATION DEVELOPMENT

The zonation system of Pilis BR – considering that PBR is an “old generation” biosphere reserve, established before the 1995 delivery of the Seville Strategy – has been under a modification procedure since 2012 in line with the criteria of the Statutory Framework. The different zones of the PBR have been identified and mapped, buffer and transition zones have been replanned to promote sustainable development and preservation of the core area.



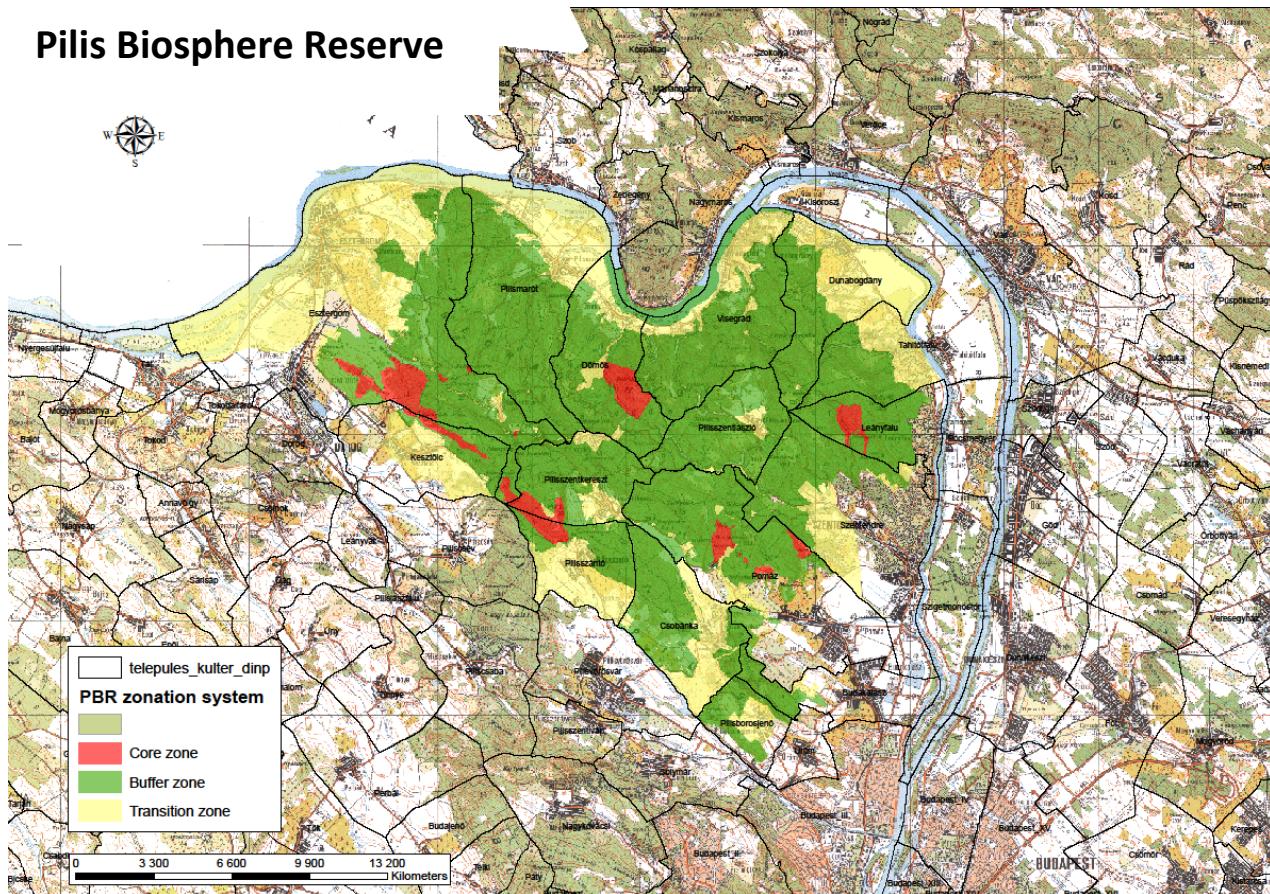
*Former zonation system of the Pilis Biosphere Reserve (2012.)*

In 2015, in accordance with the recommendations of the UNESCO, negotiations were launched to convince the local governments to join the PBR with the settlements’ administrative area.

Among the requested 16 municipalities 14 were definitely interested in cooperation and in the re-designing of the zonation system, so the expansion of the transition zone could become feasible.

The results of the negotiations were finally confirmed by signing the **Cooperation Agreement** with the signature of the local stakeholders, NGOs,

municipalities and management organizations of the PBR on 17th of June, 2016, in Visegrád. With this act the expansion of the transition zone and the whole re-designed zonation system has been successfully confirmed.



*The Pilis Biosphere Reserve's restructured zonation map, with the expanded transition zone (2017.)*

The zonation system of the biosphere reserve is not finished yet. We consider as an enormous progress that most of the local governments were definitely interested in cooperation and most of the territory of the settlements could be integrated to the transition zone – but according to our plans we strive to convince to cooperate with every local governments that are concerned.

The total area of the Pilis Biosphere Reserve was 27 080 ha in 2014, and it is 38704 ha in 2017.

	2015	2017
Core area	6274 ha	1427 ha
Buffer zone	19603 ha	24080 ha
Transitional zone	1204 ha	13197 ha
$\Sigma$	27081 ha	38704 ha

*Changes of the biosphere reserve's area*

## CORE ZONE

*Area: 1427 ha*

The role of the core area is to protect biological diversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low-impact uses (such as education). In addition to its conservation function, the core area contributes to a range of ecosystem services. Employment opportunities can also complement conservation goals (e.g. environmental education, research, environmental rehabilitation and conservation measures, recreation and eco-tourism).

