EXECUTIVE SUMMARY

State Party: Ukraine
Slovak Republic

State, Province or Region: Transcarpathian Region, Prešov Self-Governing Region

Name of Property: **BEECH PRIMEVAL FORESTS OF THE CARPATHIANS**

Geographical coordinates to the nearest second:

Table 1: Geographical coordinates of the nominated properties to the nearest second

Site element No.	Name of the primeval forest	Country/Region	Coordinates of Centre point
1	Chornohora	Ukraine, Transcarpathian Region	48° 08’ 25” N 24° 23’ 35” E
2	Havešová	Slovak Republic, Prešov Self-Governing Region	49˚ 00’ 35” N 22˚ 20’ 20” E
3	Kuziy-Trybushany	Ukraine, Transcarpathian Region	47° 56’ 21” N 24° 08’ 26” E
4	Maramarosh	Ukraine, Transcarpathian Region	47° 56’ 12” N 24° 19’ 35” E
5	Rožok	Slovak Republic, Prešov Self-Governing Region	48˚ 58’ 30” N 22˚ 28’ 00” E
6	Stužica – Bukovské Vrchy	Slovak Republic, Prešov Self-Governing Region	49˚ 05’ 10” N 22˚ 32’ 10” E
7	Stuzhytsia-Uzhok	Ukraine, Transcarpathian Region	49° 04’ 14” E 22° 03’ 01” N
8	Svydovets	Ukraine, Transcarpathian Region	48° 11’ 21” N 24° 13’ 37” E
9	Uholka-Shyrokyi Luh	Ukraine, Transcarpathian Region	48° 18’ 22” N 23° 41’ 46” E
10	Vihorlat	Slovak Republic, Prešov Self-Governing Region	48° 55’ 45” N 22° 11’ 23” E

Textual description of the boundaries of the nominated properties:

General outline of the serial nominated property

The principal axis of the serial transnational nominated property “Beech primeval forests of the Carpathians” is approximately 185 km long. It coincides with the divison between the sub-provinces of Outer Eastern Carpathians and the Inner Eastern Carpathians, extending from Maramorosh on the northern megaslope of the Rakhiv Mountains and the southern macroslope of the Chornohirskyi Range in the South-East, along the Polonynian Ridge (Polonyns'kyi chrebet) up to the Bukovské Vrchy Mts. and Vihorlat Mts. in the North-West. The individual properties are centered along this axis.

The boundaries of individual properties

Chornohora (property No. 1 in alphabetical order acc. to Tab 1) is located on the southern macroslope of the Chornohirskyi range. Its boundary of begins (clockwise) in the saddle between Mt. Hoverla and Mt. Menchil, then descends down to the Hemaneskul Brook, crosses the Horneskul Brook and ascends again on the South-Eastern ridge of Mt. Sheshu and Mt. Menchul. It continues in the West and North-Western direction until it reaches slopes overlooking the Black Tysa Valley. The boundary makes the a semicircle and returns along the contour lines of the North slopes of Mt. Menchul, then it crosses the crest connecting Mt. Petros and Mt. Sheshu and descends again into the valley of Rohneskul and then Hermaneskul brooks before it climbs back to the saddle between Mt. Hoverla and Mt. Menchil.

Havešová (Property No. 2) extends under the main ridge of the Nastaz Range, a part of the Bukovské Vrchy Mts. The property has its boundaries in the form of a loop that follows the ridge between Mt. Kalidlo and Mt. Dielnica in the South direction, then turns West and Nort-West towards the right tributary of the Ublianka Brook. After it makes contact with the brook twice, it returns on the top of one of the side crests back on the main range of the Nastaz Mts. There it turns South-East until it reaches Mt. Kalidlo again.

Kuziy-Trybushany (Property No. 3), located on the southern offspurs of the Svydovets range, extends from the North-Western slope immediately bellow Mt. Polonskyi in the Western and North-Western direction. Its boundary crosses the Valley of the River Kuziy, then makes a loop around Mt. Tempa and proceeds toward Mt. Menchul. From there, it runs in the North-Eastern direction until it reaches a ridge overlooking the Lykhyi Brook, descends towards Tysa and finally returns back to Mt. Polonskyi.

Maramorosh (Property No. 4), extends on the Northern megaslope of the Rakhiv Mountains – one of the Maramoroskyi crystal massif’s offspurs. Its boundaries begin on the

Northern slope of Mt. Pip Ivan and coincide with the Southern limit of the Bylyi Brook watershed until it hits the Yavirnykovyi Brook. After that it copies the Northern limit of the Bylyi Brook, thus ascending towards bellow Mt. Berlebashka. Following a contourline it makes a loop around Mt. Petros, drops sharply and crosses the Radomyr Brook, climbs the ridge above and turns Northwards. Before hitting the connecting line between Mt. Menchul in the West and Mt. Bolotyn Hrun in the East, it makes a sharp turn towards the East and the River Kvasnyi. Then it follows the stream towards its headwaters and following one of its right tributaries climbs to the starting point below Mt. Pip Ivan.

Rožok (Property No. 5) is located on the Western slope of the Javorník Ridge in the Bukovské Vrchy Mts. It is encompassed within boundaries that coincide with two ridges limiting the Northern slope of Mt. Rožok and the crest of the opposite slope, running from the main range of Javorník.

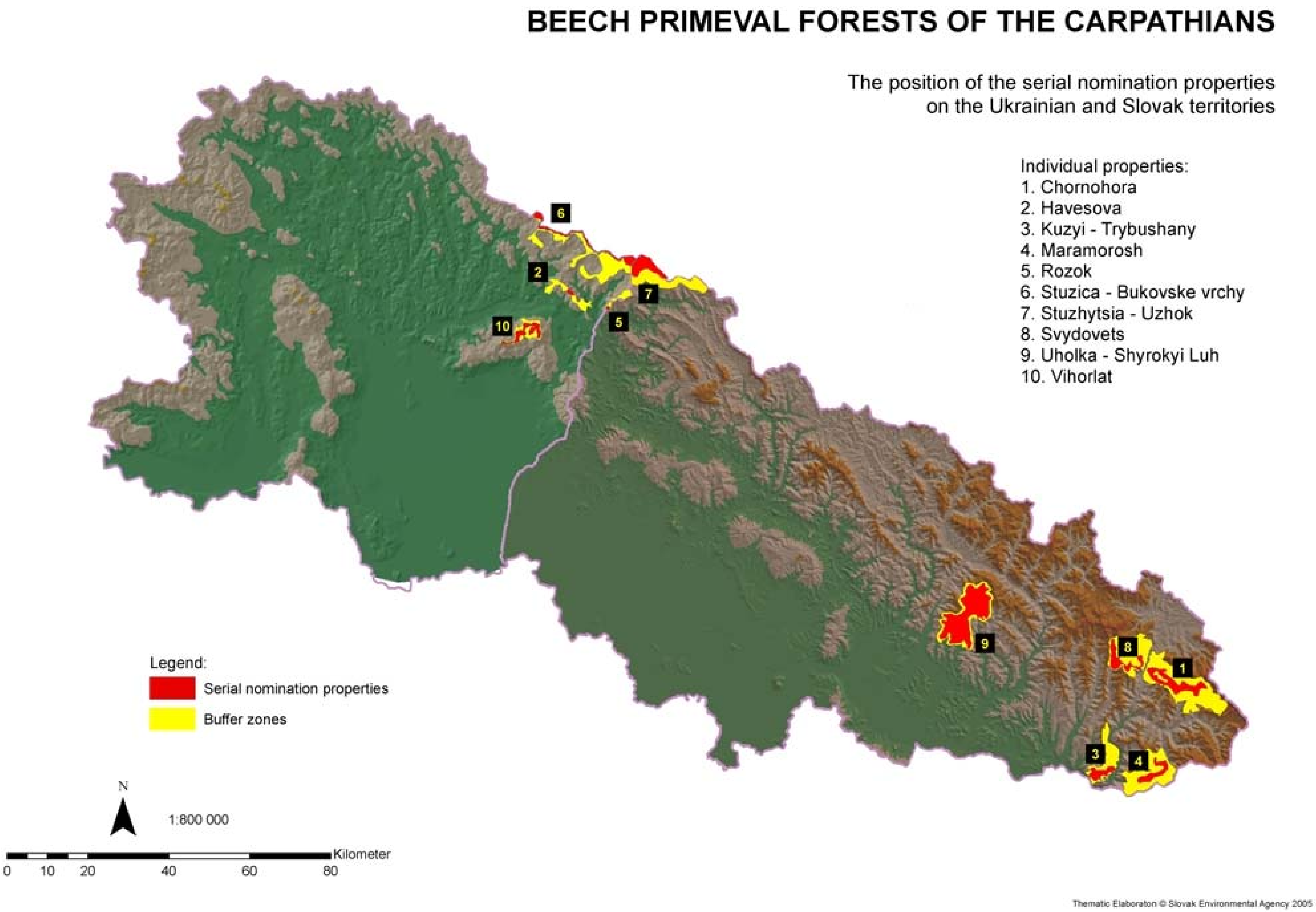
Boundaries of the **Stužica – Bukovské Vrchy** (Property No. 6) in the Bukovské Vrchy Mts. too begin on the top of Mt. Kremenets. From there the boundary follows (counter-clockwise) the state border between the Slovak Republic and Poland in the North-Western direction on the main ridge of the Bukovské Vrchy Mts and Nízke Beskydy Mts. It runs of over the top of several mountains, e. g. Mt. Čierťaž, Mt. Ďurkovec, Mt. Kruhliak, Mt. Beskyd and Mt. Čierny, before it reaches the springs of the Udava River. There, the boundary makes a loop around the Udava's headwaters and returns in the South-Eastern direction along the countourline of the main ridge towards the headwaters area of the Stužica River. There, it diverges from the main ridge of the Bukovské Vrchy Mts. and runs on the top of Mt. Príkry and Mt. Packova Kýčera, where it again turns northwards along the Kamenistý Potok Brook, then the boundary traverses the western slope of Mt. Kalnica, reaches its top and continues to Mt. Kremenec.

The boundary of **Stuzhytsia-Uzhok** (Property No. 7) on the Eastern and Southern slopes of Beskids Ridge, starts atop Mt. Kremenets and follows the main ridge that is at the same time a state border between Ukraine and Poland. It makes an convex arc towards Mt. Khresty and froms an Eastern oriented apex before Mt. V. Beskyd, from where it returns, crossing several right tributaries of the Stuzhytska River and the the river itself, to the the state border between Ukraine and the Slovak Republic south of Mt. Kalnytsya. It proceeds along the state border over the top of Mt. Kalnytsyia until it reaches the top of Mt. Kremenets again.

Svydovets (Property No. 8) covers in the highest part of the Svydovets mountains. It has its boundaries following the contour line that starts in the saddle between Mt. Blyznytsia and Mt. Stara in the Western direction. It follows the aspect of the slope, turns North and proceeds in that direction until it hits the bottom of the Kosiyska Brook Valley. At that point it turns South and runs under Mt. Menchul along the opposite side of the valley. South of Mt. Menchul it turns eastwards, crosses the Kosiyska Brook and travberses the Western slope of Mt. Stara, before it reaches the aforementioned saddle again. From there on, it follows the contour line across the North-Eastern slope of Mt. Stara, until it turns North and descends sharply to the valley bottom, where it crosses the Trostyanets Brook. From the point of crossing, it leads parallel to the contour line on Southern and Eastern slopes of Mt. Blyzhnitsa, crossing the Hropynets Brook. Before it hits the Trufanets Brook, it ascends up to the Eastern ridge of Mt. Blyznytsia, makes a wide loop and returns, again along a contourline at a higher elevation back to the saddle between Mt. Blyznitisa and Mt. Stara.

The boundaries of **Uholka-Shyrokyi Luh** (Property No. 9) on the southern slopes of the Krasna mountain pasture, and its powerful offspur of the Menchul mountain pasture, start in the North under Mt. Topas. They encompass the headwaters area of the Luzhanka River approximately to Mt. Ivaniv Zvir where the boundary turns to the West, crosses the Luzhanka River and climbs the ridge radiating from Mt. Menchul. It follows that ridge southwards and at Mt. Rankul it makes a sharp turn to the West and follows the contourlines, crossing the rivers of Velyka Uholka and Mala Uholka. After that, it traverses the Western slopes of Mt. Vezha and Mt. Menchul, until it reaches its top. It then proceeds northwards on the top of the Mt. Menchul northern spurs until it turns, at an almost right angle, eastwards again and makes a comes a full circle under Mt. Topas.

Vihorlat (Property No. 10) is located on both sides of the main range of Vihorlat. It has its boundaries traversing the South-Eastern and North-Western slopes of the Vihorlat main range, beginning at Mt. Vihorlat in the South-West and continuing along Mt. Motrogon and Mt. Sninský Kameň. At that point, the boundaries proceed towards Mt. Nežabec in the East, where there is a bifurcation point, from which one branch of the property extends towards Mt. Veža, the other towards Mt. Fedkov.



A4 size map of nominated property, showing boundaries and buffer zone

Justification
Statement of Outstanding Universal Value

The transnational nominated series “Beech primeval forests of the Carpathians” as a whole provides a superior representation of undisturbed biological and ecological processes in the monodominant mesotrophic European beech (*Fagus sylvatica* L.) primeval forests on a wide range of substrates, in terms of area, growth and the assurance of conservation management. Such forests once extended over approximately 40 % of the European continent, but the anthropogenic pressure led to their nearly entire elimination on mesotrophic sites on other territories. Now their remnants are comprised mainly to the parts of the Carpathians due to a limited extent or the absence of industrial developments.

The undisturbed ecological processes within the transnational nominated series result in a high ecological stability and dynamics that leads to the formation of hall-like structural primeval forest patterns on mesotrophic sites. Beech primeval forests of the transnational nominated series reach the highest average growing stock and feature a rich structure. Along with a balanced spatial arrangement of developmental stages, it results in the occurrence of record tree dimensions within the ergodic process of the developmental cycle. These patterns manifest outstanding aesthetical values and thereby strongly influenced aesthetical and landscape perceptions of the European civilization.

The beech primeval forests of the nominated series also contain genetic pools and provide habitats for numerous endangered species, including xylobiotic fungi, insects, hollow-nesting birds and large mammals, such as brown bear, wolf, lynx, wisent and others. Furthermore, several decades-long scientific research, carried out specifically in the transnational nominated series, strongly contributed to the development of the concept of close-to-nature forestry on the global scale. Also, the nominated series offers a unique etalon for the assessment of anthropogenic pressures on other forest ecosystems.

Criteria under which property is nominated
(itemized criteria)

The serial nomination "Beech Primeval Forests of the Carpathians" is proposed for inscription under the following criteria:

Criterium (ix): The serial nomination "Beech Primeval Forests of the Carpathians" contains outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial (forest) ecosystems and communities of their plants and animals. As a natural feature, it consists of a biological formation – climax temperate beech primeval forests with largely monospecific canopy. The development of this formation is an indispensable part of the phylogenetic history of the genus *Fagus*, which is, given the distribution of *Fagus* in the Northern Hemisphere, globally significant. The nominated series does most completely and comprehensively reflects the ecological patterns of pure stands of European beech, which is the most important constituent of forests in the Temperate Broad-leaf Forest Biome, in the Middle European Forest (2.11.05) biogeographical province and partly in the biome of mixed mountain systems. The value of the nominated beech forests does consist both in the status of European beech as originally the main forest constituent (after the the return of tree species banished from Central Europe during the ice ages was complete) in Europe, but also in their intrinsic ecological patterns as seen from the viewpoint ecology, i. e. complete stadial and developmental cycles that include all developmental stages. The serial nomination features unique characteristics of Europe's primary, indigenous, undisturbed, unique, complex (and therefore outstanding) forest ecosystems with Europe's most typical tree species as their main edificator. At the same time, it is the last best conserved remnant of monodominant beech forests that once covered large tracts of Europe. The characteristics include the absolute hegemony of European beech, its competitiveness, autoregulation and homeostasis capacity and adaptation to changing environmental conditions. The serial nomination represents highly productive and extremely stable ecosystems on mesotrophic substrates of cristalline rocks, flysh, calcareous rock (limestones) and volcanic rock (andesite), with no other tree species able to compete with the beech trees on a significant scale. The overall site conditions allow the beech to reach heights up to 56 m – tallest European beech trees measured. The formation is sustained by undisturbed biogeochemical cycles as an indispensable part of this formation.

The textural composition of these primeval forests fluctuates very little during their 230–250 years-long developmental cycle and the aerial representation of individual developmental stages is balanced over areas as small as 20–30 ha. European beech population is so well established on the respective sites that no other species, even other C-strategists such as silver fir, are able to co-exist there, except for small patches conditioned by micro-relief. The underlying ecological processes are so articulate that beech forests in this area have defied every attempt to convert them into spruce monocultures. Stands with various phases (stages) of vital cycle are available in the primeval forests. These distinctly different types of stands are called “developmental stages”. All the stages of forest development are represented in the primeval forests. They are such as the optimum stage, old growth, decay, and regeneration of selected forest and undergrowth. Along with a greatly mosaics nature according to developmental stages, the stands are characterized by a great variability of stand structures.

The existence of these monodominant beech forests allows for a long-term research of beech primeval forests, which represents a significant added value from the point of science; the respective localities have been subject to a periodical, 50 year long systematic forestry and ecological research using a common methodical, internationally accepted approach. The value of this complex research is enhanced by the overall excellent conservation of entire ecosystems including plants and animals (including brown bear, lynx, wolf, locally also wisent, elk and other species) being in a constant interaction and functioning in a functional unity. Owing to ongoing global changes, such research can not be reproduced any more as the initial and boundary conditions have changed reproducible.

Criterium (x): The serial nomination “Beech Primeval Forests of the Carpathians” contains the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing endangered species of outstanding universal value from the point of view of science or conservation. Its conservation value consists in the protection of the only remaining intact populations of pure beech (*Fagus sylvatica* L.) and the protection of European beech gene pool, not limited in the past through selection or interventions by man, but formed solely by natural processes. The beech primeval forest of the nominated series therefore also provide an invaluable opportunity to study the evolutionary history of Fagus in western Eurasia based on the evidence from genes, morphology and the fossil record.

The serial nomination also includes habitats of entomofauna, avifauna and of some mammal species (e. g. bats) bound to habitats existing only in primeval forests, as well as their intact mycoflora (484 species recorded to date). The series contains gene pools of autochthonous organisms and habitats providing favourable living conditions for globally endangered species, numerous species of entomofauna (*Osmoderma eremita*) bound to the trees necromass, hollow nesting birds dependent on presence of old standing trees (*Strix uralensis*), as well as a complete mycoflora of the Carpathian beech forests. Habitats of a number of animal species practically correspond to distribution of beech forests within the continent. The survival of numerous vulnerable species directly depends upon beech forests conservation. They are such species *as Dendrocopos leucotos, Myotis myotis, M. bechsteinii, Rosalia alpina* etc. *Myotis myotis* is a rare fauna species of the continent and, listed in Annexes 2 of the Bonn and Bern Conventions. Karst caves of the Uholka – Shyrokyi Luh cluster serve as hibernation shelters for thousands of bats. *Myotis bechsteinii* is a globally rare species and is listed in Annexes 2 of Bonn and Bern Conventions. As a typical dendrophillous species, during a year it is directly bound to tree-trunk hollows. Availability of hollow trees is for that matter the main limiting factor for this species, though still abundantly available across the serial nomination, where there have been registered parent colonies of *Myotis bechsteinii* with hundreds of bats during the last decade.

Criterium (vii): The serial nomination "Beech Primeval Forests of the Carpathians" evidently contains areas of exceptional natural beauty and aesthetic importance. Indeed, this argument can not be discarded in the face of the real impact that the appearance of Europe's primeval forests has exerted on the mindset of people and artists in particular, who in turn have hugely influenced our culture and standards by which we perceive and measure beauty and aesthetical quality – Czeslaw Milosz, a 1980 Nobel Prize winner in literature. In his "Symbolic Mountains and Forests" he wrote: "The interiors of certain Gothic cathedrals – Strasbourg, for example – replicate man's smallness and helplessness in his middle zone between hell and heaven, amid the columns of the primeval forests which still covered large areas of Europe when the cathedrals were built". Translated in the language of science, the nominated series' aesthetic value resides in the original tree species composition, structure and monumental dimensions of trees, the amount of impressively looking trees necromass that according to perception research accounts to their wild look, documented by early historians (e. g. Herodotus of Halicarnassus, Tacitus). According to the modern science of the imaginary, European primeval forests became one of the important imaginative sources, from which the Gothic architecture developed. The works of Eliade, Le Goff, Matteoli, Schama and Ovidian have documented how the image of heaven in Christianity mixed with the image of wild forests. The hall-way, cathedral-like appearance and pattern of the nominated properties features easily recognizable, featuring full-boled, tall, straight trunks of beech trees. Despite a less dramatic character of the local landscapes, the beauty and impact of the primeval forest look (of similar beech or oak forests that once covered a great deal of the European continent) on the aesthetical perception of the Gothic thinkers and architects are well documented. According to Matteoli, “The forest, an overwhelming presence of the great North, is the genius loci of the Gothic church. The tall tree trunks become columns, the ogive vaults replicate the arching of the branches connecting the trees high above. The forest/cathedral is home to northern imagery. Fairies, fantastic animals, ghosts, monsters peek out from every corner and receptacle.” The scenery of the beech primeval forests of the nominated series is unique both in Europe and in the world in this context – the cathedral growths of the North-Pacific coast have been discovered by the Europeans after the Gothic period had long ended. The images of the beech primeval forests bred mermaids in Slavic legends, Celts inhabited these forests with dryads, and Germanic tribes believed that elfs dwelt among those fairy-like trees. Also today, these forests are of a paramount significance in the traditional view of nature both in Slovakia and Ukraine.

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http://www.sopsr.sk

1. Identification of the Property

1.a Country:

Ukraine

Slovak Republic

1.b State, Province, Region:

Transcarpathian Region (Ukraine)

Prešov Self-governing Region (Slovak Republic)

1. c Name of Property:

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS

1.d Geographical coordinates to the nearest second

Table 1: Serial nomination table for the "BEECH PRIMEVAL FORESTS OF THE CARPATHIANS"

Site element No.	Name of the primeval forest	Country/Region	Coordinates of Centre point	Area of core zone (ha)	Buffer zone (ha) [1]	Map Annex[2]
1	Chornohora	Ukraine, Transcarpathian Region	48° 08' 25" N 24° 23' 35" E	2 476,8	12 925,0	7
2	Havešová	Slovak Republic, Prešov Self-Governing Region	49˚ 00' 35" N 22˚ 20' 20" E	171,3	63,99	8
3	Kuziy-Trybushany	Ukraine, Transcarpathian Region	47° 56' 21" N 24° 08' 26" E	1 369,6	3 163,4	9
4	Maramarosh	Ukraine, Transcarpathian Region	47° 56' 12" N 24° 19' 35" E	2 243,6	6 230,4	10
5	Rožok	Slovak Republic, Prešov Self-Governing Region	48˚ 58' 30" N 22˚ 28' 00" E	67,1	41,4	11
6	Stužica – Bukovské Vrchy	Slovak Republic, Prešov Self-Governing Region	49˚ 05' 10" N 22˚ 32' 10" E	2 950,0	11 300,0	12
7	Stuzhytsia – Uzhok	Ukraine, Transcarpathian Region	49° 04' 14" E 22° 03' 01" N	2 532,0	3 615,0	13
8	Svydovets	Ukraine, Transcarpathian Region	48° 11' 21" N 24° 13' 37" E	3 030,5	5 639,5	14
9	Uholka – Shyrokyi Luh	Ukraine, Transcarpathian Region	48° 18' 22" N 23° 41' 46" E	11 860,0	3 301,0	15
10	Vihorlat	Slovak Republic, Prešov Self-Governing Region	48° 55' 45" N 22° 11' 23" E	2 578,0	2 413,0	16
Total area				**29 278,9**	**48 692,7**	

[1] Not subject to nomination

[2] Each property is also depicted on the Map annexes 1–6

1.e Maps and plans, showing the boundaries of the nominated property and buffer zone

- Map Annex 1: Beech primeval forests of the Carpathians – The position of Ukraine and the Slovak Republic in the Central Europe (1:7 000 000)
- Map Annex 2: Beech primeval forests of the Carpathians – The position of the serial nomination properties on the territories of Ukraine and the Slovak Republic (1:800 000, as of January 2006)
- Map Annex 3: Beech primeval forests of the Carpathians – The position of the serial nomination properties according to tectonic units (1:800 000, as of January 2006)
- Map Annex 4: Beech primeval forests of the Carpathians – The position of the serial nomination properties according to vegetation belts (1:800 000, as of January 2006)
- Map Annex 5: Beech primeval forests of the Carpathians – Beech ecosystems as embedded in the ecological continuum
- Map Annex 6: Beech primeval forests of the Carpathians – Ecological corridors and protected areas connecting the nominated properties (1:800 000, as of January 2006)
- Map Annex 7: Chornohora; nominated property No. 1 and its buffer zone (1:100 000, as of January 2006)
- Map Annex 8: Havešová; nominated property No. 2 and its buffer zone (1:50 000, as of January 2006)
- Map Annex 9: Kuziy – Trybushany; nominated property No. 3 amd its buffer zone (1:100 000, as of January 2006)
- Map Annex 10: Maramorosh; nominated property No. 4 amd its buffer zone (1:100 000, as of January 2006)
- Map Annex 11: Rožok; nominated property No. 5amd its buffer zone (1:50 000, as of January 2006)
- Map Annex 12: Stužica – Bukovské Vchy; nominated property No. 6 and its buffer zone (1:75 000, as of January 2006)
- Map Annex 13: Stuzhytsia –Uzhok; nominated property No. 7 and its buffer zone (1:100 000, as of January 2006)
- Map Annex 14: Svydovets; nominated property No. 8 and its buffer zone (1:100 000, as of January 2006)
- Map Annex 15: Uholka –Shyrokyi Luh; nominated property No. 9 and its buffer zone (1:100 000, as of January 2006)
- Map Annex 16: Vihorlat; nominated property No. 10 and its buffer zone (1:50 000, as of January 2006)

1.f Area of nominated property (ha) and proposed buffer zone (ha)

See Table 1.

2. Description

2.a Description of Property

Beech Primeval Forests of the Carpathians as elements of the nominated series belong to the Biogeographical province Middle European Forest (2.11.05) according to Udvardy's classification (1975). All nominated localities belong to the same biome and forests complex. Slovak "Stužica – Bukovské Vrchy" and the Ukrainian "Stuzhytsa – Uzhok" as nominated properties establish a direct link between nominated properties. The nominated properties are parts of a continuum of nature, natural and semi-natural beech forests in Ukraine and the easternmost part of Slovakia.

2.a.1 Chornohora (Ukraine)

Abiotic conditions

This cluster is a part of the Carpathian Biosphere Reserve, located on the southern macroslope of the Chornohora Mountain Ridge being the most western part of the Polonynsko-Chornohirskyi watershed (the Svydovetsko-Chonohirskyi Physical-Geographic district of the Polonynsko-Chornohirskyi Region of the Eastern Carpathian Subprovince) at 700–2.061 m above sea level.

Four tectonic zones (Chornohora, Duklyanska, Porkuletska and Burkutska) are the base for the geological structure of the Chornohora massif, and they are represented by flysh with dominating sandstone. Besides, breccias sometimes occur in the geological structure of the massif.

The modern geomorphological structure of Chornohora was formed mainly in the Miocene-Holocene. At present time the south-western part of the massif is characterized by the Middle Mountain landscapes complicated due to the erosion-denudation activity of streams as well as the processes of land subsidence. They are more complicated because of an ancient icing with typical glacier forms – nivation niches, karren (rock rill), and trough valleys.

The climate conditions are temperate-warm in lower parts to cold in upper ones. Precipitation is in limits 750-1.5000 mm per year, and average annual temperature +8$^{0\,C}$-0^{0C}.

The massif covers the drainage area of the Bila (White) Tysa and Chorna (Black) Tysa Rivers; a dense network of small streams curves it.

Acid brown soils and sod brown soil predominate but meadow brown soils sometimes occur here. The soils of all types in this area have a rather high pH level (4.0) and a powerful profile (of 80-100 cm), as well as a rich content of rough humus belonging to the "modern" type - beginning since 10-12% in the upper horizons and 1-2% in transitional and bottom horizons. A low content of amfoteric bases is also characteristic for soil here (degree of saturation less than 30%).

Biota (vegetation)

The total area of the Chornohora cluster is 15.401 ha: 1.323,8 ha of the core zone and 14.078 ha of the buffer zone. The core zone includes three patches of virgin forests located close one to another and united with the sites of buffer zone, therefore, at present time this cluster represents the continuous natural massif. Besides, the territory of the Carpathian National Nature Park is adjusted to the foregoing cluster.

The Chornohora cluster covers an area from the lowest limit of the the Mountain Forest belt (ca. 600 m) up to the High Mountain vegetation belt (2.061 m). Its forests are characterized by a high diversity of communities, and within them there are a lot of sites of natural forests (viz., *Fagetum, Piceeto-Fagetum, Abieto-Piceeto-Fagetum, Piceeto-Abieto-Fagetum, Acereto-Piceeto-Fagetum, Fageto-Piceeto-Abietum, Fageto-Abieto-Piceetum, Piceetum* and others). In the Chornohora the pure beech virgin forests cover about 20% of the total beech forests area, and they occur on the altitude 600-1.250 (1.300) m above sea level. Predominate communities *Fagetum symphytosum, Fagetum dentariosum, Fagetum athyriosum, Fagetum mercurialidosum, Fagetum asperulosum,* and the mixed *Piceeto-Fagetum symphytosum, Piceeto-Fagetum oxalidosum, Piceeto-Fagetum myrtllosum, Piceeto-Abieto-Fagetum asperulosum, Piceeto-Abieto-Fagetum mercurialidosum, Fagetum stellariosum* and *Abieto-Piceeto-Fagetum.* They have the large standing volume (800–900 m^3/ha), besides, beech and fir trees occured here are sometimes 300-350 years old and 1.3 m and 1.6-1.8 m in diameter respectively.

There are also the rare communities *Ulmeto-Acereto-Fagetum symphytosum* and others. The most peculiar features of this cluster is the presence of the vast continuous groves of *Pinus mugo, Duschekia viridis* and *Rhododendron kotschy* distributed above the upper forest limit.

The shrub layer in the Chornohora virgin forests is poorly developed and it includes solitary plants of *Lonicera nigra* and *Corylus avellana*. The herbaceous layer mainly consists of *Athyrium filix-femina, Dryopteris filix-mas* and *D. carthusiana*, but also sometimes *Polystichum braunii, Gymnocarpium dryopteris, Oxalis acetosella, Galeobdolon luteum* and *Mercurialis perennis*.

As a whole, ca. 1.540 plant species are distributed within the Chornohora cluster: ca. 580 species of the Vascular Plants, 180 species of mosses, 290 species of lichens, 280 species of algae, and 90 species of fungi**.** Within the Vascular Plants, about 30 rare species occur in the forests (viz., *Huperzia selago, Botrychium lunaria, Blechnum spicant, Ranunculus carpaticus, Arnica montana, Galanthus nivalis, Lilium martagon, Listera cordata, Silene dubia, Traunsteinera globosa, Pulmonaria filarszkyana*occur, and most of them are included into the "Red Book of Ukraine" (1996) or "European Red List" (1992).). Beside the foregoing rare forest species, there are more than 20 rare species occcured in the buffer zone and the close high-mountain belt (viz., *Aconitum jacquinii, Doronicum clusii, Gentiana acaulis, Ranunculus thora, Primula minima*, *etc.*).

Biota (animal world)

The core of the fauna in the "Chornohora" cluster includes mainly species belonging to the Taiga complex, but the species characteristic for the broad-leaved forests of Europe are well represented here too: 45 species of mammals, 84 bird species, 6 reptile species and 7 amphibian species. Besides, 1 species of *Cyclostomata* and 7 species of fish occur in the local mountain rivers and streams. Within the cluster, there are several thousands of invertebrates dwelling: viz., 65 species of *Colembola,* 5 species of *Nematoda*, 1 species of *Myriapoda*, 73 species of *Lepidoptera*, 5 species of *Orthoptera,* 46 species of *Mollusca,* 70 species of *Arachneidea*, and many others.

There are a lot of species usual for the forest belt of the Carpathians including C*ervus elaphus montanus*, *Sus scrofa attila*, *Capreolus capreolus*, *Vulpes vulpes*, *Meles meles, Martes martes,* and also large carnivares, viz., *Lynx lynx*, *Canis lupus, Ursus arctos.* Other species are *Mustela lutreola* and *Lutra lutra.* An endemic species *Pitymis tatricus* occurs within the cluster, but its habitat was regarded the Western Carpathians (Vysoké Tatry) only.

There is also a lot of hollow tree-trunks within which a number of dendrophilous bats and birds dwelling, viz., the rare *Myotis bechstenii*, *Nyctalus leislerii*, *Strix uralensis*, *Aegolius funereus*, *Glaucidium passerinum,* 8 species of woodpeckers, *Regulus regulus*, *Turdus torquatus*, *Loxia curvirostra*, *Cinclus cinclus,* etc.

Tetrao urogalus rudolf being widely distributed in the forests of the Chornohora is very rare on other territories and therefore it is listed to the "Red Book of Ukraine" (1996).

Vipera berus and *Lacerta vivipara* are rather widely distributed in the Chornohora, but *Lacerta agilis* and *Anguis fragilis* are rare here.

Amphibian are represented here by *Rana temporaria*, *Bombina variegata* and *Bufo bufo.* The rare endemic species *Triturus montandoni* and *T. alpestris* breed in small stagnant reservoirs; they are included into the “Red Book of Ukraine”, and *T. alpestris* is a more rare one.

Salmo trutta m. fario, Thymalus thymalus, Cottus gobio, Cobitis taenia and *Phoxynus phoxynus* occur in the mountain rivers in the Chornohora, and *Eudonthomyzon danfordi* rarely occur here.

There is a number of the Carpathian and Eastern Carpathian endemics occuring at the territory of this cluster only [viz., *Calosoma inquisitor*, *Carabus transsylvanicus*, *Trechus plicatulus* and *Duvalius ruthenus* (Carabidae, Coleoptera)].

2.a.2 Havešová (Slovak Republic)

Abiotic conditions

Havešová National Nature Reserve is located in the Nasta mountain range of the Bukovské Vrchy Mountains, in the Dukla unit of the Carpathian outer flysch belt, between the villages of Kalná Ráztoka and Stakčínska Ráztoka. It belongs administratively to Snina District. The reserve's primeval forest stands are located from 440 to 741 metres above sea level.

The reserve is classified into the moderately warm mountainous climatic-geographical type. Mean annual temperature is 6.0–6.5 °C and the growing season lasts from 145–150 days a year. The annual precipitation is 800-850 mm, and snow cover can be observed for 140–145 days a year.

Bedrock beneath the reserve is sandstone flysch, or more precisely, Cisna sandstone layers with fine conglomerates and claystone of the Palaeocene age. The wild appearance of the reserve is accentuated by deep gullies formed on fissures by the erosion of soft claystone patches between layers of harder sandstone. The gullies are deep and have steep unstable slopes, and can form even when the relief gradient is only 3°. This substrate gave rise to average depth Cambisols (i.e., those soils that were until recently classified as "brown forest soils"). These soils are formed by a partial soil-forming process called "browning". This process is typical of biologically active environments with a pH of 4.5–7 and a well-balanced biogeochemical cycle. The process results in the formation of a massive brown Cambic diagnostic horizon that lends its colour shade to the entire soil profile. These soils occupy approximately two-thirds of the total forested area in Slovakia. They are typical soils of the most common forest ecosystems in Slovakia—beech forest. The Cambisols in the reserve differ distinctly, due to the presence of slopes of opposite aspect (southern and northern). Eutric Cambisols are prevalent on slopes with southern aspect, while Dystric Cambisols are prevalent on slopes with northern aspect. Overall, soil conditions are favourable and productive, allowing beech to reach heights of nearly metres with diameter nearly 100 cm and heights up to 56 m.

Biota

Massive beech trees *(Fagus sylvatica)* form stands with sparsely admixed (less than 5 % of the standing volume) sycamore *(Acer pseudoplatanus)*, common ash *(Fraxinus excelsior)* and wych elm *(Ulmus glabra).* Since the Subboreal period, beech has been the dominant deciduous tree species in Slovakia, and it is the backbone of this reserve, as well as many nature reserves in the country. Sycamore and common ash in combination only contribute approximately 5% of the total tree volume in Havešová Reserve.

In terms of phytocenology, the forests of Havešová are part of larger Carpathian beech forests of flysch areas, containing dominant East Carpathian species such as comfrey *(Symphytum cordatum),* and they are also a part of the sub-oceanic beech populations that spread along the outer Carpathian Arc up to the Ukraine. These sub-oceanic populations contain wood speedwell *(Veronica montana),* yellow pimpernel *(Lysimachia nemorum), Streptopus amplexifolius*, and other species. The reserve's beech forests possess a typical depauperate appearance due to the very low density of the herb layer. The most important diagnostic herb species of these forests are *Dentaria glandulosa*, a Carpathian endemic species, and sweet woodruff *(Galium odoratum).* In beech-linden forests that have high nitrogen levels, dog's mercury *(Mercurialis perennis)* and other nitrophilous species are common.

Havešová National Nature Reserve contains nearly homogeneous beech forests with significantly variable height and diameter structure. Its developmental cycle lasts 220-250 years. The developmental stages occur within spatially restricted small patches and can be delineated based on the proportion of trees within the middle overstorey and the average diameter of trees from the upper overstorey. According to the latest research, which was carried out in 1999, most forests of the reserve are in the maturation developmental stage (45-50 % of the area of the reserve), followed by the senescence stage (30-35%), and the optimum stage (20-25%). Shelterwood regeneration takes place in the reserve's forests within small 10–14 are patches and groups. Developmental independence is reached on 30 ha.

Because of the clear dominance of beech in the reserve, it is very rich in phytophagus insect species that are developmentally dependent on beech, as well as predators and parasitoids of these species. Many species of beetles develop in dead branches and trunks in various stages of decay, with each stage having a specific fauna. The blue longhorn beetle *(Rosalia alpina)* is perhaps the most beautiful of these.

Birds in the reserve include characteristic nesting species such as the stock pigeon *(Columba oenas),* the woodpecker *Dendrocopos leucotos*, and the red-breasted flycatcher *(Ficedula parva)*. Chaffinch *(Fringilla coelebs),* old world robin *(Erithacus rubecula),* coal tit *(Parus ater),* and nuthatch *(Sitta europaea),* the most common inhabitants of this primeval forest, are also worthy of mention.

2.a.3 Kuziy-Trybushany (Ukraine)

Abiotic conditions

Being the part of the Carpathian Biosphere Reserve, the “Kuziy-Trybushany” cluster is located on the southern outshoot of the Svydovets Mountain Ridge and its altitude is in limits 360-1.409 m above sea level. This cluster represents the periphery part of the Maramorosh crystalline middle-mountain massif (the Rakhiv-Chvychynsky Physical-Geographic Region of the Eastern Carpathian Subprovince).

Gneiss and quartzite occur at the territory of this cluster, and they are partially saturated with precious metals. Being the edge of the mountain scole and shifts, it also contains dolomites, limestone and hard marlstone. There is a line of Jurassic limestones in the southern part of the cluster, which usually is situated deeply under flysch in other parts of the Transcarpathia. Besides, their fragments are on the surface and look like rocks.

The climatic conditions are softer than in the High Mountains here. Average annual temperature is + 7° C, and average annual precipitation 600 mm (430 mm fall during warm season). The snow cover thickness is 40–60 cm, and in the higher localities it reaches 50–100 cm.

The cluster covers the upper part of Tysa’s left tributaries drainage basins.

Acid (dystrophic) brown soils totally dominate in the topsoil of the cluster. The characteristic features of soils here are: high pH level (4.0); a powerful profile of 80-100 cm; rich content of rough humus (10-12% in upper horizons and 1-2% in transition and bottom horizons); a low content of amphoteric bases (degree of saturation less than 30%). Like in the previous clusters, soils are very stony, mostly mid-loamy with good penetration of water and air.

Biota (vegetation and flora)

The total area of the cluster is 4.533 ha: core zone is 360 ha and buffer zone is 4.173 ha.

The oak-beech forests with admixtures of *Carpinus betulus*, *Acer pseudoplatanus* and other species occur in the forest mountain belt at 330-1.410 m, and since 400 m the pure beech forests predominate, and most of them (96%) are natural.

This cluster is remarkable because of its significant coenotic diversity. Within the beech virgin forests, there are ca. 20 communities, and within them the pure beech forests dominate, viz.,*Fagetum galiosum odoratae* and *Fagetum dentariosum.* Besides, here are a number of communities, viz., *Fraxineto-Fagetum, Acereto-Fagetum, Taxoso-Fagetum* and *Querceto petraeae–Fagetum* occuring on limestone and dolomite. Meanwhile, communities *Fagetum* *taxoso-mercurialidosum, Fagetum festucosum silvaticae* and *Piceeto-Fagetum sesleriosum heuflerianae* are rather rare within this cluster.

There are the rare or unique virgin forest communities *Quercetum petraeae* and *Abieto-Quercetum petraeae-Mercurialidosum perennis*. Exactly within foregoing communities the unusual heat-loving species occur, viz., frutices *Cornus mas, Swida sanguinea*, and herbs *Ranunculus cassubicus* and *Symphytum popovii.*

The flora of this comparatively small cluster is very rich: it includes ca. 600 species of the Vascular Plants and ca. 220 species of the Cryptogames (ca. 100 species of mosses, 40 species of lichens, 80 species of algae and 60 species of fungi). Within the foregoing flora there are 35 rare or endangered species included into the "Red Book of Ukraine" (viz*., Taxus baccata, Campanula carpatica, Cephlanthera rubra, Iris pseudocyperus,* etc.)

Biota (animal world)

49 species of mammals, 79 species of birds, 7 reptile species, and 7 amphibian species, 12 fish species and 1 species of *Cyclostomata* occur here. Besides, several thousands of invertebrates are distributed here, viz., 1 species of *Colembola,* 12 species of *Nematoda,* 7 species of *Myriapoda,* 109 species of *Lepidoptera,* and others.

The usual for the Carpathian forests species are widely distributed here, viz., mammals *Cervus elaphus montanus, Sus scrofa attila, Capreolus capreolus, Vulpes vulpes*, *Meles meles, Martes marte* and others. *Ursus arctos* often hibernates here, *Lynx lynx* isn't a permanent dweller of this cluster and it appears here from time to time. Besides, *Artiodactyla* are very numerous here. *Felis silvestris* occurs here too, but their animals are few few. There are several caves and galleries on the territory of the cluster. 8 species of bats dwell here and 4 of them are included into the "Red Book of Ukraine": *Rhinolophus hipposideros*, *Rh. Ferrumequinum*, *Myotis bechsteini* and *Barbastella barbastellus*. Besides, dendrophilous bats are well represented here.

The bird fauna is very diverse here because of the forest diversity. There is a great number of birds nesting in hollows of tree-trunks, and all species of woodpeckers usual in the deciduous biome occur here.

Four bird species nesting here (*Aquila chrysaetos, Strix uralensis, Aegolius funereus* and *Glaucidium passerinum*) are included into the "Red Book of Ukraine".

Elaphe longissima is included into the "Red Book of IUCN" and its number is rather large here. Besides, reptiles *Lacerta vivipara, L. agilis, Anguis fragilis,* and *Natrix natrix* are usual here.

The endemic of the Carpathians *Triturus montandoni*, and reptiles *Salamandra salamandra, Rana temporaria, Bombina variegata* and *Bufo bufo* occur within this cluster, and *Salmo trutta m. fario, Thymalus thymalus, Cottus gobio* and other fish species inhabit local rivers.

2.a.4 Maramorosh (Ukraine)

Abiotic conditions

Being a part of the Carpathain Biosphere Reserve (CBR), this cluster is located on the northern megaslope of the Rakhiv Mountain Ridge – an offshoot of the Maramorosh crystalline massif, at 380–1.940 m (Rakhiv-Chyvchynska Physical-Geographic Region of the Eastern Carpathian Subprovince).

This territory is very close to the Romanian National Nature Park “Maramures Mountains”. It is unique within the clusters because being of the part of the Rakhiv and the Radomyr functional zones and the Maramorosh crystalline massif. There are also flysh carbon-terigen sediments of the bottom chalk, volcanic rocks of the main constitution, upper Jurassic carbonate rocks, as well as metamorphic rocks of the basal complex (upper Proterozoic shist and gneiss, Vendian-Cambrian shist and quartz shist), and also carbonate-terigen rocks (conglomerate and conglomerate-breccia, sandstone, aleurite, upper Paleozoic and Jurassic limestone and argillite).

The landscapes of the cluster are mainly Middle Mountain erosion with patches of leveled denudation surfaces and fragments of ancient (Pleistocen) glacial landscapes. The essential part of this cluster consists of erosion-denudation slopes of valleys and mountain ridges complicated by smaller morphologic-sculptural fragments.

The climatic conditions here are softer than the same within other Carpathian Highlands. Average annual temperature is +7° C; average precipitation is 600 mm (430 mm fall during a warm season). Thickness of snow cover is ca. 40-60 cm (sometimes till 50–100 cm).

The cluster covers the upper part of Tysa’s left tributaries drainage basins.

Acid (dystrophic) brown soils dominate in the topsoil of the cluster. The characteristic features of soil here are: high pH level (pH 4.0), a powerful profile of 80-100 cm, rich content of rough humus – 10-12% in upper horizons and 1-2% in transitional and bottom horizons, a low content of amphoteric bases (degree of saturation less than 30%). The upper part corresponds to acid (dystrophic) brown soil, and the bottom one – to eutrophic saturated with calcium brown soils with neutral reaction. Soils are very stony, mostly mid-loamy with good penetration of water and air into them.

Biota (vegetation and flora)

The total area of the Maramarosh cluster is 8.474 ha: core zone is 582 ha, buffer zone is 7.892 ha.

The forest mountain belt occurs at 380–1.680 m above sea level, and most of forests here are natural. Within pure beech forests, there are mainly *Fagetum galiosum* and *Fagetum symphytosum*, but the mixed beech-spruce and beech-fir natural forests predominate and they are widely distributed here (ca. 20 communities). Within them are *Abieto-Piceeto-Fagetum oxalidosum, Piceeto-Abieto-Fagetum mercurialidosum, Piceeto-Abieto-Fagetum galiosum, Abieto-Fagetum symphytosum, Acereto-Fagetum symphytosum* predominate. The very valuable and rare forest communities are ones with the participation of *Taxus baccata*.

As a whole, ca. 980 plant species are distributed within this cluster: ca. 490 species of the Vascular Plants, 260 species of mosses, 90 species of lichens, 120 species of algae and 16 species of fungi. Within them 35 species are regarded as rare, all of them included into the "Red Book of Ukraine" (1996) and therefore they are under protection, viz., *Campanula carpatica, Centaurea carpatica, Cephalanthera longifolia* and *Lilium martagon*. Besides, a lot of the extremely rare species occur in the High-Mountain Belt, viz., *Gentiana lutea, Primula minima, Anthemis carpatica, Narcissus angustifolius, Anemone narcissiflora, Pulsatilla alba,* etc. Within the *Cryptogames, Hookeria lucens, Hookeria lucens, Lobaria amplissima, L. pulmonaria, , Plagiothecium neckeroideum, Russula turci, Sarassis crispa, Schistostega pennata, Usnea florida, U. longissima* and others occur.

Biota (animal world)

The Maramarosh vertebrate fauna core includes mainly species belonging to the deciduous, Taiga and Alpine complexes. 42 mammal species, 68 bird species, 7 reptile species and 7 amphibian species occur within the cluster, meanwhile, 7 species of fish and 1 species of *Cyclostomata* inhabit local mountain rivers. There are a lot of invertebrates, viz., 43 species of *Colembola*, 4 species of *Nematoda*, 4 species of *Myriapoda*, 75 species of *Lepidoptera*, etc.

Species of mammals occured here are usual for the forest belt of the Carpathians, viz., *Cervus elaphus montanus*, *Sus scrofa attila*, *Capreolus capreolus*, *Vulpes vulpes*, *Martes martes*, as well as large predators: *Lynx lynx*, *Canis lupus* and *Ursus arctos*. Besides, *Meles meles*, *Mustela lutreola* and *Lutra lutra* are included into the "Red Book of Ukraine" (1996).

About 10 bat species spend the summer or winter in the old galleries on the territory of the Maramorosh cluster. Within these species, there are those regarding as rare ones everywhere, viz., *Strix uralensis*, *Aegolius funereus* and *Glaucidium passerinum* nestling in tree-trunks hollows.

Several bird species (viz., *Tetrao urogalus rudolfi, Strix aluco*, *Picoidus tridactylus, Regulus regulus, Turdus torquatus, Loxia curvirostra, Cinclus cinclus)* are usual here. The bird fauna of the cluster is very peculiar due to its rocky landscapes. *Falco peregrinus* and smaller Falcons, viz., *F. subbuteo* ^{3} *F. tinnunculus,* occur only here, because of their preference to dwell in rocks. *Nucifraga caryocatactes* occurs here while nestling.

Vipera berus and *Lacerta vivipara* are widely distributed here, but *Lacerta agilis* and *Anguis fragilis* are rather occasional.

There are amphibians, viz., *Bombina variegata*, *Rana temporaria* and *Bufo bufo,* and the first two species are more numerous. The endemic *Triturus montandoni* and *T. alpestris* occur here and they are included into the “Red Book of Ukraine”.

The mountain rivers in the Maramorosh cluster are inhabited by *Salmo trutta* m. *fario*, *Thymalus thymalus*, *Cottus gobio, Cobitis taenia*, *Phoxynus phoxynu;* and *Eudonthomyzon danfordi* (*Cyclostomata*) occur rather rarely.

Being the Carpathian and Eastern-Carpathian endemics, a number of invertebrates occur in the Maramorosh only, viz., *Carabus fabricii*, *Nebria transsylvanica* and *Trechus carpaticus* (*Carabidae, Coleoptera*).

2.a.5 Rožok (Slovak Republic)

Abiotic conditions

The site, one of the most productive beech primeval forests on the Slovak territory. It is a national nature preserve embedded in the B-zone of the Poloniny National Park. The property is located in the Bukovské Vrchy (Bukovské Hills), in its part Kremencové Pohorie (Kremencové Mts.), northeast of Ulič, a village in the Snina District. It touches the boundary between Slovakia and Ukraine and borders on the Ukrainian Uzhansky National Nature Park (UNNP). The national nature preserve extends at the elevation 500–790 m a.s.l., on a NW slope from sandstones and claystone slope deposits within the outer Carpathian flysch belt. Its largest part is underlain by a rhythmic series of thinly flysch layers. Thin layers of sandstone and various claystones are superimposed on each other.

The average yearly temperature is 7 ºC, the annual precipitation ranges 780 mm and the vegetation period lasts about 190 days. Its climate has been classified in the mildly warm mountainous and moderately cold mountainous climatic-geographical types. Cambisols rich in humus have gradually formed on light grey daze sandstones and dark grey marl-clay slates. They are eutric to mesotrophicl, sandy clays, loamy clays and loams with featuring good water, air and nutrients regimes. These soils provide the basis for a higly productive primeval beech forest with the average age of trees 130 years, 210 years in the main canopy. The average standing volume ranges from 577 to 794 m^3 ha^{-1}.

The reserve is drained by Zbojský Potok brook that mouthing into Stužica River, which in turn drains into the Uh River and is a part of the Bodrog River watershed.

Biota

Massive beech trees *(Fagus sylvatica)* form stands with sparsely admixed (less than 2 % of the standing volume) sycamore *(Acer pseudoplatanus)*, common ash *(Fraxinus excelsior)* and wych elm *(Ulmus glabra).* Since the Subboreal period, beech has been the dominant deciduous tree species in Slovakia, and it is the backbone of this reserve, as well as many nature reserves in the country.

In terms of phytocenology, the forests of Rožok constitute a part of larger Carpathian beech forests of flysch areas, containing dominant East Carpathian species such as comfrey *(Symphytum cordatum),* and they are also a part of the sub-oceanic beech populations that spread along the outer Carpathian Arc up to the Ukraine. These sub-oceanic populations contain wood speedwell *(Veronica montana),* yellow pimpernel *(Lysimachia nemorum), Streptopus amplexifolius,* and other species. The reserve’s beech forests possess a typical depauperate appearance due to the very low density of the herb layer. The most important diagnostic herb species of these forests are *Dentaria glandulosa*, a Carpathian endemic species, and sweet woodruff *(Galium odoratum)*. In beech-linden forests that have high nitrogen levels, dog's mercury *(Mercurialis perennis)* and other nitrophilous species are common.

Rožok National Nature Reserve contains nearly homogeneous beech forests with significantly variable height and diameter structure. Its developmental cycle lasts 220–230 years. The developmental stages occur within spatially restricted small patches and can be delineated based on the proportion of trees within the middle overstorey and the average diameter of trees from the upper overstorey. According to the latest research, which was carried out in 1999, most forests of the reserve are in the maturation developmental stage (45–50 % of the area of the reserve), followed by the senescence stage (30–35%), and the optimum stage (20–25%). Shelterwood regeneration takes place in the reserve's forests within small 10–14 are patches and groups. Developmental independence is reached on 30 ha.

Because of the clear dominance of beech in the reserve, it is very rich in phytophagus insect species that are developmentally dependent on beech, as well as predators and parasitoids of these species. Many species of beetles develop in dead branches and trunks in various stages of decay, with each stage having a specific fauna. The blue longhorn beetle *(Rosalia alpina)* is perhaps the most beautiful of these.

Birds in the reserve include Ural owl (*Strix uralensis*) and characteristic nesting species such as the stock pigeon *(Columba oenas)*, the woodpecker *Dendrocopos leucotos*, and the red-breasted flycatcher *(Ficedula parva)*. Chaffinch *(Fringilla coelebs)*, old world robin *(Erithacus rubecula)*, coal tit *(Parus ater)*, and nuthatch *(Sitta europaea)*, the most common inhabitants of this primeval forest, are also worthy of mention.

2.a.6 Stužica – Bukovské Vrchy (Slovak Republic)

Abiotic conditions

Stužica – Bukovské Vrchy is a contigeous complex of beech primeval forests that extends from the headwaters of the Udava River (Nízke Beskydy Mts.) in the North-West to the headwaters of Stužica River (Bukovské Vrchy Mts.) in the South East. The complex comprises four primeval forest preserves (Udava, Pľaša, Rjaba Skala and Stužica) and beech primeval forests of the A (core) zone of the Poloniny National Park. Its territory lies within the borders of Snina District. It touches the boundaries of Slovakia, Poland, and the Ukraine. The territory is characterised by a great range in altitude, from 650 to 1121 metres above sea level. It has been classified in the mildly warm mountainous, moderately cold mountainous, and cold mountainous climatic-geographical types. Mean annual temperature in the reserve is 3.5–6.0 ºC, and the growing season lasts 90 to 140 days. Annual precipitation is 900–1250 mm and snow cover is present 145–180 days a year.

The property lies in the outer Carpathian flysch belt. Its largest part is underlain by a rhythmic series of thinly flysch layers. Thin layers of sandstone and various claystones are superimposed on each other. Cambisols rich in humus have gradually formed on light grey daze sandstones and dark grey marl-clay slates, thus including the whole range of Cambisols that occur in the primeval forests of Slovakia. Soil variability results from the high range in altitude, from the fact that the reserve occupies three forest vegetation zones (4^{th}–6^{th}), and from the reserve's great diversity in slope gradient and aspect.

Eutric Cambisols, the most common forest soils in Slovakia, are the main soil types in the reserve. They are high quality soils with favourable humification, usually excellent physical qualities, and good nutrient content. At altitudes over 1000 m, the Eutric Cambisols is replaced by Dystric Cambisols with pH around 4.0. Cambisols help provide the basis for productive sites with natural beech-fir forest communities. At the highest altitudes in the reserve, where short-statured maple beech forests occur, a short growing season appears to be the factor limiting forest productivity.

The reserve is drained by Stužická rieka (Stužica River) through a fan-like network of tributaries and springs with a water regime that is relatively balanced over the course of a year. Stužica River drains into the Uh River and is a part of the Bodrog River watershed.

Biota

Primeval forest plant communities that are protected within the reserve occur within the 4^{th} beech forest vegetation zone and 5^{th} fir-beech forest vegetation zone. The beech primeval forests complex contains some 200 year old beech *(Fagus sylvatica)* specimens and >300 year old clusters of silver fir *(Abies alba)* including exceptionally large individuals, as well as equally respectable sycamore *(Acer pseudoplatanus)* trees. Sycamore often occurs in stony gullies with common ash *(Fraxinus excelsior)*. The presence of sycamore and rowan *(Sorbus aucuparia)* is even more visible on ridges in the reserve. A section of forest in the 4th forest vegetation zone, where beech is the dominant species, contains the highest proportional presence of fir of any primeval forest in eastern Slovakia. Its total volume percentage can reach 35%, but the number of fir individuals never exceeds 10% of the total tree number per hectare.

It has been shown that the presence of fir enriches the productivity of the forests in the reserve, as well as their overall function during the optimum and senescence developmental stages. This is due to the lifespan of fir, which is significantly longer than the lifespan of beech. It is quite common for firtrees to outlive even 2 generations of beech. Fir diameter can reach 160-180 cm, and its volume can exceed 30 m^3. The presence of fir makes itself felt most during the advanced phase of the maturation developmental stage of the 2nd beech generation, when there is the greatest height differentiation in stand structure. Fir abundance increases in the 5th forest vegetation zone of the reserve, but beech remains the core species and continues to determine the structure and development of forest stands. Fir is 20-30% of the total standing volume. Stands in this zone are characterized by a typical hierarchical structure that is sometimes multi-layered. Beech is regarded as the determinant species of the developmental cycle, which lasts 230 to 250 years. In the senescence developmental stage, the gradual elimination of surviving beech individuals is a characteristic process. This means that the spatial structure of stands in this stage has a small-scale pattern. Developmental stages rapidly change and overlap within relatively limited areas. Developmental stage length differs when fir is present in higher numbers. The final life stages of beech are connected with the prosperity of fir growth, thus contributing to the differentiated structure of the forest stands.

The herb layer of forests in the reserve contains, in addition to typical beech forest species, sweet woodruff *(Galium odoratum)*, evergreen asarabacca *(Asarum europaeum)*, and dog's mercury *(Mercurialis perennis)*. Eastern Carpathian species are also present, such as comfrey *(Symphytum cordatum)*, spurge *(Tithymalus sojakii)*, as are a large number of suboceanic and oceanic species, such as *Aposeris foetida*, wood speedwell *(Veronica montana)*, and fescue *(Festuca drymeja)*. Spring brings the very common Carpathian endemic species *Dentaria glandulosa*. The attractive and noticeable perennial *Lunaria rediviva* resides in gullies and below ridge slopes. Mountain species such as alpine coltsfoot *(Homogyne* *alpina)*, blue sow thistle *(Cicerbita alpina)*, alpine lady fern *(Athyrium distentifolium)* and greater woodrush *(Luzula sylvatica)*, are dominant in the area of the main ridge.

From the viewpoint of biodiversity, the forests of Stužica Reserve, like other primeval forests but in contrast to commercially managed forests, host a great wealth of algae, mosses, and lichens that thrive on rocks, tree trunks and branches, and in the soil. Some insect species are dependent on this flora, including the butterfly species *Mircopterix osthelderi* and a number of other butterfly species from the genera *Bacotia*, *Dahlica*, *Taleporia*, *Proutia* and *Psyche*.

Among typical nesting birds, the Ural owl *(Strix uralensis)*, hazel grouse *(Bonasa bonasia)*, three-toed woodpecker *(Picoides tridactylus)*, red-breasted flycatcher *(Ficedula parva)*, pygmy owl *(Glaucidium passerinum)*, and white-backed woodpecker *(Dendrocopos leucotos)* have been observed. The European bison, or wisent *(Bison bonasus)* has been sighted in the reserve in recent years. Elk *(Alces alces)* is another rare mammal species found in the reserve, and wolf *(Canis lupus)* is quite common.

2.a.7 Stuzhytsia – Uzhok (Ukraine)

Abiotic conditions

This cluster is a part of the serial nomination and a part of the “Uzhanskiy National Nature Park” (UNNP), located in the western part of the Transcarpathian Region in the Tysa River basin in the frontier zone and close to the borders with the Slovak Republic and Poland.

The area of the cluster belongs to the three climatic zones: warm, temperate and cold, having the annual precipitation 850–1.000 mm and snow cover the ground during 120–180 days.

This area mainly includes flysch hills based on upper chalk layer and the Magura Zone (topsoil formed during Paleogene). The most usual soils are brown soils and meadow brown soils based on alluvial and delluvial sediments.

Biota (vegetation and flora)

The total area of the “Stuzhytsa-Uzhok” cluster is 6.147 ha: core zone is 2.532 ha, and buffer zone is 3.615 ha.

The territory of Stuzhytsa-Uzhok is situated in the Stavnensko-Zhdenivskyi Geobotanic Region.

Soil and climate here are favorable for beech forests which occupy the vast territories at elevation 400-1.200 (1.250) m above sea level. The beech mono- and oligodominant climax communities predominate here, viz., *Fagetum nudum, Fagetum dentariosum glandulosae, Fagetum festucosum (altissimae)* and *Fagetum ruboso hirti–festucosum (altissimae).* A noticeable admixture of *Acer pseudoplatanus, A. platanoides, Fraxinus excelsior*, but sometimes of *Acer campestre* and *Cerasus avium* is characteristic for these forests. At 1.200-1.260 m (upper limit of growing of deciduous trees), there is a transitive zone of beech crooked forests.

Meanwhile, the communities *Acereto pseudoplatani-Fagetum-Ruboso hirti-dryopteridosum filix-max* and *Acereto-Fagetum dryopteridosum filix-max* occur the rocky slopes. In Stuzhitsa-Uzhok two groups of sycamore-beech forests occur, and they are sycamore-beech groves growing on rocky slopes and the same on the upper timber level.

The grass layer of the foregoing forests includes *Athyrium filix-femina, Dryopteris filix-mas, Carex pillosa, Festuca altissima, Mercurialis perennis, Dentharia bulbifera, Lunaria rediviva, Symphytum cordatum, Salvia glutinosa, Senecio fuchsii, Oxalis acetosella, Actea spicata*, but also in early spring *Anemone nemorosa, A. ranunculoides, Corydalis cava, C. solida*, etc. Within them, *Galanthus nivalis, Leucojum vernum* and *Lilium martagon* are regarded as rare plants.

Biota (animal world)

The Carpathian endemic vertebrates *Sciurus vulgaris carpathicus, Lynx lynx carpathica, Dendrocopos leucotos carpathicus, Cervus elaphus carpathicus* occur in this cluster.

Within carnivores the most usual is *Ursus arctos* that dwells very to the borders of Poland and the Slovak Republic (territory of the Novo-Stuzhytske forestry).

Besides, here *Canis lupus* occurs and in stony localities *Meles meles* is present, *Capreolus capreolus* and *Sus scrofa* also occur here.

Strigiformes are represented here by *Asio otus, Strix aluco, S. uralensis.* Within *Piciformes* there are woodpackers *Dryocopus martius, Dendrocopos major, D. leucotos, D. minor.* Meanwhile, *Passeriformes* are represented here by *Garrulus glandarius, Corvus corax, Erithacus rubecula, Parus ater, P. major, Sitta europaea, Fringilla coelebs, Pyrrhula pyrrhula.*

Within *Amphibia (Caudata), Salamandra salamandra* and within *Reptilia Elaphe longissima* and *Vipera berus* are included into the “Red Book of Ukraine” (1996).

There is a lot of endemic invertebrate species, especially insects, viz., *Carabus zawadszkii, C. hampei, Nebria reitter, Duvalius subterraneus carpathicus*; and lots of species of *Staphylinidae (Chrysomeiidae, Curculionidae).*

There also species ocurring only in the north-western part of the Ukrainian Carpathians, viz., *Cychrus attenuatus* , *Pterotichus burmeisteri*.

In the upper parts of streams species of the *Gammarus* and *Niphargus* occur, and also the tertiary relict *Niphargus* remained in underground streams.

The rather rich fauna of invertebrates is noted in the mixed beech-fir stands, viz., Arthropods *Phatang Hdae, Lithobius forficatus,* beetles *Carabus violaceus,* as well as species of *Cychrus, Abax, Pterostichus, Philontus, Ocypus, Quedius*. A lot of them are endemic for the Carpathians or characteristic for the mountains of Central Europe. *Arrnadiilum* occurs, as well as larvae of *Lucamdae (Oryctes nasicornis), Cetoninae, Elateridae*. In the wet forest biotopes the numerous *Arthropods* (*Coliembola)* occur, and also *Carabus linnei, C. eschen.* Larvae, viz., *Lymexylonsdae, Buprestidae,* and *Cerambycidae,* dwell in the stands disturbed by windstorms. One of the most beautiful and rare beetles *Rosalia alpina* occurs here. There are species of *Staphylinidae, Histeridae, Cuccujidae and Thanasimus formicarius, Cucujidae. Cucujus cinnabarinus* is included into the “Red List of Europe” but it is rather widespread in some localities of Stuzhitsa-Uzhok. Within parasites, *Ichne urn onidae* is the most numerous one. *Gonepteryx rhamni, Nymphalis antio, Nymphalis polychloros, Inachis ³î* and *Aglais uriicae* are widely distributed here.

2.a.8 Svydovets (Ukraine)

Abiotic conditions

Being a part of the CBR, this cluster is located on the slopes of the Svydovets Ridge and on its offshoots at 350-1.883 m and it belongs to the Svydovets-Chornohirskyi Physical-Geographic district of the Polonynsko-Chornohirskyi Region of the Eastern Carpathian Subprovince.

The flysch formations with dominating clay and aleurite are present in the geologic structure of the cluster, and sandstones with admixtures of limestone occur here.

The western part of Svidovets is characterized by the Middle-Mountain landscapes complicated by erosion-denudation activity of streams. Besides, the fragments of the High-Mountain Meadow denudation leveled surface are characteristic features of the Svidovets summits; they are mainly flat saddles and gently sloping foothills, and they are complicated by the signs of an ancient icing with typical glacial forms (karrens and trough valleys).

The climatic conditions here vary from moderate-warm to cold. Annual precipitation is 750–1.500 mm.

The cluster covers the drainage area of the rivers Chorna (Black) Tysa and Kisva (right tributary of the Tysa River). A dense network of streams curves this area.

Acid (dystrophic) brown soils totally dominate in the topsoil of the cluster, and only small patches on rocks are covered with primitive and initial soils. The characteristic features of soils here are the high pH level (ca. 4.0), a powerful profile of 80-100 cm; rich content of rough humus (10-12% in upper horizons and 1-2% in transition and bottom horizons), and a low content of amphoteric bases (degree of saturation less than 30%). Brown soils on limestone rocks have a two-member grid (double structure). The upper part corresponds to acid (dystrophic) brown soil, and the bottom one to eutrophic saturated with calcium brown soils with neutral reaction. Soils are very stony, mostly middle-loamy with good penetration of water and air into them.

Biota (vegetation and flora)

The total area of the cluster “Svydovets” is 8.670 ha: core zone is 1.525 ha and buffer zone is 1.145 ha, and here is the richest flora within the Ukrainian Carpathians. Beside the forest vegetation belt, the High-Mountain belt (mainly subalpine and partly alpine) occur within the Svidovets site.

Soil-climatic conditions are optimal for beech, therefore its communities here are of a climax character, and they are mainly *Fagetum rubosum hirtae, Fagetum asperulosum,* *Fagetum dentariosum* and *Fagetum sparsiherbosum*. Other tree species (*Acer pseudoplatanus*, *A. platanoides, Fraxinus excelsior* and *Ulmus scabra*) are usual here.

In the upper part of the forest belt the communities *Fagetum oxalidosum, Fagetum myrtillosum* are widely distributed and sometimes *Fagetum calamagrostidosum villosae* occurs. The rare species *Galanthus nivalis*, *Epipactis helleborine*, *Listera ovata*, *Lilium martagon* and some others occur in the foregoing virgin beech forests.

The mixed forests *Acereto-Fagetum* and *Fraxineto-Acereto-Fagetum* occur on the rocky slopes because of the low viability of *Fagus sylvatica* here.

As a whole, ca. 860 plant species are distributed within this cluster: 400 species of the Vascular Plants, 180 species of mosses, 135 species of lichens, 95 species of algae and 50 species of fungi. There are 37 species included into the "Red Book of Ukraine" (1996) being under protection here, viz., *Botrychium lunaria, Hupertia selago,* etc., but also *Aster alpinus, Gentiana excisa*, Leontopodium *alpinum, Dryas octopetela*, *Pinquicula alpina* and others (grow mainly on the high-mountain rocks), mosses *Hookeria lucens*, *Plagiothecium neckeroideum,* lichens *Lobaria amplissima*, *L. pulmonaria*, *Usnea florida*, *U. longissima*, *Coriscium viride,* and fungi *Hericium coralloides*, *Clavariadelphus pistillaris*.

Biota (animal world)

40 species of mammals, 82 bird species, 6 reptile species, 7 species of amphibian and 8 species of fish occur at the territory of the cluster, and the entomofauna of the Svydovets is very rich too, viz., there are 74 species of Lepidoptera here.

Within the fauna of Svidovets, the species characteristic for the broad-leaved and boreal (Taiga) forests and also of the Alpine complexes are represented. Besides, species usual for the forest belt of the Carpathians occur the virgin forests of the cluster, viz., mammals *Cervus elaphus montanus, Sus scrofa attila*, *Capreolus capreolus*, *Mustela lutreola*, *Lutra lutra, Meles meles*, *Martes martes*, *Vulpes vulpes*, *Canis lupus*, *Ursus arctos, Lynx lynx*, *Felis silvestri* and others.

A number of hollow tree-trunks are characteristic for the cluster, and the dendrophilous bats and birds nest in them, viz., *Strix uralensis*, *Aegolius funereus*, *Glaucidium passerinum* and others. All species of woodpeckers usual for the deciduous biome occur here, and within them *Strix uralensis*, *Aegolius funereus*, *Glaucidium passerinum Dendrocopos leucotos* and *Columba oenas* rare outside virgin forests on other territories.

Within other bird species, *Buteo buteo*, *Bubo bubo*, *Corvus corax*, *Turdus merula*, *T. torquatus*, *Troglodytes troglodytes*, *Regulus regulus*, *Loxia curvirostra*, *Cinclus cinclu* are widely distributed in Svidovets.

Amphibian are represented by *Rana temporaria*, *Bombina variegata* and *Bufo bufo* including rare endemic *Triturus montandoni* and *T. alpestris* for their reproduction

Vipera berus and *Lacerta vivipara* are the usual reptiles for the cluster, while *Lacerta agilis* and *Anguis fragilis* are rare, and fish species *Salmo trutta m. fario, Thymalus thymalus, Cottus gobio*, *Cobitis taenia*, *Phoxynus phoxynus* and some other species inhabit local mountain rivers.

2.a.9 Uholka-Shyrokyi Luh (Ukraine)

Abiotic Conditions

The "Uholka-Shyrokyi Luh" cluster is an essential part of the Carpathian Biosphere Reserve (CBR) situated on the Polonynsko-Chornohirskyi Mountain Ridge on the southern megaslopes of the High Meadow Krasna (the Polonynskyi Physical-Geographic District of the Polonynsko-Chornohirskyi Region of the Eastern-Carpathian Subprovince). The massif covers the upper part of the drainage area of Mala Uholjka, Velyka Uholjka and Luzhanka rivers (right tributaries of the Tisa River). The altitude above sea level elevates within 380-1501 m. The midlle-mountain to low-mountain landscapes are based on sandy-clayed flysch with steep slopes covered by a dance network of streams, and they are characteristic for the northern part of the foregoing cluster, meanwhile, the rocky low-mountain landscapes (with elements of carst landscape) based on limestone rocks, as well as mountain tops divided by gorges, are characteristic for its southern part.

Climate is moderate: average annual temperature +7° C, average temperature in July +17° C and in January -4°C. Average annual precipitation is 948 mm (622 mm during the vegetation season), average humidity ca. 85%, and snow cover thickness 40-60 (100) cm.

Acid brown soils dominate in the topsoil of the site, and only small parts of the topsoil (mainly on rocks) belong to initial or primitive soils. The pH balance of brown soils is 4.0, topsoil is characterized by powerful profiles of 80-150 cm and by low content of rough humus (ca. 10-12% in upper soil horizons and ca. 1-2% in transitory horizons) and low degree of amphoteric base saturation (less than 30%). Brown soils based on limestones have a two-member grid: the upper part identical to acid brown soils, and the lower one to eutrophic soils (rich in calcium and with neutral reaction). The soils have a rich content of crushed stones; it is mostly mid-loamy with high penetration of water and air into it.

Biota (vegetation and flora)

The"Uholka-Shyrokyi Luh" cluster is situated in the mountain belt of beech forests. Local conditions of soil and climate correspond to the ecological-biological peculiarities of beech because of their growing in a damp and rather soft climate. Within this cluster, the beech communities are characterized by the very high vitality and they have a climax character.

The total area of the cluster is 15.033 ha: 8.835 ha - the core area, and 6.198 ha - a buffer zone. Exactly here the largest massif of the virgin beech forests is situated, and this phenomen confirms an extraordinary value and the unique nature of the foregoing cluster, as well as the greatest importance of the Uholka-Shyrokyi Luh virgin forests for the World Natural Heritage.

There are ca. 65 forest communities belonging to 10 formations, and *Fagus sylvatica* makes up here the continuous forest vegetation belt (in limits from 380 m till 1250-1350 m above sea level). The fresh or wet acid mega- and mesotrophic pure beech forests predominate here (ca. 85% of the foregoing massif). The communities *Fagetum dentariosum* and *Fagetum asperulosum* are distributed on the rich brown soils, and exactly within them some beech trees are up to 55 m in height and ca. 130 cm in diameter. There are other trees (viz., *Fraxinus excelsior, Populus pseudoplatanus*, etc.), frutices (viz., *Sambucus nigra, Daphne mezereum*, etc.) and herbs (viz., *Dentaria bulbifera, Pulmonaria* obscura, *Asperula odorata*, etc.). As a whole, these communities represent the so called phytocoenotic core of the beech forests of the foregoing cluster and the CBR.

The other beech communities here are wet *Fagetum athyriosum, Fagetum rubiosum, Fagetum symphytoso-mercurialidosum* and *Fagetum oxalidosum*, and fresh poor *Fagetum pteridio-vacciniosum, Fagetum-festucoso altissimae, Fagetum moneso-melicosum*, etc.

Meanwhile, in the biotopes with comparatively low viability of beech, mixed communities are distributed, viz., *Querceto petraeae-Fagetum, Carpineto-Fagetum, Acereto pseudoplatani– Fagetum* and others.

On the southern slopes of Uholka massif, in Vezha and Pohar areas, the relict communities *Fageto-quercetum-luzulozum luzuloides, Fageto–quercetum-asperulosum* and *Fageto–quercetum-dentariosum* have remained as the undisturbed ones. Besides, here, especially on limestones, are a lot of relict and endemic species, viz., *Staphyllea pinnata, Corallorhiza trifida*, etc.

Among dominating pure beech stands, communities *Fageto-Aceretum pseudoplatani, Ulmeto-Fraxineto excelsioris-Aceretum pseudoplatani, Fraxinetum excelsioris, Betuletum pendulae* and others are present here in small fragments.

In the localities Hrebin, Zadniy Kaminnyi, Strunga and Mala Kopytsya a number of relict communities have remained. Here are *Fageto-Tilieto-platyphyllae-Sesleriosum-heuflerianae, Fagetum-taxoso-hederosum, Fagetum-taxoso-sesleriosum* and *Fagetum-taxoso–myrtilosum*, but also the rather large natural community Fagetum with the participation of the tertiar relict *Taxus baccata* (unique within Ukraine), and very rare *Juniperetum sabinae.* Besides, on limestones only the communities *Caprineto-Fageto-spiraeoso-Mercurialidosum,* also *Ulmeto-Fraxineto–Aceretum* occur.

The beech forests with an admixture of coniferous species *Abies alba* and *Picea abies* have remained as undisturbed relict ones in the north-eastern part of the cluster (Luzhanka River basin) due to its colder climate. Some fragments of the relict *Picea abies* forests with an admixture mixture of *Betula pendula* are present on these rocks.

Within the "Uholka-Shyrokyi Luh" cluster 725 species of the Vascular Plants grow. 27 of them (viz., *Listera ovata, Platanthera bifolia, Erytronium dens-canis, Atropa belladonna,* etc.) are included into the "Red Book of Ukraine" (1996), and two species (*Pulmonaria filarszkyana* and *Silene dubia*) into the "European Red List" (1992). Within 160 moss species the most characteristic ones are *Sphagnum acutifolium* and *Polytrichum commune,* as well as *Hookeria lucens,* and lichenes (ca. 180 sp.) from *Cladonia, Cetraria, also Lobaria pulmonaria and Usnea florida*, algae (ca. 140 sp.) and fungi (ca. 100 sp) *Clavariadelphus pistillaris, Mutinus caninus, Amanita caesarea (*all of them included into the "Red Book of Ukraine").

Biota (animal world)

The fauna of beech virgin forests in this cluster is rich. Animal species usual for the Carpathians occur here together with the species regarded as rare or unique. The ungulates *Cervus elaphus*, *Capreolus capreolus*, *Sus scrofa* are usual dwellers of this site, and carnivores *Vulpes vulpes*, *Martes martes*, *Putorius putorius* are usual here too. Beech virgin forests are a shelter for the rare mammals: *Lynx lynx, Ursus arctos, Mustela erminea, M. lutreola*, *Meles meles, Neomys anomalus,* and *Sorex alpinus* (54 sp. all in all*)*. Being very rare, *Felis silvestris* is a permanent dweller of this territory. Fauna of *Cheiroptera* is very rich too, and most *Cheiroptera* species live in carst caves. Within 20 species of bats occuring here, 8 species are regarded as the unique and endangered. The winter colonies of *Cheiroptera* hibernating in local karst caves are probably the most numerous in Europe.

A large number of old hollow tree-trunks is a characteristic feature of this site, and they shelter a lot of animals (viz., *Myotis bechsteinii*, *Nyctalus leisleri)*, as well as birds nesting in hollows *(viz., Strix uralensis*, *Aegolius funereus*, *Glaucidium passerinum, etc.),* and also all the species of woodpeckers usual for the deciduous biome.

Buteo buteo, Cinclus cinclus, *Corvus corax*, *Turdus merula*, *Columba oenas*, *Troglodytes troglodytes*, *Bubo bubo* and other birds occur here too (ca. 100 sp.), together with woodpeckers *Dendrocopos medius*, *D. leucotos*, *Picus canus* and others. Within this cluster one to two couples of *Ciconia nigra* nest every year, and it is well known that they can nest only in the virgin forest, without any human intrusion.

There are reptiles *Lacerta vivipara* and *L. agilis,* and also *Elaphe longissima* which became very rare in its habitat and therefore they are included into the “International Red Data Book”.

The most usual amphibians in beech forests are *Salamandra salamandra, Bombina variegata* and *Rana temporaria* including endemic *Triturus montandoni* and *T. cristatus*.

The fish species *Cottus gobio, Cobitis taenia, Phoxynus phoxynus* occur in the mountain streams and rivers of this cluster (ca. 10 sp.), meanwhile, the endemic *Hucho hucho* comes up here from the Danube River basin in the period of spawning. A rare species *Eduonthomyzon danfordi (Cyclostomata)* also occur here.

Insects are represented mainly by the Middle European species, viz., rare *Osmoderma eremita*, *Lucanus cervus*, *Rosalia alpina, Cerambyx cerdo, Aglia tau, Parnassius mnemosinae* and some others.

Invertebrates are several thousands species including ca. 100 Lepidoptera species, 150 Orthoptera and ca. 70 Mollusca species, etc.

The fauna of invertebrates-troglobions dwelling in the karst caves includes a lot of narrow endemics. The carst caves of the Uholjka-Shyrokyi Luh cluster is the only place in the world where *Duvalius transcarpaticus* (*Carabidae*, *Coleoptera*) and *Willemia virae* (*Collembola)* occur. Besides, the rare Mollusca species dwell within the cluster, viz., *Granaria frumentum*, *Serrulina serrulata* and *Chondrula bielzi* occur here too.

2.a.10 Vihorlat (Slovak Republic)

Abiotic conditions

Vihorlat is a large complex of beech primeval forests extending along the the arc of the main range of the Vihorlat Mts. It runs from Mt. Kyjov in the South-West over Mt. Motrogon to Mt. Nežabec in the North and ends south of Mt. Fetkov in the South-East. It encompasses the Vihorlat National Nature Preserve on Mt. Kyjov. South of the village of Kamienka, it belongs administratively to Humenné District. The complex spans an altitudinal range from 630 to 1076 metres above sea level, and is classified into the moderately cold mountainous climatic type. Mean annual temperature is 5.2 to 5.7 °C and the growing season lasts 132–139 days. Annual precipitation is 950–1000 mm, and snow cover occurs 152–160 days a year.

The bedrock in the reserve is composed of andesite rocks of the Kyjov stratovolcano. There are lava flows of pyroxenic andesite, and less frequently, autochthonic sinters and pyroclastic breccias. Andosols, mainly a transitional type toward the Cambisols, have developed on andesites of the Vihorlat Mountains. It is worth mentioning here that in addition to their excellent air-water properties, these soils contain ample quantities of basic nutrients such as nitrogen, phosphorus, potassium, calcium, and magnesium. All six of the physiologically important microelements, namely iron, manganese, copper, zinc, molybdenum, and boron, are also present in these soils. They are present not only in sufficient total content, but in a ratio favourable to life, i.e., preventing the potential antagonistic action of some of these elements. Boron is exceptionally important for plant growth, in a way similar to vitamin C in animals. The excellent soil properties found in the reserve are reflected in the high stability, productivity, and good health of its ecosystems, which contain 240-year-old specimens of beech, even when viewed in a broader European context.

Biota

Beech forests in the reserve are characterised by the absence of both spruce and fir. Hardwoods such as sycamore *(Acer pseudoplatanus)* and common ash *(Fraxinus excelsior),* however, are found in the preserve’s forests due to its rocky andesite substrate. These species form so-called „scree forests“ patches dominated by herbaceous species such as belladonna scopola *(Scopolía carniolica)*, comfrey *(Symphytum cordatum)* and the beautiful, decorative species oxeye daisy *(Telekia speciosa)*. These species are accompanied by some suboceanic and oceanic species such as *Aposeris foetida* and yellow pimpernel *(Lysimachia nemorum),* which in combination form the typical East Carpathian communities found on volcanic substrates. Mountain species are also present, such as willow gentian *(Gentiana asclepiadea),* broad-leaved meadow grass *(Poa chaixii), Scrophularia sciopolii,* and others.

Vihorlatský Primeval Forest National Nature Reserve is an example of primary beech forest with an area of 250-300 ha, with distinctively variable diameter and height structure. Typical selection structure is very rare, occurring only in small patches of forest where senescence is very gradual and characterised by the dying of individual trees. Due to this fact, the regeneration stage in the forest exceeds 60 years. Most often, the senescence stage lasts less than 60 years, and thus the stands often have a two-layer structure. These two-layered stands are characterised by a richly differentiated lower overstorey and a sparsely represented upper overstorey in the latter phases of the senescence stage. The whole developmental cycle of these forests lasts 220-230 years, out of which 50-70 years are in the senescence stage, 90-110 years are in the maturation stage, and 60-80 years are in the optimum stage.

The fauna on beech is less diverse than that on oak, even though these trees are taxonomically related to each other. Around the time of spring leaf-out, large cinnamon-orange butterflies can be seen fluttering playfully in the beech forests on sunny days. These are males of beech asturnid *(Aglia tau)* seeking females who hide on lower branches. Solitary brown caterpillars of the lobster moth *(Stauropus fagi)*, resembling giant ants, can also be observed near beech at this time of year. Another interesting caterpillar, *Watsonalla cultraria*, resembles dry leaves.

The complex is a part of the Vihorlat Protected Landscape Area, which has a large number of natural landmarks, such as Morské Oko (Sea Eye) Lake, a remnant of the historical relief-forming processes in the area. This lake was formed in the Holocene period in a way typical for lakes of young volcanic mountain ranges. Andesites, released by the weathering of accompanying soft tuffs, fell from the surrounding slopes and blocked a valley that contained a small mountain brook. Water gradually filled the dammed edge of the valley, forming a lake. Remnants of the edge of the lava flow, called Sninský kameň, tower above the lake affording a beautiful view. Another noteworthy feature of the reserve is that it contains peat lands with populations of the carnivorous plant round-leafed sundew *(Drosera rotundifolia).*

2.b History and Development:

Forest tree species were not present, except for exceptions, on the territory of Western and partly Eastern Carpathians in the glacial period. They survived this period in so-called glacial refuges, that is to say in sheltered sites with the most favorable climatic conditions, usually located in southern Europe (Fig. 1). Refuge localization and migration routes can be reconstructed using analyses of fossilized pollen and fireplace carbon remnants from the Neolithic settlements. Furthermore, gene structure of current tree species populations also reflects the post-glacial distribution process. Extraordinary is that the vegetation belt of European Beech (*Fagus sylvatica* L.) and fir currently forming the chief area of Ukrainian and Slovak forests reached the territory on which the serial nomination extends as the last one in the Atlantic and promptly “sneaked” itself in between already established belts of spruce and sessile oak.

