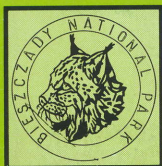


INTERNATIONAL BIOSPHERE RESERVE



IN PREPARATION IN EASTERN CARPATHIANS

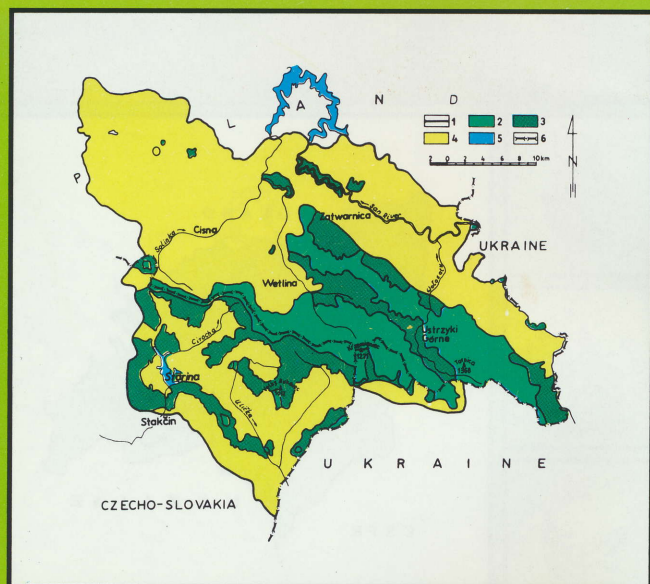


1. INTRODUCTION

The Eastern Carpathians constitute the biggest part of the Carpathian massif. They stretch for 1000 km through the territories of four states: Poland, Czecho-Slovakia, Ukraine, and Romania, between the Western Carpathians in the North and the Southern Carpathians in Romania. The south-westernmost end of the Eastern Carpathians lies on the territories of: Poland, Slovakia and Ukraine. The fragment of the mountain range located on the territory of Poland and Ukraine is the Eastern Beskidy, including the Polish Bieszczady mountains. In Slovakia these mountains are called Bukovské Vrchy. The geobotanic character of this part of the Carpathians is uniform and their wildlife is clearly distinctive from the remaining mountain ranges, particularly from the Western Carpathians.

Great scientific interest in this part of the Carpathians contributed to a large scale protection of the mountain range, although the present state of advancement in the protection of vegetation, fauna and landscape in the different countries varies. In Poland, apart from the network of about 20 wildlife reserves, the National Bieszczady Park was set up in 1973. In Slovakia, 15 reserves were set up to constitute an important part of the Eastern Carpathian Landscape Protection Reserve (Chránená krajinná oblasť Východné Karpaty). In Ukraine, a big forest and landscape reserve "Stuzhica" has existed for several dozen years as a continuation of a Slovakian reserve of the

Map of the International Biosphere Reserve Eastern Carpathians. 1 - boundary of Biosphere Reserve, 2 - core zone, 3 - buffer zone I, 4 - buffer zone II (transitional zone), 5 - water reservoirs, 6 - state boundary



same name. The above reserves stretch along the state borders and constitute a natural whole. The three borders meet in Krzemieniec (1221 m above the sea level).

2. THE CONCEPT OF THE INTERNATIONAL BIOSPHERE RESERVE

In 1990 during the MAB Conference in Kijev the Polish National Committee of MAB put forward a proposal of setting up a reserve on the territories of the three countries. The proposal met with preliminary acceptance. Since then, efforts have been made to establish common protection of this region and to recognize it as an International Reserve. From 1990 governments and wildlife protection organizations have been conducting negotiations to set up a unique, unprecedented transfrontier Biosphere Reserve "Eastern Carpathians". The region has unique wildlife, landscape and folklore characteristics. Its protection as a whole will contribute to the preservation of natural heritage, particularly for European science and culture. The international importance of the reserve is based on the following assumptions:

- it will be the only MAB Biosphere Reserve where the biggest in Europe natural beech forest stands and eastern Carpathian mountain pastures (poloniny) will be protected.
- The Reserve will cover territories of very scarce population, from 5 persons per km² (in higher parts of the mountains) to 20 per km² (in lower parts). Human influence on biocenoses and abiotic environment will thus be negligible.
- The vegetation at its present stage of development is only slightly changed by economy. That is why natural vegetation (forests and non-forests) prevails on vast territories, among which one can encounter vegetation endemic for the Eastern Carpathians and some endemic species of plants and animals as well as many species protected by the law.
- The Reserve will cover one of the largest in Europe territories of big forest animals, such as bear *Ursus arctos*, bison *Bison bonanus*, deer *Cervus elaphus*, lynx *Lynx lynx*, wildcat *Felis silvestris*. The reserve will also protect the genetic pool of some rare species of avifauna facing extinction and of such tamed animals as East Carpathian pony *Equus caballus huculensis*, being a local attraction.
- The Biosphere Reserve will protect folklore and religious monuments, such as old wooden Orthodox and Catholic churches, roadside chapels and figures, remainings of regional peasant architecture etc. The reserve will thus contribute to the protection of cultural heritage of the Eastern Caspathians, being a part of the European cultural heritage.

– Traditional agriculture and shepherding is still preserved in this region. Land use, particularly sheep breeding, will be continued on lower slopes, whereas the highest peaks will be strictly protected. Thus there is a possibility to delimit all functional zones that should be present in a typical biosphere reserve, as recommended by MAB.