On one part of the core zone the main goal - as basic activity - is conservation, and here the silvicultural use is only for the preservation of the natural wealth. There are no settlements inside the zone. Almost the whole core zone is state-owned forest. Besides this there are few hiking trails leading through these areas.

In some cases almost untouched, valuable core zone areas can be found in the PBR, surrounded and bordered upon by urban areas (f.e. in Kesztölc) with intensive usage. It happens, when f.e. unique rocky grassland patches can be found on rock walls towering above the settlement – but in this situation these habitats – due to their exposure - are difficult to reach and their protection can be guaranteed despite the proximity of the town itself. Thanks to their location these natural assets are not at risk, their conservation can be guaranteed.

## BUFFER ZONE

*Area: 24080 ha*

The buffer zone surrounds or adjoins the core areas, and is used for cooperative activities compatible with sound ecological practices, including environmental education, recreation, ecotourism, and applied and basic research. They also have an important connectivity function in a larger spatial context as they connect biodiversity components within core areas with those in transition areas.

These areas are also covered by state-owned forests. Forestry is controlled and supervised. Conservation is the main objective during forest management planning. The goal of the BR's buffer zone, in particular, to preserve the core zone and mitigate the effects coming from outside, although the buffer zone is also very valuable itself. Because the management is done mainly with conservation purposes, all activities may strengthen the conservation function of the core zone. Its functions are research and preservation with professional and educational purposes. Specialized active nature management and research are supported. Here we can find 5 settlements, which are surrounded by the buffer zone. The area is a very important target to make excursions from the capital. Many tourists, hikers come here for recreation every day, but especially on the weekends.

## TRANSITION ZONE

*Area: 13197 ha*

Transition area with a central function in sustainable development which may contain a variety of agricultural activities, settlements and other uses and in which local communities, management agencies, scientists, non-governmental organizations,

cultural groups, economic interests and other stakeholders work together to manage and sustainably develop the area's resources.

As opposed to the core zones and buffer zones, which are declared by a ministry decree, the designation of transitional zones are based on voluntary signatures of involved participating municipalities.

In the transition zone the goal is to achieve a land and landscape usage that guarantees the conservation of the natural assets and provides the benefit of the land users at the same time.

In this zone the main land use is forestry, but viticulture, fruit production, grazing and plant cultivation are also important activities. Hunting and silviculture are the first to be mentioned among the historical land uses. Throughout this hilly region there was a vast hunting ground reserved for royalties and later for the State. The Catholic Church owned forests here in the past too. Viticulture and wine-growing is the second to be mentioned, which had flourished from medieval times till the turn of this century (in that time Szentendre -Buda wine-growing region was well known and appreciated in Europe). Then there was a major set-back caused by a pest. It played an important role in this region from the beginning of this century to World War II. After the war II fruit-production was finished. Secondary steppes were formed at the place of abandoned orchards, and small gardens and holiday camps were established in the 1960s and 1970s at the place of steppes.

Four settlements are completely situated inside the zone.

The BR is one of the most visited tourist destinations (besides Lake Balaton and Budapest) in Hungary, so tourism is a major type of land use.

# **Progress on the implementation of the Seville Strategy**

## **MANAGEMENT PLAN**

*(Improved biogeographical system developed)*

The whole area of the PBR at the time of the establishment (in 1980) had a national protection by the Hungarian law, named Pilis Landscape Protection Area. The Pilis Landscape Protection Area became part of the Duna-Ipoly National Park in 1997. The whole area of the PBR overlapped with the nationally protected area so due to this special situation, a Nature Protection Management Plan was necessary and determined by the law. This Management Plan has to be synchronized with the zonation system and the land use policy plans for the PBR. This work needed a big amount of basic data and a finalised zonation system.

By 2015 the management plan of the PBR has been finalized with the professional cooperation between the BR managing organizations.

## **More visible PBR**

*(Information and promotional materials developed for individual biosphere reserves.)*

Communication and information projects have taken place first of all in Hungarian language, aiming to enhance visibility of the Pilis Biosphere Reserve among local target groups. Apart from the Directorate's own home page ([www.dunaipoly.hu](http://www.dunaipoly.hu)), there is the [www.termeszetvedelem.hu](http://www.termeszetvedelem.hu) operated by the Ministry of Agriculture, which also provides some information about the site. In the last years (after the last report) the PBR featured in all lectures and conferences organized by the Duna-Ipoly National Park Directorate (12 occasions) and it were a separate topic on two forum organized by the forestry. Naturally summaries of the PBR were part of Guide training (2 times) and the Teacher training (6 times) courses as well. Duna-Ipoly National Park Directorate who manages the conservation functions of the PBR created a page on its homepage to the PBR where the management plan and other documents can be found.

## **Cooperation with other Biosphere Reserves**

*(Mechanisms developed to foster twinning between biosphere reserves)*

Progress has been made on international cooperation building as well. The PBR management staff reached the conclusion that for the improvement of the PBR it will be necessary and useful to create mutual international cooperation. The aim of this project is the technical support and the information exchange among the BRs to promote the functional improvement of the PBR's management. With the aim of getting in contact with foreign biosphere reserves and in the effort to increase the Pilis BR's presence in international MAB activities and networking, PBR has sent a colleague to the EuroMAB-2015 conference in Haapsalu, Estonia. In 2016 the management team visited four foreign biosphere reserves with the aim of forming international cooperation:

The **Wienerwald Biosphärenpark (Austria)** was chosen as partner of PBR due to its geographical proximity and its mutual understanding of modern BR functioning. Both the PBR and the WWBP are in the vicinity of a capital city, which causes similar

challenges in both cases. Our management team made a personal visit in the Wienerwald Biosphärenpark on the 6th of April 2016. The main goal was to get to know the WWBP's zonation system and their management activities. Based on the geographical similarities and close location of the two BR's, it was concluded that there is an existing opportunity for strengthening co-operation between Wienerwald and Pilis through mutual visits, regular meetings, and the exchange of good practices.