During last Würm glacial period, beech found its refuges in the Balkans area, namely the Dinare Mountains and the Southern Carpathians, on the Italian Peninsula and in some less important sanctuaries by the Mediterranean Sea. Majority of current European beech populations come from Balkan refuges. Towards the end of Boreal climatic period, beech began to expand in the Southern Carpathians and on the territory of nowadays Slovenia. Beech reached Western and Eastern Carpathian territory in an Epiatlantic period 5.000 years ago. Beech expansion proceeded most probably along the Carpathians ridges from the south-east, the results of genetical analyses. Ever since the Subboreal period beech represents dominant deciduous tree species in the region of interest thus forming a backbone of numerous primeval forest preserves.

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Fig. 1: Start-up position of the European beech expansion Following the Boreal climatic period. See the gif animation on CD No. 1 (Migration of beech.gif)

Whereas the during the 1st and 2nd colonization waves in the 11th–12th and 13th–15th centuries the agriculture advanced to altitudes 200–300 m a.s.l. or 500 m a.s.l. respectively, during the Valachian (pastoral) colonisation in the 15th–17th centuries the upper timeberline of formerly intact forests was depressed and the mountains meadows (so called Poloniny) spread mainly in the mountain zone on the mountain ridges. Still, due to low population density in the mountain areas, large tracts of beech primeval forests remained intact. In the Vihorlat Mts. for instance, several thousand hectares of beech primeval forests were untouched until 1950, also due to low demand for beech wood and other factors, such as remoteness or use of forests owned by nobles (such as the House of Andrassy) as hunting districts (Korpeľ 1989). This picture is supported by written evidence issued by the State District Forest Authority in Chust (Ukraine), saying that "the whole surrounding area north of Chust is covered by intact pure beech stands featuring old trees of age 180 years old" and that they "will remain intact due to remoteness and bad access" (Delehan 2005).

2.b. 1 Chornohora (Ukraine)

The nature protection on the Chornohora Mountain Ridge has started before the First World War, and spruce and beech-fir-spruce virgin forests on the southern-western slopes of the Hoverla Mt. in the upper part of the Bilyi (White) Stream basin (120.6 ha) began protected at that time. Afterwards the conservation of these sites continued, and the Czech botanists Zlatnik and Hilitcer (1932) supported the enlarging of the territory of the Nature Reserve here till ca. 242 ha.

The new protected clusters had been designated here after the Second World War, and all of them were the base for establishing in 1968 the Carpathian State Reserve consisted of four isolated massifs united into two complexes, the foregoing Uholka (4.734 ha) and Chornohora (7.938 ha). The latter one consisted of three sites: Chornohirskyi (2.100 ha), Hoverlianskyi (3.927 ha) and Vysokohirnyi (1.911 ha). The first one was located on the southern macroslope of the Chornohora, while Hoverlianskyi and Vysokohirnyi site on its northern macroslope. In 1980 the northern sites were withdrawn from the territory of the Carpathian State Reserve as the core zone of the Carpathian National Nature Park. Meanwhile, in 1990 the territory of the Chornohora cluster was sufficiently enlarged (by 2.577 ha more), and as a result, the upland part of the southern macroslope of the Hoverla Mt., as well as some very valuable sites on the slopes of the Petros Mt., were added to the initial part of this cluster.

According to the Decree of the President of Ukraine No. 563/93, the Carpathian State Reserve was the base for designation of the Carpathian Biosphere Reserve (CBR) in 1993.

Due to it, the buffer zone of the CBR has been greatly extended. In 1997 the Kevelivskyi Reserve (together with its adjusted territories, viz., Svydovets) was added to the CBR. As a result, the large continuous natural complex has been created including 24 071.8 ha of the territory. In a close future we hope to enlarge the territory of the Chornohora cluster and to unite it with the Maramorosh cluster located to the west from the initial one.

2.b.2 Havešová (Slovak Republic)

The core area of the site is 171.32 ha and the buffer zone is 63.99 ha. The site has been designated as a National Nature Reserve in 1964 as a part of a larger complex of intact beech pimeval forests in the Nastaz Range.

2.b.3 Kuziy-Trybushany (Ukraine)

The nature protection at the territory of the Kuziy-Trybushany cluster was realized since XVII century because its northern part was used as a hunting forest of the Prince Eugene of Savoy, and afterwards these unique forests were under attention and protection of the Austro-Hungarian Governments. Since 1936 the Kuziy Reserve was arranged here with an area 292.8 ha. In 1974 it became the Kuziy State Reserve and in 1990 it became a part of the Carpathian State Reserve. A sufficient extension of the cluster's boundaries took place in 1997 while the well-preserved forest massif was joined to it, and as a result, its territory included 4.533 ha.

In the nearest future a new territory enlargement of the Kuziy-Trybushany cluster would be arranged, and after that Kuziy-Trybushany will join with the Svydovets and Maramorosh clusters disposed at the north and east correspondingly.

2.b.4 Maramorosh (Ukraine)

As long as in 1912 exactly here the first forest natural reserve within the Carpathians was arranged, and it was "Lysychyi-Strunzhen" ("Pip Ivan Marmaroshskyi"), with area 221.9 ha. Later, in 1932, under support of Zlatnik and Hizler its territory was enlarged till 412.2 ha. Besides, in the 1930s, another Natural Reserve (High-Mountain Meadow Petros-Hripka) was arranged here under protection of all the adjusted territories. After the Second World War the Bilyi Potik and the Radomir Reserves were restored as the National Heredity Reserves and afterwards they were united into the one continuous Maramorosh massif (with an area of 3.155 ha) which was moved to the Carpathian State Reserve.

After the re-arrangement of the Carpathian State Reserve into the Carpathian Biosphere Reserve by the Decree of the President¹ 563/93 (1993), the buffer zone of the Maramorosh cluster was sufficiently enlarged, and in 1997 its territory was enlarged till 8.474 ha.

In the nearest future a new boundary extension of the Maramorosh cluster in planned to be held, and it would be realistic to unite the Marmarosh cluster with another two clusters (Chornohora and Kuziy-Trybushany) located to the north and west respectively. The integrity of this territory with the "Maramures Mountain National Nature Park" (Romania) is an essential background for the arrangement here the Ukrainian-Romanian bilateral Biosphere Reserve "The Maramorosh Mountains". At present time the great work conducts for its designation and arrangement.

2.b.5 Rožok (Slovak Republic)

The core area of the site is 67,1 ha and the buffer zone is 41,4 ha. The site has been designated as a National Nature Reserve in 1965 as a segment of a larger complex of beech primeval forests in the Bukovské Vrchy Mts.

2.b.6 Stužica – Bukovské Vrchy (Slovak Republic)

It is a part of the new A-zone of the Poloniny National Park and encompasses several national nature preserves, most notably Stužica, Rjaba Skala, Pľaša and Udava, which were designated in 1965. Due to its size, the reserve ranks among the largest mountain-type primeval forest reserves in Europe.

2.b.7 Stuzhytsia-Uzhok (Ukraine)

The Stuzhytsya Reserve was established by the decree of the Ministry for Agriculture and Forestry of the Austria-Hungarian Empire still in 1908, and it probably was the first Reserve within both the Precarpathian Rus and Ukraine. In 19934-1936 Zlatnik established here four permanent plots for the dendrometric and phytocenotic study. One of these plots was situated exactly at the foot of the Kremenets Mt. (1.221 m above sea level) adjusted to beech crooked woodland at the edge of the upper part of the forest belt and it exists here at present time being in the centre of interests of biologists of the Uzhansky National Nature Park (UNNP) together with the biologists of the Mendel University for Agriculture and Forestry (Brno, Czech Republic - MUAF). Meanwhile, Zlatnik arranged the similar research plots on the Yavirnyk Mt. (elevation 1.017 m) with the total area 12.9 ha.

Within the territory of the Uzhansky National Nature Park, the beech primeval forests at the territory 3.000 ha are under protection. The large massifs of the undisturbed primeval forests are situated in the Novo-Stuzhytske forestry (north-western mesoslope of the Ravka Mt.), Lubyanske forestry (Vezha Mt.) and also in the Uzhotske forestry (Rozsypanets, Kinchyk-Bukovskiy Mts. and some others).

2.b.8 Svydovets (Ukraine)

The first reserve here was established is 1936 by the Government of the Czech Republic, and it was restored by the Government of the Soviet Union in 1974 only as the Svidovets Reserve. Approximately at the same time the “Blyznytsy Rocks Reserve” was arranged for conservation of the High-Mountain flora. In 1997 these two sites were united into the foregoing Svydovets cluster of the Carpathian Biosphere Reserve which covers areas on the north-western and north-eastern macroslopes of the Svydovets Ridge. At present time this cluster close to the Chornohora cluster represents one natural-territorial complex. Besides, in the nearest future it is planned to unite this cluster to the Kuziy-Trybushany cluster located to the south.

2.b.9 Uholka-Shyrokyi Luh.

The great role of the virgin ecosystems of the “Uholka-Shyrokyi Luh” cluster for science and nature protection was noted by many outstanding botanists a lot of years ago, since 30-th of the XIX century. While the Transcarpathia was an essential part of the Czech Republic, Zlatnik (1930) proposed to arrange here the Luzhanskyi Virgin Forest Reserve at the territory 1.404 ha. Afterwards the Uholka Reserve was arranged only in 1958 and the close Shyrokyi Luh Reserve in 1964 (in limits of the former Soviet Union). Exactly in 1968 the Carpathian State Reserve was arranged, and the Uholka Reserve was included into it. In 1980 the Shyrokyi Luh Reserve was joined to the Carpathian State Reserve. At last in 1993 the Carpathian Biosphere Reserve was arranged at the base of the Carpathian State Reserve, and its buffer zone was extended to 4.650 ha. As a whole, this action of the Government of Ukraine has evidently had a great advantage for protection and conservation of the virgin forests within the Ukrainian Carpathians, Ukraine and Central Europe as a whole.

2.b.10 Vihorlat

In the Vihorlat Mts., several thousand hectares of beech primeval forests remained untouched due to low demand for beech wood and other factors, such as remoteness or use of forests owned by nobles (such as the House of Andrassy) as hunting districts (Korpeľ 1989). The territory has been designated Protected Landscape Area and protected since 1973. The nominated property is part of its currently proposed A-zone (Ia conservation regime according to IUCN) and encompasses several national nature preserves, most important among them are Vihorlat, Jedlinka and Motrogon. The property is connected with the Kyjov Primeval Forest through a connecting ecological corridor.

3. Justification of Inscription

The beech primeval forests once extended over approximately 40 % of the European continent, but the remnants of pure beech natural forests are now comprised to remnants in the Carpathians. Their ecological processes, autoregulation, homeostasis and autoreproduction are based on undisturbed biogeochemical cycles as well as on natural species composition that in turn evolved as a result of post-glacial climate changes and species migration. The ecological processes ensure, among other features, an extremely high ecological stability of beech forests in terms of both resistance and resilience, despite a simple coenotic structure. The European beech (*Fagus sylvatica* L.) represents the main climax tree species in Central Europe and an important forest constituent in an area extending from the north of Spain and the south of England and Sweden to the east of Poland, the Carpathian Arc and down to the south of the Balkan Peninsula and the Apennine Peninsula, i. e. in the biogeographical provinces Atlantic (2.9.05), Central European Highlands (2.32.12), Pannonian (2.12.5) and Balkan Highlands (2.33.12). The representation of ecological processes characteristic of Europe's beech natural forests in the proposed serial nomination is therefore of global value and significance.

3.a Criteria under which inscription is proposed (and justification for inscription under these criteria):

As "natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view" and "natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty", the serial nomination "Beech Primeval Forests of the Carpathians" is proposed for inscription under the following criteria according to Paragraph 77 of the operational guidelines:

Criterium (ix): The serial nomination "Beech Primeval Forests of the Carpathians" contains outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial (forest) ecosystems and communities of their plants and animals. As a natural feature, it consists of a biological formation – climax temperate beech primeval forests with largely monospecific canopy. The development of this formation is an indispensable part of the phylogenetic history of the genus *Fagus*, which is, given the distribution of *Fagus* in the Northern Hemisphere, globally significant. The nominated series does most completely and comprehensively reflects the ecological patterns of pure stands of European beech, which is the most important constituent of forests in the Temperate Broad-leaf Forest Biome, in the Middle European Forest (2.11.05) biogeographical province and partly in the biome of mixed mountain systems. The value of the nominated beech forests does consist both in the status of European beech as originally the main forest constituent (after the the return of tree species banished from Central Europe during the ice ages was complete) in Europe, but also in their intrinsic ecological patterns as seen from the viewpoint ecology, i. e. complete stadial and developmental cycles that include all developmental stages. **The serial nomination features unique characteristics of Europe's primary, indigenous, undisturbed, unique, complex (and therefore outstanding) forest ecosystems with Europe's most typical tree species[3] as their main edificator.** At the same time, it is the last best conserved remnant of monodominant beech forests that once covered large tracts of Europe. The characteristics include the absolute hegemony of European beech, its competitiveness, autoregulation and homeostasis capacity and adaptation to changing environmental conditions. The serial nomination represents highly productive and extremely stable ecosystems on mesotrophic substrates of cristalline rocks, flysh, calcareous rock (limestones) and volcanic rock (andesite), with no other tree species able to compete with the beech trees on a significant scale. The overall site conditions allow the beech to reach heights up to 56 m – tallest European beech trees measured. The formation is sustained by undisturbed biogeochemical cycles as an indispensable part of this formation.

The developmental cycle of the beech primeval forests in the nominated properties lasts 230–250 (Fig. 2). During that period, their textural composition fluctuates only little and the aerial representation of individual developmental stages is balanced over areas as small as 20–30 ha. European beech population is so well established on the respective sites that no other species, even other C-strategists such as silver fir, are able to co-exist there, except for small patches conditioned by micro-relief. The underlying ecological processes are so articulate that beech forests in this area have defied every attempt to convert them into spruce monocultures (Míchal 1992). Stands with various phases (stages) of vital cycle are available in the primeval forests. These distinctly different types of stands are called "developmental stages" (Leibundgut, 1978). All the stages of forest development are represented in the primeval forests. They are such as the optimum stage, old growth, decay, and regeneration of selected forest and undergrowth. Along with a greatly mosaics nature according to developmental stages, the stands are characterized by a great variability of stand structures. This may be

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[3] Also able to form mixed forests with a broad range of other species when site conditions allow for their establishment.

illustrated by the inventory data of beech primeval forest on a 10 ha Ukrainian-Swiss permanent plot in Uholka – Shyrokyi Luh. Variability of forest taxation data of the 40 plots within the 10 hectare inventory plot are given in Table 2 and Fig. 3. Their vigorous growth, vitality and dynamics of beech and its stands document the fact that they grow in their physiological and ecological optima.

Tab. 2: Taxation parameters taken in Uholka – Shyrokyi Luh

Main forest taxation data of the stand (10 ha plot)	**Mean**	**Min.**	**Max**
Number of living trees per 1 ha	217	140	336
Cross cut diameter (m^2)	38.4	22	51.8
Standing volume (living trees) per 1 ha (m^3)	767	421	1042
Volume of dead wood (m^3)	73	0	308
Mean diameter (cm)	39.4	21.8	54.4
Mean diameter of dominant layer (cm)	63.1	42.3	74.1
Mean height of dominant layer (m)	40.2	33.6	42.8

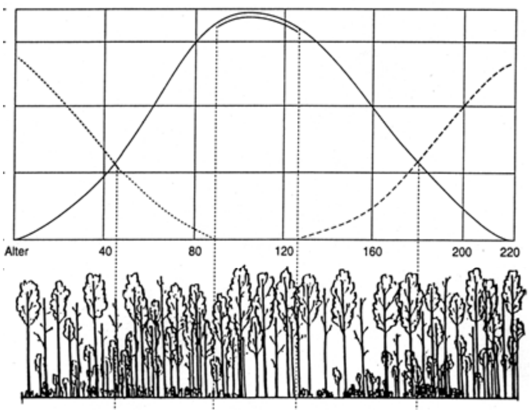

Fig. 2: 220-year-long life cycle of beech primeval forest in Havešová (Slovakia)

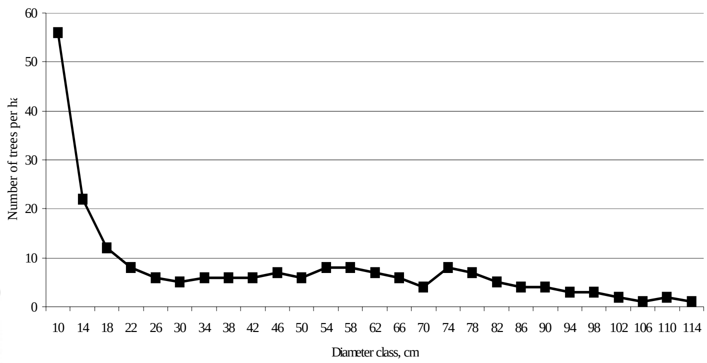

Fig. 3: Distribution of trees according to diameter class in Uholka – Shyrokyi Luh (Uholka)

Data in Tab. 3 illustrate the extremely fast decomposition of coarse woody debris due to activity of xylobitic organisms, which entirely decompose the logs within 6–7 years. The existence of these monodominant beech forests allows for a long-term research of beech primeval forests, which represents a significant added value from the point of science; the respective localities have been subject to a periodical, 50 year long systematic forestry and ecological research using a common methodical, internationally accepted approach (Zlatník *et al*. 1938, Stoiko 1973, Korpeľ 1989, Parpan 1994, Saniga, Schütz 2001, Vološčuk 2003, Commarmot 2005, Brang 2005). The value of this complex research is enhanced by the overall excellent conservation of entire ecosystems including plants and animals (including brown bear, lynx, wolf, locally also wisent, elk and other species) being in a constant interaction and functioning in a functional unity. Owing to ongoing global changes, such research can not be reproduced any more as the initial and boundary conditions have changed reproducible.

Criterium (x): The serial nomination “Beech Primeval Forests of the Carpathians” contains the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing endangered species of outstanding universal value from the point of view of science or conservation. Its conservation value consists in the protection of the only remaining intact populations of pure beech (*Fagus sylvatica* L.) and the protection of European beech gene pool, not limited in the past through selection or interventions by man, but formed solely by natural processes. The beech primeval forest of the nominated series therefore also provide an invaluable opportunity to study the evolutionary history of Fagus in western Eurasia based on the evidence from genes, morphology and the fossil record (Denk et al. 2002, 2004).

The serial nomination also includes habitats of entomofauna, avifauna and of some mammal species (e. g. bats) bound to habitats existing only in primeval forests, as well as their intact mycoflora (484 species recorded to date). The series contains gene pools of autochthonous organisms and habitats providing favourable living conditions for globally endangered species, numerous species of entomofauna (*Osmoderma eremita*) bound to the trees necromass, hollow nesting birds dependent on presence of old standing trees (*Strix uralensis*), as well as a complete mycoflora of the Carpathian beech forests. Habitats of a number of animal species practically correspond to distribution of beech forests within the continent. The survival of numerous vulnerable species directly depends upon beech forests conservation. They are such species *as Dendrocopos leucotos*, *Myotis myotis*, *M. bechsteinii*, *Rosalia alpina* etc. *Myotis myotis* is a rare fauna species of the continent and, listed in Annexes 2 of the Bonn and Bern Conventions. Karst caves of the Uholka – Shyrokyi Luh cluster serve as hibernation shelters for thousands of bats. Dynamics of number of this species during hibernation is given in Table 4. *Myotis bechsteinii* is a globally rare species and is listed in Annexes 2 of Bonn and Bern Conventions. As a typical dendrophillous species, during a year it is directly bound to tree-trunk hollows. Availability of hollow trees is for that matter the main limiting factor for this species, though still abundantly available across the serial nomination, where there have been registered parent colonies of *Myotis bechsteinii* with hundreds of bats during the last decade.

Tab. 4: Dynamics of number of *Myotis myotis* during hibernation in the Karst caves of the Uholka – Shyrokyi Luh

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Nos. of bats	495	719	658	687	978	988	1016	1020	985	1076	1120	1007	1145	1056

Criterium (vii): The serial nomination "Beech Primeval Forests of the Carpathians" evidently contains areas of exceptional natural beauty and aesthetic importance. Indeed, this argument can not be discarded in the face of the real impact that the appearance of Europe's primeval forests has exerted on the mindset of people and artists in particular, who in turn have hugely influenced our culture and standards by which we perceive and measure beauty and aesthetical quality – Czeslaw Milosz, a 1980 Nobel Prize winner in literature. He wrote: "The interiors of certain Gothic cathedrals – Strasbourg, for example – replicate man's smallness and helplessness in his middle zone between hell and heaven, amid the columns of the primeval forests which still covered large areas of Europe when the cathedrals were built"[4]. Translated in the language of science, the nominated series' aesthetic value resides in the original tree species composition, structure and monumental dimensions of trees, the amount of impressively looking trees necromass that according to perception research accounts to their wild look, documented by early historians (e. g. Herodotus of Halicarnassus, Tacitus). According to the modern science of the imaginary, European primeval forests became one of the important imaginative sources, from which the Gothic architecture developed. The works of Eliade[5], Le Goff[6], Matteoli[7], Schama[8] and Ovidian[9] have documented how the image of heaven in Christianity mixed with the image of wild forests. The hall-way, cathedral-like appearance and pattern of the nominated properties features easily recognizable, featuring full-boled, tall, straight trunks of beech trees. Despite a less dramatic character of the local landscapes, the beauty and impact of the primeval forest look (of similar beech or oak forests that once covered a great deal of the European continent) on the aesthetical perception of the Gothic thinkers and architects are well documented. According to Matteoli (1994), "The forest, an overwhelming presence of the great North, is

[4] Czeslaw Milosz (b. 1911), Lithuanian-born Polish poet. "Symbolic Mountains and Forests", Visions from San Francisco Bay, Farrar Straus (1982)
[5] Eliade, M., 1952: Images and symbols
[6] Le Goff, J., 1984: Medieval Imagination
[7] Matteoli, L., 1994: Notes for a history of glass in architecture: the Cathedrals
[8] Schama, S., 1995: Landscape and Memory
[9] Mircean, O., 2002: At the Confines of the Imaginary: The Desert
For full quotations see Chapter VII. Bibliography

the genius loci of the Gothic church. The tall tree trunks become columns, the ogive vaults replicate the arching of the branches connecting the trees high above. The forest/cathedral is home to northern imagery. Fairies, fantastic animals, ghosts, monsters peek out from every corner and receptacle." The scenery of the beech primeval forests of the nominated series is unique both in Europe and in the world in this context – the cathedral growths of the North-Pacific coast have been discovered by the Europeans after the Gothic period had long ended. The images of the beech primeval forests bred mermaids in Slavic legends, Celts inhabited these forests with dryads, and Germanic tribes believed that elfs dwelt among those fairy-like trees. Also today, these forests are of a paramount significance in the traditional view of nature both in Slovakia and Ukraine.

3.b Proposed Statement of Outstanding Universal Value

The transnational nominated series "Beech primeval forests of the Carpathians" as a whole provides a superior representation of undisturbed biological and ecological processes in the monodominant mesotrophic European beech (*Fagus sylvatica* L.) primeval forests on a wide range of substrates, in terms of area, growth and the assurance of conservation management. Such forests once extended over approximately 40 % of the European continent, but the anthropogenic pressure led to their nearly entire elimination on mesotrophic sites on other territories. Now their remnants are comprised mainly to the parts of the Carpathians due to a limited extent or the absence of industrial developments.

The undisturbed ecological processes within the transnational nominated series result in a high ecological stability and dynamics that leads to the formation of hall-like structural primeval forest patterns on mesotrophic sites. Beech primeval forests of the transnational nominated series reach the highest average growing stock and feature a rich structure. Along with a balanced spatial arrangement of developmental stages, it results in the occurrence of record tree dimensions within the ergodic process of the developmental cycle. These patterns manifest outstanding aesthetical values and thereby strongly influenced aesthetical and landscape perceptions of the European civilization.

The beech primeval forests of the nominated series also contain genetic pools and provide habitats for numerous endangered species, including xylobiotic fungi, insects, hollow-nesting birds and large mammals, such as brown bear, wolf, lynx, wisent and others. Furthermore, several decades-long scientific research, carried out specifically in the transnational nominated series, strongly contributed to the development of the concept of close-to-nature forestry on the global scale. Also, the nominated series offers a unique etalon for the assessment of anthropogenic pressures on other forest ecosystems.

3.c Comparative analysis (including state of conservation of similar properties):

Where were the beech trees?
Simon Schama: Landscape and memory

Comparative analysis within the biogeographical province Middle European Forest (2.11.5)

Slovak Republic: several other localities than those included in the serial nomination contain very good examples of pure beech primeval forests, e. g. Vtáčnik (246 ha) in the Vtáčnik Range, Raštún (109 ha) in the Lower Carpathians, Vozárska (77 ha) in the Ore Mts. and others that however do exist outside the main European beech belt of the West Carpathians. The nearly monodominant tree species composition formed due to special position of the Lower Carpathians on the outer NW rim of the West Carpathians having typical oceanic climate owing to the "comb" effect, the combined effect of migratory routes and geobarriers, or soil. The main forest areas with the monodominant European beech however extend in the Eastern part of the country over tens of thousands of hectares, where properties of the serial nomination have been selected as best examples creating a contiguous complex or such that can be easily connected by ecological corridors.

Poland and Belorussia: Beech Primeval Forests of the Carpathians as elements of the nominated series belong to the biogeographical province Middle European Forest (2.11.05).

There is only one world heritage site that partly represents natural forests of the province on its border with the Boreonemoral biogeographical province (2.10.5), namely the Bialowieza Forest / Beloweyhskaya Pushcha, included in 1979. The Bialowieza Virgin Forest features some 20 major forest associations typical of that part of Europe, mainly *Tilio-Carpinetum* and *Querco-Carpinetum*. The virgin forest is dominated by spruce *(Picea abies)*, pine *(Pinus sylvestris)*, hornbeam *(Carpinus betulus)*, lime *(Tilia cordata)*, alder *(Alnus glutinosa)*, oak *(Quercus robur)*, maple *(Acer platanoides)*, ash *(Fraxinus excelsior)*, birch *(Betula pubescens, B. verrucosa)* and aspen *(Populus tremula)*, whereas beech *(Fagus sylvatica)*, yew *(Taxus baccata)* and larch *(Larix decidua)* are missing almost entirely.

In a stark contrast to Bialowieza Forest, the serial nomination "Beech Primeval Forests of the Carpathians" encompasses forest associations whose main or sole constituent is the European beech (*Fagus sylvatica* L.). The most abundant among them are *Fagetum pauper* and *Fagetum typicum*. However, opportunities for extension of the presented serial nomination by Polish beech primeval forest reserves in the Biesczady National Park shall be considered providing a consent of the Polish authorities in the future.

In **the Czech Republic**, primeval forests quoted by Pruša (1985), e. g. Salajka (19,30 ha), Polom (19,40 ha), Razula (23,20 ha), Mionší and others are small fragments of mixed beech-fir ecosystems (<50 ha).

In **Slovenia**, Mlinšek (1967, 1972) described regeneration processes in calcareous beech primeval forests and Zeibig et al. (2005) studied the gap disturbance patterns in the Krokar (74 ha) primeval forest, on carbonate bedrock. There are several smaller protected beech primeval forests in Slovenia, Strmec on Stojna in the Kocevje area (15 h), Krokar on Boroviska Gora in the Kocevje area (69 h) and Ravna Gora in Gorjanci (15,5 ha) among them.

Romania: the total area of primeval forests in Romania, including the area of beech primeval forests, ranges from approx. 44 500 ha of primeval forests and quasi-primeval forests being currently protected (Giurgiu et al. 2001) in reserves of various categories, to 218 500 ha (Biris, Veen 2005) in total.

At the present time, however, the inclusion of such Romanian localities in this nomination has had unfortunately to be given up, because the turbulent developments concerning Romanian forests, such as re-privatisation of two mil. ha of forests (Biris, Veen 2005), presented an obstacle for a drawing a clear integrated management plan. For instance, in d' Izvoarele Nerei, i. e. one of the most famous beech primeval forest reserves in Romania (5253 ha in size), an intensive forest management has never taken place according to the available information, but although the reserve itself is quite abandoned, the neighboring forests are heavily logged, meadows are heavily grazed and the region around the peak is used by summer and winter tourism (Aszalós, Standovár 2003). Beside that, few data from a longterm research, comparable with those published by Korpeľ (1989), Vološčuk (2003), Stoyko (2002) or Brändli & Dowhanytsch (2003) were available and Parpan (1994).

However, after a clarification of the aforementioned uncertaineties, an extension of the serial nomination through Romanian sites – when the nomination is successful – shall without any doubt be considered.

Comparative analysis within comparable biogeographical provinces

Beside the above discussed countries and the serial nomination "Beech Primeval Forests of the Carpathians" itself, there are a few remains of close-to-nature beech forests in comparable biogeofraphical provinces in Europe:

- Atlantic (2.9.05), Central European Highlands (2.32.12)

Fragments of previously disturbed, now close-to-nature beech forests in **France**: Fontainebleau (136 ha, La Tillaie reserve; Grassy oak forest in 8th century, and last cut over in 1372. Described in 1664 as high forest with mature beech, oak, and some hornbeam and lime. Protected since 1853; longest untreated reserve in NW Europe.), Sainte Baume (isolated, species-rich beech forest of the Sainte-Baume range of Provence, characterized by the strong representation of evergreen undergrowth), la Massane in the East Pyréneés (in the past intensively used for grazing, charcoal production etc.).

A 250-year-old beech forest in Val Cervara (Abruzzo NP) with an area of 100 ha, with some 500 year old specimen (Piovesan et al. 2005). The old-growth stand is however not embedded into a larger complex of natural beech forest.

There are numerous primeval forest preserves in Austria (159 ha in total). They are located mainly in impenetrable terrain of the carbonate Alps. The Rothwald reserve is located in the Lower Austrian Calcareous Alps on the eastern side of the Dürrenstein (1878 m), near the border to Styria. With 412 ha and is thus the largest and most important natural forest area in Austria. The pine-fir-beech primeval forest community is characterized by dense stands of several hundred year old trees. However, in 1994 reserves in beech forests and oak-hornbeam mixed forests were missing and there is no contiguous complex of beech primeval forests left in that country.

It follows from the above data that there are no comparable beech primeval forests left in countries falling in the biogeographic provinces Atlantic (2.9.05) and Central European Highlands (2.32.12).

- Balkan Highlands (2.33.12)

According to literature sources (Leibundgut 1993, Dajoz 2000), primeval forests remains, significant in terms of quantity, structure, texture and overall representativness (except for complexes of boreal forests in the West Eurasian Taiga biogeographical province, 2.3.3.) have been preserved in the countries of the Central Europe, in the former Yougoslavia and some other countries in the Balkans. This fact has already been reflected in the inscription of Plitvice Lakes NP, Durmitor NP (Republic of Montenegro) and Pirin NP (Bulgaria) on the world natural heritage list within the Balkan Highland biogeographical province (2.33.12). They can briefly be characterised as follows: There have been 11 forest associations described in the Pirin NP, from which four include beech forests (*Ostrio-Fagetum moesiacae, Fagetum moesiacae*[10], *Abieto-Fagetum, Aceri-Fagetum*). The Parangalica forest preserve famous for the extraordinary standing volume of its forests is composed of spruce.

There are five forest preserves in the Durmitor NP: Crna Poda (devoted to the protection of old *Pinus nigra* stands), Sliv Mlinskog Potoka (size: 10 ha, protection of mixed forests of spruce and fir with beech at the elevation of 1600 m a. s. l.), Kanjon Susice (protection of fir-beech forests with sycamore), Vaskovske Stijene (protection of loose stands of *Pinus heldreichii*) a Dragisnjica. The outstanding Perucica (Sutjeska NP, Bosnia-Hercegovina) preserve does represent a mixed beech-fir ecosystem.

In the Pirin NP, the tree species composition of local forests mainly includes *Pinus peuce, P. heldreichii, P. leucodermis*.

Within the Plitvice Lakes NP, there are 22 308 ha of forest which cover 75% of the Park. The forest comprises pure, lesser-growth calciphillous stands of beech *Fagus sylvatica* at lower altitudes and mixed stands of beech and fir *Abies alba* at higher levels. The percentages of species are 72.8% beech, 22.1% fir, 4.7% spruce *Picea excelsa* and 0.4% pine *Pinus sylvestris*. One area of 84 ha has never been cut.

In **Albania**, the beech virgin forests are Puka, Rajca (Tabaku 2000) and Mirdita (Christensen, Hahn 2003). However, according to de Waal (2004), unlicensed felling and sawmill businesses flourish in the mountain forests. Sixty sawmills in the above mentioned Mirdita region were felling over 100,000 cu. m of wood annually, about 95 per cent of which was illegally felled. Other finding of the author imply grave uncertainities for the prospective management of the forest preserves.

- Other biogeographical provinces

2.15.05 Oriental Decidous Forest

Shirakami-sanchi (Japan): The core area of 10 139 ha encompasses the last remaining area of primeval Siebold’s beech forest (*Fagus crenata* B.). It is the largest beech virgin forest remaining in the East Asian Region. However, *Fagus crenata* constitutes a different species isolated from the region of Fagus sylvatica, which followed its own phylogenetic path. Beside that, *Fagus crenata* attains maximum heights of some 29 m (Ohtani et al. 2001) in the region,

[10] The populations belonging to the putative taxon *Fagus moesiaca* Czeczott seem to form an independent group acc. to Comps *et. al.* (1999).

which only about 55 % of the height attained by the European beech in the nominated properties on mesotrophic sites within its physiological and ecological optima. The height is further limited by rugged terrain relief and steep slopes (Osada et al. 2004). Henceforth the nominated properties contains examples of the maximum growth performance of European beech with corresponding hall-like forest appearance and impact on cultural and nature perceptions in Europe. Also, the total area of the proposed serial nomination is larger by some 100 km^2 and its management offers hope for even further reconstruction of natural beech forests within the connecting ecological corridors. Measured by scientific publications, research in the proposed serial nomination has generated more than 100 times more scientific papers than that in the Shirakami-sanchi region.

Conclusions

It ensues from the comparative analysis that the serial nomination of “Beech Primeval Forests of the Carpathians” is unparalleled either within its own biogeographical province or other provinces in terms of:

a) Size of the beech (*Fagus sylvatica* L.) primeval forest areas that include all developmental stages in their entirety;
b) Absolute dominance, vitality and growth of European beech as the leading species within the developmental cycle of forests, only a minimum presence of other, admixed tree species;
c) The wide spectrum of growing conditions;
d) Protection level and guarantees for current and future integrity.

Unlike on some other territories, the complex of mesotrophic nominated beech forests exists in its physiological and ecological optimum under present climatic conditions and on given substrates. The competitive capacity of European beech on this territory is illustrated by the extremely rare occurrence of spruce and fir, only limited to small secluded depressions, creating basins of cool air. The serial nomination covers the entire spectrum of site conditions in terms of climate gradients, and geological bedrock (crystalline, carbonate, flysch and volcanic).

3.d Integrity and Authenticity

Authenticity

Because the conditions of Authenticity apply for properties nominated under criteria (i) to (vi) only, we have still used criteria according to Biris, Veen (2005)[11]:

- natural composition and distribution of composing species
- complex structures (stratified on vertical plan and mosaic on horizontal plan), according to the development stages (specific textures);
- diversity of sizes and ages (occurrence of very old trees);
- the occurrence of dead wood (standing or fallen), in different stages of decay.
- representative ecosystems for the main forest formations.

The fulfilment of these criteria as well as the overall scientific value of localities making up the serial nomination "Beech Primeval Forests of the Carpathians" is widely acknowledged within the international scientific circles (Leibundgut 1993, Korpeľ 1995, Commarmot 2000, Dajoz 2000, Parviainen 2005). The development of concerned beech primeval forests is in a full accordance with to-date knowledge on the population genetics of beech (Comps et al. 2001). Beech expansion proceeded most probably along the Carpathians ridges from the south-east. Ever since the Subboreal period beech represents dominant deciduous tree species in the Carpathians thus forming a backbone of numerous nature preserves. The credibility of scientific information on properties of the nominated series secured by peer reviews of quoted papers.

Integrity

The integrity account is given according to Operational Guidelines for the Implementation of the World Heritage Convention (hereinafter referred to as Guidelines), Chapter II.E, paragraphs applying to properties nominated under criteria (vii), (ix), (x):

- Paragraph 87: All properties of the nominated series "Beech primeval forests of the Carpathians satisfy conditions of integrity.
- Paragraph 88: (a) Primeval forest properties and the nominated series as a whole are formed by unity of its abiotic and biotic components, undisturbed biogeochemical cycles, i. e. by energy and matter exchange between abiotic environment and organisms and complex

[11] In fact, the selection criteria (admission) of the nominated primeval forests have gone beyond this by the inclusion of undisturbed biogeochemical cycling and the primary character of forests (no secondary natural forests addmitted) as additional criteria.

ecological relations. Each property follows natural dynamics characterized by rich structural and textural patterns.

(b) According to Bücking (2003) and current research methodology as applied in primeval forests of the Temperate zone of Europe (Biris, Veen 2005), the homeostasis and autoregulation processes are ensured, in the case of beech primeval forests, on areas > 50 ha. This condition is fulfilled as all but one (Rožok, 67 ha) nominated primeval forest are far larger than 50 ha. The effects of abiotic factors as well as the exchange of biological information are not restricted to any considerable level, because the nominated properties, being from 3 to 80 km apart, are embedded in valuable natural and semi-natural forest complexes, of which a considerable part is protected in national or nature parks (e. g. Synevyr National Nature Park between the Uhol'ka-Shyrokyi Luh and Stuzhysia-Uzhok, Poloniny National Park). They are not encircled by agricultural land, deforested land or man-made monocultures. The external presure is therefore very limited. Genetic exchange and repopulation are then possible, which is essential for sustainable existence of the virgin forest ecosystems (Biris, Veen 2005).Contrary to that, the proposed integrated management of the nominated series considers the gradual extension of beech forest preserves and the buffer zone through the establishment of new national nature parks and forest management regulations.

(c) No disruption of ecological processes, patterns and loss of biodiversity through activities such as the extraction of litter, wood, grazing, charcoal production etc. have been found to date by *in situ* investigation or the review of historical records.

- Paragraph 90: The biophysical processes and landform features of the nominated series are intact.
- Paragrapha 91, 92: The nominated series properties are of outstanding universal value and include all areas that essential for maintaining the beauty of the sites, i. e. the representation of all forest structures occurring within the ergodic process of beech primeval forests dynamics, including hall-like old growths, snags, fallen trees and other features that lend the properties their appeal which, according to Schama (1995)

and LeGoff (1992) once presented a source of inspiration for the typical components of the Gothic architecture (*arboreal Gothic*) during the Middle Ages despite the lack of dramatic geomorphological features. Citing numerous historical sources, they argue that respected spiritual, cultural and behind-the-scenes medieval leaders such as Suger, Abbott of St. Denise, St. Bruno (founder of the Carthusian monastic order), were indeed inspired by the inner appearance of European primeval forest among other things.

– Paragraphs 91, 94: Korpeľ (1989) and others established 30 ha as the minimum area to secure the functioning of autoregulation, homeostasis and autoreproduction of monodominant beech primeval forests in their entirety, based on his research in the Carpathian beech primeval forests. The nominated properties exceed that size considerably, include all developmental stages (stage of growing up, the optimum stage and the stage of decay), feature a relatively constant proportion of the area taken by the respective developmental cycle stages across the primeval forest and manifest limited, approximately 30 % deviations in the standing volume within comparatively small segments (30–50 ha). The series spans the altitudinal range from 330 to 2061 m a.s.l. and the corresponding temperature and precipitation gradients (see Map Annex 5). It covers all slope aspects, various slope gradients – from steep to almost flat relief, a broad range of bedrock (cristalline, limestone, flysh, andezite), a wide spectrum of soil types (Dystric Cambisols, Eutric Cambisols, Rendzic Cambisols, Podsols, rare Andosols) and soil depths (from shallow soils on limestone ridges to deep soils on moderate flysh slopes). It ensues that the serial nomination contains all necessary elements to demonstrate key aspects of processes that are essential for the long term conservation of the beech primeval forests and their biological diversity.

– Paragraphs 91, 95: The nominated series of beech primeval forests makes up an invaluable genetic pool of European beech and organisms bound to European beech forest habitatsogeographic province (e. g. *Rosalia alpina*), as well as those not restricted to a particular tree species. Perhaps contradicting the general perception, populations of brown bear *(Ursus arctos)*, lynx *(Lynx lynx)* and wolf *(Canis lupus)* as big carnivores are not even bound to primeval forests in the strict sense but easily survive in extensive and relatively wild semi-natural and managed forests. Other types of habitats characteristic of mixed forests and organisms bound to tree species other than European beech (e. g. capercaillie) are represented in sites that have already been inscribed on the list of world natural heritage.

4. State of Conservation and factors affecting the Property

4.a Present state of conservation

4.a.1Chornohora (Ukraine)

At present time the Chornogora cluster is a part of the Carpathian Biosphere Reserve (CBR), and its modern status is the base for arrangement of the conservation and protection of all objects on its territory. Like in the Ugoljka-Shyrokyi Luh cluster, both conservation and protection here are regulated by the Ukrainian Legislation and by a number of the corresponding decrees, as well by the Regulations for the CBR. The state of conservation of the virgin forests within this massif is of the highest quality because of the measures taken here since 1920s.

4.a.2 Havešová (Slovak Republic)

Since the site is currently designated as a National Nature Reserve, and it is a part of the Poloniny National Park, which was awarded a European diploma by the European Council in 1998, a system of protection measures is defined for it in the National Council of the Slovak Republic Act No. 543/2002 Coll. on Nature and Landscape Protection.

4.a.3 Kuziy-Trybushany (Ukraine)

Belonging of the Kuzyi-Tribushany cluster to the Carpathian Biosphere Reserve provides it’s the reliable conservation and protection. The CBR’s activity here is regulated by the Ukrainian Legislation and by a number of decrees concerning protection and conservation of the sites belonging to the Protected Areas Network of Ukraine, as well by the Regulations for the Carpathian Biosphere Reserve and and the Management-Plan, which is arranged for a period of 10 years.

4.a.4 Maramorosh (Ukraine)

Belonging of the Marmarosh cluster to the Carpathian Biosphere Reserve provides its reliable conservation and protection. The CBR’s activity here is regulated by the Ukrainian Legislation and by a number of decrees concerning protection and conservation of the sites belonging to the Protected Areas Network of Ukraine, as well by the Regulations for the Carpathian Biosphere Reserve and the Management-Plan, which is arranged for a period of 10 years. The state of conservation of the virgin forests within this massif is of a high quality because of the measures realized here since 1920s.

4.a.5 Rožok (Slovak Republic)

Since the site is currently designated as a National Nature Reserve, and it is a part of the Poloniny National Park, a system of protection measures is defined for it in the National Council of the Slovak Republic Act No. 543/2002 Coll. on Nature and Landscape Protection.

4.a.6 Stužica – Bukovské Vrchy (Slovak Republic)

The property extends within the designated A-zone of the Poloniny National Park and encompasses several national nature preserves. According to the Act No. 543/2002 Coll. on Nature and Landscape Protection, the area is subject to Ia conservation management regime.

4.a.7 Stuzhytsia-Uzhok (Ukraine)

The official status of the National Nature Park of the Stuzhytsa-Uzhok virgin forests being also a part of the International Trilateral Biosphere Reserve "Eastern Carpathians" provides its reliable conservation and protection.

4.a.8 Svydovets (Ukraine)

At present time the Svidovets cluster is a part of the Carpathian Biosphere Reserve (CBR), and its modern status is the base for arrangement of the conservation and protection of all objects on its territory. Like in the "Ugolka-Shyrokyi Luh" and "Chornohora" clusters, both conservation and protection here are regulated by the Ukrainian Legislation and by a number of the corresponding decrees, as well by the Regulations for the CBR. The state of conservation of the virgin forests within this massif is of a high quality because of the measures realized here since 1920s.

4.a.9 Uholka-Shyrokyi Luh (Ukraine)

At present time the "Uholka-Shyrokyi Luh" cluster is a part of the Carpathian Biosphere Reserve (CBR), and its modern status is the base for arrangement of the conservation and protection of all objects on its territory because all of them are regulated by the Ukrainian Legislation and by a number of decrees concerning protection and conservation of all the sites belonging to the Protected Areas Network of Ukraine, as well by the Regulations for the Carpathian Biosphere Reserve and the Management Plan and Action Plan arranged for a period of 10 years. Therefore, the beech virgin forests together with their complexes of living organisms are the main objects of the nature protection here. We have to note that the state of conservation of the virgin forests in this massif is of the highest quality due to the the very serious measures realized here since 1920s.

4.a.10 Vihorlat (Slovak Republic)

The territory lies within the designated A-zone of the Vihorlat Protected Landscape Area. As such, it is subject to Ia conservation management regime according to the Act No. 543/2002 Coll. on Nature and Landscape Protection.

4.b Factors affecting the Property

(i) Development Pressures (e.g., encroachment, adaptation, agriculture, mining):

All nominated properties have long been subject to Ia conservation management regime according to IUCN in compliance with dedicated legislation, i. e. the Law of Ukraine “On Protected Areas Network of Ukraine” 16. 06. 1992, No. 2456-XII and the Act No. 543/2002 Coll. on Nature and Landscape Protection in the Slovak Republic. They enjoy an integral protection as parts of the core zones within the Carpathian Biosphere Reserve (CBR), Uzhansky National Park (UNNP) and Poloniny NP and Vihorlat Landscape Protection Area.

Territorial development

In **Ukraine**, the law guarantees their protection from both direct civilisation impact and further infrastructural development also in terms of the territorial planning. In Ukraine, the Law of Ukraine “On the general scheme of territory planning in Ukraine” No. 3059-III, approved by the Verkhovna Rada of Ukraine (the Parlament of Ukraine) on February 7, 2002 contains the General scheme of territory planning in Ukraine (further on – “the General Scheme”) and defines priorities and conceptual decisions on planning and use of Ukrainian territory, including provision of sustainable development of settlements and the formation of ecological network.

In the **Slovak Republic**, territorial development is controlled by the General supraregional territorial system of ecological stability (hereinafter GESTES), approved by the Government of the Slovak Republic on April 27, 1992, Resolution Nr. 319. GESTES is similar to the concepts used in the theory of European Ecologial Network (EECONET)[12]. The establishment of biocentres and biocorridors that coincide with the territory of the neminated properties, their buffer zones and broader surroundings was projected into the Territorial Plan for the greater Prešov Self-Governing Region, as approved by the statutory rules of the

[12] The National Ecological Network of Slovakia was published in 1995 (Sabo, P., ed. : National Ecological Network of Slovakia, IUCN Bratislava, 1995, 323 pp.).

Government of SR No. 216/1998. Given the current legislation framework, the nominated localities, their buffer zones or connecting corridors are not threatened by the developmental pressures.

Forestry

Forestry in Ukraine and in Slovakia presents no danger to the nominated properties. No forestry-related activities or operations are allowed or considered within the nominated properties because as national nature preserves or core areas of biosphere reserves and national parks they a subject to Ia conservation management according to IUCN.

In the Slovak Republic, forests within the nominated properties have forest management plans stipulating **non-intervention policy** according to Legal norms providing for the forest management plans, contained in the §1–5 of the Act of the Slovak National Council No. č. 326/2005 Coll. on the forest management and state administration of forest management and in the wording of the pursuant regulations and Regulation of the Ministry of Agriculture of the Slovak Republic No. 5/1994 Coll. on forest management

(ii) Environmental pressures (e.g., pollution, climate change, desertification)

Air pollution

Due to the fact that there are no major air pollution sources on the adjacent territory, absence of any major industrial development within the broader territory both in the past and at the present time, and position outside the main air pollution long-distance transfer routes, air-pollution induced damage to primeval forests of the nominated properties has not been established.

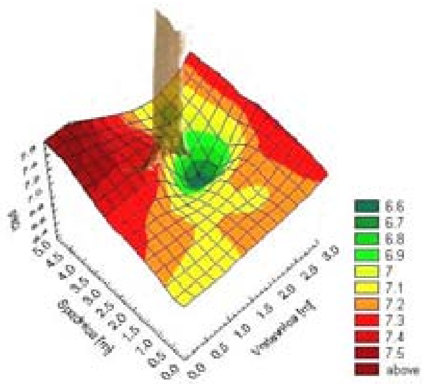

Fig. 4: Model of the beech stemflow impact on soil properties. No dramatic soil reaction decrease or heavy metals accumulation have been detected within the stemflow zone on the nominated localities.

For survey of potential pollution load, a method specially suited for beech forests has been selected (Fig. 4). The pH-value and concentrations of chemical elements within the stem-flow zone of beech trees in particular is an early indicator of potential acid or heavy metals load of ecosystems due to air pollution (Šály, Pichler 1993). The investigations have shown that no significant increase in soil acidity or heavy metals content due to potentially polluted stemflow water occurred in the nominated properties.

Climate changes

According to Forest Gap Model, in the Carpathian forest at lower elevation (100–450 m a.s.l.), ecological condition for beech may worsen and sessile oak could take a higher proportion in the tree species composition, while at higher altitudes, conditions for European beech will remain favourable mainly due to water regime, including options for further expansion of beech toward higher altitudes and higher representation of noble broadleaves, such as sycamore and ash (Minďáš, Škvarenina 2003). Overall, beech forest are the least threatened ecosystems among sub-mountain and mountain forest ecosystems. Owing to climate pattern of the Eastern Carpathians, no considerable reduction of precipitation is foreseen due to the combined effect of air-streams bringing humidity both from the Atlantic, Adriatic and Black Sea.

(iii) Natural disasters and risk preparedness (earthquakes, floods, fires, etc.):

Wind

Wind and fire are the most important factors threatening the static and ecological stability of nominated primeval forests. In case of wind there is practically no effective protection in place to avert wind caused disasters except for avoiding open stand boundaries, a measure for which there is no need in the case of the nominated properties, because they are surrounded by buffer zones of a sufficient area. However, current data from beech primeval forests show that gaps can be defined as small, as a result of dying of old trees (endogenous stand development), and big, as a result of outside abiotic factors (exogenous stand development) (Runkle 1992). In beech primeval forests specifically, the size gap disturbances patterns may vary from several m^2 to a few hectares (Rosenbergar et al. 2002, Zeibig et al. 2005) and such disturbances thus represent naturally occurring disturbances in beech forest ecosystems. Generally, large-scale disturbances in beech virgin forests are rare.

Forest fires

On contrary to windstorms, forest fires are not a part of the ecosystem processes in the Carpathian beech forests. Forest fires represent most immediate danger mainly for xerotherm communities on carbonate rocks with shallow, drought-prone soils (Škvarenina et al. 2003).

Nominated properties are situated on sites with a high annual precipitation that provide for high soil moisture levels and semiuvidic water regime. The vincinity of a large open water surface of the Starina and other water reservoir in the adjacent areas provide a source of water if needed in a case of emergency (forest fire) in any of the nominated properties.

(iv) Visitor/tourism pressures

According to Pichler and Soroková (2004), domestic population in the rural areas adjacent to the nominated properties does not perceive the difference between forests as such and truly natural forests as very significant. That is also due to the semi-natural character of the majority of Carpathian and especially East-Carpathian forests. The awareness of natural forests is comparatively low. This perception begins to change for better in young generation, following the inclusion of a more appropriate, ecological interpretation of natural forests in the modern textbooks and intense ecological and nature protection awareness rising campaigns through the Carpathian Biosphere Reserve and Poloniny National Park administrations. Natural forests therefore cannot be considered a primary attractor for the ecotourism development carried by native citizens. Hiking in the pursuit of physical workout in a clean environment and wilderness, seeking extraordinary vistas, collecting forest fruits, camping, hunting and fishing remain the activities mostly sought for by the majority of domestic visitors. Based on this, it is not recommended to actively advertise mass tourism in natural forests at present, as the pursuit of such activities would inevitably lead to a considerable ecosystem load and unchecked penetration of pristine ecosystems. Instead, guided or interpretative forms of tourism shall be encouraged. Practical experience gathered by The Centre for Scientific Tourism in Slovakia at the Institute of Ecology, Slovak Academy of Sciences, during the last six years, i. e. from 1998 till 2003, has delivered important insights into the public perception of natural forests and their possible utilization for ecotourism.

Indeed, there is a lasting interest for primeval forests among forestry scientists, ecologists, nature conservationists and enthusiasts, both native and international. They learnt about Slovak primeval forests mostly from scientific literature, co-operation and the internet sites. Their visits surged following the regime change after 1989, first on the basis of personal contacts and later in the form of guided scientific excursions organized by the Centre for Scientific Tourism in Slovakia. They also often resulted into further scientific co-operation and further visits by people generally interested in nature (Zach 2003). Measured by the number of study tour participants, both in terms of groups and individuals, primeval forests excursions rank as the most popular and attractive tours among other products in this group.

This may change in a few years when children now exposed to the new ecological and environmental education grow up and response more positively to the restrictions necessarily limiting people's behavior in pristine ecosystems of natural forest, including rangers' guidance. However, an active information policy and promotion of primeval forests as nature treasures can be recommended in order to secure their sustained protection in terms of preserves' number, area and protection management. It has been shown in this study that the involvement of medially known and supportive personalities can serve as one among many ways of how to achieve that goal.

Overall, there is no threat to the nominated properties from tourism development currently or in the foreseeable futrure. The numbers of visitors to the entire area is only approximately 80 000 a year and only a fraction of this figure enters the sites on available marked hiking trails or during guided walk.

(v) Number of inhabitants within the property and the buffer zone:

Table 5 shows the number of inhabitants living outside the primeval forest buffer zones, because there are no inhabitants either within the sites or their buffer zones (data from the 2001 population survey). Every buffer zone is divided into several subzones depending on the distance from a particular primeval forest (up to 1 km, 1–3 km, 3–5 km, 5–10 km of direct distance). No inhabitants live within the core and buffer zones. No inhabitants live within boundaries of the Property and its buffer zones.

Table 5: Number of inhabitants living in buffer zones of nominated primeval forests (as of 2002)

Primeval forest	**Number of inhabitants given for different distance subzones**				
	< 1 km	**1–3 km**	**3–5 km**	**5–10 km**	**Total**
Chornohora	0	0	0	0	0
Havešová	0	0	589	3.050	3.339
Kuziy-Trybushany	0	15	50	0	65
Maramorosh	0	0	0	0	0
Rožok	0	0	258	860	1118
Stužica – Bukovské Vrchy	0	0	337	740	1.077
Svydovets	0	0	0	0	0
Uholka-Shyrokyi Luh	0	25	76	0	101
Vihorlat	0	0	1.981	10.147	12.128

5. Protection and Management of the Property

5.a Ownership:

Primeval forests of the nominated series, i. e. the stands and the premises on which they grow, are state property of Ukraine and the Slovak Republic.

5.b Protective designation:

The establishment of CBR and UNNP was enacted by the Decree of the Cabinet of Ministers of the Soviet Union No. 568, 12.11 1968, the Decree of the Cabinet of Ministers of the Soviet Union No.565, 12. 12. 1979, the Decree No. 119, 30.05.1990, and the Presidential Decrees No. 563/93, 26.11.1993, No. 325/97, 10.09.1997, No. 1230/99, 27.09.1997.

The properties have been subject to nature protection for several decades. The nominated properties located on the territory of Ukraine are an integral part of the Carpathian Biosphere Reserve and the Uzhanskyi National Nature Park (UNNP). Their protection is stipulated by the Law of Ukraine "On Protected Areas Network of Ukraine" 16.06.1992, No.2456-XII. CBR and the UNNP are subordinated to the Ministry for Environmental Protection of Ukraine.

The nominated properties on the Slovak territory coincide with the area- designated A-zones (Ia conservation management regime acc. To IUCN) of the Poloniny National Park (established through the Act of the Government of the Slovak Republic No. 258/1997) and Vihorlat Protected Landscape Area, following the provisions of Act No. 543/2002 of the Slovak National Council on Nature and Landscape Protection.

The A-zones have been designated during 2004–2005 approved by the Ministry if Environment of the Slovak Republic, which will submitt them for a formal governments approval in 2006.

In the meantime, the core and buffer zones are under strictest protection as NATURA 2000 sites, biocentre and biocorridors. The new area-designation and establishment of core zones enabled a considerable expansion of the area of strictly protected beech primeval forests, compared to the previously existing system of national nature preserves. Thus for instance the nominated property Stužica – Bukovské Vrchy (Property No.7) includes also the national nature preserves Stužica, Rjaba Skala, Pľaša and Udava.

The buffer zones coincide with parts of the B-zones where only management aimed at enhancing or supporting the ecological stability is allowed. The entire areas of the Poloniny National Park and Vihorlat Protected Landscape Area, as well as their connecting corridors coincide with the NATURA 2000 biotopes (acc. to the Annex I of the Council Directive

92/43/EEC of 21 may 1992 on the conservation of natural habitats and of wild fauna and flora): Asperulo-Fagetum beech forests (code 9130, Viceníková, Polák 2003), Medio-European subalpine beech woods with Acer and Rumex arifolius (kód 9140, Viceníková, Polák, 2003). In the Slovak National List of NATURA 2000 areas, the territory of Poloniny NP is included as Beskyd SKUEV 0129 and Stinská SKUEV 0210, the territory of Vihorlat Protected Landscape Area is include as Morské Oko SKUEV 0209. Their connecting ecological corridors between Beskyd a Morské Oko are listed as Ulička SKUEV 0234 and Ublianka SKUEV 0063. This National NATURA 2000 List was approved by the Government of the Slovak Republic by Decree No. 239, March 17, 2004 and forwarded to the European Commission in Brussels following standard procedures. In the mean time, until the final decision is made by the EC, these areas are under preliminary protection regime according to the Act No. 543/2002 of the Slovak National Council on Nature and Landscape Protection.

Among areas covered by the Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds are the Bukovské Vrchy Mts. and Vihorlat Mts., in which Poloniny NP and a Vihorlat Protected Landscape Area are situated. Also their connecting corridors belong to areas covered by the same directive. The proposed list of wild bird areas have been approved by the Government of the Slovak Republic No. 636, July 9, 2003 and and forwarded to the European Commission in Brussels following standard procedures. Similar to the List of NATURA 2000 localities, these areas also are under preliminary protection regime according to the Act No. 543/2002 of the Slovak National Council on Nature and Landscape Protection until approved by the EC.

5.c Means of implementing protective measures

In both countries, the protection regime corresponds to Ia management regime of IUCN class. In the buffer zone, only measures aimed at supporting natural processes are allowed according to the cited legislation.

According to the Law of Ukraine “On Nature Protection Fund of Ukraine”, the protection measures are enforced under a threat of severe penalties stipulated by the Decree of the Cabinet of Ministers No. 521, 21.04.1998. Control over implementation of protective legislation on the territory of the Property is carried out by the Inspection Service, which is submitted to the Carpathian Biosphere Reserve (CBR) Administrations that manage the Property. The on-site monitoring will consist in regular inspections of the sites by professional rangers. Currently, approximately 200 forestry officers are in charge of protection of the massifs on the Ukrainian territory. Forest beaters perform twenty-four-hour patrolling of the territory. Forestry beat points are situated on the edges beyond each of the clusters. Twice a year the authorities of the CBR and UNNP realize an inspection of their territory and use the necessary preventive measures. The State Forest Guard Service closely co-operates with the Police and other closer services.

On the Slovak territory, protection measures covering the nominated properties are enforced by the State Nature Conservancy, as elaborated in "Protected area maintenance programmes" (§54, sec.3–4 of the Act 543/2002), worked out by the respective authority (NP Poloniny, Vihorlat Protected Landscape Area) in compliance with §21 of the Regulation No. 24/2003 of the Ministry of the Environment of the Slovak Republic, and subject to the approval by the Government of the Slovak Republic. On the Slovak territory, regular inspections are carried continuously or more often if necessary by four Poloniny National Park rangers and twenty voluntary nature protection guards, whose competences are defined by the Act and Guards of the State Nature Conservancy of the Slovak Republic according to § 72 of the Act No. 543/2003 Coll. on Nature and Landscape Protection. The guards are entitled to monitor, prevent and avoid illegal cuttings, illegal picking up of berries, poaching, bird criminality, nest robbery, illegal collection of animals and trespasses against the law related to the mass tourism.

5.d Existing plans related to municipality and region in which the proposed property is located (e.g., regional or local plan, conservation plan, tourism development plan):

Ukraine

The Transcarpathian region (Zakarpatska oblast), in which the Ukrainian localities of the bilateral serial nomination are found, was designated in 1946; the town of Uzhgorod is the regional center with all regional administrative bodies located there. Its development is governed by the General scheme of territory planning in Ukraine (further on – "the General Scheme"), as defined by the Law of Ukraine "On the general scheme of territory planning in Ukraine", Verkhovna Rada of Ukraine, 7.02.2002, No. 3059-III. It lays out priorities and conceptual decisions on planning and use of Ukrainian territory, provision of sustainable development of settlements, development of industrial, social and transport, as well as the formation of ecological network.

Regulations provided in the General Scheme correspond to the principles of appropriate documents adopted at the UN Conference on the settlements' development (HABITAT-II) and to corresponding recommendations of the UN European Economic Commission and the

Council of Europe. According to it, any territorial developments must respect not only nature protected areas, but also areas covered by the The Law of Ukraine “On Ecological Network of Ukraine”, adopted by the Supreme Council (Parliament) of Ukraine in 2004, the Law of Ukraine “On the State Programme of Ukraine’s National Environmental Network Development for Years 2000–2015” (see Annex 8) – in 2000 and the Law of Ukraine “On Nature-Protection Fund of Ukraine” 16.06.1992, No.2456-XII, Nature, that are important for biological and landscape diversity conservation.

In order to guarantee efficient utilization of territories that are of a special ecological, scientific, aesthetic value it is envisaged to elaborate a system of state (national) support for such territories. The implementation of the General Scheme is fulfilled by the bodies of the state power and by local self-governing bodies in the order envisaged by Ukrainian Legislation.

The Carpathian Biosphere Reserve and the Uzhanskyi National Nature Park, to which the nominated properties on the Ukrainian territory belong, are subordinated directly to the Ministry and their territory belongs to the Nature Protection Fund of Ukraine. The administrations of both establishments however manage their territories in close co-operation with local bodies of state power and self-government.

Management of the sites belonging to the Carpathian Biosphere Reserve is executed according to the Project of the Territory Organization and Natural Complexes Protection of the Carpathian Biosphere Reserve and Statutes of the Carpathian Biosphere Reserve (Annex 5). Management of the sites belonging to the Uzhanskyi National Park is executed according to the Regulations for UNNP (Annex 5).

Slovak Republic

Several plans apply to the Prešov Self-Governing Region, in which the nominated properties are located:

– General supraregional territorial system of ecological stability (hereinafter GESTES, Annex 10), approved by the Government of the Slovak Republic on April 27, 1992, Resolution Nr. 319: GESTES is similar to the concepts used in the theory of European Ecologial Network (EECONET)[13]. The system has established a framework for the strategy of ecological stability, biodiversity and gene fund conservation and is thereby binding for the creation of regional and local systems of ecological stability and also for

[13] The National Ecological Network of Slovakia was published in 1995 (Sabo, P., ed. : National Ecological Network of Slovakia, IUCN Bratislava, 1995, 323 pp.), see Annex 4.

territorial development plans and any plans concerning spatial arrangement of land and land use. The aforementioned General supraregional system approved of the representation of the The East Carpathian biogeographical province by the provincial core area (biocentre) Poloniny (5 680 ha) and regional core area (biocentre) Vihorlat (app. 5.650 ha). The selected core areas can be connected to the system of ecological corridors (biocorridors), as well as biocorridors connecting the two biocentres.). The notion „biocentre“corresponds to the „core area“, the notion „biocorridor“ responds approximatelly to the „ecological corridor“.

– Territorial Plan of the Prešov Self-Governing Region (Annex 10), approved by the Government provison No. 216/1998 Coll.), which reflects the GESTES principles;

The care for nominated properties is incorporated into management plans elaborated by the respective authority (NP Poloniny, Vihorlat Protected Landscape Area) in the form of "protected area maintenance programmes" (§54, sec.3-4 of the Act 543/2002), which are prepared in compliance with §21 of the Regulation No. 24/2003 of the Ministry of the Environment of the Slovak Republic that represents executive legal norm to this act, and approved by the Government of the Slovak Republic. The protected area maintenance programmes establish a binding framework for the elaboration of forest management plans. Thus, every nominated property is individually covered by an approved forest management plan (FMP) for a 10-year period, which stipulates **non-intervention policy** within the nominated primeval forests. In the buffer zone, the FMP allows for measures aimed to support natural processes if necessary, using the close-to-nature forestry approach.

5.e Property management plan or other management system

See Annex 2 for Integrated Management Plan of the transnational nominated property.

5.f Sources and levels of finance

Financing of the Carpathian Biosphere Reserve and Uzhansky National Park are provided by the State Budget of Ukraine and with the support of their own income. Their budget in 2004 was 3 500 000 UAH (Ukrainian hryvnyas), approx. 700 000,– USD as of the current rate of exchange. Logistic is performed with the help of budget assignations and with the help of their own incomes received form some commercial activity. Amount of financing and Plan of measures on nature protection are approved every year by the Minister for Environmental Protection of Ukraine.

Ministry of the Environment of SR provides funding for protected areas management, approximately 250 000,– USD for Poloniny NP, Eastern Carpathians Protected Landscape Area and Vihorlat Protected landscape Area in total. Funds are distributed via State Nature Conservancy of the Slovak Republic run as a state budgetary organization.

5.g Sources of expertise and training in conservation and management techniques

State Nature Conservancy of the Slovak Republic and the CBR and UNNP administrations in the Ukraine are the bodies responsible for continual development of management and nature conservation practices and skills for various levels of protected sites through continual training of its employees, usually having a university degree in ecology, landscape and nature protection or forestry. That training involves the participation of international university scholars on one hand and the engagement of the employees in scientific research on the other hand, often as graduate students or post-docs. The rangers must have completed their high school education. The management measures foreseen for the buffer zones (only if necessary), which are included in a forest management plan are carried out by forestry organizations. A high level of practical management techniques is also assured by an intense international co-operation such as in terms of Association of the Carpathian National Parks and Reserves (ACANAP), scientific conferences and the involvement of NGOs and municipal governments.

5.h Visitor facilities and statistics

CBR and UNNP run special departments that serve as the main providers of guided indoor and outdoor activities, information, expertise, instructions and assistance for visitors to the area. Annualy, they cater for approximately 50 000 visitors. A part of the respective CBR department in Rakhiv is a Museum of Carpathian Ecology aimed at the explanations of the natural history of the Carpathians and etnography of that region. Main accommodation and boarding services are available in Rakhiv hotels.

On the Slovak territory, the Visitors Centre in Nová Sedlica as an integral part of the Poloniny NP provides the same type of visitor services. Data on numbers of visitors are monitored and kept by the Poloniny National Park Administration and the ECPLA. According to their records taken between 1997–2004, the Poloniny NP territory is visited by approximately 30 000 visitors per year.

Expert guidance is also provided by the Centre for Scientific Tourism at the Slovak Academy of Sciences (www.ecosystems.sk). In addition, it has also introduced some technological innovations with the use of E-learning (www.poznajachran.sk) that for instance inform visitors on the formation of flysh or karst bedrock that in turn provides foothold for primeval forests of the nominated properties. The Centre also provides a unique opportunity for explaining the underlying natural history through a GPS-aided system coupled with Pocket PCs, which itself is a major innovation usable for explaining the natural history of any natural heritage, because it "shrinks" the time scale.

Fig. 5: GPS-aided dynamic visualisation of the nominated properties' natural history

Location-specific, GPS-controlled dynamic animations run on the Pocket PCs that are distributed among the visitors prior to the tour. The animations pre-installed on the hand-held devices help the visitors to visualize the long-term ecological processes in the forest, as explained by the guides, such as geological developments and primeval forests dynamics. Main accommodation and boarding services are available in pensions in Nová Sedlica and Stakčín.

5.i Policies and programmes related to the presentation and promotion of the property

Information about the site is presented in various basic research and forestry publications in Slovak and foreign scientific literature. However, presentation and promotion of the nominated among the domestic and foreign population uses various channels, such as movies, media coverage and a dedicated project "Green diplomacy". The most successful among the movies in terms of awards were the "Primeval forests of the Carpathians" (produced by the Centre for Scientific Tourism in Slovakia at the Slovak Academy of Sciences), awarded prize for the documentation of natural heritage at the international film festival Envirofilm 1999, which was then aired on Slovak TV, further "Through the Carpathians" and others. These movies were distributed in schools. Green diplomacy is a project that aims at rising the awareness of primeval forests by promoting them through the visits of prominent persons, such as ambassadors and personalities known from the public life. As an exampe, HRH The Prince of Wales in his capacity as a nature enthusiast visited a primeval forest in Slovakia in

2000[14]. Following media coverage increased the awareness of primeval forests in Slovakia from 10 to some 70 %according to a poll {Pichler, Soroková 2005).

Fig. 6: HRH The Prince of Wales visits A Carpathian Primeval Forest in Slovakia

The virgin forests are the subject of the complex study held by the Ukrainian and foreign biologists. The Scientific Department of the CBR intensively co-operate with the Lviv and Uzhgorod National Universities, Precarpathian National University (Ivano-Frankivsk), Kholodnyi Institute of Botany and Shmalhausen Institute of Zoology of the Ukrainian National Academy of Sciences (both in Kiev), State Nature Museum of the Ukrainian Academy of Sciences (Lviv), Ukrainian Scientific Research Institute of Mountain Forestry (Ivano-Frankivsk), Federal Institute of Mountain, Snow and Landscape Investigation (WSL – Birmensdorf, Switzerland), Mendel University of Agriculture and Forestry (Brno, Czech Republic), and some others.

The Scientific Department of the Carpathian Biosphere Reserve conducts permanent detailed study of the cluster, and the data on the Uholka-Shyrokyi Luh massif are available in the numerous papers and thesises published in the scientific journals, located on the web-sites of the scientific-research institutions, and also in the “Chronicles of Nature” of the CBR.

The data on the “Uholka-Shyrokyi Luh” cluster are in the numerous booklets, guidebooks, brochures, films and so on, e. g. a very valuable book “Virgin Forests in the Centre of Europe”. Guidebook about Forests of the Carpathian Biosphere Reserve” was published by the Scientific Department of the CBR together with the biologists of the Swiss Federal Institute of Forest, Snow and Landscape Investigation (WSL) in 2003 in Ukrainian and German.

[14] “During his first stop on his two-day tour of the Carpathian mountain region he strolled through a primeval forest, where he was then presented fujara, a musical instrument favored by Carpathian shepherds for 800 years.” (a typical headline from newspapers published immediately after his visit).

5.j Staffing levels (professional, technical, maintenance):

CBR and UNNP have 310 and 110 employees available – this number includes the whole biosphere reserve including the buffer and developmental zones. Poloniny NP, East Carpathians Protected Landscape Area (ECPLA) avail of 24 employees (only those with university degree). The positions are filled through natural scientists and university educated forest ecologists possessing adequate professional experience and practical skills that are capable of sole management of forest reserves. Expert management is reinforced by the co-operation with the staff from the Centre for Nature and Landscape Protection of State Nature Conservancy SR. Forest Districts are bodies responsible for the practical implementation of forest management measures within the buffer zones and corridors connecting the properties. They employ highly qualified staff as well as possess necessary technical equipment. From the total number of employees, 199 forestry officers are in charge of protection of the massifs on the Ukrainian territory.

The number of staff responsible for management and specialized work (e. g. research) related to the nominated properties on the Slovak territory is 16 plus 8 rangers available for patrolling the nominated properties on the Slovak territory (Poloniny NP, Eastern Carpathians Protected Landscape Area, Vihorlat Protected Landscape Area). They are assisted by 32 voluntary Nature guards operating on the basis of the § 72 of the Act No. 543/2003 Coll. on Nature and Landscape Protection

6. Monitoring

In the absence of developmental pressures, the monitoring of the nominated properties means mainly a sustained or periodically repeated systematic observation and quantitative collecting of data on the state of respective components of the natural environment of the primeval forests on stationary permanent monitoring plots. Beside recording the current state itself it also includes the observation of external factors that may manifest an influence on primeval forests, such as long distance air pollution. In the monitoring process the main components being observed are: air, water, soils and biota including trees as main edificators of the geobiocenoses. For the monitoring and the evaluation of samples, state-of-the-art technology is used, e. g. Time Domain Reflectometry, CNS elemental analyzer, electric resistivity and X-ray tomography.

A regular monitoring of beech virgin forests in the Ukrainian Carpathians started after the Carpathain State Reserve was established in 1968, the monitoring of primeval forests on the Slovak territory began as early as 1964. It is now carried out on a co-operative basis and using a unified methodology accross a network of permanent sampling plots. Biometric measurements on the permanent plots are held every 5 or 10 years respectivelly, depending on the parameter. Other investigations cover soils, geobotany, phytocoenology, zoology (all groups of vertebrates and some groups of invertebrates). To co-ordinate both types all the activities, Joint Centre for the Research of Temperate Primeval Forests has been founded in 2005 (www.virginforests.sk).

6.a Key indicators for measuring state of conservation:

Table 6: Key indicators for measuring state of conservation:

Indicator	Periodicity	Location of Records
Extreme temperatures	weekly	CBR, Poloniny National Park, Eastern Carpathians Protected Landscape Area, Vihorlat Protected Landscape Area headquarters, Database of the Joint Management Committee of the "Beech Primeval Forests of the Carpathians" series
Precipitation	every two weeks	
Other meteorological characteristics obtained from hydrometeorological institutes (daily temperatures, wind, relative air humidity, solar radiation etc.)		
Soil water regime	weekly	
Physiologically available water	weekly	
Maximum water capacity	yearly	
Hydrophysical soil properties	yearly	

Chemical composition of precipitation – both horizontal and veritical	every two weeks	
Chemicals input into primeval forests in the form of stemflow, throughfall	every two weeks	
Soil water chemistry	every 5 years	
Stabile soil indicators (soil profile description and soil classification, textural analysis, physical properties, humus and chemical analysis)	every 5 years	
Labile soil indicators (pH, mobile nutrients and heavy metals, S, T, V values – CEC, ecological and genetic humus quality, humus layer)	every 5 years	
Microbial activity of soils, CO_2 production in the spring, summer and autumn	3 times a year	
Health status of main primeval forest constituents	once a year	
Biodiversity monitoring with the emphasis on species known as indicators of primeval forests intactness or bioindicators	twice a year	
Monitoring of organisms bound to primeval forests	every two years	
Primeval forest structure and texture monitoring	every 5 years	
Soil biota monitoring	5 year intervals	

Air: Extreme temperatures (weekly), precipitation (every two weeks), temperatures (daily temperatures taken from nearest meteorological station and their derivatives), other meteorological characteristics obtained from hydrometeorological institutes (wind, relative air humidity, solar radiation etc.)

Water: Soil water regime for the analyses of solute transport in soils, physiologically available water (weekly using non-destructive tensiometers, Time Domain Reflectometry, Electrical Resistivity Tomography), maximum water capacity and hydrophysical soil properties (yearly), chemical composition of precipitation – both horizontal and veritical (pH, H^+, Ca^{2+}, $Mg^{2+,}$ K^+, Na^+, NH^{4+}, NO^{3-}, $(SO_4)^{2-}$, Cl^-, F^-, electric conductivity), chemicals input into primeval forests in the form of stemflow, throughfall (every two weeks), soil water chemistry by lysimeters (pH, H^+, Ca^{2+}, $Mg^{2+,}$ K^+, Na^+, NH^{4+}, NO^{3-}, $(SO_4)^{2-}$, Cl^-, F^-, electric conductivity, C, N, S Elemental an analyzer).

Soil: Stabile soil indicators (soil profile description and soil classification, textural analysis, physical properties, humus and chemical analysis), labile soil indicators (pH, mobile nutrients and heavy metals, S, T, V values – CEC, ecological and genetic humus quality, humus layer

– every 5 years), microbial activity of soils, CO_2 production in the spring, summer and autumn (3 times a year).

Biota: Health status of main primeval forest constituents is monitored acc. methods adopted by International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (once a year), biodiversity monitoring with the emphasis on species known as indicators of primeval forests intactness or bioindicators (twice a year), monitoring of organisms bound to primeval forests (every two years), primeval forest structure and texture monitoring (every 5 years), soil biota monitoring (5 year intervals).

Both countries have had a long tradition of monitoring of the tree component of the strict preserves. Sampling methods include:

- permanent experimental plots, measurement of the living trees DBH > 8 cm, species composition, height, sociological (age) class, stem and crown quality, damage, necromass (3 degradation phases)
- transects: living trees DBH > 1 cm, species composition, height, position, crown parameters, natural regeneration (using 4 height classes).

Monitoring frequency ranges from 5 to 10 years. Additional research includes: soils, biogeochemistry, phytocoenology, zoology (birds, bats), fungi etc. with an increasing emphasis on inter-disciplinary and comparative research in reserves and managed areas

Currently, the arrangement of monitoring plots establishes an irregular net. In the future, each site shall also have its own subsystem that will consist of plots on two levels:

- a higher level drawing on a few monitoring plots with a wide array of frequently or continuously measured parameters (one or two monitoring plots for every primeval forests in the nominated series assumed)

– a lower level containing a design of additional monitoring plots aimed at low-frequency measurements (0-4 monitoring plots for every primeval forest in the nominated series assumed). The goal of the second level is to identify possible changes of a primeval forest as a whole.

6.b Administrative arrangements for monitoring property:

Constant monitoring, most part of inventory-making and scientific research are held by the scientists of Scientific Departments of the Carpathian Biosphere Reserve and the Uzhanskyi National Nature Park. Besides that, on the basis of contracts National Universities of L’viv, Uzhgorod and Ivano-Frankivsk, Different Institutes belonging to the Ukrainian

National Academy of Sciences, Federal Institute of Forest, Snow and Landscape Investigations (WSL, Switzerland), Mendel Agriculture and Forestry University (Czech Republic) conduct their research and investigation here.

On the Slovak territory, the monitoring is carried-out by the state nature conservation authority, universities (Faculty of Forestry in Zvolen, Faculty of Natural Sciences of the Comenius University Bratislava, Faculty of Ecology and Environmental Sciences of the Technical University Zvolen and others) and research institutes (Institute of Forest Ecology and Institute of Landscape Ecology of the Slovak Academy of Sciences). Research and monitoring are financially secured by the Ministry of Environment of the Slovak republic, state grant commissions and non-governmental organisations. To co-ordinate both types of activities, Joint Centre for the Research of Temperate Primeval Forests has been founded in 2005 (www.virginforests.sk).

6.c Results of previous reporting exercises:

Data on monitoring, which lasts here for many years already, are found in 27 volumes of Chronicles of Nature of the CBR and in 3 volumes of Chronicles of Nature of UNNP, as well as in numerous scientific reports, proceedings, abstract volumes, articles monographies, and in professional literature. 5 PhD thesises and 1 Doctor degree thesis were defended on the basis of these investigations.

Main results of s 25 years long monitoring of the properties on the Slovak territory are available in Korpel’ (1993). Beside an extensive and comprehensive monitoring, to-date monitoring has focused mainly also on inventory research. Its results have been summarised by Bublinec & Pichler (2001). Continually updated information is also available at the official website of the Joint Centre for the Research of Temperate Primeval Forests (www.virginforests.sk).

7. Documentation

7. a Photographs, slides, image inventory and authorisation table and other audiovisual materials

Table 7: List of slides

Id. No	Format (slide/ print/ video|	Caption	Date of Photo	Photographer / Director Of the video	Copyright owner (if different than photographer/ director of the video)	Contact details of copyright owner (Name, address, tel/fax and e-mail	Non exclusive cession of rights
1	slide	Chornohora	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
2	slide	Chornohora	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
3	slide	Chornohora	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
4	slide	Havešová	2002	TU Zvolen	n/a	pichler@vsld.tuzvo.sk	granted
5	slide	Kuziy-Trybushany	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
6	slide	Kuziy-Trybushany	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
7	slide	Maramarosh	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
8	slide	Maramarosh	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
9	slide	Rožok	2004	TU Zvolen	n/a	pichler@vsld.tuzvo.sk	granted
10	slide	Stužica – Bukovské Vrchy	2000	TU Zvolen	n/a	pichler@vsld.tuzvo.sk	granted
11	slide	Stužica – Bukovské Vrchy	2000	TU Zvolen	n/a	pichler@vsld.tuzvo.sk	granted
12	slide	Stužica – Bukovské Vrchy	2000	TU Zvolen	n/a	pichler@vsld.tuzvo.sk	granted
13	slide	Svydovets	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
14	slide	Svydovets	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
15	slide	Uholka-Shyrokyi Luh	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
16	slide	Uholka-Shyrokyi Luh	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
17	slide	Uholka-Shyrokyi Luh	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
18	slide	Uholka-Shyrokyi Luh	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted

Table 7: List of prints

Id. No	Format (slide/ print/ video|	Caption	Date of Photo	Photographer / Director Of the video	Copyright owner (if different than photographer/ director of the video)	Contact details of copyright owner (Name, address, tel/fax and e-mail	Non exclusive cession of rights
1	Print	Chornohora	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
2	Print	Chornohora	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
3	Print	Havešová	2002	TU Zvolen	n/a	pichler@vsld.tuzvo.	granted

4	Print	Havešová	2002	TU Zvolen	n/a	pichler@vsld.tuzvo.	granted
5	Print	Kuziy-Trybushany	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
6	Print	Kuziy-Trybushany	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
7	Print	Rožok	2004	TU Zvolen	n/a	pichler@vsld.tuzvo.sk	granted
8	Print	Stužica – Bukovské Vrchy	2000	TU Zvolen	n/a	pichler@vsld.tuzvo.sk	granted
9	Print	Stuzhytsia-Uzhok	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
10	Print	Svydovets	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
11	Print	Svydovets	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
12	Print	Uholka-Shyrokyi Luh	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
13	Print	Uholka-Shyrokyi Luh	2003	CBR Rakhiv	n/a	cbr@rakhiv.ukrtel.net	granted
14	Print	Vihorlat	2003	TU Zvolen	n/a	pichler@vsld.tuzvo.sk	granted
15	Print	Vihorlat	2003	TU Zvolen	n/a	pichler@vsld.tuzvo.sk	granted

7. b Texts relating to the protective designation, copies of property management plans or documented management systems and extracts of other plans relevant to the property

- Annex 1: Map Annexes[15]
- Annex 2: Integrated management plan for the serial nomination "Beech primeval forests of the Carpathians"
- Annex 3: Color prints
- Annex 4: Summary – the NECONET of Slovakia
- Annex 5: Project of the territoria organization and protection of natural comlexes of the Carpathian Biosphere Reserve, Regulations of the National nature Park Uzhanskyi"
- Annex 6: Decree of the Slovak Government on the establishment of Poloniny National Park and decree of the Slovak Government on the establishment of Vihorlate Protected Area
- Anenx 7: Development of the ECONET of Ukraine
- Annex 8: Law of Ukraine on the State Programme of Ukraine's Environmental Network Development for years 2000–2015
- Annex 9: Decisions of the Government of the Slovak Republic to the National list of NATURA 2000 and the Wild Birds Areas
- Annex 10: General supraregional territorial system of ecological stability an the Territorial development plan of the greater Prešov Self-Governing Region

[15] Due to time and technical constraints, the maps could not have been furnished with geographical coordinates in time. However, new maps are under peraparation.

7. c Form and date of most recent records and archives held

The most recent and detailed records of the state of the nominated properties and their components, including primeval forests dynamics, structure and biodiversity have been acquired between 1996–2006 within the framework the periodical survey. The reults are available in the form of published scioentific articles, reports and databases. All acquired data are collected and classified by nature protection administrations responsible for the respective properties, i. e. Carpathian Biosphere Reserve Administration (Ukraine) and Poloniny National Park Administration (Slovak Republic).