The International Biosphere Reserve will include the following territories: in Poland – Bieszczady National Park (27,064 ha) and two landscape parks bordering upon it, from the west, Ciśniańsko-Wetliński Landscape Park (Cisna-Wetlina) (46,025 ha) and from the north, Dolina Sanu Landscape Park (35,835 ha); in Slovakia – proposed "Eastern Carpathians National Park" (40,601 ha), in Ukraine – "Stuzica" Reserve (2542 ha) together with protection zone (approx. 1708 ha). The total area of the Reserve amounts to 153,775 ha.

3. OVERALL CHARACTERISTIC OF THE EASTERN CARPATHIANS BIOSPHERE RESERVE

The Eastern Carpathians, situated on the meeting point of Polish, Slovakian and Ukrainian borders, have unique landscape, vegetation zones, flora and fauna, as well as unique geological structure, relief and climate. They also have their own, characteristic culture. These are the most primeval and the most scarcely populated mountains in the whole Carpathians.

CLIMATE. The Reserve has mountaneous climate with continental features. It is characterized by big amplitudes of day and night temperatures. Mean annual air temperatures decrease with height, from 7.5°C on 300 m to 5.9°C on 530 m and to 4.9°C on 840 m.a.s.l. The warmest month of the year is July (mean annual temperature in Poland 15.8 to 16.2°C, in Slovakia 15.3 to 17.4°C), whereas the coldest months are January and February (mean temperature in the Bieszczady Mountains -5.4 to -7.4, and in Bukovske Vrchy from -4.0 to -5.8°C). The absolute minimum temperature was measured in Komańcza (-34.4°C) and Ustrzyki Górne (-40.0°C). The highest temperature amounted to 31.0°C in Sianki near the Polish-Ukrainian border.

Annual rainfall on this territory ranges from 800 mm in lower locations to 1250 mm in the highest parts of the mountains. Most of the rain falls in the summer months, with July being the wettest month. Snow coverage, whose thickness depends on height, lasts for 90-140 days a year with thickness of 40-80 cm, up to 150 cm maximum.

GEOLOGY AND SOILS. The Eastern Carpathians on the territory of Poland, Slovakia and Ukraine are built of sedimentary rocks from the Cretaceous period and older Tertiary period. These sediments are often called the Carpathian flysch. The mountains are moderately high – the highest peak Tarnica has 1346 m. Anticlinal ridges are most often made of limestone resistant to weathering, whereas

synclines consist mostly of easier weathered shists. The result of such geological structure is a ridge-and-valley arrangements of mountain ranges. They are divided by picturesque river valleys. The river beds are cut by rocky ridges, characteristic for this region.

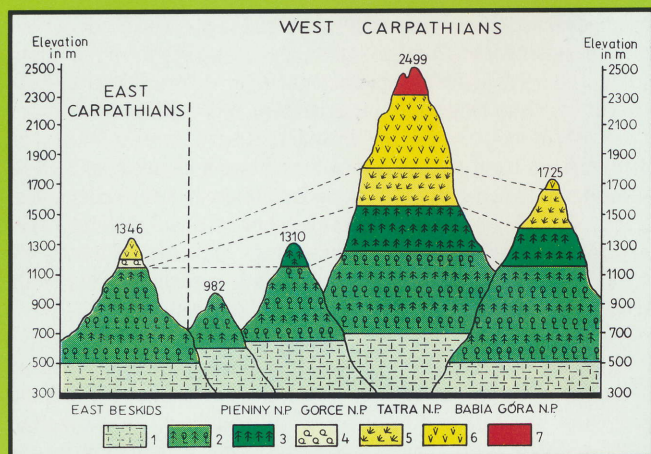
Two types of soil prevail in the Biosphere Reserve: brown forest soils that emerged from weathering of limestones and shists, as well as alluvial and hydrogenic soils, occurring mostly in river valleys. The biggest surface is covered by brown leached soils and gley, relatively acid and relatively rocky. Mountain tops are covered mostly by cryptopodzol soil, the slopes – gley. The valleys are built of mud soils and, less commonly, of marshy soils on peaty subsoil.

RELIEF AND LANDSCAPE. Relief and contemporary landscape of the described part of Eastern Carpathians are connected with the geological structure and resistance of different rocks to weathering processes. The most typical landscape forms, not present in any other mountains, can be found in the Polish part of the Bieszczady. On the highest mountain tops, relatively rounded and covered with grasses, one can find picturesque rocks emerged during long erosion. They are surrounded by stony fields with scarce vegetation (gołoborza in Polish). The rocks stand on their own or form groups, sometimes resembling long ridges; their height reaches a dozen meters. Most rocks are asymmetrical. Walls facing the south-west are steep and precipitous, whereas those facing the opposite direction are relatively easy and covered with alpine meadows.

The landscape of Bukovske Vrchy consists of more rolling hills and valleys dividing mountain ranges.

View on the Bieszczady Range from Riaba Skala (S.P.)