On the 24th of August 2016 the delegation of the PBR's Council visited the Polana Biosphere Reserve in Zvolen, Slovakia, to discuss the possibilities of the cooperation. The Polana and the Pilis BR have similarities in their geographical situation and the forest coverage, so our management activities are comparable. On the negotiation the partners decided to prepare a Slovak-Hungarian cross-border INTERREG SHKU project together. The main objectives of the project are to involve the local communities in the BR's activities, and to establish e.g. touristic developments. On the 15th of September 2016 the Slovak partner visited the PBR and we and further project consultations were held.

Colleagues of the PBR staff have visited the Entlebuch Biosphere Reserve, Switzerland, on May 11, 2016. The purpose of the study visit was to learn from the challenges and solutions of the only Swiss BR. The trip included a visit to the Biosphere Centre in Schläpfheim, where scientific co-ordinator Florian Knaus held an introductory presentation concerning the management of the BR, its current and past issues. Focus was given to the participatory approaches, collaboration with UNESCO, organization and financing of the BR (sponsoring, product marketing, volunteer works, etc.). The seminar was followed by a guided sight visit to Heiligkreuz, a cultural and spiritual monument of Entlebuch. Here the possibilities to use synergies of tourism and conservation have been discussed.

As a considerable progress, on 14th of June 2016, a Memorandum of understanding for cooperation in the field of nature conservation was signed with the Carpathian Biosphere Reserve, Ukraine. The cooperation partners declare their interest for cooperation on the field of nature conservation and further development of the Carpathian Biosphere Reserve and the Pilis Biosphere Reserve.



**Carpathian Biosphere Reserve**  
webpage: [cbr.nature.org.ua](http://cbr.nature.org.ua)



**Duna-Ipoly National Park**  
webpage: [www.dunaipoly.hu](http://www.dunaipoly.hu)

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*This memorandum has been signed by the cooperation partners to underline the importance of cross-border cooperation and international cooperation in nature conservation. The cooperation should contribute to raise the capacity of both cooperation partners, to widen the horizon in the management tasks and to make the management more efficient.*

June 14, 2016

Mykola Rybak  
Director

Carpathian Biosphere Reserve

*Feri András*

Füri András  
Director  
Duna-Ipoly National Park  
Directorate



Between

**Carpathian Biosphere Reserve, Ukraine**, 90600 Rakhiv, Krasne Pleso, 77, represented by Director Mykola Rybak,  
and

**Duna-Ipoly National Park Directorate, Hungary**, 2509 Esztergom, Strázsahégy,  
represented by Director Füri András.

1. The cooperation partners declare their interest for cooperation on the field of nature conservation and further development of the Carpathian Biosphere Reserve in Ukraine and the Pilis Biosphere Reserve (located on the area of the Duna-Ipoly National Park) in Hungary.
2. The partners are interested to develop a common dialogue. To ensure the exchange of experience in the management of biosphere reserves and in the exchange of relevant information, regular joint meetings, and study visits are foreseen.
3. On the field of nature conservation especially habitat management and the protection of river basins.
4. A closer cooperation to develop ecotourism has been identified of interest for both sides. Joint workshops, seminars and training of employees should contribute to raise capacity in this field.
5. To improve the skills of employees, to raise the capacity and to widen the horizon in management tasks, workshops and seminars.
6. The cooperation partners declare their interest for a joint approach in the development of transnational and EU funded projects.
7. The cooperation partners declare their interest for elaboration of detailed action plans when needed, such as involvement in joint projects.
8. The cooperation partners assign two employees for the daily contact:

In compliance with the Memorandum, the partners are interested in the exchange of experience in the management of biosphere reserves. As one from the important topics, a closer cooperation to develop ecotourism has been identified of interest of both sides. Exchange of relevant information, regular joint meetings, study visits are foreseen.

On 2<sup>nd</sup> September 2016., four experts of the PBR management organization participated on the international scientific-practical conference 'Environmental, social and economic aspects of the Maramures border region development' in Rakhiv, Ukraine. The event was organized and hosted by the Carpathian Biosphere Reserve as the celebration of the 45th anniversary of UNESCO's Man and Biosphere Programme. DINPD's colleagues have volunteered to hold two presentations – one on cross-border cooperation in the field of nature conservation (HU-SK), the other on a new municipal solid waste management system introduced to the rural environment of Harghita County, RO. On September 2-3, the staff of 30 people visited two nature trails in the pristine beech forest of Transcarpathia.

For each of these four foreign biosphere reserves, the experiences hopefully foreshadow a long-term cooperation.

There is continuous professional cooperation between BR managing organizations within Hungary, as well as with the Hungarian National MAB Committee.

## A) Conservation Function

### Habitat restorations within the PBR

(Factors leading to environmental degradation and unsustainable use are identified)

At the moment, 83% of PBR's territory is owned by the state and managed by Pilis Park Forestry (hereinafter PP Zrt.). There is a good, continuous cooperation between PP Zrt. and the National Park Directorate (the cooperation between these two main organizations was recorded in a **Cooperation Agreement** on the 18th of June 2013.) PP Zrt is the territory's largest manager, who spent approximately 1 million HUF on habitat preservation and restoration between 2009 and 2013 with the professional support of the other PBR management organization from Operative Program grants.

#### The grants were utilized for the following activities in the last 3 years:

- *Replacement of foreign tree species (evergreens, locusts) with native species such as turkey oak- oaks and hornbeam- oaks.*

The evergreens took up about 5% of PBR territory. After the restoration works the ratio decreased to 4%. The Robinia species took up about 3% of the woods, but after the grant money was used for the restoration of the habitats the percentage decreased to 2.5%.