7.d Address where inventory, record and archives are held

The source materials and originals of reports, scientific artcicles, as well as specialized databases are kept by:

1. Ministry of the Environment of the Slovak Republic
Department of Nature and Landscape Protection
1 L. Štúr Square, 812 35 Bratislava, Slovak Republic

2. Slovak Inspectorate for the Environment
Nature Conservancy Inspectorate Headquarters
2 Karloveská Street, 812 22 Bratislava, Slovak Republic
(with regional offices in Bratislava, Banská Bystrica, Žilina and Košice)

3. State Nature Conservancy of the Slovak Republic
Centre for Nature and Landscape Protection
10 Lazovná Street, P.O. BOX 5, 974 01 Banská Bystrica, Slovak Republic
(with executive bodies described in part 4d of this nomination project)

4. Slovak Environmental Agency
Centre for Environmental Project Programming
26 Kammerhofská street, 96900 Banská Štiavnica, Slovak Republic

5. Slovak Environmental Agency
Centre for Environmentalistics and Informatics
28 Tajovského Street, 97500 Banská Bystrica, Slovak Republic

6. Technical university of Zvolen
Faculty of Forestry
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7. Slovak Academy of Sciences
Institute for the Forest Ecology
4 Štúrova Street, 96001 Zvolen, Slovak Republic

8. Carpathian Biosphere Reserve 90600
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Rakhiv, Transcarpathian Region
Ukraine

9. State Nature Museum (Ljviv)
79000, Teatralna str., 18
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10. Institute of Ecology
of the Ukrainian National Academy of Sciences (UNAS)
79000, Chaikovskoho str.,7
Ljviv, Ukraine

11. Institute of Zoology of UNAS
01601,Khmelnytskogo str., 15
Kyiv-30, Ukraine

12. Institute of Botany UNAS
01601 Tereshchenkivska str., 2
Kyiv, Ukraine

13. Ljviv National University (Faculty of Geology)
79000, Doroshenka str.
42 Ljviv, Ukraine

14. Uzhgorod National University (Faculty of Geography)
88000, Voloshyna str., 32
Uzhgorod, Ukraine

15. Ukrainian Scientific Research Institute for Mountain Forestry
76000, Grushevskogo str.
31, Ivano-Frankivsk, Ukraine

16. Mendel University of Agriculture and Forestry
Zemědělská 3, Brno – Černá pole
61300, Czech Republic

17. Institute for Geography
of the Russian National Academy of Sciences Moscow
Staromonetnaya str, 21, Russia

18. Ukrainian State Project Agency (Irpin')
08200, Proletarska str., 22-24
Irpinj, Kyiv District, Ukraine

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Slovak Republic
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Fax: +421 *44* 551 43 81
E-mail: smopaj@smopaj.sk
Www: www.smopaj.sk

– **Centre for Scientific Tourim in Slovakia**
Institute of Forest Ecology, SAS
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90600 Rakhiv
Ukraine
Tel.: +380 3132 22193
Fax: +380.3132 22054
E-mail: cbr@rakhiv.ukrtel.net

8.d Official Web address

Thus far, there are two main web addresses that provide rich resources on the nominated properties:

– http://cbr.nature.org.ua/main.htm (the official web address of the Carpathian Biosphere Resreve, Ukraine)
– www.virginforests.sk (the official web address of the Joint National Centre of Temperate Primeval Forests Research, Slovakia)

An official web addreess for the nominated property is under preparation in Ukrainian, Slovak, English and French languages (www.carpathianbeech.sk, www.carpathianbeech.sk).

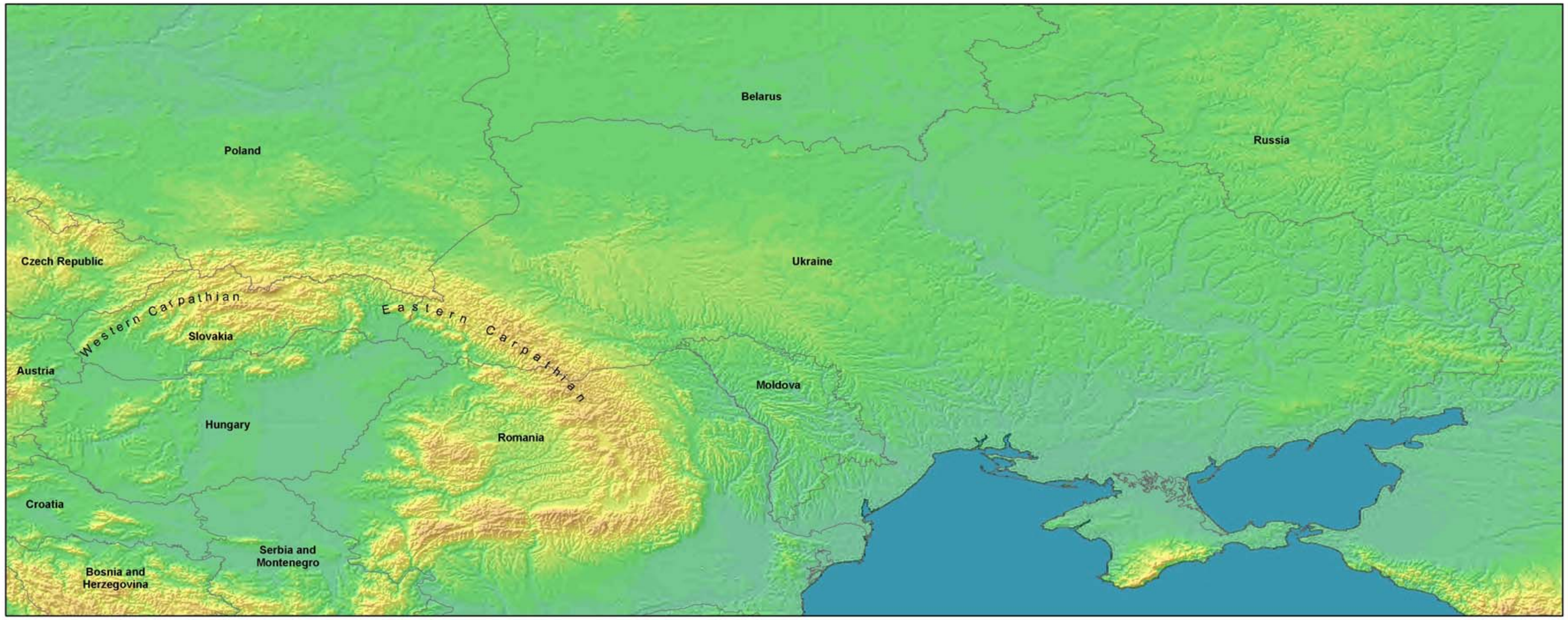
9. Signature on behalf of the State Party

…………………………………………	………………………………………….
Pavlo Mykolayovych Ihnatenko	**László Miklós**
Minister of Environmental Protection	Minister of Environment
of Ukraine	of the Slovak Republic

Map annex 1

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS

The position of Ukraine and the Slovak Republic in the Central Europe



N

1:7 000 000

Kilometer

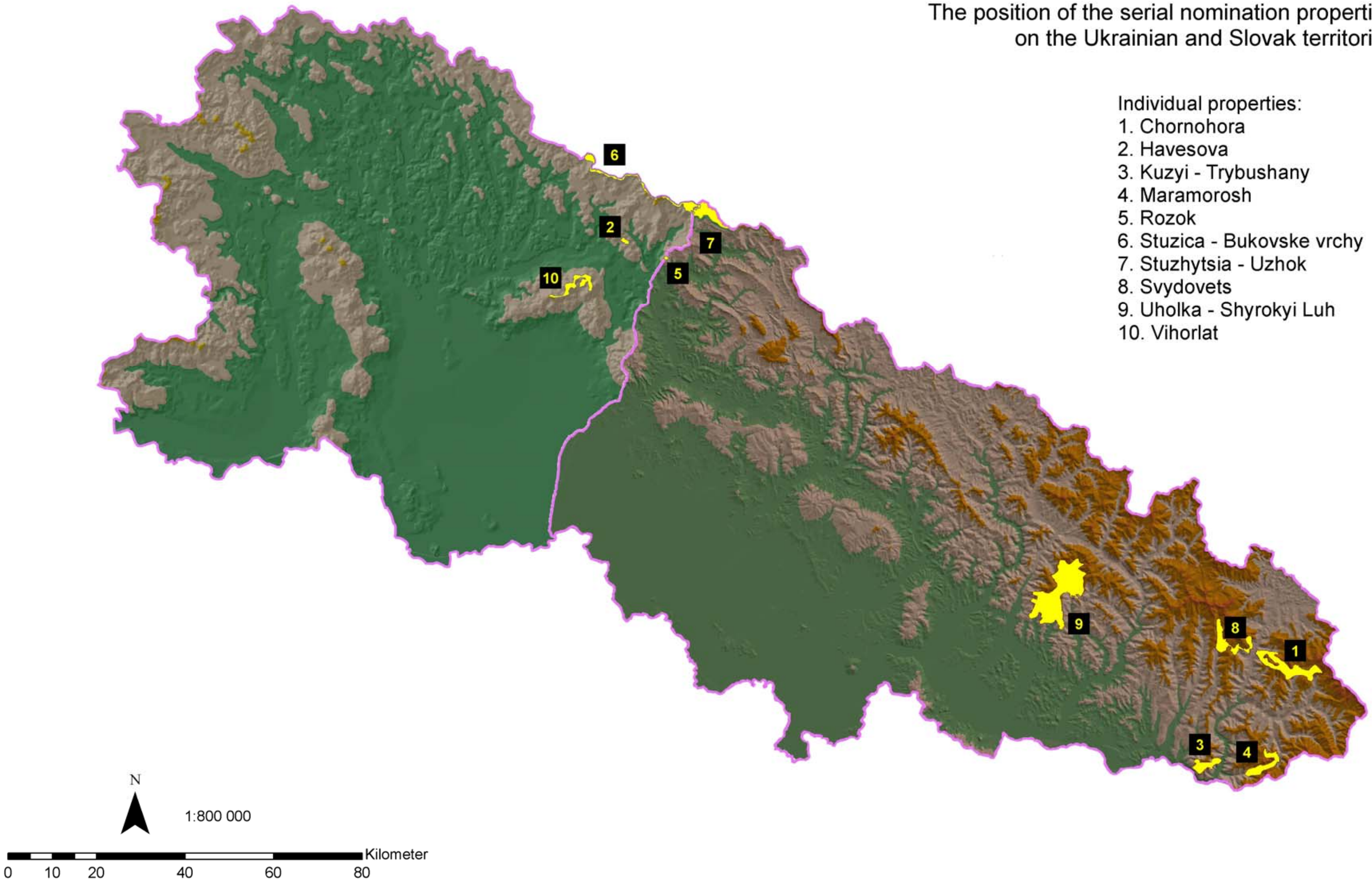
0 85 170 340 510 680

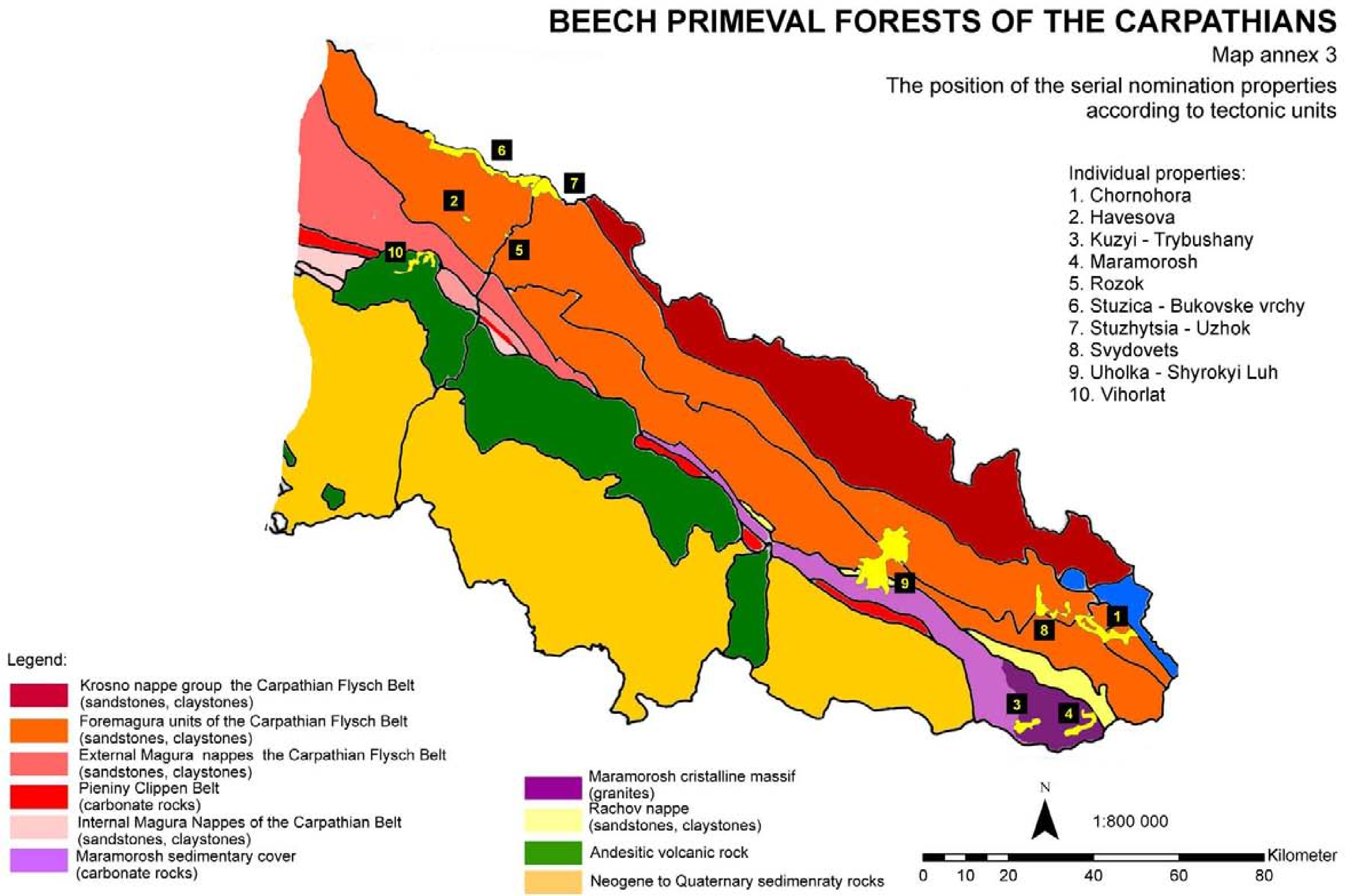
BEECH PRIMEVAL FORESTS OF THE CARPATHIANS

Map annex 2

The position of the serial nomination properties on the Ukrainian and Slovak territories

Individual properties:
1. Chornohora
2. Havesova
3. Kuzyi - Trybushany
4. Maramorosh
5. Rozok
6. Stuzica - Bukovske vrchy
7. Stuzhytsia - Uzhok
8. Svydovets
9. Uholka - Shyrokyi Luh
10. Vihorlat

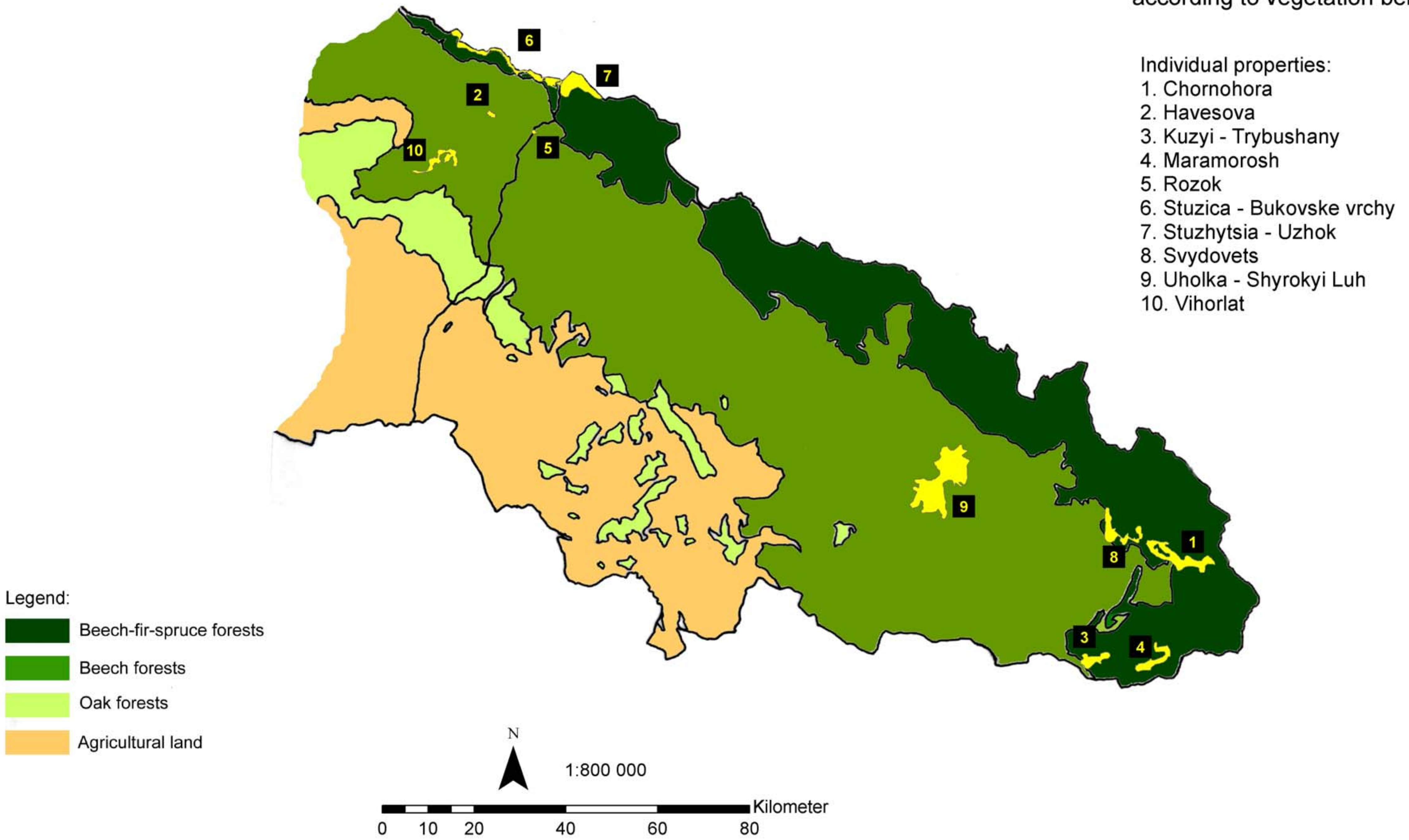



BEECH PRIMEVAL FORESTS OF THE CARPATHIANS
Map annex 3
The position of the serial nomination properties according to tectonic units
Individual properties:
1. Chornohora
2. Havesova
3. Kuzyi - Trybushany
4. Maramorosh
5. Rozok
6. Stuzica - Bukovske vrchy
7. Stuzhytsia - Uzhok
8. Svydovets
9. Uholka - Shyrokyi Luh
10. Vihorlat
Legend:
Krosno nappe group the Carpathian Flysch Belt (sandstones, claystones)
Foremagura units of the Carpathian Flysch Belt (sandstones, claystones)
External Magura nappes the Carpathian Flysch Belt (sandstones, claystones)
Pieniny Clippen Belt (carbonate rocks)
Internal Magura Nappes of the Carpathian Belt (sandstones, claystones)
Maramorosh sedimentary cover (carbonate rocks)
Maramorosh cristalline massif (granites)
Rachov nappe (sandstones, claystones)
Andesitic volcanic rock
Neogene to Quaternary sedimenraty rocks
N
1:800 000
0 10 20 40 60 80
Kilometer

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS

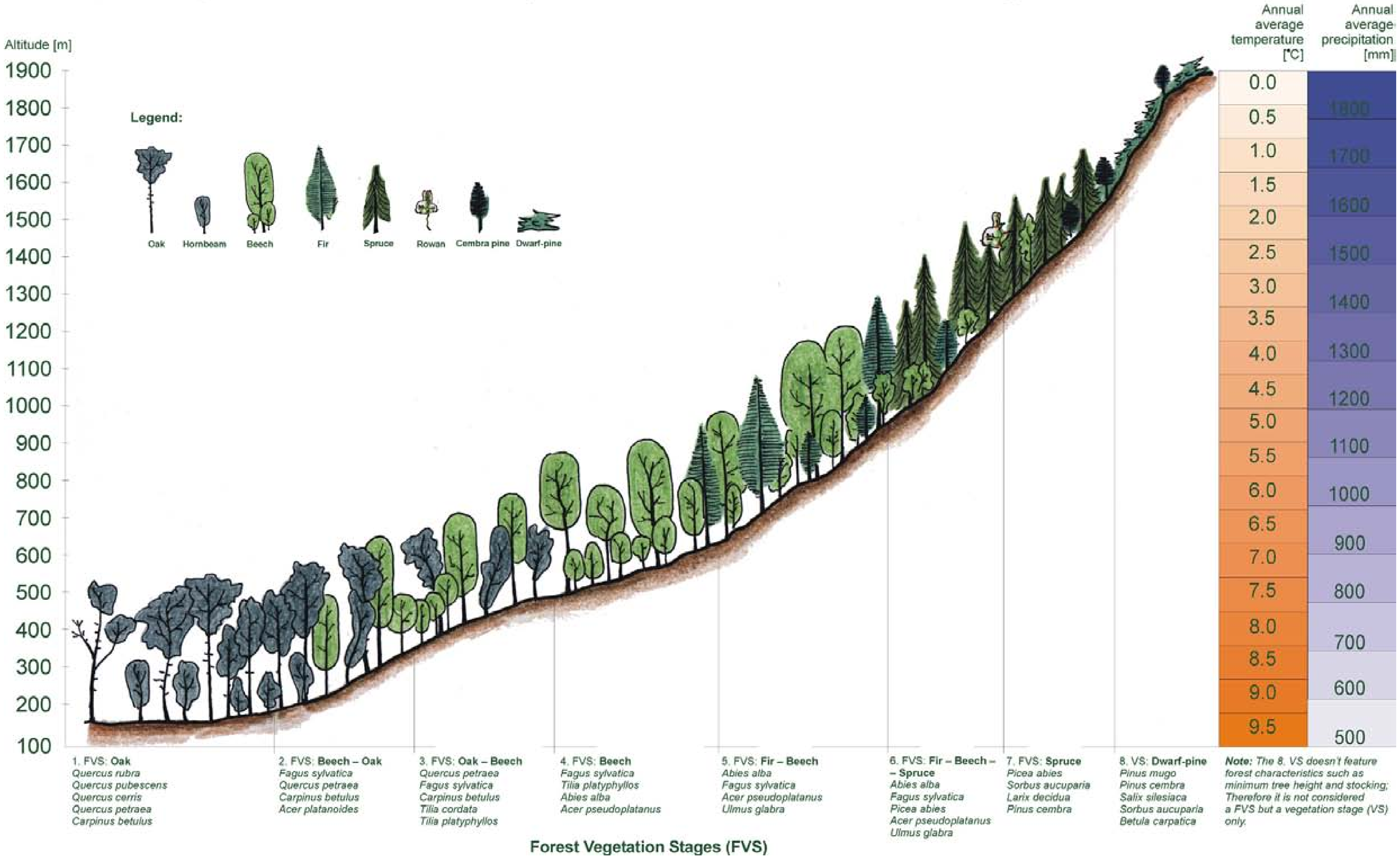
Map annex 4

The position of the serial nomination properties
according to vegetation belts



BEECH PRIMEVAL FORESTS OF THE CARPATHIANS

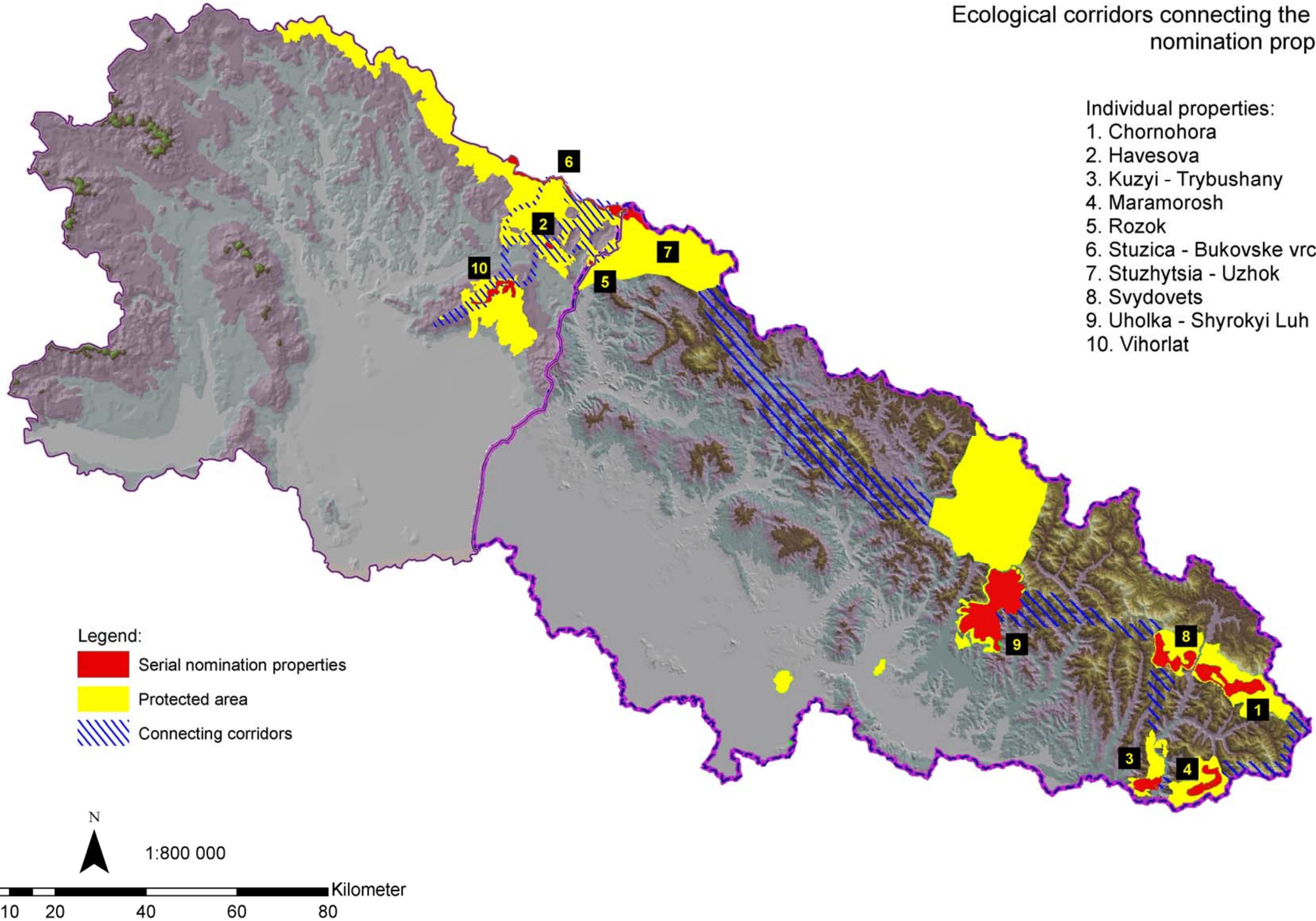
Map annex 5 - Bech ecosystems as embedded in an ecological continuum



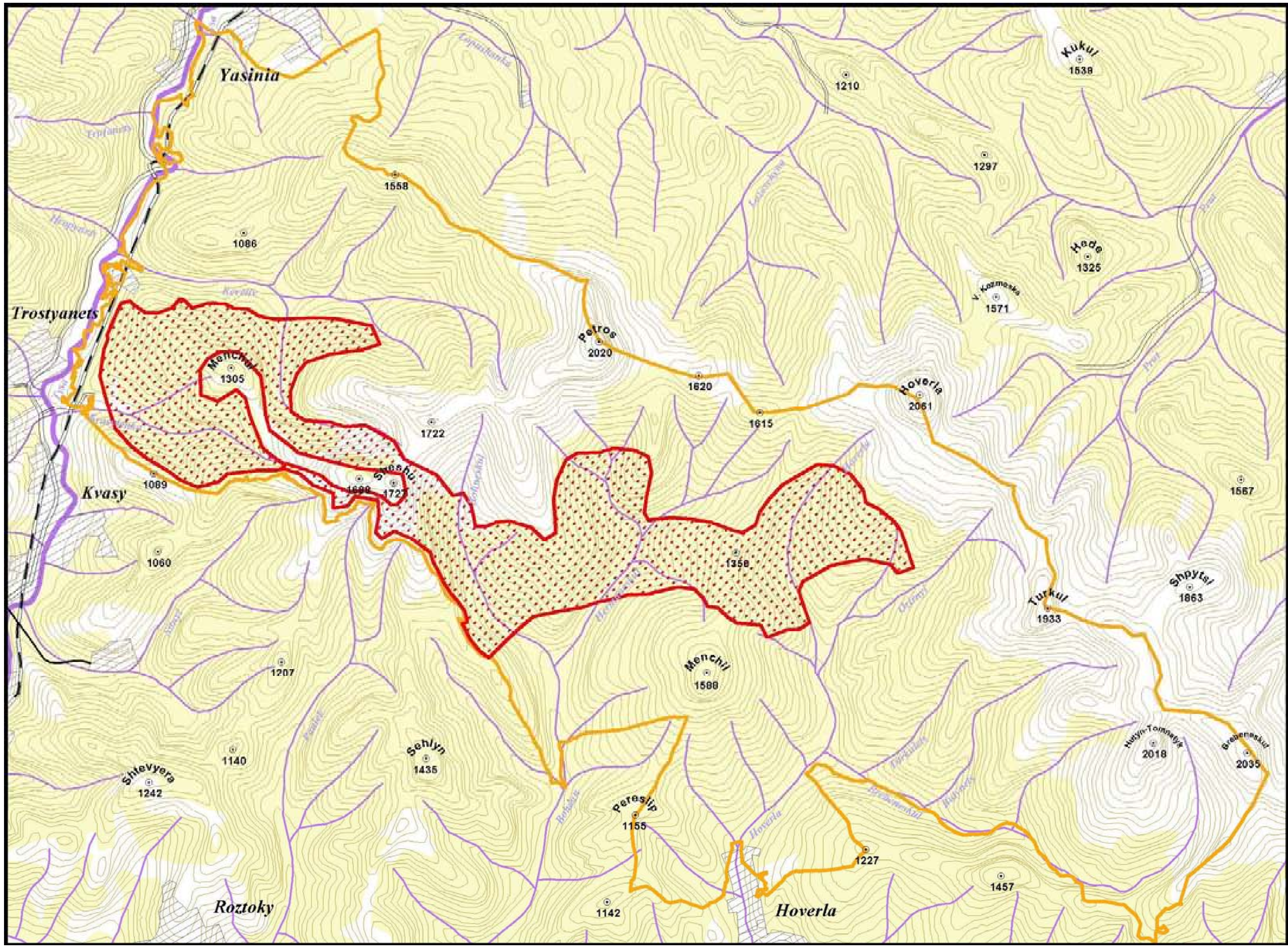
BEECH PRIMEVAL FORESTS OF THE CARPATHIANS

Map annex 6

Ecological corridors connecting the serial nomination properties



Thematic Elaboraton © Slovak Environmental Agency 2005



Map annex No. 7

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS (Ukrainian part)

CHORNOHORA (CH)

Legend:

- Core zone
- Buffer zone

Note: The buffer zone coincides with the Chornohirskyi massif of the Carpathian Biosphere Reserve

- Forests
- Urban areas
- Lakes
- Streams
- Primary transportation roads

1 : 100 000

Map Annex No. 8

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS

Map sheets of individual properties within the nominated series

Havesova

Legend:

Core zone

Buffer zone

Note: The buffer zone boundary coincides with the Havešová National Nature Preserve (category Ia according to Guidelines for Protected Area Management Categories (IUCN, 1994)).

Forests

Urban areas

Lakes

Streams

Primary transportation roads

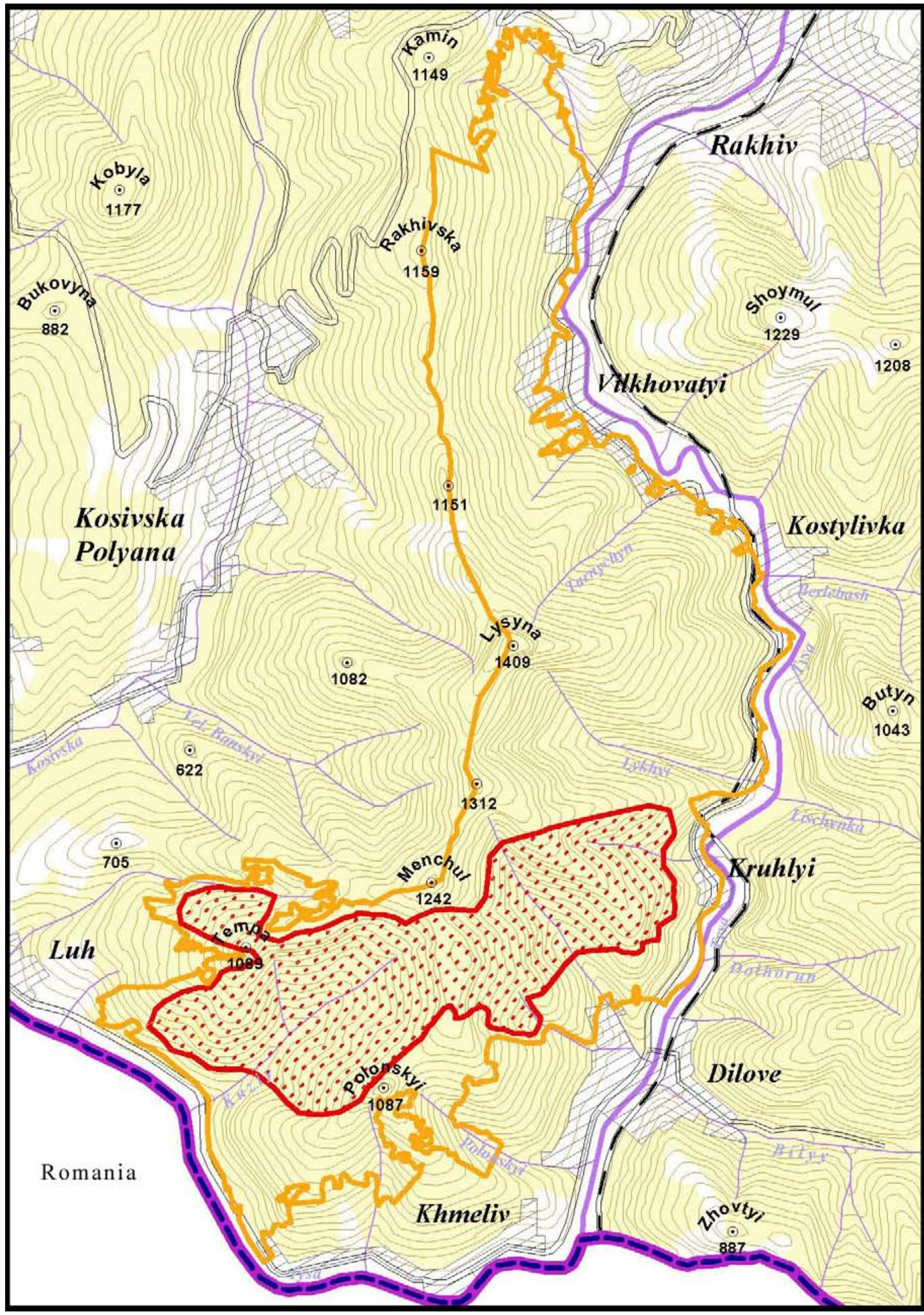
Secondary transportation roads

Forest and rural hard top roads

Forest and rural dirt roads

1:50 000

Map annex No. 9



BEECH PRIMEVAL FORESTS OF THE CARPATHIANS (Ukrainian part)

KUZIY-TRYBUSHANY (KT)

Legend:

- Core zone
- Buffer zone

Note: *The buffer zone coincides with the Kyziy-Trybushanskyi massif of the Carpathian Biosphere Reserve*

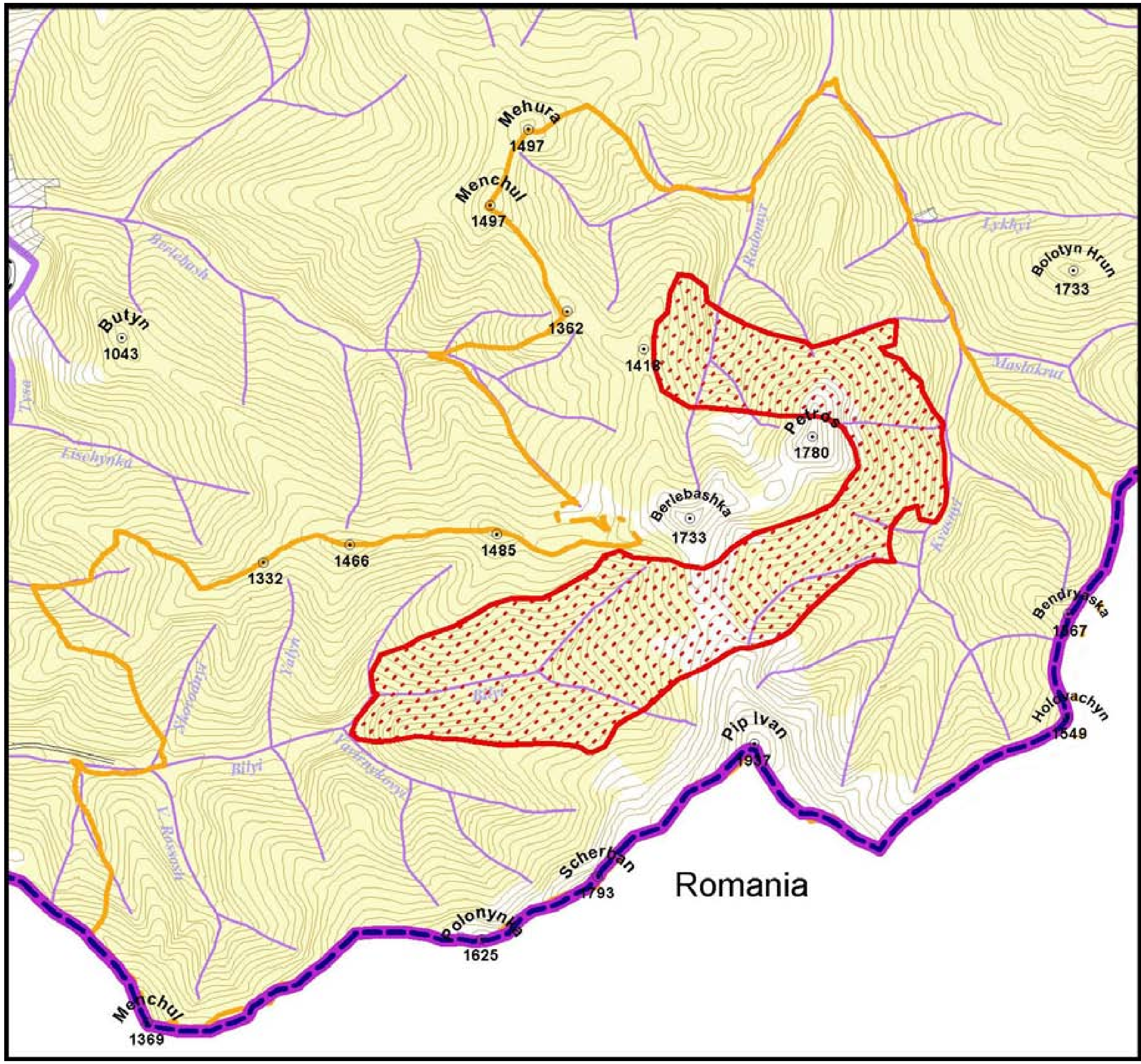
- Forests
- Urban areas
- Lakes
- Streams
- Primary transportation roads

1 : 100 000

Map annex No. 10

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS (Ukrainian part)

MARAMOROSH (MR)



Legend:

- Core zone
- Buffer zone

Note: *The buffer zone coincides with the Maramoroskyi massif of the Carpathian Biosphere Reserve*

- Forests
- Urban areas
- Lakes
- Streams
- Primary transportation roads

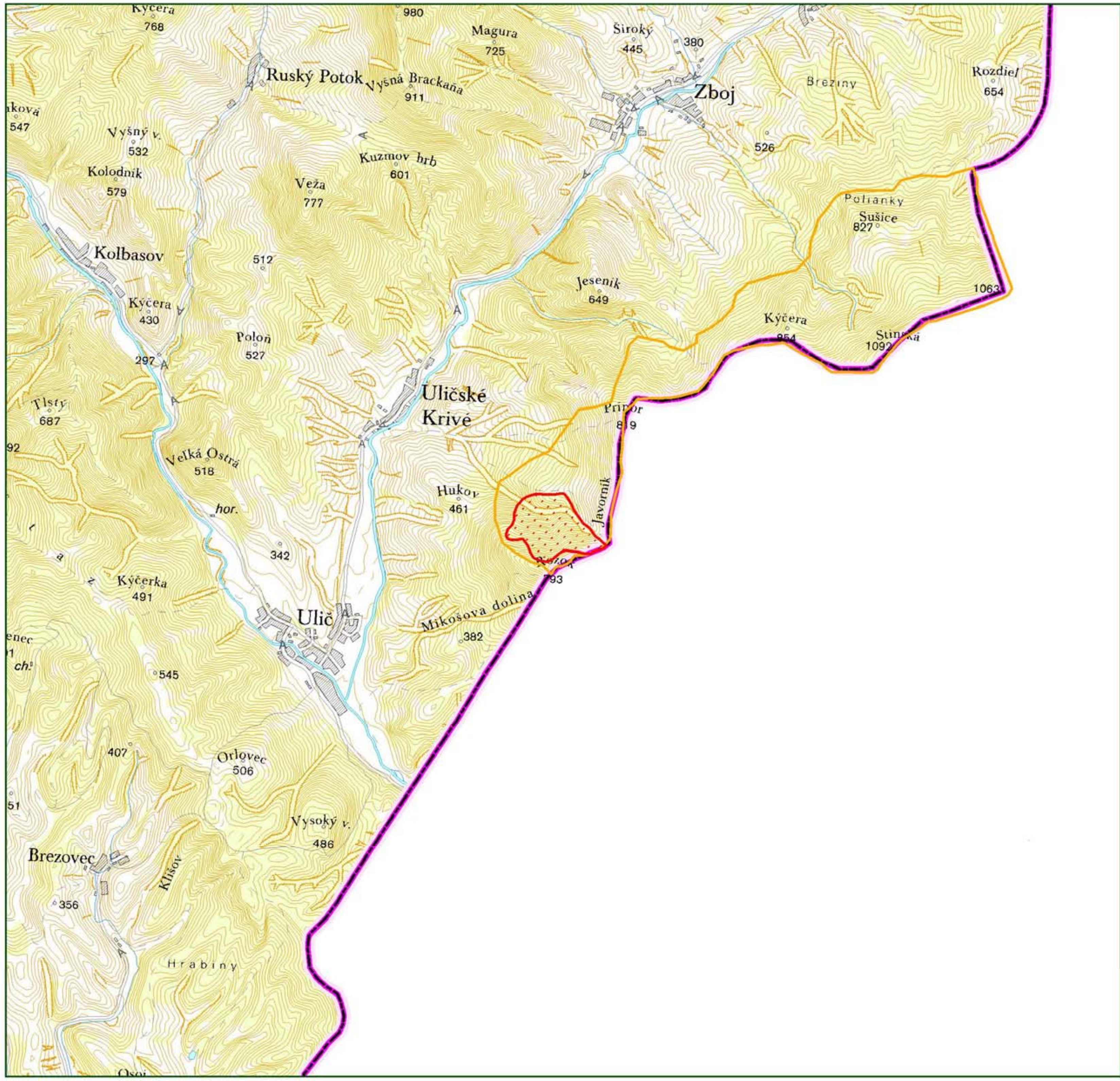
1 : 100 000

Map Annex No. 11

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS

Map sheets of individual properties within the nominated series

Rozok



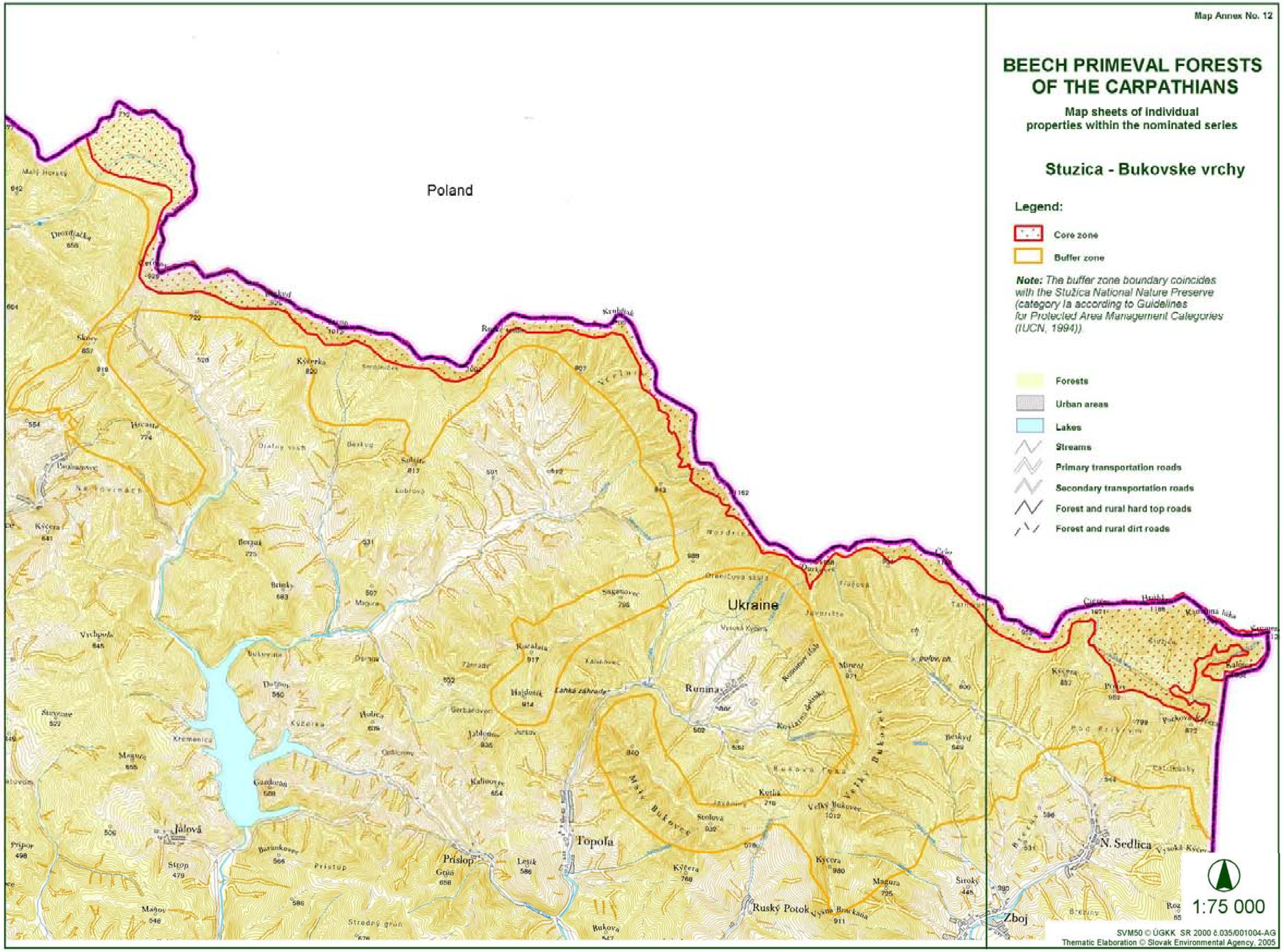
Legend:

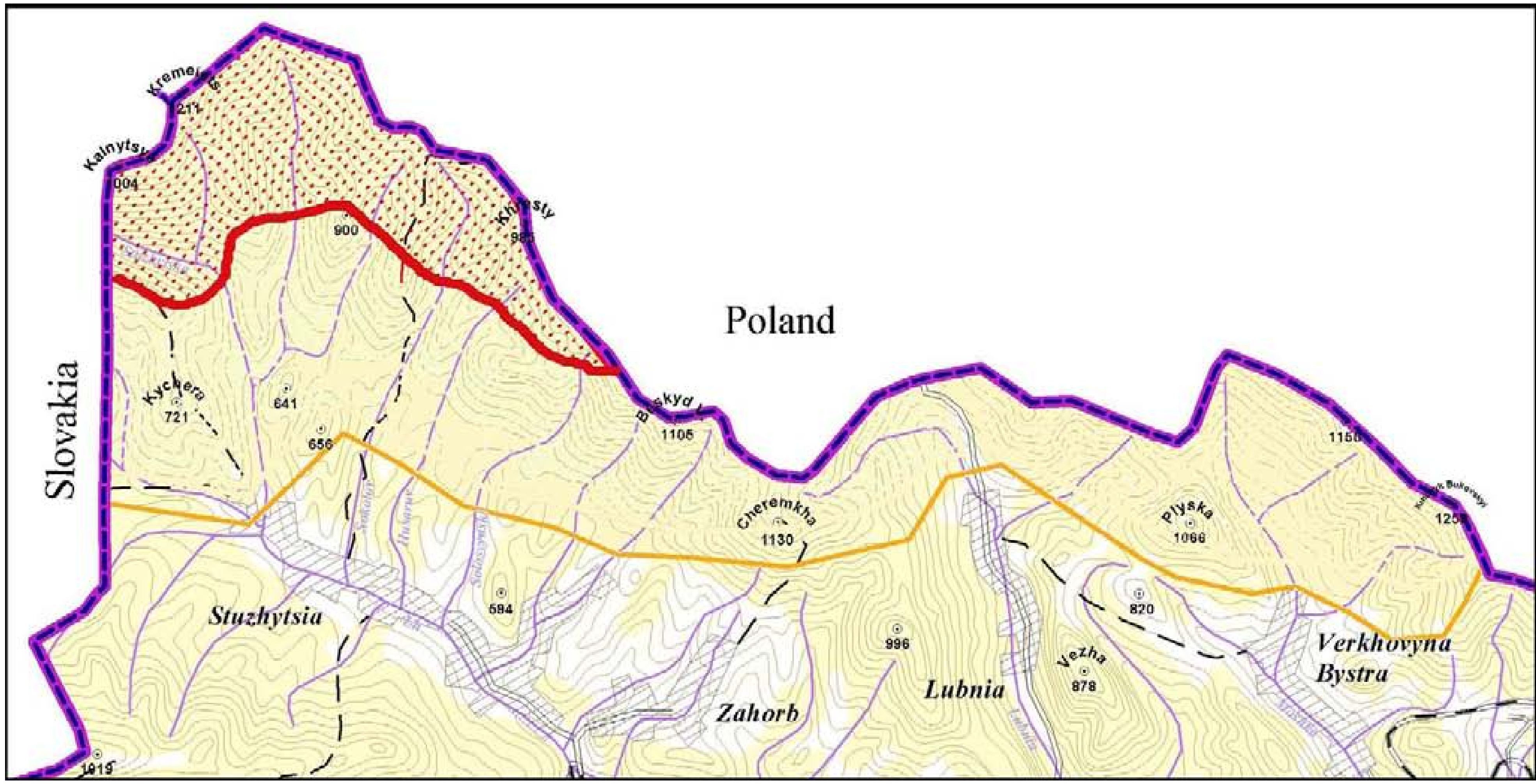
- Core zone
- Buffer zone

Note: *The buffer zone boundary coincides with the Hrončecký Grúň National Nature Preserve (category Ia according to Guidelines for Protected Area Management Categories (IUCN, 1994)).*

- Forests
- Urban areas
- Lakes
- Streams
- Primary transportation roads
- Secondary transportation roads
- Forest and rural hard top roads
- Forest and rural dirt roads

1:50 000


Map Annex No. 12
BEECH PRIMEVAL FORESTS
OF THE CARPATHIANS
Map sheets of individual
properties within the nominated series
Stuzica - Bukovske vrchy
Legend:
Core zone
Buffer zone
Note: The buffer zone boundary coincides with the Stužica National Nature Preserve (category Ia according to Guidelines for Protected Area Management Categories (IUCN, 1994)).
Forests
Urban areas
Lakes
Streams
Primary transportation roads
Secondary transportation roads
Forest and rural hard top roads
Forest and rural dirt roads
Poland
Ukraine
Runina
Topoľa
Jalová
Príslop
Ruský Potok
N. Sedlica
Zboj
1:75 000
SVM50 © ÚGKK SR 2000 č.035/001004-AG
Thematic Elaboration © Slovak Environmental Agency, 2005



Map annex No. 13

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS (Ukrainian part)

STUZHYTSIA-UZHOK (SU)

Legend:

Core zone

Buffer zone

Note: *The buffer zone lies within the Uzhanskyi National Nature Park*

Forests

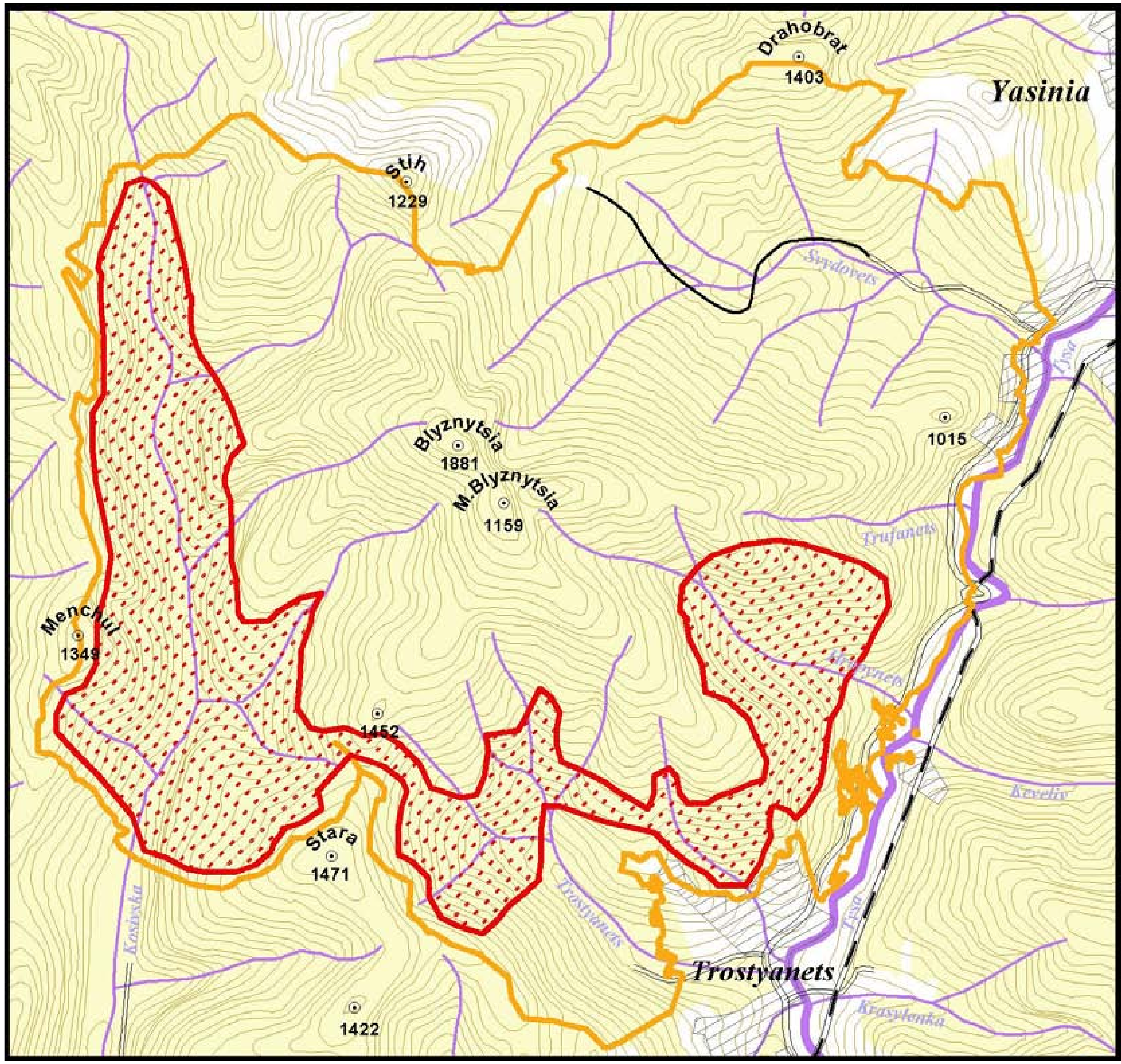
Urban areas

Lakes

Streams

Primary transportation roads

1 : 100 000



Map annex No. 14

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS (Ukrainian part)

SVYDOVETS (SV)

Legend:

- Core zone
- Buffer zone

Note: *The buffer zone coincides with the Svydovetskyi massif of the Carpathian Biosphere Reserve*

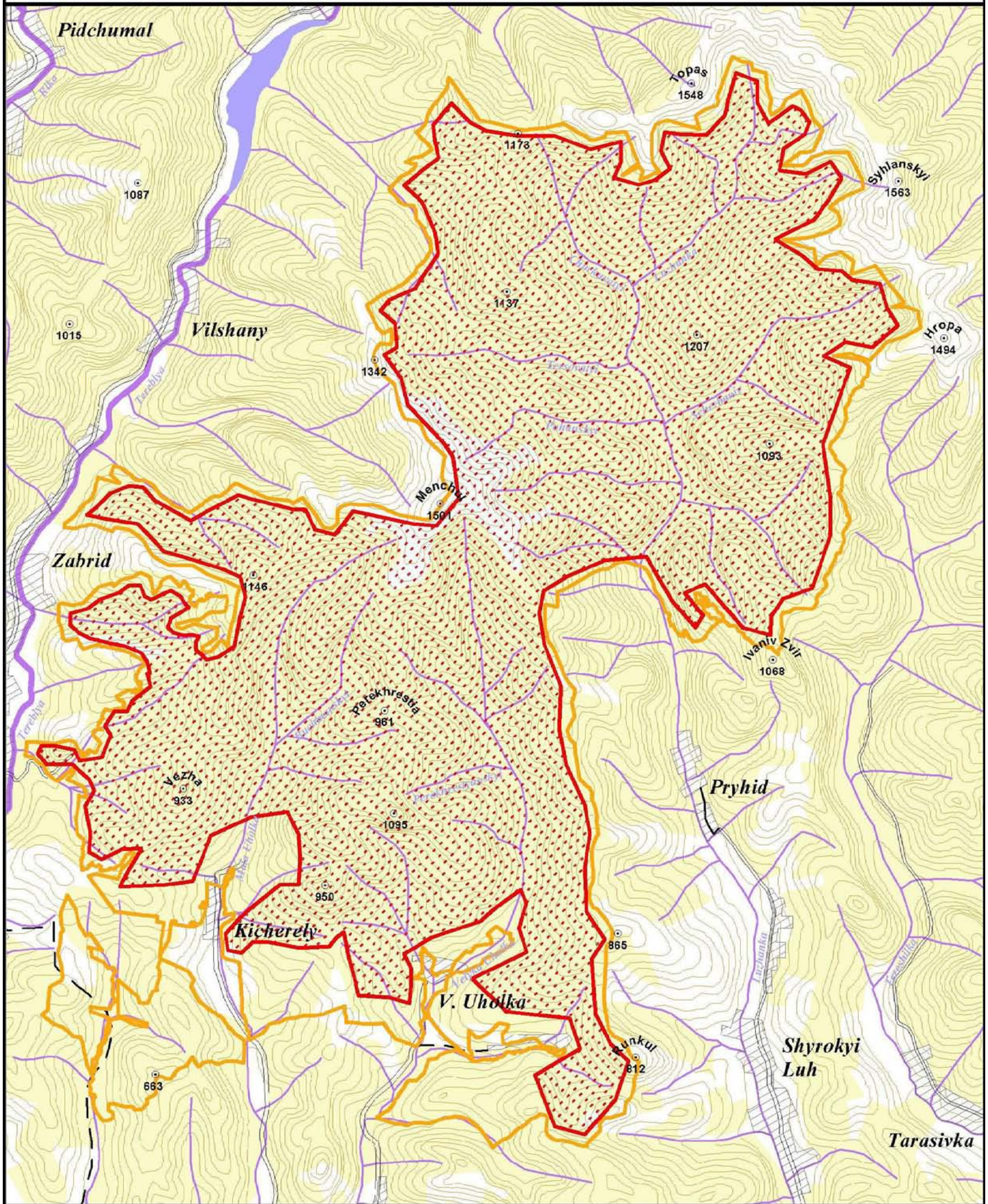
- Forests
- Urban areas
- Lakes
- Streams
- Primary transportation roads

1 : 100 000

Map annex No. 15

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS
(Ukrainian part)

UHOL'KA-SHYROKYI LUH (USh)



Legend:

- Core zone
- Buffer zone
- Forests
- Urban areas
- Lakes
- Streams
- Primary transportation roads

1 : 100 000

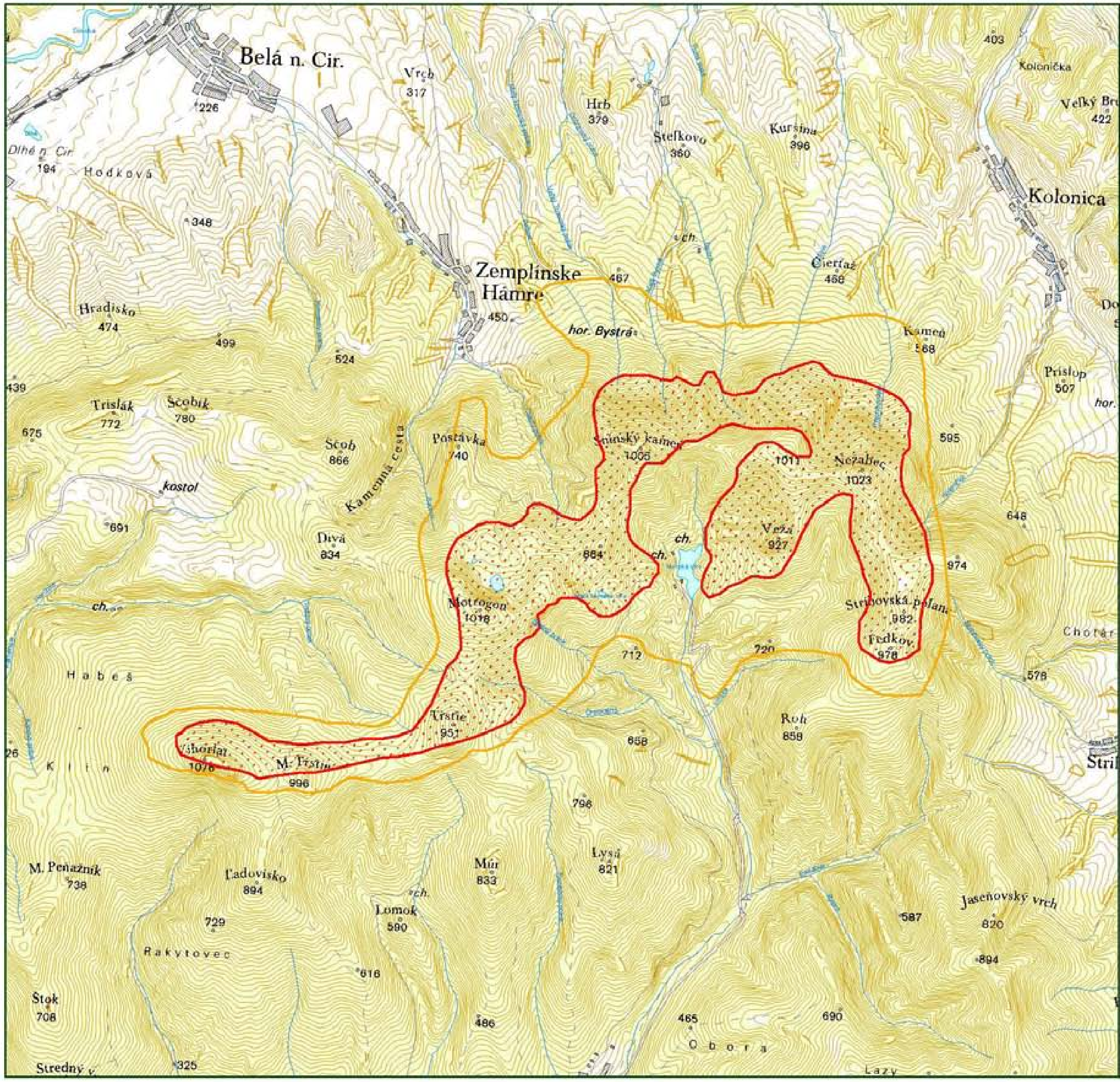
Note: The buffer zone coincides with the Uholsko-Shyrokoluzhanskyi massif of the Carpathian Biosphere Reserve

Map Annex No. 16

BEECH PRIMEVAL FORESTS OF THE CARPATHIANS

Map sheets of individual properties within the nominated series

Vihorlat



Legend:

- Core zone
- Buffer zone

Note: *The buffer zone boundary coincides with the Vihorlatský Prales National Nature Preserve (category Ia according to Guidelines for Protected Area Management Categories (IUCN, 1994)).*

- Forests
- Urban areas
- Lakes
- Streams
- Primary transportation roads
- Secondary transportation roads
- Forest and rural hard top roads
- Forest and rural dirt roads

1:50 000

INTEGRATED MANAGEMENT PLAN FOR THE SERIAL NOMINATION "BEECH PRIMEVAL FORESTS OF THE CARPATHIANS"

I. Introduction

The presented integrated management plan for the serial nomination "Beech primeval forests of the Carpathians" (hereinafter referred to as IMP) is not seen as a closed document. In the course of time it will be updated, adjusted and corrected if necessary in the process of its implementation so as to meet its pre-defined objectives. Additionally, we consider the IMP a tool for the transfer of the knowledge acquired by scientific methods into the real world of nature conservation and for both identification and and implementation of steps and measures aimed at maintaining a long-term integrity of nominated localities. It is understood that the IMP quality and implementation efficiency depends on the support of the involved stakeholders and parties. Such support can be achieved by a combined approach based on explanatory work, identifications of potential benefits for the involved entities and ways how to materialise those benefits without compromising the natural values and their integrity but instead by drawing on them, and the legal instruments.

The management is based on scientific results from research on virgin forests and the various interactions between them and society with all their relevant components. Because a continuous improvement of primeval forests protection and management depends on a public support mobilisation, all inhabitants, opinion leaders and decision makers have to be sensitized over this issue through activities such as awareness rising, education and lobbying. An important role is played here by environmental ethics and justice. In this field also IMP has incorporated the experience and expertise of ACANAP[1] that has been promoting the adaptive management of primeval forests and biodiversity in the Carpathians as well as opportunities for exchange of management, research and monitoring experience and for creation of a harmonic relationship between people and nature in the Carpathians.

The integrated management plan is based on both existing and planned instruments and mechanisms supposed to ensure and promote the long-term conservation and extension of the Beech primeval forests of the Carpathians as a serial nomination proposed for inscription onto the List of World Natural Heritage. Parts of this IMP have therefore a legally binding character while others present recommendations negotiated and approved by all stakeholders. The IMP of the primeval forest series nominated by Ukraine and the Slovak Republic for

[1] Association of the Carpathian National Parks and Reserves

inscription onto the UNESCO World Heritage List is organised on two mutually interlinked levels. Each series' property has a management plan based on a strict non-intervention policy. State parties guarantee the strictest level of protection for the series of nominated primeval forests (Ia management regime acc. to IUCN) and the monitoring aimed at preventing possible anthropogenic damage or disturbance on the legal premises given in 4 c). The main aim is to leave nominated properties to their spontaneous self-regulating development, free of anthropic intervention. Current buffer zones can be subject to regulatory management measures aimed to secure and enhance ecological stability of forest stands. On its second level, the IMP covers the serial nomination as a whole with objectives listed bellow.

II. General Objectives

The clear identification of the serial nomination innate values for which it is proposed for inclusion in the world natural heritage, long-term research, monitoring and experience gathered from the international co-operation within the ACANAP framework and other fora has allowed for a clear definition of integrated management plan objectives:

(i) To ensure the most effective conservation of the nominated properties with all their abiotic and biotic components, geo- and biodiversity and ecological processes; to secure a lasting homeostasis and self-reproduction of the respective ecosystems and their protection both against anthropic and anthropogenic factors

(ii) To maintain and expand the existing, ecologically connected complex of primeval and natural beech forests that encompass and connect (link) the nominated properties on both the Slovak and the Ukrainian sides through the conservation of other remaining natural beech forests within the proposed corridors connecting the nominated properties and measures supporting the succession of managed beech semi-natural forests adjacent to and between the nominated properties, to convert the expanded area into a continuous buffer zone encompassing the nominated properties, in addition to the already existing ones; that will support the exchange of biological information between the properties.

(iii) To use nominated series of primeval forests for scientific research in order to acquire knowledge transferable and applicable on the level of sustainable, close-to-nature and continuous-cover forestry through mimicking of selected primeval forests patterns; at the same time also serve the call for enhancement of landscape ecological stability not only on national but also global level;

(iv) To use natural heritage for enhancement of ecological and environmental education, awareness of primeval forests and their intrinsic, innate value in the local communities, nations and the global community; educational activities shall be carefully chosen to maintain integrity and conservation of the existing sites, to preserve their naturalness and uniqueness and to avoid both their devastation or degradation.

(v) To allow for the sustainable use of natural resources in the broader region through the support of traditional crafts, products and ecotourism, the latter having the beech primeval forests as one of its attractors, as a source of income for the nearby communities, based on a proper sensitization of the local and foreign visitors over their value through multiple communication channels, including the internet page, provision of guided walks, eductional trails, interactive learning, films, press articles an other forms.

III. Legal instruments

This chapter lays out valid legal instruments applied to ensure meeting the above objectives in areas within and outside the serial nomination properties perimeter. An effective coordination of the legal instruments use and implementation represents one of the main tasks of the Joint Management Committee (hereinafter JMC). JMC itself has no legal enforcement powers, but they are sufficiently exercised by institutions represented in it, mainly the ministries of environment of both countries, national park and biosphere reserve administrations, State nature conservancy and municipal governments. The legal instruments are divided into two groups and several sub-groups in this chapter. The first group includes legal instruments that ensure in a thorough and consequent manner the conservation of the nominated properties and partly enable also their possible extension.

The second group establishes a legal instruments framework that enables the embedding of the integrated management plan objectives into a complex territorial planning and their implementation through the Landscape ecological planning, because the principal questions asked in the planning process is: What are the valuable elements in the landscape worth protection? Then the land use is adjusted according to this priority.

Nature protection oriented legal instruments

Legal instruments for the management of the nominated properties: The nominated properties are subject to non-intervention management guaranteed by the state laws of Ukraine and the Slovak Republic. According to the Law of Ukraine “On Nature Protection Fund of Ukraine”, the beech virgin forests selected for the nomination are located within the core zones A of the CBR and thus under the strictest protection. The protection measures are enforced under a threat of severe penalties stipulated by the Decree of the Cabinet of Ministers No. 521, 21.04.1998.

Protection measures related to the nominated beech primeval forests on the Slovak territory are regulated by the provisions of Act No. 543/2002 Coll. on Nature and Landscape Protection (hereinafter only Act). In the wording of § 16, section 1 of the Act, any interventions are prohibited in these strictly protected areas. **The cited protection regimes correspond to Ia management regime of IUCN classification.**

That principle is in turn projected in the elaboration of forest management plans. Every nominated property is individually covered by an approved forest management plan (FMP) for a 10-year period, which stipulates no-intervention policy within the nominated primeval forests. In the buffer zone, the FMP allows for measures aimed to support natural processes if necessary, using the close-to-nature forestry approach. Legal norms providing for the forest management plans are contained in the §1- 5 of the Act of the Slovak National Council No. č. 326/2005 Coll. on the forest management and state administration of forest management and in the wording of the pursuant regulations and Regulation of the Ministry of Agriculture of the Slovak Republic No. 5/1994 Coll. on forest management. Both of them provide specific provisions for the structure and design of forest management plans. Additionally, each cluster of nominated properties has its buffer zone supposed to reinforce desired protection effect. Protection measures are realized by the State Nature Conservancy.

Legal instruments for the management of the nominated properties’ buffer zones: The management of the nominated properties buffer zones (zone B) is regulated by the state laws of Ukraine and the Slovak Republic (Ukraine: Law of Ukraine “On Nature Protection Fund of Ukraine”, Law of Ukraine “On the nature reserve fund of Ukraine” No. 2456-XII; Slovak Republic: Act No. 543/2002 Coll. on Nature and Landscape Protection). Only measures in support of natural processes are allowed within a buffer zone. Such measures are planned, if necessary, in the management plans of national nature preserves, and projected into binding forest management plans.

Legal instruments for the management of the connecting corridors and areas outside the serial nomination properties and buffer zone perimeter: On the Ukrainian territory, the connecting corridors linking the properties are subject to the Law of Ukraine No. 1989-111 "On establishing of the Ukrainian national ecological network". These forests are thus either under state protection and designated already for the future extension of the Carpathian Biosphere Reserve or are they reserved for the establishment of new protected areas (See Map Annex No. 6), e. g. the Zhdymyr Nataional Nature Park with a rather vast territory has been established.

On the Slovak territory, the largest part of the connecting corridors (about 85 % on the Slovak territory) is located within the boundaries of the Poloniny NP and VPLA. Thus, they are subject to forest management plans, in which the application of close-to-nature continuous-cover forestry toolbox is secured by the obligatory incorporation of "protected area maintenance programmes" (§54, sec.3-4 of the Act 543/2002), worked out by the respective authority (NP Poloniny, ECPLA) in compliance with §21 of the Regulation No. 24/2003 of the Ministry of the Environment of the Slovak Republic, and subject to the approval by the Government of the Slovak Republic. ECONET, NECONET – Ivan

The rest (about 15 % on the Slovak territory) is covered by forest management plans that respect principles of sustainable forestry acc. to the Act of the Slovak National Council No. 326/2005 Coll. In these sections of connecting corridors, the sole application of continuous-cover forestry toolbox must yet be negotiated within the Steering committee.

<u>Complex territorial planning oriented legal instruments</u>

The General scheme of territory planning in Ukraine (further on – "the General Scheme") defines priorities and conceptual decisions on planning and use of Ukrainian territory in, improvement of settling system and provision of sustainable development of settlements, development of industrial, social and transport-engineering infrastructure, formation of ecological network. The General Scheme has its legal footing in Law of Ukraine "On the general scheme of territory planning in Ukraine" Verkhovna Rada of Ukraine, 7.02.2002, No. 3059-III and its fully respects the Law of Ukraine "On Nature-Protection Fund of Ukraine" 16.06.1992, No.2456-XII. Regulations provided in the General Scheme correspond to the principles of appropriate documents adopted at the UN Conference on the settlements' development (HABITAT - II) and to corresponding recommendations of the UN European Economic Commission and the Council of Europe. In order to create a sufficient environment for living and favorable conditions for economic development, and also to provide efficient use of the territories' potential and conservation of their natural and cultural originality based upon the results of evaluation of anthropic pressures, the territory is determined basing upon the kinds and regimes of utilization: areas with intensive industry; territories with mostly agricultural industry located there; territories of the Nature Protection Fund of Ukraine that are important for biological and landscape diversity conservation; zones with expended radiation level and some other. In order to guarantee efficient utilization of territories that are of a special ecological, scientific, aesthetic value it is envisaged to elaborate the system of state (national) support for such territories. The General Scheme is implemented by the bodies of the state power and by local self-governing bodies in the order envisaged by Ukrainian Legislation.

The Carpathian Biosphere Reserve and the Uzhanskyi National Nature Park are subordinated directly to the Ministry and their territory belongs to the Nature Protection Fund of Ukraine. But still, administrations of both establishments manage their territories in close co-operation with local bodies of state power and self-government. There operate Co-ordination Councils with the members representing both local authorities and representatives of the Reserve and the Park respectively.

The territorial planning in the Slovak Republic is regulated by Act No. 50/1976, 103/1990, 262/192, 136/1995, 199/1995, 222/1996, 229/1997, 175/199, 237/2000, 416/2002, 553/2001 Coll. This establishes a compulsory framework for the designation of functional zones based on the landsape-ecological planning (LANDEP) and allows for an organic incorporation of corridors connecting the nominated properties into the territorial plans for the respective region (The Prešov Self-Governing Region on the Slovak territory has had its binding Territorial Plan approved by the Government provison No. 216/1998 Coll.). The acts allow for the necessary changes in the territorial plans through territorial proceedings that result into issuing a territorial decision. In the case of issuing a decision on the landscape protection, decisions are based on § 39b, Act No. 50/1976 Coll.

Legal instruments stipulating and encouraging the participative processes

According to Ukrainian Legislation, some areas within the zone of anthropogenic landscapes of these nature protection establishments belong to stakeholders (not within the core and buffer zones), but any kind of activity performed by landusers is supervised by CBR and UNNP respectively. More than that, Scientific Boards of the aforementioned establishment include not only scientists and specialists, but also representatives of local bodies of power and stakeholders.

On the Slovak territory, the acts that regulate the preparation of territorial plans also provide for the participation of municipal and regional governments, state administration, state nature conservancy, non-governmental organisations and other entities in that process. The creation and functioning of non-governmental organisations is regulated by the Act No 83/1990 Coll.

IV. Management structure

As it has been outlined above, **the conservation of the nominated properties can be ensured within the existing legal framework**. So, the sheer conservation of the nominated properties is not the sole objective of the integrated management plan. Much more it is oriented at the mobilization of the public resources in order to pursue a vision of a contiguous natural area over which the natural beech forests dynamics will be the governing force, and whose natural heritage is respected and recognized as a unique intrinsic value that can be utilized for people's benefit in a both sensitive and sensible manner. To proceed along these lines, the integrated management structure for the serial nomination must be kept simple, transparent and shaped according to project management standards.

IMP consists of two stages, in which two entities are supposed to play decisive roles. Currently, during its 1st top-down stage, the integrated management plan aims at the implementation of the objectives (i) and (iv), as well as for the preparatory steps towards the implementation of the objective (ii). An awareness rising campaign is continues so as to sensitize and inform a broad spectrum of stakeholders on the values of the beech primeval forests of the Carpathians, the need for their conservation, on their nomination for the world natural heritage, as well as on the opportunities opening up for the East Carpathian region in terms of ecotourism, cultural tourism, manufacturing of traditional products and provision of services, as well as shape and intensify the participative process by the initiation of a bottom-up process, which is currently rather limited. The main coordinator of these steps and processes is the Joint Management Committee for the Integrated Management of the Beech Primeval Forests of the Carpathians.

During the 2nd stage that too has already begun, an intense co-operation on the implementation of objectives (ii), (iii) and (v), as well as the expression of interests pertaining to these objectives is expected within a panel representing a broad spectrum of stakeholders.

IV. 1 Management co-ordination

The territory of the serial nomination is embedded into a specific legal, executive and administrative system that in turn allows for the practical execution of steps and measures aimed at IMP implementation. For that reason, the management of the serial nomination requires superior structures that are locally, nation-wide and bilaterally supported on a political level. For that purpose, a Joint Management Committee for the Integrated Management of the Beech Primeval Forests of The Carpathians (JMC) was established by the ministries of environment of both countries. It has been entrusted with further development and adjustments of the integrated management plan, as well as its co-ordination. To be functional and effective, it does not need a special executive authority, because that is available to its members.

The top-down approach initiated by the ministries, state nature conservancies, as well as scientific circles is necessary during the 1st phase because the public awareness of the primeval forests and their potential for sustainable ecotourism has been found relatively low among inhabitants and organizations in the remote areas, where natural forests are still abundant and considered a standard part of people's environment[2]. The political support on both municipal and state levels is secured.

Its competences are delegated and its financing is secured by the ministries. JMC meets quarterly or when a need arises, and prepares reports on the state of the properties on a yearly basis. It coordinates the serial nomination monitoring based on unified methodology and reports the ministries and national UNESCO committees on emerging problems in the pursuit of integrated management goals. It initiates steps necessary to assure scientific research, monitors and supports, where possible and feasible, the extension of the heritage already declared by additional properties. Committee is responsible for the implementation of nominated series of primeval forests integrated management policy into practice, both in terms of the conservation management and the foreseen expansion of the buffer zone.

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[2] Pichler, V., Soroková, M., 2005: Utislisation of natural Forests for Ecostourism: Matching the goals and Reality. Forest Snow and Landscape Research, 79 (1/2), 185–194.

Currently, the committee pursues the goals sorted out for the 1st stage of the integrated management plan development and implementation, i. e. objectives (i) and (iv), as well as the preparation for the implementation of the objective (ii). An awareness rising campaign is continued so as to sensitize and inform a broader spectrum of stakeholders on the nomination proceedings and the respective criteria to be met, as well as on opportunities opening up for the East Carpathian region in terms of ecotourism, cultural tourism, manufacturing of traditional products and provision of services in connection with the possible awarding of the world natural heritage label. The ultimate goal is to shape and intensify the participative process in the bottom-up direction as the 2nd stage.

During the 2nd stage, a JMC-assisted creation of an Integrated Management Panel (IMP Panel) Panel as a non-governmental organisation is foreseen in order to achieve a balanced representation of all stakeholders' interests willing to participate in the pursuit of IMP objectives. The panel members will both co-operate with the JMC on the implementation of objectives (ii), (iii) and (v) and to voice their interests pertaining to these objectives. There will be an intense and fruitful communication between the JMC and the Panel. JMC will provide panel with the vital information on the opportunities for both sensitive and sensible utilisation of the world natural heritage lable as well as the goals and criteria to be met. The Panel will probably be active mainly in the fields of forestry, public relations and lobbying, ecotourism (transportation, services), for which it will set up dedicated working groups. Together, they will closely cooperate in all areas, in partcicular in the territorial planning aimed at the extension of corridors connecting the serial nomination properties and their sensible and differentiated utilisation.

IV.2 Practical management

As outlined in chapter IV. (Management structure), the practical management in the areas of nature conservation, science, awareness rising and territorial planning is coordinated by the JMC and carried out by the responsible organisations represented in it, through the available legal framework.

IV.2.1 Specific objectives

The following are the main inter-related **specific objectives**, derived from general objectives (Chapter II of IMP) and of this framework and integrated management plan, their outputs and activities[3]:

Objective I: co-ordination of joint activities concerning serial property

Output I.1: Establishment of the Joint Management Committee of the serial property

– Activity I.1.1*: Establish the Joint Management Committee of the serial property

– Activity I.1.2**: Elaborate and approve the statutes o the Joint Management Committee of the serial property

Output I.2: Regular meetings of the Joint Management Committee of the serial property

– Activity I.2.1*: Organize regular meetings of working group to elaborate joint serial nomination "Beech primeval forests of the Carpathians" (Ukraine-Slovakia);

– Activity I.2.2*: Develop Joint Integrated Management Plan (IMP);

– Activity I.2.3*: Organize regular meetings concerning IMP implementation and agree the short-term action plans;

– Activity I.2.4**: Organize public presentations to introduce preparation of transboundary serial nomination "Beech primeval forests of the Carpathians", as well as objectives, outputs and activities of the Management Plan;

– Activity I.2.5**: Found of working groups for the short-term action plans realization;

– Activity I.2.6**: Make annual reports for IMP implementation and update the Plan;

Output I.3: An operation management for realization of IMP

– Activity I.3.1**: Provide operation management for Management Plan by administrations of the Carpathian Biosphere Reserve (Ukraine) and Poloniny National Park including:

[3] (*remarks:* * - already achieved; ** - on-going activity; *** other activities are still to be implemented)

– prepare meetings of the JMC and agree with Committee members their agendas;

– elaborate draft action plans, control realization of the IMP, work packages and action plans;

– invite other interesting parties, especially the IMP Panel representatives to JMC meetings;

– formally establish relations with regional authorities (in Ukraine: Department of Environment and Natural Resources in the Zakarpats'ka Oblast, Transcarpathian Regional State Administration; in Slovakia: governments of Prešov and Košice Self-governing Regions, municipal authorities;

– implement other issues of the JMC or elaborate new proposals.

– Activity I.3.2**: Conduct regularly together with local authorities and other interested parties, and those represented in the IMP Panel in particular, operation management concerning biodiversity conservation and sustainable development of the region, especially in buffer zones of the serial property.

Output I.4: Realisation of separate points of the Management Plan and founding of special working groups

– Activity I.4.1**: Appoint Joint Steering Committee mechanisms for the Integrated Management Plan realization;

– Activity I.4.2**: Develop special projects and found working groups for implementation of separate points of the Integrated Management Plan;

– Activity I.4.3**: Estimate results of working groups output and elaborate new proposals for the IMP.