Vertical distribution of natural vegetation in the East and West Carpathians. 1 - submontane zone, 2 - lower (mixed) mountain forest zone, 3 - upper (coniferous) mountain forest zone, 4 - green alder shrub zone, 5 - dwarf pine (subalpine) zone, 6 - alpine grasslands zone, 7 - zone of summits

RIVER NETWORK. Springs under the mountain tops and ridges are the beginning of streams that in the lower parts join together to create bigger rivers. The river network forms a grid, which is characteristic for mountains of ridge-and-valley structure. This part of the Eastern Carpathians has an important hydrological role as a source of waters contributing to two catchments: the Baltic and the Black Sea. Three important rivers have their springs here: the San, the Dniestr and the Uz. The springs are situated close together, near the Polish-Ukrainian border. The San gathers waters from numerous streams flowing from northern slopes and discharging its waters into the Vistula directs them to the Baltic Sea. The Dniestr flows towards the East and discharges its waters directly into the Black Sea. On the south, smaller rivers such as the Ulicka and the Zbojsky Potok join the Uz, which in turn joins the Cisa and the Danube, discharging into the Black Sea. The Reserve is thus divided by an European watershed of hydrological and sedimentological importance for the three neighbouring countries.

VEGETATION ZONES. Vegetation of the Eastern Carpathians on the territory of the International Biosphere Reserve is characterized by a specific arrangement of altitude levels. Unlike in the Western Carpathians, here we can only find three vegetation levels: foot hills (up to 500 m), lower forest zone (500 – 1100) 1150 m) and mountain meadows zone, regarded as alpine (over 1100-1150 m). The spruce forest characteristic for the upper forest zone is not present, so is the dwarf pine (*Pinus mugo*) zone, typical for the Western Carpathians. It is presumed that dwarf pine is replaced by *Alnus viridis* groves.

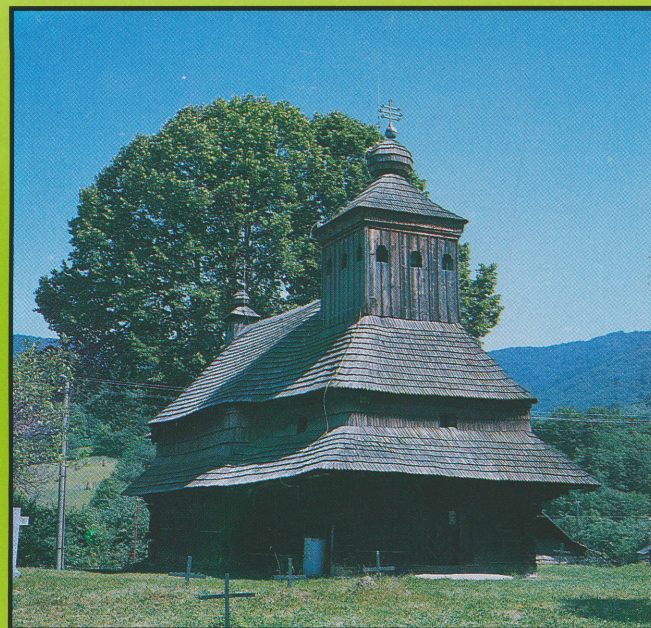
occurring above the forest boundary. These groves are an unique botanical phenomenon of this region.

4. NATURAL AND CULTURAL HERITAGE

NATURE MONUMENTS. Old, virgin forests, so far not altered by civilisation, are still preserved on vast territories of the International Biosphere Reserve. These Eastern-Carpathian primeval forests with natural vegetation, including huge, old beeches, firs and sycamore trees deserve to be protected as the most precious examples of the natural heritage of this region. In the Bieszczady Mountains, such valuable forests include, among others, the Beech Forest (Puszcza Bukowa) along the border, the Bieszczady Forest on the San River, and forests in the "Sine Wiry" and "Huculskie" reserves, being parts of landscape parks.

In Slovakia, the old forests are called "preforests". Many preforests are preserved in the highest zones of the Bukovske Vrchy Reserve. They are protected as strict reserves. Beech preforests are protected, among others in "Stuzica" (659 ha, also on the Ukrainian side in the same reserve of 2542 ha), "Rožok" (67 ha), "Havesova" (171 ha), "Riaba Skala" (95 ha), "Plasa" (111 ha) and others. Fir preforests are protected in the following reserves: "Udava" (52 ha), "Patolska Jedlina" (157 ha) and "Komarnicka Jedlina" (75 ha). Beech and sycamore forests can be found in "Beskid" (49 ha) and "Stinska" (91 ha) Reserves.

The wooden Orthodox Church in Sedlica village (S.P.)



CULTURAL MONUMENTS. The region has a fascinating history and folklore, created by nations that settled here and learned to live in harsh mountaneous conditions far from European communication and trade routes. Ancient settlers, mostly Łemkowie (in the West) and Bojkowie (in the East) built their houses and churches of wooden logs with simple carved or painted ornaments. Despite of widespread destruction caused by the World War II and the first years after the war, many remainings of old peasant architecture are still preserved as houses, Orthodox and Catholic churches, roadside chapels and figures. The oldest wooden monuments are the ones in Bodružala in Slovakia from 1658. They are protected as monuments of folk culture. Similar remainings, although not so old, can be found also in the Polish Bieszczady.

Wood has been used for a long time not only as a building material and to heat houses, but also to produce charcoal. Beech wood is the best one to use for this purpose. Old chronicles and documents say that charcoal was produced already in 15th and 16th centuries near Certiżne, Habura, Hostovice, Wyżna Jablonka and Runina in Bukovke Vrchy. Similar production was carried out in the Bieszczady. Increasing demand for charcoal was caused by the development of metallurgy. To transport wood and people, the inhabitants built narrow gauged railways. They operate till this day. Also the traditional way of burning out charcoal in primitive kilns and more modern retorts is preserved. They are the remainings of the past and deserve to be protected as monuments of regional culture.