- *Restoration of forest pond habitats*

Over one hundred lakes can be found on PBR territory, including both natural and small artificial (10 m<sup>2</sup> to 1 ha) ponds. The natural ones were created by earthquakes, tectonic movements, and mud slides; the artificial ones were created by the damming of river valleys. These little ponds served as water reservoirs for wildlife and for grazing animals in the forests. By now even the artificial ponds present a natural view, their flora and fauna are very valuable. These small ponds are exceptionally important to BR's herpetofauna, they provide places for reproduction to amphibians. Unfortunately many of these ponds have been completely filled with sludge. As part of this project 14 small ponds were restored.

- *Restoration of mountain meadow habitats*

Meadows in the PBR were created between the 17th-19th centuries by clear cutting of woods. Meadow steppe plant species appeared and formed valuable associations on the regularly mowed meadows. A lot of protected plants inhabit these grasslands. As the livestock grazing declined in the region the mowing stopped and shrubs began to overtake the grasslands. One part of the project dealt with the revitalization of 16 meadows (approx. 20 with combined area).

- *The reduction of aggressively spreading invasive tree species (*Ailanthus altissima*)*

*Ailanthus altissima* was introduced to Hungary in the mid 19th century but its aggressive spreading in BR became noticeable from the 1990s. Today *A. altissima* grows uninhibited in gardens and roadsides in areas neighboring BR and it can be found in great numbers in newly cut clearings. As part of the project we got rid of the individuals found on roadsides in the woods and on the edge of the woods. In accordance with the requirements of the grant the manager takes responsibility of the activity's continuation beyond the grant's timeframe, for at least 5 more years. The national park managing PBR also takes care of the seed producing individuals growing in settlements outside the country's borders.

- *Restriction of illegal traffic in BR territory*

There is a network of forest roads and tracks in PBR for forestry purposes. The easy accessibility of these roads has given rise to frequent illegal deposition of waste materials, damaging of habitats by wood and stone stealing and recreational activities causing harm to the environment. As part of the project 340 km of the road system were secured by 18 strategically placed gates.

### **Professional dialogue in the forestry exploitation planning (Survey made of stakeholders' interests)**

The professionals of PBR help plan and supervise the execution of forestry projects. The existing cooperation developed into a new phase from 2005. The focus of forestry became oriented to the best management practices such as selective timbering, selective cutting and new tree planting. As a result the area of forests not utilized for logging has increased. Also the areas cultivated with selective timbering increased, which resulted in areas permanently covered with forest. Rearrangements to improve the quality of habitats are also under construction. The 10-year-plan of three forestry-management units was established and one was modified in the last three years. These changes affected 20 900 ha out of a total of 25 216 ha area of forest, that is about 80% of the overall forested area.

#### **Changes in numbers:**

- Permanent forest cover (forest for non-wood uses, selection cutting) 5360 ha
- Planned stand-conversion: 2391 ha
- Forests managed in long rotation with gradual regeneration cutting: 13 181 ha

Similar changes were conducted for smaller forest management units (by the district forest management plan), however, summarized data is only available by April 2012. It is worth noting that DINPD constantly cooperates not only with the management but also with the direct supervisors and forest-rangers.

## **B) Development Function**

### **Population living in the BR**

	<i>permanently</i>	<i>seasonally</i>
<i>Core Zone:</i>	0	0
<i>Buffer Zone:</i>	0	0
<i>Transition Zone:</i>	approx. 2.000	approx. 3.000

In the area of PBR only a few people live, villages are mainly outside the area (4 small villages are part of transition zone). Visitors arrive mainly from Budapest and its surroundings, from villages and towns along the Danube. The PBR constantly cooperates with local governments, municipalities during spatial planning processes and has good relations with the local non-governmental nature conservation societies as well (Magyar Madártani és Természetvédelmi Egyesület Helyi Csoportja, Pilisi Természetvédelmi Egyesület, Csobánkai Értékőrző és Községszépítő Egyesület, Mackó-barlang Környezetvédő és Természetjáró Egyesület Csobánka, Erdei Iskola Alapítvány, Szentendre, Élő Táj egyesület, Szentendre). The PBR also cooperates with the Pilis-Dunakanyar Regional Association (Pilis-Dunakanyar Többcélú Kistérségi Társulás). The

above mentioned institutions organize together 10-15 programs per year with the cooperation of the PBR.

### **Professional discussion of development ideas of settlements in the area of PBR** *(Factors leading to environmental degradation and unsustainable use are identified)*

In 2016 major structural changes have been made in the PBR's decision-making system – the goal was to involve the stakeholders to the PBRs activities and to make the decision-making system more democratic.

The most significant change is that the coordination board of the PBR was established under the name of the "Forum of the Pilis Biosphere Reserve". The Forum's first, inaugural meeting was convened in the Mogyoróhegyi Forest School in Visegrád, Hungary, on the 17th of June, 2016, where the **Steering Committee** of the PBR was elected as well. On the other hand, as a result of the consultations, on the meeting the participants accepted and signed the **Cooperation Agreement** that regulates the PBR's operation (See Annex 1.).

Since its inception, the Steering Committee holds regularly its formal meetings, the first meeting was on the 12nd of September 2016.

The PBR is functioning well in its newly formed structural system.

We consider as an important step, the PBR stakeholders' cooperative INTERREG project.