Output I.5: Optimisation of borders of the property and its buffer zones

– Activity I.5.1*: Optimise borders of the property and its buffer zones;

– Activity I.5.2***: Study possibilities for extension of the serial nomination by Romanian and Polish localities in cooperation with Romanian and Polish experts.

Objective II: Ensuring the most effective nature conservation of the serial nomination properties

Output II.1: Improving conservation of beech primeval forests as an integral biological formation

– Activity II.1.1*: Analyze in detail existing information on virgin forests of the serial property;

–Activity II.1.2**: Continue iinvestigations of structure, functions and biogeochemical cycles in virgin forests;.

–Activity II.1.3**: Develop GIS-maps of vegetation and habitats.

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Output II.2: Improvement of natural conditions for conservation of the most significant natural habitats and valuable biodiversity, especially globally threatened species

– Activity II.2.1: Analyze existing information and experience concerning conservation of the most significant natural habitats, flora and fauna species globally threatened and identify the information gaps;

– Activity II.2.2**: Analyze the existing and potential threats to the most significant natural habitats, flora and fauna species. Identify vulnerable zones such as upper timberline, ecotones, mires, spring areas and others and sensitive sites of high biodiversity value at risk;

– Activity II.2.3**: Carry out additional investigations on species of flora and fauna, their habitats to fill up the information gaps in database of the serial property;

– Activity II.2.4**: Compile the inventories, generalize and incorporate existing information and new data on the flora, fauna and habitats into database of the serial property and use it in long-term monitoring of biodiversity;

– Activity II.2.5**: Elaborate special action plans for conservation of separate species of flora and fauna globally threatened;

–Activity II.2.6**: Implement special measures and provide special regimes for conservation of rare and endangered species of flora and fauna.

Output II.3: Development of detailed regulatory mechanisms and management guidelines for each individual area of the serial property

–Activity II.4.1: Analyze existing management system and threats to each individual area;

–Activity II.4.2: Develop detailed regulatory mechanisms and management guidelines for controlling negative impacts to outstanding natural values.

Output II4: Effective management checked by long-term monitoring

– Activity II.4.1**: Propose necessary changes in conservation of the most vulnerable ecosystems, rare and endangered species of flora and fauna and habitats;

– Activity II.4.2*: Establish permanent plots for annual qualitative and quantitative recording of vegetation to detect early signs of changes.

Objective III: Promoting sustainable land resources management in buffer zones and connecting ecological corridors of the serial property

Output III.1: Implementation of the buffer zoning and connecting corridors systems and long-term monitoring of their effectiveness

– Activity III.1.1**: Propose ecological corridors connecting the serial nomination properties based on the system of protective and special purposes forests, the National ECONET of the Slovak Republic, the system of **Natura 2000** areas in the Slovak Republic, as well as the Law of Ukraine "On establishing of the Ukrainian national ecological network" and the proposed principles of ECONET in Ukraine;

– Activity III.1.2***: Area-designate the connecting corridors on individual forest stands level based on the Map Annex Nr. 6, forest maps and the information that will become available through the implementation of the PINMATRA project[4], resulting into a polygon map of primeval forests in the Ukraine.

– Activity III.1.3**: Leaning on national ECONETs, propose the optimal management for connecting corridors on forest stands level, most preferably non-intervention regime and close-to-nature forestry management in the other cases; **in limit cases**, initiate expropriation process offset by corresponding

[4] The co-operative Dutch-Ukrainian project is due to start in 2006

government compensation, or purchasing of land within the framework of the LIFE scheme

– Activity III.1.4**: Conduct meetings with regional and local leaders and other stakeholders to announce the designation of the buffer zoning and connecting corridors systems; explain in detail their objectives, implications and implementation of the system; obtain feedback from the participants;

– Activity III.1.5**: Implement proposed ecological corridors into binding regional development plans, implement their management modes into forest management plans

– Activity III.1.6**: Implement the long-term monitoring program; channel findings back to the serial property database to evaluate the effectiveness of the zoning system.

Output III.2: Extensive monitoring and mapping of social and economic factors on the terrestrial environment and natural resources

– Activity III.2.1**: Inventory and verify land-ownership and user rights, especially those constituting permanent ownership and grazing and cuttings rights. Channel the gathered information into the database of the serial property.

– Activity III.2.2**: Document the traditional practices (e.g. forestry, agriculture, etc.) pertaining to sustainable use of natural resources.

– Activity III.2.3**: Produce the guidelines for traditional land and water resources use and biodiversity conservation. This document will subsequently be used for promoting awareness at the local level, and also provide guidelines for the governments, planning and research institutions.

Output III.3: Income generating activities from traditional products and activities

– Activity III.3.1: Develop legal measures and contractual framework to safeguard the serial property rights of the local inhabitants and to ensure that any economic benefits derived from the sustainable use of resources, including recreation will benefit them;

– Activity III.3.2: Provide vocational (technical and financial) training for the development and management of the above income generating activities, incorporating environmental awareness programs which explain the serial property conservation objectives behind these income generating activities.

Output III.4: Supportive development activities launched to assist sustainable development and enhance public support

– Activity III.4.1**: Collaborate with development agencies to develop joint nature conservation and development activities.

– Activity III.4.2**: Implement alternative to intensive forestry and agriculture technologies which are environmental friendly within the connecting corridors.

Output III.5: Monitoring and documentation of ecological and socio-economic changes.

– Activity III.5.1***: Carry out ecological and socio-economic surveys in the serial nomination properties and adjacent areas; introduce environmental extension officers with the techniques of monitoring and recording changes in the parameters, and report findings on regular basis.

– Activity III.5.2***: Input as much as possible data from the above mentioned surveys in the databases; integrate and analyze the data as appropriate; document the process of change and disseminate success stories and best practices; study and discuss with local inhabitants on the possible causes of failure and revise the intervention accordingly.

Objective IV: Strengthening institutional and human resources capacities

Output IV.1: Supply with work offices and equipment of the serial property staff

– Activity IV.1.1*/**: Construct new buildings and reconstruct existing offices for protected areas staff, meeting rooms, libraries, visit-centres (museum), research laboratories, sanitary faciulities for staff and guests.

– Activity IV.1.2*/**: Supply protected areas staff within the serial property with hardware and software including Internet connection.

Output IV.2: Biodiversity database, use of natural resources and environmental monitoring in the serial property and its buffer zones

– Activity IV.2.1*/**: Create database of the serial property and update it regularly.

– Activity IV.2.2*/**: Use of database for planning and management for biodiversity conservation and sustainable natural resources use in areas of the serial property and its buffer zones.

– Activity IV.2.3*/**: Provide national and international scientists and environmental officers with the serial property database access.

Output IV.3: Raising professional and technical skills

– Activity IV.3.1**: Survey the current professional and technical capacity of the serial nomination staff and local inhabitants to identify the types and levels of training needed for the natural resources management in the long run. Suggested area for consideration includes: Heritage Convention mechanisms, study and management of biological and landscape diversity, forest management, water regimes in rivers and mires, education in the sphere of environment and traditional and progressive environmental friendly economic use, sustainable tourism management, computer's education;

– Activity IV.3.2***: Based on this survey, provide the appropriate professional and technical training to selected local inhabitants;

– Activity IV.3.3**/***: Raise the level of expertise of the staff of the protected areas, forestry enterprises and others who are included into the Management Plan realization, namely: heads of research, forest observation, restoration of natural resources, monitoring, education, recreation, protection units and others;

– Activity IV.3.4**: increase the number and range of organisations involved in cross-border cooperation, including organisations not previously involved.

Output IV.4: Strengthening environmental awareness and knowledge base to incorporate biodiversity conservation and sustainable use objectives into development in the serial property and adjacent areas

– Activity IV.4.1***: Conduct regular meetings, seminars and workshops between the protected areas staff, representatives from interesting parties, NGOs and science teams for joint planning, co-ordinate and evaluate activities in the serial property and its buffer zones, as well as to enhance knowledge transfer;

– Activity IV.4.2**: Use of databases from partner organizations, in particular of research and educational organizations in planning and developing decisions regarding biodiversity conservation and sustainable development of the serial property and its buffer zones.

Output IV.5: Using legislative framework for the protection of the serial property and its buffers zones and a balanced use of the connecting corridors

– Activity IV.5.1**: Identify "gaps" in the present national legislations, and the Zakarpats'ka Oblast Parliament (Ukraine) and Presov Self-governing Region (Slovakia) acts whose existence could potentially allow for uncontrolled exploitation of natural resources in the buffer zones and connecting corridors (e.g. overgrazing, wood-cutting etc), violation of indigenous serial property rights, and habitat destruction (damaging of local people houses, quarrying, recreation overactivities, etc.); identify any contradictory regulations, overlaps of governments jurisdictions, gaps in treatment of issues and unrealistic enforcement of regulations;

– Activity IV.5.2***: Propose revision of the present legislation to improve protection and management of the serial property and its buffer zones;

– Activity IV.5.3: Adjust the enforcement capacity to implement the above mentioned legislative and regulatory mechanisms.

Objective V: to promote environmental education and awareness

Output V.1: Increase public awareness and organize conservation awareness campaigns

– Activity V.1.1**: Further develop communication skills of protected areas staff, who are responsible for education in the sphere of conservation, carry out ecological monitoring, develop methods for sustainable development and implement special protected measures in the Carpathian region;

– Activity V.1.2**/***: Organize meetings, seminars and workshops among environmental officers to exchange experience and expand activities, supervision of conservation of habitats of special interest, environmental monitoring and recreational measures involving local teachers, pupils and other social groups;

– Activity V.1.3**: Implement special programs and campaigns for nature conservation and sustainable development awareness in the region;

– Activity V.1.4**: Design and implement conservation awareness out-reach campaigns;

– Activity V.1.5***: Organize public consultations on the issue connecting corridors management ; submit received comments and suggestions from the local authorities, NGOs, other institutions and inhabitants to the JMC for review and endorsement;

–Activity V.1.6**: Support local communities' initiatives in culture, education and social spheres.

Output V.2: Optimization of sustainable recreational and tourist activities in the adjacent region of the serial property.

– Activity V.2.1**: Develop co-operation between protected areas administrations with tourism and recreation establishments;

– Activity V.2.2***: Determine optimal recreation regimes for different ecosystems of the serial property, buffer zones and connecting corridors, and implement special regimes for visitors in different seasons;

– Activity V.2.3**: Support sustainable ecotourism activities and services in the broader region, develop visit-centres and educational paths within the framework of international cross-boundary schemes, such as the EU-funded INTERREG;

– Activity V.2.4***: Determine special fees for recreational resources use and take into account the serial property rights of local inhabitants.

– Activity V.2.5***: Sign agreements with local communities and protected areas administrations for co-operation.

– Activity V.2.6**: Develop transboundary sustainable tourism in this serial property; improve area's attractiveness as a tourism and investment destination.

IV.2.2 Practical management mechanisms and measures framework

Nominated properties management: Practical conservation management of the nominated series properties is realised by both the Carpathian Biosphere Reserve Administration and the Uzhanskyi National Nature Park Administration in the Ukraine, and by the organisational units of State Nature Conservancy of the Slovak Republic (Poloniny National Park, Vihorlat Protected Landscape Area). Results of their activities are quarterly reported to the JMC.

Management of the corridors connecting the nominated properties: The ecological corridors connecting those serial nomination properties, which are not yet connected by buffer zones or protected areas, **do exist *de facto***. They coincide with the system of NATURA 2000 areas on the Slovak territory, National Ecological Network of Slovakia (Annex No. 4) and the proposed geographical directions of the ECONET of Ukraine, specifically with the elements of the Halitsko-Slobozhanski Eco-corridor that encompasses also sectors of virgin forests in the Carpathians. The practical management of the connecting corridors will alternatively consist of non-intervention, small-scale shelterwood and continuous forestry systems. According to Huston (1979), small to intermediate ecosystem perturbations do not interfere with the ecosystem integrity, but non-intervention is preferred wherever possible in the IMP.

The start-up situation for the establishment of the connecting corridors is favorable. Four clusters of Ukrainian part of nomination (Chornohora, Svydovets, Kuziy-Trybushany and Maramorosh) are situated on the distance of 1–5 km from one another. Forests under state protection are situated in between, reserved for the future extension of the Carpathian Biosphere Reserve. Uhol'ka-Shyrokyi Luh is located on the distance of about 60 km from those mentioned above. It is also surrounded with natural forests. The territory of the National Nature Park "Synevi" is adjusted to this property on the northwest and the establishment of ecological corridors connecting it with the four aforementiond properties is planned. It is foreseen that in the nearest future some areas within the outlined ecological corridors will be given to the Carpathian Biosphere Reserve.

Stuzhytsia-Uzhok cluster is a constitutive part of the trilateral transboundary biosphere reserve "Eastern Carpathians" and is directly adjusted to the Stužica Reserve on the Slovak territory, which itself is an integral part of the Poloniny National Park, in which all but one nominated properties on the Slovak territory are embedded. It is the most distant of Ukrainian sites and it is naturally connected through continuous massifs of beech forests with the other Ukrainian sites. According to the Law of Ukraine "On establishing of the Ukrainian national ecological network" on territories connecting the sites new forest reserves will be established (See Map Annex No. 6). The first step has already been made – the Zhdymyr National Nature

Park with a rather vast territory has been established. On the Slovak territory, Vihorlat will be connected by a similar coridor to the cluster of three properties within the Poloniny National Park. That partcicular corridor will overlap with the Vihorlat Protected Landscape Area (approx. 300 ha of beech primeval forests). All these facts serve the basis for establishing an indivisible nature-territorial complex on the Ukrainian part and Slovak territories.

Given the current situation, the management of corridors management consists in:

- The placement of the buffer zone areas under the Ia conservation management regime to achieve the autoregulation of ecosystems
- The establishment of new forest reserves on territories connecting the sites (applies for natural forests that has not been managed yet)
- The application of specific measures within the designated corridors connecting the properties; these measures will include:
    - reclassification of concerned forests stands as protective forests subject to a low intensity management
    - extension of the rotation period from current 110 years to ≥ 150 years and the application small groups shelterwood system or its variations;
    - a gradual transition from shelterwood system to the selection system that features no rotation period but a continual regeneration period instead;
    - mimicking the natural forests patterns through the introduction of the continuous-cover forestry and its toolbox
- The entire abandonement of forestry operations and introduction of natural dynamics.

The best possible alternative for specific elements of connecting corridors will be determined by JMC, based on consultative proceedings including the stakeholders represented in the IMP Panel[5]; they will be embedded in the management programs of the respective

[5] In the 2nd stage, the Panel will take over considerable responsibilities in the area of awareness rising, education, ecotourism, cultural aspects, territorial planning, development and establishment of the BEPFOC world natural heritage label and consequent lobbying for the benefit of the heritage and the network members. For this purpose, the network will establish dedicated working groups. As an example, the working group “sustainable transportation” will, in co-orpartion with the steering committee and the Centre for Scientific Tourism in Slovakia (www.ecosystems.sk) investigate opportunities for the re-establishment of express trains connecting the cities of Snina (Slovakia) and Rachov (Ukraine) as gates to the BEPFOC world natural heritage. To give another example, the working group “Cultural aspects” will investigate the underlying connections between the natural and cultural heritage in the region and present it through documentaries or publications. They in turn may provide an additional incentive for ecotourims development. In case of a successful nomination and thus also the Panel creation, it will likely employ managerial staff equivalent to approximately 200 % personal capacity.

protected areas and through the territorial plans respecting the principles of the National ECONET of the Slovak Republic (finished and approved – Annex No. 4) and the ECONET of Ukraine (under preparation – Annex No. 7). In both cases, changes will be also reflected in the forest management plans elaborated and periodically renewed for the concerned areas beginning 2006 (see the Action plan).

The overall implementation of the above principles is guaranteed by the legal authority of organisations represented in the JMC and the ministries of environment or environmental protection of both Ukraine and Slovakia. In the limit cases and after a thorough analysis of viable alternatives, expropriation including a corresponding compensation and the implementation of proposed management will be proposed by the JMC, pursued and carried through by the national ministries represented in it (The Ministry of Environmental Protection of Ukraine, The Ministry of Environment of The Slovak Republic).

The practical management also draws to a large extent on the experience of the JMC members and among them of the Association of the Carpathian National Parks and Reserves (ACANAP) in particular. Since its establishment in 1992 it has collected, exchanged ant utilized information and knowledge of ecosystem research through workshops, conferences and symposiums with the purpose to help to solve conceptual problems of the nature protection, management and monitoring of Carpathian Mountains[6].

V. Research and monitoring

The research and monitoring of the serial nomination properties, the buffer zones and connecting ecological corridors will be coordinated by the Joint Management Committee.

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[6] The Proceedings from this International Scientific Conferences have been published :

- cc from the Conference „Topic Problems on Protection of Frontier National Parks“ held in Pieniny National Park, Slovakia, on July 1992
- from the Conference „Forest Protection in Protected Areas of Carpathians“ held in Bükk National Park, Hungary, on September 1993
- from the Conference „Research and Management of the Carpathian Natural and Primeval Forests“ held in Bieszczady National Park, Poland, on October 1994
- from the Conference „Methods of the Monitoring of Nature in Carpathian National Park and Reserves“ held in Carpathian Biosphere Reserve, Rakhiv, Ukraine, on October 1995
- from the Conference „Rangers in Carpathian National Parks and Protected Areas“ held in Aggtelek National park, Hungary, on September 1996
- from the Conference „International Aspects of Study and Conservation of the Carpathians Biodiversity“ held in Rakhiv, Ukraine, on September 1997
- from the Conference „Issues of Sustainable Development in the Carpathian Region“ held in Rakhiv, Ukraine, on October 1998
- from the Conference „Mountains and People“ held in Rakhiv, Ukraine, on October 2002.

JMC will develop and maintain its own GIS-aided database containing all necessary layers pertaining to the world natural heritage status of the nominated properties. JMC and its activity in this field will lean on the existing and well proved research and monitoring activities performed by the scientific departments of the CBR, UNNP and the Poloniny National Park[7]. The results will be reported to the JMC in the form of published works and final reports. If a need arises, JMC can also initiate, through its scientific communication officers, a research on specific problems.

In Ukraine, approximately twenty scientists affiliated with the CBR and UNNP scientific departments, assisted by 11 technicians and equipment, available in zoological, botanical and phenological laboratories, GIS laboratory and the laboratory of forest and landscape research, will take part in the research and monitoring activities. In addition, officers of the State Forest Guard will continue conducting day-to-day field observation of botanic, zoological, climatic and other natural phenomena under supervision of the scientists. Results of these observations are registered in special cards, as well as in the data basis used for the Chronicles of Nature. Numerous scientific-research institutions also have valid agreements and contracts with administrations of CBR and UNNP and conduct their research and investigation here (Institute of botany, Institute of Zoology, Institute of Mountain Forestry, Ivano-Frankivsk, Uzhgorod National University and many others).

The scientific research and monitoring of the nominated series properties on the Slovak territory will continue to be carried out by the Faculty of Forestry (TU Zvolen), Faculty of Ecology and Environmental Sciences (TU Zvolen), Institute of Forest Ecology (Slovak Academy of Sciences, Zvolen) and the Faculty of Natural Sciences (Comenius University, Bratislava) for over 50 years. Currently, there are approximately 30 scientists engaged in this dedicated interdisciplinary primeval forests forest research whose results are regularly published.

New joint scientific projects aimed at the integrated ecological research of the serial nomination properties have been prepared and will be submitted after the opening of the 7th EU Framework program (see Annex 4)

The systematic monitoring of the nominated properties will be performed based on systematic scientific research, continual monitoring and risk assessment studies, carried out

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[7] There have been successful efforts to coordinate the research and monitoring methodology has been unified since the early works of Zlatník (1938) and the Korpeľ (1995), Bublinec and Pichler (2001), Vološčuk (2003), Parpan (1994). It has been formulated in the proceedings from the ACANAP conferences „Research and Management of the Carpathian Natural and Primeval Forests“, held in Bieszczady National Park, Poland, in October 1994, and „Methods of the Monitoring of Nature in Carpathian National Park and Reserves“ held in Carpathian Biosphere Reserve, Rakhiv, Ukraine, in October 1995.

by the CBR, UNNP and Poloniny National Park. Its results will be reported to and evaluated by the JMC, which will also assess the potential threats to the serial nomination as a whole. If necessary, JMC shall take action through the competent institutions represented in it and in co-operation with the IMP Panel. The on-site monitoring will consist in regular inspections of the sites by professional rangers. Currently, approximately 200 forestry officers are in charge of protection of the massifs on the Ukrainian territory. Forest beaters perform twenty-four-hour patrolling of the territory. Forestry beat points are situated on the edges beyond each of the clusters. Twice a year the authorities of the CBR and UNNP realize an inspection of their territory and use the necessary preventive measures. The State Forest Guard Service closely co-operates with the Police and other closer services. On the Slovak territory, regular inspections are carried out twice a month or more often if necessary by four Poloniny National Park rangers and twenty voluntary nature protection guards, whose competences are defined by the Act and Guards of the State Nature Conservancy of the Slovak Republic according to § 72 of the Act No. 543/2003 Coll. on Nature and Landscape Protection. The guards are entitled to monitor, prevent and avoid illegal cuttings, illegal picking up of berries, poaching, bird criminality, nest robbery, illegal collection of animals and trespasses against the law related to the mass tourism.

VI. Management principles

It is clear from the previous chapters that the integrated management plan is based on the combination of both the top-down, government-driven and bottom-up, local population-driven approach. The top-down approach with the JMC as its main channel focuses on the conservation issues and the maintenance of the nominated series overall integrity, as this basic principle shall not be compromised by any further deliberations.

However, the foreseen participation of selected big players, such as the State Forests of the Slovak Republic, state owned company, and others in the JMC sessions does not constitute the participatory principle to the desired degree. That’s why JMC has the ambition to strengthen that principle by the initiation of bottom-up activities through a broad participation of stakeholders, organised in the IMP Panel. IMP Panel shall focus on benefiting the local population through activities that at the same time comply with the promotion of the BEPFOC (BEech Primeval FOrests of the Carpatians) and IMP objectives, mainly in the areas of forestry, ecotourism, BEPFOC label development and marketing, consequent lobbying etc.

So, the integrated management plan principles can be summarized in the following manner:

- uncompromised application of the conservation management based on scientific knowledge and monitoring through the available legal framework, enacted through the government-driven top-down approach;
- implementation of the broad participatory principle through the bottom-up approach aimed at voicing the stakeholders' interests and thereof translation into concrete results benefiting the local population, mostly in terms of ecotourism development, public relations and marketing and their spin-off effects;
- combined top-down and the bottom-up approach to enhance the BEPFOC integrity and value through the formal establishment of corridors connecting the nominated properties and their embedding into the regional territorial plans, where such formally ackowledged corridors do not yet exist.

VII. Promotion and educational activities

During the 1st phase, JMC encourages promotional and educational activities related to BEPFOC through the respective departments of the Carpathian Biosphere Reserve, UNNP and Poloniny National Park. It provides them with the expertise reaching beyond the standard provision of information and educational activities such as the own internet sites of the Carpathian Biosphere Reserve and the Poloniny National Park (available at http://cbr.nature.org.ua/main.htm, www.sopsr.sk). JMC has already co-operated on setting-up a comprehensive and interactive internet site www.virginforests.sk dedicated to the research of temperate primeval forests. Currently it is preparing an interactive internet site containing dynamic animations of the primeval forests patterns and dynamics based on the format developed by the Centre for Scientific Tourism in Slovakia (CSTS, available at www.poznajachran.sk). It also heavily leans on the use of modern technology in setting up pocket-PC and GPS-aided educational trails, whose concept and technical solutions were developed by CSTS (available at www.poznajachran.sk/mojchodnik). Further activities include video production, publishing and communication with the media outlets. JMC committee has initiated the elaboration of several diploma thesis by university students on the most effective communication of IMP objectives to various categories, such as children, pupils, students, parents and others. It has also begun a campaign called "Green Diplomacy" intended to raise the BEPFOC awareness among both national and international opinion leaders and decision makers. As a significant achievement in terms of PR, a visit of HRH The Prince of Wales to some of the nominated properties has highlighted their value among the local and partly also international population through the intense media coverage (Pichler, Soroková 2005).

During the 2nd phase, the IMP Panel will participate strongly in the PR and educational activities on both national and international levels. Currently, works continue on a movie dealing with the underlying connection between the primeval forests and the architectural developments during the Middel Ages that will be offered to international TV-channels.

VIII. Mechanisms of Ukraine-Slovakia co-operation to implement the Management Plan

The principal mechanism of the cooperation between Ukraine und the Slovak Republic in the management of the bilateral serial nomination will consist in the Action Plan and other working activities of the Joint Management Committee, including regular meetings and consultations, permanent E-mail contact among the JMC members, participation of the JMC members in the cross-border co-operation for socio-economic development 'Carpathian Euroregion', scientific cooperation, development and maintenance of serial nomination web page with database covering the property, annual plans and reports; joint working groups, development of special joint action plans, preparation of joint projects and programs, renewing of management plan. If a need arises, JMC can, according to its Statutes (under preparation, see Annex 2), bring outstanding issues to the attention of the Minister of Environmental Protection of Ukraine and the Minister of Environment of the Slovak Republic.

IX. Funding of the Joint Management Committee and the Integrated Management Plan

The main financial resources for the functioning of the Joint Management Committee are the state budgets of Ukraine and the Slovak Republic. Both countries will yearly allocate 25 thousand EUR,- for covering the JMC activities. Additional resources for the implementation of the IMP, going beyond the normal tasks of organisations represented in the JMC, will also be allocated, according to state and regional budgets procedures, on a yearly basis and based on the Action Plan and the Plan of Main Tasks elaborated by the JMC as implied in the JMC Statutes. The estimated start-up allocation for 2007 will be 25 thousand EUR,- provided by the Ministry of Environmental Protection of Ukraine and the Ministry of Environment of the Slovak Republic. If need arises, JMC can request special budgetary measures, e. g. for expropriation and corresponding compensation of ownership rights.

Besides state and regional budgets, JMC and IMP Panel working groups will prepare and submit projects for various schemes, in particular those supposed to promote international cooperation, such as the EU-funded INTERREG (see Annex 3), LIFE and other schemes. These projects will aim at the elaboration of feasibility studies, management plans, reconstruction of habitats, ecotourism development and other activities.

Funds for scientific research will be aggregated from dedicated scientific projects, such as PRIMEFOR (see Annex 4), projects funded by Research and Development Agency of the Slovak Republic and Scientific and Grant Agency of the Slovak Republic.

Annex 1 to IMP

List of the members of the Joint Management Committee

for the Integrated Management of the for the properties of the serial nomination

“Beech Primeval Forests of the Carpathians”

1) Mykola Stetsenko, First Deputy Head of the State Agency for Protected Areas of the Ministry of Environmental Protection of Ukraine, co-chairman of the committee.
2) Dr. Jozef Kramárik, head of the Nature and Landscape Protection Section of the Ministry of Environment of the Slovak Republic, co-chairman of the committee
3) Prof. Fedir Hamor, Director of Carpathian Biosphere Reserve (Ukraine), deputy chairman of the committee
4) Peter Repka, MSc., Director of Poloniny National Park (Slovakia), deputy chairman of the committee
5) Ambassador Tetiana Izhevska, deputy head of the National Commission of Ukraine for UNESCO
6) Prof. Dr. Vasyľ Parpan, director of the Institute of Mountain Forestry Ivano-Frankivsk, Ukraine
7) Prof. Dr. Ivan Vološčuk, deputy head of the Slovak National Committee for the UNESCO Programme MAB, Slovakia
8) Assoc. Prof. Dr. Viliam Pichler, Faculty of Forestry of the Technical University Zvolen, Slovakia
9) Mr. Mykola Andrus, head of the Deputies Council of Zakarpatska Oblast, Ukraine
10) Mr. Pavol Vočko, head of the Regional Environmental Protection Authority, Prešov, Slovakia
11) Mr. Jurij Smereka, deputy director of the State Department of Ecological Resources in Zakarpatska Oblast, of the Ministry of the Environmental Protection of Ukraine
12) Mr. Peter Chudík, head of the Prešov Self-governing Region, Slovakia

Annex 2 to IMP

Action plan for the implementation

of the Integrated Management Plan for the properties of the serial nomination

"Beech Primeval Forests of the Carpathians"

No.	Action	Responsible body	Time of implementation	Expected outcome
1	To establish the Joint Management Committee with the Ukrainian and Slovakia representation	Ministry of Environmental Protection of Ukraine, Ministry of Environment of the Slovak Republic	August 9–10, 2005, Ukraine	List of members of the Joint Management Committee from Ukraine and Slovakia approved
2	Elaborate the Statutes of the Joint Management Committee	Joint Management Committee, Ministry of Environmental Protection of Ukraine, Ministry of Environment of the Slovak Republic	June 2006, Slovakia	Statutes of the Joint Management Committee approved
3	To elaborate and adopt Integrated Management Plan for the Serial Transboundary Natural Property "Beech Primeval Forests of the Carpathians"	Joint Management Committee	January 9–11, 2006, Ukraine	Integrated Management Plan adopted
4	To organize meetings of the Joint Steering Committee in Ukraine and Slovakia	Administration of the Carpathian Biosphere Reserve, State Nature Conservancy	June 2006, Slovakia	Action plan for implementation in 2005–06 of the Management Plan adopted
5	To complete nomination on the Serial Transboundary Natural Property "Beech Primeval Forests of the Carpathians"	Joint Management Committee	January 20, 2006, Slovakia	Nomination dossier completed
6	To area-designate the ecological connecting corridors on forest stands level	Joint Management Committee	September 2007	List of forests stands constituting the ecological corridors assembled
7	Determine management modes for connecting	Joint Management Committee	December 2007	Management regimes for

	ecological corridors on forest stands level			connecting ecological corridors on forest stands level approved
8	To begin the implementation of non-intervention or close-to-nature forestry management approaches in the connecting ecological corridors through the renewal of 10–year forest management plans	Joint Management Committee, Ministry of Environmental Protection of Ukraine, Ministry of Environment of the Slovak Republic	2006–2015	Forest management plans stipulating non-intervention or close-to-nature forestry enacted
9	Continue the currently running and initiate new multilateral projects aimed at the elaboration of action plans for biodiversity conservation in the nominated properties, buffer zones and connecting corridors	State Agency for Protected Areas (Ukraine), State Nature Conservancy (Slovakia)	2006–	Action plans for conservation in the property of globally threatened species of flora and fauna
10	Feasibility study of opportunities for sustainable use of resources, including international ecotourism	State Agency for Protected Areas (Ukraine), State Nature Conservancy (Slovakia)	2006–2007	Recommendations and best practices as a basis for updating the plans of regional development and management plans
11	To prepare annual joint report on the action plan implementation	Joint Management Committee	Annually, beginning 2006	Annual report
12	To update action plan as of 2007	Joint Management Committee	January 2007	Action plan updated

Annex 3 to IMP

INTERREG IIIB CADSES – Project proposal (preliminary outline)

SUSTAINABLE DEVELOPMENT THROUGH NATURE-BASED MANAGEMENT OF FOREST RESOURCES AND HERITAGE-ORIENTED TOURISM IN THE CARPATHIANS

Four priorities are covered by this project proposal. They are mutually interlinked by inputs and outputs and contribute to solving the challenge of sustainable use of resources in the Carpathians.

I. Protecting and developing natural heritage

The most important natural values in the concerned countries regions are represented by the Carpathian primeval forests in particular. Regarding patterns such as tree species composition, specific developmental cycles and the overall dynamics, no similar forests can be found in other parts of the world. Beside pure beech primeval forests, currently extremely rare in Europe, oak forests and renowned fir-beech primeval forests of the Carpathians reflect the variability of climax forests that once covered the area extending from Central France to Western Ukraine and from Southern Sweden to the mountainous part of Central Italy. They are also home to populations of numerous endangered tree species, e. g. yew (*Taxus baccata*) and elm (*Ulmus glabra*), xylobiont species and birds nesting in cavities or on broken trees. The unique standing of the Carpathian primeval forests has been highlighted by the inclusion of the Ecoregion No. 77, to which they belong, among the world's most important ecoregions known as "WWF Global 200". Selected ecoregions cover the most outstanding examples of each major habitat type from every continent. The primeval forests of the Carpathians also fall under the EU Natura 2000 Habitats directive, mainly 9110 *Luzulo-Fagetum* beech forests, *Asperulo-Fagetum* beech forests, Medio-European limestone beech forests of the *Cephalanthero-Fagion*, *Tilio-Acerion* forests of slopes, screes and ravines and others. They represent a source of knowledge for sustainable management of forest resources and risk prevention.
To ensure the protection of this invaluable heritage, On 22 May 2003 in Kiyv, Ukraine, the Ministers of the Environment of the Czech Republic, Hungary, Poland, Romania, Serbia and Montenegro, Slovak Republic and Ukraine signed the Framework Convention on the Protection and Sustainable Development of the Carpathians. The Carpathian Convention provides the framework for cooperation and multi-sectoral policy coordination, a platform for joint strategies for sustainable development, and a forum for dialogue between all stakeholders involved. Natural heritage protection is facilitated by initiatives such as The Carpathian Ecoregion Initiative, 'CERI' (formerly known as the 'CEI'), an international network of NGOs and research institutes from seven Carpathian countries (Hungary, Slovakia, Czech Republic, Poland, Romania, Ukraine and Serbia & Montenegro) dedicated to the protection of one of the most important natural areas of Europe, and of the world and ACANAP. On the national level, it rests on national legislations, such
Currently, the integrity of Carpathian primeval forests is partly compromised due to fragmentation. While the localities have sufficient size (Korpel' 1995, Bücking 2003, Biris, Veen 2005) and contain all mutually related and reciprocally dependent key components interlinked by undisturbed biogeochemical cycles, the exchange of biological information however is not sufficiently guaranteed, because the localities are from 3 to 80 km apart, partly embedded in intensively managed forests and agricultural land. According to current knowledge, genetic exchange and repopulation are possible when the virgin forest ecosystems

are connected by ecological corridors consisting of forests subject to nature-based management (Korpeľ, Saniga, Biris, Veen 2005). Therefore, our project proposes the establishment of such corridors, in which a combination of conservation and forest management regimes would be applied.

Objectives (and related tasks, work packages)

a) To create a continuous, contigeous complex of natural forests that will encompass and connect (link) the important primeval forest reserves on the Slovak, Ukrainian and Romanian territories; The objective can be achieved through the conservation of other remaining natural forests within proposed corridors connecting the preserves, measures supporting the succession of managed semi-natural forests between them and the application of nature-based forest management (see Priority 4.1)

Given the current situation, the management of corridors management can be based on:

- The placement of the buffer zone areas under the Ia conservation management regime to achieve the autoregulation of ecosystems
- The establishment of new forest reserves on territories connecting the sites (applies for natural forests that has not been managed yet)
- The application of specific measures within the designated corridors connecting the properties; these measures will include, according to the status of forest estates negotiated in the 2nd stage:
    - reclassification of concerned forests stands as protective forests subject to a low intensity management
    - extension of the rotation period from current 110 years to ≥ 150 years and the application small groups shelterwood system or its variations;
    - a gradual transition from shelterwood system to the soft selection system that features no rotation period but a continual regeneration period instead;
    - mimicking the natural forests patterns through the introduction of the continuous-cover forestry and its toolbox
- The entire abandonement of forestry operations and introduction of natural dynamics

The best possible or negotiable alternative for specific corridors will be implemented through the management programmes of the respective protected areas or through the territorial plans outside the protected areas. In both cases, changes will be also reflected in the forest management plans elaborated for the concerned areas.

II. Protecting and developing cultural heritage

The natural values along with the cultural heritage of the concerned countries and regions establish a base for ecotourism as one of the primary elements of sustainable development. On a one hand side, there is a steadily growing interest for Carpathian ecosystems among forestry scientists, ecologists, nature conservationists and enthusiasts, both native and international. They learnt about primeval forests mostly from scientific literature, co-operation and the internet sites. Excursions often resulted into further scientific co-operation and further visits by people generally interested in nature (Zach 2003, Pichler 2005). Measured by the number of study tour participants primeval forests excursions rank as the most popular and attractive tours among other products in this group that include geology and botany field excursions. Upon recommendation or personal initiative of excursion members, numerous groups of visitors that usually constitute the customer base for study tours operators, both international and domestic, also asked for guidance through the primeval forests. The excursion programs usually featured a sandwich pattern, i. e. primeval forests visits were combined with cultural heritage sites in a convenient manner. The interest is steadily growing but dependent on pushing the envelope through personal contacts, business contact with study tours operators, targeted advertising, publishing and visual media

On the other hand, the natural and cultural values are little known among non-experts due to a lack of an active information policy. Currently, the overall numbers of visitors are rather low compared to countries such as Poland, Hungary or the Czech Republic, partly due to country's short existence and the lack of presentation on the part of the state government. For example, the Austrian, Hungarian, Czech, and Polish governments spent 49.4, 41, 5.5 and 8 million USD respectively for advertising their countries as tourism destination, compared to only 1.6 million USD spent by the Slovak government for that purpose.

Objectives

a) Expanding an integrated and interactive internet information systems providing information on natural and cultural history of concerned regions and their infrastructure for ecotourism and interpretative tourism: expertise provided by the Centre for Scientific Tourism in Slovakia (www.poznajachran.sk, www.ecosystems.sk).

b) Expanding the system of interpretative tourism scheme Carpathicum, based on local tourism infrastructure and focused on the natural and cultural heritage and their underlying connection (topics: vymenovať)

III. Promoting environmental protection and resource management
Mimicking of Carpathian natural forests patterns

Forests in the partner countries have the potential to contribute significantly to torrent control and flood avoidance, replenishment of water reservoirs, carbon accumulation in forest ecosystems, landslide and erosion control, geo- and biodiversity protection, and feature recreational, cultural and various other social values.

According to the Strategic Research Agenda of the Forests Based Sector's Technological Platform, that potential depends entirely on ensuring the sustainable character of forestry, on using research to make wood a more predictable engineering material, and on reducing the input of material, energy and work per unit wood and wood based-products. All these assumptions seem to be seriously compromised across Europe: The burning of fossil fuels may lead to problems in applying the traditional concept of sustainable forestry, in which site factors are assumed steady-state (Wagonner 1994, Kauppi 1995). The predictability of wood as material is limited due to wood market volatility, amplified by wood availability being a delayed function of the demand. And finally, the profit margins from wood utilization are often not high enough to cover the necessary silvicultural measures in many countries (Commarmot et al. 2000).

In this situation, nature-based management of forest resources becomes a principal doctrine aimed to narrow the gap between managed and nature forests patterns, to ensure higher forests stability, to provide for a diversified supply of wood and to achieve desired forests functions at lower costs. Therefore, the major aim of this network is to find new ways of how substantially more natural patterns and processes normally taking place in the primeval forests can be harnessed for the benefit of forest resources management under global changes. The highly integrated approach goes far beyond of what has been achieved in this field thus far. The partnership overcomes geographic and interdisciplinary fragmentation and establishes the critical mass of capacity in order to bridge the limited, site- or region-specific character of the available knowledge and to significantly advance the theory and practice of nature based management of forest resources, capable of adapting to site conditions where it is applied and to new conditions yet to be experienced. This shall provide a major advance in this field, which is bedeviled by the dispersion and scarcity of primeval forests remnants and differences in data collection modes and methodology, making direct comparisons among studies, useful modeling and the transfer of knowledge into forest management difficult or impossible.

Conceptual foundations

Brang (2005) reviewed the concept of virgin forests as a knowledge source for central European silviculture. Small-scale regeneration methods, such as progressive felling by small groups and single tree or group selection systems correspond best to the natural regeneration processes in undisturbed beech forests. But a number of other patterns occurring in primeval forests can potentially be used in forest management after further research of the opening opportunities, for instance the substitution of tending and thinning by natural regeneration, suppression and released of target trees by auxiliary trees; growing of mosaic forests composed of small patches covered by bio-groups of different age, as devised from the textural primeval forests patterns or the mimicking of the biometric parameters of oak crowns able to sustain the maximum stem diameter increment while maintaining its quality in oak primeval forests. The natural growth and increment rhythm, as well as the production of higher quality and larger dimensions can be supported by an according initial suppression of certain species, such as fir and spruce. The response of other species, such as oak and beech must further be studied, similar to the question how much trees necromass should be retained in managed forests in order to provide habitats for stenoec organisms, microclimate-smoothing within forest stands, and contribute to carbon accumulation in the surface humus and ultimately in mineral soils.

Thus, there is a widely recognized need to consolidate and extend the network of studied primeval forests to achieve necessary replications and thus overcome the site dependency, which currently presents the barrier to knowledge transfer. Also, no major breakthrough has yet been made in the synthesis of silviculture, hydrology, soil physics, ecology and biogeochemistry in particular, which is urgently needed in order to assess the impact of primeval forests patterns and processes on the environmental functions, including carbon sequestration, slope stability, runoff quantity and quality and erosion controls.

Objectives:

a) To develop a comprehensive understanding of the causes for the variation in ecological patterns and processes within temperate primeval forests: Some of the results from primeval forest research could have been generalized, such as the developmental independence of small forest segments in beech primeval forests on mesotrophic sites. Further and more complex research covering the entire spectrum of site conditions will yield exceptional data and provide ESR with a unique training opportunity in field methods.

b) To resolve the introduction and maintenance of natural forests patterns in managed forests: The opportunities for a cost-effective and ecologically sound approach, based on the introduction of selected processes and patterns of the primeval forests ecosystems into the forest management toolbox, depend on the site conditions, its past use, previous forest management and its current and future goals. Further research shall therefore focus on what other forest structures are most suitable to benefit from self-regulating processes and how these structures can be achieved.

IV. Promoting risk management and prevention of disasters

Nature-based management of forests

Landslides, floods, forest fires, windthrow and windbreak pose major threat to mountainous areas such as the Carpathians. On multiple occasions, the availability and safety of natural resources, as well as the safety and quality of life of citizens living in the affected areas have been seriously compromised or severely degraded for a long period of time. However forests that exist in balance with site conditions provide a high level of protection against such disasters.

For instance, forest canopies, manly those in natural or primeval forests featuring a multi-layer structure, exert a smoothing effect on throughfall and the development and subsequent transmission of pressure waves down the soil profile, which can cause a slope to co collapse (Keim, Weiler, Skaugset). Also, complex forest stands can respond much more rapidly to an increased soil water content during or after strong rainfall events. It has been shown that in beech forests, the surpressed trees can increase their transpiration rate as much as five times compared to main canopy trees. Normally, surpressed trees are present only in close-to-nature forests because they are removed form managed forests at an early stage of a forest stand development. In that way, nature-based forest structures and textural patterns function as important flood avoidance factors. In addition, rich forest structures are typical of uneven-aged stands that are much less prone to windthrow, because the structural patterns dissipate the wind energy and prevent the synchronization of trees oscillations. Also the windbreak is less frequent, as the exposure of trees to winds from their origin leads to the formation of stems having their centres of gravity much lower that in trees growing in monocultures. Their crowns are conical and narrow, providing winds with little resistance. As a result of comparatively low disturbances frequency and biodiversity they sustain (Duelli), natural forests suffer much less from forest fires that often rage on windthrow or windbreak areas, e. g. most recently in the High Tatras, where settlements had to evacuated.

Conceptual foundations

Regulation capacity of primeval forests ecosystems sustains ecological processes and the vital environmental functions, such slope stability protection, torrent control, retention, accumulation, filtration and the carbon sequestration. Functions provided by primeval forests are often assumed superior to functions fulfilled by managed forest. However, this line argument deserves a scientific scrutiny, because multiple evidences indicate that certain combinations of these functions can not be achieved at the same time. A reliable and accurate determination of ecological and environmental functional capacity of forests is the fundamental prerequisity for sustainable, close-to-nature and adaptive forestry under global changes.

Objectives

b) To form a self-contained picture of the temperate primeval forests functional capacity: Most temperate primeval show an outstanding performance in terms of biomass production, the ecological resistance and resilience, biodiversity, preventing erosion, retention and carbon accumulation. Not always, however, these functions are provided simultaneously. In the light of increasing efforts to employ natural processes in forest management, there is an urgent need to determine the effects of natural patterns and processes on forest functions.

Deliverables:

- Nature based management of forests resources in the Carpathians: research on a compendium (textbook), dissemination workshops for policy makers, workshops for end users (owners, managers)

- a pilot study: practical application of the above in the creation of ecological corridors connecting the sites constituting the nomination project; a study and its projection into forest management plans
- use of natural heritage in the development of ecotourism schemes (Carpaticum): itineraries, interactive maps, central info

STARTPAGE

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PART B

STAGE 1 – OUTLINE PROPOSAL

“PRIMEFOR”

Table of Contents for the Outline Proposal

MIMICKING PRIMEVAL FORESTS PATTERNS IN NATURE-BASED FOREST RESOURCES MANAGEMENT

1. Network motivation and aims:

According to the Strategic Research Agenda of the Forests Based Sector's Technological Platform, the competitiveness of the sector depends entirely on ensuring the sustainable character of forestry, on using research to make wood a more predictable engineering material, and on reducing the input of material, energy and work per unit wood and wood based-products. All these assumptions seem to be seriously compromised: The burning of fossil fuels may lead to problems in applying the traditional concept of sustainable forestry, in which site factors are assumed steady-state (Wagonner 1994, Kauppi 1995). The predictability of wood as material is limited due to wood market volatility, amplified by wood availability being a delayed function of the demand. And finally, the profit margins from wood utilization are often not high enough to cover the necessary silvicultural measures in many countries (Commarmot et al. 2000). In this situation, nature-based management of forest resources becomes a principal doctrine aimed to narrow the gap between managed and nature forests patterns, to ensure higher forests stability, to provide for a diversified supply of wood and to achieve desired forests functions at lower costs. Therefore, the major scientific aim of this network is to find new ways of how substantially more natural patterns and processes normally taking place in the primeval forests can be harnessed for the benefit of forest resources management under global changes. Owing to the network structure, the early stage researcher (ESR) will for the first time get an integral view of nature forests ecosystems on distinct sites in the Temperate Zone of Europe. That experience accompanied by a highly interdisciplinary approach will create a new breed of scientists able to pose clear scientific questions even in the face of considerably complex ecosystem patterns and demands on forest functions. Trained under the supervision of acclaimed scientists, they will be able to resolve the challenge of a science-based and economically viable management of forest ecosystems in a possibly transient, non-steady-state environment.

2. Scientific objectives

The research training activities will unfold around the principal axis, constituted by the network's scientific objectives. These objectives will be achieved within the framework of tasks which are described in detail in the Work Plan section (4):

a) To develop a comprehensive understanding of the causes for the variation in ecological patterns and processes within temperate primeval forests: Some of the results from primeval forest research could have been generalized, such as the developmental independence of small forest segments in beech primeval forests on mesotrophic sites. Further and more complex research covering the entire spectrum of site conditions will yield exceptional data and provide ESR with a unique training opportunity in field methods.

b) To form a self-contained picture of the temperate primeval forests functional capacity: Most temperate primeval show an outstanding performance in terms of biomass production, the ecological resistance and resilience, biodiversity, preventing erosion, retention and carbon accumulation. Not always, however, these functions are provided simultaneously. In the light of increasing efforts to employ natural processes in forest management, there is an urgent need to determine the effects of natural patterns and processes on forest functions.

c) To extract the past and assess the current and future global climate change impact on temperate forests: Primeval forests, owing to a negligible human intervention, provide us with a window of opportunity to estimate the interference of climate fluctuations with the growth dynamics of tree populations. Any changes however must be evaluated and judged against the natural dynamics.

d) To resolve the introduction and maintenance of natural forests patterns in managed forests: The opportunities for a cost-effective and ecologically sound approach, based on the introduction of selected processes and patterns of the primeval forests ecosystems into the forest management toolbox, depend on the site conditions, its past use, previous forest management and its current and future goals. Further research shall therefore focus on what other forest structures are most suitable to benefit from self-regulating processes and how these structures can be achieved.

3. Current international state-of-the-art and scientific originality of the project

The network objectives have been set after a thorough evaluation of both successes and failures in primeval forest research and in the transfer of its results into sustainable forestry.

3.1 Conceptual foundations and the transfer of knowledge from primeval to managed forests

Brang (2005) reviewed the concept of virgin forests as a knowledge source for central European silviculture. Due to the case-study character of the available knowledge, there continues to be disagreement about the degree to which the processes observed in primeval forests can legitimately be incorporated into the managed forests dynamics. Small-scale regeneration methods, such as progressive felling by small groups and single tree or group selection systems correspond best to the natural regeneration processes in undisturbed beech forests. But a number of other patterns occurring in primeval forests can potentially be used in forest management after further research of the opening opportunities, for instance the substitution of tending and thinning by natural regeneration, suppression and released of target trees by auxiliary trees; growing of mosaic forests composed of small patches covered by bio-groups of different age, as devised from the textural primeval forests patterns or the mimicking of the biometric parameters of oak crowns able to sustain the maximum stem diameter increment while maintaining its quality in oak primeval forests. The natural growth and increment rhythm, as well as the production of higher quality and larger dimensions can be supported by an according initial suppression of certain species, such as fir and spruce. The response of other species, such as oak and beech must further be studied, similar to the question how much trees necromass should be retained in managed forests in order to provide habitats for stenoec organisms, microclimate-smoothing within forest stands, and contribute to carbon accumulation in the surface humus and ultimately in mineral soils. Thus, there is a widely recognized need to consolidate and extend the network of studied primeval forests to achieve necessary replications and thus overcome the site dependency, which currently presents the barrier to knowledge transfer. Also, no major breakthrough has yet been made in the synthesis of silviculture, hydrology, soil physics, ecology and biogeochemistry in particular, which is urgently needed in order to assess the impact of primeval forests patterns and processes on the environmental functions, including carbon sequestration, slope stability, runoff quantity and quality and erosion controls.

3.2 Project novelty and expected contributions

The highly integrated approach employed by the network goes far beyond of what has been achieved in this field thus far, and for the first time it has the ambition to shed light on the causes for the spatio-temporal variability so as to help bridge the limited, site- or region-specific character of the available information. This shall provide a major advance in this field, which is bedeviled by the dispersion and scarcity of primeval forests remnants and differences in data collection modes and methodology, making direct comparisons among studies, useful modeling and the transfer of knowledge into forest management difficult or impossible.

4. Workplan

The research conducted in this network has been structured into five distinct but interrelated research tasks. Tasks #1 and #4 provide the new empirical data basis for the network. Task #3 and #4 narrow the uncertainties in the development of the primeval forests mimicking toolbox within the task #5.

4.1 The research tasks

Task 1: Comparative study of current ecological patterns and processes in primeval forests and of their spatial variability in the temperate zone of Europe; **Task description and approach:** The task aims to reveal the causes of the differences in structure, texture, disturbances, regeneration and the overall dynamics under a range of environmental and genetic causes responsible for the variability of observed patterns. For that purpose, series of primeval forests on distinct sites will be composed in numbers assuring a proper replication. The respective patterns and processes will be studied using existing records and current or new observations; **Task leader:** ZVO; **Involved partners:** GOT, RAK, LJU, BRA, ZVO.

Task 2: Regulation capacity assessment of primeval forests ecosystems; **Task description and approach:** We will measure locally, model and on larger scales estimate the regulation functions of primeval forest, i. e. their capacity to sustain ecological processes and the vital environmental functions, such slope stability protection, torrent control, retention, accumulation, filtration and the carbon sequestration. Functions provided by primeval forests are often assumed superior to functions fulfilled by managed forest. However, this line argument deserves a scientific scrutiny, as there is a multiple evidence that certain combinations of these functions can not be achieved at the same time. The corresponding analysis will draws on results from task #1 and deliver a list of functions worth mimicking for the task #5. **Task leader:** DUB; **Involved partners:** DUB, ZVO, BRA.

Task 3: Analysis of possible temporal variations in temperate primeval forests patterns; **Task description and approach:** This task shall detect possible global climate change impacts on the patterns and dynamics in primeval forests on the backdrop of environmental stochasticity. Network partners (ZVO, RAK) avail of data from a 50-year-long continuous primeval forests research and so the approach will lean, beside dendrochronological analyses, on contrasting current patterns against data taken prior to the rapid onset of the global changes, and against site and genetic variations as identified in task #1. The results will enable capturing the emergent trends and making more specific predictions about the future fate of forests ecosystems. **Task leader:** TOR; Involved partners: TOR, ZVO, GOT, BRA

Task 4: Investigation of interactions between primeval forest patterns and organisms; **Task description and approach:** In compliance with Huston (1979), who predicted the highest species richness under intermediate perturbations, no significant differences in species richness between a beech primeval forest and a properly managed beech forest have been detected (Duelli et al. 2005). However, primeval forests patterns support saprophagous organisms groups, e. g. millipedes, gastropods, saproxylophagous beetles and xylobiont fungi, birds nesting in tree cavities and others. They in turn may strongly influence primeval forests traits, such as the spatial heterogeneity of surface humus and natural regeneration. Therefore, these and other important interactions, such as those between ungulates and their predators in relation to natural regeneration dynamics, will be studied. Comparatively less attention will be paid to biodiversity inventories. **Task leader:** RAK; **Involved partners:** ZVO, RAK, BRA

Task 5: Mimicking of primeval forests patterns in close to nature forestry**; Task description and approach:** Three teams in this network (GOT, ZVO, LJU) have made independently significant contributions to the study of primeval forests patterns and their incorporation into close-to nature silviculture. These teams join forces in this network to evaluate primeval forests patterns and experiments, as well as to emulate the underlying processes by means of computer modeling. In that way, new applications and recipes for nature-based management of forest resources will be developed. That approach will draw on findings from previous tasks. We envision that ESRs employed in the network are thoroughly exposed to both theory-building and empirical research. **Task leader:** GOT; **Involved partners**: ZVO, LJU, GOT, RAK, BRA

4.2 Research facilities

We have chosen approximately fifty primeval forests of outstanding authenticity and integrity. The group reflects the variability of climax forests across an area that extends from Central France to Western Ukraine and from Southern Sweden to the mountainous part of Central Italy. The group includes primeval forest in the Slovak republic (e. g. Kasivarova, Dobroc, Havesova,), in Ukraine (e. g. Uholka, Svydovets, Kuzyi-Trybushany) and in Slovenia (e. g. Strmec) They are composed mainly of sessile oak (Quercus petraea), European beech (Fagus sylvatica), silver fir (Abies alba) and Norway spruce (Picea excelsa). These species represent the backbone of the European forestry and some of the best studied tree species in Europe. The field sites were selected from areas close to the home institutions of the network partners. In these localities, advanced research methods will be applied. Besides, teams in Zvolen, Rakhiv, Ljubljana and Göttingen avail of series of experimental plots where close-to-nature forest management methods are applied, which enable comparative studies based on multiple replications.

4.3 Selected research methods

The research teams have further developed within collaborative research, e. g. by O'Linger et. al (1997), and successfully applied the following selection of methods: **Site capacity determination:** As opposed to usual site descriptions, the field method relies on the determination of site parameters in absolute terms, e. g. total amount of available nutrients instead of concentration only. This is achieved by the conversions using for instance the total volume of forest soil cover. The variables will be measured by advanced technology, such as electrical resistivity tomography, Time Domain Reflectometry, elemental analyzers and others owned by several teams (ZVO, DUB). **Population genetics of forest tree species:** Our groups (ZVO, GOT) have expertise in studying the genetic structuring of tree species populations using alloenzymes, isoenyzmes and DNA analyses. They are used to determine the postglacial migration of tree species in the Carpathians and the adjacent regions and will help determine the spatial variability of primeval forests patterns in the area of interest (Comps et al. 2001). **Global change impact detection and modeling:** The main methods to be applied are the measurement of the growth rate through basal area increments (TOR) and time series analysis of primeval forest dynamics over past 50 years (ZVO, RAK). **Structural analysis of the primeval forests, including the gap analysis:** A co-operation of two teams (GOT, ZVO) lead to the development of a standard method applied on 10 ha plots. The investigation includes determination of the site resources utilization, the crown volume, forest canopy gaps, trees necromass survey, natural regeneration and other parameters. The research will rely on ground measurements and the evaluation of aerial photographs or satellite images from IKONOS or Quickbird satellites. **Growth models:** Forest structure generators (SIBYLA) developed by two teams (ZO, GOT) within a co-operative research will be used to generate individual tree data from stand data and predict spatial structure. This is inasmuch significant that the close-to-nature forestry approach is increasingly concerned with individual trees, their production and stability. Thinning models (SIBYLA Cultivator, SIBYLA Prophesier) shall be employed to model autoselection as compared to tending, thinning and harvesting.

5. Collective experience and collaboration between the research teams

Our network includes complementary research skills from population genetics, biogeochemical cycling, forest ecology, silviculture and forest management, environmental sciences and mathematical modeling, which are required for successful accomplishment of the ultimate aim of the network. Task #1 involves the majority of teams, while each of the remaining tasks include 3 to 5 teams having the necessary expertise, with the network coordinator (BRA) being involved in each task. Thus, the network overcomes geographic and interdisciplinary fragmentation and establishes the critical mass of scientific capacity in order to significantly advance the theory and practice of nature based management of forest resources, capable of adapting to site conditions where it is applied and to new conditions yet to be experienced. The network partners are:

UKE – Institute of Landscape Ecology, Slovak Academy of Sciences, Bratislava, Slovakia: Network coordinator. The institute has been participating in nine projects within the 5th EU and 6th EU Framework Programs: BIOSCENE, BIOPRESS, CARBOMONT, BIOHAB, BIOPLATFORM, BIOFORUM, RURAL-ETINET, ALTERNET and SENSOR. The team under the leadership of Dr. J. Oszlányi, the institute's director, has co-operated with all network partners. The main contributions of this team to the network consist in investigations of biomass production, carbon accumulation and biodiversity survey in forest ecosystems, as well as regionalization of results and the network management.

Two key publications:

Oszlányi, J., 2001: Research in UNESCO Biosphere Reserves as one of the elements of the Seville Strategy. Ekológia – Bratislava. 20 (3): 45–53.

Oszlányi, J., Grodzinska, K., Badea, O., Sharpyk, Y.: Nature conservation in Central and Eastern Europe with a special emphasis on the Carpathian Mountains. Environmental Pollution. 130 (1): 17–32.

GOT – Faculty of Forest Sciences and Forest Ecology, Georg-August-University Göttingen, Germany: Partner #1, leader of task #5. The team of the Faculty of Forest Sciences and Forest Ecology in Göttingen contributes to the network by extraordinary complementary research in the fields of silviculture and forest ecology. They are represented by the group of. Prof. Dr. A. Dohrenbusch and it includes forest regeneration, competition-based control of young stands, ecological demands of forest trees species, ecological and economical aspects forest developments, e. g. carbon sequestration and water quality

Two key publications:

Dohrenbusch, a., 2000: forest management. In: Puhe, J. Ulrich, B.: Global Climate Change and Human Impacts on Forest Ecosystems. Springer Ecological Studies: 419–462.

Dohrenbusch, A.; Bartsch, N. (eds.) (2002) Forest development – succession, environmental stress and forest management. Springer, Berlin, 220 pp.

ZVO – Faculty of Forestry, Technical University Zvolen, Zvolen, Slovakia: Partner #2, leader of task #1. Results of to-date longest systematic research of the primeval forests in the Temperate Zone of Europe have been published by Korpeľ (1995), the co-founder of modern natural forests research in Europe. His work has become a reference for further primeval forest research results. Consequently, it has been cited one hundred and forty five times in the ISI-indexed journals and more than 1000 times in journals indexed by other databases. The team has been participating in several projects within the 5th and 6th EU Framework Programs: FRAXIGEN, FRAXINAS, Implementing Tree Growth Models (ITM), WARM.

Two key publications:

Saniga, M., Schütz, J.P., 2001: Dynamik des Totholzes in zwei gemischten Urwäldern der Westkarpaten im pflanzengeographischen Bereich der Tannen-Buchen- und der Buchenwälder in verschiedenen Entwicklungsstadien. Schweiz. Z. Forstwes. 152, (10): 407–416.

Comps, B., Gömöry, D., Letouzey, J., Thiébaut, B., Petit, R. J., 2001: Diverging Trends Between Heterozygosity and Allelic Richness During Postglacial Colonization in the European Beech. Genetics, Vol. 157: 389–397.

RAK – Carpathian Biosphere Reserve, Rakhiv; UA: Partner #3, leader of task #4. The research team of the Carpathian Biosphere Reserve, has a long-standing experience in performing the biodiversity inventories and has achieved remarkable results in comparative studies between biodiversity in primeval and managed forests. As a result, his team organized the scientific conference "Natural Forests in the Temperate Zone of Europe – Values and Utilisation" in 2003 in Rakhiv, during which one hundred and thirty contributions dealing with biological, social and economic aspects of natural forest ecosystems and thereof utilization were presented (Hamor, Commarmot 2003). The participation of the Rakhiv team is indispensable for the network as the team contributes its research plots in the largest European beech reserves, e. g. Uholka – 6200 ha in size, Kuzyi-Trybushany – 4200 ha in size. Carpathian Biosphere Reserve closely cooperates with Zvolen team on the research of permanent experimental plots in the Ukrainian primeval forests founded by prof. Zlatník (Zlatník et. al 1938, Vološčuk 2003). Their data records complete the series of observations needed for capturing spatial variety of primeval forests in the Temperate Zone of Europe and their temporal variations.

Two key publications:

Commarmot, B., Bachofen, H., Bundziak, Yo., Bürgi, A., Ramp, B., Shparyk, Yu., Sukhariuk, D., Viter, R., Zingg, A., 2005: Structures of virgin and managed forests in Uholka (Ukraine) and Sihlwald (Switzerland): a comparative study. For. Snow Landsc. Res. 79, 1/2: 45–56

Dovhanych Ya.E., 1986: Carnivores of the Carpathian Reserve. Moscow, 12–14.

LJU – Biotechnical Faculty, University of Ljubljana, Ljubljana, Slovenia: Partner #4, Tasks # 1, 5. Leader of the team, prof. J. Diaci made highly significant contributions to the "Nature-based Management of beech in Europe – a multifunctional approach to forestry", an international project supported by the EU fifth framework program. The project has delivered scientifically founded policy recommendations and management guidelines for sustainable forest management. His team specializes on ecophysiological research on gap dynamics in virgin forests and on indicators for monitoring and evaluation of forest biodiversity in Europe.

Two key publications:

Christensen, M., Hahn, K., Mountford, E. P., Odor, P., Standovar, T., Rozenbergar, D., Diaci, J., Wijdeven, S., Meyer, P., Winter, S., Vrska, T., 2005: Dead wood in European beech (Fagus sylvatica) forest reserves. Forest ecology and management, 210 (1–3): 267–282.

Diaci, J., Pisek, R., Boncina, A., 2005: Regeneration in experimental gaps of subalpine Picea abies forest in the Slovenian Alps. European journal of forest research 124 (1): 29–36.

TOR – Department of Agronomy, Silviculture and Land Management, University of Turin, Turin, Italy: Partner #5, leader of the task #3. The team headed by prof. R. Motta, an associate editor of Dendrochronologia, an interdisciplinary scientific journal of tree ring science, is devoted to dendroecological analysis of the conifer trees, the studies of forest stands histories, and the research on the impact of the global climate change on forests. They also conduct silvicultural experiments, such as small gaps or elongated cuts, established in order either to maintain the current status using natural regeneration or to improve the structures and the "naturalness" of the forest stands.

Two key publications:

Motta R, Garbarino F, 2003: Stand history and its consequences for the present and future dynamic in two silver fir (Abies alba Mill.) stands in the high Pesio Valley (Piedmont, Italy). Annals of Forest Science, 60 (4): 361–370.

Motta, R., Edouard, J., 2005: Stand structure and dynamics in a mixed and ultilayered forest in the Upper Susa Valley, Piedmont, Italypper Susa Valley, Piedmont, Italy. Canadian journal of forest research,35 (1): 21–36.

DUB – Department of Environmental Resource Management, Faculty of Agriculture, University College Dublin, Dublin, Ireland: Partner #6, leader of the task #2. The team of Prof. E. P. Farrell has made significant contribution on the assessment of forests environmental functions, mainly soil protection, the provision of clean water and carbon accumulation, under the global climate change. Prof. Farrell acts as Member of the COST Action E21 Management Committee (Contribution of Forests and Forestry to the Mitigation of Greenhouse Effects) and COST Action E25 Management Committee (European Network for a Long-term Forest Ecosystem and Landscape Research Programme).

Two key publications:

Goodale, C. L, Aber, J. D. , Farrell, E. P., 1998: Predicting the relative sensitivity of forest production in Ireland to site quality and climate change. Climate research 10 (1): 51–67.

Byrne, A. K., Farrell, E. P., 2005: The effect of afforestation on soil carbon dioxide emissions in blanket peatland in Ireland. Forestry 78 (3): 217–227.

6. Training

The research program will help to train ESR able to provide a scientifically sound basis for the implementation of the Resolution on Forestry Strategy for the EU, adopted by the European Council in 1998, and specifically for sustainable production of renewable resources and sound environmental practices as the main objectives. This new generation of scientists will also be essential for the development and implementation of the Strategic Research Agenda of the EU Forests Based Sector's Technological Platform, EU environmental policies and the EU Climate and Environment Program. These expectations are not unrealistic, as our network teams have had a long record of successful participation in the 5th and 6th EU FPs. Early stage researchers will benefit both directly from their network-specific activities and indirectly from operating in a creative, international and interactive scientific environment.

6.1 Training needs

From the viewpoint of human resources, the transfer of know-how from applied ecology of primeval forests ecosystems into practical management of forest ecosystems has been seriously hindered not only by the scarcity and dispersal of primeval forests remnants, but also by the lack of an interdisciplinary approach. Thus, most universities in Europe provide the training in nature-based forestry only of a facultative appendix. Though we cannot undertake to train new fully fledged experts in each area within this network, we can help the young researchers to become familiar with the purpose and use of methods applied in the particular fields. Only then can they attain the capacity to pose relevant questions, to capture the complexity of forest ecosystems and extract solutions for the practical, adaptive and nature-based management of forest ecosystems. We have identified training need for young European researchers especially in the following areas: **Experimental designs:** In forestry research, proper replication of studies is sometimes confused with pseudoreplication. ERSs shall receive training on setting up proper research designs in order to ensure opportunities for the transfer of knowledge. **Methods of field work:** There is little methodological standardization of field techniques employed in primeval forests and silvicultural studies, which makes comparative studies difficult. Thus, it is essential to develop comparable methods, widely applicable with minimum modification. **Quantitative analyses of biogeochemical cycles:** The biogeochemical cycling is often analyzed or modeled qualitatively, or quantitative analyses and modeling are performed on spatially very limited compartments. Such approach can essentially mask the overall patterns, such as the carrying capacity of sites. The use of absolute values shall be encouraged. **Spatio-temporal variability:** In studying heterogeneity, what we call ground noise (or residual variance) in classical statistical inference, actually may be the matter of our study in highly complex ecosystems. ESRs should become acquainted with a wide spectrum of statistical methods. **Genetics applied to forestry studies:** Though there is no lack of general expertise in the use of molecular techniques in population biology in Europe, there is an ever present need to help field researchers acquire a better understanding of the opportunities presently available via the application of current molecular techniques.

6. 2. Training programme

In this network, ERS will develop an ability to work in groups. On completion of the project, transferable and specific skills will enable them to overtake responsibilities in collaborative research, to understand and predict the direct and indirect effects of forest management.

6.2.1 Early stage researchers (ESRs)

Early stage researchers employed in this program will receive a contract for 1–3 years in one of the seven research teams in the network. It is foreseen that they will focus on the following topics: Genetic causes for spatial variations in production, structure, texture, natural disturbances and regeneration within a primeval forests sample: 2 ESR (ZVO, GOT); Site factors and variations in primeval forests patterns: 3 ESR (RAK, ZVO, GOT); Interactions between primeval forests patterns, biodiversity, populations and ecosystems fragmentation: 2 ESR (RAK, ZVO, BA, GOT); Regulation functions of primeval forests compared to managed forests (torrent control and flood avoidance, replenishment of water reservoirs, carbon accumulation in forest ecosystems, landslide and erosion control an others): 3 ESR (DUB, ZVO, BRA); Temporal changes and predictions of primeval forests dynamics: 3 ESR (TOR, ZVO); Emulating primeval forests processes and patterns in managed forests: 5 ESR (ZVO, RAK, GOT, TOR, DUB).

The total estimated number of ESR is between 15 and 20 which corresponds to approximately 600 person months. Over the period of the contract, each ESR will spend at least two months with at least two other tams in compliance with his o her Personal Career Development Plan, elaborated in co-operation with personal supervisors recruited from among the respective partner faculty. During periods of intensive field work, ESR will work together at particular locations in association with the local task leader and scientists, post graduate students, and undergraduate assistants. During winter months, ESR will visit other laboratories and work closely with faculty and staff involved in the statistical analyses of material and data gathered in the field season and the modeling. The visits and secondments will be coordinated in order to fit the schedule of structured training courses provided by the network partners, summer schools, workshops and network wide training activities, including E-learning, data visualisation, as well as joint database development on web-platforms. A particularly strong emphasis will be put on a simple access to structured and, wherever possible, visualized data across the entire network. All relevant information and data will be available to the network partners, ESRs and ERs on the internet site currently under development (www.virginforests.sk). The teams will provide the ESRs with training in techniques presented in Training needs section (6.1).

6.2.2 Experienced researchers (ERs)

The ER will be given the opportunity to visit two other laboratories in the network for one month per year of their contract. This mobility is essential to the transfer of knowledge, research collaboration as well as to the training of ESR. Two meetings will be organized by the network (years 2 and 3) in which all ESR and ER in the network will give presentations and discuss progress and conclusions. All ESR and ER will be strongly encouraged to participate in staff development programs in the institutions where they are employed, annual career development appraisals will be carried out, and training progress will be subject to annual reports.

6.3 Procedure to hire early stage and experienced researchers

The vacancies will be advertised by informative folders sent to forest ecology, silviculture and forest management departments at the universities and scientific institutes across Europe, through the IUFRO Newsletter and its division and task force meetings, national Pro Silva organizations and ERA ENV (a new European initiative financed by the European Commission through the 6 th Framework Programme aimed at the integration of Associated Candidate Countries and new EU member states into European Research Area by environmental approaches). The selection will take place on a competitive base, but in case of equal scores female candidates will be preferred to achieve a minimum 40 % representation of female ESRs and ERs.

7. Literature

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Huston, M., 1979: General hypothesis of species diversity. Am. Nat., 113, 81–101.

Kauppi, P. E., 1995: What Is Changing in the Global Environment? Papers presented in IUFRO'95 Sub-Plenary Sessions.

Vološčuk, I., 2003: The geobiocenological research in the natural forest ecosystems of the Carpathian protected areas. The monographical studies on national parks (3). State nature conservancy Banská Bystrica, 122 pp.

Zlatník, A., Korsuň, F, Kočetov, F., Kseneman, M., 1938: Průzkum přirozených lesů na Podkarpatské Rusi. Sborník vyzkumných ústavů zemědělských ČSR, sv. 152, 524 pp.

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ENDPAGE

HUMAN RESOURCES AND MOBILITY (HRM)
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PART B

STAGE 1 – OUTLINE PROPOSAL

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Annex 4

National Ecological Network NECONET - Slovakia

Summary - the NECONET of Slovakia

(A Shortened English version)

Introduction

The main reason for the alarming global rate of species loss (around 10,000 per year - Bennett, 1991) is the ongoing destruction of nature and semi-nature ecosystems, exceeding new thresholds also on the European continent. Continent-wide loss of species and destruction of natural habitats is accompanied also by decreasing ecological stability of the land. Thus, a response on the international level is inevitable One of the recent initiatives is the concept of a European Ecological Network (EECONET) It represents a qualitatively higher stage of the nature conservation not only based on protection of threatened species, rare ecosystems and unique nature sceneries, but also on securing the dynamics of development of protected areas through interconnection of their structure and functions.

The co-ordinator of the design of the European Ecological Network (EECONET) through partial proposals of National Ecological Networks (NECONETs) is the IUCN European Programme. The presented publication "National Ecological Network of Slovakia" is the first part of the international project called "IUCN National Nature Plan" simultaneously carried out in the four countries in Central Europe (Hungary, Poland, Czech Republic, Slovak Republic) This interdisciplinary project concerns all important sectors of the economy, since the effective nature protection has to consider not only ecological aspects but also the economic, social, cultural and political processes which influence it

1. Natural conditions in Slovakia and nature conservation

1.1. Characteristics of natural conditions in Slovakia

Peter S raka, Stefan Maglocký, Jozef Steffek, Jana Ruzièková, Rudolf Amrein

Slovakia lies in the geographical centre of the Europe. Its area covers 49035 km^2, inhabited by 5.5 million people, the average population density is 107 inhabitants per square km The area is prolonged in West-East orientation, achieving the length of 420 km, the widest part in the meridian orientation is 195 km, the shortest one 75 km. The area is filled with the provinces of the Alpine-Himalayan system: Western Carpathians as the substantial part, but also Eastern Carpathians, Western-Pannonian and Eastern-Pannonian basin.

Slovakia represents naturally highly diversified landscape, from the larger part spread in the mountainous country with the bows of the prolonged mountain crests, structured by the intra-mountain basins. In the southern part, large lowlands prevail. The highest point is the Tatra's peak Gerlach - 2655 m a s l., the lowest point, where the river Bodrog is leaving the territory of Slovakia lies at the altitude 94 m a.s l. Slovakia is bounded from the north largely by the high Carpathian massifes and from the south mostly by the rivers Danube and Ipel'.

The complex geological structure, motley geomorphological conditions, presence of the three climate areas (warm, mildly warm, cold), the mountainous West-Carpathian influence penetrating with the lowland Pannonian influence, has resulted in the concentration of unique nature conservation values with enormous nature potential, uncommonly high biodiversity in the relatively small area in this part of Europe. Apart from the Mediterranean and nival zones, all other European vegetation zones are developed at the territory of Slovakia.

The substantial part of the territory (cca 41%) is covered by forests Despite attack of imissions and consequent damage and weakening of growth, we can still find large areas of well preserved original forest stands, representing significant part of the world heritage. Especially precious (from the viewpoint of biodiversity) are also the areas of secondary communities, created by human activities repeated through centuries. On the territory of Slovakia cca 2500 autochthonous and archeophyte species of higher plants and cca 50,000 species of animals (including invertebrates and soil microorganisms) can be found.

1.1.1. Geological structure

The character of the landscape is the result of a very complex geological structure and tectogenesis. The structure developed from the large descending space of geosyncline character, which had been folded in the several eras at the end of Secondary and Tertiary era. Orographic pressure reduced the geosyncline area significantly and a chain mountain range of a complex structural plan developed. The basic feature of the West Carpathians is a nappe structure built by the rock complexes from the Precambrium to Tertiary period included. The Western Carpathians are divided into several zones· the inner Carpathians in the south and outer of flysch Carpathians in the north. Between them there lies a narrow klippen belt which is considered to be a part of the outer Carpathians.

The inner Carpathian core mountain ranges are older and they are built from Proterozoic and Palaeozoic crystalline rocks (granite, diorite and others) The remnants of the significant neovolcanic activity, which took part in the Western Carpathians in the Tertiary period, are central- and eastern-Slovakian neovolcanic rocks (andesite, ryolite and others), forming mountain ranges in the inner bow. The outer bow is built of Mesozoic sedimentary rocks (limestone, and others) as well as of the Carpathian flysch (sandstones, claystones and others). On dolomite and limestone karst phenomena have developed, especially caves, chasms and gorges The longest cave system is represented by the Demanová caves (32 km), the whole number of caves is cca 3700.

1.1.2. Geomorphologic conditions

The territory of Slovakia consists of two subsystems of the Alpine-Himalayan system: the Carpathians and the Pannonian basin. Territory of Slovakia is divided into four provinces Western Carpathians, Eastern Carpathians, Western Pannonian basin, and Eastern Pannonian basin (Mazúr, Lukniš, 1982). The Western Carpathians cover more than a half of the territory and consist of two subprovinces the inner Western Carpathians and the outer Western Carpathians. The Eastern Carpathians cover the region of north-eastern Slovakia and are divided into the subprovinces of the inner Eastern Carpathians and the outer Eastern Carpathians. The West Pannonian basin reaches this territory in two subprovinces Vienna basin and Small Danubian basin The Eastern Pannonian basin reaches south-east Slovakia in the Eastern Slovakia lowland which belongs to the Great

Danubian basin.

The system of the Western Carpathians is further divided into the Carpathian upland and Subcarpathian basins According to geological development and structure the Carpathian upland it is divided into three zones· the zone of flysch Carpathians (outer Carpathians), the zone of central Carpathians and the zone of inner Carpathians. System of basins, valleys, canyons and gaps divides these three zones into separate units. High diversity can be evidenced by the presence of 84 geomorphologic units of 17 geomorphologic regions The relief in Slovakia is very diverse with occurrence of the morphotypes typical for inland environment of the temperate zone. In the basic division according to elevation degrees four different zones can be distinguished. lower uplands from 300 m to 1 000 m a s l (covering 45% of the area), medium uplands from 1 000 m to 1 500 m a.s l. (14%), lowlands and hilly-countries from 96 m to 300 m a s l. (40%), high uplands from 1 500 m to 2 655 m a s l. (1%).

Relief forms began their development with the beginning of permanent dry land period. The greatest influence in this development had the Quaternary period, particularly glacial and inter-glacial periods. The development of relief was influenced by the character of geologic underlier, gradient, exposition and vegetation cover. The most characteristic relief forms for the territory of the West Carpathians are the glacial forms (the High and Low Tatra Mts., Fatra, Orava), eroding basins and canyons (valleys of the Váh river, Slovenský raj Mts), karst relief with cave system (Slovenský raj , Low Tatra, Choè Mts.), terraces of rivers with their silts, volcanic forms, landslides (flysh zone), sand dunes (Záhorie, Eastern Slovakia lowland).

1.1.3. Soil characteristics

Exceptionally diverse spectrum of soil types origins in the heterogeneity of the relief, its properties, exposition and geological substrate. In the lowland flatlands alluvial and flood-plain soils prevail. On the loess of hilly-countries, where the evaporation is greater than precipitation the black soils occur. Brown soils prevail in the regions where these two factors are well balanced. There, where the precipitation is greater than evaporation, the illimerised soils developed, and high level of ground water table caused development of gleyed soils.

In the mountain regions brown soils - cambisoils containing raw humus developed. On limestones and dolomites of the Slovak Ore mountains (Slovenské rudohorie) and Fatra-Tatra region rendzina soils developed Pararendzinas are mostly developed in the Matra-Slanské Mts. region. Saline soils developed in the lowland depressions. Peat soils developed in the Orava region and eastern part of Žitný ostrov island in the Danubian lowland The clay soils prevail in lowlands, river alluviums and basins. Loamy soils are present mainly in the hilly-countries and mountains in the region of the Danubian lowland, Slovenské stredohorie Mts., Slánske and Zemplínske vrchy Mts., Lubovnianska vrchovina Mts., and in the northern part of the Eastern Slovakia lowland below Vihorlat Mt Sandy soils developed in the Záhorská nízina lowland, Zitný ostrov island, in the region north-east of Komárno, Subtatran basin, southern part of Turiec basin and in the downstream region of the Latorica river. Skeletonised soils prevail in High Tatra mountains, southern part of the Strázovské vrchy Mts., Small Fatra and Low Tatra mountains, in Èierna hora Mt and in Slovak paradise.

Most of the soils have been affected by human activities, apparent on the most fertile soils black soils, brown soils and black "èiernica" soils. Unaltered natural or potential fertility, which developed in natural conditions, is represented by anthropically uninfluenced soil types (black soils, brown soils, ilimerised soils etc. Affected natural fertility (cultural fertility) as a result of cultivation of original soil types is represented by the anthropogenic soils utilised exclusively as fertile soils. These soils can be found in heavily agriculturally utilised lowlands.

Fertility of most of the forest mountain soils does not differ from their natural fertility very much. Agriculturally utilised soils, concentrated mainly in lowlands and basins have more or less apparent cultural fertility. Recently, there have been recorded signs of degradation of soil horizon or disconnection of ground water table from the soil horizon. A variety of changes in landscape such as destruction of verdure, drainage projects and reclamations affect the water regime and support negative influence of water and wind erosion and salting of soils. Large areas are being under influence of acidic atmospheric depositions.

1.1.4. Climate

According to the Alisov classification Slovakia belongs to the continental European part of temperate climatic zone. Continental character of the climate gets stronger in the eastward direction, reason for which are prevailing westerly winds In the territory of Slovakia the air masses of temperate climatic latitudes predominate, only for a short time the arctic air from the north reaches the territory in winter months as well as the tropical air masses from the south in summer months. Interchangeable weather is caused by intensive cyclone activity. The area of Slovakia is divided into three climatic regions:

1. warm - number of summer days from 50 to 70 (average temperature above 25°C), snow cover less than 70 days, characteristic for regions with elevation less than 300 m a.s.l.,
2. mildly warm - number of summer days from 20 to 50, snow cover 100 days, max. of the July isotherm is 16°C, characteristic for regions in elevation from 300 to 800-1 000 m a.s.l.,
3. cold - number of summer days from 0 to 30, snow cover 100 to 200 days, characteristic for regions with elevation more than 800 to 1 000 m a s.l.

The most significant climatic factor is elevation and degree of continentality. Latitude does not influence the climate significantly. More apparent role is played, especially in the mountains, by terrain exposition and inverse air stream. The climate is influenced by geomor-phological properties, typical intermountain basins with local inversion of climatic conditions.

1.1.5. Hydrology

The Western Carpathians are together with the Czech massif called the roof of Europe.. Most of the major rivers (of the prevailingly centrifugal river network) origin below their central mountain ranges Major part of the rivers of Slovakia belong to the Black Sea - the Danube catchment. Only a small area east of High Tatra Mts. belongs to the Baltic Sea catchment. Watersheds divide the territory of Slovakia into three main catchments: the greater one of the Danube is subdivided by the principal Slovakian watershed into area of the tributaries of the Danube (the Morava, Váh, Nitra, Ipel', Hron rivers) and the catchment of the Tisa with the Bodrog river system (the Latorica, Laborec, Uh, Ondava, Topl'a), the Slaná river system (the Slaná, Bodva, Hornád, Torysa). The third is a small catchment of the Dunajec river, the Visla tributary - with its main tributary, the Poprad river.

Natural lakes are quite rare. The lakes in Slovakia are mainly relicts of the glacial era in the area of the High Tatra Mts In the Slovak territory there are about 100 of these mountain lakes (tares). The largest mountain lake is the Great Hincovo tarn which is 20 ha large and 50 m deep. The other natural lakes are of small significance. They developed either by periodical flooding of terrain depressions or by impoundment of a valley by landslides.

From the water management viewpoint, important are several hundred dam lakes, built for the purposes of water supply, power industry, irrigation and recreation. Unique are the reservoirs (tajch) used in the past for mining purposes, mostly located nearby the town Banská Štiavnica, where these were declared to be a part of the world cultural heritage.

Slovakia is rich in resources of ground water and of mineral and thermal waters (these rank Slovakia in the first places in Europe in their number and use) The largest supplies of ground waters are situated in the regions of the Danubian lowland and Eastern Slovakia lowland, places with thick layers of accumulated gravel and sand-gravel. Rich supplies of ground water can be found in the karst areas, the total area of which is 3200 km^2.

1.1.6. Vegetation and flora

Forests, meadows and agricultural fields with their vegetation cover and current composition of flora and vegetation structure reflect geological conditions, macro- meso- and microclimatic conditions, hydrology, development of surface shaping as well as the human activities The historical development of vegetation cover after the ice age can be traced back through the presence and combination of plant species.

Forests cover approximately 40% of the whole territory of Slovakia which is more than 2,000,000 ha of forest stands. From this area, 57% are deciduous and 43% coniferous forests The most common are forests with dominance of the beech 19 85% of beech woods, 15.34% of beech oak woods, 11.92% of fir beech woods and 9.73% of beech fir woods. In coniferous forests the most common are spruce woods (27.5%) 72.2% of the total forested area are timber production forests, 13.6 per cent of forests have protection functions. Almost 50 per cent of the total area of Slovakia are used as the agricultural land. Almost 2 per cent of the area is covered by bodies of water. The rest (8 per cent) is urbanised or used for other purposes. Strongly anthropogenised agricultural landscape with low ecological stability continuously covers lowlands and flat hilly-countries in the southern and south-eastern part and some of the inner Carpathian basins

In kolin and planar vegetation zone the most common are oak and oak hornbeam forest plant communities. They are present on a variety of parent rocks types. Broad floristic diversity is characteristic for oak woods with the oak Quercus pubescens. They can be found on the Secondary era limestones and dolomites and early Tertiary eruptive rocks with shallow soils They often create a complex with xerothermic grass-herbaceous communities of steppe character. Since the areas in lower elevations have been settled by man, particularly in the lowlands and basins the oak and oak hornbeam woods occur only in fragments (i.e Danubian, Eastern Slovakia lowlands).