The typical Bojko house in Nova Sedlica village (S.P)



A primeval beech forest in the Stuzica Nature Reserve (S. T.)

5. WILDLIFE OF THE BIESZCZADY NATIONAL PARK AND ADJOINING LANDSCAPE PARKS



On the territory of Poland, the Eastern Carpathians are represented by the range of Western Bieszczady. They cover an area of 715 km² between the Lupkowska Pass (585 m) and the Użocka Pass (889 m). Typical mountaneous landscape can be found in the following massifs: Tarnica (1346 m), Krzemień (1335 m), Halicz (1333 m), Bukowe Berdo (1238 m), Połonina Caryńska and Wetlińska (1297 m and 1228 m), Dział (1136 m) and the long stripe along the border with Okraglik (1100 m), Rabia Skała (1199 m), Mała and Wielka Rawka (1260 and 1307 m), Krzemieniec (1221 m) and Rozsypaniec (1146 m).

An important element of the Bieszczady landscape are deep, ravined valleys dividing the biggest massifs. The most widely known is the San ravine through Otryt, or the Nasiczniński Potok ravine dividing Połonina Caryńska and Wetlińska massifs. The river network, and particularly watersheds creates conditions for the occurrence of high peatbogs, very characteristic for this area. They are common on the upper San River, smaller ones can be found near the Wołosatka and Wetlina rivers. The peatbogs are known for their interesting vegetation, as they are rich in rare, protected and relict species.

The most precious areas from the point of view of wildlife and landscape are protected in the Bieszczady National Park, set up in 1973, and in two landscape parks: San Valley Park and Ciśnieńsko-Wetliński Park, set up in March, 1992. Apart from these



Flowering cat's ears *Hypochoeris uniflora* on alpine grassland in the Bieszczady National Park (Z.D.)

large-territory protected areas, there are also numerous nature reserves. All of the above reserves are located within the boundaries of the International Biosphere Reserve.

VEGETATION. The Bieszczady National Park covers the big massifs and peaks divided by ravined valleys, its wildlife is thus diversified and rich. The biggest proportion is taken by forests (over 85%), covering slopes up to 1150 m high. Above the forests one can find mountain meadows called *połoniny*. These cover about 10% of the area. The vegetation consists of 31 plant communities, including 10 forest and scrub communities.

The majority of the Park (over 80%) lies in the lower forest zone. Slopes from 700 m to 1150 m are covered with beech forest with fir *Abies alba* and sycamore *Acer pseudoplatanus*. The most developed community is Dentario glanduloseae-Fagetum with the prevailing beech *Fagus sylvatica*. In the high mountains one can find beech forest with *Lunaria rediviva* or *Allium ursinum*. On dry mountain peaks the prevailing are beech forests with *Festuca dymejia* and *Carex pilosa*. These have a distinct Eastern-Carpathian character and are a unique communities of the Bieszczady.

A significantly smaller proportion is taken by fir forests, occurring mostly along the border. These fall into two taxonomic categories: close to Galio-Abietetum and Abieti-Piceetum montanum. In shady

and wet valleys one can also find sycamore forest *Phyllitido-Aceretum* with rare fern *Phyllitis scolopendrium*. In lower parts of the mountains there are alder forests with *Alnus incana*, including two communities: Alnetum incanae and Caltho-Alnetum. In lower river valleys one can find willow thicket *Salicetum triandro-viminalis*.

Lower parts of the mountains are mostly covered by meadows and herbs, growing on clearings and abandoned arable land. Flat and wet areas are occupied by *Cirsietum rivularis* or *Stellario-Deschampsietum* meadows. On the slopes one can find pastures *Lolio-Cynosuretum* and *Festuco-Cynosuretum*. Small wet niches are overgrown with sedge communities: *Caricetum rostratae* and *Carici-Agrostietum*. The most common of herb communities are *Petasetum kablikiani* and *Rumicetum alpini*. Meadows near the higher forest boundary are full of *Arunco-Doronicetum*, and along the routes one can often find a synantropic community of *Epilobietum angustifolii*.

Very interesting vegetation can be found in the mountain meadows zone (*połoniny*). Prevailing are mat-weed *Nardus stricta* meadows represented by two communities: *Leontodono-Nardetum* and an endemic Eastern-Carpathian *Nardetum carpaticum orientale*. There are also three other endemic communities: *Poo chaixii-Deschampsietum caespitosae*, *Trolio-Centauretum* and *Pulmonario-Alnetum viridis*. One can also find *Vaccinietum myrtilli* and *Empetro-Vaccinietum* berries. Peatbogs near the San River are the only

Flowering sundew *Drosera rotundifolia* (S.P.)





Alpine połonina grassland on Dzurkovec Peak (J.F.)

area in the whole Bieszczady Mts where one can find *Vaccino uliginosi*-Pinetum forests with relict stand of scots pine *Pinus silvestris*.

FLORA. In the Bieszczady mountains we encounter about 900 vascular plant species, 250 mosses and 300 lichens. There is also a rich variety of fungi. It is worthwhile to mention Eastern-Carpathian species; there are 27 such vascular species and the most important are: pink – *Dianthus compactus*, vipers grass – *Scorzonera rosea*, violet – *Viola dacica*, cornflower – *Centaurea kotschyana*, veratrum – *Veratrum album*, thistle – *Cirsium waldsteinii* and a unique species – hellebore – *Helleborus pupurascens*. There are three endemic species: vascular spurge *Euphorbia carpatica* and cow wheat – *Melampyrum saxosum*, and a fungus, *Pleurotus wetlinianus*, growing on beech wood.