The PBR's Steering Committee decided to prepare a Slovak-Hungarian cross-border INTERREG SHKU project with the Polana Biosphere Reserve in Zvolen, Slovakia. The main objectives of the project are to involve the local communities in the BR's activities, and to establish e.g. touristic developments. As the Joint Secretariat of the Interreg V-A Slovakia-Hungary Cooperation Programme informed us, our application registered under the registration number SKHU/1601/1.1/106, submitted within the 1st Call for proposals successfully fulfilled the admissibility, administrative and eligibility conditions. As a next step our project proposal is forwarded into the quality assessment. The results of the quality assessment and the decision of the Monitoring Committee on approval of the applications are expected in the 3rd quarter of 2017.

### **Selection forest plot due to sustainable forest management** *(Conservation and sustainable use activities identified and promoted)*

The Pilis Park Forestry, the most important land user of PBR, designated 2,391 ha selection forest between 2007 and 2011. These forests are on the most valuable parts of the PBR and responsible for the permanent forest cover program. Selection forests are in larger blocks. In these blocks there are not only old trees and presently a huge amount of living stock, but also young stands. In these stands tending cuttings help the development of the stand structure of selection forest. The land user (PPZrt.) and the Conservation Manager (National Park Directorate) selected the forest blocks and the returning dates together. The land user does not make any felling during the vegetation

period at the area of PBR. The selected forest block is not only one of the first experimental plot in the PBR, but also in Hungary, where more sustainable sylviculture is practised.

### **Enhancement of the traditional land use**

*(In situ conservation plans for genetic resources in biosphere reserves)*

The area of PBR is basically low mountain deciduous forest, so grasslands and arable farming play just a secondary role compared to sylviculture. Nevertheless the agricultural use is present on the mountain fields and on the small inclusions of grasslands, so there is a local possibility of introducing nature-friendly agricultural methods. In the north-western part of the PBR, on the periphery of Esztergom City, there is a state owned grassland, where the present form of grassland farming is not sustainable. Long time habitat maintenance is not guaranteed because of the intensive shrub spreading and the very extensive mowing, which is not in connection with livestock farming. Thus, the Directorate cooperates with local farmers who would like to reintroduce sheep grazing, which would enhance the population of native Hungarian sheep breeds (for example: racka).

The management of the PBR started to prepare an infrastructure development plan (building restoration, fold system, water supply of sheep etc.) in 2011, and intends to apply for a grant in the Environment and Energy Operative Program.

### **Sustainable social and economic activities**

*(Private sector initiatives to encourage, establish and maintain environmentally and socially sustainable activities.)*

The main goal is to increase the participation of non-governmental organizations and the economic activities which do not threaten biodiversity protection. Among the recreation and sport activities the most popular ones are orienteering and hiking on the tourist trail system. 5 or 6 big (2-300 participants) orienteering competitions and about 8-10 hiking tours have been organized by Sport and Tourist Associations annually in the region. During the authorization procedures, PBR stands for the interests of nature protection by the spatial (no entry into the core zone) and temporal restrictions (limitations during the vegetation period).

Rules of the protected areas are known by the organizers of the sport competitions.

Tourist associations organize guided tours for families on easy trails, 5 or 6 times a year. It is possible to visit the whole area of PBR (the core zone can be visited on the marked trail system). So the number of non-organised visitors is significant (1,5-2 millions annually). Because of the descending net incomes, people prefer the cheap recreation possibilities, presumably there were more visitors in the last two years, but no statistics exist.

Other companies also have eco-tourism profile in the region, for example: Pilisi Zöld Út movement, but we have to mention the Mária-út, too. This is a representative, sacred nature trail without guide. The PBR's conservation manager helped to shape the trail system. Other similar initiative is a planned representative tour in the region, which will focus on monuments of Hungarian based Pálos order.

The valuable natural landscape attracts the representatives of movie industry. In the last 3 years 6 feature films and annually approximately 5-6 short films (mostly advertising films) have been made in the region.

### **Cultural significance of the site**

This region has played an important and specific role in Hungarian history from the Hungarian Conquest till now, but the size of this report is too small even for the brief introduction of the region. The BR lies among three major towns (Esztergom, Visegrád, Buda – all were residing cities of Hungarian kings) with numerous sites and monuments of historical, cultural and archeological importance. Esztergom is the seat of the Catholic Archbishop. There are many archeological sites from the Later Stone Age, Bronze Age, Iron Age, Ancient Times (the Danube was the eastern border of the Roman Empire), times of the Great Migration and from the Middle Ages.

Several ruins and archeological discoveries, protected buildings, and historic monuments illustrate its rich, and eventful past. This area used to be the heart of the country during the Middle Ages: although after two hundred years the royal court abandoned Esztergom for Buda, the former town remained the centre of the Hungarian Catholic Church. Later Visegrád became the capital. The castle built here was originally founded by the Angevin King Charles Robert, and was the setting for the Visegrád Congress of 1335, attended by the monarchs of Central Europe and the Grandmaster of the Teutonic Knights. Emperor Sigismund and King Mátyás Corvinus also ruled the country from this town.

### **C) Research and educational functions**

#### **Investigation of the National Biodiversity Monitoring System**

*(Biosphere reserves are integrated into national monitoring programs which are linked to similar monitoring sites and networks)*

Within the PBR, there are several research programs including the National Biodiversity Monitoring System. The NBMS has got standard methods to investigate the different parts of ecosystem, systematically. It follows the condition of protected and threatened natural assets, observes the flagspecies of typical communities and living resources of Hungary, human activities and direct or indirect effects of environmental factors.

Beyond the systematic monitoring investigations, the PBR's conservation manager organization liaises with scientists working on the area of PBR, by the help of grants starts programs for status surveys. As a result of this work, there are habitat maps close to the two thirds of the area of PBR, or big amount of biotic data available by nowadays.