Streams of the larger rivers are accompanied by azonal willow poplar and ash elm woods. On the drifting sands in the Danubian and Záhorská nízina lowlands arenicol plant communities, oak pine and pine woods can be found Submountain and mountain creeks are bordered by alder and willow belts. For its uniqueness are important alder stands in salt marshes in depressions without discharge (e g. Jurský Šúr). Floristic and vegetation diversity of swamp forests is magnified by macrophyte vegetation of still waters of oxbow lakes in the catchments of great rivers. In the whole territory of Slovakia, but in greater intensity in the Orava region, in the inner Carpathian basins and in the Tatra mountains region the biodiversity is magnified by presence of biotopes of springs, salt marshes and peat bogs with relict, especially glacial plant species They significantly contribute to the natural heritage. Part of the peat bogs was in the past either excavated or submerged in the water reservoirs.

As for deciduous forests the most common are beech woods They occur on various types of parent rocks in submountain or mountain vegetation zone. The period of their most intensive historical development after the ice age is Atlanticum and Subatlanticum In these climatic periods also some other Subatlantic species penetrated the territory of

Slovakia, for example fir. Special attention deserve the beech and fir beech woods of primeval character, e g. Dobroè primeval forest, Komárnik fir woods, Badín primeval forest. Very high biodiversity is typical for beech woods on limestone substrates, particularily in the klippen zone. Ecological requirements for thickness of soil did not allow them to penetrate into areas with steep slopes and shallow soils. At these places relict pine forest stands stayed preserved with occurrence of the pine *Pinus silvestris* which, on very thin soils, is replaced by grass-herbaceous communities with island character (the Strázovské vrchy Mts., Little and Great Fatra Mts , Slovak paradise Mts.). Due to their floristic diversity, occurrence of relict and endemic species and vegetation diversity, they represent a significant part of the natural heritage. Part of the beech forest was cut down in past and used for char coal production or in metallurgy, and was replaced by spruce monoculture (e.g. Slovak Ore Mountains).

In the mountain zone the evergreen coniferous forest prevail. Elevation span of their occurrence lies between 1000 m and 1550 m a.s l. in dependence on the character of the rock and mountain range. A dominant tree species is the spruce In a forest composition, besides spruce, common species are pine, larch and fir In High Tatra Mts. on the boundary between mountain and subalpine zone where spruce is replaced by dwarf pine also cedar pine occurs. The belt of dwarf pine achieves elevation of 1800 m a s l and gradually with higher elevations is replaced by alpine zone. In elevations about 2300 m a s.l. at some places signs of subnival zone can be found

Major part of the plant species occurs in the meadow ecosystems located in areas of the agricultural land. Natural alluvial meadows follow water courses. In the past they were used for hay production or as pastures. On the pastures of southern Slovakia rarely can be found species and communities of saline soils. Floristic diversity is also characteristic for hill-side meadows. During the Valachian (pastoral) colonisation these meadows spread mainly in the mountain zone on the mountain ridges. Above the subalpine zone with dwarf pine there is a zone of alpine meadows. Significant part of these meadows and pastures was ploughed and turned into monoculture fields by using new seed material and fertilisers.

The area of Slovakia can be divided into three phytogeographical regions. The largest part is the region of the West Carpathian flora (Carpaticum occidentale). Region of the East Carpathian flora (Carpaticum orientale) covers a small portion of the north-eastern part of Slovakia. Southern Slovakia, with small exceptions is a part of Central European and East European thermophilous, Pannonian flora (Panonicum). These regions can be further subdi-vided into lower phytogeographical units. Boundaries between them are usually not sharp.

Estimates say that in the territory of Slovakia occur 1000 species of blue-green algae and 10000 species of algae, out of which only less than a quarter has been confirmed so far. From more than 1400 species of lichens mentioned in literature sources only 1000 species have been recorded. Number of fungi species (macromycetes) is estimated from 4000 to 5000. 822 species of mosses have been recorded. Number of vascular plants species according to the current data is about 3000, out of which 2500 species are autochtonous or spontaneously allochtonous species (Maglocký, Feráková, 1993). However, many of these species are today rare or threatened. For example, the new Red list of vascular plants (based on IUCN criteria) includes 939 species (37,56% - Maglocký, Feráková, 1993).

Slovakian flora - original, natural, relict and endemic plant species represent natural heritage with a unique gene pool content. Vegetation through its richness, diversity and relatively well preserved concentration in small area creates good phyto-sociological preconditions for preservation of rare and endangered plant species Plant communities with their soil protection and water protection function exceed the framework of the Slovak republic. With the assistance of the projected system of ecological networks none of the rare and susceptible species or threatened communities should be omitted. Ecological corridors are a precondition for evolution and thus a precondition for permanent sustainability.

1.1.7. Fauna

Development of natural conditions at the territory of Slovakia was in the post glacial period mostly determined by climatic changes (Lozek, 1973). After the end of the ice age approximately 10000 years ago the climate began to warm up. This trend culminated in the period of Atlanticum (5000 - 8000 years ago), when the average temperatures were 3° C higher than today. After this climatic optimum the climate warms up and cools down inter-changeably which leads to strengthening of a continental character of the climate. During the Atlantic period forest vegetation spreads out together with typical Central European fauna of deciduous forests. 7000 years ago first signs of cultivated land appear.

From the zoogeographical point of view Slovakia belongs to Euro-Siberian part of Palaearctic region (Buchar, 1983). Most of the vertebrates belong to arboreal elements of European deciduous forests. These species survived the last ice age in the refuges of Mediterranean. Some species occurring in the original mountain coniferous forests of taiga type belong to boreal elements. A significant element that influences present composition of fauna in Slovakia are species of steppe origin, e.g. *Ablepharus kitaibelii, Acrida hungarica, Tibicina haematodes, Mantyspa styriaca, Mantis religiosa, Eresus niger, Carabus hungaricus, C scabriusculus* or birds *Otis tarda, Burrhinus oedicnemus*. Their penetration into this region was probably facilitated by deforestation of landscape and its alteration into cultural steppe.

Some of the Slovakian mountains are inhabited by original Western Carpathian species, such as molluscs *Cochlodina cerata, Chilostoma rossmaessleri, Ch. cingulellum, Chondrina tatrica, Sadleriana pannonica,* beetles *Nebria tatrica, Deltomerus tatricus* and *Duvalius bokori, Pitimys tatricus,* amphibians e g. *Triturus montadoni* Eastern Carpathian endemic species include e.g. *Nebria fusipes, Deltomerus carpathicus, Trichia bielzi, Carpathica calophana*

Our fauna is also rich in relict species which after the last ice age withdrew from this area to the north and managed to survive in small island-like refuges such as *Sorex alpinus, Sicista betulina, Microtus nivalis, Microtus oeconomus* Some of them evolved into endemic sub-species, such as marmot *Marmota marmota latirostris* and chamois *Rupicapra rupicapra tatrica* Some species occur in geographically large areas in Eurasia and North America, for example wolf *Canis lupus.* Only exceptionally the species, whose areas of distribution reach tropical zone occur in Slovakia, for example *Miniopterus schreibersii.*

For many species Slovakia is the easternmost boundary of their area of distribution. (molluscs *Arion intermedius, Arion rufus,* beetle *Platycleis albopunctatus* or westernmost boundary for species such as molluscs *Perforatella dibothrion,* and beetle *Platycleis grisea*

As a result of human influence many species have been introduced into this area. Some of them successfully adapted to the local conditions and developed stable population such as nonarctic cicada *Stictocephala disonia* At present 27 introduced vertebrate species occur in Slovakia, for example fallow deer *Dama dama,* mouflon *Ovis musimon,* rabbit *Orictolagus cunicullus and* muskrat *Ondatra zibeticus*

Tha fauna of Slovakia is very rich. There lives 525 original vertebrate species, from which 93 species are mammals (53 of them are in the Red list, 15 of them in E category, 37 in V category, 3 relict species, 7 acclimatised species and 6 allochtonous species), 352 bird species (219 in the Red list, 30 in E category, 32 in V category, 5 allochtonous species, 5 invasive species, 1 acclimatised species, 13 reptile species (4 in E category), 18 amphibian species (3 in E category, 15 in V category), 53 species of fish and 4 species of cyclostomates. From the huge number of evertebrates Slovakia is home for 246 species of molluscs, 68 dragonfly species, approximately 4 000 species of butterflies, 8 000 species of beetles, 800 species of spiders and 11 000 hymenopterans (Jedlièka, 1995, Šteffek, 1994).

1.2. Current activities in nature conservation

Jozef Kramárik, Peter Sabo, Peter Straka

1.2.1. Brief history of the activities in nature conservation in Slovakia

In Slovakia, nature conservation dates back to the 13th century, when Béla IV issued the king papers dealing with the duties of the Badín foresters (1250) as well as forbidding hunting and fishing in some Tatra submountain areas (1265). The nature conservation precautions were declared also by other governors· e.g. by Žigmund from Luxemburg (1417), Vladislav Jagelovský (1504), Maximilán II (1565), palatine František Wesselényi (1665), or count Mikuláš Draškovič (1672). The emperor Leopold I has pronounced through a king patent the first protected territory in Slovakia, the thermal water resources in Piešťany (1862). Especially significant was the edition of highly progressive Theresian Forest Order (1769. By the turn of the centuries several small protected areas have been declared, e.g. Jubilee forest at Kysihýbel' (1891), the stripe of the forest in the High Tatras (1893), nature reserves Ponická oak-wood (1895), Súl'ov rocks (1907), Badin and Dobroè primeval forests (1913). After establishment of the Czechoslovakia some larger protected areas were declared, e.g. karst areas Liptovský kras, Slovenský kras, Chočský kras, Beliansky and Javorinský kras, further Muránska planina plateau, Hnilecké vrchy hills, Plavecký a Smolenický kras karst, karst of the Veľká Fatra and Starohorské vrchy and other areas (Klinda, 1984).

The conceptual basis of nature conservation was laid by the Tatra National Park law (1948) and by the first Nature Conservation Law (1955), Concept of the establishment of the protected landscape areas in Slovakia (1964), Preventive nature conservation measure (1970-1975), further supported especially by the „Project of the development of protected areas till the year 2000" (1981) and Concept of the development of State nature Conservation till 2005, A shift to higher qualitative was performed by the elaboration of the concept of the Territorial Systems of Ecological Stability (TSES) and by the adoption of the new Nature and Landscape Conservation Act (1994), valid from January 1, 1995.

1.2.2. Current state of legislation for nature conservation in Slovakia

It is created by a large number of new laws dealing with the conservation of nature, landscape and individual components of the environment adopted after 1989 (the Environmental Law, the Agricultural Soil Fund Protection Law, the Air Protection Law, the Minerals Use and Protection Law, the Environmental Impact Assessment Law, Nature and Landscape Conservation Act) Many older laws have been renewed after 1989, (e g. about forestry, water management, hunting, building, regional planning). Significant is also a „green article" of the Constitution of the Slovak Republic, according to which, each citizen has a right for healthy environment as well as a duty to protect environment, nature and cultural heritage.

From the viewpoint of state policy, especially significant are also further documents The „Strategy, principles and priorities of the state environmental policy" were approved by the Parliament. This document defines 5 basic priorities of the state environmental policy, among which especially significant (from the viewpoint of ECONET) is the 5th one: „The preservation of biological diversity, protection and rational use of natural resources and optimisation of the spatial structure and use of the landscape". Other important document (this time issued by the Ministry for Soil Management) include „The principles of State forestry policy in Slovakia" and „Strategy and conception of the forestry development in Slovakia till 2000."

The key law for nature conservation is the new Nature and Landscape Conservation Act (the law 287/1994) Its advantage is the complex protection of nature and landscape. The whole territory of Slovakia is divided into 5 zones of different conservation level. The categories of the protected areas are defined according to IUCN criteria. The law includes the compensation for the property damages due to nature conservation precautions.

Nature and Landscape Conservation Act No. 287/1994 defines the following categories of landscape protection

- I. (lowest) degree - general protection applied for the whole territory of Slovakia,
- II degree - Protected Landscape Area, Protective Buffer Zone of National Park,
- III.degree - National Park, Protective Buffer Zone of Protected Area,
- IV.degree - Protected Area, Protective Buffer Zone of Nature Reserve, Protective Buffer zone of Natural Monument,
- V degree - Nature Reserve, National Nature Reserve, Natural Monument, National Natural Monument

A Protected Landscape Area by means of generally obligatory regulation issued by the Ministry for Environment can be declared a larger area, usually larger than 1000 ha, with scattered ecosystems, important for preservation of biological diversity and ecological stability, with characteristic appearance of the landscape or forms of historic settlement.

A National Park can be declared by means of a decree issued by the government. It refers to a larger area, usually larger than 1000 ha, mostly with ecosystems either not significantly changed by human activities or situated in a unique and original landscape structure, creating supraregional biocentres, and are a part of the most significant natural heritage, where nature protection interests have priority over other activities.

A Protected Area can be declared by the regional bureau for environment by means of generally obligatory regulation It refers to smaller areas usually smaller than 1 000 ha which mostly function as biocorridors, interaction elements or biocentres of local or regional significance

A Nature Reserve can be declared by the regional bureau for environment by means of generally obligatory regulation It refers to smaller areas usually smaller than 1 000 ha, which represent original, or by human activities only slightly affected ecosystems and biocentres.

A Natural Monument can be declared by the regional bureau for environment by means of generally obligatory regulation. It refers to point, linear or small area ecosystems, their parts or elements, usually smaller than 50 ha with scientific, ecological, aesthetic or landscape significance, mainly outcrops, rock structures, felsenmeers, canyons, parts of water courses, springs, lakes, swallow holes

A National Nature Reserve can be declared by the Ministry for Environment by means of generally obligatory regulation. It refers to a unique natural monument, which represents a supraregional biocentre as a part of the most significant natural heritage of the country.

A National Natural Monument can be declared by the Ministry for Environment by means of generally obligatory regulation It refers to a unique natural monument, which represents a part of the most significant natural heritage of the country.

The new nature and landscape protection act also defines the principal rights and duties in general protection of nature and landscapes, protection of protected plant and animal species, protected minerals and fossils, protection of wooden plants, forms of declaration, changes and abolishment of protected parts of nature, it also deals with the documentation of nature and landscape protection, access to the country, sanctions against violations and jurisdictions of authorities involved in nature protection

Slovak Republic ratified also six international treaties dealing with nature conservation:

1. Convention on Biological Diversity (from 1994),
2. Ramsar convention (from 1990) - treaty about wetlands of international significance,
3. Convention on international trade with endangered species (CITES from 1992),
4. Convention on protection of migrating wild animals (The Bonn Convention from 1994),
5. Convention on protection of European wildlife and natural habitats (The Berne Convention from 1994),
6. Convention Concerning the Protection of the World Cultural and Natural Heritage (from 1991).

1.3. Experience with the concepts analogical to ecological network

Jana Ruzièková, Jozef Šteffek

1.3.1. Trends towards development of ecological networks

In Slovakia, similarly as in other European countries, the influence of systematic scientific disciplines is more and more applied to nature conservation Approximately from the 1970s, the landscape-ecological research has been more intensively dealing with the questions of the landscape-ecological stability (further only „ecological stability"). The aim of this concept is to increase the nature potential of the landscape through reenforcing its self-regulating mechanisms, more efficient biodiversity conservation and definition of the particular areas potential for sustainable development Well-known product of this development is e g. a complex LANDEP methodology, recommended by the Agenda 21 (Ruzièka, Miklós, 1982).

Methodology of TSES was prepared by multidisciplinary team (Bucek, Lacina, 1993, Löw et al., 1984). In 1985 the Institute of Experimental Biology and Landscape Ecology of the Slovak Academy of Sciences prepared the Ecological Generel for the Slovak republic. In relation to the resolution of the Government of Slovak republic No 319/1992 in respect to the proposal of the Generel of supraregional territorial system of ecological stability and in relation to the law No. 50/1976 about regional planning and construction order, the document "Methodological instructions for preparation of the documentation for TSES" was elaborated (Ministry for Environment, 1993) and is continually being updated. Elaboration of the TSESs on national and regional levels has been already finished, local TSESs are planned to be finished by 2005

1.3.2 A brief introduction to the theory and philosophy of TSES

Territorial System of Ecological Stability (TSES) represents such a whole-spatial structure of mutually interconnected natural and seminatural ecosystems, their components and elements, which safeguards the diversity of the conditions and forms of life in the landscape and creates prerequisites for sustainable development The basis of this system is formed by biocentres, biocorridors and interaction elements of the supraregional, regional and local significance (Miklós, 1992, Šteffek, 1993, MŽP SR, 1993)

A biocentre represents an ecosystem or a group of ecosystems, which permanently provides conditions for reproduction, shelter and nourishment of the organisms and for preservation and natural development of their communities. The supraregional Territorial System of Ecological Stability (TSES) defines 87 biocentres of the national importance, covering 217,000 ha (5,4%) of the territory of Slovakia

A biocorridor is a spatially interconnected set of ecosystems, which connects biocentres and enables dispersal and migration of species, and the exchange of the genetic information of the living organisms and their communities, or to which are linked the interaction elements

Interaction elements are created by the ecosystems in the touch with the landscape expressively damaged or changed by man. Each interaction element is connected with the biocentres and biocorridors, which together with it support and safeguard the functioning of the ecostabilising mechanisms in the landscape

Urbanisation of an area causes fragmentation and isolation of biotopes. The result is intensified degeneration and extinction of individual species or populations, an irreversible loss of the natural resource together with its possible stabilising function in a landscape. Development of various types of nature ecosystems requires 20 to 350 year-long time span. For this reason the natural and close-to-nature ecosystems should be stabilised as a biological infrastructure to be respected during all kinds of landscape changes.

TSES in Slovak republic is based on the principle of creation of a whole spatial system of ecological stability and preservation of diversity of conditions and forms of life on the Earth. Ecological stability of landscape should be strengthened mainly where there are not ecologically stable elements i.e in a landscape strongly changed by humans.

The most strategic aspects of ecological stability preservation are following

- permanent preservation of production capabilities of landscape which is a basis for long-term satisfaction of societal needs,
- preservation of self-regulative mechanisms in ecosystems in order to decrease needs for supply of additional energy for maintenance of ecosystems in the state suitable for man,
- preservation of sufficient resistance, adaptive and compensation abilities of landscape against human interference,
- preservation of biodiversity, which is the necessary condition for practical utilisation of gene pool, which may have a permanent economic importance for man,
- preservation of ecological stability, biodiversity and gene pool that has unambiguously irreplaceable role in functioning of a variety of ecosystems.

According to the latest understanding, the TSES functions as a tool for determination of dynamic landscape management aimed to preserve, sustain or create stability of a landscape system (Šteffek et al., 1992). Evaluation of a landscape in the framework of TSES presents a holistic and systematic approach which understands a landscape as a dynamic system, and in its evaluation process proceeds from the general evaluation through the syntheses and numerous interpretations of its properties to the final evaluation of the system. TSES deals with evaluation of all kinds of landscape components (abiotic, biotic and socio-economic)

1.3.3. Supraregional TSES of Slovak republic

A part of the state policy to improve the current state of environment in Slovakia was an approval of the Concept of Territorial Systems of Ecological Stability. Elaboration of the Generel of the Supraregional TSES of Slovak Republic (GSTSES) also resulted from this and was approved by the Slovak government (decree No. 319, 1992). The aim of the GSTSES was to delineate the areas the role of which is first of all to secure development of ecologi-cally stable communities adequately to the diversity of ecological conditions in Slovakia.

Proposal of biocentres was mainly based on the following criteria (L o w at al., 1984, Húsenicová et al., 1991):

- criterion of diversity of potential and real ecosystems,
- measure of natural systems preservation,
- criterion of the current state of nature and landscape,
- criterion of necessarily essential spatial and time parameters and spatial connections
- societal restrictions and intents,
- spatial framework of the selection was created by means of selected sosiecoregions as a biogeographical criterion.

Supraregional TSES presents a spatial arrangement of ecologically significant and well preserved natural areas, providing an important document for the strategy of protection of ecological stability, biodiversity and the gene pool of the Slovak republic (Slovak Commission for the Environment, 1992). It consists of 87 biocentres, out of which 77 are biocentres of supraregional significance, 9 provincial biocentres and 1 biospheric biocentre. In many cases these are parts of ecologically significant units and areas, national parks and protected landscape areas and therefore represent qualitatively their most valuable parts.

The total area of supraregional, provincial and biospherical biocentres in the territory of Slovakia is about 2, 700 km^2, which is about 5 5% of the total area of Slovak republic Total area of the core areas, i.e. the most valuable parts of selected biocentres is about 740 km^2 (1.5% of the total area of Slovakia Network of the supraregional biocentres is supplemented by 2,700 km of biocorridors. Concept of the TSES has a legislative support in the Nature Conservation Act No 287/1994, Regional planning and construction law No. 50/1976.

Correspondence of TSES to ECONET

The notions used in the theory of TSES are similar to the concepts used in the theory of ecological networks· the notion „biocentre" responds roughly to the „core area" (a core area is usually larger), the notion „biocorridor" responds approximatelly to the „ecological corridor", The main differences are based on the criteria applied for the selection of ecological network elements. In case of ECONET they reflect wider European viewpoint, while in case of TSES they are based on minimal spatial sizes enabling the functionality of the network. The ECONET structure is more robust, reflecting the necessity to support better core areas as well as various categories of ecological corridors. It should be noted, however, that the notion „interaction element" is rather different from the notion of „nature deve-lopment area". Interaction element is useful especially on local ECONET level, while nature development area (NDA) should comprise more functions and may effectively support ECONET on both European and national level (see the map of the NECONET of Slovakia).

2. Concept of the European and national ecological network

2.1. Concept of the European Ecological Network - EECONET

Peter Sabo, Peter Straka, Jozef Šteffek, Peter Veen

2.1.1. International background of EECONET - the Maastricht conference

The European Ecological Network (EECONET) started to be developed on the initiative of Holland, IEEP - Institute for European Environment Policy, which elaborated the concept of ecological network in 1991. This concept expressed an idea of a unifying and dynamic protection of the individual species of the organisms together with their environment It is based on identification of the most significant ecosystems as "core areas" and orientates the conservation measures on maintenance and strengthening of natural processes, on which these ecosystems depend. It includes protection of "ecological corridors", enabling migration and dispersion of the individual species of organisms. The ecological network concept includes, moreover, "nature development areas" particularly significant from the point of view of functionality of ecological network and of its individual subsystems (Bennett, 1991)

The idea of the European Ecological Network (EECONET) recommends to include into it also legislatively so far non-protected areas, significant for EECONET dynamics. It requires also the protection of ecological corridors, understood as corridors of European, national and lower significance. It emphasizes the importance of the interconnection of scattered, fragmented biotopes and ecosystems in economically utilized, markedly changed and/or damaged landscape EECONET can play an important role also in the alleviation of the consequences of global warming, during which many species will be endangered, if they will not have new habitats and routes to the space of suitable climatic conditions.

The creation of the European Ecological Network is concentrated today on two levels:

a. EECONET - European Ecological Network represents a network of core areas and other important elements from the point of view of biologic and ecosystem diversity on the level of European continent, and links to the systems selected on all its levels and zones.

b. NECONET - National Ecological Network represents a network of important core areas and other important elements on national level, in specific cases on the multinational one.

In Maastricht, the international conference "Towards a European Ecological Network by protection of natural heritage" was held in 1993, defining EECONET as an effective pan-European framework for a more effective nature conservation in Europe. EECONET concept became an integral component of the prepared European biodiversity conservation strategy.

The main strategic aims of biodiversity conservation were declared by Maastricht conference conclusions as follows (Bennet, 1994):

a. protection and recovery of all key-ecosystems and all important species supporting biologic and landscape diversity of European significance,

b. management of the areas with high nature value (includinmg biodiversity) by professional managers or by means of extensive agriculture and sustainable forestry and fishery,

c. recovery of the natural processes with minimal interference of human activities in a sufficiently large number of areas of sufficient size all over the Europe,

d. enhancing the quality of the countryside as a whole, including the coastal regions to preserve the conditions for all the ecosystems and for all the species of organisms,

e. acceptance of the principle of sustainability as the main principle for adoption of decisions and planning of actions,

f. strengthening of the wide public support for nature protection and for increasing the biologic and landscape diversity of the countryside,

g. contribution to sustainable living of all European nations.

EECONET presents a framework of cooperation in the effective conservation of areas of high biodiversity, which are of European significance and in strengthening of the ecologic relations between them It supports existing international systems of territorial conservation and enables building of a coherent European ecological network, including core areas representing all types of habitats. This network will support effective ways of conservation of vulnerable species and ecosystems, conservation of frontier areas of a high natural value, conservation of identified migration routes, as well as definition of proper and relevant priorities in case of species and ecosystem conservation. A result has to be also the transition of the emphasis of the nature conservation policy from species to habitats, from sites to ecosystems, and from national to international measures (Bennett, 1991)

On the national and international level, the ecological network was proposed so far in Holland and Spain Similar concepts were applied in Slovak republic and Czech republic, not yet, however, including more widely accepted pan-European criteria

2.1.2. Basic concept of EECONET - the Dutch experience

In 1990 the Dutch government and parliament accepted the National strategy of nature conservation - Nature Policy Plan - NPP, the essential component of which was the EECONET. The idea of the Dutch ECONET arose in 1987, and its elaboration took 4 years. The priorities of the choice of target species were based on their international significance (e.g. inclusion in the IUCN list or West-Palearctic species at least 1/4 of which nests in Holland), negative trend - a marked retreat of species on the national scale (50% retreat of the numbers since World War II, the 25% retreat of bird-species), rarity - from the national point of view (their distribution on less than 1/4 of the area, in a bird species less than 12,500 nesting pairs). In the list of the target species the following taxonomic groups were included. lower and higher plants, mammals. birds, reptiles, amphibians, fishes, butterflies, dragonflies and others, representing together about 700 species (Hoogeveen, 1994).

Criteria for the selection of core areas (Bennett, 1991):

a The core areas represent in the respective range typical habitats, characterizing every biogeographic zone.

b. They are characterized by natural ecologic processes (protection of the regions with substantial representation of the original ecosystems).

c They are characterized by a high degree of biodiversity (conservation of the areas marked by a great genetic, species and ecosystem diversity).

d They are characterized by occurrence of many endemic or critically endangered species (conservation of endemic, endangered, rare, and retreating species).

e. They are particularly significant for migration or dispersal of species (both on national and European scale).

In addition also the criterion of minimal size of the core area of international and national significance was applied, set to 500 ha (in case of a forest 1000 ha). However, in case of particularly significant or unique areas even smaller areas were included Also other functions of the core areas were taken into consideration - e.g the support of the agriculture. forestry, fishery and their synergic influence on the value of the area (Bennett, 1991, Lammers, 1994).

Criteria for the selection of ecological corridors (Opschor, 1993)

a. the size of the core areas to be connected,
b. the distance to other equivalent types of habitats,
c. the character of the corridor, its size and presence of the barriers,
d. the strength of the anthropic pressure on the corridor (urbanisation, agriculture, etc.),
e. the degree of the corridor degradation,
f. in case of need the considerations about possible consequences of the global warming.

Ecological corridors were proposed especially with consideration to the species about which the necessary data were available (such as e g. the trout, otter, badger, deer) and also the Rhine and Mase river systems were chosen as EECONET elements (Lammers, 1994).

Criteria of the selection of nature development areas (areas of revitalisation):

a. ecological significance, necessity to build a corridor,
b potential vegetation structure in a new corridor,
c existence of reserve corridors,
d developmental pressure on the newly created corridor (Van Dijk, 1993).

As the areas with the highest potential for rehabilitation were shown the wetlands, followed by forests, zones of shrubs and deserted agricultural areas In addition, the perspective areas of revitalisation (nature development elements) were grass growths poor in nutrients, marshes and woodlands (Bruggink, 1994). ECONET also stimulated the plans of rehabilitation of habitats of the endangered species (Van Genne, 1994).

2.1.3. Basic principles of Central European ECONET adopted in Štefanová

There are various expert vies concerning design of the EECONET or NECONET. To safeguard the Central European coordination, In September 1994, in the Štefanová village in Slovakia, a small IUCN seminar was held, at which the following supplementary common basic criteria for the selection of the Central European ECONET elements were adopted

A. The basic assumptions for selecting the components of the Ecological Networks are.
   1. the work with biogeographical units should be realised on the level of subprovince,
   2. networks should be functioning entities for the long-term survival of natural communities, including dispersion and migration of species,
   3. networks should be as much as possible coherent with the existing protected areas,
   4. the design of networks may be based on different scales, however the scales 1:1,000,000 or 1:500,000 are recommended for the final Pan-European and national scale.

B. The selected core area is considered to include the following features.

1. being a representative of a certain biogeographical subprovince, and/or being of a unique importance from the Pan-European viewpoint,
2. consisting of natural and/or seminatural ecosystems and/or man-made natural ecosystems,
3. having a high significance (level) of biodiversity and/or supporting the survival of threatened species,
4. having a certain minimal area (recommended 500 ha on the European level) and the spatial position functioning for the survival of native species or communities,
5. functioning as a source for the potential distribution of native species over a larger surrounding area.

C. The selected ecological corridor is considered to include the following features·

1. enabling the dispersion of species to suboptimal habitats in the surroundings of the core areas and nature development areas,
2. providing a route (by connecting core areas and nature development areas) for migration and dispersion of species on the European scale,
3. providing a dwelling habitat for species as an extension of the core areas.

D. The selected nature development area is considered to include the features

1. areas to be selected for proper nature management,
2. areas requiring restoration of the natural values needed for sustainability of the network,
3. areas having perspective and capacity to enlarge the size of the core areas, e.g. by using spots with a high diversity in abiotic conditions, which can be preserved in a long term,
4. situated on important migration routes of native species on the European level

In spite of the efforts to adopt the common criteria of the Central European ECONET, their common interpretation in practice proved to be difficult, especially due to a different level of the naturalist inventories in the individual states and the influence of their landscape ecological schools. In the Slovak proposal, as the key values are applied the nature conser-vation values of the West Carpathians as a whole, which markedly influence the landscape ecological conditions in the neighbouring regions of Hungary, Czech republic and Poland

2.2. Concept of the National Ecological Network of Slovakia - NECONET

Milan Koreò, Jozef Šteffek, Peter Sabo, Peter Straka, Jana Ruzièková

2.2.1. Understanding and the aims of NECONET in Slovakia

We understand the notion *"ecological network"* as a system of mutually interconnected nature elements, which serve as reserves of richness and diversity of life, enabling natural flows of organisms, energy and mineral elements, directing the process of their dispersal and migration and functioning as ecostabilising factors of the landscape. One of the basic land-scape-ecological characteristics of the ecological network is its complexity, including the density, continuity and interconnectedness of the individual components. Simpler networks create in the country mashes of various sizes and various quality of their components.

The strategic aims of the National ECONET (NECONET) design and management·

1. To safeguard more effective conservation of biodiversity in Slovakia - especially on the level of species and ecosystems.
2. To increase the ecostabilizing efficiency of nature elements, which will improve the quality of nature environment and improve the landscape productivity.

Apart from these two main aims we follow also the original EECONET aims defined at the Maastricht and at the IUCN coordination meetings (Bennett, 1994, IUCN,1994). From the viewpoint of systems theory we understand ECONET to be an abstract notion defined on the landscape system (geoecosystem) We understand by this a system of nature and socio-economic phenomena, which is bounded to the earth surface and has *chorical, synergical and chronological aspects* Chorical aspect is obvious. More difficult is the perception of two other aspects, which leads to the disharmony between (often) mechanically understood ECONET elements and real dynamics of the landscape system Thus, a mutual connection between real space and time, in which ECONET has to function, has a great significance.

2.2.2. Basic theoretical theses of the Slovak NECONET design

In the design of Slovakian NECONET, the terminology was used in the sense of the international conventions and in the sense of the valid national legislature (e g the new Nature and Landscape Conservation Act no 287/1994) In addition to the use of the above mentioned sources, some of the terms were slightly enlarged, as follows:

Diversity and ecostabilizing efficiency

Enlarging biodiversity definition

Besides the classical definition (WRI, IUCN, UNEP, 1992), we express it also as a richness and diversity of the spatial arrangement of the concrete plant and animal taxa and their communities in the landscape. Biodiversity depends especially on diversity of nature ecological factors, i.e. on ecodiversity. In current landscape structure we derive biodiversity from the progressive successions of the ecosystems, directed towards a climax. As this spatial arrangement significantly influences the ecological stability of the landscape (through diverse geoecological relations) we consider the application of this principle very important during ECONET design.

Geoecodiversity.

as one of the ways of expressing heterogenity and mosaic structure of the landscape matrix, with emphasis on its functional aspect. By this concept we understand the number, extent and spatial order (equitability) of landscape components Its significance is based on the assumption that the higher is the number of natural and nature elements and the higher is their extent, the higher will be the stability of the country. This is based on the assumption that the landscape system can be stabile only when there are sufficiently diverse ecological relations, able to replace each other (compare Jurko,1990).

To distinguish anthropic influences on geoecodiversity, the decisive notion is *"carrying capacity of the area"*. It responds to such a kind, way and scale of the anthropic activity, which decreases neither ecological stability, nor landscape functional potential.

Ecostabilizing efficiency:

ECONET is an open system. One of the expected results of its functionality is *ecostabilizing efficiency*, i e the ability of the ECONET elements to preserve and renew permanently the conditions of their own existence and to influence positively more or less desertified and degraded, ecologically less stable environment. It is the measure of the manifestation of ecological stability and equitability of all the

ECONET elements From the viewpoint of system theory, this denotes the ability of these elements to create and control negative feedbacks (compare to Odum, 1977, Míchal, 1992).

Ecological stability of the landscape

is not just a simple sum of the stabilities of the individual ECONET elements, but depends also on their purposeful spatial arrangement. Decisive requirement in the ECONET design is to preserve the stability of the landscape as a whole (compare Míchal, 1992) It is difficult to measure the degree of the ecological stability. It is often derived from the degree of denaturation of the landscape, as its reversed value. The ecological stability of the ECONET can be judged according to its succession maturity (we assume that the climax communities have usually the most stabile homeostatic balance).

Functional structure of the ECONET

Basic functions of the ECONET are

to safeguard maximal biodiversity, to provide ecological stability and to support productivity of the landscape. ECONET has a complex functional structure, expressible in a simple form in the scheme 1.

Central in the ECONET concept is the notion „ecosystem", which we narrow here to „natural" and „nature ecosystems" and identify it with the notion „natural" or „nature geobio-coenosis". Biocenoses and their abiotic environments are regarded as subsystems of the ecosystems The interrelations between them are denoted as topical (vertical) relations.

ECONET elements

In relation to biodiversity, *core areas* have predominantly preservation (conservation) function, while *ecological corridors* have predominantly dispersal and migration function. The decisive criterion of their functionality is the real state of their nature ecosystems. Specific group of the ECONET elements is represented by *"nature development areas"*, which complete and support imperfect or suboptimal parts of the main ECONET elements (core areas, ecological corridors), and which complete and strengthen the ecological network as a whole. At the same time the state of their ecosystems is not optimal and without proper "nature development" they may cause "faults" in ECONET funcionality.

Core areas

Core areas (CAs) represent the set of the keystone, ecologically stabile nature ecosystems of the territory, usually in the nodes of the ecological network. In the literature these nodes are described as „crossroads", emerging, at the contact of several landscape components, with simultaneous occurrence of various kinds of food for animals, denoted as „reserves", „biota refuges" or „gates", functioning as significant check-points of the flow of organisms. The flows are regulated by nodes, many of which serve more as propagators than final targets. Through movement regulation the flow could be speeded up, slowed down, or a temporary supply could be formed in the nodes (Forman et Godron, 1993)

Apart from the typical core areas with three or more relations (ecological corridors) we can find also other kinds: conjunctive - with two related links (ecological corridors), final - with one related link and island - without direct continuous relation to other ECONET elements.

Terrestrial island core areas have also character of refuges with ecologically clear sharped ecosystem types (e g. structure of subalpine, alpine and subnival ecosystems, peat bogs, etc.) As a rule, in natural CAs of this kind occur stenovalent, often endemic, or relict species. ***Water island core areas*** are characterized by natural or man created water reservoirs. For the transmigrating bird species they serve as temporary places of rest and sources of food In this respect they can be considered to be ECONET propagational nodes.

Mc Arthur et Wilson (1967) distinguish areas where certain population settles, successfully growths and reproduces (contrary to the places of rest) - and call them "take-off platforms" for further expansion of the species We have to stress that this character of the core areas prevails in the national ECONET of Slovakia.

According to the nature conservation value we distinguish the core areas

1. *Typical* - prevailingly with the typical (characteristic) types of ecosystems representing a certain biogeographic region.

2. *Unique* - prevailingly with rare, especially preserved types of ecosystems representing a certain region or with extraordinary high biodiversity

General criteria for the selection of core areas into the National ECONET of Slovakia·

Reflecting basic, generally accepted criteria of the selection and design of ECONET elements (Bennett, 1991, Bennett, 1994, IUCN, 1994), we have enlarged them as follows:

1. Nature conservation value, which includes·
   - preservation (originality) of the ecosystems,
   - rarity of the original, eventually secondary ecosystems and species,
   - degree of the biodiversity, i e. the diversity and richness of the biotic elements,
   - endangerment of the ecosystems and species.
2. Representativeness of the structures of the original ecosystems.
3. Equitability (spatial order) in the current landscape structure.
4. Possibility of the practical implementation into ECONET.

Ecological corridors

The "ecological network" concept leads to the imagination of "core areas" links through "ecological corridors" (ECs) However, nature knows exceptions Typical examples of the CAs, not interconnected through terrestrial ECs are e.g an oasis in the desert or an island in the ocean Even these are not absolutely isolated from other parts of the biosphere, but are connected through "aerial migration routes" (see e.g MacArthur et Wilson, 1967).

The migration routes represent special kind of the ecological corridors (ECs), due to these reasons· 1) Migrations are connected with specific - cyclic and two-directional move-ment of organisms (animals) during various seasons of the year. 2) Migration routes cannot be usually precisely limited in the space, we mostly determine direction of the migration.

Ecological corridor is a multifunctional notion. Apart from a cyclic movement of animals (in case of migration routes) it serves as a „channel" for one-directional dispersal (diffusion) of various taxonomic groups of organisms, from the places of their higher concentrations, to the places of their lower concentrations In case of plants, ECs enable especially dispersal to long distances. Apart from this, ECs serve also as channels for the flow of mineral nutrients

Differentiation of ecological corridors According to the prevailing habitats we differentiate *terrestrial* and *hydrical* ecological corridors According to the position in ECONET we can further distinguish *conjunctive* (linking at least two core areas of the same hierarchical level) and *blind* ECs (not finished by the core area of the same hierarchical level on both sides, or not finished by the core area on one side at all, but important from the viewpoint of functionality of lower level ECONET). According to the connectedness we can distinguish *continuous* and *discontinuous* ECs. (Discontinnuous ECs are based on stepping stones, and serve for interrupted movement or movement by leaps) According to the topography we can distinguish *distributional*, *valley* and *transversal* ecological corridors. According to the corridor width and consequent composition of communities, we can distinguish *line, belt* and *water flow* ecological corridors.

The ECs are selected according to the general conditions of the functionality of the landscape. In this frame ecological corridors function as channels of three kinds of flows - energy, mineral nutrients and organisms (regardless of the fact that in relation to the other kinds of flows they function as semipermeable membranes) Ecological corridors are mostly not determined for the particular plant or animal species, although their design is based on the known terrestrial, water and aerial dispersal and migration routes.

For the selection of the ECs into National ECONET of Slovakia essential was

1. existence of the optimal conditions for temporal survival of organisms,
2. possibility of dispersal and migration of organisms along ecological corridors and through the optimal biotopes into environment,
3. possibility of the practical implementation into ECONET (compare IUCN, 1994).

Nature development areas:

Areas, where it is necessary to strengthen the nature component - for the ECONET functionality - are called nature development areas (NDAs).

According to the expected primary function of the NDAs we distinguish:

1. NDAs with primary protective (conservation) function, isolated remnants of original or secondary ecosystems, or their structures, significant for biodiversity conservation (e.g. NDAs with a potential to become CAs or supporting ECs).
2. NDAs eliminating the direct anthropic disturbances of the ECONET elements (e.g NDAs surrounding CAs or ECs threatened by these disturbances).
3. NDAs determined for the revitalization (NDAs in the landscape with the overall absence of the original communities), which may lead to the defective functionality of ECONET, unless these NDAs are revitalised.

Hierarchical structure of ECONET

ECONET is a hierarchical system Its elements can be ordered into several hierarchies - according to the encapsy principle The distinctive level is substantial for the definition of an ECONET element (if the level of distinction increases, the elements of preceding level can become a system and vice-versa). During European ECONET design, we work mostly on the small scale category level covering the hierarchies of European (supranational) and national level Our working scale for the partial synthetic maps and for the final ECONET was 1:500000 However, also lower levels (regional and local) are very important

ECONET is a territorial system and thus, the hierarchy of ECONET elements should reflect their territorial significance This implies „pouring" of the priorities of the higher hierarchical levels into lower levels According to the work of Lôwe et Moryadas (1975 ex. Forman et Godron, 1993) the flow of organisms reflects this, i e. hierarchical dispersal

The hierarchy principle in the ECONET design is important also for the ecological corridors. On a higher hierarchical level, ECs may be represented by a system of appropriately ordered islands (refuges) linking biota gene pool resources. These islands can be formed by CAs of the middle hierarchical level. Similarly, ECs of the middle hierarchical level (regional ECONET) may be represented by the CAs of the lower hierarchical level (local ECONET - see scheme 2 on page). From the hierarchy of ECONET elements we can derive the requirements of nature conservation, eventually the ways and forms of the land use.

ECONET and the existing territorial system of nature conservation

Current territorial system of nature conservation (TSNC) is a partial subsystem of ECONET. Its aim is to preserve especially the „network of rare ecosystems". It is based on the principles of the differentiated nature conservation, the preservation function being the primary one So called "network of protected areas" can be considered (with a certain simplification) to be a backbone of the existing ECONET network.

Basis of this protected network is represented by 5 national parks and 16 protected landscape ares, covering 17.5% of the territory of Slovakia. Apart from these, 899 small scale protected areas covering 102,452 ha, and 7 Ramsar localities have been declared till December 31, 1994 Also 4 Biosphere reserves have been declared in Slovakia.

The linking focal point between the existing territorial system of nature conservation and ECONET is the *"nature conservation value"* of species, communities, habitats or generally of parts of nature. We understand by it.

1. in relation to species: its rarity and endangerment,
2. in relation to community or other terrestrially linked group of biota its position from the viewpoint of preservation (originality) and biodiversity.

The basic differentiating factor between current TSNC and ECONET is the term "ecological corridor". Its concept shifts previous "conservative" nature conservation to a higher conceptual level, which comprises principles of landscape ecology.

2.2.3. Working procedure in the design of the NECONET of Slovakia

The design of the National ECONET (N-ECONET) of the Slovak Republic was elaborated by the combined inductive-deductive working procedure

1. Inductive approach was based on the evaluation of the individual parts (biogeographical units) and is aimed at the evaluation of the whole territory of

Slovakia. The basic analytical material is represented by the inventory of the nature-conservation values of the biota in Slovakia (distribution of species in the whole territory and especially in the potential CAs of the National ECONET).

2. Deductive approach was based on the evaluation of the whole (territory of Slovakia) and is directed to the evaluation of its parts (biogeographical units) The basic analytical material is represented by the summary cartographic documents about the nature of Slovakia. Apart from biota it evaluates also abiotic conditions.

This evaluation was done according to two time horizons, corresponding to potential (reconstructed) landscape structure (not influenced by man - derived from biota) and to present landscape structure (changed by man). The basic working procedure in both approaches was the same and consisted of three phases

1. the accumulation and elaboration of input information,
2. the analysis of input information,
3. the development of partial syntheses.

The outputs of the partial syntheses were processed in the final synthesis of the NECONET proposal. During development of the maps in both levels (partial and final), statistical methods were used, especially cluster analysis and the overlay map analysis, utilizing the Graphical Information System (GIS) Digitization of the input documents and their consequent processing enabled to gain new and detailed information about the distribution of the individual biotic elements, and/or about synthetic nature units (see scheme 3).

3. Input information: Specific features of the biogeographical division and reflection of the supraregional TSES

3.1. Specific biogeographical features influencing ECONET design

Jana Ruzieková, Jozef Šteffek, Dušan Matis

The territory of Slovakia is situated on the contact of the two principal Central European provinces: Pannonian biogeographical province (province of steppes) and Province of Central European deciduous forests (Maøan, 1958, 1965, Èepelák in Mazúr et al , 1982, Buchar, 1983). The northern boundary of the Pannonian province which crosses southern Slovakia is characterised by the presence of steppe and forest-steppe xerothermophilous plant and animal species. This area is the northernmost part of the biogeographical distribution e.g of *Acer tataricum, Quercus cerris, Cotinus coggygria, Pulsatilla hungarica* (from the plant species), *Saga pedo, Acrida hungarica, Emys orbicularis, Emberizia cia* (from the animal species), etc. In the boundary zone of the Pannonian biogeographical province species of the Central European geoelement meet species of the Pontic and Submediter-ranian geoelement and penetrate into suitable biotopes of southern slope expositions in the neighbouring mountains approximately to the elevation of 750 m above see level

The major part of Slovakia, however, belongs to the biogeographical province of Central European deciduous forests, which spreads from the central part of France to the eastern edges of the Carpathians. Here is situated a major part of the West Carpathian biogeographical subprovince which extends as far as eastern Moravia and southern Poland. Besides the diverse spectrum of the typical central European species a very important feature is the presence of the West Carpathian endemic species e g *Daphne arbuscula, Cyclamen fatrense, Pulsatilla slavica, Delphinium oxysepalum* (from the plant species), *Pitimys tatricus, Belgrandiella slovenica, Chondrina tatrica,* etc. (from the animal species) The northern part of Eastern Slovakia (the Bukovské and Vihorlatské vrchy Mts) already belongs to the East Carpathian biogeographical subprovince, with several endemic species e.g. *Aconitum lasiocarpum, Viola dacica, Ranunculus carpathicus.* The Carpathians determine the western boundary of distribution for several species e.g. *Scopolia carniolica, Helleborus purpures-cens, Telekia speciosa* and other species (Bucek in Húsenicová et al., 1992).

3.1.1. Phytogeography of Slovakia in relation to ECONET

Jana Ruzièková, Štefan Maglocký

High terrain diversity is responsible for differences in elevational and expositional climate reflected in the climate-vegetation gradients. Biocenoses in Slovakia can be divided into 10 vegetation degrees. With the exception of Mediterranean biota and biota of the nival degree, all kinds of vegetation degrees typical for the European continent developed here. In the south of Slovakia a continuous 1st oak wood degree can be found, characterised by the dominant presence of thermophilous species with fragments of steppes and forest-steppes. The broad alluviums of rivers have rather different composition of species, and are characterised by a wide spectrum of swamp forest types, wetlands and periodical lakes. Unique, but for the Pannonian province typical are communities of saline steppes.

Biocenoses of the 2nd beech-oak and 3rd oak-beech degree cover continuously hilly-countries and mountains of lower elevations. In this zone the thermophilous species fade away and species of deciduous forests gain dominance. These species dominate in the 4th beech vegetation degree, where beech is considerably dominant, especially in Eastern Slovakia In the 5th fir-beech degree, which is mainly located in elevations above 700 m a.s.l. submountain and mountain species become present. In some mountain ranges with high elevations there are very well developed biocenological series of the 6th spruce-fir-oak degree, 7th spruce degree and 8th dwarf pine degree. These series are in higher elevations followed by subalpine and alpine degrees, in the High Tatras also the subnival degree is developed (Buèek in Húsenicová, Ruzièková et al , 1992).

The flora of Slovakia is related to the two hierarchically higher units· the Central European and Pontic-South-Siberian regions. From the species that have their centre of distribution in the Central European region, the following should be mentioned: *Atropa bella-donna*, *Carex umbrosa*, *Carpinus betulus*, *Colchicum autumnale, Festuca psammophila*, *Galium sylvaticum*, *Genista germanica*, *Luzula luzuloides*, *Corydalis cava*, *Pulsatilla pratensis*, *Quercus petraea*, *Ranunculus lanuginosus, Spergularia echinosperma* Besides these Central European species, also the species with larger areas of distribution can be found here, e.g. *Actaea spicata*, *Alnus glutinosa*, *Asarum europaeum*, *Corylus avellana*, *Fraxinus excelsior*, *Hepatica triloba*, *Stellaria holostea*, *Lathyrus vernus*, *Tithymalus cyparissias, Cynosurus cristatus* Elements of the Pontic-South-Siberian region have found very good conditions for thermophytics, a climatic phenomenon characterised by dry summers and cold winters >From the species of this region should be mentioned e.g. *Aster amellus*, *Cotoneaster niger*, *Cerasus fruticosa*, *Crambe tataria*, *Iris pumila*, *Linaria genistifolia*, *Salvia nemorosa*

From the Central European region the centre of species distribution in Slovakia is in the Carpathian subregion within its Northwest Carpathian subprovince. This is a Slovakian speci-f city, since other phytogeographical units have their centre of distribution outside of the Slovak territory and penetrate here only with their marginal parts. The Northwest Carpathian province according to Meusel et al (1965) or the region of the Western Carpathian flora according to Futák (1972) is characterised by mountain and high-mountain flora In this case this is not a continuous distribution of the mentioned elements, but mosaic-like alternation of ecotopes depending mainly on the terrain configuration and elevation. Unlike Meusel et al (1965), Futák (1972) divides this area unit in a greater detail into 5 lower level units - districts 1) district of the Subcarpathian flora, 2) d of the high Carpathians, 3) d of the inner Carpathian basins, 4) d of the west Beskid Mts. flora and 5) d. of the east Beskid Mts flora A number of significant species can be found here, especially in the high Carpathians.

Into the territory of eastern and south-eastern Slovakia some of the East Carpathian species penetrate and diversify Slovak flora. Some of them, that occur only in these areas, are not Eastern Carpathian endemic species They also occur in the Balkan peninsula, others in the Alps, or they may have even larger area of distribution.

The region that falls into the Area of Pannonian flora includes the lowlands and hilly-countries of southern Slovakia This area is characterised by presence of the thermophilous elements (xerothermophilous species) that penetrate here from the southern regions, i e from Hungary, or Balkan peninsula The area is characterised by presence of distinct ecotopes such as saline soils, sands and wetlands along the Danube river and downstream sections of the Slovak major rivers.

Futák (1972) characterised the relationships between the Slovak flora and the flora of neighbouring countries. Some species (e.g. *Rhododendron*) do not reach the territory of Slovakia, since the major part of Slovakia falls into the area of the West Carpathian flora. For example, *Alnus viridis, Arnica montana* and some other species are absent in Slovakia, but, they occur in the Eastern Carpathians, the Alps and south Bohemia.

In respect to the Polish flora, we can conclude that more than 300 Slovak taxa do not naturally grow in Poland. On the other hand, in Poland we can find some species abundant in the Eastern Carpathians plus some other continental species that spread along the northern side of the Carpathian bend, but do not reach the territory of Slovakia. Thermophilous elements with their high abundance in the south occur more rarely in Slovakia than, for example, in Hungary. With respect to the geographical position accompanied by the lowland character of the landscape Hungary lacks mountain species In comparison to the Czech republic, their flora does not include some of the species that are common in Slovakia, but the Slovak flora, on the other hand, misses some of the species of the Subatlantic, Boreal-Subatlantic and Alpine distribution. Some of the species occurring in Slovakia can be also found in the Jeseníky, Krkonoše, and Šumava Mts. A comparison of the Carpathian and Alpine flora suggests similar conclusion like comparison of the Slovak flora with the flora of neighbouring countries. Some of the species are common for both mountain systems, some other are specific only for one of these areas

Thus, the territory of Slovakia can be considered a significant intersection of different elements of flora. Thanks to its position in the centre of Europe and specific conditions of its environment, despite the small area, 40 endemic species tied to the territory of Slovakia can be found here. Some of these taxa are classified as species, for example *Campanula xylocarpa*, *Cerastium tatrae*, *Cochlearia tatrae*, *Cyclamen fatrense*, *Daphne arbuscula*, *Delphinium oxysepalum*, *Dianthus nitidus*, *Euphrasia exaristata*, *E. stipitata*, *Festuca tatrae*, *Hesperis slovaca*, *Knautia slovaca*, *Koeleria tristis*, *Onosma tornense*, *Papaver tatricum*, *Poa granitica*, *Pulsatilla slavica*, *P. subslavica*, *Saxifraga wahlenbergii*, *Soldanella carpatica*, *Thlaspi jankae* and *Trisetum ciliare*.

In relation to the European Ecological Network the forest ecosystems, with presence of the beech, play a significant role From the point of view of the primary stability of landscape they are considered to be the most significant, since the beech within its areal of distribution is an extremely resistant species and creates a basis for the stability of forest ecosystems At present, the beech comprises 28% of all forest stands and is the most common tree species in the Slovakian forests. Thus, it is a part of the Slovak cultural heritage with a significance for optimal functioning of the forests (Švec in Húseničová, Ruzièková et al , 1992).

The cornerstones of ecological stability in the territory of Slovakia, with direct impact on stability of European significance, are created by the core mountains of Slovakia and their forest ecosystems, which can be documented by presence of distinct flora and fauna. Even though Slovakia is one of the countries with the highest diversity, many of these species are critically endangered. Critically endangered and rare taxa from the perspective of nature conservation can be divided into two groups 1) Taxa with secured territorial protection in individual types of protected areas 2) Taxa without any kind of territorial protection

Territorial protection is secured for the major part of original, endemic and relict plant gene pool. In the future the territorial form of protection should complexly cover the floristic richness in Slovakia It requires to complete the network of protected areas, the implementation of legislation, since at present the territorial protection system does not prevent the destruction and threatening of the species directly in the protected areas

3.1.2. Zoogeography of Slovakia in relation to Econet

Jozef Šteffek, Dušan Matis

Development of natural conditions in the territory of Slovakia was determined mainly by climate changes after the last ice age approximately 10,000 years ago (Lozek, 1973). Gradual warming of the atmosphere culminated 5,000 to 8,000 years ago (Atlanticum) and led to development of continuous forests. This period was characterised by development of typical deciduous forest communities. In this period human activities started to change the landscape At first the drier localities in lowlands were settled, later the humans penetrated into submountain and mountain areas. This was the beginning of deforestation in this region.

From zoogeographical point of view Slovakia belongs to Euro-Siberian part of Palaearctic region (Buchar, 1983). Most of the animals living in Slovakia belong to arboreal elements of European deciduous forests. Only a small part of animals belongs to boreal elements, for example *Sicista betulina*, molluscs *Vertigo alpestris, V. substriata, Discus ruderatus.* A significant element, which influences the composition of today's fauna is extending aridisation. Beginning in the subboreal period thermophilous species penetrate into this region and spread across the deforested landscape to the north, e g. molluscs *Cecilioides acicula, Helicella obvia,* insects *Acrida hungarica*, *Saga pedo* or *Mantis religiosa*.

Species such as *Ablepharus kitaibelii*, *Lacerta muralis*, *L viridis* and *Emys orbicularis*, that occurred here also during the warm interglacial periods, penetrated to this territory after the end of the last ice age again, and during the period of Atlanticum stayed preserved in the xerotherm islands in the south of Slovakia During the interglacial periods a number of endemic species developed, which still are components of present fauna. These are the species of some of the West Carpathian ranges, for example molluscs *Cochlodina cerata, Chilostoma cingulellum, Ch. rossmaessleri, Chondrina tatrica, Spelaeodiscus tatricus,* beetles *Gaurotes excelens, Nebria tatrica, Deltomerus tatricus, Duvalius bokori*, chamois *Rupicapra rupicapra tatrica* or marmot *Marmota marmota latirostris.*

Also after the last ice age in some regions of the West Carpathians new species such as *Alopia bielzi clathrata*, *Cochlodina fimbriata remota*, *Clausilia dubia ingenua*, *Candidula soosiana*, *Sadleriana pannonica* developed. Not only fauna, but also flora is diversified by some species, which reach margins of their areas of distribution in this region, for example *Pagodulina pagodula*, *Abida secale*, *Trichia filicina* From among plant species we can mention for example *Saxifraga mutata* at Salatín

Also some East Carpathian endemic species reach the territory of Slovakia, for example molluscs *Trichia bielzi, Carpathica calophana*, polypede *Leptoiulus baconyensis* *stuzicensis*, beetles *Stenus obscuripes, Nebria fuscipes* and *Deltomerus carpathicus* (Škapec et al , 1992) With the beginning of Holocene warming some species withdrew to the north and stayed in this territory in the highest elevations only in the form of glacial relicts. These species lived here in higher abundance during the Wurm period, for example *Vertigo modesta, Columella columella gredleri*

Central position of Slovakia in Europe has a great significance also for the migration of species in the north-south direction, but also in the east-west-east direction. It can be evidenced by the five bird trans-European migration routes and bat migration routes that cross this territory. Recently, resettlement of the east and south mountain ranges of Central Europe by large mammals such as the wolf *(Canis lupus)*, bear (*Ursus arctos*), lynx (*Lynx lynx*), which survived in the northern and eastern regions of Slovakia and Ukraine, has taken place

Slovakia belongs to the Central European countries with the highest biodiversity. However, many biotopes of the mentioned animal species were destroyed. Thus, many of them are endangered and some of them disappeared from this area forever. The actual red lists of threatened plant and animal species include almost a half of the known species

Therefore, the central part of the West Carpathians created by the greater Tatra-Fatra Mts. complex should be declared a biosphere reserve of the world significance. The region of Slovakia, in the European context, has a high significance with respect to the long migration distances of animals. Large mammals enter the territory from the north and east (especially the wolves), and proceed to the west and south (all the species) and also to Poland (bears). This direction is also kept by all autochtonous deer species (with exception of the chamois).

In the past, there very likely existed a migration route of big animals situated between Carpathians and Alps, and a migration route from Balkan (or even from the Caucasus via Balkan) to the Danubian lowland and Carpathians (Hell in Húsenicová et al., 1992). The importance of Slovakia also increases after the evaluation of migration routes of different bird species. Besides the main migration route along the Danube river, some other migration routes lead along the Váh river and through Eastern Slovakia. For example, gees and some other bird species stopover at the Danube river on their migration route through the Tisa lowland We should also mention flocks of ravens from north-east Europe that come to winter in the southern parts of Slovakia.

3.2. Implementation of the Supraregional Territorial System of Ecological Stability (SR-TSES)

Jana Ruzièková

3.2.1. Possibilities of implementation of SR-TSES in ECONET

The network of 87 delineated supraregional biocentres includes all important types of ecosystems in Slovakia. Besides dominating forest communities (oak woods, beech woods, spruce woods, dwarf pine growths and floodplain forests) it also includes sufficiently large samples of non-forest ecosystems (steppes, forest steppes, saline steppes, wetlands and water communities). Series of supraregional biocentres also include samples of natural as well as man changed communities of subalpine meadows above the timberline.

The core areas of supraregional biocentres created by natural communities should be at least 10 to 50 ha large, and the total area should not be smaller than 1 000 ha with dominance of close-to-nature ecosystems Core areas of the provincial biocentres should be larger than 1 000 ha, and the total area of a biocentre should be larger than 10 000 ha.

The core area of a biosphere biocentre should be larger than 10 000 ha

The spatial criteria for biosphere biocentre were met in the Belianske Tatry Mts (in SR-TSES design), where natural forest and high-mountain geobiocenoses are protected on the area of 13 500 ha This fact can be evidenced by the complete spectrum of plant species from the 5th to 9th degree, and also by all typical animal species, including large vertebrates (e g *Ursus arctos, Lynx lynx, Rupicapra rupicapra, Canis lupus, Aquilla chrysaetos*) The network of provincial biocentres includes samples of almost all habitat types, characteristic for biogeographical provinces and subprovinces in the territory of Slovakia.

In the Pannonian biogeographical province there are two provincial biocentres: the Burda Mt. and Zádielská dolina - Turniansky hradný vrch in the transition zone between the Pannonian and Carpathian province in the Slovak karst. Provincial biocentre Èabrai in Krupinská vrchovina Mts. is an evidence of penetration of thermophilous biota from the Pannonian region into the region of deciduous forests of the West Carpathian ranges

In the West Carpathian biogeographical province the provincial biocentres contain samples of almost all principal types of geobiocenoses, all of the vegetation degrees present here, as well as trophical and hydrological conditions. The West Carpathian biota is repre-sented in provincial biocentres Krivánska Fatra with core areas NNR Suchý - Klaèianska Magura, Pol'ana with core area NNR Pol'ana nad Detvou, Slovenský raj with core areas NNR Kysel', Prielom Hornádu, Sokol, Piecky, Vernárska tiesòava Liptovské kopy with core areas NNR Tichá dolina, Kôprová dolina. Balocké vrchy with core areas NNR Dobroèský prales a Klenovský Vepor. Muránska planina with core areas e.g. NNR Fabova hol'a, Vel'ká a Malá Stozka. The East Carpathian biota is represented in the provincial biocentre Poloniny with core areas NNR Stuzica - Riaba skala. Besides these provincial biocentres, also the provincial biocentre Malý Polom situated on the borderline between Moravia and Slovakia was selected. This biocentre represents geobiocenoses of the 5th and 6th vegetation degree of the West Carpathians flysh zone.

The selected supraregional biocentres can be connected to the system of supraregional biocorridors. On the basis of the type of their communities they were divided into corridors of mountain, mesophilous, thermophilous, aquatic and floodplain biota (Atlas of Environment and Public Health of CSFR, 1992). Supraregional biocorridors usually continue in the territory of Poland and Hungary. An important link in their connection to Austria is Devínska Kobyla Mt. and the river Danube, where there lies a corridor of floodplain and aquatic biota. This biocorridor leads farther to the limestone hills on the Austrian side of border. Noteworthy in respect to connection of western part of Slovakia with Moravia is the fact that the biocorridor of mountain and mesophilous biota lying on the Slovak-Moravian border is continuous with only a few, very short interruptions. This main West-Carpathian biocorridor has branches of other supraregional biocorridors, that enable westward penetration of species.

Significance of Slovakia on the European level from the gene pool conservation point of view can be documented by the fact that many different species spread out from this region. Regular migrations, even creation of new populations west from the territory of Slovakia, mainly in Moravia takes place here, for example of *Corvus corax, Lynx lynx, Ursus arctos, Felix silvestris and Canis lupus.* The number of species reaches even farther westerly. Similarly, some species migrate from the territory of Slovakia to the south. However, the directions of supraregional biocorridors should be understand as temporary. Their precise delineation can be determined on the basis of current landscape structure in the areas close to the national border and after delineation of supraregional biocentres at the territories of other countries.

Development of the European and National Ecological Networks takes place on two different levels On this fact also the criterion of minimal and optimal area parameters is based. A major part of Slovakia (2/3 of the total area) maintained relatively well preserved natural landscape Biocentres and biocorridors of biospheric and provincial significance will represent the most valuable component of the core areas of European significance. Most of the biocentres of supraregional significance will be used as a basis for the NECONET.

Biocentres of supraregional significance proposed to be incorporated in the ecological network (national and European level) are listed in the subchapters 3.2 2. and 3.2.3 of the original Slovak text

4. Input information and partial syntheses: data about the distribution of plant and animal species

Inductive approach is based on the evaluation of the individual biota components (flora and fauna), and, from the evaluation of the individual geographical areas proceeds to the evaluation of the whole territory of Slovakia.

4.1. Specification of the criteria for the core areas selection

Jozef Šteffek

According to general criteria for the selection of the European core areas and ecological corridors defined in the Dutch national ECONET (Bennett, 1991), by the Maastricht Conference (Bennett, 1994), and recommended by the experts from central European countries at the meeting at Štefanová (IUCN, 1994), and according to criteria discussed with the experts on zoology, botany, geography and ecology, we have adopted for the inductive approach the following criteria for the selection of the core area, ecological corridor and nature development area into the national ecological network (NECONET):

1. Criteria to determine predominantly a degree of originality and gene pool significance .
2. Criteria to determine later the state of the ecological stability of a particular territory.

Criteria to determine predominantly a degree of originality and gene pool significance:

1. Representativeness (typical area representing certain biogeographical unit).
2. Originality (area with relatively well preserved nature ecosystems)
3. Biodiversity (area with the occurrence of the flora and fauna species, significant from the gene pool point of view - relicts, endangered species).
4 Position (area enabling potential dispersal of species into surroundings - gene pool tanks).
5 Size (the core areas on the pan-European level should have at least 500 ha) (Bennett, 1994, IUCN, 1994).

Selection of the core areas into the EECONET is based also on other assumptions

a Unique areas within the biogeographical units on the level of subprovinces.
b. Areas of sustainable development, with conditions of functioning communities, including functioning migrations.
c. Areas with a possibility to provide legislative protection

These criteria has been enlarged and completed by engaged Slovak experts as follows:

1. Representativeness in Slovakia

 Representativeness of the Western-Carpathians

 Large part of the selected territories should safeguard protection of the representative original geobiocenoses, which prevail in the Carpathian subsystem. Many of these areas are already included into the network of the protected areas However, this network should be re-evaluated and completed by lacking types of geobiocenoses, representing specific character of the Western-Carpathians.

Representativenes of the sub-Mediterranean

As the influence of the sub-Mediterranean reaches its northern frontier in our territory, we are reflecting it in the frame of the ecological corridors The same can be said about the influence of the Pannonian region, the centre of which is on the territory of Hungary and thus we expect that representative core area of this type should be selected just on the territory of this state.

Representativeness of the prae-Carpathicum (from the viewpoint of zoogeography)

The species of this area represent important component of our biota, they are represented especially by small hilly islands in Southern Slovakia (e.g Devínska Kobyla, Zemplínske vrchy).

2. Originality of the habitat·

This represents the most important criterion for the selection of areas into NECONET - those plant and animal communities which are the closest to the potential natural ones should be included into NECONET. To this criterion relates also the degree of the ecological stability, ecostabilizing efficiency of the vegetation and of the present landscape structure.

3. Significance from the point of view of biodiversity

Basic classification of the observed species:

It is necessary to respect territories with the highest occurrence of the species significant from the gene pool point of view (endemites, relicts, stenovalent species, important indicators, keystone species) - and species, which are retreating or near extinction However, as this is a long-term task, here we concentrate on the species of the selected groups of flora and fauna and the selected types of threatened habitats. For this aim we have selected groups of species, the distribution of which was elaborated in detail, including preparation of 184 distribution maps.

Degree of the threats to gene pool

The primary task was to elaborate the evidence of those species of plants and animals, which are endangered at this time, based on the assumption that the inclusion of the localities of their occurrence into ECONET will safeguard their further survival Many of these are *"bioindicator species"* indicating by their presence certain important properties of the environment which they live in, e.g.·

1. relict species - indicating originality and preservation of the habitats,
2. endemic species - significant from the biogeographical viewpoint as their occurrence is bound to the territories with a distinctive development,
3. stenovalent forest and wetland species - sensitive to anthropic influences and currently retreating due to human activities,
4 synanthropic and segetal species - pointing to the secondary character of habitats

4 Significance from the point of view of the position in the landscape:

This criterion concerns especially nature development areas, to which we can include many ecological corridors However, selection criterion is not understood in one way:

1. The designation of ecological corridors is based on the migration routes of birds and large animals. However, especially in the second case, this is a venator effect of the doubtful gene pool (from the point of view of originality).
2. The designation of ecological corridors is based on the ecological conditions, which are necessary for the functioning of ecosystems. These are based on slowly moving species, with relatively high bioindicative evidence (e g plants, some groups of invertebrates).

5. Size:

The last criterion was the recommended size of the core area of the European importance - this area should have at least 500 ha.

Criteria to determine later the state of the ecological stability of a particular territory.

1. Ecostabilizing efficiency of the present landscape structure (PLS).

   This is based on the analysis of the land use, with the decisive role of the size of the areas and the diversity of the landscape elements. Changes in the land use indicate harmony or disharmony (lowered ecological stability) between land use and ecological conditions This way of classification can be completed by the evaluation of the ecostabilizing influence of the vegetation. Working map of the PLS has been elaborated by Ing. Klára Janèurová and by Ing Peter Janèura according to the State geographical map in the scale 1:500 000 (1995).

2. Size of the selected area.

   The size of the selected area should safeguard the permanent existence and development of the whole set of plants and animals by protecting their trophic chains However, to determine size parameters definitely would mean a disrespect for certain part of biota. This size will be different in large lowlands, different in narrow basins Nevertheless, we will assign to individual levels of ECONET (EECONET, NECONET) those elements, the size parameters of which will enable their description in a given map scale.

Basic criteria for the selection of ecological corridors into EECONET

1. the originally defined European criteria for EECONET (Bennett, 1994),
2. the basic criteria for Central European space, adopted by the experts from the individual Central European countries in Štefanová (see part 2.1. - IUCN, 1994),
3. the criteria reflecting time-space factors, - the influence of the Western-Carpathians, sub-Mediterranean (pannonian region, pontic region, ...) and Prae-Carpathicum. Further, the influence of the Eastern-Carpathians, Beskids, Alps and sub-Atlantic influence.

The way, in which the species from the individual biogeographic regions disperse, at the same time expresses also the direction of their penetration outside their original territory. West-Carpathian species enrich the biota of the countries surrounding Slovakia (Bohemia and Moravia, Poland, Hungary, Ukraine and Austria). We talk about emigration and these species are called *emigrants* The species, which penetrate into our territory (imigrate) from these surrounding states are *immigrants* (from the Eastern-Carpathians, Beskids, sub-Atlantic, Pannonian region, from Alps, from the Mediterranean and sub-Mediterranean ...). Both ways of penetration are limited by the origin in a particular centre. All the species, characterizing these centres are expressive indicators and their areal is limited Another group is composed of the species, which are widely distributed throughout the world, or in

Europe, have high vagility and move in various directions This way of dispersal (penetration) can be called permigration and these species are called *permigrants*

Other factors, which influence the distribution of the organisms include geological substrate, soil conditions, geomorphology and relief, hydrological conditions (micro-watersheds), climatic factors. Specific case of organisms dispersal is their *dispersal in the uncontinuous corridor, e g by leaps, introductions* (see part 2.2.) There are proofs about isolated occurrence of the species in the geographically distant areas, where they can get through air taken by animals, etc (e.g. alpine species *Saxifraga mutata* on the Salatín in Nízke Tatry, further isolated occurrence of the *Alopia clathrata* in Zádieslká valley, when the whole genus *Alopia* can be found only in Southern Romania, similarly isolated is the occurrence of the species *Cochlodina fimbriata remota* on Vtáènik, where it can get from the Alps.

Different view is necessary for the designation of the long-term fixed migration routes (e g. migration routes of birds) or for the evaluation of the dispersal of the species in the Holocene. Current possibilities of dispersal and migration of species are conditioned by the present landscape structure with the significant role of the barrier effect of the anthropogenic structures. The first factors can be called historical, while the second ones are present factors, with historical background, but clearly visible today. Their causes are in the anthropic pressures on the landscape structure change, but also in the on-going process of global warming

(Scheme 4 in the subchapter 4.1. of the original Slovak text presents simplified diagram of the inductive approach to NECONET design.)

4.2. Analysis and processing of data about species distribution

Jozef Šteffek, Štefan Maglocký, Rudolf Šoltés, Anna Lackovièová and Michal Ambros, Rudolf Amrein, Stanislav David, Pavel Deván, Viera Feráková, Peter Gajdoš, Izabela Háberová, Milan Janík, Katarina Janovicová, Ján Kliment, Anton Krištín, Anna Kubinská, Ján Kulfan, Zuzana Kyselová, Eva Lisická, Oto Majzlan, Helena Oťahelová, Vojtech Peciar, Jana Ruzièková, Karol Sloboda Vladimír Slobodník, Vladimír Smetana, Andrej Štollman, Marcel Uhrin, Peter Urban

The primary task was to process the evidence of the threatened plants and animals (many of them are important bioindicators). Concerning mapping of species distribution, we concentrated on lichens (Lichenes), bryophytes (Bryophyta), vascular plants (Pteridophyta, Spermatophyta), molluscs (Mollusca), spiders (Aranea), butterflies (Lepidoptera), damselflies (Odonata), some groups of hymnopterous insects (Hymenoptera), from the vertebrates on amphibians (Amphibia), reptiles (Reptilia), birds (Aves) and mammals (Mammalia).

Plant and animal species were selected according to the Red list of Ferns and Flowering Plants (Pteridophyta and Spermatophyta) of the flora of Slovakia (Maglocký, Feráková, 1993) and according to several ecosozological lists of various groups of animals (Šteffek, 1994), (Krištín, 1994). The distribution maps of 184 species were digitized for the purposes of further syntheses (maps overlay) by Karol Sloboda. Apart from specific bioindicator species, these maps include also many important *"keystone species"* affecting many other organisms in the ecosystems (T.Miller, 1994) From vertebrates these include e g. top predators (large mammals and the birds of prey), from invertebrates e g. important pollinators, spiders, etc.

The definition of the endangerment of the species was based on the categories of endangerment according to IUCN We have applied the IUCN criteria used at the time of project elaboration (Only in November 1994 new categories of the degree of endangerment of the taxons for the Red lists were approved - Kadleèík, 1996).

Extinct (Ex): Species not confirmed for a longer time after a repeated research of their typical localities and other known or possible localities

Endangered (E): Species in a danger of extinction, the survival of which is improbable if the conditions endangering them do not change. It includes species, the numbers of which are reduced to a critical limit, or the biotopes so drastically reduced that they are considered immediately endagered by extinction.

Vulnerable (V): The species which in the near future will enter the category of the extinct if the causal factor will continue to influence them. Included are the species of which majority or the whole population are reduced owing to an excessive exploitation, extensive destruc-tion of the biotopes or other damage of the nature environement Species with populations severely damaged, the existence of which is not safeguarded and species with populations so far numerous, but under a serious influence of dangerous factors in the whole areal.

Rare (R): The species with small populations, not yet in the categories Endangered and Vulnerable, but under a risk. These species are usually localized in geographically limited areas or biotopes, or are thinly scattered in a larger area.

Indeterminate (I): The species known to belong to one of the categories mentioned, but not definitely classified due to a lack of information

4.2.1. Distribution of the plants in the territory of Slovakia - lower plants

Rudolf Šoltés, Anna Lackovièová, Anna Kubinská, Zuzana Kyselová, Eva Lisická, Vojtech Peciar, Katarína Janovicová

Distribution of lichens in the territory of Slovakia:

The lichen flora in the territory of Slovakia, dependent especially on the climatic conditions, geologic structure and purity of the environment, is relatively varied. According to the published studies (the first one from 1791), in Slovakia 1492 species were found, growing on trees, shrubs, processed as well as plain wood, on rocks, rock fissures, on concrete, ground, mosses and plant remains, etc. Unfortunately, during the recent decades, anthropic influences, especially high concentrations of imissions in the atmosphere, caused a retreat, even extinction of tens of sensitive lichen species. Direct and indirect destruction of the substrates and the development of tourism eliminated many further taxons even at places where they theoretically have the best conditions for their development. Therefore, we suppose that at present time in Slovakia there is a maximum of a thousand of lichen species.

According to the most recent findings (Pišút, Lackovièová, 1995a), in Slovakia 39% of lichens are endangered to a higher or lesser degree, representing 580 species. Of them 112 taxons (7.5%) are included in the category of the extinct or missing, 124 endangered, 233 vulnerable, 100 rare, and 11 lichens have indefinite values of endangerment. On the basis of the present state, it is not possible to denote some lichens as endemics (the species evaluated as endemics may have been only omitted). As the subcarpathian element two species could be evaluated: *Belonia herculana* and *Ramalina carpatica.*

The nomenclature of the lichens is indicated according to the study of PIŠÚT et al. (1993). To characterize the lichen flora in the specific areas, we have selected especially the species included in the Red list of lichens of Slovakia (Pišút, 1993a) and the regional red lists of Kyselová et al. (1994) and/or Lisická (1995).

Distribution of bryophytes in the territory of Slovakia:

In Slovakia at present 891 species of bryophytes *(Bryophyta)* are in evidence, of which 229 species of liverworts (*Hepaticopsida)*, 2 species of hornworts *(Anthoceropsida)* and 680 species of mosses *(Muscopsida)*, of which 540 species included in the red list. This means that in Slovakia cca 4.4% of the Earth riches of this group of plants are represented.

The Slovak endemics of the bryophytes create a small group consisting of the three species: *Brachythecium vanekii, Pterygoneurum kozlowii* and *Ochyraea tatrensis* Another important group of the bryoflora of Slovakia is represented by glacial relicts, as are *Hygrohypnum polare, Cinclidium arcticum, Cinclidium stygium, Helodium blandowii, Brachythecium glaciale, Tortula norvegica, Dicranum groenlandicum, Conostomum tetragonum, Tomenthy-pnum nitens, Drepanocladus lycopodioides, Pseudobryum cinclidioides, Paludella squarrosa, Bryum neodamense, Scorpidium scorpioides, Meesia triquetra, Barbula johansenii*

According to the category of the endangerment of the gene pool of bryophytes we can distinguish extinct (Ex) - 35 species, endangered (E) - 52 species, vulnerable (V) - 66 species, rare (R) - 186 species and indetermined (I) - 201 species. The most significant activities threatening gene pool of bryophytes are the recultivation works on wetlands, ploughing the salt marshes, abandoned land and pastures, meliorations of peat-bogs and swamps, extraction of substrates, urban interventions, liquidation of thatched roofs, walls and fences, liquidation of non-forest growth, logging in the forests, limitation of the pasturing in the mountain meadows and consequent reduction of the habitats of the coprophilous species, chemization of agriculture, acidification of the air in the town and industrial aglomerations, atmospheric acidic depositions and other imissions, pollution of water streams, etc.

List of the distribution of the selected target species of bryophytes is in the subchapter 4.2.1. of the original Slovak text The data about distribution of the bryophytes are included in the description of the individual core areas of the European and national significance. The list of the bryophyte species is composed according to the nomenclature of Kubinská et al. (1993), category of the endangerment of the bryophyte gene pool is according to Kubinská, Janovicová, Peciar (1995). Category of the endangerment of the bryophyte gene pool for the phytogeographic district Tatry (Tatras) is according to regional red list (Kyselová et al., 1994). The original Slovak text in the subchapter 4 3. includes also the maps (in reduced size) of the distribution of selected 11 species of lichens and 8 species of bryophytes. In determining the category of endangerment we have used the categorization according to IUCN.

4.2.2. Distribution of the plants in the territory of Slovakia - vascular plants

Štefan Maglocký, Jana Ruzièková, Rudolf Amrein

Selection of the higher plants for network mapping of their actual distribution was done in such a way, that through the species, which have a high capability to express by their phenomenality the property of the areal, it was possible to present data about the European, central-European, Carpathian and West-Carpathian distribution.

a. The ecological relations of species to their habitats should reflect original, relatively well preserved habitats,
b. The selected species should represent ecological groups from the most threatened habitats, i e. wetlands, habitats of salty soils, inland sand dunes, meadows, saline meadows and peat-bogs, forests, mountains and high mountains habitats,
c Their set of outer characteristics and qualities should represent regeneration capability in the negative processes of lowering and disturbing biodiversity,
d The bioindicative capability of the species from the Orchideaceae family should be used.

Through their presence the selected species of higher plants confirm the nature complexes of the core areas of the NECONET. At this place we also present (in the

Slovak text) the maps of the distribution of the selected 30 species of higher plants (presented in reduced size - maps in the original scale are available at the IUCN foundation, Slovakia).

4.2.3. Distribution of the animals in the territory of Slovakia

Jozef Šteffek a Michal Ambros, Stanislav David, Pavol Deván, Peter Gajdoš, Milan Janík, Anton Krištín, Ján Kulfan, Oto Majzlan, Vladimír Slobodník, Vladimír Smetana, Andrej Štollman, Peter Urban, Marcel Uhrin

In Slovakia red lists of a number of fauna groups were elaborated, of which some were used in our project for biodiversity evaluation. We mention briefly proportion of the species according to the individual IUCN categories

- Molluscs (Mollusca) - 246 species, of which EX-4, E-24, V-10, R-15, I-9. 78 species included in the red list (Šteffek, 1994a).
- Spiders (Araneae) - 879 species (Czech Republic-826 sp , Poland-675 sp., GB-619 sp.), of which EX-21, E-80, V-135, R-127, I-16. 379 species included in the red list, representing 43% of the whole arachnofauna of Slovakia (Gajdoš, Svatoò, 1994).
- Plecopterans (Plecoptera) - 98 species, of which EX-4, E-6, V-5, R-9, 10 Carpathian endemics (Krno, 1994).
- Dragonflies (Odonata) - 69 species, of which 47 (66%) included in the red list of dragonflies of Slovakia. EX-8, E-9, V-7, R-6, I-13 (David, 1994).
- Moths and Butterflies (Lepidoptera) - E-25, V-49, R-9, I-12, K-7 (K-insufficiently known), - Zygaenoidea, Rhopalocera, (Kulfan, 1995).
- Fishes (Pisces) - 58 original species including lampreys, E-6, V-9, R-6,I-9 (Holèík, 1994)
- Amphibians (Amphibia) - 21 taxons recorded in Slovakia. All of them (100%) included in the red list. E-7, V-11, R-3 (In· Jedlièka (ed.), 1995).
- Reptiles (Reptilia) - 20 taxons recorded in Slovakia, all of them (100%) included in the red list. E- 4, V-7, R-9 taxons (In: Jedlièka (ed.), 1995).
- Birds (Aves) - In Slovakia 352 species of birds living in the wild were recorded by March 1, 1995 In the categories EX - 2 (0.6%), E-30 (8.5%), V-32 (9.1%), R-40 (11.3%), I-19 (5.4%), Im-96 (27.2%). The most threatened groups are the birds of prey and owls, so-called steppe species (e.g *Otis tarda, Burhinus oedicnemus*), Coraciformes, water fowl and some stenoecious species of the song birds (*Lanius* spp., *Monticola* spp.) (In Jedlièka (ed), 1995).
- Mammals (Mammalia) - 85 species recorded in Slovakia, 55 species (64 7%) included in the red list. EX-2, E-12, V-19, R-5, I-17 species (In. Jedlièka (ed), 1995).

The most important activities threatening the gene pool of the animals include:

a. degradation and liquidation of nature habitats by large-scale agriculture, drying out of the marshlands, improper forestry practices (e g. clear-cuts), construction of large water-works, urbanization, building of industrial works and motorways, regulation of waterways,
b. influence of imissions and application of chemicals (mainly in agriculture) resulting in foreign substances in the environment (pesticides, heavy metals, imissions),
c. intensive large-scale agriculture and mechanization, intensive pasturing,
d. eutrophication and pollution of water, meliorations and other hydrologic changes,
e. loss of continuity of areals caused by construction of buildings, road networks and communications networks (e g. collisions with electricity grids),
f. direct influence of transport (collisions with the vehicles, noise),
g hunting, fishing and poaching, losses of animals on the migration routes,
h collection for commercial purposes, threatening of hibernation sites and other direct

liquidation of animals by man (e.g also by burning of the grass),

i. certain kinds of sports and recreation (threatening mainly mountain species), disturbance of threatened species habitats (by tourism, photographying, etc.),

j threatening of the hibernation sites and direct liquidation by man,

k. climate changes.

4.3. Inductive approach - partial syntheses

Jozef Šteffek, Jana Ruzièková, Karol Sloboda a kol

Slovakia mountains, especially West Carpathians, divide Central Europe into the southern and the northern part, thus dividing also areals of the distribution of thermophilous species from the areals of the distribution of northern species Also division between northern seaboards and the Black Sea is running through the northern frontier of Slovakia

Relatively well preserved forest ecosystems with strong height differentiation of the area create in the territory of Slovakia groups of biotopes, unique from the European point of view. Communities of the original European and Carpathian flora and fauna have been formed here (Matis, 1990). >From the viewpoint of the anthropogenic changes of biocenoses and their internal ecological stability, areas with relatively very little (eventually little) changed biocenoses with middle, high or very high ecological stability prevail in Slovakia.

The number of gene pool important species or communities was the main criterion for the choice of the core areas The background material was provided by the knowledge of the experts participating, as well as from the studies of the specialists on different flora and fauna groups. The number of the species in the individual categories, according to the geomorpho-logic entities served as a basis for the evaluation of the territory of Slovakia from the point of view of the real occurrence of rare, endemic and endangered species.

The final synthetic proposal:

The proposal of the core areas to be included into the NECONET Slovakia consisted of the recommendations of the experts for the individual flora and fauna group as well as the digitized data on the distribution of the 184 mapped species. The synthetic maps were obtained by overlaying of the individual distribution maps The interpretation was performed by means of five selected criteria - representativeness, originality of the biotope, significance for the biodiversity, degree of endangerment, size of the area The resulting group of the areas was created as the representative segments of biodiversity and geoecodiversity.