Flora of high mountains (alpine and subalpine) is especially rich and interesting and includes over 70 species. Most of them grow on the alpine meadows (połoniny) zone. The most visible are anemone – *Anemone narcissiflora*, cat's ears – *Hypochoeris uniflora*, garlic – *Allium victorialis*, globe flower – *Trollius europaeus* var. *transsilvanicus*.

The number of species protected by law is very high, there are 56 species, of which 46 are strictly protected. The most interesting are: aconite – *Aconitum tauricum* and *A. paniculatum*, gentian – *Gentiana cruciata*, ostrich fern – *Matteucia struthiopteris*, sundew – *Drosera rotundifolia*, marsh helleborine – *Epipactis palustris*, and among the partially protected species – ledum – *Ledum palustre*.

Arunco silvester in Arunco-Doronictum association (Z.D.)



FAUNA. Unique fauna of the Bieszczady mountains includes about 200 species. Among those, many are rare and splendid, such as brown bear – *Ursus arctos*, introduced bison – *Bison bonasus* and predacious cats: lynx – *Lynx lynx* and wildcat – *Felis silvestris*. Permanent inhabitants of this area are: deer *Cervus elaphus*, wolf *Canis lupus*, wild boar *Sus scrofa*. A very interesting animal of this region is the hucule pony *Equus*

caballus huculensis, an endemic breed based on the primitive mountain horse. Among the 107 species of birds, the most rare are ural owl – *Strix uralensis*, alpine accentor – *Prunella collaris* and water pipit – *Anthus spinoletta*. Also living here are golden eagle – *Aquila chrysaetos*, lesser spotted eagle – *A. pomarina* and three-toed woodpecker – *Picoides tridactylus*. A very interesting rare animal is Aesculapian snake – *Elaphe longissima* which formed its biggest and very rare in Poland colony of over 200 individuals in the San valley near Otryt. A very important role in the Bieszczady fauna is played by predacious animals. There are 10 such species among the forest mammals and 30 among birds. Such a high number of predators cannot be found in any other region of Poland. The Bieszczady fauna also includes some endemic species of the whole Carpathians in the following groups of invertebrates: coleoptera, springtailes, caddis flies.

The kite *Milvus milvus* (S.P.)



Howfinch

Coccothraustes coccothraustes (S. P.)





6. WILDLIFE OF THE BUKOVSKÉ VRCHY AND ITS PROTECTION

The Slovakian part of the protected area covers lower mountains than the Bieszczady, with very few peaks above 1000 m.a.s.l. The Bukovské Vrchy elevation fluctuates between 198 m and 1221 m. with highest peak Krzemieniec Mt., lying on the cross of three borders. Apart from that only Stínska is 1092 m high, and the two tops of Wielki Bukowiec are 1012 and 1002 m. This wooded area has scarce population and little agriculture. Wildlife has been altered more in the lower parts, whereas in the mountains the natural features are still preserved, despite of prolonged exploitation of the forests and meadows.

VEGETATION. Vegetation zones in the Bukovské Vrchy are similar to those in the Bieszczady. The poloniny level is present only in the highest mountains, whereas the slopes are covered by forest: beech *Fagus sylvaticus*, sycamore *Acer pseudoplatanus* and silver fir *Abies alba*. Between forests there are meadows and pastures, also present in river valleys. In the margins of valleys arable land occurs. In the past these were covered by forests with oak *Quercus robur* and hornbeam *Carpinus betulus*, to a smaller extent by ash *Fraxinus excelsior* and alder *Alnus glutinosa*. Their fragments are still preserved as well as many remainings of flora typical for communities Carici pilosae-Carpinetum and Mercuriali-Fraxinetum. Some of them are preserved in reserves.

The best preserved are forests of the lower forest zone. These are in majority beech diversified in 6 vegetation communities. The most

important of these is Carpathian beech forest Dentario glandulosae-Fagetum and a similar one, sycamore forest Aceri-Fagetum. Other forms of beech forests are: Carici pilosae-Fagetum and Festuco drymejae-Fagetum. In the lower parts of mountains the beech prevails, higher – beech and fir, still higher – beech and sycamore. The most beautiful beech and fir forests are preserved near Osadny and Nova Sedlica, where fires reach the height of above 50 m. The timber line of the forest is marked by beech, often of a dwarfy form. Along mountain streams one can find alder forests Alnetum incanae and Matteucio-Alnetum incanae and at the mountain feet – willow shrubs Agrostio-Salicetum pupureae.

On the poloniny zone grow mountain meadows and grasses including about 10 vegetation communities. The following communities have an Eastern-Carpathian character: Poo chaixii-Deschampsietum caespitosae, Poo chaixii-Calamagrostietum arundinaceae, Gentiano-Poetum chaixii, Leontodono-Nardetum and Polygalo-Nardetum. Grasses mingle with Homogyno-Vaccinetum berries. In sum, the vegetation of the Bukovské Vrchy includes about 60 communities, among which 15 are forest, 10 – meadow, 10 – mountain meadow communities. There are also numerous sedge, herb, xerothermic and other communities.

FLORA. On the whole territory of the Bukovské Vrchy there are about 960 species of vascular plants, 230 mosses species, 70 liverworts and over 260 fungi. This floristic variety stems from the variety of conditions and the transitional location of the area between the Western Carpathians and the main Eastern Carpathian massif. The flora of mountain meadows is especially diversified with numerous Eastern-Carpathian species, such as: ragwort *Senecio papposus*, spurge *Euphorbia sojakii* (endemic species), viper's

Flowering liverwort *Hepatica nobilis* (S.P.)