#### **Biodiversity day**

*(Local stakeholders are included in education, training, research and monitoring programs)*

Biodiversity days have been organized at first time in 2011 because of accentuation of biodiversity Esztergom region's mountain grasslands and forest margins

together with importance of natural science investigations. Representatives of 15-20 natural sciences (zoologists, botanists, and geologists) attended a predetermined investigation plot and with different methods tried to register as many species as possible. It became a yearly programme. The location of this program changes every year, free for visitors, results are published in leaflets and there is media interest of this project. This project started by an NGO (Magyar Biodiverzitás Kutató Társaság Egyesület). This Association organized the program in Esztergom and the PBR's conservation manager organization gave some financial and professional support.

### **Develop a multifunctional forest survey method** *(Coordinated research and monitoring plan implemented)*

PBR as is an important area of the study of the effects and the development of sustainable forestry. In Hungary there are two distinct methods for forest measurements: one measures from the point of view of nature conservation, which emphasizes the importance of the selection of habitats/ floral associations and preparation of lists of species living in the area. The other type of forestry data collection focuses on timber and fiber production and solely on the diversity and age distribution of woody plant species in the area. Both methods have the drawback to be based on polygon data collection and disregard important ecological factors, like microhabitats, damages caused by wild animals, fine scale leveling. A new, so called grid-system method is currently under development, which combines the requirements of both nature conservation and forest management. This new technique is based on the measurement of all the quality and quantity traits of a forest on a simplified scale and their GIS analysis.

The newly developed methods for data collection of forest measurements started in 2012-13 financed by Bioregio SEE project. Meetings and debates with the interested organizations (forest managers, non-governmental organizations, researchers, education centers) started in 2012-13. The main goal was the examination of the relationship of environmental factors, natural forestry factors and that of forest utilization.

### **Operation of an Educational Center at Esztergom** *(Ecology field center developed at the biosphere reserve)*

Currently the PBR's conservation manager organization has an education centre in Esztergom on PBR territory. Besides showcasing the protected territory, the centre's program includes educational tours for elementary schools. Furthermore there is a trail next to the centre where guided tours are available. They organize accredited teacher training in environmental studies twice a year and they also have an educational summer camp for children. The visitor centre collaborates closely with the Danube Museum in Esztergom. This collaboration involves continuous information sharing, combined distribution of publications, teacher training, and shared organization of events such as the World Water Day, World Environmental Protection Day, and Day of Trees and Birds. The education centre also takes part in the training of ELTE (Eötvös Lóránt Science University) students majoring in Geography or Environmental Studies.

## **Operation of a Sylvan Community Centre at Visegrád**

*(Ecology field centre developed at the biosphere reserve)*

PBR's other significant education centre is the Visegrad Sylvan Community Center under the management of Pilis Park Forestry. The house and the camping site next to it serve the environmental education. The centre provides educational activities appropriately adjusted to the age level of the participants. The centre has environment related activities for all age groups.

## **Operation of educational nature trails**

*(Ecology field centre developed at the biosphere reserve)*

There are 19 educational trails in the PBR (Esztergom 1, Pilismarót 1, Dömös 1, Pilisszentkereszt 1, Dobogókő 1, Csobánka 2, Pilisborosjenő 1, Szentendre 9). The main aim of educational trails are to show the most representative protected species of the local flora and fauna. One out of the 19 educational trails is maintained by Management of Duna-Ipoly National Park, 2 are maintained by local governments, 1 by private constitution and 12 by non-governmental organizations (NGOs). Grants were awarded for the set up of the educational trails in each case and the management of PBR was responsible for the professional execution.

## **Conduct tour guide training programs**

*(A local educational and training programme is in place)*

Following MAB's instructions PBR supports all initiatives that focus on sustainable area management and environmental education. The management organizations cooperated with non-governmental organizations twice to offer a tour guide training program for individuals. The training provided knowledge about the teaching methods on geographical, geological, floral and faunal features of the preserved areas. In classes it was also emphasized that a tour guide plays a role model and is provided with an influential position in modifying and correcting visitor behavior to ensure that it is environmentally responsible. Altogether 30 individuals participated in the two programs, which were conducted by the PBR's conservation manager organization together with the Erdei Iskola Alapítvány (Forest School Foundation).

## **Develop a multifunctional educational and visitor center at Dömös**

*(Ecology field centre developed at the biosphere reserve)*

Hundreds of thousands visit villages along the Danube each year to relax. For this reason, educational centers built at the area of Danube Bend as well as BPR have outstanding importance in environmental education. Pilis Park Forestry runs nature education centres for children around Visegrád, but these centres do not really serve the function of general exhibitions because their location requires visitors to make a detour and their programs are usually for education only. After long preparations in 2011, a former hotel at Dömös came into the possession of the PBR's management organization. This house is located very close to the Danube and has exceptional infrastructural potential for showcasing the region's complex natural and cultural values. In 2012 plans were started for the badly needed renovation and rebuilding of this house, provided that financial assistance will be available. There would be sections of the building dedicated

to the protected regions in the riparian zone of the Danube, to Duna-Ipoly National Park, to Pilis Biosphere Reserve and to the Carpathian Region. Exhibitions will be presented in both Hungarian and English language. As planned, the Visitor Center will be ready in 2019.

## Tourism

*(Indicate the number of visitors coming to the Biosphere Reserve each year)*

### The „Danube Bend”

Shortly after the Danube enters Hungary from Slovakia, the river makes an abrupt turn to South before continuing its 420-kilometer journey through Hungary. The Danube Bend, as this region is known, has long been famous for its beautiful rolling hills and historic villages. For passengers aboard luxury river cruise boats or day-trippers from nearby Budapest, the region is often a highlight of their visit to Hungary. It is one of the most important and popular tourist destinations of the country.

More than one third of the Danube Bend region is made up of the Pest County portion of the Pilis Hills, the Visegrád Hills and Szentendre Island which stretches all the way to the border of Budapest.