Evaluation:

The selection of an area to be included into the set of core areas, ecological corridors or nature development areas was based in the inductive approach on subjective evaluations of a given area by the experts involved (dozens of them participated in this process). By applying the above-mentioned criteria the first proposal of the Slovakia NECONET core areas was prepared It has been enlarged, precised and supplemented by the confrontation of the results of the partial analyses of both inductive as well as the deductive approach (the latter one is more detailedly described in the following chapter). For the illustration of partial syntheses of the inductive approach, we present in subchapter 4.3. synthetic maps of the species distribution according to the individual groups.

Note: For the inductive approach syntheses were used also geologic maps (by Peter Straka), map of the present landscape structure (by Klára Janèurová and Peter Janèura), and maps of distribution of important gene pool species (by the individual experts responsible for the respective group). The processing of the maps of the selected plant species was coordinated by Rudolf Šoltés (lower plants) and Štefan Maglocký (higher plants). The processing of the maps of distribution of the selected animal species was coordinated by Jozef Šteffek The distribution maps were digitized and the synthetic composite maps were realized by Ing. Karol Sloboda in cooperation with RNDr. Jozef Šteffek.

5. Input information and partial syntheses - Deductive approach

5.1. Analysis and processing of input map information

Milan Koren sr , Milan Koren jr

As already mentioned, in the deductive approach the input information were excerpted from the existing, especially relatively rich carthographic materials about the individual nature elements as well as synthetic materials about the natural environment of Slovakia. All the digitized maps were produced in the final scale 1:500,000, eventually 1:1,000,000, even in cases when it was necessary to digitize more detailed material (e g. geobotanical map in the scale 1 200,000 - in this case generalization has taken place after digitization).

5.1.1. Information about abiotic environment

Soil map (digitized by IUCN), 1:500,000

It was digitized on the basis of the *Soil map of Slovakia 1:400,000 (Hraško,J et al , 1994)* This map depicts the soil cover by means of specific and repeated configurations of its components - structure types of the soil-cover forming the map units. This enables to clarify the internal structure of the soil cover and the connections between the soils and soil-forming substrates, altitude, inclination, relief, water, elements of climate and biocomplex.

Map of geomorphologic entities (digitized by IUCN), 1: 500,000

This was created by digitization of the *Map of regional-geomorphologic entities of Slovakia 1:500,000 (Mazúr, E. et Lukniš, M., 1980)* The geomorphological entities are depict-ed in this map as unrepeatable individuals This is an individual classification, which is not limited by the traditional orographic viewpoints, but emanates from much broader geo-morphologic basis, with a complex understanding of a georelief.

5.1.2. Information about the original plant communities distribution

Geobotanic map (digitized by IUCN), 1:500,000

It was set-up by digitization of the *Geobotanic map of ÈSSR, 1:200,000, Slovak Socialist Republic (Michalko, J. et al , 1986),* which is actually a vegetation-reconstruction map of climax plant communities. In this sense, current reconstructed vegetation is an imaginary picture of the vegetation covering the territory of Slovakia in accordance with the abiotic environment, if there had not been any anthropic influences during the historic times. The Zurich-Montpellier system was used for plant communities classification The entities earmarked represent the types of structures of the original plant communities of Slovakia on the level of the above scale In our approach we consider this material essential

5.1.3. Biogeographical underlying materials

Map of phytogeographic division of Slovakia, 1:1,000,000 (Futák, J. 1980)

This map depicts categories of territorial division in relation to flora distribution. The boundaries of phytogeographic regions and of the lower entities were marked in accordance with the boundaries of the selected geomorphologic entities. We used differentiation into three basic regions of the Pannonian flora, of the West-Carpathian flora and of the East-Carpathian flora These regions were further differentatied into smaller entities in the process of the selection of core areas, ecological corridors and nature development areas.

Map of the fauna regions of Slovakia, 1: 1,000,000 (Èepelák, J., 1980)

This map depicts categories of territorial division in relation to fauna distribution and is based on the results of many authors

5.1.4. Information about the geoecological types distribution:

Geoecological map (map of nature landscape types) 1:500,000 (Mazúr et al., 1980)

This map represents a synthetizing cartographic picture about the nature landscape. It summarizes the quality of six nature elements: geological substrate, georelief, climate, water, soil and vegetation. The aim is to provide the basic spatial information about the type of "permanent abiotic conditions" which can be used for characterizing the ecological stability of the landscape. The scale of the map allowed to classify nature landscape types on four taxonomic levels, from the macroregional types with the area of ten thousands of square km to the types with the area of several square km. As basic criteria during typological differentiation of the relief have been used interaction relations, physiognomic (morphologic) features, structure, genesis and development trends in the country.

5.1.5. Information about the current landscape structure:

Map of the current landscape structure of Slovakia (digitized by IUCN) 1: 500,000

It was constructed by digitization of the *Basic map of Slovakia 1:500,000 (Bureau of Geodesy, Cartography and Cadaster of SR, Bratislava 1980)* and improved according to current situation It represents the topographic situation of Slovakia with basic landscape elements (forests, agricultural land, water flows and water bodies, large settlements, road and railway networks) This is the underlying material for the assessment of the current land use and the real possibility of the NECONET design Huge industrial areals, urban agglorne-rations and transit structures are featured here as barrier elements, impairing biota migration.

Map of current landscape types 1: 500,000, (Mazúr, E. et al., 1980)

The map represents the current landscape types changed by anthropic activities, i e. cultural landscape. As the basic differentiation characteristic, intensity of the anthropic intervention into the natural landscape was used. This map was utilised for determination of so called localization criteria of the ECONET proposal

5.1.6. Information about protected parts of nature:

Map of projected nature conservation areas of the SSR

This map was the result of the Project of the network of the protected areas up to the year 2000 (Homza, Š. et Pacanovský, M , et al , 1983 according to the state of 30 9.1973) It provides the first, comprehensive and in many cases still relevant intentions of the legal declaration of the individual categories of the protected areas of Slovakia

Map of the protected areas of Slovakia of 1.1.1995, 1:500,000 (Kramárik, J., 1995)

It represents the actual state of the protected areas of Slovakia according to categories defined by the new Nature and Landscape Conservation Act NR SR no 278 from 1994 (where the nature conservation categories already reflect the international criteria set by the IUCN).

Generel of the Supraregional Territorial Systems of Ecological Stability of the Landscape (TSES) of the Slovak Republic, map 1.1,000,000 (Ministry for Environment of the Slovak Republic, 1992) and map 1:200,000 (Urbion Bratislava)

It is the resulting concept of the distribution of biocenters, biocorridors, interaction elements and further TSES categories in the sense of officially valid methodology in Slovakia, the governmental decision No 319/1992 (For more details about TSES, see the Chapter 3).

5.2. Deductive approach - partial syntheses

Milan Koren sr , Milan Koren jr.

S1. Areas of geobotanic entities: This is the basic information about the distribution of 37 map entities calculated for the territory of Slovakia as a whole and according to the individual biogeographic regions as well In both cases they refer both to the original landscape (the entire territory according to the current as well as reconstructed vegetation) and to the current landscape and/or current vegetation (taking as the basis the bounds of the current forest-land of Slovakia, on which the natural forest communities exist).

S2. Diversity of the vegetation cover: Diversity of the vegetation cover expresses the current diversity (number of areals) of the individual geobotanic entities for the area unit

S3. Spatial complexity of the vegetation cover: Spatial complexity expresses here the geometric diversity (frequency of variation, length of boundaries) of the areals of geobotanic entities for the area unit

S4. Biogeographic regions (BRs): They are a result of the existing phytogeographic division of Slovakia according to Futák (1980) and zoogeographic division according to Èepelák (1980) into four hierarchical levels - region, subregion, district, subdistrict, decomposed further into smaller parts (Mazúr, E et Lukniš, M. 1980), created as an intersection of the previous four hierarchical levels with the geomorphologic entities on the level of the geomorphologic whole in the sense of Mazúr, E , et Lukniš, M (1980). These entities are, as a rule, total geographic individuals with specific structure of the relief and specifities of geology, climate, river-networks, springs, soil cover, distribution of settlements, transport nodes and axes, etc. On the level of N-ECONET there exist 128 entities with average area of cca 380 km2.

S5. Diversity of the original plant communities: Diversity is a complex expression of spatial complexity and diversity of vegetation cover.

S6. Distribution (rarity) of the original plant communities: Distribution (rarity) of the original plant communities was evaluated on the basis of the geobotanic entities area. By cluster analysis, these areas (separately for original landscape structure and separately for current landscape structure) were divided into six classes: the most wide-spread, very wide-spread, wide-spread, moderately wide-spread, little wide-spread (rare), very little wide-spread (very rare). This presents a view of the territorial differentiation of the original plant communities according to their distribution (rarity).

S7. Characteristic structures of the original plant communities: It is a survey of characteristic, typical or concommittant original plant communities according to biogeographic entities. We have earmarked two-component to eight-component structures of the original plant communities, serving as a model for definition of ECONET elements for the required content We consider as characteristic the plant communities, which at the level of biogeographic region cover more than 15% of its area, at the level of biogeographic subregion cover more than 10% of its area, at the level of biogeographic district and subdistrict cover more than 5% of their area.

S8. Rare structures of the original plant communities: They are the result of the evaluation of the biogeographic regions according to the proportion of rare and very rare plant communities. Only communities exceeding together 5% of the area of the respective region were taken into account In the evaluation of the current landscape structure, the degree of preservation of the forest area was taken into account (biogeographical regions with grades 4 and 5 were not considered). The evaluation is performed according to 5-grade scale. the rarest structure, very rare structure, rare structure, relatively rare structure, common structure The BRs classified into grades 1 to 4 are denoted as „unique".

S9. The degree of preservation of the forest-land area: It is a reciprocal expression of the degree of anthropic change of the landscape, especially by extensive agricultural activities We have derived it from the proportion of the forest and agricultural land fund in the respective biogeographic region. We have evaluated it by five grade scale

1. insignificant remainders of forest area (with current forest proportion up to 20%),
2. little preserved forest area (with current forest proportion 21 to 45%),
3. relatively preserved forest area (with current forest proportion 46 to 70%),
4. well-preserved forest area (with current forest proportion 71 to 90%),
5. very well-preserved forest area (with current forest proportion more than 90%).

S10. The degree of preservation of the original plant communities structure:

It expresses the change of the proportion in the participation of the original plant communities in the current landscape in comparison with the original landscape. We have calculated it as a sum of the differences in the participation of the characteristic plant communities ("s") in the original and current landscape. The values calculated were divided into five classes· unchanged structure ("s" up to 3%), little changed structure ("s" 4 to 19%), relatively little-changed structure ("s" 20 to 34%), changed structure ("s" 35 to 49%), strongly changed structure ("s" more than 50%).

S11. The "complete" preservation of the original plant communities: It is a comprehensive expression of the degree of preservation of a forest area and preservation of the structure of the original plant communities The individual BRs are evaluated according to five grades: strongly changed (DPF=1, DPO=1), changed (DPF=2, DPO=2), relatively preserved (DPF=3, DPO= 3), preserved (DPF=4, DPO=4), well-preserved (DPF=5, DPO=5). Here DPF denotes the degree of preservation of the forest-land area and DPO denotes the degree of preservation of the original plant communities structure.

S12. Landscape-ecological needs: Landscape-ecological needs ensue from the overall character of a natural environment, which we interpret by means of quality of the soil environment and geoecologic types. They suggest the potential suitability for localization of the core areas as well as ecocorridors.

S13. Landscape-ecological limits: Landscape ecological limits were derived from the current landscape structure They are an expression of the real barrier limiting the implementation of a selected area for NECONET.

S14. Social requirements: They are a projection of the current protected areas network and/or its potential enlargement in the sense of the officially approved documents

S15. Nature conservation value of the plant communities: It includes three indicators rarity, degree of preservation and diversity of the original plant communities structures

S16. Representativeness of the plant communities: It reflects two aspects - typicalness and uniqueness of the communities according to the biogeographic regions

S17. Equitability: It is an integrated indicator of the necessary spatial configuration of the core areas on the basis of the landscape ecological needs and landscape ecological limits

S18. Possibility of practical implementation: It is the result of the existing landscape-ecological limit evaluation on one hand and social requirements on the other.

5.3. Other aspects: Evaluation of the occurrence of the significant taxons of flora on the territory of Slovakia

To the basic analytical and synthetic materials for the landscape-ecological studies (including proposal of the NECONET of Slovakia) belong also the maps of the distribution of rare, endemic, endangered, retreating, or extinct taxons of flora These maps were produced according to the avaliable data from the database of the flora of Slovakia (Bertová, 1982, 1984, 1985, 1988, 1992, Futák, 1966 and others) completed by a field research

Extinct, missing and indetermined taxons of flora

Certain number of extinct species of plants was recorded also in the flora of Slovakia. Other, larger group of plant species is recorded (during life of the last generation) to be quickly retreating under the influence of human activities, even to the brink of their extinction.

To the individual taxons, included into extinct, missing and indetermined category we have assigned coefficients of significance from the viewpoint of their extinction in Slovakia or in certain area (K_{vyh}), and from this we calculate index of the significance of the territory (I_{vyh}). According to these indexes (I_{vyh}) we can distinguish localities into individual groups and characterize them from localities without extinct and missing taxons to localities with the highest number of data about extinct and missing taxons.

Endemic taxons

Large group of very rare plant species consists of endemic plants Slovakia is rich in these species. Their complete enumeration would be very long, and due to certain problems connected with endemism also incomplete. Several species are bounded only to the territory of Slovakia, others are bounded to the Carpathians, others only to a very limited locality, etc.

According to its origin and distribution (West-Carpathian, East-Carpathian, Carpathian, Pannonian and other endemite, subendemite, paloendemite, neoendemite, endemite of small areas, etc.) as well as according to the degree of its bondage to the territory of Slovakia we can assign two coefficients - the coefficient of endemism (K_{end}) and the coefficient of the bondage to to certain territory (K_{viaz}). From these, we can compute for a particular territory an index of the significance of this territory from the point of view of the occurrence of endemic species (I_{end}). According to this index (I_{end}) we can distinguish various groups of the individual territories, allocate them certain degree of endemism and characterise them.

Rare and endangered taxons

Several lists of the rare and endangered species of plants have been elaborated so far. These lists are perpetually actualized according to the new literature and field research. At the same time, each particular smaller area requires to elaborate an individual list of rare and endangered species, which will reflect specificities of a given territory.

According to the degree of endangerment we can assign to each rare and endangered species of plants its coefficient of the significance from the point of view of endangerment (K_{ohr}). According to the occurrence of the individual taxons in a particular territory we can compute index of the significance of this territory from the point of view of the occurrence of rare and endangered plant species (I_{ohr}). According to this index it is possible to distinguish and characterize individual territories of Slovakia.

Use for the landscape-ecological studies, for nature conservation and for the NECONET

In the above we presented a view on the territory of Slovakia according to significant flora components as are endemic, extinct and missing species, as well as endangered and rare species. All these components are significant for the design of the national ecological network of Slovakia. According to the data relevant to these parts we can create a map of the significance of flora in Slovakia for nature conservation needs For each particular territory a conservation index (Iochrany) is computed from the indexes of endemism (Iend),, extinction (Ivyh) and endangerment (Iohr) This index allows to distinguish and characterize individual areas from the point of view of their significance fo nature conservation.

From the elaborated map data on the occurrence of rare, endangered, endemic, extinct, missing and other plant taxons we can characterize individual smaller territorial units from the point of view of the occurrence of the individual groups of plants and consequently from the point of view of their rarity, uniqueness, biodiversity preservation, stability. Simultaneously we can characterize each territory also from the point of view of the nature conservation needs and in this way to point to such areas, which are still not covered by existing system of protected areas, but require increased care either with regard to the occurrence of the rare, endangered or endemic species.

Through a transposition of the maps elaborated in this way, we can acquire a picture about the significance, rarity and endangerment of a particular territory and its parts, according to which we can determine real localities significant as gene pool refugees of the significant taxons of flora Comparing this picture with the geobotanical map of Slovakia, phytogeographic division and other materials about the territory (map of the real vegetation, ecological stability of the area, ecologically significant segments, fauna, etc) we gain the whole picture about the status of the country or its required part

Conclusion for the NECONET proposal

Several floristically rich and rare areas are already included into the system of the protected territories of Slovakia. To the territories, on which there are no or seldomly declared protected territories and according to our evaluation they have relatively high conservation index (Iochrany) is necessary to devote more attention, especially in cases of high anthropic pressure Areas with high conservation index should become parts of the core areas of the National Ecological Network of Slovakia, or at least parts of their buffer zones (or nature development areas). The schemes and graphs about distribution of rare, threatened, endemic and extinct species are included at the end of chapter 5 of the original Slovak text).

6. FINAL SYNTHESIS - PROPOSAL OF THE NATIONAL ECOLOGICAL NETWORK OF SLOVAKIA (NECONET)

6.1. Selection of the components of the National ECONET

Milan Koren, Jozef Šteffek, Jozef Kramárik, Štefan Maglocky, Peter Straka, Jana Ruzièková a kol

6.1.1. Reflexion of the selection criteria for core areas

1. Nature conservation value (rarity, degree of preservation, diversity).

With regard to the ECONET aims, we concentrated on the areas with the highest occurrence of the species significant from the gene pool viewpoint and species retreating or near to extinction. As it is impossible to cover the whole gene pool wealth of Slovakia, we have concentrated on selected groups of fauna or selected types of habitats (see chapter 4). We are keeping to the principle that core areas of higher significance (national, European, biospheric), should include predominantly ecosystems of the climax stage or of a stage close to climax. The core areas of lower significance can be more successionally heterogeneous.

On the basis of the original plant species distribution (rarity) map, we also propose

1. to preserve the group of very little wide-spread (very rare) communities and little wide-spread (rare) communities in the current area, to conserve the areas of the "island" type existing especially in the "sea" of the transformed agricultural landscape,
2. to preserve most of the groups of moderately wide-spread communities (relatively rare) among the ECONET elements,
3. to keep the group of the remaining communities in an adequate proportion (close to model representation) among the ECONET elements

2. Representativeness

The concept of representativeness (of ecosystems, plant communities, geoecologic types, etc) emphasizes two aspects The first aspect reflects their "typicality", the second one their rarity. According to the aspect prevailing, we distinguish the typical core areas (including parts of the territory with typical ecosystems) and unique ones (including parts of territory with unique ecosystems, which are for the territory evaluated at the same time the typical ecosystems). Large part of the selected core areas should safeguard protection of the representative original geobiocenoses, which prevail in the Carpathians.

3. Equitability

This criterion represents various aspects of the space. The first is the correspondence to the biogeographical unit, which is to be represented by a core area, the second one is the size and spatial arrangement of the area, in which it is to act as a stabilizing nature system, i.e. as an opposing pole of the denaturalized surroundings, balancing out all kinds of disturbances, the third one is the homogenity of the internal structure of the core area

Equitability is closely related also to the size of the core area itself. This depends especially on the type of landscape and the landscape-ecological relation. Optimal size of a core area should guarantee permanent existence and development of the whole order of plants and animals by safeguarding their complete foodchain

4. Possibility of practical implementation

ECONET functioning without collisions requires to minimize the anthropic disturbances. Therefore, it is an advantage to include into this system protected areas, in which the legislative protection is guaranteed. The possibility to include other areas into the ecological network clearly depends on a number of landscape-ecological limits. With regard to the environment, ECONET accepts the economic function (forest management, water-resources management, agriculture management, tourism management) and environmental function, aimed at the creation of a healthy and pleasant environment for the man.

6.1.2. Reflexion of the selection criteria for ecological corridors

The proposal of the ecological corridors of the European significance was based on the following criteria considered

1. The capacities for species dispersal through optimal habitats into surrounding areas
2. The ways and routes for migration and dispersal of species on the European level.
3. The conditions for temporary existence of species living in the core areas
4. The specificities of biogeographic regions, especially of the West-Carpathian region, in relation to the neighbouring biogeographical regions, and/or to interpenetration of the individual geoelements (emigration, imigration, transmigration) (compare to IUCN, 1994).

The individual criteria are not thus based only on the knowledge related to the migration routes of birds and game, but also on the knowledge of ecological conditions, which guarantee ecosystems functioning. They are based also on the less mobile species, but with high bioindication expression (e.g. plants and certain groups of evertabrates).

6.1.3. Reflexion of the selection criteria for nature development areas

The proposal of nature development areas of the European and national significance was based on the following criteria

1. Considering the territories with rare ecosystems, not fulfilling the other criteria for the core areas of European or national significance
2. Considering the denaturalized parts of the biosphere core area.
3. Considering the territories without core areas of European or national significance.
4. Considering the interrupted parts of ecological corridors
5. Considering the buffer zones of the core areas of European or national significance with a need for improvement of nature component

6.2. The hierarchy of the ECONET elements

Milan Koren, Jozef Šteffek, Jozef Kramárik, Štefan Maglocký, Peter Straka, Jana Ruzièková a kol

Biosphere level of the ECONET (B-ECONET) in the biogeographic sense corresponds to the level of biogeographic region in the sense of Futák (1980). The criterion for its selection is a high concentration of nature conservation values, relative preservation (originality) of the whole area and uniqueness of a predominant part of lower order core areas, included in it. The European level (E-ECONET) corresponds, in the same way as the preceeding one, to lower biogeographic entities - region, subregion, district, subdistrict. National level (NECONET) corresponds to the district, subdistrict, eventually part of the biogeographic region) Each hierarchical level represents a specific (autonomous) system with specific mechanisms of functioning and therefore also a specific behaviour.

6.2.1. The elements of biosphere significance

Core area (CA) of the biosphere significance

The highest nature conservation values (from the point of view of rarity, but also preservation and high diversity of the ecological structure) are concentrated in the biogeographical subregion of the high central Carpathians - Eucarpaticum. It is a subregion of extraordinary significance, surpassing by its nature conservation value all the surrounding subregions, in fact a „hot spot" of Central Europe, where the flows of organisms concentrate.

On the basis of the individual landscape-ecological division, emphasizing uniqueness and wholeness of the selected structures, we have assigned to it the entire biogeographical subregion of the intra-Carpathian basins - Intercarpaticum and parts of the neighbouring subregion of the prae-Carpathian flora - Praecarpaticum, West-Beschidian flora - Beschidi-cum occidentale and East-Beschidian flora - Beschidicum orientale. We denote the determin-ed areal as a whole as West-Carpathian Biosphere Core Area

The dominant biogeographical district in this areal are the Tatras, the highest mountain range of the Carpathians. The significance of the Tatras is stressed by the fact that between the Alps and the Caucasus, and in the direction to the North Pole, there are no higher mountains. From the landscape-ecological point of view, the Tatras and their adjacent areas represent a holistic regional structure with a typical Carpathian sub-mountain landscape, with large forest complexes of the mountain landscape and unique high mountain landscape

The submountain agriculturally used landscape, with a predominance of meadows and pastures has still a lot of tree verdure The remnants of wetland communities have also high nature value. The submountain and mountain landscape with a strongly differentiated structure of forest communities is a precondition of a great biotic diversity and richness of the life forms. The high mountain landscape is a unique and rich island of the nature values. Unique is also the subnival belt, not existing anywhere else in the Carpathians.

Central position in the West-Carpathian biosphere core area is occupied by the long mountain range of Low Tatras. In addition to the Tatras and Low Tatras, this biosphere core area includes further 15 core areas of the European significance. of which 7 (the Lúèanská Fatra, Kriváòska Fatra, Vel'ká Fatra, Choèské vrchy, Ïumbierske Tatry, Král'ovohol'ské Tatry a Pieniny) belong to the biogeographical subregion of the High Carpathians, 6 (the Kremnické vrchy, Pol'ana, Muráòska planina, Slovenský raj, Volovské vrchy, Branisko) belong to the subregion of the Prae-Carpathian flora, 1 (the Horná Orava) to the subregion of West-Beschidian flora and 1 (the Levoèské vrchy) to the subregion of East-Beschidian flora.

Ecological corridors of biosphere significance:

The selected ECs of biosphere significance are connecting the Alps, West-Carpathians and East-Carpathians. Other ecological corridors of biosphere significance are blind.

6.2.2. The elements of European significance:

Core areas of European significance:

These elements are considered as quasi-homotypical from the points of view of the current landscape structure and landscape-ecology. In all the core areas definitely prevail natural forest formations, representative for the corresponding landscape type, and/or biogeographical district. They include also the so called frontier core areas, which are, as a rule, a part of bilateral, or trilateral frontier protected areas. Together, we have determined and described 35 core areas of the European significance However, it is evident, that today, there are not fully representative core areas in all the biogeographic regions any more.

The category of the European significant core areas includes:

1. Core areas of the (higher level) West-Carpathian biosphere core area.
2. Core areas, in relation to the West-Carpathian core area functioning as stepping stones.
3. Remaining unique core areas
4. Frontier core areas
5. Other significant core areas

Considering this level of core areas, especially important are forest beech ecosystems, which are representative for the whole fringe zone of the West-Carpathian biosphere reserve. From the viewpoint of ecological stability of the landscape, we consider them to be the most important landscape component in the territory of Slovakia, as the beech in its natural areal is the most resistant wooden species In the past, as well as today, it creates the basis of the stability of forest ecosystems, and thus of the whole country.

Ecological corridors of European significance:

ECs on the European level are represented by several types of corridors (see the map):

1. Pan-European bird-migration routes
2. Directions of the penetration of geoelements of flora and fauna including: West-Carpathian elements spreading from West-Carpathian biosphere reserve (Slovakia). Alpine elements, penetrating from the Alps (Austria) through the mountain bridge of the Malé Karpaty. Pontic and Sub-Mediterranean elements, spreading from the frontiers with Hungary along the warm river valleys. East-Carpathian elements, penetrating from Ukraine through the Východné Karpaty and Vihorlat mountain ranges
3. River ecological corridors, the Danube-Moravia and the Váh-Orava

Nature development areas of European significance:

NDAs on this level have predominantly preservation function, supporting existing CAs of European significance, functioning as their buffer and/or transition zones. Further NDAs have been designed in case of non-existence of a core area in a given biogeographical district (e.g. in lowlands) and in suboptimally or non-functioning parts of the ecological corridors.

6.2.3. The elements of national significance

Core areas of national significance:

According to the criterion of representativeness it was not possible to select CAs in all the biogeographical units (subregions, districts, subdistricts). Despite this we have selected 35 highly valuable core areas of national significance (see the ECONET map). Of a great importance at this level are again beech forest ecosystems. However, the CAs of N-ECONET include also sufficiently large samples of non-forest ecosystems (steppes, wood-steppes, saltmarshes, wetlands and water communities). These types of habitats are represented also in E-ECONET, but their representation in N-ECONET is higher. CAs of national significance represent specific added value also to the development of network of protected areas.

Ecological corridors of national significance:

All the above described ecological corridors of the European significance are also ECs of national significance. Apart from these, 15 other important river corridors have been selected, as well as the territorial ecological corridors connecting different core areas, as well as nature development areas.

Nature development areas:

These include often only non-representative rests of rare original communities. They can be of enormous significance as gene pool „sites" These localities lack the characteristics necessary for their selection as core areas of NECONET. On the other hand, they play an important role of strengthening and completing this NECONET We have determined NDAs with the main function to protect the core area, NDAs, which may become new core areas in the future (completing the ecological network) and NDAs with the main function of a structural element of an ecological corridor (see the map of National ECONET of

Slovakia).

6.3. A brief summary description of the Slovakia NECONET

The network of the selected CAs, NDAs and ECs of all the three hierarchical levels is designed to include all the main types of the ecosystems in Slovakia - including the regional specificities in the individual biogeographic regions Besides the predominant forest ecosystems (oak forests, beech forests, fir-beech forests, detritus forests, spruce forests, dwarf-pine forests and floodplain forests) they include also sufficiently large samples of non-forest ecosystems (steppes, wood-steppes, saltmarshes, wetlands and water communities). In a number of core areas, there are precious samples of natural as well as man influenced - secondary ecosystems and ecosystems of alpine meadows above the upper tree line.

The selected CAs are linked, for the most part, by a really functioning system of ecological corridors In their selection, we have taken into account the diversity of ways of dispersal and migration, as well as variety of migration routes of plants and animals.

The territory of Slovakia serves as a gene pool reserve of the European importance for various species of organisms It has been observed that from this country over the last decades regularly a number of important animals have dispersed, especially westwards from the Slovak territory There is a similar migration of some species southwards. For linking of the ECs to the Austrian territory, the key region is the Devínska Kobyla with the river of Danube, on which pass both the EC of water and floodplain biota, and the EC of the xerothermophilous biota. For the uninterrupted contacts of biota of the western part of Slovakia and Moravia in the Czech Republic, the presence of the continued ECs of the mountainous and mesophilous biota on the Czech/Slovak boundary, is highly significant. To this EC (one of the most important in the West-Carpathians), further ECs of lower degree are linked, enabling a penetration of the Carpathian flora and fauna elements further to the West

Lists of the core areas of the National Ecological Network of Slovakia, differentiated according to their European or national significance is included in the subchapters 6 4 1. and 6.4.2. of the original Slovak text. Reflection of the existing SR-TSES in the proposed NECONET of Slovakia is included in the tables of the subchapter 6.4.3 The chapter 7 provides the basic administrative, geological, botanical and zoological characteristics of the core areas of European and national importance. Description of the ecological corridors of European significance is included at the end of the chapter 7.

Conclusion: The NECONET of Slovakia and its further use

A brief evaluation of fulfilling the project aims and project procedure

For the solution of the NECONET of Slovakia - the following goals were met·

1. A proposal of the NECONET SR, identifying various types of key territories indispensable for functioning of the European ecological network (core areas, ecological corridors, nature development areas), in accordance with the criteria set internationally (design of national networks in Central Europe was coordinated by IUCN)
2. A brief review description of core areas (and in outline also ecological corridors) of the proposed NECONET SR, which, at the same time, will provide enough concise information about natural values of the area, justifying its inclusion into the given

category.

3 It can be concluded that both aims were achieved to a higher extent than proposed in the original project proposal The NECONET SR proposal was not limited to the map in the scale 1 1,000,000, but was prepared also in the scale 1·500,000 (the scale in which it was set up). The reason was to make the NECONET SR proposal in the first place practically utilizable also for the national nature conservation needs In the NECONET synthesis, we used a complex approach and computer syntheses. It made possible to use in the proposal both the important landscape-ecological knowledge, as well as the knowledge of experts about the distribution of the key species and the endangered ones in the territory of Slovakia

Basic outcomes achieved in the project, its "added value"

a. Synthesis of the basic review of the distribution of selected endangered species It was carried out for 70 core areas (35 of the European and 35 of national significance) The selected groups included lichens, mosses, higher plants, molluscs, spiders, dragonflies, hymenopterans, beetles, amphibians, reptiles, birds and mammals. Also maps of distribution of the selected 184 species were processed by computer. Consequently, synthetic composite distribution maps were created These became the basis of a working synthetic map of the NECONET core areas and ecological corridors of the inductive approach

b. Digitization of the selected maps - key maps for the proposal of ecological networks· The choice of maps for digitization was done at the meetings of experts in first half of 1994 (The digitized maps are described in Chapter 5.) Digitization of the maps, inspite of the time-consuming process, contributed to an increase of the precision and quality of the whole proposal and their computer synthesis became an important input material. At the same time, it demonstrated the effectiveness and operation of the chosen complex approach.

c. Evaluation of the existing system of protected areas of SR: Processed and digitized was the new map of protected areas of Slovakia reflecting already the new categorization of the areas according to the new Nature and Landscape Conservation Act No 287/1994. The layers digitized are the basic input for the new map of protected areas, the publishing of which is prepared by the Ministry of Environment in 1996 The map reflects the state of protected areas of SR by 15 September 1995, included in the NECONET SR final synthesis

d. Evaluation of the existing supraregional TSES SR The NECONET SR proposal drew also from the existing Supraregional TSES, which was evaluated to cover the highest possible number of biocentres of supraregional significance by core areas of NECONET. All of the biocentres are covered in NECONET SR, either as the core areas, ecological corridors or as nature development areas. When cared after and recovered in a right way, some nature development areas can become new NECONET and EECONET core areas in the future.

e. The resulting synthetic proposal of ecological network of Slovakia As the NECONET SR proposal was very detailedly described in the preceding chapters and is presented in the enclosed map which is a part of the presented report, we only indicate that the proposal in the mentioned form (as well as the method used) surpassed the framework of the original task. Nevertheless, we present the proposal as a further step towards the building of a complete and representative national ecological network of Slovakia.

Proposals of further research and solutions of ECONET protection

a The legislative protection of all core areas and ecological corridors The proposal of the NECONET of Slovakia includes several core areas, which are not a part of any protected area. To safeguard a full functionality of NECONET, we consider important to safeguard as quickly as possible the legislative protection of these core areas of European and national significance Also, it is necessary to provide legislative protection of all ecological corridors

b. Monitoring of the state of the core areas of European and national significance A number of core areas are excessively loaded by the impacts of human activities. Also new economic conditions increase the pressure on the intensive use of natural resources. Neither consequences of global warming are negligible. Thus, it is necessary to safeguard monitoring of changes of the state of vegetation, flora and fauna in all the core areas of NECONET.

c Working on the models of sustainable development· It is clear that all the core areas of national significance cannot have the national park statute However, it is necessary to protect their biodiversity. This requires reflection of nature conservation needs in all the sectors of economy, especially those, with largest impact on the ecological network. These are forest economy, agriculture, recreation and tourism, water management and transport. Models of sustainable development covering all the core areas present a long-term task

d A wide discussion to NECONET proposal and its improvement on the basis of the response obtained. Parallelly with the above described activities, we propose a wide evaluation of the proposal of the NECONET of Slovakia by governmental and non-governmental institutions to optimize further the presented NECONET proposal This may include predominantly more precise drawings of frontiers of the core areas, and re-categorization of some of the three types of areas included in the map of NECONET SR, as well as completion by further nature development areas, especially in the lowlands.

e Selection of the areas for revitalization and completion of the NECONET: We need to search for possibilities to create new NECONET areas, in order to provide adequate density of the ecological network. On the NECONET map, there is also the category of nature development areas, which play a role of potential core areas These areas should be evaluated in detail, eventually completed, and for the selected ones, strategies of care should be elaborated, or they could be revitalized complexly in such a way to be able to fulfill the function of the core area in the lacking node of the ecological network.

IUCN Foundation, The World Conservation Union, Slovakia

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Summary translated by: Martin Maloveský (chap. 1,3), Ludmila Sabová (chap. 2,4,5,6,7,8)

МІНІСТЕРСТВО ЕКОЛОГІЇ ТА ПРИРОДНИХ РЕСУРСІВ УКРАЇНИ
ДЕРЖАВНИЙ КОМІТЕТ ЛІСОВОГО ГОСПОДАРСТВА УКРАЇНИ
УКРАЇНСЬКЕ ДЕРЖАВНЕ ПРОЕКТНЕ ЛІСОВПОРЯДНЕ ВИРОБНИЧЕ ОБ'ЄДНАННЯ
КОМПЛЕКСНА ЕКСПЕДИЦІЯ

Для службового користування
Інв. № КП-147 Прим. № 1

ПРОЕКТ

організації території та охорони природних комплексів

КАРПАТСЬКОГО БІОСФЕРНОГО ЗАПОВІДНИКА

ДЕРЖАВНОЇ СЛУЖБИ ЗАПОВІДНОЇ СПРАВИ МІНІСТЕРСТВА ЕКОЛОГІЇ ТА ПРИРОДНИХ РЕСУРСІВ УКРАЇНИ

Том І

Пояснювальна записка

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Ірпінь - 2002

Затверджено

Наказ Міністерства екології та природних ресурсів України №294 від 3 серпня 2001 року, зі змінами згідно Наказу Міністерства охорони навколишнього природного середовища України №44 від 26 січня 2005 року

ПОЛОЖЕННЯ
ПРО КАРПАТСЬКИЙ БІОСФЕРНИЙ ЗАПОВІДНИК

1. ЗАГАЛЬНІ ПОЛОЖЕННЯ

1.1. Карпатський біосферний заповідник (далі – Заповідник) створено на базі Карпатського державного заповідника, згідно з Указом Президента України "Про біосферні заповідники в Україні" від 26 11.1993 р. № 563/93.

Територія Заповідника розширена відповідно до Указу Президента України "Про розширення території Карпатського біосферного заповідника" від 11.04.1997 р. № 325/97 на 24315 га.

Заповідник розташований на території Виноградівського, Рахівського, Тячівського, Хустського районів Закарпатської області.

Ділянки землі та водного простору з усіма природними ресурсами та об'єктами вилучаються з господарського використання і надаються Заповіднику у постійне користування в порядку, встановленому чинним законодавством України.

1.2. Заповідник є природоохоронною, науково-дослідною установою міжнародного значення, входить до складу природно-заповідного фонду України, охороняється як національне надбання, щодо якого встановлюється особливий режим охорони, відтворення та використання.

Заповідник належить до всесвітньої глобальної мережі біосферних заповідників, нагороджений Європейським Дипломом Ради Європи від 30.09.1998 р.

1.3. Організаційно-правові засади функціонування Заповідника визначаються Конституцією України, Законами України "Про охорону навколишнього природного середовища", "Про природно-заповідний фонд України", "Про наукову та науково-технічну діяльність", іншими законами, підзаконними актами, Проектом організації території, охорони, відтворення і ефективного використання природних комплексів Карпатського біосферного заповідника (далі – Проект організації території) та цим Положенням.

1.4. Заповідник є юридичною особою, має самостійний баланс, реєстраційні рахунки в органах Державного казначейства України, має печатку з зображенням Державного герба України і своїм найменуванням, бланки, штампи та емблему, що реєструються в установленому порядку.

1.5. Заповідник підпорядковується Міністерству охорони навколишнього природного середовища України (далі – Мінприроди). Оперативне управління діяльністю Заповідника здійснює Державна служба заповідної справи України (далі – Орган управління)

ПОГОДЖЕНО:	ЗАТВЕРДЖЕНО:
Начальник Головного управління національних приподних парків і Заповідної справи	Міністр охорони навколишнього природного середовища та ядерної безпеки України
28.10.99 В. Б. Леоненко	В. Я. Шевчук 29.10.99

ПОЛОЖЕННЯ
про національний природний парк Ужанський

1. ЗАГАЛЬНІ ПОЛОЖЕННЯ

1.1. Національний природний парк Ужанський (надалі НПП Ужанський) створено згідно з Указом Президента України від 27 вересня 1999 р. № 1230/99 на території Великоберезнянського району Закарпатської області на площі 39159.3 га.

НПП Ужанський створено з метою збереження, відтворення та раціонального використання природних ландшафтів, що мають важливе природоохоронне, естетичне, наукове, освітнє, рекреаційне та оздоровче значення

1.2.НПП Ужанський є природоохоронною, рекреаційною, культурно-освітньою, науково-дослідною установою загальнодержавного значення і входить до складу природно-заповідного фонду України

1.3. Правові засади функціонування НПП Ужанський визначаються Конституцією України, законами України “Про охорону навколишнього природного середовища" , "Про природно-заповідний фонд України", "Про власність ", іншими нормативними актами України та цим Положенням

1.4. НПП Ужанський є юридичною особою, веде самостійний баланс, має печатку із зображенням Державного герба України і свого найменування, штампи, реєстраційний рахунок у відділенні Державного казначейства України, поточний та інші рахунки в установах банків та емблему, яка реєструється відповідно до чинного законодавства.

1.5. НПП Ужанський підпорядковується Міністерству охорони навколишнього природного середовища та ядерної безпеки України (надалі - Мінекобезпеки України).

REGULATIONS

on the National Nature Park "Uzhanskyi"

1. GENERAL PROVISIONS

1.1 National Nature Park "Uzhanskyi" (further on - UNNP) has been designated on September 27, 1999 according to the Presidential Decree on the territory of Velykyi Bereznyi district of the Transcarpathian region (Ukraine) with an area of 39.159,3 ha UNNP was designated with an aim to provide conservation, restoration and rational use of the natural complexes that have a significant nature-conservation, aesthetic, scientific, educational and recreational meaning

1.2 UNNP is a nature-protection, recreation, culture-educational, scientific research institution of the national significance and belongs to the Nature-Protection Fund of Ukraine.

1.3 Legally, UNNP functions according to the Constitution of Ukraine and Laws on Ukraine "On environmental protection", "On the nature-Protection Fund of Ukraine", "On property" and other legal-normative acts of Ukraine, and also according to this Regulations.

1.5 UNNP is subordinated to the Ministry for Environmental protection of Ukraine (further on – the Ministry).

TERRITORIAL STRUCTURE AND REQUIREMENTS FOR NATURAL COMPLEXES PROTECTION

2.1 Area of UNNP comprises 39.159,3 ha, including 14.904,6 ha of lands given to the Park for permanent use, and 24.254,7 ha of lands used by stakeholders. Functional zoning of UNNP's territory is made according to the project of Territorial Organization. In order to secure nature conservation, restoration and recreational use of natural complexes and sites of UNNP, its territory is divided into functional zones·

- protected zone (core area)
- zone of regulated recreation activity
- permanent recreation zone
- zone of economic use.

3 RESEARCH

3.1 Scientific research within UNNP is held with the purpose to elaborate scientific bases for conservation, renovation and rational use of natural resources, and provision of permanent monitoring.
3.2 Main trends of research are defined by scientific programs and plans of scientific activity that are adopted by the Central Agency for national nature parks of Ukraine, State Agency for Nature Protection and National Academy of Sciences of Ukraine.

5. INTERNATIONAL CO-OPERATION

5 1 UNNP participates in elaboration and implementation of international scientific and scientific-technical programs.

6. MANAGEMENT

6.1 UNNP is managed by its special Administration headed by the director, who is appointed by the Ministry.

6.2 The park's Administration elaborates:

- structure and personnel, amount of expanses that are to be approved and signed by the Ministry;
- work-plan and financial plan that have to be approved by the Central Agency for national nature parks.

9. PROPERTY

9.2 Everything that belongs to UNNP is the property of the state and is given to the Park for operation.

10. SHIFT OF BOUNDARIES AND CHANGE OF STATUS AND CATEGORY

10.1 Shift of CNNP's boundaries and change of the status or category may be done according to the valid Legislation only.

СТРУКТУРА ТЕРИТОРІЇ ТА ВИМОГИ ЩОДО ОХОРОНИ ПРИРОДНИХ КОМПЛЕКСІВ

2.1. Площа земель НПП Ужанський складає 39159.3 га, в тому числі 14904.6 га земель, що надані парку у постійне користування та 24254.7 га земель, що включені до складу земель парку без вилучення у землевласників та користувачів. Із земель, що включені до парку без вилучення 17004.8 га перебувають у постійному користуванні підприємств, 7220.1 га перебувають у віданні місцевих рад та 29.8 га, що перебувають у землевласників та землекористувачів.

Функціональне зонування території НПП Ужанський здійснюється на підставі Проекту організації його території, що затверджується в установленому порядку. З метою забезпечення охорони, відтворення та рекреаційного використання природних комплексів і об'єктів НПП Ужанський , його територія поділяється на такі функціональні зони:

- заповідна зона;
- зона регульованої рекреації;
- зона стаціонарної рекреації;
- господарська зона.

2.2. Згідно з функціональним зонуванням та урахуванням природно-охоронної, оздоровчої, наукової, рекреаційної, історико-культурної та інших цінностей природних комплексів та об'єктів на території НПП "Ужанський" встановлюється диференційований режим щодо охорони, відтворення та використання його природних ресурсів.

Заповідна зона - призначена для охорони та відновлення найбільш цінних природних комплексів парку; на її території забороняється будь-яка господарська та інша діяльність, що суперечить цільовому призначенню, порушує природний розвиток процесів та явищ або створює загрозу шкідливого впливу на її природні комплекси й об'єкти, а саме:

- будівництво споруд, шляхів, лінійних та інших об'єктів транспорту і зв'язку, не пов"язаних з діяльністю НПП, розведення вогнищ, влаштування місць відпочинку, стоянка транспорту, проїзд і прохід сторонніх осіб, прогін домашніх тварин поза спеціально встановленими для цього маршрутами, пересування механічних, гужових та інших транспортних засобів (крім транспорту парку) за винятком шляхів загального користування, лісосплав, проліт літаків і гелікоптерів нижче 2000 метрів над землею, подолання літаками звукового бар'єру над територією НПП Ужанський та інші види шумового впливу, що перевищують встановлені нормативи;
- геолого-розвідувальні роботи, розробка корисних копалин, порушення ґрунтового покриву та гідрологічного режиму, руйнування геологічних відшарувань, застосування хімічних засобів боротьби з шкідниками і хворобами рослин і лісу, усі види лісокористування, а також заготівля кормових трав, лікарських та інших рослин, збирання грибів, плодів, насіння, випасання худоби, відлов і відстріл звірів, птахів, порушення умов їх оселення,

гніздування, інші види користування рослинним і тваринним світом, що призводять до порушення природних комплесів;
- мисливство, рибальство, збирання колекційних та інших матеріалів, за винятком матеріалів, для виконання наукових досліджень.
Для охорони, збереження й відтворення корінних природних комплексів, проведення наукових досліджень та виконання інших завдань у заповідній зоні, відповідно до Проекту організації території НПП Ужанський , охорони, відтворення та рекреаційного використання його природних комплексів і об'єктів, допускається:
- збір колекційних та інших матеріалів, пов'язаних із веденням наукових досліджень, виконання робіт, передбачених планами довгострокових стаціонарних досліджень, проведення екологічної освітньо-виховної роботи;
- виконання відновлювальних робіт на землях з порушеними корінними природними комплексами, а також здійснення заходів щодо запобігання змінам природних комплексів внаслідок антропогенного впливу;
- здійснення протипожежних і санітарних заходів, що не порушують режиму заповідності, спорудження у встановленому порядку будівель та інших об'єктів, необхідних для виконання поставлених перед парком завдань;
- стоянка й проїзд транспорту парку;
- у разі термінової необхідності, за клопотанням науково-технічної ради парку в заповідній зоні, з дозволу Мінекобезпеки України можуть проводитись санітарні рубки та, роботи, пов'язані з ліквідацією осередків шкідників і хвороб або недопущенню їх появи, а також розробка вітровалів, буреломів і сніголомів.
Зона регульованої рекреації - призначена для короткострокового відпочинку та оздоровлення населення. У зоні регульованої рекреації дозволяється:
- проведення санітарних рубок і заходів, пов'язаних із збереженням, відтворенням і ефективним рекреаційним використанням природних комплексів та об'єктів згідно з Проектом організації території парку;
- регульований збір грибів, ягід, плодів дикорослих плодових рослин із дотриманням природоохоронного та лісового законодавства;
- обладнання туристських та еколого-пізнавальних стежок, організація природоохоронної пропаганди, короткотривалі туристські екскурсії й відпочинок населення, збір наукової інформації;
- регулювання чисельності диких тварин до оптимальної, шляхом відлову з наступним переселенням та селекційного відстрілу, спортивне.полювання, у межах визначених та закріплених мисливських угідь, з дозволу Мінекобезпеки України;
- відновлення популяцій місцевих видів риб;
На території зони регульованої рекреації забороняється:
- головне рубання лісу, будівництво промислових, господарських і житлових об'єктів, не пов'язаних з діяльністю парку, розробка корисних копалин, кар'єрів, забір грунту, промислове рибальство й мисливство, промислова заготівля лікарських рослин;

- рух та стоянка стороннього автомобільного та гужового транспорту, організація масових спортивних та туристських заходів, розміщення наметових таборів, човнових станцій не погоджені з адміністрацією парку;
- розведення вогнищ поза відведеними для цього місцями, застосування хімічних засобів боротьби з шкідниками та хворобами рослин і лісу, інші види діяльності, що порушують природні комплекси парку або знижують природну екологічну чи рекреаційну цінність його території та можуть негативно вплинути на стан природних комплексів й об'єктів заповідної зони.

Зона стаціонарної рекреації - призначена для розміщення готелів, мотелів, кемпінгів та інших об'єктів обслуговування відвідувачів НПП Ужанський . Рекреаційна діяльність на території НПП Ужанський організовується його спеціальними підрозділами, а також іншими підприємствами, організаціями на підставі угод з адміністрацією парку.

У межах господарської зони проводиться господарська діяльність, спрямована на виконання поставлених перед парком завдань, виділяються площі сінокосів, пасовищ, орні землі, лісові площі, необхідні для задоволення потреб парку і його працівників, знаходяться населені пункти, об'єкти комунального призначення парку, а також землі інших землевласників і землекористувачів, включені до складу парку, на яких господарська діяльність здійснюється з додержанням загальних вимог щодо охорони навколишнього природного середовища.

2.3. На територіях регульованої, стаціонарної рекреації та господарської зон забороняється будь-яка діяльність, яка призводить або може призвести до погіршення стану навколишнього природного середовища та зниження рекреаційної цінності території та об'єктів парку.

2.4. Територія НПП Ужанський враховується в усіх видах проектної документації.

3. НАУКОВО -ДОСЛІДНІ РОБОТИ

3.1. Науково-дослідна робота на території НПП Ужанський проводиться з метою розробки наукових основ охорони, відтворення та раціонального використання природних ресурсів, встановлення постійного моніторингу за станом природи.

3.2. Основні напрямки наукових досліджень визначаються у наукових програмах і планах науково-дослідних робіт, які затверджуються Головним управлінням національних природних парків й заповідної справи Мінекобезпеки України (надалі Головне управління) та Національною академією наук України.

3.3. Для ведення наукових досліджень в НПП Ужанський створюється науковий структурний підрозділ.

3.4. З метою узагальнення результатів наукових досліджень і спостережень за станом й змінами природних комплексів, а також розробки заходів по відновленню та підтриманню стабільності природних екосистем, щорічно у визначеному порядку ведеться Літопис природи.

3.5. НПП Ужанський проводить роботи з екологічного навчання, екскурсійної діяльності, екологічного туризму по визначених науковопізнавальних маршрутах, здійснює навчально-виховну роботу в учбових закладах у межах своєї території.

5. МІЖНАРОДНЕ СПІВРОБІТНИЦТВО

5.1. НПП Ужанський бере участь у співробітництві по виконанню та дотриманню норм міжнародних правових документів у галузі охорони природно-заповідного фонду, може приймати участь у розробці міжнародних наукових і науково-технічних програм та забезпеченні обміну науковою інформацією.

5.2. НПП Ужанський має право займатися зовнішньоекономічною діяльністю відповідно до чинного законодавства.

6. УПРАВЛІННЯ НПП УЖАНСЬКИЙ

6.1. Управління НПП Ужанський здійснюється адміністрацією на чолі з директором, який призначається на посаду за контрактом з Мінекобезпеки України, за поданням Головного управління та погодженням з обласною і районною державними адміністраціями.

6.2. Адміністрація парку розробляє:

• структуру, штатний розпис, кошториси витрат, погоджує з Головним управлінням і подає на затвердження Мінекобезпеки України;
• виробничо-фінансові плани і подає їх на затвердження Головному управлінню.

6.3. Директор є розпорядником коштів і несе персональну відповідальність за роботу НПП Ужанський, забезпечує дотримання законності, трудової і виробничої дисципліни, організовує виконання затверджених планів і завдань з усіх напрямків діяльності парку.

6.4. Директор призначає та звільняє з посади головного лісничого і заступника директора за погодженням із Головним управлінням, а головного бухгалтера - ще й з Головним управлінням планування, обліку і контролю Мінекобезпеки України.

6.5. У разі відсутності директора з поважних причин (відрядження, відпустка, хвороба тощо), його обов'язки виконує головний лісничий.

6.6. Директор, згідно з штатним розписом, комплектує кадри наукових працівників на конкурсній основі, а інженерно-технічних та інших штатних працівників - за згодою сторін, відповідно до Кодексу законів про працю України .

7. ФІНАНСУВАННЯ, МАТЕРІАЛЬНО-ТЕХНІЧНЕ ЗАБЕЗПЕЧЕННЯ ТА ГОСПОДАРСЬКА ДІЯЛЬНІСТЬ

7.1. Фінансування НПП Ужанський здійснюється за рахунок державного бюджету України. Кошти, отримані від надання послуг з природоохоронної, туристично-екскурсійної, рекламно-видавничої та іншої діяльності, є спеціальними коштами НПП Ужанський і вилученню не підлягають.

Ці кошти використовуються для здійснення заходів щодо охорони території та об'єктів НПП Ужанський .

9. МАЙНО НПП "УЖАНСЬКИЙ "

9.1. Майно установи становлять основні фонди та кошти, а також інші цінності, вартість яких відображається в самостійному балансі парку.

9.2. Майно НПП Ужанський є державною власністю і закріплене за парком на праві оперативного управління.

10. ЗМІНА МЕЖ, КАТЕГОРІЇ ТА СКАСУВАННЯ СТАТУСУ ТЕРИТОРІЇ

10.1. Зміна меж, категорії та скасування статусу території НПП Ужанський здійснюється згідно з чинним законодавством.

Annex 6

Nariadenie vlády 258/1997 Z.z.

WHC REGISTRATION
Date 31.01.06
Id N° 1133
Copy 3 Item OP

(ktorým sa vyhlasuje Národný park Poloniny)
Autor. vláda SR
Platnosť od 30.9.1997
Účinnosť od 1.10.1997

Uverejnené v Zbierke zákonov č. 109/1997 strana 2637
NA ZÁKLADE:
287/1994 Z.z.
§12 ods 2, §14 ods 1 a 6,

OBLASŤ: Právo životného prostredia

258/1997 Z.z.

NARIADENIE VLÁDY
Slovenskej republiky

z 23 septembra 1997,

ktorým sa vyhlasuje Národný park Poloniny

Vláda Slovenskej republiky podľa § 12 ods 2 a § 14 ods 1 a 6 zákona Národnej rady Slovenskej republiky č 287/1994 Z z o ochrane prírody a krajiny nariaďuje

§ 1
Národný park Poloniny

Územie Polonín a východnej časti Nízkych Beskýd v okrese Snina sa vyhlasuje za Národný park Poloniny (ďalej len "národný park")

§ 2
Územie národného parku

Územie národného parku sa nachádza v katastrálnych územiach Dara, Hostovice, Kalná Roztoka, Klenová, Kolbasov, Nová Sedlica, Osadné, Ostrožnica, Parihuzovce, Pčoliné, Príslop, Runina, Ruská Volová, Ruské, Ruský Potok, Smolník, Stakčín, Stakčínska Roztoka, Starina, Topoľa, Uličské Krivé, Veľká Poľana, Zboj a Zvala Národný park má výmeru 29 805, 0514 ha, jeho územie je vymedzené v prílohe

§ 3
Ochranné pásmo

Pre národný park sa vyhlasuje ochranné pásmo na území okresu Snina Ochranné pásmo má výmeru 10 973, 2893 ha, jeho územie je vymedzené v prílohe

§ 4
Dokumentácia

Mapy, v ktorých sú zakreslené hranice národného parku a jeho ochranného pásma, sú uložené na Ministerstve životného prostredia Slovenskej republiky, na Krajskom úrade v Prešove a na Okresnom úrade v Snine

§ 5
Účinnosť

Toto nariadenie nadobúda účinnosť 1 októbra 1997

Vladimír Mečiar v r.

PRÍLOHA

I. Vymedzenie územia národného parku

Územie národného parku je vymedzené v teréne podľa katastrálnych máp so stavom v katastri nehnuteľností k 1 januáru 1996 a podľa lesníckych organizačných máp M 1 25 000 so stavom k 1. januáru 1994, z ktorých hranica národného parku bola prenesená do základnej mapy Slovenskej republiky M 1.50 000 na tieto mapové listy

28-43 Papín - 1992 28-44 Zboj - 1992 38-21 Snina - 1992 38-22 Ubľa - 1992

Hranica národného parku sa začína na severozápade na štátnej hranici s Poľskou republikou, cca 1 km juhovýchodne od kóty 877 m n m Pokračuje juhovýchodným smerom masívom Malý Horský do doliny toku Udavy, prechádza cez potok na lesnú cestu vedúcu z obce Osadné do doliny Západojuhozápadným smerom pokračuje pravým okrajom lesnej cesty po ľavostranný bezmenný prítok Udavy západne od kóty Drozdiačka (658 m n m) Pokračuje juhovýchodným smerom po ľavom brehu potoka cca 400 m a odtiaľ juhozápadným smerom vystupuje do svahu masívu Hlboké k dolnému okraju lesa Odtiaľ západným smerom pokračuje 1 km po okraji lesa, kde sa spája s lesnou cestou vedúcou do obce Osadné, po ktorej ľavom okraji pokračuje cca 1, 5 km k intravilánu obce Osadné Východojuhovýchodným smerom pokračuje po okraji lesa po cestu vedúcu z obce Hostovice na kótu 664 m n m , ďalej severným smerom obchádza Sovičovu jamu a vystupuje na kótu 664 m n m Pokračuje severovýchodným smerom po hrebeni cca 500 m a ďalej po hrebeni východojuhovýchodným až juhovýchodným smerom cez kótu Skory (857 m n m) a kótu 816 m n m na kótu Hrčasté (774 m n m) Ďalej po hrebeni cca 3 km juhozápadným smerom do sedla východne od kóty Kyčera (651 m n m) Pokračuje južným až juhojuhovýchodným smerom po hrebeni, prechádza cez lesnú cestu vedúcu z obce Pčoliné do doliny potoka Stružnica a ďalej na kótu Vrchpole (654 m n m), kde sa spája s katastrálnou hranicou Pčoliné a súčasne s ňou nezmeneným smerom pokračuje po hrebeni, prechádza cez lesnú cestu vedúcu sedlom z obce Pčoliné k vodnej nádrži Starina Zo sedla vystupuje na najbližší kopec a západojuhozápadným smerom pokračuje po bočnom hrebeni na kótu Stavenec (522 m n m) a hranicou lesných porastov zostúpi k okraju lesa, kde sa východojuhovýchodne od obce Pčoliné spája s lesnou cestou Pokračuje cca 500 m východojuhovýchodným smerom po okraji cesty a ďalej južným až západojuhozápadným smerom po okraji lesa k pravostrannému bezmennému prítoku potoka Chotinka Prechádza cez potok a lesnú cestu vedúcu do doliny a okr
ajom lesa pokračuje nezmeneným smerom k úpätiu svahu Južným smerom vystupuje na hrebeň, ktorým pokračuje na kótu Prípor (498 m n m), ku katastrálnej hranici medzi obcami Stakčín a Snina a po nej južným až juhojuhovýchodným smerom cca 3 km hrebeňom na kopec medzi kótami Mazúrov vrch (498 m n m) a Vŕšok (434 m n m) Južným smerom sleduje katastrálnu hranicu, zostupuje po svahu cca 700 m, východným smerom hranicou lesných porastov obchádza kótu Vŕšok (434 m n m) z južnej, východnej a severnej strany a pokračuje severovýchodným, severoseverovýchodným až severoseverozápadným smerom po okraji lesa hore dolinou potoka Chotinka Ponad lesnú škôlku okrajom lesa prechádza východným smerom cez potok Chotinka a cez cestu vedúcu dolinou a pokračuje okrajom lesa k potoku Javorovec a ďalej juhovýchodným smerom k intravilánu obce Stakčín Prechádza cez bezmenný ľavostranný prítok potoka Chotinka a okrajom lesa postupne severným, severoseverovýchodným až severovýchodným smerom obchádza intravilán obce Stakčín až po štátnu cestu Stakčín - Jalová Pokračuje severným smerom po okraji lesa popri ľavom okraji tejto štátnej cesty až po katastrálnu hranicu Jalová a ďalej po nej západným smerom cez kótu Strop (479 m n m) a kótu 509 m n m do miesta, kde katastrálna hranica prechádza cez štátnu cestu Stakčín-Jalová východne od obce Jalová Odtiaľ juhovýchodným smerom 150 m sleduje pravý okraj tejto štátnej cesty a ďalej východným a severovýchodným smerom pokračuje po okraji lesa k vodnej nádrži Starina Východným smerom

po severnom okraji priehradného múru a príjazdovej cesty pokračuje po štátnu cestu Príslop-Stakčín Južným smerom prechádza cez cestu a ďalej juhovýchodným smerom sleduje východný okraj cesty po most nad riečkou Cirocha Pokračuje južným smerom po okraji lesa popri ľavom okraji Cirochy k jej bezmennému ľavostrannému prítoku na severovýchodnom okraji intravilánu obce Stakčín a ďalej východojuhovýchodným smerom proti smeru toku potoka, okrajom lesných porastov pokračuje k pramenisku potoka Severovýchodným smerom
vystupuje okrajom lesných porastov ku kóte Makovisko (430 m n m) a východojuhovýchodným smerom zostupuje do doliny bezmenného pravostranného prítoku potoka Oľchovec severne od obce Stakčínska Roztoka Severoseverovýchodným smerom, proti smeru toku, po ľavom brehu potoka vedie do doliny cca 1 km a ďalej východojuhovychodným smerom vystupuje hranicou lesných porastov na hrebeň a juhojuhovýchodným smerom opäť zostupuje do doliny potoka Oľchovec Jeho pravým brehom pokračuje k sútoku s jeho ľavostranným prítokom a ďalej juhovýchodným smerom pokračuje po lesnú cestu do Stakčínskej Roztoky v doline bezmenného potoka Severovýchodným smerom vystupuje hranicou lesných porastov do svahu a južným smerom pokračuje do doliny potoka Lieskovec, kde sa spája s katastrálnou hranicou Po pravom brehu potoka pokračuje cca 1, 5 km, východojuhovýchodne od kóty Lieskovec (496 m n m) vystupuje východným smerom do sedla a odtiaľ juhojuhovýchodným smerom pokračuje hrebeňom do ďalšieho sedla a odtiaľ východojuhovýchodným smerom zostúpi do doliny potoka Ublianka severne od obce Kalná Roztoka Prechádza cez potok a lesnú cestu a po okraji lesa zostupuje juhovýchodným smerom dolinou k okraju lesa Severoseverovýchodným smerom vystupuje po okraji lesa na hrebeň k lesnej ceste vedúcej do obce Kalná Roztoka a ďalej východojuhovýchodným smerom zostupuje do doliny potoka Chmeľnica Prechádza cez potok a cestu vedúcu dolinou do obce Kalná Roztoka a južným smerom po jej ľavom okraji pokračuje cca 1 km k okraju lesa Okrajom lesa pokračuje juhovýchodným smerom po katastrálnu hranicu Kalná Roztoka a ňou južným smerom po pravom brehu ľavostranného bezmenného prítoku potoka Ublianka k okraju lesa a ďalej východojuhovýchodným smerom po okraji lesa do doliny Volovského potoka Prechádza po moste cez potok a nezmeneným smerom vystupuje lesnou cestou na hrebeň, prechádza cez katastrálnu hranicu obce Ruská Volová a ďalej nezmeneným smerom hranicou lesných porastov do doliny bezmenného ľavostranného prítoku Volovského potoka severoseverovýchodne od obce
Ruská Volová Ďalej prechádza cez potok a cestu vedúcu dolinou po okraji lesa a týmto juhojuhozápadným smerom pokračuje dolu dolinou cca 300 m po most nad týmto potokom Ďalej vedie cca 300 m severovýchodným smerom po okraji lesa a pokračuje východojuhovýchodným smerom po okraji lesa do ďalšej doliny bezmenného potoka Po pravom brehu potoka pokračuje cca 100 m a ďalej východojuhovýchodným smerom vystupuje hranicou lesných porastov na hrebeň severne od obce Brezovec, kde sa spája s jej katastrálnou hranicou Tou pokračuje severoseverovýchodným smerom hrebeňom po katastrálnu hranicu obce Ulič v sedle juhojuhovýchodne od kóty 545 m n m Po nej vedie severoseverozápadným až západoseverozápadným smerom po lesnú cestu vedúcu do obce Ulič a ďalej východojuhovýchodným smerom po okraji lesa cca 400 m popri ceste Hranicou lesných porastov severoseverovýchodným až východoseverovýchodným smerom obchádza zo západnej a severnej strany kótu Kýčerka (491 m n m) a pokračuje východojuhovýchodným smerom k sútoku potoka Ulička s jeho pravostranným bezmenným prítokom Okrajom lesa pokračuje cca 1, 5 km severoseverozápadným smerom, severovýchodným smerom prechádza cez potok Ulička a cez štátnu cestu Ulič-Kolbasov a okrajom lesa vedie východojuhovýchodným až severovýchodným smerom, vystupuje na hrebeň a hrebeňom vedie severoseverozápadným smerom po okraji lesa cca 700 m a ďalej východným smerom pokračuje okrajom lesa k bezmennému pravostrannému prítoku Zbojského potoka Prechádza cez potok a okrajom lesa pokračuje cca 400 m juhovýchodným smerom a severoseverovýchodným smerom vystupuje na hrebeň, kde sa spája s katastrálnou hranicou Uličské Krivé Po nej pokračuje severozápadným smerom po katastrálnu hranicu Kolbasov a po nej postupuje západným smerom do sedla severoseverovýchodne od kóty Veľká Ostrá (518 m n m) Hranicou lesných porastov vedie severozápadným smerom k bezmennému ľavostrannému prítoku potoka Ulička a ďalej západojuhozápadným až juhojuhozápadným smerom k štátnej ceste Ulič-Kolbasov Západným smerom prechádza cez št átnu cestu a potok Ulička a pokračuje severoseverozápadným a severozápadným smerom po okraji lesa k Dolinskému potoku a ďalej hranicou lesných porastov k potoku Štavinka, kde sa napája na katastrálnu hranicu obce Topoľa Touto hranicou pokračuje západojuhozápadným smerom cca 800 m a severozápadným smerom hranicou lesných porastov k Zajanovmu potoku, kde proti smeru toku pokračuje hranicou lesných porastov po katastrálnu hranicu Príslop a po nej západoseverozápadným smerom na hrebeň juhozápadne od obce Príslop
Severoseverovýchodným smerom pokračuje dolu svahom k bezmennému potoku a severozápadoseverným smerom opäť vystupuje hranicou lesných porastov po svahu a juhozápadným smerom pokračuje na hrebeň Hrebeňom vedie severoseverovýchodným smerom na kótu Jabloňov (835 m n m), kde sa spája s katastrálnou hranicou obce Topoľa Po nej pokračuje severoseverovýchodným až severovýchodným smerom hrebeňom do sedla

juhozápadne od kóty Hajdošík (914 m n m) Pokračuje juhovýchodným smerom južne od tejto kóty hranicou lesných porastov do doliny potoka Ulička, prechádza nezmeneným smerom cez potok a štátnu cestu Topoľa-Runina, vystupuje na svah a ďalej pokračuje juhovýchodným smerom do doliny pravostranného prítoku Dankovho potoka Vedľa potoka pokračuje okrajom lesných porastov juhozápadným a juhojuhozápadným smerom cez Dankov potok k ceste Ruský Potok-Topoľa a ďalej nezmeneným smerom hranicou lesných porastov k ľavostrannému prítoku potoka Ulička Západným smerom pokračuje po pravom brehu potoka k jeho sútoku s potokom Ulička južne od obce Topoľa Juhovýchodným smerom vystupuje po svahu po katastrálnu hranicu Topoľa a po nej pokračuje východným smerom Severne od kóty Buková (547 m n m) opúšťa katastrálnu hranicu a pokračuje juhojuhovýchodným smerom po lesnú cestu severozápadne od obce Kolbasov a po jej okraji zostupuje cca 100 m Pokračuje juhovýchodným smerom úpätím svahu po cestu vedúcu do obce Kolbasov na jej severovýchodnom okraji a ďalej severným smerom vystupuje na kótu Koločník (579 m n m) Po hrebeni vedie sev eroseverovýchodným smerom, ide po katastrálnu hranicu obce Ruský Potok a ďalej severným smerom katastrálnou hranicou po cestu Ruský Potok-Topoľa Pokračuje severovýchodným smerom hranicou lesných porastov po svahu severovýchodne od kóty Stolová (932 m n m) do doliny Ruského potoka Východným smerom prechádza cez potok a cestu a vystupuje do východného svahu hrebeňa Veľký Bukovec (1 012 m n m) a Vyšná Brackaňa (914 m n m) a južným smerom pokračuje hranicou lesných porastov po katastrálnu hranicu Ruský Potok juhozápadne od kóty Vyšná Brackaňa (914 m n m) Katastrálnou hranicou pokračuje po hrebeni juhozápadným smerom na kótu Veža (777 m n m) a východojuhovýchodným smerom zostupuje svahom do doliny bezmenného pravostranného prítoku Zbojského potoka a po jeho pravom brehu k okraju lesa Okrajom lesa vedie severozápadným smerom popri ceste vedúcej do doliny cca 400 m, prechádza cez cestu a juhovýchodným smerom sa okrajom lesa vracia na štátnu cestu Uličské Krivé-Zboj Okrajom lesa sleduje túto cestu severoseverovýchodným smerom cca 1 km po skalný masív na ľavej strane cesty, južným smerom prechádza cez túto cestu a Zbojský potok k okraju lesa a tým pokračuje k bezmennému ľavostrannému prítoku Zbojského potoka severovýchodne od obce Uličské Krivé Ďalej vedie juhovýchodným smerom po okraji lesa po lesnú cestu vedúcu na kótu Prípor (819 m n m) a okrajom lesných porastov pokračuje juhozápadným smerom k sútoku dvoch bezmenných potokov východne od obce Uličské Krivé Nezmeneným smerom vystupuje na kótu Hukov (461 m n m), kde sa spája s katastrálnou hranicou obce Ulič a južným smerom po nej pokračuje do miesta, kde katastrálna hranica odbočuje na východ Odtiaľ pokračuje južným, juhovýchodným až východojuhovýchodným smerom hranicou lesných porastov do Mikošovej doliny po štátnu hranicu Slovenská republika-Ukrajina cca 500 m juhozápadne od kóty Rožok (793 m n m)

Po štátnej hranici pokračuje severovýchodným smerom po katastrálnu hranicu Nová Sedlica Ďalej severozápadným smerom katastrálnou hranicou na hrebeň na lesnú cestu a ďalej po hrebeni severovýchodným smerom cez kótu Nad Čiernym (696 m n m) na okraj lesa Tým pokračuje severozápadným smerom k prameništu Rozdielneho potoka a po jeho ľavom brehu vedie k jeho pravostrannému prítoku Pokračuje juhozápadným smerom okrajom lesa po katastrálnu hranicu obce Nová Sedlica a ďalej juhozápadným smerom hranicou lesných porastov do doliny Bystrianskeho potoka Prechádza cez potok a hranicou lesných porastov vedie k prameništu Krásneho potoka Juhojuhovýchodným smerom vystupuje do svahu severozápadne od kóty Kýčera (854 m n m) a pokračuje ďalej juhozápadným smerom svahom po lesnú cestu smerujúcu do obce Zboj Ďalej vedie severozápadným smerom po hrebeni na kótu Jeseník (649 m n m) a ďalej po hrebeni severozápadoseverným smerom zostupuje do doliny Zbojského potoka k štátnej ceste Uličské Krivé-Zboj Prechádza cez cestu a severozápadným smerom vystupuje po svahu a hranicou lesných porastov pokračuje severozápadným až severným smerom východným svahom ku kóte Magura (725 m n m) k pravostrannému prítoku Hrabového potoka Pokračuje cca 200 m východným smerom po pravom brehu potoka, juhojuhovýchodným smerom vystupuje do sedla a ďalej východným smerom po svahu hranice lesných porastov vedie juhojuhovýchodným smerom po lesnú cestu vedúcu do doliny Hrabového potoka Severovýchodným smerom zostúpi do doliny, prechádza cez Hrabový potok a nezmeneným smerom vystupuje na lesnú cestu vedúcu po hrebeni do obce Zboj Hrebeňom po nej pokračuje severozápadným smerom cca 500 m a ďalej východojuhovýchodným smerom hranicou lesných porastov vedie do doliny potoka Ráztoka Prechádza cez lesnú cestu a potok a pokračuje juhojuhovýchodným smerom po ľavom brehu potoka cca 250 m Východným smerom vystupuje na hrebeň, ktorým pokračuje severným smerom ku Guľovej jame, a ďalej juhovýchodným smerom dolinou ľavostranného prítoku potoka Ráztoka hranico
u lesných porastov vedie k lesnej ceste vedúcej do obce Zboj, ďalej masívom Brezov na hrebeň, kde sa spojí s katastrálnou hranicou Nová Sedlica Po nej pokračuje južným smerom na okraj lesa a ďalej severným smerom po okraji lesa cez kótu Bahno (596 m n m) do doliny Zbojského potoka na ľavý okraj cesty vedúcej dolinou do obce Nová Sedlica Okrajom cesty vedie juhovýchodným smerom po ľavostranný prítok Zbojského potoka pri Širokom Severovýchodným smerom

vystupuje do svahu masívu Pod Príkrym po lesnú cestu vedúcu do doliny Zbojského potoka severne od kóty Široký (582 m n m) Ďalej vedie juhovýchodným smerom hranicou lesných porastov do doliny ľavostranného prítoku Zbojského potoka juhovýchodne od kóty 544 m n m V smere toku potoka pokračuje na okraj lesa a odtiaľ severovýchodným smerom okrajom lesa na križovatku ciest severoseverovýchodne od obce Nová Sedlica a ďalej východným až severovýchodným smerom do sedla k lesnej ceste severne od kóty 636 m n m Ďalej vedie juhojuhovýchodným smerom hranicou lesných porastov do doliny Tichého potoka a po jeho pravom brehu k štátnej hranici Slovenská republika-Ukrajina Pokračuje severným smerom štátnou hranicou s Ukrajinou po štátnu hranicu s Poľskou republikou a ďalej západným smerom štátnou hranicou s Poľskou republikou až do východiskového bodu

Národný park má výmeru 29 805, 0514 ha (z toho poľnohospodárska pôda 1 895, 7557 ha, lesná pôda 26 996, 2714 ha, vodné plochy 414, 6155 ha, zastavané plochy 48, 0247 ha, ostatné plochy 450, 3841 ha)

II Vymedzenie ochranného pásma národného parku

Územie ochranného pásma národného parku (ďalej len "ochranné pásmo") je vymedzené v teréne podľa katastrálnych máp so stavom v katastri nehnuteľností k 1 januáru 1996 a podľa lesníckych organizačných máp M 1 25 000 so stavom k 1 januáru 1994, z ktorých bola hranica ochranného pásma prenesená do základnej mapy Slovenskej republiky na tieto mapové listy

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Ochranné pásmo tvoria štyri samostatné časti (tri vonkajšie a jedna vnútorná), ktorých jadro predstavujú intravilány obcí

Jadro prvej, vonkajšej časti ochranného pásma tvorí intravilán obce Jalová Hranica ochranného pásma sa začína severovýchodne od obce Stakčín v mieste, kde sa hranica národného parku spája so štátnou cestou Stakčín-Jalová Prechádza cez štátnu cestu a vedie severovýchodným smerom k rieke Cirocha, ktorú križuje, a pokračuje severovýchodným smerom na okraj lesa, kde sa spája s hranicou národného parku

Jadro druhej, vonkajšej časti ochranného pásma tvoria intravilány obcí Kolbasov, Príslop, Ruský Potok, Ulič a Uličské Krivé Hranica ochranného pásma sa začína severne od obce Brezovec na dotyku hranice národného parku s katastrálnou hranicou Brezovec Vedie juhovýchodným smerom po okraji lesa k potoku Brezovčík a ďalej okrajom lesa postupne severným, juhovýchodným až juhojuhovýchodným smerom ku katastrálnej hranici Brezovec na úpätí kopca Klišov Ďalej vedie severovýchodným smerom po okraji lesa k lesnej ceste v doline ľavostranného prítoku potoka Brezovčík Prechádza cez potok a pokračuje juhozápadným smerom okrajom lesa k potoku Brezovčík Jeho pravým brehom vedie cca 500 m a ďalej východným smerom hranicou lesných porastov k ľavostrannému prítoku potoka Ublianka Popri potoku vedie okrajom lesných porastov k jeho pramenisku a ďalej juhovýchodným smerom hranicou lesných porastov po štátnu hranicu Slovenská republika-Ukrajina Po štátnej hranici vedie severovýchodným smerom do Mikošovej doliny, kde sa spája s hranicou národného parku

Jadro tretej, vonkajšej časti ochranného pásma tvoria intravilány obcí Nová Sedlica a Zboj Hranica ochranného pásma sa začína na dotyku katastrálnej hranice Nová Sedlica-Zboj so štátnou hranicou Slovenská republika-Ukrajina južne od kóty Rozdiel (654 m n m) a vedie severovýchodným a severným smerom po štátnej hranici do doliny Tichého potoka, kde sa spája s hranicou národného parku

Jadro štvrtej, vnútornej časti ochranného pásma tvorí intravilán obce Runina Hranica ochranného pásma sa začína západne od obce Runina na dotyku potoka Ulička s katastrálnou hranicou Vedie severozápadným smerom po tejto katastrálnej hranici po most cez Verbľačí potok Ďalej severoseverovýchodným smerom vystupuje na hrebeň a po ňom na lesnú cestu na svahu masívu Oren čova skala Ľavým okrajom cesty východojuhovýchodným smerom vedie cez Vysokú Kýčeru a Romanov žľab do Košiarnej dolinky k Hlbokému potoku Ďalej západným až severozápadným smerom pokračuje po pravom brehu Hlbokého potoka až do východiskového bodu

Ochranné pásmo má výmeru 10 973, 2893 ha (z toho poľnohospodárska pôda 4 606, 5459 ha, lesná pôda 5 671, 0917 ha, vodné plochy 129, 2522 ha, zastavané plochy 121, 8749 ha, ostatné plochy 444, 5246 ha)

Vyhláška 111/1999 Z.z.

(ktorou sa územie Vihorlat ustanovuje za chránenú krajinnú oblasť)
Autor Ministerstvo životného prostredia SR
Platnosť od 28 5 1999
Účinnosť od 1 6 1999

Uverejnené v Zbierke zákonov č 53/1999 strana 1158
NA ZÁKLADE:
287/1994 Z.z.
§13 ods 1 a 3,

RUŠÍ PREDPIS:
9/1974 Zb.,

OBLASŤ: Právo životného prostredia

111/1999 Z.z.

VYHLÁŠKA
Ministerstva životného prostredia Slovenskej republiky

z 19 apríla 1999,

ktorou sa územie Vihorlat ustanovuje za chránenú krajinnú oblasť

Ministerstvo životného prostredia Slovenskej republiky podľa § 13 ods 1 a 3 zákona Národnej rady Slovenskej republiky č 287/1994 Z z o ochrane prírody a krajiny ustanovuje

§ 1
Chránená krajinná oblasť Vihorlat

Územie Vihorlat v okresoch Michalovce, Sobrance, Humenné a Snina sa ustanovuje za Chránenú krajinnú oblasť Vihorlat (ďalej len "chránená krajinná oblasť")

§ 2
Územie chránenej krajinnej oblasti

(1) Územie chránenej krajinnej oblasti sa nachádza v katastrálnych územiach Jovsa, Poruba pod Vihorlatom, Remetské Hámre, Hlivištia, Choňkovce, Podhoroď, Ruská Bystrá, Vyšná Rybnica, Hrabová Roztoka, Strihovce, Kolonica, Ladomírov, Stakčín, Snina, Zemplínske Hámre a Valaškovce

(2) Chránená krajinná oblasť má výmeru 17 485, 2428 ha, jej územie je vymedzené v prílohe

§ 3
Dokumentácia

Mapy, v ktorých sú zakreslené hranice chránenej krajinnej oblasti, sú uložené na Ministerstve životného prostredia Slovenskej republiky, na Krajskom úrade v Košiciach, na Krajskom úrade v Prešove, na Okresnom úrade v Michalovciach, na Okresnom úrade v Sobranciach, na Okresnom úrade v Snine a na Okresnom úrade v Humennom

§ 4
Zrušovacie ustanovenie

Zrušuje sa vyhláška Ministerstva kultúry Slovenskej socialistickej republiky č 9/1974 Zb , ktorou sa vyhlasuje chránená krajinná oblasť Vihorlat

§ 5
Účinnosť

Táto vyhláška nadobúda účinnosť 1 júna 1999

László Miklós v r

Príloha

VYMEDZENIE ÚZEMIA CHRÁNENEJ KRAJINNEJ OBLASTI VIHORLAT

Územie chránenej krajinnej oblasti (ďalej len "oblasť") sa nachádza v Prešovskom kraji v okrese Humenné v katastrálnom území Valaškovce (vojenský obvod) a v okrese Snina v katastrálnych územiach Hrabová Roztoka, Kolonica, Ladomírov, Snina, Stakčín, Strihovce a Zemplínske Hámre, ďale v Košickom kraji v okrese Michalovce v katastrálnych územiach Jovsa a Poruba pod Vihorlatom a v okrese Sobrance v katastrálnych územiach Hlivištia, Choňkovce, Podhoroď, Remetské Hámre, Ruská Bystrá a Vyšná Rybnica

Súpis katastrálnych máp

Územie oblasti je vymedzené v teréne podľa katastrálnych máp so stavom k 1. januáru 1998 a podľa lesníckych organizačných máp M 1 : 25 000 so stavom

- k 1. januáru 1990 pre lesný hospodársky celok Remetské Hámre, Hlivištia, Ubľa a Kamenica,
- k 1 januáru 1991 pre lesný hospodársky celok Snina a Jovsa,
- k 1. januáru 1993 pre lesný hospodársky celok Kamienka

Z týchto máp bola hranica oblasti prenesená do Základnej mapy Slovenskej republiky M 1 . 50 000 na tieto mapové listy.

M 38 - 21 Snina,
M 38 - 23 Sobrance

Hranica oblasti vychádza z bodu na severovýchodnom okraji obce Jovsa, pokračuje východným smerom okrajom lesa po most na potoku Myslina, odtiaľ na severovýchod proti prúdu potoka Myslina do priestoru Požiare, kde sa lomí na východ a po okraji lesa odbočuje v pravom uhle na juh a pokračuje po toku ľavostranného prítoku potoka Myslina hranicou lesa Po vrstevnici v nadmorskej výške 300 m smeruje približne na východ cez Porubský potok, kde dosiahne katastrálnu hranicu obcí Poruba pod Vihorlatom - Remetské Hámre, po ktorej smeruje južne na kótu 295 m n m , severovýchodným smerom obchádza kótu Čierna studňa (345 m n m) a pokračuje hranicou lesa ponad severný okraj obce Remetské Hámre do potoka Okna Ďalej sa stáča na juh a pravým brehom potoka pokračuje na most pri Novej píle, odkiaľ vedie asi 2100 m po okraji lesa cez kótu 270 m n m , stáča sa na severovýchod a pokračuje približne 1000 m po okraji lesa Asi 150 m od kóty 326 m n m smeruje juhovýchodne a vyúsťuje na lesnú cestu Rybnička Pokračuje juhozápadným smerom po okraji lesa až po potok Rybnička a ďalej juhovýchodným smerom okrajom lesa po katastrálnu hranicu obce Vyšná Rybnica Potom smeruje na východ, pretína pravostranný prítok Slaného Potoka, juhovýchodným smerom pretína jeho ľavostranný prítok, odtiaľ pokračuje na juhovýchod až juh a východne prechádza cez kótu 252 m n m Ďalej pokračuje po severovýchodnom okraji lesa a ceste Choňkovce - Podhoroď, obchádza západný okraj obce Podhoroď až po lesnú cestu vedúcu do obce Ruská Bystrá Z tohto bodu hranica oblasti smeruje severozápadne po pravostrannú zákrutu do obce Ruská Bystrá, odtiaľ severozápadne cez potok Luhy, západne obchádza kótu Poloň (573 m n m) Ďalej pokračuje severozápadným smerom cez pravostranný prítok Hrabového potoka a pravostranny prítok Rovného potoka, odtiaľ po lesnej ceste severným smerom ku západnému okraju obce Strihovce Tu sa hranica oblasti stáča severozápadne <%-2>proti toku ľavostranného prítoku Rovného potoka cez kótu 578 m n m , ďalej smeruje po lesnej ceste na sever až do bezmenného ľavostranného prítoku potoka Luh, kde sa v pravom uhle lomí na západ, prechádza cez kótu 648 m n m <%0>až do ľavostranného prítoku potoka Kolonička, odkiaľ pokračuje lesnou cestou približne na severovýchod až sever. Na križovatke lesných ciest sa prudko stáča na juhozápad, pokračuje lesnou cestou severne od kóty Na kameni (568 m n m) do potoka Prechodovec, západným smerom prechádza cez potoky Kuršina, Veľká Bystrá a Malá Bystrá až na okraj lesa asi 200 m východne od kóty 450 m n m Potom sa stáča na juhovýchod a pokračuje okrajom lesa k Čiernemu potoku a ku katastrálnej hranici obce Zemplínske Hámre, odtiaľ na križovatku Kamennej cesty a lesnej cesty. Touto lesnou cestou prechádza cez kótu 524 m n m až na hranicu vojenského výcvikového priestoru (VVP) Prebieha po hranici VVP a súčasne po hranici lesa, pretína potok Porúbka, stáča sa na kótu 691 m n m a prevažne juhozápadným smerom pokračuje hranicou lesa po sútok potokov Kamenica a Klinov Ďalej pokračuje juhojuhovýchodným smerom proti toku potoka Klinov, prechádza sedlom severoseverovýchodne od kóty Malý Peňažník (738 m n m), odkiaľ pokračuje po pravom brehu Jovsianskeho potoka až k východiskovému bodu severovýchodne od intravilánu obce Jovsa

Chránená krajinná oblasť má výmeru 17 485, 2428 ha Z toho je 603, 0011 ha poľnohospodárskej pôdy, 16 647, 6962 ha lesnej pôdy, 30, 4175 ha vodných plôch, 0, 7019 zastavaných plôch ha a 203, 4261 ha ostatných plôch

Annex 7

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NATIONAL ECOLOGICAL CENTRE OF UKRAINE

DEVELOPMENT OF THE ECONET OF UKRAINE

Final report resulting from the IUCN Office for Central Europe Project:

"ECONET Development in Central and Eastern European Countries"

Project coordinator:

Dr. Ludmila Vakarenko

Kyiv - Ukraine
1999

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CONTENTS:

INTRODUCTION.