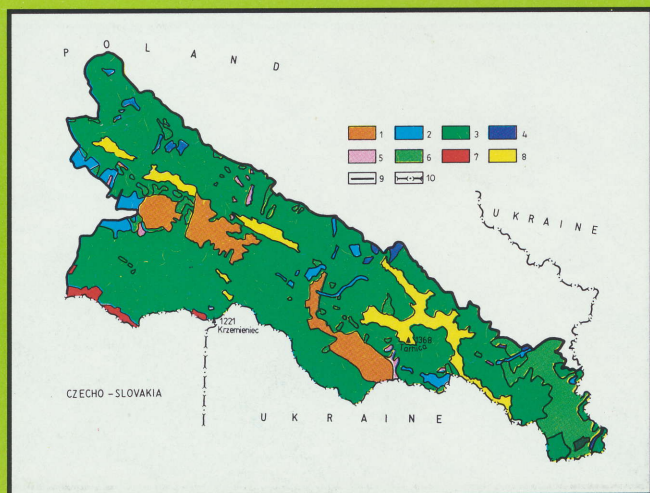


Iberian cross adder *Vipera berus* in highest elevations of the Tarnica massif (Z.D.)

grass *Scorzonera rosea*, bellflower *Campanula abietina* and others. To rare East-Carpathian forest plants belong: vetchling *Lathyrus laevigatus*, buttercup *Ranunculus carpaticus*, squill *Scilla kladnii*, and bastard balm *Melittis melissophyllum*.

Group of legally protected species is numerous. It includes, first of all, orchids *Epipactis helleborine*, *E. microphylla*, *Coeloglossum viride*, *Leucorchis albida*, *Orchis caryophylla*, *O. ustulata*, *O. laxiflora* ssp. *elegans*, *Dactylorhiza sambusina*, *D. maculata* ssp. *transsilvanica*,

Vegetation map of the Bieszczady N.P. 1 - lower mountain pastures, 2 - grey alder wood (*Alnetum incanae*), 3 - beech forest (*Dentario glandulosae* - *Fagetum*), 4 - fir forest (*Abies alba* stands), 5 - larch forest (*Larix* stands), 6 - spruce forest (*Picea abies* stands), 7 - sycamore forest (*Acer pseudoplatanus* stands), 8 - alpine polonina grasslands, 9 - boundary of the national park, 10 - state boundary



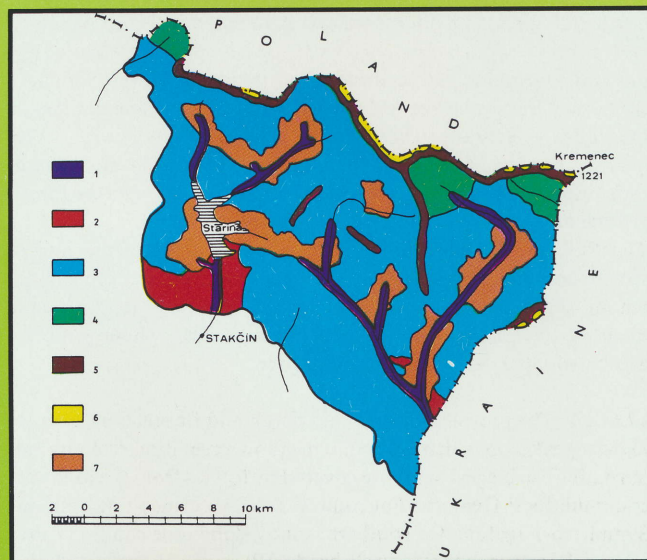
Traunsteinera globosa, gentians *Gentiana pneumonanthe*, *G. cruciata*, *G. lutescens* ssp. *carpatica* and others.

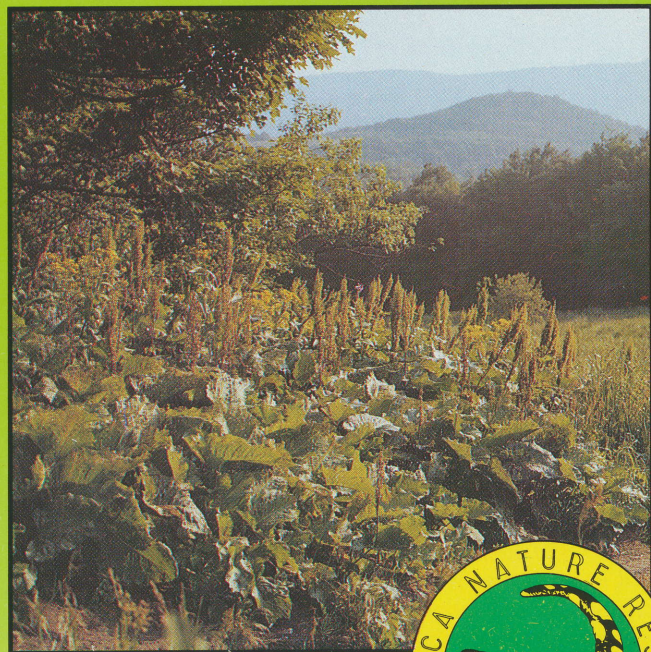
FAUNA. The wildlife of this region has many unique species, especially invertebrates. Many species live on the borderline of their range, there are also endemic species. There are rare species among birds, living in isolated habitats. To the rarest belong ural owl, some eagles, kites *Milvus milvus* and *M. migrans*. The poloniny meadows are the home of water pipit *Anthus spinoletta*.