It was in the second part of the 19th century that the region began to develop into a vacation belt. Some of the best Hungarian writers, artists and musicians have retreated this land, where they found inspiration and space to create. The imprint of the intellectual activity of the area is manifest in the unique exhibitions held in memorial houses and museums, and in events - a veritable feast of cultural activities.

The Visegrád Hills stretch over the varied landscape from Esztergom, all the way to Szentendre. The volcanic rock formation and romantic valleys make this a favourite destination for visitors. The chain of hills called Pilis that are running from Pilisszántó through Pilisszentkereszt all the way to Dobogókő are extremely attractive, a paradise for nature lovers with their bizarre rock formations, caves, and a rich flora and fauna.

The Danube Bend is also one of the richest regions in terms of historical and cultural heritage. In Visegrád the architectural heritage of this one-time royal seat of Hungarian kings serves to remind us of its former splendour. There are the ruins of the 11th-century Bailiff's Castle (ispáni vár) and the decanal church (esperesi templom), the 13th-15th-century Citadel (fellegvár) and the Castle (alsóvár) at the foot of the hill and, of course, the 14th-15th-century Royal Palace (királyi palota) itself.

Szentendre is known as the city of art, museums and galleries as its streets, buildings, museums and churches bring the arts to life. The Open-air Village Museum is also located here and gives visitors the chance to become familiar with rural architecture and folk heritage from all over Hungary.

The descendants of the Germans, Slovaks and Serbians who once settled in the Danube bend still live here, each preserving their distinctive heritage.

## Tourism in numbers

This region is the center region of Hungary, in every respect, not just because it's geographically in the middle of the country, but including the capital city Budapest, it is the most important region of Hungary from both economical, social and cultural aspects.

Due to the data published by the Hungarian Central Statistical Office, in January 2015, the number of nights spent by foreign and domestic visitors in this region increased by 7.5% and 11% respectively compared to a year earlier. The guest turnover of accommodation establishments measured in tourism nights increased by an overall 8.9%. The gross revenues of accommodation establishments grew by 18% at current prices.

In January 2015, compared to the base period foreign guests spent 609 thousand nights in accommodation establishments, their number of arrivals and tourism nights increased by 11% and 7.5% respectively.

Domestic guests spent 585 thousand tourism nights in accommodation establishments, their number of arrivals and tourism nights increased by 10% and 11% respectively. The guest turnover measured on the basis of domestic tourism nights is increasing.

From 2014 to 2015 the room occupancy in hotels rose by an average of 2.5 percentage points to 38.2%.

## Forest schools and education centers:

### *Kökörcsin Forest School*

The „Kökörcsin” (the pasque flower) education center (forest school), operated by the Duna-Ipoly National Park Directorate, is situated North from the city of Esztergom, on PBR territory. The surroundings of the forest school – formerly a military shooting range, until 1990 – are under national protection thanks to its remarkable natural assets. Besides showcasing the protected territory, the forest school is the center of the area's environmental education activities. The staff of the forest school offer programs to school classes or tourist groups, such as birding, guided walks on the nature trail, hidrobiological assays, medical plants and their therapeutical effects, team buildings.

On the nature trail, next to the center, guided tours are available. The center is one of the scenes of the biannually organized accredited teacher training in environmental studies, and they also have an educational summer camp for children. The visitor center collaborates closely with the Danube Museum in Esztergom. This collaboration involves continuous information sharing, combined distribution of publications, teacher training, and shared organization of events such as the World Water Day, World Environmental Protection Day, and Day of Trees and Birds. The education center also takes part in the training of ELTE (Eötvös Lóránt Science University) students majoring in Geography or Environmental Studies.

On the guided tours the number of the visitors shows an increasing trend from year to year.

The forest school had 650 visitors in 2013 and 1740 visitors in 2014.

#### *Mogyoróhegyi „Madas László” Forest School*

The all-year long open forest school is operated by the PPZrt. (Pilis Park Forestry Company) offers accomodation for 12 persons in forest log cabins, and professional guided tours of various lengths. Yearly an average of 6200 children and their educators take part in the 1100 forest schools programs.

#### *Accredited professional training programme for educators*

The 60 hours (6 days) long accredited professional training programme for educators (mainly school teachers) called „implementation of environmental education under field conditions” is organized every second year by the Duna-Ipoly National Park Directorate, using the potentials (protected areas and education centers) of the Directorate and the PBR. During the programme, regardless to their previous educations, the educators could gain basic, useful knowledge about nature, about the most typical plant- and animal species, the most common habitats, the region's geology and of course about the Directorate's nature conservation activities.

#### *Development of the key tourist destinations*

Since 2010 numerous projects have been emplemented to improve the possibilities of the tourism, especially the hiking in the PBR: lookout towers, different kind of accommodations, forest schools and ecotourism centers, nature trails, forest excursion destinations and resting places have been built.

#### *Dömösi Zöld Forgatag*

The all-day-long free family day titled Dömösi Zöld Forgatag (in Enlish: green whirlabout, hustle and bustle in the village of Dömös) is organized every year. The goal of the event is to represent the natural and cultural assets of the region. The participants could attend in guided tours, in wild animal shows, in bird ringings and other programs for adults and children. The visitors can taste and purchase the products of the local farmers and producers.

#### *Cave tourism*

In the area of the PBR around 400 caves can be found.

Given their geology, the Pilis Mountains are rich in caves (in Hungarian: barlang). These range from simple, short, "dwelling-size" halls (which also served as home for the ancient man) to complex cave systems, parts of which haven't been fully explored yet. The caves and sinkholes are to be found all across the hills; the richest area seems to be the Pilis-tető mountain. Here a couple of long caves - previously believed to be separate -

have recently been proven to be connected (with gas-tracing method), but not all of the connections have been explored yet.