The Project for the development of the ecological network of Ukraine (hereafter ECONET of Ukraine) is being developed according to Article 16 of the Constitution of Ukraine, the Law of Ukraine "On ratification of the Convention on Biological Diversity" (1994), the Pan-European Biological and Landscape Diversity Strategy (Sofia, 1995), in fulfilment of decrees of the Cabinet of Ministers of Ukraine # 439 "On the Strategy of Conservation of Ukraine's Biological Diversity" of 12 May 1997 and # 1259 "On improvement of the state management of nature conservation in Ukraine" of 12 November 1977, as well as for implementing major activities outlined in the "Main directions of the state policy of Ukraine in the fields of environment protection, use of natural resources, and environmental safety" approved by the Verhovna Rada (Parliament) of Ukraine on 5 March 1998, # 188\BP.

The main legal basis for development of the national ecological network is provided in Article 60 of the Law of Ukraine "On Protection of the Natural Environment" of 25 June 1991.

The ecological network is an integrated territorial system of specially protected natural landscapes, including protected areas of the national nature conservation system, territories used for recreation, water management, agriculture, and other areas and units defined by the national legislation of Ukraine.

Formation and development of the ecological network includes measures and activities aimed at transformation of the State Land Fund structure by transferring some portion of economically used lands to other categories, i.e. specially protected natural areas for conservation and restoration (re-naturalization) of biological and landscape diversity.

1. ANALYSIS OF THE NATURAL CONDITIONS FOR THE DEVELOPMENT OF THE ECONET OF UKRAINE.

1.1. The present status of natural areas and units.

Natural areas and units in need of a special protection measures (nature conservation areas, recreational lands, water protection and field protection zones, and other similar types) in Ukraine cover an area considerably lesser than arable lands, settlements, transportation system, and other areas considerably transformed by economic activity of human beings Protected areas are unevenly distributed on that territory The present area and territorial structure of specially protected lands of Ukraine provide some basis for regarding these lands as a territorial system with certain characteristics of an ecological network The present status of natural areas in Ukraine only partially meets the criteria of the Pan-European Ecological Network.

The ecological network includes a portion of the country, which still has intact or partially transformed natural landscapes. According to the Land Code of Ukraine, the following land categories can be classified as ecological network components:

1. Lands used for conservational, recreational, therapeutic, and cultural purposes;
2. Lands of the Forest Fund,
3. Lands of the Water Fund,
4. Reserve lands (in part)

Among the land categories classified by types of their use, the following can provide components of the ECONET:

1. Forests and other forested areas;
2. Non-forested mires,
3. Open lands without vegetation, or partially covered with vegetation,
4. Waters (including rivers, canals, reservoirs, estuaries),
5. Areas contaminated by radionuclides (in part),
6. Agricultural lands (hayfields, pastures, etc)

Areas occupied by the mentioned categories are stated in Tab. 1.

Tab 1. Areas of different lands categories of Ukraine and percentage of natural landscape areas

No	Land categories	Area, thou Ha	% of the area of the country	Areas with natural landscapes	% of the area of the country
1	Agricultural lands total - Including hayfields – pastures -	42965,5 2307,3 5465,6	71,20	 2307,3 5465,6	 3,82 9,06
2	Forests and other forested areas: Total – Including: forests – forest shelter belts and hedges – shrub thickets – Of forests and forested areas: lands used for nature conservation, protection and other ecological purposes and recreation -	10380,2 9424,6 645,5 310,1 4177,2	17,20	10380,2 9424,6 645,5 310,1	17,20 15,62 1,07 0,51
3	Lands of settlements	2336,9	3,87		
4	Non-forested mires	940,4	1,56	940,4	1,56
5	Radioactively contaminated lands excluded from agricultural use	136,0	0,21	136,0	0,21
6	Open lands without vegetation or partially covered with vegetation	1180,8	1,96	1180,8	1,96
7	Water bodies – total – Including: rivers - canals – lakes – reservoirs – estuaries -	2415,0 244,0 162,2 540,8 1133,7 334,3	4,00	2415,0 244,0 162,2 540,8 1133,7 334,3	4,0 0,4 0,27 0,90 1,88 0,55
	Total	60354,8	100	22825,3	37,81

Natural landscapes still occupy ca. 2/5 of the total area of Ukraine. The least transformed landscapes preserved in regions occupied by forests, shrub thickets, mires, open barren lands, etc., which cover 19 65% of Ukraine's territory. However, if we consider that only 44% of forests perform protective and conservational functions, we can assume that really natural (or close to natural) landscapes occupy only 12.73% of the total area of the country

Natural complexes within nature conservation units are best protected The Nature Conservation Fund of Ukraine includes biosphere reserves, strict nature reserves ("zapovednik"), national nature parks, regional landscape parks, reserves ("zakaznik"), nature monuments, protected sites, botanical gardens, arboreta (dendrological parks), zoos (zoological parks), horticultural monuments, etc., covering 2250 thousand hectares, or 3 8% of the total area of Ukraine. About 500 thousand hectares of land is used by organizations and institutions of the nature conservation system.

1.2. LANDSCAPE RESOURCES FOR THE FORMATION OF THE UKRAINIAN ECONET

A landscape analysis of the current status and prospects for the development of the Ukrainian ECONET has been accomplished on the basis of a complex physico-geographical approach A zonal and regional division has been used, splitting up the country into zones, subzones and regional landscape complexes This has been done according to physico-geographical and bio-geographical justifications of the updated scheme of the author concerning the physico-geographical division of Ukraine into districts. Anthropogenic transformations of natural areas have been taken into account, which may be included or excluded from the ECONET. An account has been made of how well various landscape types are represented in the network

Main features uniting various natural areas of Ukrainian lowlands have been identified. These are the openness and accessibility to land and water, the absence of inter-regional barriers (in particular, surface barriers) for the flow of air masses, regional oro-tectonic and zonal-regional conditionality of the internal landscape structure; consolidation of the area by river valleys of various order; broad links of between the land and two seas. Each of these features has been examined as factors influencing the integration and further development of the Ukrainian ECONET This gave the opportunity to analyse a class of related links, which condition the efficiency of each concrete factor as an integrator for the ECONET, discover their unrealised potential Prospects have been made clear of the preservation, optimization and further development of the Ukrainian ECONET.

The consideration of landscapes as complexes of mutually linked and interacting natural and transformed by human constituents provides to possibility to present the resources for establishing an ECONET, taking into account many other resource factors. In general they can be presented as a totality of components and factors, and complex factors of landscape resources for establishing an ECONET. To these belong the following fairly diverse factors-constituents. To first group we ascribe factors and components as territorial (dryland) and aquatic-terrestrial (inland water), aquatic (marine), aerial, oro-tectonic (among them lowlands, highlands as well as river valleys), lithogenic; biogenic; anthropogenic. Among anthropogenic we distinguish agrolandscape, forest-amelioration, communal, transport, water supply factor-constituents To the second one belong zonal, altitudinal, regional and local complex factors Among the zonal ones in Ukraine it is necessary to distinguish broad-leaf forest, forest-steppe, steppe (northern steppe and southern steppe) and dry steppe factors. We present the landscape study vision of these mentioned factors influencing the establishment of the Ukrainian ECONET, having in mind their numerous (actually due to combination) mutual links

Territorial (dryland) and aquatic-terrestrial (inland water) factors. To this group belong the most obvious and essential qualities of dryland area embedded with inland waters and being a substrate for the realisation of all the terrestrial and terrestrial-aquatic constituents of the ECONET.

Among the landscape factors it is appropriate to distinguish terrestrial and aquatic (wetland) landscape complexes In doing so it is logical to pay most of our attention to natural formations of linear extension, such as rivers - river-bed and oxbow complexes, natural and man made lakes (ponds and reservoirs) - and stretches of coastal zones and marine shallows, which are natural or man-man eco-corridors for numerous biota and function as efficient constituents of the eco-network

We should note that meadow and meadow-palustrine and palustrine complexes of the upper reaches of the largest rivers and quite often in the middle flow of average- and small-scale rivers in Ukraine are transformed to are large extent: drained and often ploughed, river courses are straightened and channelised.

Well preserved are extensive flood-plain landscape complexes of certain average- and large-sized rivers of the Polissya - Turia, Stokhod, Sluch, Desna, Seim, Revna, Snov, Sozh, Dnipro (upstream the Kyiv Reservoir), small rivers which have not been or weakly impacted by amelioration.

Aquatic (marine) factors. These naturally bring together the terrestrial-aquatic ECONET of Ukraine and link it broadly with two seas, integrating the network of river valley ecocorridors of Ukraine into one unit, in particular those which belong to the Azov-Black Sea catchment area River valley and marine, especially coastal ecocorridors are vital for the life of many plant and animal species, in particular birds. The areas of water of both the seas act as a wide and uninterrupted inter-regional ecocorridor linking the subtropical zone and the northern temperate zone.

Natural landscapes of the coastline, sand bars and spits form narrow belts linking terrestrial, aquatic and submarine benthic shelf complexes Maritime coastal ecocorridors of a high rank are confined to these landscape formations.

Inter-regional ecocorridors of the Black and Azov seas stretches for hundreds and thousands of kilometres They continue, for instance, from the mountainous Crimean coast to the steppe area of the Crimea, further to the Sivash and the dry steppe area of the Lower Dnieper, the Black Sea coast, extending further into Romania and Bulgaria Such a thread-like inter-regional ecocorridor consists actually of the coastal zone - the contact between land, the sea surface and bottom - and natural areas formed by accumulation, abrasion (accompanied often by landslides), or even erosion. In many hardly accessible places with high steep cliffs such coastal complexes are practically beyond any human impact (for instance, the Atelesh abrasive and landslide coastal area of the Tarkhankut Peninsula in the Crimea) In low places all the coastal complex is comprised of beach strip, however this strip is uninterrupted, never dries up, and in whatever condition is efficient in playing its ecofunction - the function of a stable in time and space inter-regional corridor acting at the conjunction of dryland and marine environment.

Less long, however significant as well in the regional_context are ecocorridors of marine shell-detrite and sandy spits, sand bars and islands with poor semidesert-like vegetation, often of halophytic type They isolate from the sea estuaries and lakes (Arabatska Strilka, for instance, has the length of 114 km, Lebedivska Kosa, which isolates a number of lakes from the sea, starting from Lake Sasyk up to Lake Burnas, is 51 km long). They as well may be surrounded by the sea (Biryuchi Island together with Fedotova Kosa is 44 km long, Obitochna Kosa - 27 km, etc) They normally accumulate coastal deposits (Tendrivska Kosa - 65 km, Jarylgach Island together with Levkina Kosa - 42 km) - and also permanently fulfill the functions of a regional or sub-regional ecocorridor within the limits of the marine shallows.

Oro-tectonic factors. Regional oro-tectonic conditioning of the natural environment of the continental part of Ukraine is high uniform The orientation of the main oro-tectonic constituents of the lithogenic base within the limits of Ukraine - from the NW to the SE - is the same ranging from the Zakarpattya to the Zadonetski Steppe of Starobilshchina this direction have the Ukrainian Carpathians, the Dniester valley, Volyno-Podilska elevation, the Tovtry range, valleys of the Western Bug and Southern Bug, the Pridniprovska elevation, the valley of the Dnieper from Kiev downstream to Dnipropetrovsk, the

Pridniprovska lowland, fragment of valleys of large and small rivers as well as passages of the Livoberezhzhya and the valley of the Siverski Donets. Thus, oro-tectonic factors forming the Ukrainian ECONET a closely linked with river valley factors.

The SW direction of the mentioned constituents of the oro-hydrography of Ukraine is laid by deep-lying tectonic structures, which directly or partially are reflected in the modern relief In practice all the mentioned oro-hydrographic formations are river valleys or morpholithogenic **ecocorridors of high inter-regional and regional rank.**

The submeridional direction is not so wide-spread in Ukraine and is exemplified by the left tributaries of the Dniester and the right tributaries of the Pripyat, i e within the Podillya and Volyn regions, an also partially in the valley of the Desna, Poltavske Livoberezhzhya and Starobilshchina

Many times it is possible to distinguish sublatitudinal continuality. whole regions - Small and Pripyatske Polissya, ancient fluvio-glacial valley of the Ancient-Slovechna, valleys of such rivers as the Pripyat, Zheriv, Uzh, Desna (partially) and Seim, Oster - and valleys of Rastavitsa and Ros, Oril, Samara, upper reaches of Vovcha, Konka, the previous Velyki Luh (nowadays beneath the waters of Kakhovski Reservoir), the Dniprovski Liman, Kinburnska and Tendrivski spits, Jarylgach Island, the axis of the Prichornomorski Lowland (Karkinitska Zatoka - north of the Lake Sivash)

The fact of oro-tectonic constituents within the limits of the bigger portion of Ukraine being orientated in one direction is a powerful factor, which reveals itself in many natural ecocorridors of inter-regional and regional rank. What is more, the oro-tectonic conditioning can be considered as a guarantee of the integrity and full representation of components and therefore of the functional reliability of the ecocorridors. Without doubt, this significant group of components and factors for the formation of the ECONET should be considered and used as the skeletal part_of the Ukrainian ECONET.

Oro-tectonic factors subordinate the group of plain and mountain-system factors. To the first belong lowland factors - the most favourite if one considers the small possibility for surface forms to pose an obstacle and lower chances for possible ecological changes, as far the transformation of air masses above them hardly occurs to a large extent, highland factors - these are "transformers" of humid air masses and favour more the moisture-loving components of the biota, ridge and range factors - are close to the latter and are usually distinguished by their lithogenic influence.

Mountain-system factors are outstanding first of all because of their influence as a barrier and for concentrating moisture, for their lithogenic influence, which favours many representatives of the flora and fauna. On the other hand landscapes of mountainous systems (to a lesser extent the landscapes of elevations) create conditions for endemism, preservation of certain species of the biota, which have not found refuge in the plains, particularly the lowland landscapes

And once again about **river valley factor.** They are important because they have the optimal for ecocorridors elongated form, which is combined with the appropriate content - inter-regional and regional, they are practically uninterrupted chains consisting of diverse natural massifs (lithogenic, biogenic, aquatic), in places changes by man, however still being real natural ecocorridors including many components. Such are numerous river valleys, they are one of the most complex and meaningful natural ecocorridors, the oro-tectonic conditioning of the direction of river valley ecocorridors is one of the most strong natural integrators of the Ukrainian ECONET.

Lithogenic factors. A bright example of the lithogenic impact on the formation of a regional ranking ecocorridor is the **Tovtry Hilly Range** with its picturesque and diverse ecological conditions combining lime-stone remains, tracts of broad-leaf forests and stony steppe. The Tovtry range is spread to a distance of 200 km in the central part of the Volyn-Podilski region sub-parallel to the Dniester valley.

Biogenic factors. The diversity of biota of various landscape formations in Ukraine is rich and exhibits many variants Among them - broad-leaf and coniferous (mainly pine) forest landscapes, forest-steppe, meadow, steppified meadow, genuine steppe, dry steppe, semidesert landscapes; in the Crimean Mountains - in addition forest and bush-forest with Mediterranean elements.

Perhaps one of the most powerful within the limits of Ukraine natural ecocorridors is biogenic - the broad-leaf forest It is extended sublatitudinally and ranges from the Volyn and Zhytomyr Polissya and continues further through the Kiev Polissya and ends up in the Chernigiv and Novgorod-Siverski Polissya In many places of the broad-leaf forest zone natural biogenic landscape formations are alternated by anthropogenic transformations; in numerous river valleys these are ameliorated meadows and, in between the valleys, farmland

Hardly less significant are biogenic factors for the natural landscape complexes in the forest-steppe, but their distribution here is not so wide, compared with the natural landscapes of the broad-leaf forest zone.

Landscapes of the Nyzhnodniprovski, Prisivasko-Priazocski and Crimean steppes are featured mainly by biogenic inter-regional ecocorridors of river valley type (primarily river-bed aquatic, floodplain forest and reedbed complexes) of the Lower Dnieper and the Dniprovski Liman and the surroundings of the river Molochna together with the Molochny Liman. An outstanding regional ecocorridor in the Lower Dnieper area is a belt of forest plantation and natural oak-birch-alder vegetation (the so-called "kolki") of sands and surroundings of saline lakes within the Kinburn Peninsula This belt extends with a few interruptions up to almost 140 km.

Anthropogenic factors. Presented above factors embrace primarily the properties of natural landscape formations These are complimented by a large group of landscape formations, which are basically natural, but have been transformed under human impact, and which are considered to be anthropogenic factors of the formation of the ECONET. To these belong various, however consolidated in space formations, and correspondingly, ecocorridors of anthropogenic origin. They are related to agricultural land and numerous forest plantations, most often tree lines, interchanged by rural and urban settlements, crossed by transportation lines, other lines of communication, drainage networks, pipelines and other irrigation and watering channels These are agrolandscape, forest amelioration, municipal, transport, water channel factors of the ECONET formation. These are regularly located in the south of Ukraine - in the steppe and, especially, in the dry steppe areas The drainage systems are located mainly in the northern broad-leaf forest landscape area and their river valley complexes.

Zonal factors. According to the division of Ukraine into four zonal types, the factors responsible for the formation of the ECONET are broad-leaf forest, forest-steppe, steppe and dry steppe factors.

2. Basic conditions for developing the ECONET of Ukraine.

2.1. General aspects.

At present there exist favourable prerequisites for expanding areas of natural landscapes These favourable factors are inter alia the following:

- as a result of the economic reforms, introduction of environmental and eco-economic priorities in land use, diversification of land ownership system, new socioeconomic conditions have been developed for exclusion of some agricultural areas (especially degraded arable lands) from economic use because of their economic unprofitableness,
- transfer of such unprofitable agricultural lands to the system of restoration of natural landscapes is recognized as the most socially expedient type of land use of such areas,
- alienation of strips of water protection lands along rivers according to the Water Management Code of Ukraine;
- delimitation of coastal lands as a special category,
- increase of forested areas,
- the need to fulfill Ukraine' s international commitments regarding international environmental conventions.

2.2. Legal aspects

The basic legal documents for establishment of nature conservation units (core areas) of national and local importance are: the Law of Ukraine "On the Nature Conservation Fund of Ukraine" (1992), the Forest Code of Ukraine (1994) and the Water Code of Ukraine (1995). Internationally important core areas are created in accordance with international legal documents: wetland areas - according to the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention, 1971); natural heritage sites - according to the Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention, Paris, 1972), areas of special interest and significance (united into the Emerald Network of Europe) - according to the Convention for the Protection of Wild Fauna and Flora and Natural Habitats in Europe (Bern Convention, 1979), coastal and marine areas - according to the Convention on the Protection of the Black Sea against Pollution (Bucharest, 1992) European recognition of protected areas is pursued through the European Diplomas issued by the Council of Europe according to Resolution (91) 16 of the Ministerial Committee of the Council of Europe of 17.06.1989, and through their inclusion into the special list of biogenetic reserves according to Resolution (73)30 of 26 10.1973. Other international legal documents used are the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979), Agreement on the Conservation of Bats in Europe (Bonn, 1991), Agreement on the Conservation of African-Eurasian Migratory Waterbirds (Bonn, 1996), Agreement on the Conservation of Whales and Dolphins of the Black and Mediterranean Seas and Adjacent Regions of the Atlantic (Monaco, 1996), etc

3. The goal and directions of the development of the National ECONET.

The main goal is to set up a territorially bound and integral system of natural and semi-natural areas structured for enabling natural routes, dispersal and migration of species of animals and plants. In addition to that, the national ecological network should conform to requirements of the Pan-European Ecological Network.

The main direction in forming the components of the national ecological network are

- justification of the spatial structure of the ECONET for uniting natural habitats of populations and species into a coherent, united system;

- providing sufficient areas and adequate outlines of ECONET components to ensure stable existence, free dispersal and migration of plant and animal species,

- selection of areas suitable as ECONET components (core areas, ecological corridors, etc) and definition of their place in the structure of lands,

- justification of measures for promoting development of the ECONET;

- introduction of a state inventory system for ECONET components included into the Land Cadastre, Forest Cadastre, Water Cadastre, and development of the State Cadastre of the national ecological network;

- optimization of area, structure and state of ECONET elements,

- expanding the areas of protected areas, raising their status; reservation and subsequent preservation of natural areas rich in biodiversity, especially mature natural communities, riverine (riparian), montane and ravine forests, virgin lands; unique, typical and endangered ecosystems and landscapes; habitats of rare, vulnerable and threatened species of plants and animals, their communities, geological formations, standard types of soil, etc ;

- development and implementation of the General Plan for development of the national ECONET and regional plans and schemes;

- granting a special conservational status to some selected regions and implementation there biological, ecological, technological and social elements of sustainable development,

- harmonization of contact zones between the national ECONET of Ukraine with ECONET elements of adjacent countries in the context of developing the Pan-European ECONET,

- environmental education and information for the local population on the importance of the ECONET in maintaining ecological stability in the region, implementing a sustainable socioeconomic development policy, strengthening responsibility and participation of the local administration bodies and population in conservation of the biological and landscape diversity,

- decreasing areas of agricultural lands, in particular the percentage of arable lands,

- limitation of intensive use of ecologically vulnerable lands,

- practical introduction and application of principles of environmentally sustainable land use; non-exhaustible us e of lands;

- environmental rehabilitation of natural areas in the Dnipro (Dnieper) River basin, improvement of riparian and floodplain ecosystems in the basins of the Dnister (Dniester), Pivdenny Bug (Southern Bug), Zahidny Bug (Western Bug), Siversky Donets', Danube, implementing measures for conservation of wetlands, in particular by expanding areas occupied by natural landscapes and strengthening their water storage and regulation capacity,

- development and implementation of measures aimed at conservation of biological diversity of the Black Sea and the Sea of Azov; development of a network of marine protected areas, re-naturalization and better protection of coastal zones,

- afforestation and reforestation of former agricultural lands (if ecologically appropriate),

- restoration (re-naturalization) of steppe, meadow, wetland and other ecosystems,

- promoting habitats for species of plants and animals and their communities, especially those listed in the Red and Green Data Books of Ukraine, international "red lists", and international conventions/treaties ratified by Ukraine.

- optimization of practices of agriculture, forestry, fisheries, etc, taking into consideration habitats and living conditions of representatives of the local flora and fauna,

- rehabilitation, conservation and restoration of urban/rural "green belts".

4. Structure of the ECONET: possible elements.

4.1. Elements of structure.

According to the national legislation, the core areas and ecological corridors are formed by the following areas and sites

1. Areas and sites (units) of the nature conservation system (Nature Conservation Fund) as core areas of the ecological network, including nature reserves, biosphere reserves, national nature parks, regional landscape parks, reserves (landscape, forest, botanical, zoological, ornithological, entomological, ichthyological, hydrological, geological, paleontological and speleological ones), nature monuments, artificially created units (botanical gardens, arboreta, zoological gardens, parks, horticultural monuments, etc.).

2. Aquatic sites and units (marine areas, lakes, reservoirs, rivers, etc.) as core areas and buffer zones, small extended units (canals, ponds) and protected areas of the National Water Fund (water protection zones, coastal and riverine protected belts, sanitary zones along water bodies, etc.) as ecological corridors

3. Forests of I category valuable forest areas, forests of special importance for protection of environment; forests of scientific and historical value, including genetic reserves, forest plantations of fruit trees, and subalpine tree and shrub communities - as core areas, forests in settlements, green belts around settlements and industrial complexes, forests of the 1st

and 2nd belts of sanitary zones around water sources, forests of sanitary protection zones around recreational and medical units and resorts - as buffer zones, forest belts along watercourses and around water bodies, anti-erosion and protective belts along railroads and highways, state forest shelter belts, forests in the steppe zone, etc. - as ecological corridors

4. Forests of II category, which mainly perform buffer functions and, however used in economic forestry, also have some ecological importance.

5. Resorts and areas of medicinal importance with pronounced natural curative and recreational values· mineral wells, climatic and other conditions beneficial for human health - as buffer zones

6. Recreational lands used for public recreation and tourism - as buffer zones.

7. Other natural areas (plots of steppe non-arborescent vegetation, meadows, pastures, rocky outcrops), lands of military test sites and training/testing grounds, lands of the water management system - as buffer zones and ecological corridors

8. Extensively used agricultural lands - as buffer zones

9. Lands contaminated by radionuclides - as areas with special regime of protection and management .

Buffer zones (belts) are created for protection of core areas and ecological corridors from external negative impacts and factors, promotion of favourable conditions for development and self-restoration in core areas and ecocorridors, at the same time, buffer zones serve the relationships between society and nature, optimize management aimed at conservation of existing and restoration of already lost natural values.

4.2. The ECONET of Ukraine: perspectives of implementation

This should be determined, on one hand, by its functional assignment as an integrated natural system, which should provide·

the preservation for the normal functioning of all natural processes the minimum necessary amount of diversity of all levels and forms of its organisation, support to the ecological balance of the area, the improvement of the living standards of the human population, both environmental and social, on the other hand - by the degree of the differentiation of the environment and the state of its preservation. Under all conditions it is necessary to keep to those numerous requirements, which were discussed previously, choosing the optimal, economically feasible and realistic design, in which the levels of differentiation of the natural environment would be represented by corresponding hierarchical levels of the ECONET.

The highest levels of the differentiation of the natural environment in Ukraine, as known, are zonal and orographic. The representativeness of objects of these levels in the ECONET corresponds to their national and pan-European significance. Speaking about this rank we have in mind the broad-leaved forest region (zone) or the mixed forest landscape zone, which is presented by the Polissya and partially by the Podilska Vysochina; the forest-steppe region (zone), which coincides with the landscape zonality, with the exception of the mentioned above part of the Podilska Vysochyna and includes another part of the Podilska Vysochyna and parts of the Prydniprovska Vysochyna and Serednyorosiyska Vysochyna and Prydniprovska Nyzovyna, Poltavska Rivnyna, and the steppe region, which practically coincides with the landscape zone and occupies the southern parts of the Prydniprovska

Vysochyna and the Serednyorosiyska Vysochyna, the Pryazovska Vysochyna and Donetska Vysochyna, as well as the spacious Chornomorska Nyzovyna. As to the orographic differentiation we have the Ukrainian Carpathians and Crimean Mountains. In the general case this is the latitudinal differentiation. The meridional differentiation is presented by the valleys of large rivers - Dniester, Western Bug, Dnieper, and Siverski Donets, which are migratory routes for numerous animals and plants, a habitat for original floodplain complexes of diversity, which run across all zones. Such an approach is to a certain extent in accordance with the catchment principle for preserving nature, which is taken into account when dividing Ukraine into biogeographical districts In such a way the ECONET of pan-European significance is composed of three latitudinal belts, four meridional, and two mountainous ones.

The principle geographical directions of the ECONET

It is possible to propose an ECONET, which consists of 12 elements of the highest level - five latitudinal, five meridional ecocorridors and 2 highlands, which cover cores - units of the existing protected areas network and embrace buffer zones, which are presented by forests of the 1st group, green belts around settlements, forest-parks and recreational zones. These ecocorridors embrace, correspondingly, three natural zones (in the latitudinal extension) and the valleys of five main water courses in Ukraine (in the meridional and sub-meridional extension), allowing simultaneously getting the maximum representativeness of natural complexes, save our efforts and seek out a synergic effect. Their possible extension may be the following. The latitudinal corridors 1/Poliski (forest), 2/Halytsko-Slobozhanski (forest-steppe), 3/Bukovynsko-Donski (steppe), 4/ Azovo-Chornomorski (coastal), 5/Marine

The Poliski Corridor covers a part of the catchment of the Western Bug, the right tributaries and the Pripyat itself, crosses the Dnieper, embraces the left tributaries and the Desna itself. In such a way, starting from the Shatski Lakes in the west and providing a link with Poland, bordering Belarus in the north, it ends up at the border with Russia - in the north and east, in a forested and boggy area. This corridor embraces the principle marshlands, regions of the main catchment of the Dnieper and its tributaries, and partially the catchment of the Western and Southern Bug rivers, Dniester, Siverski Donets. In this area there are comparatively many intact landscapes. It may include such core areas as the Shatski National Nature Park (NNP), the future Verkhnyodniprovski, Desnyanski, Mezenski NNP, the future Poliski Biosphere Reserve

The Halitsko-Slobozhanski Corridor stretches from the Syan River in the west, embracing Rostochchya, Opillya, the Carpathians, Podillya, Prydniprovya, Poltavshchyna, Slobozhanshchyna up to the rivers of the Siverski Donets catchment and the Don in the east. In such a way within the limits of the basic ecocorridor we have sectors of the catchment area of rivers of the largest size, zones of endemism in the Carpathians and Podillya, sectors of virgin forest - beech and spruce in the Carpathians, oak in the Podillya and Slobozhanshchyna, pine stands in Slobozhanshchyna, hornbeam-wood of Rostochchya, plots of steppe in Opillya, Prydniprovya, relic cretaceous communities of the Siverski Donets, refuges for relict groups in the Carpathians, Opillya, Podillya.

The belt of the Bukovynsko-Donski Corridor passes from the Khotynska Vysochyna and the Dniester Valley in the west, embracing the Dnistrovsko-Dniprovski region, Livoberezhno-Dniprovsko-Priazovski northern-steppe region, Donetski and Zadonetsko-Donski northern-steppe territory and the northern part of the Prychornomrya (i e. the lowlands near the Black Sea) In such a way the Bukovynsko-Donski Corridor embraces the larger part of the Steppe Zone in Ukraine, being wedged in between the Hruzski Yelanchyk and Mius rivers in the south and the Donets and Don, as well as Starobilshchyna and Bilovodsk, in the north. The natural complexes within this corridor are the most damaged by man and fragmented, these are plots of steppe, petrophytic communities, endemics and relics of the Pobuzhzhya, Northern Pryazovya Core elements of this corridor are the nature reserve Yelanetski Step, Ukrainian Steppe Nature Reserve (with its branches), Provalski Step, an array of regional landscape parks

The Azovo-Chornomorski (coastal) Corridor extends from the Danube in the west along the coastline of the Black and Azov seas up to the Hruzki Yelanchyk in the east, embracing the southern part of the Steppe Zone (Prydniropvska Nyzovyna and Pryazovska Nyzovyna, as well as the Crimean steppe region) This corridor is featured by a diversity of ecosystems. Here will be preserved typical steppe, sandy-steppe, deltaic, aquatic-saline and freshwater ecosystems, and also ecosystems of coastal spits and islands The core elements of this corridor are biosphere reserves Chornomorski, Dunaiski and Askania-Nova, reserves Krynski (Crimean), Yaltynski, Kara-Dag, Mys Matyan, Opukski and Kazantypski

The Marine ecocorridor occupies the near-coastal belt of the Black and Azov seas and the surrounding of Island Zmyini (i e Snake Island).

Meridional ecocorridors There are five of them - Dunaiski, Dnistrovski, Buzski, Dniprovski, Siversko-Donetski. They are linked with valleys of rivers which are extended primarily in a north-south direction and connect different zones along a distance of thousands of kilometres, providing contacts between different biomes, including those of the sea. In such a way meridional corridors are capable of performing a double function - preserving ecosystems not only within themselves, but preserving as well river valley components located in the limits of the first-third terraces. Depending on the extent of human encroachment, such linking of latitudinal corridors creates a network, which covers much of Ukraine and provides a high level of representativeness of landscape and biotic components, communities and populations

The Dunaiski corridor is composed of two parts the upper one, which includes the Carpathian rivers belonging to the Danube catchment - Tysa, Uzh, Latorytsa, and the lower part, which includes the Ukrainian part of the Danube Delta It is important for preserving ecosystems of the landscapes of mountain river valleys and the unique deltaic ecosystems of the Danube, which are of European-wide value.

The ecosystem meaning of the Dnistrovski corridor is the preservation of riverine, coastal-riverine, deltaic-estuarine communities, as well as terrace complexes, including those of canyon type Being fed by tributaries from the right from the Carpathians and from the left - from the Podillya, crossing the Tovtry, Bukovyna, Kodry, Budzhakski Steppe, Prymorska Nyzovyna, and forming in its lower reaches together with the Turunchuk a branched estuary system, it consolidates an enormous area. It should be noted that before the catastrophic spill of saline waste-water from Stebnyk in 1983 the Dniester was one of the best preserved rivers in Europe, with a rich relic fauna complex, the remains of which still survive in its tributaries.

The Buzski corridor is composed of its main part - the valley of the Southern Bug and in the north of a branch of the Polissya, protruding into the valley of the Western Bug. On the contrary to the Dniester, the Southern Bug is considerably dammed (12 reservoir along the main river course), however still retains its ecological potential, particularly in its lower, featured by rapids portion. Crossing the Podillya and Steppe Zone, the Southern Bug ends up in the Dnipro-Buzski Liman, an d along its route it forms very different types of natural complexes, ranging from marshlands, meadows and forests in the north to stony, sandy and typical steppe, halophyte and estuarine in the south The ecosystem meaning of this corridor is to maintain the relative integrity and restoration of natural components of a river valley - a refuge of many endemic and relic complexes, as well as panmixia within the limits of three latitudinal-zonal corridors

The Dniprovski ecocorridor runs along the Dnieper valley - from Radul in the Polissya crossing all the zones and corresponding latitudinal corridors - up to the Black Sea, ending up in the Dnipro-Buzski Liman Because of human development from time immemorial natural complexes of this area are considerably damaged or transformed by technogenic impact, for instance, by many gigantic reservoirs, thousands of industrial enterprises and infrastructure. At the same time here can be found yet fairly large areas of intact ecosystems, which can be considered in certain places and sequences as a basis for renaturalisation within the belt of the corridor. Saying this we have firstly in mind the Zamglay mire, forest complexes of Kiev Oblast, horn-beam stands of Cherkasy Oblast, floodplain forests of Prysamarya, oak and steppe communities of the second and third terraces, psammophytic complex Oleshky, estuarine and halophytic communities, reedbed complexes of the lower reaches

The Siversko-Donetski ecocorridor mainly coincides with the valley of the river Siverski Donets and links latitudinal corridors in the east. Core elements of this corridor are the NNP "Svyati Hory", branches of the Ukrainian Steppe Nature Reserve and the Stanychno-Luganski reserve, and in the future it should include new protected areas in all three zones along the river valley and its tributaries.

Fig.1 Scheme of the division of Ukraine into physical geographical units. Boundaries: a - country, b - zone, c - subzone, d - territory; e - subterritory, f - region

ZONE OF BROAD-LEAVED FORESTS. **Polisski broad-leaved forest territory, (region 1-5, Ukrainian Polissya):** Volynski subterritory: 1 - region of Volynske Polissya, 6 - Volynska Vysochynna region, Slutsko-Dniprovski Polisski subterritory. 2 - region of Zhytomyrske Polissya, 3 - region of Kievske Polissya, Dniprovsko-Desnyanski Polisski subterritory. 4 - region of Chernihivske Polissya, 5 - region of Novhorod-Siverski Polissya, **Western-Ukrainian broad-leaved forest territory:** 7 - region of the Small Polissya, 8 - Rostotsko-Opilska hilly region, 9 - Western-Podilska Vysochynna region, 10 - Serednyopodilska Vysochynna region, 11 - Prutsko-Dnistovska Vysochynna region

FOREST-STEPPE ZONE. **Dnistrovsko-Dniprovski forest-steppe territory:** 12 - NW Prydniprovska Vysochynna region, 13 - NE Prydniprovska Vysochynna region, 14 - Kievska elevated region, 15 - Prydnistovsko-East-Podilska Vysochynna region, 16 - Seredyobuzska Vysochynna region, 17 - Centralnoprydniprovska Vysochynna region, 18 - S Podilska Vysochynna region, 19 - S Prydniprovska Vysochynna region, **Livoberezhno-Dniprovski forest-steppe territory:** 20 - N Dniprovska terrace lowland region, 21 - NW Poltavska elevated region, 22 - SE Poltavska elevated region, 23 - S Dniprovska terrace lowland region, **Serednyoruski forest-steppe territory:** 24 - Sumska slope-hill region; 25 - Kharkivska slope-hill region.

STEPPE ZONE **Northern Steppe subzone: Dnistrovsko-Dniprovski northern steppe territory:** 26 - S Moldovska slope-hill region, 27 - S Podilska slope-hill region, 28 - S Prydniprovska slope hill region; **Livoberezhno-Dniprovsko-Pryazovski northern steppe territory: Livoberezhno-Dniprovski northern steppe subterritory:** 29 - Orilsko-Samarska lowland region, 30 - Kinsko-Yalynska elevated region, **Pryazovski northern steppe subterritory:** 31 - Pryazovska Vysochyna region, 32 - Pryazovska Nyzovyna region, **Donetski northern steppe territory:** 33 - W Donetska slope-hill region, 34 - Donetska Vysochyna region, **Zadonetsko-Donski northern steppe territory:** 35 - Starobilska slope-hill region, **Southern Steppe subzone: Prychornomorski southern steppe territory:** 36 -

Zadnistrovsko-Prychornomorska lowland region; 37 - Dnistrovsko-Buzska lowland region; 38 - Buzsko-Dniprovska lowland region; 39 - Dniprovsko-Molochanska lowland region; 40 - W Pryazovska slope-elevated region.

DRY STEPPE ZONE. **Prychornomorsko-Pryazovski dry steppe territory:** 41 - Nyzhnyobuzsko-Dniporovska lowland region, 42 - Nyzhnyodniprovska terrace-delta lowland region, 43 - Prysivasko-Pryazovska lowland region, **Krymski (Crimean) steppe territory:** 44 - Prysivasko-Krymska lowland region, 45 - Tarkhankutska elevated region, 46 - Centralnokrymska elevated region, 47 - Kerchenska hill-ridge elevated region

CRIMEAN MOUNTAINS (KRYMSKI HORY) 48 - Perehirno-Krymska region, 49 - Hirsko-Krymska region; 50 - Pivdennoberezhno-Krymska region.

UKRAINAIN CARPATHIANS (UKRAINSKI KARPATY) 51 - Peredkarpatska Vysochyna region; 52 - Zovnishnyo-karpatska region, 53 - Vododilno-Verkhovynska region; 54 - Polonynsko-Chornohirska region, 55 - Rakhivsko-Chivchinska region, 56 - Vulkanichno-Karpatska region, 57 - Zakarpatska lowland region.

5. Main activities of development of the national ecological network

The main directions in developing the national ecological network include.

1. Creation of nature conservation units on territories with suitable conditions for conservation/preservation of natural complexes, sufficient representativeness of plant and animal species, suitable for establishment and subsequent functioning of protected areas according to Tab 2.

1. Tab 2. Prospective changes of the area of the Nature Conservation Fund of Ukraine

Category	Area, thou. ha	Area, thou. ha	Area, thou. ha
National nature parks	530	1455	2329
Nature reserves (zapovedniks)	126	340	422
Biosphere reserves	179	250	301
Other categories	1419	2200	3223
Total	2209	4225	6275
% of the territory of Ukraine	3,8	7,1	10,7

2. Measures for strengthening the protection status of nature conservation units foresee increase of lands owned by these units from 0.5 million ha to 2.0 million ha, extension of areas of strict protection zones, implementation of integral conservation measures for restoration of natural complexes.

3. Inclusion of historical and cultural units, as a special category, into the national ecological network.

4 Delimitation of areas of the Emerald Network of Ukraine (according to the Bern Convention), wetlands of international significance (Ramsar sites), units protected according other international conventions and treaties

5. Formation of transboundary protected areas (as core areas) of European and regional importance.

6. Converting strongly eroded arable lands into meadows

7. Development of forest shelter belts and hedges

8. Conservation of degraded and polluted lands with their subsequent re-naturalization (afforestation, reforestation, transformation into meadows or wetlands).

9. Use of natural areas within military testing/training grounds as buffer zones of the ecological network.

10. Development of the nature conservation system in coastal and maritime areas.

In parallel to creation of new ECONET areas the following measures are also being planned

1. Securing of important migration and wintering areas for birds, development of an integrated system of their protection

2. Expanding the network of water areas and units for protection of migrations of fish species.

3. Restoration and re-creation of standard plant communities typical for each geobotanical province of the forest, forest-steppe, and steppe zones; development of a system for their conservation.

The development of the ECONET will cover the period until 2015, and include two stages. 2000-2005 and 2006-2015.

The first stage. growth of areas of National ECONET components, introduction of methods and practices for creation of new protected areas, development of the legal basis for the national ecological network, implementation of necessary scientific research and facility building measures.

The second stage. integrated activities aimed at reaching the planned area if the National ECONET, implementation of a system of conservational measures for restoration of natural ecosystems within the network.

6. System of support.

6.1. Legal mechanism.

In order to secure the implementation of the ECONET development program, it is highly desirable to develop and adopt new legal documents (laws and regulations) regarding development of the ECONET, first of all, legal acts regulating coordination of activities of different sectors of the national economy, especially those activities aimed at development of individual components of the ECONET. In order to achieve this goal, it is necessary to pass the Law of Ukraine "On the National Ecological Network", and to make appropriate amendments to the Land Code of Ukraine, Forest Code of Ukraine, Water Code of Ukraine, the Law of Ukraine "On Protection of the Natural Environment" (of 25 June 1991)

The importance of the ECONET for the Ukrainian society provides justification for inclusion of the following principles to the environmental legislation·

1. Implementation of ecologically sound and strict standards and limits for the use of natural resources (including soil, water, air, animals and plants, etc) within units and components of the National Ecological Network

2. Introduction of both ecological and economic tools for regulation of environmental effects and consequences of economic activities and management on the natural components of the ECONET.

6.2. Logistic and institutional support

The program of development of the National Ecological Network of Ukraine outlines activities of many levels of the state administration and affects many areas and units of the natural environment, which is systemically organized through natural landscapes. Because of its multicomponent structure, the National ECONET for its normal development requires an adequate system of decision-making

Natural landscapes are used by many sectors nature conservation system, forestry, water management system, agriculture, tourism industry, resort and recreation industry, transportation, defence, urban and rural settlements, and others. At the same time, the program of development of the National Ecological Network of Ukraine defines and outlines activities of these and some other sectors in establishment and management of ECONET components within the sectors.

According to these specific features, the program stipulates the creation of a special mechanism and tools, which will include:

- setting up a cross-sectoral body for coordination of measures and activities aimed at development of the ECONET, and a special center responsible for the program at the level of the Cabinet of Ministers, or under the aegis of the central governmental administration;

- inclusion of ECONET areas and units of the national significance, as a separate component, into the General Scheme for territorial development of Ukraine,

- establishing a database storing information about the present status of ECONET components and assessment of their efficiency,

- introducing a special category of lands, "Lands of the National Ecological Network", and listing lands of this new category in the State Land Cadastre of Ukraine

In order to actualize the outcome, the Program will be reviewed and updated every five years This process will include redefining of activities according to the financial, material, and institutional resources available. It is proposed to introduce a document reflecting implementation of the five-years stages of the Program (Progress Report on development of the National Ecological Network), and corresponding annual documents, which will be endorsed by the Cabinet of Ministers of Ukraine.

The unified Cadastre of the National Ecological Network will be set up It will include data on total area of the ECONET lands, status of these lands and their classification according to the categories of the Land Fund of Ukraine, structural features of these lands according to their functional affiliation

For assessment of efficiency and cost-effectiveness of expenses for development and management of the ECONET, a control system will be introduced. It will include:

- the monitoring center of the National Ecological Network, which will be responsible for collecting data on the present state of the ECONET, social assessment of efficiency of the ECONET, preparing recommendations on management and decisions regarding the current and strategic policy,

- the cross-sectoral council responsible for managing the development of the ECONET and delineation of priority measures of that development,

- an annual report presenting measures aimed at development of the ECONET, analysis of problems and solutions, and assessment at a cost-benefit basis.

6.3. Education, training, dissemination of information and public participation.

For purposes of environmental education, promoting positive attitudes to the living nature embodied in the integral spatial network covering the whole territory of Ukraine, the Program foresees the following

- establishment of new and reorganization of existing centers of environmental expertise active in the field of social assessment of conservation of natural landscapes, species of plants and animals, and their habitats,

- development and implementation of new curricula and training courses aimed at raising public awareness and promoting public participation in the formation of the National Ecological Network,

- creation of territorial sub-units of NGOs based upon the principle of their correspondence to the structural components (elements) of the ECONET;

- ensuring the public understanding of importance of the National Ecological Network as one of the national priorities of the socioeconomic development of the country;

- consistent implementation of measures aimed at dissemination of knowledge about the importance of the ECONET for sustainable development, non-exhaustible nature use, and economic wellbeing.

7. Coordination of development of the National Ecological Network in the context of development of the Pan-European Ecological Network

The Program foresees linking national ecological networks through bilateral elements/components on the base of core areas and ecological corridors (wherever possible and feasible), and drafting coordinated plans of land management.

For elaboration transboundary issues and problems, joint groups of experts having international experience in implementing the Pan-European Biological and Landscape Diversity Strategy. Coordination of plans and timetables for establishment of boundary and transboundary components will be mandatory regarding the following countries:

Poland - Western Polissia (Zahidnopolis'kyi) Biosphere Reserve, Biosphere Reserve "The Eastern Carpathians" ("Shidni Karpaty"), Roztochansky Biosphere Reserve,

Byelarus'(Byelorussia) - Western Polissia (Zahidnopolis'kyi) Biospere Reserve, Rivnensky

Biosphere Reserve, Pripiat-Stohid National Nature Park;

Russia - Snovsky Nature Reserve, Lugansky Nature Reserve, Starogutsko-Desnyansky National Nature Park, Maeotida National Nature Park, Donets Range National Nature Park,

Romania - Danube Biosphere Reserve, Vyzhnytsya National Nature Park;

Moldova - Lower Dnister (Nyzhnyo-Dnistrovsky) National nature Park,

Slovakia - Biosphere Reserve "The Eastern Carpathians" ("Shidni Karpaty").

CONCLUSIONS & EXPECTED RESULTS

The National Ecological Network plays several important roles promotes conservation of the landscape diversity, strengthens stability of ecosystems due to establishing links and interaction between different types of biocenoses, secures migration routes for species of plants and animals, etc The ecological network indirectly promotes protection of groundwater and surface water, creates favourable condition for human health, positively influences natural resources used in agriculture, fisheries, forestry; protects settlements and transportation system against natural disasters and industrial catastrophes, decreases the negative climatic impact of the greenhouse effect, promotes oxygen production by plants; decreases dust accumulation and pollution of the lower strata of the atmosphere, and creates many other effects and conditions beneficial in ecological and socioeconomic aspects.

It is expected that the implementation of the Project will result in

- reaching a new level of ecological stability in Ukraine,
- introducing sustainable and non-exhaustible use of natural resources in a large portion of the country,
- developing the resource base for tourism industry, recreation and promotion of human health,
- increasing the natural resources potential of agricultural lands adjacent to the ECONET units;
- restoring the natural status of degraded landscapes;
- systematizing and rationalizing the legal and regulatory base for conservation of the landscape diversity of Ukraine, and harmonizing it with international legal acts;
- creating a network of transboundary protected areas as international components of the Pan-European Ecological Network,
- ensuring restoration of normal ecological cycles in the environment, decreasing the danger of degradation of lands and fertility losses;
- renaturalizing lands recently excluded from agricultural use, restoring areas of forests, meadows and mires to the optimum level, ensuring efficient conservation measures in virgin forests, steppe ecosystems, wetlands of local, national and international significance;
- proper conservation of the major portion of biological and landscape diversity of Ukraine, including all rare and threatened species of the flora and fauna, and their communities,
- coordination of activities of central and local state administration, local municipal bodies and NGOs in developing the National Ecological Network of Ukraine

ANNEXES.

1. Scientific resources
2. Cartographic resources
3. Example of an establishment of an econetwork on the level of „small rivers"
4. Development of the National Ecological Network in Ukraine and the problem of alien species
5. Report on the Seminar "Green corridors to tomorrow present status and prospects (towards justification of the National Ecological Network of Ukraine)" .
6. Project proposals for the design and implementation of the ECONET of Ukraine
7. List of members of the National Steering Committee

ANNEX 1.

SCIENTIFIC INFORMATION RESOURCES

At the very beginning of the XXth Century scientific schools involving natural history scientists started to develop in Ukraine and publications appeared on flora, vegetation, geology, geomorphology, soils, climate, seas, inland waters etc These works have not lost their significance even now

Since then very much has been done to study in detail the nature of Ukraine and resources of the country, an enormous amount of facts has been collected In the course of collecting this data and its generalisation numerous scientific schools were formed P.A Tutkovski (geology), M I Dmitriev (geomorphology), G G Makhov (soils), D M Sobolev (geotectonics), V I Krokos (Quaternary deposits), M I Huk (climate), G I Shvets (hydrology), M A Oksner (mycology), O V Topachevski (algae studies), O V Fomin (botany), Ye M Lavrenko (geobotany), O P.Markevitch (parasitology), I I Schmalhausen (evolutionary morphology), I G Pidoplichko (palaeozoology), O O Brauner (faunistics) etc The principle personnel of these schools work at various institutes of the National Academy of Sciences of Ukraine which was established in 1918 A less numerous team of researchers works at the biological and geographical faculties of Kiev National University, the national university „Kievo-Mohylyanska Akademia", universities in Kharkiv, Dnipropetrovsk, Lviv, Uzhgorod, Chernivtsi, Donetsk, Odessa, Simferopol, at the Ukrainian National Agrarian University, Lviv Forest-Technical University, numerous agrarian and teachers-training universities in Lviv, Kamyanets-Podilsk, Poltava, Sumy, Dnipropetrovsk, Kharkiv, Odessa etc A fairly large team of researchers works as well at a number of research institutes of the Agrarian Academy of Sciences

To these we can add the scientific personnel of the staff of protected areas in Ukraine Carpathian, Chornomorski, Dunaiski, Askania-Nova biosphere reserves; Shatski, Synevyrski, Karpatski, Vyzhnitski, Azovo-Sivash, Svyati Gory and Podilski Tovtry national nature parks, as well as such nature reserves as Poliski, Gorganski, Rostotski, Medobory, Kanivski, Dniprovsko-Orelski, Yelanetski, Ukrainian Steppe, Luganski, Crimean, Yaltinski Forest-Mountain, Karadagski, Kazantypski, Opukski, Mys Martian In Ukraine there are 24 botanical gardens Most of their scientific personnel is concentrated at the Central Botanical Garden (Kiev), Nikitski Botanical Garden (Yalta), Donetsk Botanical Garden, the Fomin Botanical Garden (Kiev), the botanical gardens of Lviv, Uzhgorod, Chernivtsi, Odessa, Kharkiv universities and some other ones as well.

Scientists from these institutions have collected a mass of data featuring the nature of Ukraine the landscape of the country, its geological and geomorphological structure, rivers, lakes, reservoirs, estuaries, seas, plant and animal wildlife, etc This material has been summarized in more than 15 thousand scientific works For instance, data on the plant kingdom is presented in the 12 volume „Flora of Ukraine" (1938-1963), three editions of „The key to higher plants of Ukraine" (1950, 1965, 1987), keys for the identification of higher plants of the Crimea (1972) and the Ukrainian Carpathians (1977), „The key to Fungi of Ukraine" (5 volumes in 7 books - 1967-1979), „The key to freshwater algae" (12 volumes in 16 books - 1938-1993), „The flora of lichens of Ukraine" (3 volumes - 1956-1993), „The flora of mosses of Ukraine" (3 issues - 1987-1989), „The flora of fungi of Ukraine" (5 out of 40 have been published - 1992-1998), „The vegetation of Ukraine" (4 volumes - 1968-1973) Data on the fauna is embraced in the fundamental series „Fauna of Ukraine", out of 200 planned volumes 58 have been published (1957-1998) A 5 volume series „Hydrobiology and ecology of waterbodies in Ukraine" (1987-1997) is dedicated to the studies of rivers, lakes and estuaries Another 5 volume series „The nature of Ukraine" (1980-1997) gives an overview of the natural history of the country A start has been put to a series of monographs „Nature reserves and national nature parks in Ukraine", up to now 9 volumes have been published (1980-1997)

Besides these there are dozens of other publications of national and regional scale reflecting various scientific aspects For instance, „The perspective network of protected areas of Ukraine" (1987), „The Green Book of Ukraine" (1987) Scientists participated as well in drafting „The Law of Ukraine on the protection of the natural environment" (1991), „The Law of Ukraine on protected areas" (1992), „The Law of Ukraine on Animal Wildlife" (1993), the National Programme „Reserves", etc

Up to date the biota of Ukraine consists of 70 thousand species That number includes about 25 thousand plant species and about 45 thousand animal species The most thorough studies involve higher plants (5,600 species, including introduced species), mosses (80 species) and lichens (1000 species), to a lesser extent have been studied algae (4000), and insufficiently fungi and myxomycetes

(15,000 species) The Ukrainian Red Data Book lists 439 vascular plant species, 28 mosses, 17 algae, 27 lichens, 30 fungi species Among the fauna vertebrates have been most widely studied (750 species), and poorly studied remain arthropods (39,400 species) The Red Data Book of Ukraine lists 155 vertebrate species, 204 arthropods and 23 other invertebrate species

In such a way the diverse network of scientific institutions of various profile, the involvement of a large number of qualified professionals, equipped with modern methods and enormous practical and theoretical knowledge, affirm the ability of Ukrainian scientists to elaborate the ecological network of the country, considering both at the national and local level, and viewing it as an integrity of the Pan-European ecological network

ANNEX 2.

CARTOGRAPHIC RESOURCES FOR THE JUSTIFICATION OF THE DEVELOPMENT OF THE ECOLOGICAL NETWORK OF UKRAINE

Types of cartographic resources and their features	Titles of the cartographic sources of information	Date of publication (year)	Scale
Ukraine. Small scale general scientific and applied			
Atlases of small scale maps - observational, scientific-informational, popular-reference	Atlas of the natural conditions and natural resources of Ukraine School-regional studies atlases of administrative oblasts of Ukraine (Kievska, Chernihivska etc) Educational atlas of Ukraine (extended edition) Ukraine Atlas	1978 1980-1997 1997, 1998,1999 1996	1:2500000-1 12000000 1:10000000 and smaller 1:3000000-1 4500000 1 4500000-1 6500000
Series of small scale maps - overviews, scientific reference	„The natural environment and Man" The series contains 53 mainly statistical maps, which reflect the arrangement of protected areas, condition of certain natural components, investments into certain sectors of nature conservation activity	1993	1 6000000
Individual maps of small scale, overviews, including ones with text	Nature conservation in URE (vol II) Reserve areas of Ukraine in the bulletin „Zhiva Ukraina" (No 1) The Nature Conservation Network (sectoral) Ecological assessment of surface waters Assessment of soil fertility	1989 1997 1998 manuscript Manuscript	1:7000000 1:5000000 1.4500000 1 3000000 1 3000000
Ukraine. Series of average scale general scientific maps			
Collective series of poster scientific reference maps of nature, population, economy	Physical map Geomorphological map, Quaternary cover, soils, vegetation, unfavourable natural phenomena and processes, areas foe leisure and treatment of the human population, water-logged areas, development of amelioration, the nature conservation network Population Economical map	1990 For the period of 1962 to 1985	1:1000000 1 750000 1:1000000 1 500000 1 750000

		1978 1985 1990	1:750000 1:1000000
Series of average scale maps on a precise basis	Ukraine Ukraine Ukraine Series of maps of oblasts of Ukraine (the sheet contains the area of two oblasts)	1998	1:1000000 1 500000 1:750000 1 200000
Series of geological maps, scientific and reference	Series contains maps depicting the tectonic structure and neotectonics, oil-bearing regions etc	1989	1 500000
Series of educational maps of nature, population, economy (posters)	Maps of nature depict the geological (tectonic) structure and mineral resources, soils, surface waters, plant and animal wildlife, climate, landscapes, state of the environment, nature conservation Map of population Map of economy general and of various branches of industry fuel & energetics, metallurgy, chemistry, machine building, light & food industry, construction industry, forestry & agricultural complex, transport network	1993-1994 1995-1996	1:1000000 1:1000000
Individual average scale maps	Ecological assessment of the quality of surface waters The pollution of atmospheric air	1997 1996	1:1000000 1:1000000

ANNEX 3.

THE ECONET AS A WAY FOR RESTORING NATURAL LANDSCAPES AND THEIR RESOURCES AND FOR IMPROVING THE STATE OF THE ENVIRONMENT

The modern crisis of relation in society and the worsening environment create grounds for confirming that the strategy, the basis of which is the strive of mankind to subdue Nature by heavily exploiting its resources, has failed Therefore the main task facing mankind today is the search of ways how to ensure development and at the same time improve the state of the environment

An optimal way for preserving and starting the restoration of the natural and quasi-natural biocenotic cover of landscapes, especially of the most impacted by humans steppe and forest-steppe areas, along with restoring the biospheric functions of living matter, is the creation of an ecological network A network of areas, the main functions of which would be not only the renewal of migration routes for populations of many species, but as well the restoration of biospheric functions of natural landscapes, that is to say to increase the productivity functions of biodiversity

<u>*ECONET*</u> (EN)- is a method for restoring and the persistence in Ukraine of natural landscapes and their biological resources, and a way allowing landscapes to fulfill their lost (to a large extent) ethnogenic, biospheric, climatic, resource functions in harmony with the needs of modern society and its development

From the methodological viewpoint we see the ecological network as a way for the gradual restoration to an optimal level on the basis of preserved sites housing natural biocenoses of human-impacted landscapes, a way to increase the rate of the renewal of natural resources, moving further to a harmonic coexistence of society and the natural environment *within these areas*

The surface of Ukraine is cut across by a dense network of river valleys, gorges and ravines with flueny waters, ranging in size from small temporal streams to big rivers, such the Dniester and Dnieper According to our lengthy observations, in Ukraine the most well preserved sectors of the landscape (if we exclude forested and protected areas) are the so-called „inconvenient for human use" patches in river valleys, particularly terraces with patches of steppe vegetation or terrace forests, sometimes meadows in floodplains Precisely these nowadays are the core of the concentration of the natural gene pool, and in the future should become the source for restoring natural biocoenoses in places damaged by man (refuge function)

The rational and planned creation within these areas of protected areas (PA) of various category, accomplishment of measures aimed to extend them and join them physically would mean the start of creating an ecological network

Besides this, today there is an urgent need in Ukraine to elaborate and implement a new nature conservation category „a landscape of the valley of a small river". This should be a multi-functional protected area with special functions referring to the preservation and restoration of specific valley landscapes of small rivers, as well as to the natural function of linking remote patches of landscape of one or several rivers

Therefore, as far as river valleys house the largest preserved patches of landscapes with natural or close to natural biocoenotic cover, especially in the steppe and forest-steppe areas, it seems most reasonable here on the basis of water protection zones and adjacent areas (especially badly damaged) of the future rehabilitation fund to create the ECONET of Ukraine This approach, as we see it, does not refer to mountainous regions in Ukraine

The elaboration and implementation of a set of measures aimed at creating an EN in river and floodplain ecosystems and focusing on the protection, conservation and replenishment of biological diversity and use of biological resources with help to improve the socio-economic conditions of the life of the human population, develop the recreational potential

From this standpoint there is a sense to evaluate river valleys according to the Ukrainian water legislation The principle document in this case is the „Water Code of Ukraine", adopted the Verkhovna Rada on 06 06 1995 The most important articles for creating the EN should be regarded those ones, which account for establishing water protection zones, riverside protection strips and which regulate limited economic activity within these strips

Therefore, according to the „Water Code of Ukraine", for purposes of creating and maintaining a favourable water regime, the improving the sanitary condition of small rivers and reservoirs, protecting them from being silted and polluted water protection zones are established, which according to the law are protected areas with corresponding rules for their use and economic activities involving them

Water protection zones are composed of

- banks in between the native river-bed and the floodplain,
- terraces above the floodplain, slopes and edges of the native banks, gorges and ravines, which are open to the river valley;
- part of the slopes, gorge network above the source of the river

Within the limits of water protection zones are distinguished riverside protection strip, the width of which is

- for rivers up to 100 km long - not less than 25 m,
- longer than 100 km - not less than 50 m,
- around the banks of ponds and reservoirs occupying up to 3 ha the strip from the edge of the water should be 25 m wide, for ponds and reservoirs larger than 3 ha - not less than 50 m

The main hydrographic characteristics of Ukrainian rivers

To the category of small rivers belong water courses, which have a catchment area of not more than 2000 sq km, provided that it is located in one physico-geographical zone According to the length criterion, small rivers are considered those, which are not longer than 100 km

The river network of Ukraine is divided into several main catchment areas

- Vistula River catchment - embraces the rivers of the NW of the country;
- Danube catchment, to which belong the rivers of the catchments of the Tysa and Prut, and also a few rivers, which drain into the Prydunaiski lakes downstream of the mouth of the Prut,
- the catchment of the Dniester includes the rivers of the eastern slopes of the Ukrainian Carpathians, as well as rivers of the Podilska Vysochyna;
- the catchment of the Southern Bug - embraces the rivers of the Podilska Vysochyna and Prydniprovska Vysochyna;
- the catchment of the Dnieper - cuts across Ukraine from north to south and embraces rivers of many geomorphological regions,
- between the Danube and Dniester, as well as the Dniester and Southern Bug are about 70 rivers, which flow across the Prychornomorska Nyzovyna and drain into limans of the Black Sea coast of directly into the sea;
- the catchment of the Siverski Donets, the right-side tributary of the Don,
- rivers, which drain into the Azov Sea, its limans or bays

Most of Ukraine (98% of the area) belongs to the catchment of the Black and Azov seas and only 2% of the area belongs to the catchment of the Baltic Sea

All together in Ukraine there are more than 63 thousand small rivers and water courses totalling a length of 185 8 thousand km, and out of them about 60 thousand (95%) are very small (not longer than 10 km), their total length is 112 thousand km, meaning that the average length of such a water course is 1 9 km

3 212 small rivers, which have the length of 10 km and more, total the length of about 75 thousand km Within the catchment of the Dnieper there are 1383 (43%) of such rivers (long in total 32 1 thousand km), in the Dniester catchment - 453 (14%), totalling a length of 10 6 thousand km Within the Southern Bug catchment area there are 367 such rivers According to the „Handbook " the number of such rivers totals 4 011, however here we have taken into account all the water courses being longer than 10 km, and which cross the borders of Ukraine with Russia, Belarus and Moldova Their valleys in the future may serve to create an integrated inter-state EN

In the table **„Some hydrographic features of small rivers in Ukraine"** are given the general numbers of small rivers of each catchment area of the main rivers and their total lengths We as well have calculated the approximate area of the possible elements of the ecological network, which would be created on the basis of water protection zones of the hydrographic network of Ukraine

All together the area of the elements of the ecological network totals about 4,250 thousand ha 10-15% of this area falls on settlements, which are located within the limits of water protection zones As to these, the „Water Code of Ukraine" provides clear instructions, explaining the process of implementing it articles, which foresee the gradual removal of houses and buildings for economic purposes from, firstly, the riverside protection strip and later from the water protection zones Precisely the same is foreseen in the „National programme for conservation of biodiversity for the years 1998-2015" (at the moment this programme is being considered by the Verkhovna Rada) For instance, it has been planned to „remove from the riverside protection strip 459 thousand buildings"

Table 1 „Some hydrographic features of small rivers in Ukraine"

Catchment	Length of the main river, km	Total of small rivers		Amongst them small rivers longer than 10 km		Amongst them small rivers not longer than 10 km		Minimal tentative area of the possible elements of the EN thou. ha
			length, km	num-ber	length, km	num-ber	length, km	
Vistula Syan, Western Bug	**457**	**3110**	**6908**	**108**	**2316**	**3002**	**4592**	**115**
Danube:	**174**	**17612**	**35163**	**333**	**6352**	**17279**	**28811**	
mountain and foothill rivers of the Prut and Tysa catchments		17175	33243	291	5501	16884	27742	0
tributaries of the lower Danube (Steppe)		437	1920	42	851	395	1069	**85**
Dniester:	**925**	**14886**	**32272**	**453**	**10629**	**14433**	**21643**	**100**
Southern Bug	**806**	**6638**	**20109**	**367**	**8033**	**6271**	**12076**	**80**
Synyukha (Forest-Steppe)		1651	5314	104	2014	1547	3300	20
Inhul (Steppe)		396	1922	43	1017	353	905	10
Dnieper (total)	**1121**	**15381**	**67156**	**1398**	**32115**	**13998**	**35041**	**2500**
Kievske Reservoir		6616	27917	550	11460	6066	16457	100
including in that number Pripyat		4429	20075	419	8771	4010	11304	80
Styr		581	2936	56	1252	525	1684	
Horyn		2255	9366	244	4191	2011	5175	
Teteriv		1788	6446	102	2217	1686	4229	
Kanivske Reservoir		1729	9440	194	4569	1535	4871	
Desna		1328	7610	156	3662	1172	3948	
Kremenchugske Reservoir		2751	10920	214	5154	2537	5766	
Ros (Forest-Steppe)		1129	4240	79	1899	1051	2341	
Sula (Forest-Steppe)		1176	4482	90	2108	1086	2374	
Dniprodzerzhynske Reservoir		1977	6917	144	3692	1833	3225	
Psyol (Forest-Steppe)		1330	3885	79	1849	1251	2036	
Vorskla (Forest-Steppe to Steppe)		545	2389	52	1418	492	971	
Dniprovske Reservoir		1410	7039	163	4241	1247	2798	
Samara (Steppe)		497	2560	62	1514	435	1046	
Kakhovske Reservoir		360	2226	59	1477	301	749	
Bazavluk (Steppe)		92	685	19	478	73	207	
Inhulets		491	2465	59	1293	432	1072	
Rivers of the northern Prychornomorya		1702	6606	154	3685	1548	2929	370
including in that number: Kohylnyk		346	1440	34	196	312	1634	20
Rivers of the Crimea		986	3145	74	1428	912	1717	
Siverski Donets	700	1460	8811	221	5434	1239	3377	500
Rivers of Pryazovya		2213	8687	194	5020	2019	3667	500
Including in that number those in the Crimea		602	2417	56	1334	546	1083	130
Northern Pryazovya		1609	6270	136	3686	1473	2584	
TOTAL			185712	**3212**	73584		112136	**4250**

The average width of the catchment areas of small rivers in the flat parts of Ukraine is about 10-15 km, narrowing in the mountains to 5-7 km and widening to 15-20 km in the Prychornomorya lowland It is reasonable to establish water protection zones, and together with that elements of the EN, of an average width of 500 m in the Prykarpatski region and up to 1000-1500 m in the steppe areas Allocation of such areas to the EN should not significantly affect farming as far as these could be used in a sustainable way for producing fodder and as in general farming becomes a private business

In Ukraine 811 8 thousand ha of land has been recognized as water protection zones (the figure of 1990) The „National programme for conservation of biodiversity for the years 1998-2015" foresees the renaturalisation, grassland establishment, plantation of trees in water protection zones and areas in hazard of erosion on an area totalling **1,700 thousand ha**

In such a way, the **elements of the ecological network,** which will be created on the basis of water protection zones of rivers, should include, besides protected areas (reserves etc), the following

- the area of water protection zones of small and average length rivers, which for the most fully embrace landscapes of river valleys of different levels *The area of such land in Ukraine totals about 4,250 thousand ha,*
- certain landscapes, which are adjacent to water protection zones of the valleys of small rivers, which previously were ploughed, but are inclined at an angle exceeding 5° and the soils of which are regarded to be washed away to an average extent (according to the „Handbook of small rivers" such are considered as „arable of limited use") Such areas should be included to the newly created category of protected areas, the so-called „Rehabilitation fund". These areas are intended for the restoration of the natural or quasi-natural state of the landscape To make a justified assessment of such areas a special investigation is needed,
- other elements of the hydrographic network - valleys of rivers under the length of 10 km Such areas constitute in Ukraine about 8,000 thousand ha (in this case a more precise assessment is needed) These should be included to the EN on its second and further steps of implementation, however they should not be privatised, or if privatised, then on special conditions

In order to gain more success in establishing an EN on the basis of water protection zones of rivers and other land of little use for farming, it is necessary to.

- elaborate and endorse a new category of protected areas - „reserves for restoring natural ecosystems („Reserve fund"), exclude these from privatisation (or allow it on special conditions), and extend them to such a level so natural and quasi-natural landscapes would consist about 30%

Another urgent measure today would be the elaboration and implementation of a new to Ukraine category of protected areas „Landscape of a valley of a small river"(LVSR) This should become a multi-functional conservation category, the aims of which would be

- the protection of the landscape;
- protection and restoration of the natural state of the floodplain,
- protection and restoration of the natural state of the river,
- this area should become the resource for the renewal and spreading of biodiversity into adjacent territories (refuge function),
- this area can reach the length, within the water protection zone of the river, of 50 and more kilometres and, in such a way, fulfill the role of an ecological corridor (local or inter-regional), but in most cases can be at the same time an area, which fulfils within the EN the functions of a core component,
- this area can link together adjacent to the water protection zone of the river sectors, for instance, parts of the „rehabilitation fund" (RF)

To the category LVSR should be assigned firstly areas, where there are patches of intact or fully preserved landscapes and corresponding biocoenoses, which are suitable for fulfilling the refuge function - accelerated restoration of typical biocoenoses

As a result the „Landscape of a valley of a small river" will be an ecological corridor uniting remote parts of populations and a landscape with natural biocoenoses, where much more living matter will be functioning, compared to what we have today in the degraded landscapes of river valleys

And concluding lets look into the future - in 30-50 years, when a frame will be established for all the EN, human settlements will no more concentrate along rivers At that time most of the population will wish and will have the opportunity once again to live not in big cities (megapolises), but in settlements, which will have the maximum possible, easy access of its inhabitants to the natural landscapes, to the biotic and landscape diversity

ANNEX 4.

DEVELOPMENT OF THE NATIONAL ECOLOGICAL NETWORK IN UKRAINE AND THE PROBLEM OF ALIEN SPECIES

The problem of introduction of non-native (alien, adventive) species into the natural environment draws much attention of scientists and conservationists Important conclusions and recommendations on the problem were adopted by the UN/Norway Conference on Alien Species, Trondheim, Norway, 1-5 July 1996

Various aspects of interaction between native and non-native species are important and should be considered prior to creation of the National ECONET of Ukraine, as well as during implementation of any other conservational projects and measures

Article 8(h) of the Convention on Biological Diversity calls each Party to the Convention to prevent the introduction of, control and eradicate (as far as possible and as appropriate) those alien species which threaten ecosystems, habitats or species

Alien species are defined as species that occur in places different from their area of natural (native, aboriginal) distribution Some of them become invasive, threatening ecosystems, habitats, and native species

Invasive species were identified as a serious global threat to biological diversity, and in some countries the most important threat Such taxa threaten the natural and productive systems which they invade, in many cases causing disruption of ecosystems, homogenization of biota, and extinctions of species and populations This often results in significant environmental, economic, health and social problems, imposing tremendous expenses and seriously affecting a large number of people

On of the most threatening global biotic trends is homogenization of biota However, this homogenization includes only synanthropic species, those more or less adapted to live with man or close to man, and endure human influence

For many native species, the trend is opposite In the case of native species and natural ecosystems, we have many examples of fragmentation of biota virtually at all levels (species, populations, plant communities, ecosystems, etc)

Thus, we have to take into consideration both trends; fragmentation and homogenization of biota, and try to construct the National ECONET system in such a way, that it should promote homogenization of natural ecosystems and prevent homogenization of the synanthropic biota (disturbed habitats, alien species, etc)

Commonly understood, introduction is the deliberate or accidental release into the natural environment, in a given territory, of a species that has never been represented there There are, however, some other forms and types of introductions, which are of interest for our topic, e g re-introduction Re-introduction is a transfer into a territory of a species which was naturally represented there in the past and since disappeared from the area, either naturally, or as a result of human activity. Introduction of specimens of a species into a territory where the species is still present can be regarded as the restocking of the species or its populations

Any deliberate introductions of alien species into areas and sites of the ECONET of Ukraine have to be strictly prohibited However, when re-introduction or restocking measures are considered for native species, several precautions and conditions are also necessary It is important to make sure that the species no longer exists in the area, and has no chance of restoring its populations in a natural way It is also necessary to know for sure that the species indeed existed in the area in the past quite recently, and has disappeared because of human impact, and not because of some natural factors The source populations have to be genetically, geographically, morphologically, etc as close as possible to the original population which existed in the target area before

Precautions should be taken when creating ecological corridors along railroads, highways, around settlements, in forest shelter belts and hedges, since such areas and strips are often favourite migration routes and pathways for many alien plants and animals

It is recommended to establish within the ECONET sites and units a special alien/invasive species monitoring system in order to prevent spreading of aliens and their invasions (both ecological and geographical)

Since development of the ECONET will potentially create large sites and strips of natural ecosystems, some of them will probably serve as natural barriers preventing invasions of at least some of alien species and further destruction of natural habitats

We believe that in planning measures to control invasive alien plants, the special attention should be paid to the agriophytes and also potential agriophytes among epoecophytes, since these groups are especially dangerous to the native biodiversity at all levels (gene pool, species and populations, plant communities, ecosystems) In addition to that, a monitoring system should be established for risk assessment of the potential threat posed by casual aliens (non-persisting species) In order to prevent and combat invasions of alien plants in Ukraine, we need a new level of cooperation and coordination between various official bodies and sectors within the country (research institutions of the National Academy of Sciences and the Agricultural Academy, ministries and governmental agencies, such as customs, phytoquarantine structures, local administration, NGOs, etc) Many of these aspects directly affect development of the National ECONET of Ukraine

Examples and case studies

In order to outline the present situation with alien species in Ukraine, let us mention at least a few examples of invasive plants

The problem of "floristic pollution", a part of "biotic pollution process", is extremely important and actual in Ukraine The flora and vegetation of this country is profoundly changed by man, and it opens broad opportunities for invasions of alien (adventive) plants, fungi and animals

According to V. Protopopova (1986), there are ca 650 alien species of vascular plants in Ukraine, which are listed in her book However, at present these figures are much higher

Many alien plants are now very common components of man-made, semi-natural and natural habitats In many cases they are also firmly incorporated into the local floras and plant communities

Dramatic examples are alien plants of American origin According to current estimations, there are at least 160 species of American plants represented in the Ukrainian wild flora (of course, not all of them can be regarded as completely naturalized) Invasions of American plants in Europe (and in Ukraine in particular) are often accompanied by significant microevolutionary changes and dramatic coenotic adaptations

Among the most invasive and successful American aliens, the following taxa should be mentioned Acer negundo L , Amaranthus powellii S Wats , Ambrosia artemisiifolia L , Amorpha fruticosa L , Bidens frondosa L , Cenchrus longispinus (Hackel) Fernald, Grindelia squarrosa (Pursh) Dunal , Quercus rubra L (Q borealis Michx), Robinia pseudacacia L , etc As case studies show, these and some other American species should be regarded as invasive taxa threatening native plant communities and species Of course, there are important alien plants from other regions of origin as well

Alien species of trees pose a specific threat to natural ecosystems because of their role in plant communities Practically all invasive trees and shrubs were originally cultivated in Ukraine for ornamental, forestry and other purposes

First introduced into Ukraine in 1804, black locust (Robinia pseudoacacia L), a native of eastern North America, has been extensively cultivated in the country as an excellent ornamental and honey plant It was also much praised for its ability to prevent land erosion However, it has become recognized as an invasive plant only recently Black locust is especially dangerous for still existing vulnerable tiny patches of steppe and meadow-steppe vegetation in the central and southern parts of Ukraine (Forest-Steppe and Steppe physiographic zones) For example, in the Kaniv Nature Reserve (Cherkassy Region, central Ukraine) black locust actively penetrates into steppe communities on loess slopes, transforming these habitats into dense Robinia thickets and dramatically decimating the native biological diversity (plants, fungi, insects, other invertebrates, etc) A similar situation is rather characteristic for many other sites and areas in Ukraine, including protected ones

Another American alien, Amorpha fruticosa L (known in cultivation in Ukraine since the first half of the previous century), is extremely invasive in riparian and alluvial habitats of the valleys of large rivers, especially the Dnipro (= Dnieper) In such habitats Amorpha fruticosa overcompetes local shrubs (especially native species of Salix, etc) It also often occurs along forest margins, in forest shelter belts, along railroads, etc

Cultivated in Ukraine as an ornamental and forestry tree since the 1850s, northern red oak (Quercus rubra L = Q borealis Michx) is quite common in many regions of Ukraine In some areas it is known as escaped and/or completely naturalized, penetrating into the natural forest plant communities It is especially aggressive in the broad-leaved and mixed forests and parks of the "Green Belt" of Kiev, strongly overcompeting native tree species (such as the native pedunculate oak, maples, and even hornbeam) and completely changing the structure of native plant communities

The threat posed by these and some other (Acer negundo L , Fraxinus pennsylvanica March, Padus serotina (Ehrh) Agardh = Prunus serotina Ehrh , etc) quite common cultivated introduced plants was underestimated, and has been realized only recently Unfortunately, at present we do not have any programs aimed at effective control of these invasives in natural and semi-natural habitats of Ukraine

Sandbur (Cenchrus longispinus (Hackel) Fernald) was occasionally introduced into Ukraine in the first half of our century It was first reported for Ukraine (as "C longispinus L.") by D Larionov (1951), from the Skadovsk District (Kherson Region, southern Ukraine) Now it is a quite common and aggressive weed in sandy habitats in southern Ukraine, where it is known from Kherson, Mykolayiv, Odessa, Donetsk regions, and the Crimea It is also rapidly spreading in the Kiev area (northern central Ukraine), along the sands of the Dnipro, and in ruderal habitats within the city Sandbur is officially recognized as a noxious quarantine weed extremely dangerous for agriculture, livestock, and native plant communities In particular, sandbur replaces local plants and alters native vegetation patterns in vast sandy areas of the Lower Dnipro, including unique sand steppes and alluvial habitats of the Black Sea (Chornomorsky) Nature Reserve All attempts to control the species were so far unsuccessful

ANNEX 5. SEMINAR

Held by National Ecological Centre of Ukraine and Ukrainian Committee for Support of UNEP (UkrUNEPCom), with support of IUCN Office for Central Europe

PROGRAM OF THE SEMINAR:

"Green corridors to tomorrow: present status and prospects (towards justification of the National Ecological Network of Ukraine)"

9 30 - 10 00 - Registration
10 00 - Opening ceremony

L. P. Vakarenko IUCN Program "Development of the ECONET in Ukraine" and its implementation
Ya. I. Movchan Methodology of development of the ECONET in Ukraine Strategy and policy
Yu. R. Shelyag-Sosonko· Structure of the ecological network and hierarchy of its components
A. O. Tkachov Socioeconomic prerequisites and resources of development and formation of the ecological network

11.15 - 11 30 Coffee break
11 30 - Continuation of the session

G. O. Parkhomenko Cartographic resources for developing and mapping the ECONET in Ukraine
V. M. Pashchenko. Landscape resources for development of the ECONET of Ukraine
Yu. V. Dubrovsky Agricultural water bodies as potential components of the ECONET

13 00 - 13 30 Lunch
13 30 - Afternoon session

A. M. Oleshko· "Zhyva Ukrayina" ("Living Ukraine") newsletter. spreading the word about the ecological network of Ukraine
R. Khymko Role of river valley landscapes in the prospective ecological network
S. Tarashchuk & O. Derkach Experience of developing a local ecological network in the Mykolayiv Region

16 00 - 16 15 Coffee break
Discussion on various aspects of development of the ECONET of Ukraine General discussion

Yu. R. Shelyag-Sosonko Activities of the UkrUNEPCom aimed at conservation of biodiversity in Ukraine

Adoption of Resolution of the Seminar
18 00 Closing the seminar Dinner.

SEMINAR REPORT

The National Seminar "Green corridors to tomorrow present status and prospects (towards justification of the National Ecological Network of Ukraine)" was held in Kyiv (Kiev) on 28 January 1999 in the House of Scientists, the National Academy of Sciences of Ukraine The main goal of the seminar was to discuss various aspects and problems related to development of the ecological network (ECONET) of Ukraine and its subsequent inclusion into the Pan-European Ecological Network Scientists, officials of the Ministry for Environmental Protection and Nuclear Safety of Ukraine (MEPNS) and other governmental agencies, representatives of NGOs and amateurs participated in the seminar The seminar has been organized and held by the National Ecological Centre of Ukraine (EcoCentre) within the framework of the IUCN program "Development of the ECONET in Ukraine", under the aegis and with financial support of the IUCN, and with assistance of the Main Department (Board) of National Parks and Reserves, MEPNS

Participants of the seminar were 58 scientists, representatives of governmental agencies and NGOs, individuals and guests from abroad (Mr Jarle Harstad, GEF, Mr Ajay Gupta, UNDP)

The Seminar was opened at 10 00 with a presentation of L Vakarenko, the national coordinator of the program "ECONET development in CEECs" (IUCN Project N 75598X/Ukraine, Contract number. 75598X/4) Her presentation was entitled "IUCN Program 'Development of the ECONET in Ukraine' and its implementation". Dr Vakarenko informed participants about main activities of the IUCN, cooperation between the IUCN and the National EcoCentre of Ukraine, and objectives of the program "ECONET development in CEECs", she also introduced experts and members of the Coordination Council

The presentation by Dr Ya Movchan, member of the Coordination Council, was entitled "Methodology of development of the ECONET in Ukraine. Strategy and policy " Dr. Movchan emphasized that the goal of the National Ecological Network of Ukraine is to ensure cenotic completeness, ecosystemic integrity and biotic representativeness, he outlined basic criteria for selection of ECONET components, described the categories of ECONET components and elements, and gave information about concrete measures towards development of the ECONET. One of such actions was preparation, by experts from the Main Department (Board) of Natural Parks and Reserves, MEPNS, of the Long-Term Program of Development of the National Ecological Network of Ukraine
He also replied to many questions asked by participants regarding the activities of MEPNS in developing the National ECONET

In his presentation "Structure of the ecological network and hierarchy of its components", Acad. Yu Shelyag-Sosonko shared his vision of the general structure of the National ECONET, its components and connections between them Questions of the participants were devoted mostly to selection of structural components in the field, and the role and place of the existing protected areas in the integral structure of the ECONET.

Program expert Dr. A Tkachov outlined socioeconomic prerequisites and resources available for development and formation of the ecological network He demonstrated the place of the ECONET in the territorial organization of the society, and discussed the present status of protected areas and units Dr Tkachov expressed his opinion that at present we have favourable socioeconomic conditions for expanding ECONET areas by including additional protected areas and by restoration of lands and ecosystems, which have to be excluded from other modes of use (including radioactively contaminated areas) As one of the authors of the Long-Term Program of Development of the National Ecological Network of Ukraine, Dr Tkachov described some aspects and provisions of the program Questions to Dr Tkachov mostly concerned concrete mechanisms of development of the ECONET, financial and institutional support available, actions of MEPNS, and establishment of tools for inventory of ECONET components within the state statistics system

Expert Dr G Parkhomenko described cartographic resources for developing and mapping the ECONET in Ukraine She presented various atlases, maps and series of maps, and discussed methodological aspects of geographical and spatial distribution of ECONET components Dr Parkhomenko expressed her opinion regarding problems and possible solutions in developing a series of maps of the National Ecological Network of Ukraine

Expert Dr V. Pashchenko reported on landscape resources for development of the ecological network in Ukraine He analyzed in detail the present status and prospects of development of the national ECONET from the point of view of landscape geography His main point was the following landscape and landscape-forming factors of development of the ECONET are real and functional, they can serve as the base for landscape and biotic corridors of different ranks In addition to that, Dr. Pashchenko discussed some problems of terminology He prefers such terms as "ECONET", "ecocorridor", "biodiversity" or "biotic diversity" versus "ecological network", "ecological corridor", "biological diversity". At least some participants accepted his opinion

Expert Yu Dubrovsky discussed the problem of agricultural water bodies as potential components of the ECONET, demonstrated their importance as biodiversity sites and components of the ecological network. Questions to Dr Dubrovsky mainly concerned justifications for such a view on artificial water bodies

Mr Jarle Harstad, a representative of the GEF Secretariat, described activities of GEF in the field of biodiversity conservation and cooperation with MEPNS The audience was much interested and asked many additional questions

After lunch the session resumed Ms A Oleshko, Editor of "Zhyva Ukrayina" ("Living Ukraine") newsletter, presented information on "Zhyva Ukrayina", its aims and scope The main objectives of the bulletin are spreading the word about the biodiversity conservation and environmental education in Ukraine Some recent issues were devoted to the National ECONET of Ukraine The participants received recent issues of "Zhyva Ukrayina".