Among the mammals, the most important big forest animals are brown bear, elk *Alces alces*, deer and wandering here from the Bieszczady mountains bison. The Bukovske Vrchy are also inhabited by lynx and wolf being here the rare animal. Aesculapian snake is a representative of rare species too.

Endemic animals belong to invertebrates. These include, among others, *Polydesmus polonicus*, *Leptoiulus baconyensis stuzicensis*, *Polyzonium transsilvanicum*, *Stenus obscuripes*, *Deltomerus carpaticus*. A group of less common invertebrates of the Eastern Carpathians includes: earthworms *Allelobophora carpatica* and *Eisenia lucens*, and *Trichia bielzi* snail. Among insects - *Strangalia thoracica* and *Rosalia alpina*. Among butterflies, it is worth mentioning such rare species as *Apatura iris*, *Aglaia tau*, *Fabriciana aglaia*, *Papilio machaon* and *Parnassius mnemosyne*.

Vegetation map of the Bukovske Vrchy area. 1 - *Alnus glutinosa*-*Fraxinus excelsior* forest, 2 - *Alnus incana*-*Fraxinus excelsior* forest, 3 - *Fagus silvatica*-*Quercus petraea* forest, 4 - *Fagus silvatica* forest, 5 - *Fagus silvatica*-*Acer pseudoplatanus* forest, 6 - *Fagus silvatica*-*Abies alba* forest, 7 - *Fagus silvatica*-*Abies alba*-*Acer pseudoplatanus* mixed forest





7. WILDLIFE IN THE STUZICA RESERVE IN UKRAINE

The Stuzica Reserve of 2542 ha, bordering upon Poland from the north and Slovakia from the west, is dominated by beech, beech-fir and beech-sycamore forests. Their dense range is divided by mountain meadows and clearings. The mountains are very similar to the Slovak Bukovské Vrchy. Landscape relief is much milder than in the Polish Bieszczady. The highest peaks 1000 m high are located near the borders. The highest one is Krzemieniec 1221 m. Towards the south and east of the border the altitudes decrease and the forests get smaller; the density of human settlements grows.

The Reserve protects wildlife in a area of springs of the Stuzica stream and its numerous tributaries, flowing through deep canions among shady beech forests. These primeval forests are the remainings of the old Eastern-Carpathian forest. The whole protected area is situated on the lower forest zone.

FLORA. The prevailing forests are beech and fir reaching even the highest peaks, on which mountain meadow vegetation remains only partially. The biggest areas are covered by forests from the following communities: Dentario-Fagetum, Galio (Asperulo)-Fagetum and Symphyto-Fagetum. On southern, sunny slopes one can find Carici pilosae-Fagetum, and near well-heads Allio ursini-Fagetum. A cha-

racteristic feature of lower forest vegetation is the occurrence of mixed forests with beech, fir and elm *Ulmus montana*. On wet, stony soil one can encounter mountain sycamore forests *Aceretum pseudoplatani*.

Near the upper forest boundary, which is located on 1200-1230 m one can find very rare in the Carpathians beech-sycamore and beech-sorb forests with distorted tree trunks caused by strong winds. In the subalpine zone the characteristic vegetation is alder *Alnus viridis*, creating a mosaic with grasses of the poľonina meadows, e.g. *Plumonario-Deschampsietum* and *Calamagrostio-Deschampsietum*. Mountain meadows have a rich flora with many Eastern-Carpathian species, such as *Viola dacica*, *Cirsium waldsteinii*, *Melampyrum herbichii*, *Helleborus purpurascens*, *Senecio papposus*, *Telekia speciosa*, *Anemone nercissiflora*. Among rare forest species, one can find *Lilium martagon* and *Streptopus amplexifolius*. Vascular plants of the Stuzica reserve has over 500 species. This includes many

Wolf *Canis lupus* rare animal in the Slovakian part of the reserve (S.P.)



protected plants, such as orchids *Orchis laxiflora* ssp. *elegans*, *O. cariphora*, *O. ustulata*, *Dactylorhiza incarnata*, *Iris sibirica* etc.

FAUNA. Fauna of the Stuzica Reserve is similar to the one in Bieszczady. One can encounter here almost all aforementioned animal species. In addition, in the Ukrainian part of the Biosphere Reserve one can often find black stork *Ciconia nigra*, agile frog *Rana dalmatica*, spotted salamander *Salamandra salamandra*, newt *Triturus montadoni*, and reptiles adder *Vipera berus*, and snake *Elaphe longissima* – the latter can be found in the lower locations on sunny clearings. Among invertebrates one can find some Eastern-Carpathian species: *Allelobophora carpatica*, *Eisenia lucens*, *Trichia bielzi*. The most rare species include: *Strangalia thoracica* (Eastern-Carpathian endemic species), purple emperor *Apatura iris*, and black Apollo *Parnassius mnemosyne*.

The Stuzica Reserve has recently been enlarged by 1700 ha. A buffer zone of 2500 ha will be established in the future on the south and east side. Thus, the best conditions for the protection of precious wildlife, particularly forest fauna, will be created.

Charcoal production in the Bieszczady Mts.