The Pilis Mountains were built from Triassic carbonates and are attached to the Szentendre-Visegrádi andesite mountain in the North-East. Within them 150 caves are known today, all of them shorter than 500 m.

A far-from-complete, arbitrary selection of caves in the Pilis:

Pilis-barlang (Pilis cave)

Ajándék-barlang (Gift cave)

Leány-Legény-Ariadne-barlangrendszer (cave system of Girl, Lad, and Ariadne caves)

Kis-kevélyi-barlang / Mackó-barlang (Little Lordly / "Teddy Bear" cave)

Pilisszántói-kőfölke (cave dwelling of Pilisszántó)

Szopláki-ördöglyuk ("Devil's hole" of Szoplák Mtn.)

Papp Ferenc-barlang (Ferenc Papp cave)

Gyopáros-barlang / Nagy-Kevélyi-kőfölke (Edelweiss cave / Big Lordly cave)

Zöld-barlang (Green cave)

Kevély-nyergi zsomboly (sinkhole of Kevély-saddle)

Csúcs-hegyi-barlang (cave of Csúcs Mtn.)

Sátorkőpusztai-barlang (cave of Sátorkőpuszta)

The longer and hardly accessible caves feature very nice stalagmites and stalacites. These are closed for protection of both the caves and people (there are dangerous passages). Some, however, can be safely and legally visited under the supervision of professional guides. Other caves (dwellings), or their easily accessible parts, can be visited freely.

Hungary's third longest and fourth deepest cave known is in the PBR and it is the Leány-Legény-Ariadne (Girl, Lad, and Ariadne) cave system, opening at the foot of the escarpment of the Csévi cliffs. It is 14800 meters long and 204 meters deep. According to the archaeological finds, the Legény cave section's wide entrance gave shelter to several prehistoric groups of people from the Neolithic age. Its chambers are connected by shafts and narrow passages into a maze. Its formations suggest that the original thermal water cave also functioned as a karstic spring cave at a time.

The most famous cave of the region is the Sátorkőpuszta Cave which opens near the mining town of Dorog. Discovered by quarrying in 1946, it is a typical cave of purely thermal water origin. A bizarre chain of spherical cavities constitutes the 354 m long cave as if we were inside a bunch of grapes. When it was discovered, its walls were covered by a fusion of popcorn-calcites, aragonite needles, and, mainly in the lower great hall, thick gypsum accumulations. Unfortunately, by today several lootings have left the cave almost empty (ravaged). The cave is strictly protected since 1982. Its entrance is closed.

Its 200 meters long upper section is accessible for the adventure tourism.

Tours are organised for small groups guided by a specialized guide in this relatively undisturbed cave - qualified as protected natural asset, for the purpose of seeking adventure and active relaxation. The provision of the conditions of the visit does not require any transformation of the nature, only a safe walking path (step, ladder, handrail) is installed. The caving tour with crawling and climbing requires physical ability to perform movements, physical endurance and basic caving equipment (lighting, helmet, wetsuit). Special clothing is needed.

#### *Operation of a Sylvan Community Center at Visegrád*

PBR's other significant education center is the Visegrád Sylvan Community Center under the management of Pilisi Parkerdő Zrt. The house and the camping site next to it serve the cause of environmental education. The center provides educational activities appropriately adjusted to the age level of the participants. The center has environment related activites for all age groups.

#### *Operation of educational nature trails*

There are 19 educational trails in PBR (at Esztergom 1, at Pilismarót 1, at Dömös 1, at Pilisszentkereszt 1, at Dobogókő 1, at Csobánka 2, at Pilisborosjenő 1, at Szentendre 9). The main aim of educational trails is to show the most representative protected species of the local flora and fauna. One out of the 19 educational trail is maintained by the Duna-Ipoly National Park Directorate, 2 are maintained by local governments, 1 by private constitution and 12 by non-governmental organizations (NGOs). In each case grants were awarded for the set up of the educational trails and the management of PBR's conservation manager was responsible for the professional execution.

The estimated number of foreign and national visitors is around two million per year. There is no regular statistical study about the number of visitors. The estimations concern the Transition Area and the nature trail of BR.

- **One day tour** – the most significant type (estimated 8000-1500000 visitors)
- **Weekend recreation** (only in favorable season) – mainly in adjacent area of the BR but in the Transition Area it is also significant (est. 300000 visitors).

- **Hunting** – mainly for big game (wild boar, deer, mouflon) in both state-owned and private land.
- **Camping** – there are four campsites in the BR and additionally 20 at out of the border of the Transition Area.
- **Camping for EE** – there are about 20 places where nature conservation and environment protection is taught to 10-14 years-old children in a week long camp. One of the most important is Nature and Forest Protection Camping (Mogyoróhegy forest school in Visegrád) operated by Pilis Park Forestry.
- **Horseriding** – It is organized and operated by privately owned clubs around the Transition Area. For the most time it is linked to other recreational activities (e.g.: one day tour, weekend camping etc.).
- **Rock climbing** – it is not significant because the suitable places are usually strictly protected areas (Core and Buffer Zones) for the conservation of rare geological formations, plants and animals.
- **Mountain biking** – it has become very popular in recent years. The impact has not been assessed yet, it mainly depends on the measure of land-using, but this activity is not a welcomed type of tourism from the point of view of nature conservation.
- **Para-gliding, hang-gliding** – they cause severe damage to Pilis-tető Core Area by trampling or the vegetation at set-off points and by disturbing animals.
- **Observation of plants and animals** – the activity is mainly organized, it happened in the nature conservation camps, on the permitted areas.
- **Fishing** – there are two lakes are in the Transition Area. Among them Kerekfő connects to the Core Area, here it is important to supervise the fishing activity.