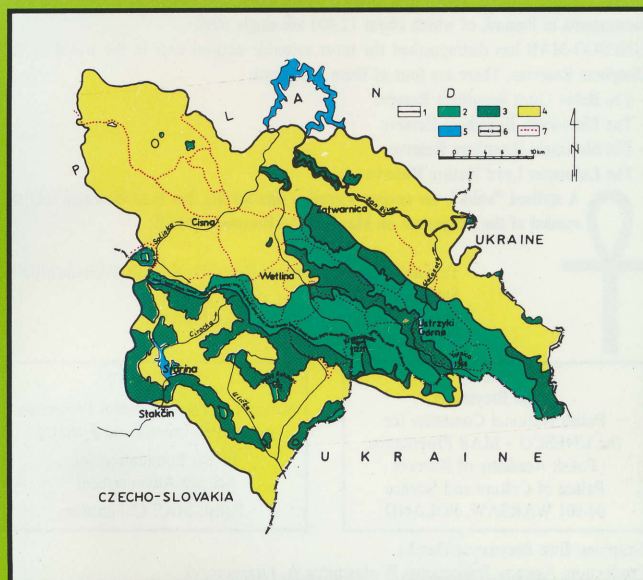
8. TOURISM ON THE INTERNATIONAL BIOSPHERE RESERVE

The Biosphere Reserve in the Eastern Carpathians will not only serve as an interesting research object, but also as an area of local and international tourism. This can happen thanks to a well-developed network of good roads and tourist walks. These have been marked mostly along mountain crests, so that the tourist can admire a broad panorama of Eastern-Carpathians, different from other mountain ranges. The Eastern Carpathians have easy slopes and rounded tops, accessible for school excursions, as well as individual and group tourism. The mountains are accessible for people of different age and experience in climbing.

The network of tourist walks is marked on the attached map. The network is clearly denser on the Polish side, i.e. in the Bieszczady National Park. This is where the highest and the most attractive mountain ranges and summits are located. Another interesting walk is the one running along the Polish-Slovakian border, joining the highest border peaks, covered mainly by grasses (above the timber line). The tourists can thus admire broad panoramas that attract large groups of local and foreign walkers. In the future, Eastern Carpathians will surely be visited by foreigners as a truly international reserve that should be advertised and known by Europe and the World.



Touristic map of the Biosphere Reserve. 1 - boundary of the International Biosphere Reserve, 2 - core zone, 3 - buffer zone I, 4 - buffer zone II (transitional zone), 5 - water reservoirs, 6 - state boundary, 7 - touristic trails



The beginning of nature conservation in Poland dates back to the 11th century when King Bolesław Chrobry forbade chases of after beavers (*Castor fiber*). In time of King Władysław Jagiełło (15th century) reign the protection was also widened on yews (*Taxus baccata*) and old monumental trees like oaks and limes. In the 16th century King Zygmunt Stary introduced protection of rare, endangered and extincting animals like European bison (*Bison bonasus*) and aurochs (*Bos primigenius*).

At present more than 260 plant species and about 600 animal species are protected by law. New Law on Nature Conservation of 16 October 1991 comprises of 9 different categories of nature conservation among which the most important are national parks, nature reserves, landscape parks, areas of protected landscape and nature monuments.

National Parks – include areas of over 1000 ha of particular natural value and represent one or more primeval or little transformed ecosystems. Each park has a special protection status and area divided on fully and partly protected reserves. At present there are 17 National Parks in Poland with a total area of over 177 000 ha, i.e. about 0,57% of the country's area.

Nature Reserves – cover smaller areas supporting valuable plant or animal communities, sites of rare or relic species or species at the boundary of geographical range as well as unique geological or geomorphological forms. At the beginning of 1992 there were 1062 nature reserves in Poland (including 534 forest reserves, 130 floristic and 107 faunistic reserves). Their total area amounts to 126 087 ha, i.e. 0,40% of the country's area.

Landscape Parks – cover areas of significant natural values. Land use is there limited, e.g. no big industrial installations, bigger breeding farms, or other enterprises polluting the environment may be located there. So far 68 landscape parks have been established in Poland with a total area of 1,215,485 ha i.e. about 3,89% the country's area.

Areas of Protected Landscape – cover the most characteristic landscape patterns of a given region (e.g. forests, valleys, lake districts) frequently in a complex with monuments of national culture. Human activities are not limited in this kind of area. Till now more than 160 areas of protected landscape have been established with a total area of about 3,500,000 ha, i.e. more than 11% of the country land surface.

Nature Monuments – there are usually single objects or small areas, protected for scientific, historical or aesthetic reasons. In this category we distinguish old trees, monumental alleys, erratic blocks, rocks and others. Now there are more than 16,000 nature monuments in Poland, of which about 12,000 are single trees.

UNESCO-MAB has distinguished the most valuable natural sites in the world as the **Biosphere Reserves**. There are four of them in Poland:

- The Babia Góra Biosphere Reserve
- The Białowieża Biosphere Reserve
- The Słowiński Biosphere Reserve
- The Łuknajno Lake Nature Reserve



A stylized "ankh", the ancient Egyptian sign for life, has been incorporated into the symbol of the Programme on Man and the Biosphere (MAB)

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Sponsored by
Ministry of Environmental Protection,
Natural Resources and Forestry
Polish Foundation for
Science Advancement
Polish MAB Committee

Graphics: Ewa Breymeyer-Darska

Production: Agencja Reklamowo-Wydawnicza A. Grzegorzczuk