Expert Dr. R Khymko discussed the importance of river valley landscapes for the prospective ecological network He also outlined his own vision of the National ECONET of Ukraine, stressing its importance for preserving natural landscapes Questions to Dr Khymko mostly concerned the problem assessment of "rehabilitation" (restoration) areas intended for restoration of "quasi-natural" ecosystems Another question was about the meaning of a potentially new category of protected areas, "valley landscape of a small river", which was proposed by Dr. Khymko

The last presentation was made by Drs S. Tarashchuk (National EcoCentre, Kyiv) and O. Derkach (Mykolayiv Branch of the EcoCentre) They shared their experience in developing a local ecological network in the Mykolayiv Region The authors presented a scheme for the network, which will consist of core areas, buffer zones, and ecocorridors It is the first real attempt to implement the ECONET idea at the local level of an administrative region (Ukr · oblast) The presentation received much attention and, consequently, many questions were asked

16 00 - 16 15 Coffee break

Discussion on various aspects of development of the ECONET of Ukraine General discussion

Mr. Yu Zin'ko (Lviv University, Lviv) shared experience of developing an ecological network in Transcarpathia

Dr. T. Kotenko (Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine) stressed the special importance of the ECONET for the steppe zone of Ukraine, a region with severely fragmented ecosystems, and proposed to use former military areas for conservational purposes

Dr I Zagorodnyuk (Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine) additionally stressed the role of ecological networks for preventing the fragmentation of biota and unification of natural ecosystems The ECONET will be extremely important for migrations of animals Dr Zagorodnyuk also criticized the current practice of planting pure Scots pine (Pinus sylvestris) and black locust (Robinia pseudoacacia) forests in the steppe zone

Dr A Travleev (Dnipropetrovsk University, Dnipropetrovsk) expressed his disagreement with previous participants (Tarashchuk, Kotenko, Zagorodnyuk), who proposed to stop or considerably limit afforestation measures in the steppe zone Dr Travleev believes that man-made forest plantations and shelter belts (hedges) are an inevitable and very important components of steppe landscapes They should be included into the ECONET as ecocorridors

Dr S Popovych (Main Department, MEPNS, Kyiv) proposed to address the President of Ukraine regarding improvement of financial support to nature conservation In his opinion, all nature reserves should be included into the National heritage list These and some other proposals by Dr Popovych were included into the Resolution of the seminar

Dr. Ivan Udra (Institute of Geography, National Academy of Sciences of Ukraine, Kyiv) discussed migrational abilities of plants and animals, and proposed to strengthen biogeographical studies for developing scientifically sound justifications for proposed ecocorridors

In order to summarize proposals and notes of participants, the Resolution Committee has been unanimously elected. The Committee consisted of V Maltsev (Chair), T. Kotenko and R Khymko

During the work of the Committee, Acad. Yu Shelyag-Sosonko, President of UkrUNEPCom, provided information about activities of this NGO in conservation of biodiversity and development of the National ECONET. Additional data were submitted by representatives of local branches of UkrUNEPCom A Travleev (Dnipropetrovsk University, Dnipropetrovsk), Yu Zin'ko (Lviv University, Lviv), N. Bashtovyi (Sumy Pedagogical University, Sumy), and V Ostapko (Donetsk Botanical Garden, Donetsk)

17.30 Head of the Committee read the draft of the Resolution After discussion, the Resolution has been voted and adopted

18 00 Closing the seminar Dinner

RESOLUTION OF THE SEMINAR

The National Seminar "Green corridors to tomorrow present status and prospects (towards justification of the National Ecological Network of Ukraine)" was held in Kyiv (Kiev) on 28 January 1999 Its main goal was to discuss various aspects and problems related to development of the ecological network (ECONET) of Ukraine and its subsequent inclusion into the Pan-European Ecological Network Scientists, officials of the Ministry for Environmental Protection and Nuclear Safety of Ukraine (MEPNS) and other governmental agencies, representatives of NGOs and amateurs participated in the seminar The seminar has been organized and held by the National Ecological Center of Ukraine (encounter) within the framework of the IUCN program "Development of the ECONET in Ukraine", under the aegis and with financial support of the IUCN, and with assistance of the Main Department (Board) of National Parks and Reserves, MEPNS

After discussing the significance of ecological networks for conservation of biological and landscape diversity, and principles, theoretical and applied aspects, and resources for development of the national ECONET, the participants of the seminar, meeting in Kyiv, Ukraine, on 28 January 1999

- RECOGNIZE that development of the Pan-European Ecological Network as a pan-European system of nature conservation is a logical and consistent stage of conservational activities in the XX century; it is an integral natural system of conservation, restoration and improvement of the natural heritage of the European continent, which unites efforts at the national and international levels, only such integral system can resist the adverse global trends affecting and changing the natural environment

- AGREE that it is necessary and desirable to support the development of the National Ecological Network in Ukraine with its subsequent inclusion into the Pan-European Ecological Network; prerequisites of such a network are the advanced legal basis in the field of environment and use of natural resources, the existing natural areas (protected areas, wetlands of international significance, forests of I category, lands of the Water Fund, etc) as potential ECONET components, and a strong scientific and informational potential,

- RECOGNIZE the exclusive importance of the ecological network for preservation of severely fragmented ecosystems of the steppe zone of Ukraine, including sandy areas of southern Ukraine, as habitats for rare species of plants and animals, and ALSO RECOGNIZE the importance of the Azov - Black Sea (coastal-steppe) ecological corridor, as a component of the Asian-European (Eurasian) ecocorridor, which is of the national, pan-European, and even global significance in biodiversity conservation; the participants also DRAW ATTENTION to the positive experience in developing a local ecological network in the Mykolayiv Region

Sharing concern regarding the accelerating pace of decline of biological and landscape diversity and understanding the need for urgent actions for conservation of all existing natural and semi-natural ecosystems and restoration of degraded ecosystems, the participants of the seminar support the draft version of the Long-Term Program of Development of the National Ecological Network of Ukraine prepared by the MEPNS, and urge the Cabinet of Ministers of Ukraine to expedite the adoption of the program

For development and implementation of the ECONET of Ukraine and for promoting a wide public support to the program, the participants of the seminar propose

- to develop the National Ecological Network of Ukraine, paying the special attention to its transboundary links with components of the Pan-European Ecological Network, and using, where feasible and appropriate, the concepts and mechanisms outlined in the document "The European Ecological Network" (EECONET),

- to develop the Law of Ukraine on the National Ecological Network;

- to set up the National Steering Council for promoting the implementation and functioning of the ECONET;

The participants of the seminar believe that the scientific basis of the ECONET should be strengthened, especially regarding the following directions and aspects

- to develop the National Ecological Network of Ukraine on the unified landscape basis, considering all natural and anthropogenic (human) factors; to pay a special attention to human ecology, especially territories with favourable living conditions, those best suitable for recreation and therapeutic purposes,

- the ECONET should provide conditions for normal existence and free migrations of the native biota, and prevent dispersal and invasions of alien species,

- to pay a special attention to river valley landscapes, including those of small rivers, which could and should play an important role in migrations of both terrestrial and aquatic plants and animals

- to ensure use of correct and appropriate scientific terminology in all documents on any aspects of development and functioning of the ECONET;

- to investigate the problem of inventory of the "destructive network" areas and their subsequent rehabilitation and re-naturalization

The participants of the seminar appeal to the Verhovna Rada (Parliament) of Ukraine to expedite the approval of the Law of Ukraine on the Plant Kingdom and the Program (Action Plan) of Conservation of Biodiversity in Ukraine

The participants of the seminar appeal to the Verhovna Rada (Parliament) of Ukraine, the Cabinet of Min sters of Ukraine, MEPNS, and the Defence Ministry of Ukraine, urging these governmental bod es

- to ensure conservation of natural landscapes in military areas (test sites, testing/training grounds, etc) during their de-militarization, to prevent their conversion into arable lands or other modes of man-influenced degradation as a result of transfer of such lands to other land users/owners,

- to consider inclusion of such areas into the National Ecological Network of Ukraine,

- to ensure (legally, institutionally, etc) conservation of natural and semi-natural ecosystems, and restoration of degraded ecosystems of the steppe zone of Ukraine, considering the fact that these ecosystems suffered most from the impact of human activity,

- to improve financial support of institutions of the Nature Conservation Fund, and to include all reserves (zapovedniks) into the National Heritage list of Ukraine

The participants of the seminar recognize a very low level of public awareness and knowledge in the field of conservation of biological and landscape diversity, especially regarding issues related to the ECONET, and thus recommend to improve the system of public information and environmental education, in particular, it is recommended

- to ensure a wide discussion on the concept and program of development of the ECONET, widely involving NGOs;

- to spread information about and share experience of regions of Ukraine in development of local and regional ECONET components,

- to advise the Ministry of Education to improve curricula and education courses at all levels by adding materials on the importance of biodiversity conservation and the role of the ecological networks in this process

The participants of the seminar note an important contribution of the IUCN into the process of development and implementation of the Pan-European Ecological Network, and appeal for additional support to the programs of development of the National Ecological Network of Ukraine

Considering an outstanding significance of the future ECONET for conservation of the biota in the steppe zone of Ukraine, and importance of results of the project "Sustainable Agriculture and Biodiversity Conservation in Russia and Ukraine", the participants of the seminar ask the European program of the IUCN to inform about the results of this project The project has been completed at the beginning of 1998, however, neither Ukrainian institutions - IUCN members, nor MEPNS received information on the project outcome

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ANNEX 6. PROJECT PROPOSAL

Title: „Development of the Forest ECONET of Ukraine and Reconstruction of Artificial Forests"

Duration of Project 2 years

Summary

According to the recommendations made in the course of the workshop „Green Corridors into the Future" and of the IUCN European Forest Seminar in Warsaw (April 1996), the main priority in the field of the forest policy is conservation and maintaining of forest biodiversity

Principal ways for achieving this goal are increasing of the forested area and development of an ecological network connected to the Pan-European ECONET. Forest areas, both natural and artificial ones, play an extremely important role in the ECONET

Depending on ecological importance of a particular forest massif, it can be 1) a key element of ECONET, 2) connection link between different landscapes or other elements, 3) ecological corridor, or 4) reserves for different species/groups of biota (e g special reserves for insects or birds)

As compared to other European countries, Ukraine has a very low percentage of its forested area (14 3% of the total territory of the country), but quite considerable areas of eroded soils, which can be afforested (reforested) in future At the same time, Ukraine already has a network of forest conservation territories and objects, in addition, according to the Decree of President of Ukraine (No 79/94, 10 04 1994)) some other territories are reserved for creation of new nature conservation units In addition decisions have been made on distinguishing forests, including those of high nature conservation value (Resolution of the Cabinet of Ministers of Ukraine, No 557, 27 07 1995) etc Thus, our country has the base for the next step in protection and conservation of biological and landscape diversity This necessary step is the creation and development of the National ECONET of natural landscapes (with forest ecosystems as the basic link), and its subsequent incorporation into the Pan-European ECONET system

The ECONET will include existing forest areas plus lands planned to be afforested (reforested) Especially this is important for the Steppe Zone of Ukraine where natural forests have hardly survived and an acute problem is the creation of forests belts which are viral for the preservation of biodiversity The legal reservation of such lands for further afforestation is especially important now, when problems of rational use of eroded lands previously belonging to collective farms and other owners/users, and their transfer to the state forest fund are especially urgent

Objective:

Development of the Forest ECONET of Ukraine, with its incorporation into the Pan-European ECONET, and necessary reconstruction of artificial and semi-natural forests in connection to the first task

Development of legal, economic, ecological, and social problems related to the main task mentioned above

Background:

By its forest area (14 3% of the total territory of the country), Ukraine belongs to the group of scarce-forested countries in Europe Because of that the country cannot satisfy it own needs in timber and wood (the deficit of timber is about 30 mln cubic meters per year), and forests exhausted by overcuttings cannot normally maintain the ecological balance and stability In addition, due to economical problems forest shelter belts and massifs are neglected, and creation of new artificial forests and forest plantations is at the freezing point Such a situation results in intensification of processes of erosion in agrolandscapes These negative processes cover ca 25 mln ha of lands, and the harvest losses due to erosion are estimated to be ca 40% of the total expected harvest It is especially true for the Forest-Steppe and Steppe zones of Ukraine

The proposed Project „Development of the Forest ECONET of Ukraine and Reconstruction of Artificial Forests" will be based on the following principles

1. Ukraine already has a network of protected natural forest territories (total area 845 000 a), as well as a list of new conservation units planned to be established in the near future However, since Ukraine has rather high density of population (80-150 persons per square km in different regions) and powerful industrial potential, all protected territories and objects are surrounded by arable lands, industrial zones, small or large settlements and other areas intensively used and/or profoundly transformed by man Now it is time to make the next step in protection and conservation of biological and landscape diversity the creation and development of an integrated system, which would incorporate both existing and planned protected territories and conservation objects, and would unite them by ecological corridors into the National ECONET Establishment of this ecological network of forest, meadow, steppe and other natural ecosystems, with inclusion into it also artificial forests, will partly compensate the negative impact of human activity on landscapes, provide necessary connections between landscapes, stabilize erosion processes, and promote conservation of biodiversity

2 It is evident now, that it is impossible to ensure proper nature conservation and environmental protection in a separate country Because of that, the closest cooperation of European countries in this field is especially important National ecological networks will be successful and functionally efficient only if integrated within the united European system Thus, the National ECONET of Ukraine must be a vital part of the Pan-European ECONET

3 For increasing the forested area, maintaining stability of agrolandscapes and improving efficiency of ECONET, it is necessary to exclude from agricultural use at least 4 mln ha of eroded lands for their subsequent afforestation For proper implementation of these measures, it is necessary to provide economic and ecological justification of transfer of these lands from agricultural owners/users to the state forest fund, and to solve legal aspects of this transfer.

4 In the Steppe Zone of Ukraine, the artificial forests and forest plantations in many cases were created without taking into consideration the local ecological conditions It resulted in conflicts between forest users and conservationists These conflicts can be resolved by the Programme of Reconstruction of Artificial (Man-Made) Forests and Optimization of Agrolandscapes developed in parallel with creation of the National ECONET This Programme could harmonize interests of all involved sides, such as foresters, agriculture, conservationists, local population, etc

5 The creation of the ECONET will also facilitate implementation of the Conventions on Biodiversity and Convention on Combating Desertification in Ukraine Activities All activities on the proposed Project are aimed at protection of biological and landscape diversity and maintaining favourable living conditions in Ukraine These activities may be supported by the created network of forest experts and experts which are involved in the design of the Ukrainian ecological network.

6 To create the map of functional zonation of the forests of Ukraine using GIS-technologies and ecological landscape approach This map will be used as a base for development of the ECONET. To identify locations of core areas, ecological corridors, buffer zones, including international ones, and locations of lands reserved for afforestation

7 To connect the proposed ECONET with the existing forest and landscape pattern in Ukraine

8 To analyze functional models for selected forest massifs within the planned ECONET. To compare efficiency of interzonal, valley and riverine, protective and other types of ecological corridors

9 To prepare ecological, economic and social justification for transferring certain eroded ands previously owned/used by collective farms and other owners/users to the state forest fund for subsequent afforestation To create regional strategic programmes of re-forestation and afforestation in connection to the development of ECONET and depending on ecological peculiarities of natural zones and regions

10 To develop a tactical programme for creation and development of regional ECONET units for a selected pilot [=model] region, and plan of reconstruction of artificial forests

11 To organize a National Seminar „Development of the Forest ECONET of Ukraine, and Reconstruction of Artificial Forests" and a few local seminars

OUTPUT:

1 Recommendations on economical, social, ecological, legal aspects of development of the ECONET of Ukraine, and reconstruction of artificial forests resulting from the programme The general strategic Programme for reconstruction of forests of Ukraine, which will take into account regional and local peculiarities of natural zones in Ukraine

2 Prospective map of the Forest ECONET of Ukraine, and a local (model area) ECONET map, with their justification

3 Establishment of new protected areas of forest as key elements of the ECONET in Ukraine

4 Design of a pilot management plan for maintaining certain elements of the National ECONET

USERS:

The Final report and other materials of the Project will be submitted to the state administrative bodies, first of all to the Ministry for Environmental protection and Nuclear Safety of Ukraine and State Committee of Forestry Materials will be published
and/or send to organizations, institutions and individuals interested in or involved into problems and activities of biodiversity conservation

ANNEX 7. NATIONAL STEERING COMMITTEE:

1. **Stetsenko M.P.,** Head of the Central Board for National Nature Parks & Nature Reserve Management (CBNNP&NRM) of the Ministry for Environmental Protection & Nuclear Safety of Ukraine
2. **Oleshchenko V.,** Administration of the President of Ukraine
3. **Yakovlev Ye.A ,** Director of the Institute of Geography, NAS Ukraine
4. **Popovitch S.Yu.,** Head of Department of CBNNP&NRM
5. **Movchan Ya.I.,** senior researcher of the Institute of Botany, NAS Ukraine
6. **Hardashuk T.V.,** Head of the NGO „Zelena Ukraina".

Annex 8

LAW OF UKRAINE

ON THE STATE PROGRAMME OF UKRAINE'S NATIONAL ENVIRONMENTAL NETWORK DEVELOPMENT FOR YEARS 2000-2015

(Vidomosti Verkhovnoyi Rady Ukrayiny (VVR), 2000, issue 47, page 405)

The Supreme Council (Parliament) of Ukraine RESOLVES hereby as follows

1 The attached State Programme of Ukraine's National Environmental Network Development for Years 2000-2015 shall be approved

2 This Law shall become effective from the date of the publication thereof

3 The Cabinet of Ministers of Ukraine shall

- appoint people in charge of the implementation of actions related to the development of the national environmental network,
- earmark appropriate funds for the implementation of actions related to the development of the national environmental network for the forthcoming year during the development of the draft State Budget of Ukraine and the draft State Economic and Social Development Programme of Ukraine

LEONID KUCHMA
President of Ukraine
City of Kyiv, 21 September 2000
#1989-III

Approved by
Law of Ukraine
#1989-III
of 21 September 2000

STATE PROGRAMME OF UKRAINE'S
NATIONAL ENVIRONMENTAL NETWORK DEVELOPMENT
FOR YEARS 2000-2015

Section I GENERAL PROVISIONS

The State Programme of Ukraine's National Environmental Network Development for Years 2000-2015 (hereinafter referred to as the "Programme") has been developed in the context of requirements related to the further refinement, improvement and development of the environmental legislation of Ukraine, as well as in line with recommendations of the Pan-European Biological and Landscape Diversity Strategy (1995) in respect of the issue of the development of an Pan-European Environmental Network as a single spatial system of areas of European countries with the natural or partly altered condition of the landscape

A great deal of importance is placed upon the improvement of the regulatory and legal framework in the field of the preservation, expansion, restoration and protection of the single system of areas with the natural condition of the landscape and other natural complexes and unique areas, the establishment of natural objects subject to special protection on their territory, thus contributing to the reduction, prevention and elimination of the negative impact of the business and other activities of the people on the environment, the preservation of natural resources and the gene pool of the animate nature

The environmental network development provides for changes in the structure of the stock of lands of the country by attributing (on the basis of the justification of the environmental safety and the economic feasibility) some lands used for purposes of the economy to the categories subject to the special protection with the restoration of the diversity of natural landscapes inherent in them

The wealth of natural landscapes is the common property of the Ukrainian people, its natural heritage and should serve to the current and future generations as declared in the Constitution of Ukraine (254k/96-VR)

1 Terms and Definitions

The following terms and definitions shall are used herein

'biological (biotic) diversity' shall be understood as the totality of all species of plants, animals and micro-organisms, groups thereof, and ecosystems within the territory of Ukraine, its territorial and internal marine waters, exclusive (marine) economic zone and continental shelf The biological diversity consists of the species, population, cenosis and genetic diversity Human beings are an integral component of the biological diversity and cannot exist other than within it,

'buffer zone' shall be understood as an area with the natural or partly altered condition of the landscape, which surrounds the most valuable sections of the environmental network and protects them against the impact of negative external factors of the natural or anthropogenic origin,

'environmental network' shall be understood as an integral territorial system, which includes areas of natural landscapes subject to the special protection, and areas and objects of the natural reserve fund, resort, curative, recreational, water protection, field protection areas and objects of other types as specified by the legislation of Ukraine and is a part of the structural territorial elements (hereinafter referred to as the "elements") of the environmental network, namely natural regions, natural corridors and buffer zones,

'cadastre of areas and objects of the natural reserve fund' shall be understood as a system of recording and assessing the condition of areas and individual objects of the natural reserve fund, and their territorial totalities in terms of quantity and quality, whose purpose is to provide executive agencies, localself-administration bodies, individuals and legal entities with adequate data on the legal status, title, regime, geographical location, quantitative and qualitative characteristics of these areas and objects, their environmental, scientific, educational, recreational and other value for the purposes of the protection, preservation and efficient management of the operation and development of the natural reserve fund,

'land conservation' shall be understood as the withdrawal of (agricultural or industrial)lands from the economic turnover for a certain period to take actions aimed at the restoration of the fertility and environmentally acceptable condition of soils, as well as the restoration (renewal) of the lost environmental balance in a specific region,

'environmental network status monitoring' shall be understood as a system of the observation of changes in components of the environment within the environmental network in order to timely identify the negative trends in their condition, assess possible consequences of such changes, predict and prevent negative processes, eliminate their aftermath,

'population' shall be understood as a totality of individual organisms of the same species with general conditions required to maintain the number of such organisms at a certain level during a long period,

'natural region' shall be understood as a natural and territorial formation of considerable area, whose integrity shall be determined by area-specific phyto-landscape, physical and geographical, administrative and other indices characterised by typical and unique natural complexes, diverse flora and fauna, and which plays a regional role of stabilising the environment,

'natural corridor' shall be understood as an area of land or water surface either being in or brought to the natural condition, which ensures that the environment meets the conditions of the continuity, systematic unity and carries out the bio-communication functions at various levels of the spatial organisation of the environmental network,

'natural landscape' shall be understood as an integral natural and territorial complex with genetically homogenous and uniform natural conditions of localities, which have developed as a result of the interaction of components of the geological environment, relief, hydrogeological regime, soils and biocenoses;

'coastal marine natural landscapes' shall be understood as natural landscapes including land and sea (water) based natural complexes and objects,

'existence environment of plants and animals' shall be understood as a totality of environmental conditions (both abiotic and biotic), which an individual, a population or a species exists in and cannot exist without,

'cenosis (biocenosis)' shall be understood as an historical totality of plant and animal species inhabiting an area with more or less uniform existence conditions (biotope)

2 Current Condition of Areas and Objects Subject to the Special Protection

Areas and objects subject to the special protection (areas and objects of the natural reserve fund, resort and curative, recreational, water and field protection, and other natural areas and objects) account for a relatively insignificant share of the territory of Ukraine The current area and territorial structure of the lands of Ukraine, whichare subject to the special protection, provide certain grounds for attributing them to a territorial system with certain features of an environmental network The current condition of natural landscapes of Ukraine meets the criteria of the Pan-European Environmental Network only in part

The national environmental network shall include the share of lands of the country, where natural landscapes have been preserved in an almost unchanged or partly changed condition

The area of lands being components of Ukraine's National Environmental Network is specified in Annex 1.

In addition, the environmental network shall also include individual littoral sections of the Black Sea and Sea of Azov

Natural landscapes can be observed at almost 40 per cent of the territory of Ukraine They are preserved in the least changed condition at lands covered with forests, shrubs, marshes, and at open lands, whose area accounts for about 19 7 per cent of the total area of the country Since only 44 per cent of forests perform protective and environmental functions, one may assume that landscapes occupying about 12 7 of the territory of the country are in the condition close to the natural one

The best-protected are the natural complexes within territories of the natural reservefund As of 01 September 2000, the natural reserve fund of Ukraine includes biosphere and natural reserves, national natural parks, regional landscape parks, special reserves, natural monuments, reserve tracts, botanical gardens, dendrological parks, zoological parks, parks being monuments of the landscape architecture with the total area of around 2 4 million hectares, or 4 per cent of the territory of the country. Almost 0 5 million hectares of these lands have been granted for use to institutions of the natural reserve fund

Currently, the flora of Ukraine consists of over 25 thousand plant species, the fauna consists of almost 45 thousand animal species The negative anthropogenic factors of the influence upon the environment resulted in the extinction of a large number of biological species and endangered the existence of many existing species This resulted in 541 plant species' and 382 animal species' being included in the Red Book of Ukraine and 127 rare and extinct typical plant groupings' being included in the Green Book of Ukraine The number of almost all species of birds of prey, as well as waterfowl, Gallinaceae, crane-like birds, mammals, fishes and insects is gradually reducing

Negative changes in the marine flora and fauna are brought about by the appearance of dangerous foreign species The Lychnia, Koeleria, Centaurea, Liliaceae, Amaryllidaceae, Gallinaceae Till the end of this century, 20 more species of mammals and a number of other species of animals and plants can be entered in the Red Book of Ukraine More than 20 per cent of populations of wild herbs or technical plants are on the eve of the exhaustion as a result of the uncontrolled use

In biocenoses of Ukraine, the trend of the rapid propagation of virus infections has been observed A number of flora and fauna objects are affected with viruses

According to the Programme of the Prospective Development of Reserves in Ukraine (177/94-VR) approved by Resolution of the Supreme Council (Parliament) of Ukraine of 22 September 1994, the area of the natural reserve fund has been growing dynamically However, its share in the total area of Ukraine, the diversity of types of natural landscapes and plant groups, the territorial structure of the nature protection territories do not fully comply with international standards, the strategy of planning the territory of the country In addition, as a result of the prevalent development of raw material production sectors in Ukraine, which are the most hazardous sectors from the environmental pointof view, and the excessive tillage of soils, the conditions of ensuring the territorial continuity of areas with natural landscapes deteriorated This complicates and sometimes makes impossible the spatial processes of the biological exchange at the cenotic and genetic levels inherent in the live nature.

The favourable pre-requisites for the increase in the area of lands with natural landscapes, which emerged in the course of the reform of economic relations in the field of the land use, are ensured by.

- withdrawing agricultural lands (first of all, degraded arable lands) as a result of the non-profitability of their use for designated purposes,

- withdrawing land plots, which have lost their natural condition and endanger the preservation of the environment, from the industrial use (in the field of raw materials production, construction and in other sectors),

- giving preference to the restoration of natural landscapes as the most appropriate type of the use of lands withdrawn from the agricultural use,

- establishing water protection zones and coastal protection belts around waters,

- increasing the area of forests, woodland belts around agricultural lands, industrial and residential areas;

- the need for Ukraine to comply with its international commitments in the field of the environmental protection

3 Objective and Tasks of the Programme

The principal objective of the Programme is to increase the area of lands of the country under the natural landscapes to the level sufficient for the preservation of their diversity close to their initial natural condition and the development of their territorially integrated system built to ensure the possibility to use the natural ways of the migration and propagation of species of plants and animals, which would ensure the preservation of natural ecosystems, species and populations of the flora and fauna At that, the National Environmental Network should meet the requirements to the operation thereof within the Pan-European Environmental Network and perform the leading functions in respect of the preservation of the biological diversity In addition, the Programme should contribute to the balanced and sustainable use of biological resources in the economy

Major tasks of the Programme shall be as follows

1) in the field of the development of the national environmental network

- to determine the spatial structure of the environmental network in order to systematise and determine the ways of the integration of natural environments of the existence of populations of wild flora and fauna species in a territorially integral complex,

- to determine the area of individual environmental network elements in order to ensure favourable conditions of the existence, free propagation and migration of plant and animal species,

- to justify and refine the organisational, economic, scientific, practical and other actions in order to support the process of the development and protection of the environmental network,

- to determine areas for the development of components of the national environmental network, such as natural regions, natural corridors of national importance, to define their place in the structure of lands,

- to optimise the area, structure and status of elements of the environmental network, to increase their protection status,

- to reserve and then confer the appropriate status on reserve areas being rich in terms of the biodiversity, especially on the old nature groupings, river-bed, mountain, and gully forests, virgin lands, typical and unique ecosystems and landscapes, existence environments of rare and endangered species, geological formations and standard soil types, etc ;

- to agree upon the issues related to the transboundary integration of elements of environmental networks of neighbouring countries with elements of the national environmental network of Ukraine in order to develop the Pan-European Environmental Network,

- to inform the population about the role of the environmental network in maintaining the environmental balance in regions, to ensure the participation of local executive agencies and the population in the preservation of the landscape diversity,

2) in the field of the protection and restoration of land resources

- to optimise areas of agricultural lands and to reduce the extent of the tillage of such lands,

- to improve the structure of agricultural lands and to enrich them with natural components,

- to introduce a soil-protective farming system with the contour-irrigation organisation of the territory,

- to restrict the destructive intensive use of environmentally vulnerable lands;

- to preserve the agricultural lands with very washed out and very deflated soils at slopes, whose gradient exceeds 5-7 degrees,

3) in the field of the protection and restoration of water resources

- to ensure the ecological sanation of natural land and water areas, especially river sources, to improve the condition of flood ecosystems in basins of Dnieper, Dnister, Southern and Western Boog, Siversky Donets, Danube, including the creation of protective belts along the coasts of water objects, especially at very steep areas, to take actionsaimed at the preservation of wetlands, to enhance their water protective and water control ability, ensure their re-naturalisation and improve the protection of natural complexes of the water protection zones of water objects,

- to develop and take actions aimed at the preservation of coastal landscapes of the Sea of Azov and the Black Sea, to create a network of marine objects of the natural reserve fund,

4) in the field of the protection, use and restoration of resources of the flora and fauna

- to create areas with forest and meadow type vegetation in agricultural landscapes,

- to restore (re-naturalise) the steppe, meadow, wetlands and other natural landscapes, where appropriate and feasible,

- to arrange for new areas to maintain the existence environments of certain plant and animal species entered in the Red Book of Ukraine and the natural plant groups entered in the Green Book of Ukraine, the European Red List of Plants and Animals Endangered throughout the World, as well as other plant and animal species included in lists of international conventions and agreements binding upon Ukraine,

- to optimise the agriculture, forestry, hunting and fishing taking into account the existence conditions of species of the local flora and fauna,

- to improve the condition of the protection, preservation and restoration of greenery plantations and forests being components of greenery zones of cities and other populated areas,

5) in the field of the biodiversity preservation

- to maintain, strengthen and restore key ecosystems and existence environments of plant and animal species,

- to ensure the stable management of the positive potential of the biological diversity by way of the optimal utilisation of the social and economic opportunities at the national and regional levels,

- to take into account the objectives in the field of the preservation, and balanced and sustainable use of the biological diversity in all sectors using or influencing the same,

- to take targeted actions meeting the requirements of the preservation of various types (mountain, steppe, meadow, coastal, marine, river, flood, lake, wetland and forest) of ecosystems and based upon the legal and financial potential of the nature users and state authorities

4 Conceptual Provisions of the National Environmental Network Development

The following shall constitute the legal basis for the development of the national environmental network Laws of Ukraine "On Environmental Protection" (12264-12), "On Natural Reserve Fund of Ukraine" (2456-12), "On Fauna" (3041-12),"On Flora" (591-14), the Land Code of Ukraine (561-12), the Forest Code of Ukraine (3852-12) and the Water Code of Ukraine (213/95-VR) The natural areas of international importance shall be set up in accordance with international treaties of Ukraine, for instance 1971 Convention on Wetlands of International Importance especially as Waterfowl Habitat (995_031), 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention (995_089), 1979 Convention on the Conservation of European Wildlife and Natural Habitats (995_034) (1979), 1979 Convention on the Conservation of Migratory Species of Wild Animals (995_136), Convention on the Protection of the Black Sea Against Pollution (995_065) (1992), Convention on Biological Diversity (995_030) (1994), Pan-European Biological and Landscape Diversity Strategy (1995), Convention on the Protection and Use of Transboundary Watercourses and International Lakes (994_273) (1999)

The natural regions, natural corridors and buffer zones in their continuous integrity shall form a network, which unites natural landscape areas into a territorially integral system Depending on functions, area and animaland plant species structure, elements of the international, national and local importance shall be identified within the national environmental network

The natural regions shall be formed in territories, which contain objects of the natural reserve fund, whose percentage is considerably higher than the country average value, as well as other territories, which meet the conditions determined by the national environmental protection legislation or international regulatory and legal acts (conventions, agreements, treaties, etc) and ensure the protection of the landscape and biological diversity, especially those, which include habitats of rare and endangered species of plants and animals

The natural corridors shall have the form of natural landscape areas of a prolonged configuration being of various width, length, or shape, and interconnecting natural regions They should ensure the appropriate conditions of the preservation of wildlife species

The buffer zones shall be established to protect the natural regions and corridors against the detrimental impact of external factors, to create more favourable conditions within them for the development, self-restoration, and optimisation of management forms in order to preserve the existing natural values and to restore those extinct

The following shall be the components of structural elements of the environmental network

1) areas and objects of the natural reserve funds being the major natural elements of the environmental network, namely natural and biosphere reserves, national natural parks, regional landscape parks, sanctuaries (landscape, forest, botanical, general zoological, ornithological, entomological, ichthyological, hydrological, general geological, palaeontological, and karst/speleological), natural monuments, as well as their protection zones, artificial objects (botanical gardens, dendrological parks, zoological parks, parks being monuments of the landscape architecture),

2) water objects (sections of a sea, lake, water reservoir, river), wetlands, water protection zones, coastal protection belts, allocation belts, coastal belts of waterways and sanitary protection zones, which make up the relevant basin systems,

3) forests of the first group,

4) forests of the second group,

5) resort and curative areas with their natural resources,

6) recreational areas for the organisation of the recreation of the population and tourism,

7) other natural areas (areas with steppe vegetation, meadows, pastures, rock placers, sands, saline lands, etc),

8) land plots, where natural plant groupings entered in the Green Book of Ukraine grow,

9) land plots, where species of animals and plants entered in the Red Book of Ukraine stay or grow,

10) partly, the agricultural lands used extensively—pastures, meadows, hay harvesting areas, etc ;

11) radioactively polluted lands, which are not used and are subject to special protection as natural regions with specific status

Section II. DEVELOPMENT OF THE NATIONAL ENVIRONMENTAL NETWORK

5 Increasing the Area of the National Environmental Network

In order to increase the area of the national environmental network, the Programme provides for the following actions

1) setting up objects of the natural reserve fund in areas, which meet the conditions of ensuring the protection of natural complexes (Annex 2),

2) increasing the area of lands granted for use to institutions of the natural reserve fund from 0 5 to 2 million hectares,

3) preserving natural landscapes in areas being of historical and cultural value,

4) including actions aimed at setting up and arranging the water protection zones and coastal protection belts of water objects in programmes of the ecological sanation of basins of Siversky Donets, Southern Boog, Dnister, Danube and Western Boog, implementing a special regime of the use of lands in river source areas,

5) forming transboundary nature protection areas of international importance,

6) setting up protective forest plantations and field protection forest belts, arranging meadows (Annex 3),

7) preserving the degraded and polluted lands with subsequent partial reforestation thereof (Annex 4),

8) maintaining natural landscapes in lands used for the industrial, transportation, communication and defence purposes,

9) increasing the area of forests in an environmentally appropriate manner

As a result of the implementation of the above actions, it is projected that the area of lands of the national environmental network will be as specified in Annex 5

6 Restoration of the Natural Condition of Elements of the Environmental Network

In areas being components of the national environmental network, it shall be ensured that special actions be taken aimed at the prevention of the destruction of or damage to natural landscapes, natural plant groupings entered in the Green Book of Ukraine, the preservation of animal and plant species entered in the Red Book of Ukraine, the improvement of theirexistence environment, the creation of appropriate conditions for their propagation in their natural state and dissemination

In order to ensure the performance of the environmental protection functions of the national environmental network, the Programme provides for the following actions

1) the protection of the animal existence environment during their migration and wintering, and the creation of a system of the protection of animals,

2) the expansion of the network of water objects for the migration of fish,

3) the creation of conditions for the restoration of the diversity of species of plants and animals, and phyto-cenoses in natural zones,

4) the protection of wetlands of the international and national importance,

5) the implementation of actions aimed at preventing the detrimental impact on natural complexes of elements of the national environmental network,

6) the implementation of a system of taking the environmental protection actions in order to preserve natural complexes of elements of the national environmental network,

7) the preservation of populations of plant and animal species, special actions aimed at ensuring the migration of animals and plants at intersections of natural and transport corridors

7. Development of the Integral Territorial Structure of the National Environmental Network

The national environmental network shall include elements of the national and local importance to be identified on the basis of scientific, legal, technical, organisational, financial and economic criteria

The following shall be considered elements of the national environmental network of national importance

- natural areas, where both existing natural reserve areas and those to be set up are concentrated First of all, these are Carpathian Mountains, Crimean Mountains, Donets Ridge, Azov Highlands, Podillia Highlands, Polissia (marshy woodlands), sources ofsmall rivers, certain estuary areas of large rivers, marine coastal area, the continental shelf, etc ;

- major communication elements of the nationalenvironmental network, namely, the latitudinal natural corridors ensuring the natural communications of zonal nature in Polissia (forest zone), Halychyna - Slobozhanshchyna (forest-steppe zone), Southern Ukraine (steppe zone), as well as meridional natural corridors limited in terms of their space with valleys of large rivers (Dnieper, Danube, Dnister, Western Boog, Southern Boog, Siversky Donets), which combine water and flood landscapes, i e , the ways of the migration of numerous species of plants andanimals

A separate natural corridor of international importance consists of a chain of coastal and marine natural landscapes of the Sea of Azov and the Black Sea, which surrounds the territory of Ukraine in the South

The list of major elements of the national environmental network of national importance is provided in Annex 6

Elements of the national environmental network being of local importance shall be identified in specific regional programmes and regional schemes of the environmental network development

8 Organisation of Common Transboundary Elements of the National Environmental Network and the Pan-European Environmental Network

The programme provides for the integration of the national environmental network with environmental networks of neighbouring countries being members of the Pan-European Environmental Network by means of setting up common transboundary elements of the environmental network within natural regions and natural corridors, agreeing upon the land use projects in border areas

The common transboundary elements of the national environmental network will be set up in co-operation with the following countries

- the Republic of Poland (Western Polissia biosphere reserve, Eastern Carpathian biosphere reserve Roztochany biosphere reserve),

- the Republic of Belarus (Western Polissia biosphere reserve, Rivne natural reserve, Prypiat-Stokhid national natural park),

- the Russian Federation (Snov natural reserve, Luhansk natural reserve, Desna-Stara Guta national natural park, Meotida national natural park, Donets Ridge national natural park),

- Romania (Danube biosphere reserve, Vyzhnytsia national natural park),

- the Republic of Moldova (Lower Dnister national natural park),

- the Slovak Republic (Eastern Carpathian biosphere reserve)

The list of actions aimed at setting up the national environmental network of Ukraine and the scope of funds required for such actions are provided in Annexes 7 and 8

Section III PROGRAMME IMPLEMENTATION MECHANISM

9 Regulatory and Legal Framework

In order to ensure the implementation of the Programme, it is planned to adopt legal acts aimed at implementing the legal norms of the development of the national environmental network To this end, the laws of Ukraine on the national environmental network of Ukraine, on the preservation of lands, on the economic incentives motivating the land owners and users to take actions aimed at the development and maintenance of the environmental network, on the coastal belt of theseas shall be adopted, appropriate changes shall be introduced in the Land Code of Ukraine, the Forest Code of Ukraine, the Water Code of Ukraine, laws of Ukraine "On Environmental Protection", "On Ensuring the Sanitary and Epidemiological Well-being of the Population"

It is planned to develop and approve other regulatory and legal acts aimed at improving the economic mechanism related to the protection and restoration of natural landscapes, and the preservation of their biological diversity

In order to strengthen the liability for the violation of requirements of the legislation on the protection, use and restoration of the landscape diversity, it is planned to introduce changes in the Criminal Code of Ukraine and the Administrative Misdemeanour Code of Ukraine

10 Funding

The implementation of the set of actions provided for hereby shall be financed from funds of the State Budget of Ukraine, the republican budget of the Autonomous Republic of Crimea, local budgets, environmental protection funds in budgets of all levels, as well as from other sources, for instance grants of the Global Ecological Foundation and other international environmental organisations The Programme may be funded by enterprises of all ownership forms and other legal entities

The major source of the coverage of expenses for the development of elements of the national environmental network being of national importance shall be the funds earmarked in the general and special funds of the State Budget of Ukraine for the actions aimed at the protection of the environment The development of structural elements of the national environmental network being of local importance shall be funded from funds specified in appropriate sections of local budgets and local environmental protection funds

The feasibility study of actions aimed at developing the elements of the national environmental network being of national importance with approximate estimate of the results thereof shall be submitted annually as part of the draft State Economic and Social Development Programme of Ukraine for the coming year by a specifically authorised central executive agency being in charge of the issues of the ecology and natural resources of Ukraine, which is the party contracting the Programme on behalf of the state

11 Scientific Support

In order to provide the scientific support to the actions aimed at the development of the national environmental network, the Programme provides for the fundamental and applied research aimed at developing recommendations and methods of the preservation and restoration of the landscape diversity, including the evaluation of the current condition of natural landscapes, the justification of the most efficient actions, which will ensure the balanced and sustainable use of their natural resources, the inventory of natural complexes and components thereof, the organisation of keeping the cadastres of natural resources and the environmental monitoring within the national environmental network, the establishment of appropriate databases and geographical information systems

12. Organisational Support

The organisational support to the implementation hereof shall be rendered by the specifically authorised central executive agency being in charge of the issues of the ecology and natural resources of Ukraine together with concerned central and local executive authorities This agency shall also control the implementation hereof

The agency ensuring the organisation of the Programme implementation shall submit reports to the Cabinet of Ministers of Ukraine on an annual basis, as well as the necessary information on the progress of the implementation of Programme tasks

On the basis of the provided information, the Cabinet of Ministers of Ukraine shall adjust the Programme tasks, their contents and scope of funding

A deliberative body (Co-ordination Council) shall be set up to co-ordinate activities of the central and local executive agencies implementing the Programme The membership of the body shall include officials of these agencies, representatives of public organisations and leading scientists The co-ordination council shall also exercise the functions appertaining to

- the organisation of the development of the general and regional schemes of the national environmental network development,
- the preparation of proposals related to the inclusion of the national environmental network in the General Zoning Diagram of the Territory of Ukraine as a special functional area,
- the preparation of proposals on the adjustment hereof, if necessary,
- the organisation of the compilation of the national report on the status of the development of the national environmental network once in 5 years

13 Information about the Status of the National Environmental Network and the Public Participation in the Development Thereof

In order to increase the level of the ecological education and training, and environmental awareness of the population, to make more active its participation in the implementation of actions aimed at the development of the national environmental network,the Programme provides for the following

- the support to the establishment of new and the involvement of the existing public environmental expert centres in activities aimed at making the society realise the significance of the problem of the preservation of the landscape diversity and the existence environments of plant and animal species,
- the development and the implementation of proposals concerning the involvement of the population in the actions aimed at the development of the national environmental network, including young people and taking into account the experience of the out-of-school environmental education in the field of the generation of the environmental culture and awareness of the problems of the environmental protection

Section IV. PROGRAMME IMPLEMENTATION STAGES

It is planned to implement the Programme till the year 2015 in two stages (2000-2005 and 2006-2015)/

At the first stage, it is planned to ensure the increase in the area of individual elements of the national environmental network, to apply economic levers of the support to their development in lands of all ownership forms, to develop the appropriate regulatory and legal framework, to undertake the necessary scientific research and take organisational actions

At the second stage, it is planned to bring the area of the national environmental network to the level required for ensuring the environmental security of the country, commissioning a stable system of the environmental actions aimed at the preservation of the landscape and biological variety

Section V. SOCIAL, ECONOMIC AND ENVIRONMENTAL RESULTS OF THE PROGRAMME IMPLEMENTATION

The Programme implementation will ensure the preservation and restoration of the landscape diversity and contribute to

- maintaining the environmental balance on the territory of Ukraine,
- creating the natural conditions for the life and development of human beings in an environmentally balanced environment brought as close as possible to natural landscapes;
- preventing the irreversible loss of a part of the gene, demographic, cenotic and ecological pool of the country,
- ensuring the balanced and sustainable use of the nature in a considerable portion of the territory of Ukraine,
- developing the resource base for tourism, recreation and making the population healthier,
- increasing the natural resource potential in agricultural lands adjoining the national environmental network,
- improving the regulatory and legal framework of the environmental protection and harmonising the same with the international one,
- developing the Pan-European Environmental Network,

- ensuring the restoration of bio- and geochemical turnovers in the environment, reducing the threat of the degradation and the loss of fertility of lands,

- re-naturalising the lands withdrawn from the agricultural use,

- strengthening the co-ordination of activities of central and local executive agencies, local self-administration bodies, public environmental organisations in the field of the solution of problems of the environmental security of Ukraine

Annex 1
to the Programme

Areas Being Components of the
National Environmental Network

Area type	Area thousand hectares	as percentage of the total area of the country
Hay harvesting area	2307 3	3 82
Pastures	5465 6	9 06
Forests and other areas covered with woods	10380 2	17 2
including		
Forests	9424 6	15 62
Forest-type belts	645 5	1 07
Shrubs	310 1	0 51
Open marshes	940 4	1 56
Radioactively polluted lands not used for the economic purposes	136	0 21
Open lands not covered or slightly covered with vegetation	1180 8	1 96
Waters, total	2415	4
including		
Natural watercourses	244	0 4
Artificial watercourses	162 2	0 27
Lakes	540 8	0 9
Artificial reservoirs	1133 7	1 88
Estuaries	334 3	0 55
TOTAL	22825 3	37 81

Annex 2
to the Programme

Protected Areas and Objects of the
Natural Reserve Fund of Ukraine

Category of areas and objects of the natural reserve fund	Area of lands					
	thousand hectares			as percentage of the total area of the country		
	a s of 01 09 20 00	a s of 2005	a s of 2015	a s of 01 09 20 00	a s of 2005	a s of 2015
National natural parks	6 00	1 455	2 329	1 0	2 4	3 9
Natural reserves	1 60	3 50	4 22	0 .3	0 6	0 7
Biosphere reserves	2 12	2 50	3 01	0 3	0 4	0 5
Other categories of the natural reserve fund	1 427	2 200	3 223	2 4	3 6	5 3
TOTAL	2 399	4 255	6 275	4	7	1 0 4

Annex 3
to the Programme

Protective Forest Plantations, Field-protection Forest Belts, Meadow-covered Degraded and Radioactively Polluted Lands—Projected Components of the National Environmental Network

Region	Area, thousand hectares		
	protective forest plantations	field-protection forest belts	meadow covered degraded and radioactive lands
Autonomous Republic of Crimea	9 66	5 6	30 5
Oblasts (provinces)			
Vinnitsa	18 2	0 7	38 6
Volyn	34 95	1 53	53 7
Dnipropetrovsk	109 62	17 88	261
Donetsk	36 83	10 45	51 6
Zhytomyr	90 55	0 7	3 2
Zakarpattia	1 17	0 23	14 9
Zaporizhia	33 78	16 6	248 4
Ivano-Frankivsk	7 89	0 68	10 9
Kyiv	45 67	2 76	46 3
Kirovograd	39 88	4 8	44
Luhansk	27 49	5 4	226 3
Lviv	7.15	0 28	29 4
Mykolaiv	72 28	20 8	72 8
Odessa	66 62	22 77	17 9
Poltava	105 55	9 02	168 5
Rivne	68 3	1.7	72 7
Sumy	6 54	2 26	54 9
Ternopil	11 11	0 5	63 7
Kharkiv	40 21	12 86	26 8
Kherson	16 48	20 42	25 8
Khmelnitsky	10 05	0 86	60 5
Cherkassy	44 52	5 97	48 2
Chernihiv	40 03	0 42	60 7
Chernivtsi	2 66	0 02	31 9
City of Kyiv	0 1		0 1
City of Sevastopol	0 61	0 1	0 4
TOTAL	947 9	174 31	1763 7

Annex 4
to the Programme

Degraded and Polluted Lands Intended for the Conservation

Region	Area, thousand hectares	
	Degraded and polluted lands	Including the lands to be reforested
Autonomous Republic of Crimea	31 9	1 4
Oblasts (provinces)		
Vinnitsa	42 6	4
Volyn	75	21 3
Dnipropetrovsk	347 4	86 4
Donetsk	66 4	14 8
Zhytomyr	79 2	76
Zakarpattia	15 1	0 2
Zaporizhia	256	7 6
Ivano-Frankivsk	14 8	3 9
Kyiv	84 3	38
Kirovograd	69 7	25 7
Luhansk	231 2	4 9
Lviv	29 4	
Mykolaiv	87 8	15
Odessa	37 2	19 3
Poltava	267 6	99 1
Rivne	124 2	51 5
Sumy	58 2	3 3
Ternopil	63 7	
Kharkiv	57 1	30 3
Kherson	33 25	7.45
Khmelnitsky	63 5	3
Cherkassy	80 84	32 64
Chernihiv	89 7	29
Chernivtsi	32 21	0 31
City of Kyiv	0 1	
City of Sevastopol	0 8	0 4
TOTAL	2339 2	575 5

Annex 5
to the Programme

Individual Components of the National Environmental Network

Environmental network component	Area, thousand hectares		As percentage of the total area of the country		As percentage of the area of the environmental network as of 2015
	as of 01 09 200 0	as of 2015 (proj)	as of 01 09 200 0	as of 2015 (proj)	
Hay harvesting areas and pastures	77 72 9	95 36 6	12 88	15 8	37.9
Forests and forested areas	10 380 2	10 955 7	17 2	18 15	43 55
Open marshy lands	94 0 4	94 0 4	1 56	1. 56	3 75
Radioactively polluted lands not used for he purposes of the national economy	13 6	13 6	0 21	0 21	0 5
Open lands without vegetation or with inconsiderable vegetation	11 80 8	11 80 8	1 96	1. 93	4 7
Waters	24 15	24 15	4	4	9 6
TOTAL·	22 825 3	25 164 5	37 81	41 68	100

Annex 6
to the Programme

Major Elements of the National Environmental Network Being of National Importance

Environmental Network Element	Location (in terms of the physical and geographical conditions)	Major areas and objects being components of the environmental network
	NATURAL REGIONS	
Carpathian region	Carpathian mountain country	Carpathian, Roztochany, Eastern Carpathian biosphere reserves, Gorgany natural reserve, Synevyr, Carpathian, Uzh, Skole Beskydy, Hutsulshchyna national natural parks
	Prykarpattia and Opillia	Halytsky national natural park
Crimean mountain region	Crimean mountain country	Krymsky natural reserve, Yalta mountain and forest reserve, Karadag, Opuksky natural reserves Sevastopol, Chatyr-Dag national natural parks
Western Polissia region	Western Polissia	Western Polissia biosphere reserve, Cheremsky, Rivne, Southern Polissia natural reserves
Central Polissia region	Dnieper Polissia	Polissky biosphere reserve, Dniprovsky, Desniansky natural reserves, Mezynsky, Korostyshyvsky, Ichniansky, Holosiyivsky national natural parks
Eastern Polissia region	Eastern Polissia	Serednioseymsky, Desna-Stara Guta, Trostianets-Vorskla national natural parks
Podillia	Podillia Highlands	Medobory natural reserve, Podilsky Tovtry, Kremenetski Hory, Central Podillia, Savransky Forest, Dnister Canyon national natural parks
Middle Dnieper	Middle Dnieper	Ukrainian Forest Steppe Biosphere reserve, Cherkassky Bir, Kholodny Yar, Middle Dnieper, Trakhtemyrivsky, Pereyaslav-Khmelnitsky, Chornolissky national natural parks, Kaniv natural reserve
Donets	Siversky Donets valley	Sviati Hory, Siversky Donets, Slobozhansky, Homolshansky national natural parks
Donets-Azov	Donets Ridge, Azov	Ukrainian Steppe Natural

	Highlands	reserve, Priazovsky and Meotida national natural parks
Tavria	Dnieper-Molochna Interfluve	Black Sea, Askania Nova biosphere reserves, Lower Dnieper, Azov-Sivash national natural parks
Lower Dnister	Lower course of Dnister valley	Lower Dnister national natural park
Lower Danube	Lower course of Danube valley	Danube biosphere reserve
Azov	Sea of Azov	Kazantypsky, Opuksky natural reserves, Azov-Sivash, Sivash, Meotida national natural parks
Black Sea	Northeast shelf of the Black Sea	Zernova Great Philofora Field, Small Philofora field, Dzharylgach, Kinburn Cape national natural parks
	NATURAL CORRIDORS	
Polissia	Forest zone	Forests of the 1st and 2nd groups, marshes
Halychyna - Slobozhanshchyna	Forest steppe zone	Forests of the 1st and 2nd groups, forest belts, meadows, pastures
Southern-Ukrainian	Steppe zone	Forest belts, pastures, hay harvesting areas
Coastal	Coastal belt of the Sea of Azov and the Black Sea	Internal marine waters, capes, shoals, beaches, islands
Dnister	Dnister valley	Flood plains, shrubs, sloped lands with insignificant vegetation, forests, water objects
Boog	Southern and Western Boog valleys	Hay harvesting areas, sloped lands with insignificant vegetation, forests, water objects
Dnieper	Dnieper valley	Flood plains, shrubs, hay harvesting areas, sloped lands with insignificant vegetation, forests, water objects
Siversky Donets	Siversky Donets valley	Flood plains, shrubs, hay harvesting areas, sloped lands with insignificant vegetation, forests, water objects

Annex 7
to the Programme

ACTIONS AIMED AT THE DEVELOPMENT OF THE NATIONAL ENVIRONMENTAL NETWORK

Name of the object of the natural reserve fund (area, hectares)	B udget code	Esti mated cost of work, UAH thousand	>From the following sources			Time for completion (in years) broken by budget codes for each object
			s tate budget	nv protect ion funds	g rants of int'l env orga-nisa-tions	
1 Development of designs for the establishment of natural reserve fund objects and the land allocation for the organisation of territories thereof						
National natural parks to be established						
Priazovsky, 20 thousand	2 00600 2 40600	320	2 20	00		2000-2002
Meotida, 15 thousand	2 00600 2 40600	120	7 0	0		2000-2002
Sivash, 195 thousand	2 00600 2 40600	400	3 00	00		2000-2002
Prypiat-Stokhid, 50 thousand	2 00600 2 40600	450	3 00	50		2000-2002
Svidovets, 15 thousand	2 00600 2 40600	120	7 0	0		2001-2003
Halytsky, 14 thousand	2 00600 2 40600	70	4 0	0		2001-2003
Pereyaslav-Khmelnitsky, 10 thousand	2 00600 2 40600	80	5 0	0		2001-2003
Hutsulshchyna, 50 thousand	2 00600 2 40600	400	3 00	00		2001-2003

Dnister Canyon, 10 thousand	2 00600 2 40600	80	5 0	0		2002- 2004
Dzharylgach, 10 thousand	2 00600 2 40600	80	5 0	0		2002- 2004
Trostianets-Vorskla, 40 thousand	2 00600 2 40600	300	2 00	00		2002- 2004
Siversky Donets, 20 thousand	2 00600 2 40600	160	1 00	0		2003- 2005
Granite Steppe Boog, 5 thousand	2 0600	40	4 0			2003- 2005
Velyky Loog, 40 thousand	2 00600 2 40600	300	2 00	00		2003- 2005
Lower Sula, `7 thousand	2 00600 2 40600	140	1 00	0		2004- 2006
Central Podillia, 15 thousand	2 00600 2 40600	120	8 0	0		2004- 2006
Samarsky Bir, 20 thousand	2 00600 2 40600	160	1 00	0		2005- 2007
Precarpathian, 20 thousand	2 00600 2 40600	160	1 00	0		2005- 2007
Dykankivsky, 15 thousand	2 00600 2 40600	120	8 0	0		2006- 2008
Slobozhansky, 10 thousand	2 00600 2 40600	80	5 0	0		2006- 2008
Kinburn Cape, 10 thousand	2 00600 2 40600	80	5 0	0		2007- 2009
Trakhtemyrivsky, 10 thousand	2 00600 2 40600	80	5 0	0		2008- 2010

Lower Dnieper, 50 thousand	2 00600 2 40600	400	3 00	00		2009— 2011
Krymsky, 25 thousand	2 00600 2 40600	200	1 30	0		2010- 2012
Savransky Forest, 10 thousand	2 00600 2 40600	80	5 0	0		2011- 2013
Chatyr-Dag, 5 thousand	2 00600	40	4 0			2012- 2014
Saki, 10 thousand	2 00600 2 40600	80	5 0	0		2013- 2015
Zernova Great Philofora Field, 100 thousand	0 600	100	1 00			2013- 2015
Small Philofora field, 30 thousand	2 00600	60	6 0			2013- 2015
Biosphere reserves to be established						
Western Polissia, 40 thousand	2 00600 2 40600	280	2 00	0		2000- 2002
Eastern Carpathian, 50 thousand	2 00600 2 40600	350	2 50	00		2000- 2002
Krymsky, 40 thousand	2 00600 2 40600	320	2 50	0		2001- 2003
Roztochany, 25 thousand	2 00600 2 40600	170	1 20	0		2012- 2015
Polissia, 50 thousand	2 00600 2 40600	350	2 50	00		2004- 2006
Ukrainian Forest Steppe, 50 thousand	2 00600 2 40600	350	2 50	00		2010- 2012
Donets Ridge, 20 thousand	2 00600 2 40600	140	1 00	0		2012- 2015
Natural reserves to be expanded						

Medobory, 2 thousand	2 00600	20	2 0			2000-2002
Polissia, 14 thousand	2 00600 2 40600	100	8 0	0		2001-2003
Dnieper-Oril, 505	2 00600	10	1 0			2002-2004
Biosphere reserves to be expanded						
Carpathian, 10 thousand	2 00600 2 40600	70	5 0	0		2002-2004
Danube, 20 thousand	2 00600 2 40600	140	1 00	0		2003-2005
Black Sea, 50 thousand	2 00600	50	5 0			2005-2007
National natural parks to be expanded						
Vyzhnytsia, 3 thousand	2 00600	20	2 0			01-2003
Synevyr, 3 thousand	2 00600	20				2001-2003
Podillia Tovtry, 20 thousand	2 00600 2 40600	100	7 0	0		2002-2004
Uzh, 10 thousand	2 00600	50	5 0			2003-2005
Sviati Hory, 10 thousand	2 00600	50	5 0			2004-2006
TOTAL		741 0	5 270	140		

Note The Programme does not cover the establishment of new natural reserve fund areas under the National Dnieper Basin Environmental Sanation and Potable Water Quality Improvement Programme (123/97-VR) approved by Resolution of the Supreme Council (Parliament) of Ukraine of 27 February 1997 as follows Stara Guta biosphere reserve (8 thousand hectares), Dniprovsky (55 thousand hectares), Desniansky (54 thousand hectares), Southern Polissia (15 thousand hectares) natural reserves, Holosiyivsky, (3 thousand hectares), Ichniansky (46 68thousand hectares), Mezynsky (31 6 thousand hectares), Cherkassky Bir (40 thousand hectares), Serednioseymsky (2 thousand hectares), Chornolissky (15 thousand hectares), Kholodny Yar (6 thousand hectares), Dnieper-Boog (50 thousand hectares), Korostyshyvsky (20 thousand hectares), Kostopilsky (30 thousand hectares), Middle Dnieper (300 thousand hectares) national natural parks

Actions	Budget code	Estimated cost of work, UAH thousand	From the following sources	Time for completion (in years) broken by budget codes for each object

			s tate budget	nv protect ion funds	rants of int'l env orga-nisa-tions	
2 Keeping the state cadastre of the natural reserve fund of Ukraine						
Setting up an automated system for keeping the state cadastre of the natural reserve fund of Ukraine	2 40600	4 00		00	00	2000-2002
Taking inventory of natural complexes of areas and objects of the natural reserve fund of Ukraine	2 40600	2 000		0		2001-2015
Setting up and keeping a single geographical information system and database, preparing the reporting materials of the state cadastre of the natural reserve fund of Ukraine	2 00600 2 40600	1 500	5 00	00	00	2001-2015
Issue of the reporting materials of the state cadastre of the natural reserve fund of Ukraine	2 00600	2 00	2 00			2001-2015
TOTAL:		4 100	7 00	700	00	
3 Preservation of populations of species of animals and plants						
Development of regulatory documents and keeping the state cadastres of flora and fauna	2 00600 2 40600	1 1200	6 000	200		2000-2015
Inventory of habitats of plant species entered in the Red Book of Ukraine and plant groupings entered in the Green Book of Ukraine	0 600 2 40600	1 500	5 00	000		2000-2015
Assessment of the status of populations of plant and animal species entered in the Red Book of Ukraine	2 40600	7 00		00		2000-2015
Establishment of centres for artificial rearing of rare and endangered species of plants and animals	2 00600 2 40600	2 00	1 00	00		2002-2005
Establishment of centres for the storage of the genetic material of rare and endangered species of plants and animals	2 00600	3 000			000	2002-2015
TOTAL.		1 6600	6 600	900	100	

4 Taking actions arising from the performance of commitments of Ukraine under international treaties						
Setting up the national and regional databases of the environmental network	2 00700	5 00			00	2000-2005
Development of the General Scheme of the National Environmental Network Development	2 00700	8 00	4 00		00	2000-2002
Development of regional schemes of the environmental network development	2 00700	2 500			500	2001-2005
Compilation of the national list of objects of the natural heritage	0 700	3 00	3 00			2002-2004
Identification of new wetlands meeting the criteria of wetlands of international importance	2 00700	4 00			00	01-2015
Development of management plans for wetlands of international importance	0 700	1 000			000	2001-2015
Identification of areas of special interest in respect of their preservation within the natural reserve fund of Ukraine according to 1979 Convention on the Conservation of European Wildlife and Natural Habitats	2 00700	8 00	4 00		00	2001-2005
Identification of areas of special interest in respect of their preservation according to 1979 Convention on the Conservation of European Wildlife and Natural Habitats outside the natural reserve fund of Ukraine	2 00700	4 00	2 00		00	2001-2005
Preparation of descriptions of the most valuable objects of the natural reserve fund for the award of the European Diploma of the Council of Europe	2 00700	1 00	1 00			2001-2005
Preparation of descriptions of the relevant objects of the natural reserve fund for entering them into a special list of bio-genetic natural areas	2 00700	1 00	1 00			2006-2015
Compilation of lists of wetlands of national importance	2 00700	1 00	1 00			2006-2015
Compilation of lists of wetlands of local importance	2 00700	7 00	7 00			2006-2015
Development of management plans for wetlands of national importance	0 700	8 00	8 00			2001-2015

TOTAL·		8 500	3 100		400	
5 Scientific work to support the implementation of the Programme						
Development of proposals for the improvement of the system of the development of the environmental network of natural areas with different level of the anthropogenic influence, methods and criteria of the identification of natural areas for the preservation of the landscape diversity by turning them into reserves	0 40202	5 00	5 00			2000-2015
Study of the species, cenosis diversity and the middle- and large-scale mapping of natural complexes and components thereof for the purposes of the comprehensive monitoring, the establishment of geographical information systems	0 40202	3 000	3 000			2000-2015
Development of a system of criteria for the assessment of the condition of components of ecosystems of natural reserve areas on the basis of their scientific, recreational and social importance The development of methodologies of the economic valuation of natural reserve areas	0 40202	3 00	3 00			00-2015
Development and implementation of methods and techniques of the sociotechnical basis of the biodiversity of the natural reserve fund The development of the concept and strategy of the ecosystem protection and management in national natural parks	0 40202	7 00	7 00			2000-2015
Development of the scientific model of the organisation of the monitoring of the environment in areas of the natural reserve fund and keeping of the state cadastre of the natural reserve fund of Ukraine	0 40202	2 500	2 500			2000-2015
TOTAL		7 000	7 000			
PROGRAMME GRAND TOTAL		4 3610	2 2670	1740	200	

Annex 8
to the Programme

GENERAL ALLOCATION OF FUNDS REQUIRED FOR THE IMPLEMENTATION OF THE NATIONAL ENVIRONMENTAL NETWORK DEVELOPMENT PROGRAMME FOR YEARS 2000-2015 (BY STAGES AND SOURCES OF FUNDS)

UAH '000

o	General Actions	S ub-total	Broken down by years						
			000	001	002	3	004	005	2 006-2015
	Development of designs for the establishment of natural reserve fund objects and the land allocation for the organisation of territories thereof	7 410	40	00	60	00	00	00	2 810
	Keeping the state cadastre of the natural reserve fund of Ukraine	4 100	00	50	50		00	00	2 600
	Preservation of populations of species of animals and plants	1 6600	50	50	50	50	50	50	1 5100
	Taking actions arising from the performance of commitments of Ukraine under international treaties	8 500		00	00	00	00	00	6 000
	Scientific work to support the implementation of the Programme	7 000	00	40	40	40	40	40	4 400
	TOTAL:	4 3610	990	240	200	090	090	090	3 0910
	from the following sources								
	State Budget	2 2670	40	90	00	40	40	40	1 9260
	Environmental protection fund	1 1740	00	00	50	00	00	00	7 190
	Grants of international environmental organisations	9 200	50	50	50	50	50	50	4 100

Annex 9

UZNESENIE VLÁDY SLOVENSKEJ REPUBLIKY
č. 239
zo 17. marca 2004

k národnému zoznamu navrhovaných území európskeho významu

Číslo materiálu: 6324/2004
Predkladateľ: minister životného prostredia

Vláda

A. schvaľuje

A 1. národný zoznam navrhovaných území európskeho významu,

B. ukladá

ministrovi životného prostredia

B 1. zaslať národný zoznam navrhovaných území európskeho významu Európskej komisii

do 30 apríla 2004

ministrovi pôdohospodárstva

B 2. pripraviť a na schválenie vláde predložiť projekt monitoringu lesných ekosystémov v územiach zaradených do siete NATURA 2000

do 31. decembra 2004

podpredsedovi vlády a ministrovi hospodárstva

B.3. v spolupráci s ministrom životného prostredia, podpredsedom vlády a ministrom financií, ministrom dopravy, pôšt a telekomunikácií, ministrom pôdohospodárstva a ministrom práce, sociálnych vecí a rodiny vypracovať a predložiť na rokovanie vlády analýzu dopadov príslušnej legislatívy na rozvoj cestovného ruchu

do 31 mája 2004

C. mení

C.1. v bode B 1 uznesenia vlády SR č. 636 z 9 júla 2003 termín úlohy z 31. decembra 2003 na 30. apríla 2004.

Vykonajú: podpredseda vlády a minister hospodárstva
podpredseda vlády a minister financií
minister životného prostredia

minister pôdohospodárstva
minister dopravy, pôšt a telekomunikácií
minister práce, sociálnych vecí a rodiny

VLÁDA SLOVENSKEJ REPUBLIKY

UZNESENIE VLÁDY SLOVENSKEJ REPUBLIKY
č. 636
z 9. júla 2003

k národnému zoznamu navrhovaných chránených vtáčích území

Číslo materiálu: 3935/2003

Predkladateľ: minister životného prostredia

Vláda

A. schvaľuje

A.1. národný zoznam navrhovaných chránených vtáčích území s tým, že nároky na zdroje z verejných financií z titulu realizácie vyhlášok, budú kryté z prostriedkov rozpočtovej kapitoly Ministerstva životného prostredia SR;

B. ukladá

ministrovi životného prostredia

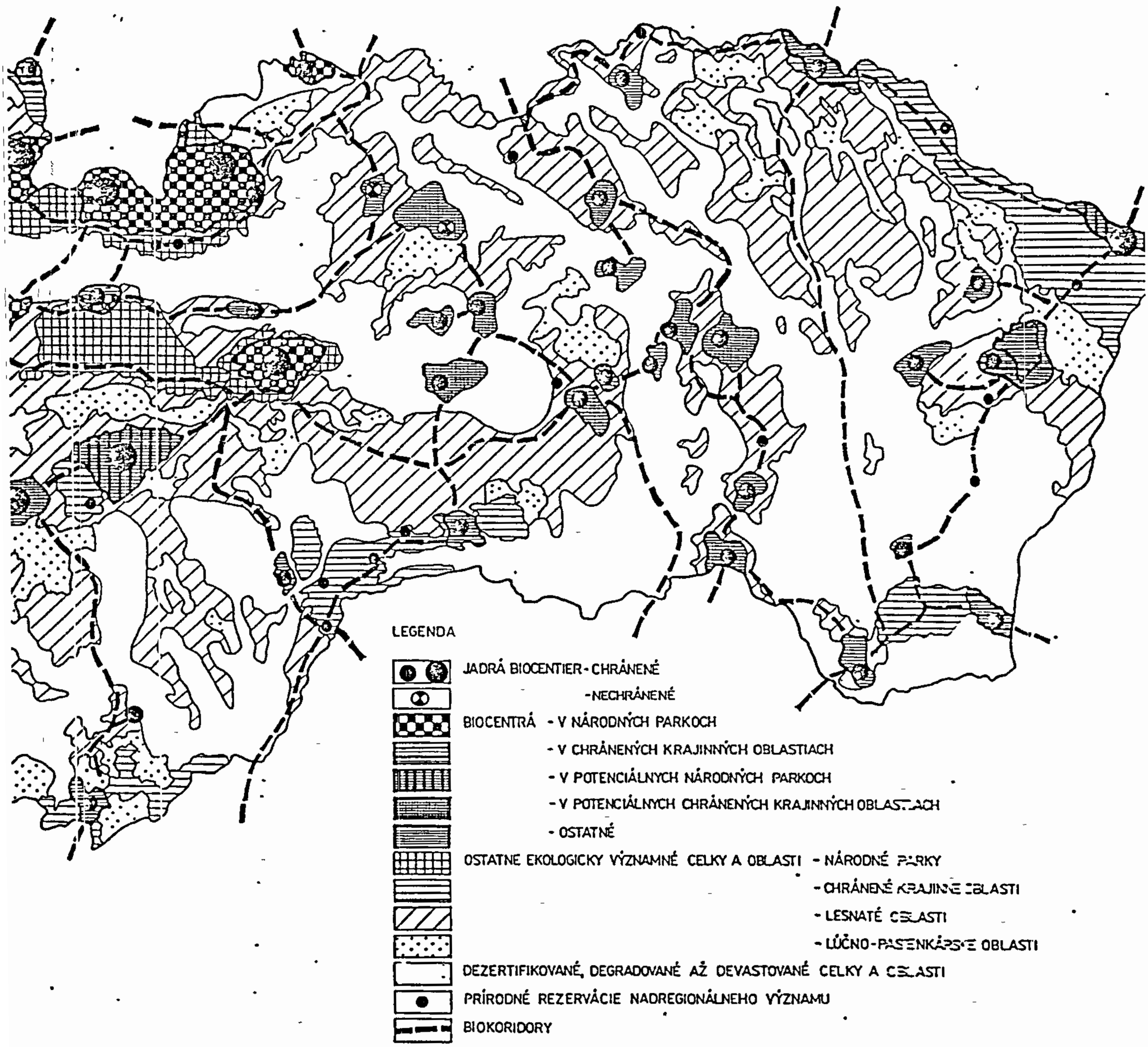
B.1. zaslať národný zoznam navrhovaných chránených vtáčích území Európskej komisii

do 31. decembra 2003.

Vykoná: minister životného prostredia

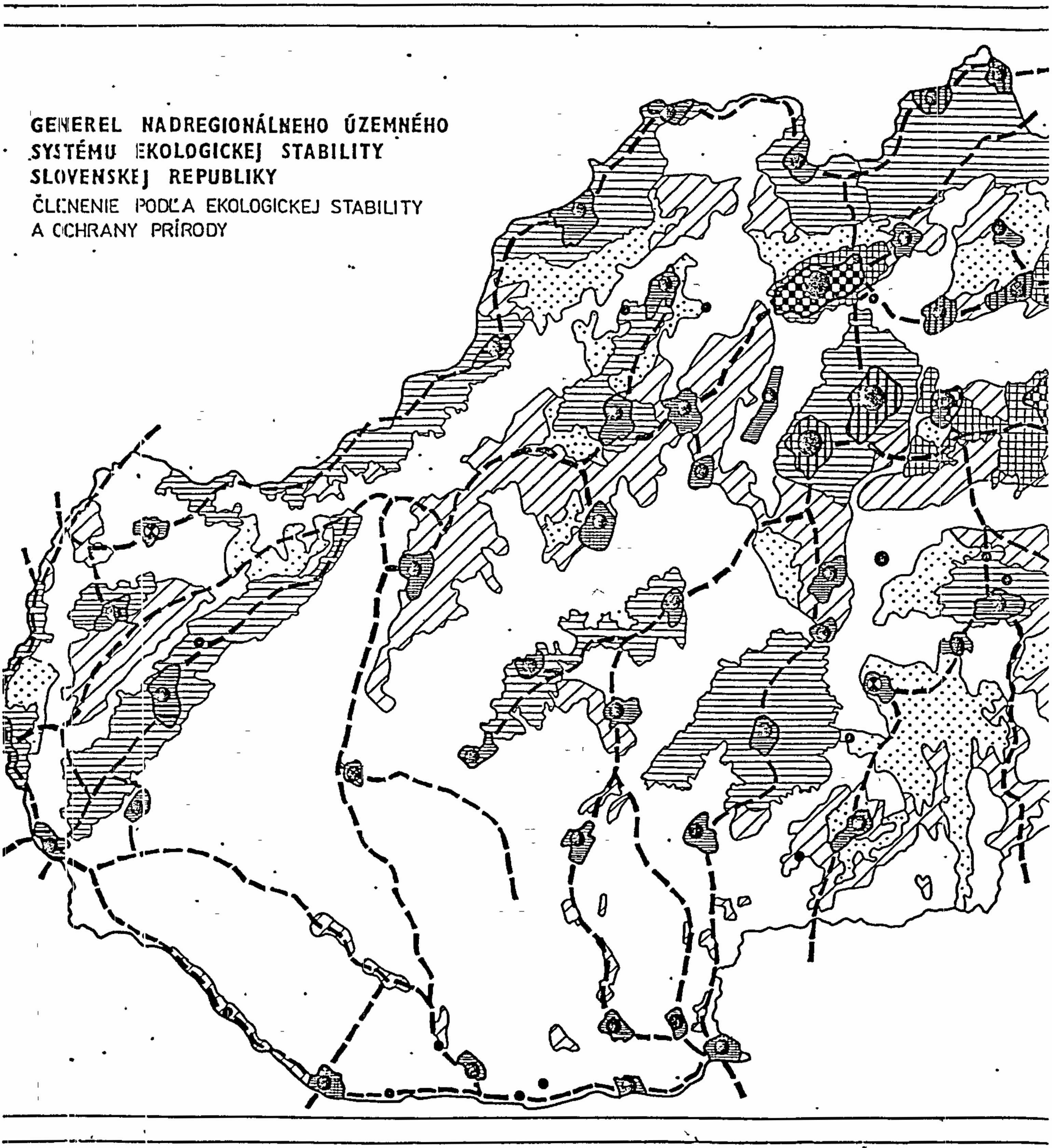
Doc by Vilian Pichler, PhD

Annex 10



Doc. Ing. Viliam Pichler, PhD

Schválené uznesením vlády SR č. 319 zo dňa 27.4.1992.



Ročník 1998

Zbierka zákonov

SLOVENSKEJ REPUBLIKY

Čiastka 82 | Uverejnená 10. júla 1998 | Cena 10,40 Sk

OBSAH

216

NARIADENIE VLÁDY Slovenskej republiky

zo 7. apríla 1998,

ktorým sa vyhlasuje záväzná časť územného plánu veľkého územného celku Prešovský kraj

Vláda Slovenskej republiky podľa § 29 ods. 2 zákona č. 50/1976 Zb. o územnom plánovaní a stavebnom poriadku (stavebný zákon) v znení zákona č. 229/1997 Z. z. nariaďuje:

§ 1

(1) Vyhlasuje sa záväzná časť územného plánu veľkého územného celku Prešovský kraj. Priestorové vymedzenie tohto veľkého územného celku je znázornené v prílohe č. 1.

(2) Základné zásady usporiadania územia a limity jeho využívania určené v záväzných regulatívoch funkčného a priestorového usporiadania územia sú záväznou časťou územného plánu veľkého územného celku Prešovský kraj a sú uvedené v prílohe č. 2.

§ 2

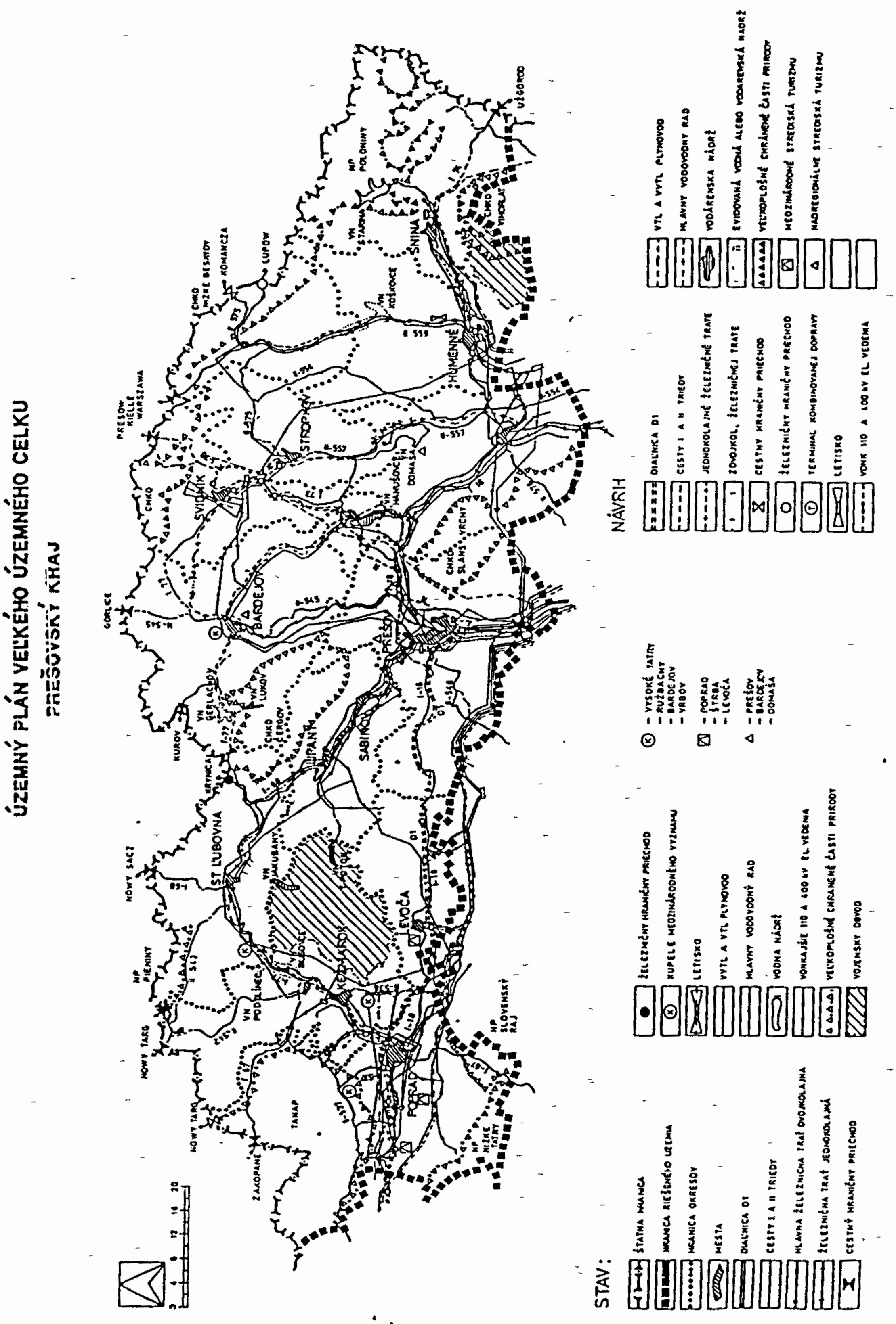
Dokumentácia schváleného územného plánu je uložená a možno do nej nahliadnuť na Ministerstve životného prostredia Slovenskej republiky, na Krajskom úrade v Prešove, na Okresnom úrade v Prešove, na Okresnom úrade v Bardejove, na Okresnom úrade v Humennom, na Okresnom úrade v Kežmarku, na Okresnom úrade v Levoči, na Okresnom úrade v Medzilaborciach, na Okresnom úrade v Poprade, na Okresnom úrade v Sabinove, na Okresnom úrade v Snine, na Okresnom úrade v Starej Ľubovni, na Okresnom úrade v Stropkove, na Okresnom úrade vo Svidníku a na Okresnom úrade vo Vranove nad Topľou.

§ 3

Toto nariadenie nadobúda účinnosť dňom vyhlásenia.

Vladimír Mečiar v. r.

Príloha č. 1 k nariadeniu vlády č. 216/1998 Z. z.



Príloha č. 2
k nariadeniu vlády č. 216/1998 Z. z.

ZÁVÄZNÁ ČASŤ ÚZEMNÉHO PLÁNU VEĽKÉHO ÚZEMNÉHO CELKU PREŠOVSKÉHO KRAJA

I. Záväzné regulatívy funkčného a priestorového usporiadania územia

1. V oblasti usporiadania územia, osídlenia a životného prostredia
   - 1.1 podporovať dobudovanie multimodálneho koridoru
     - 1.1.1 vytvorením západovýchodného koridoru Bratislava – Žilina – Prešov – Košice,
     - 1.1.2 vytvorením severojužného koridoru Poľská republika – Stará Ľubovňa – Prešov – Košice – Maďarská republika,
   - 1.2 vytvoriť územno-technické podmienky na rozvoj osídlenia
     - 1.2.1 nadregionálnych sídelných rozvojových osí:
       1. Česká republika – Žilina – Poprad – Prešov – Vranov nad Topľou – Michalovce – Ukrajinská republika,
       2. Poľská republika – Stará Ľubovňa – Sabinov – Prešov – Košice – Maďarská republika,
     - 1.2.2 regionálnej sídelnej rozvojovej osi Spišská Nová Ves – Levoča – Kežmarok – Stará Ľubovňa – Prešov – Bardejov,
     - 1.2.3 nadregionálnych sídelno-komunikačných rozvojových osí.
       1. Prešov – Giraltovce – Svidník – Poľská republika,
       2. Brezno – Poprad – Kežmarok – Spišská Belá – Javorina – Poľská republika,
       3. Vranov nad Topľou – Humenné – Snina – Ukrajinská republika,
     - 1.2.4 regionálnych sídelno-komunikačných rozvojových osí.
       1. Stará Ľubovňa – Bardejov – Svidník – Domaša – Vranov nad Topľou,
       2. Spišská Belá – Spišská Nová Ves – Lysá nad Dunajcom – Poľská republika,
   - 1.3 považovať za ťažiská osídlenia
     - 1.3.1 ťažisko osídlenia medzinárodného významu košicko-prešovské s centrami osídlenia Prešov a Sabinov,
     - 1.3.2 ťažiská osídlenia nadregionálneho až celoštátneho významu:
       1. popradsko-spišskonovoveské s centrami osídlenia Kežmarok, Levoča, Poprad a Svit,
       2. bardejovské s centrom osídlenia Bardejov,
       3. michalovsko-vranovsko-humenské s centrami osídlenia Humenné a Vranov nad Topľou,
     - 1.3.3 ťažiská osídlenia regionálneho významu:
       1. staroľubovnianske s centrami osídlenia Podolínec a Stará Ľubovňa,
       2. svidnícko-stropkovské s centrami osídlenia Stropkov a Svidník,
     - 1.3.4 ťažiská osídlenia miestneho významu
       1. Giraltovce, Hanušovce nad Topľou, Lipany, Medzilaborce a Snina,
       2. Spišská Belá, Spišské Podhradie a Široké-Fričovce,
       3. Spišská Stará Ves, Maťašovce, Spišské Hanušovce, Starý Smokovec a Štrba,
   - 1.4 vytvárať možnosti pre vznik suburbánnych zón okolo ťažísk osídlenia s prihliadnutím na ich stupeň sociálno-ekonomického rozvoja,
   - 1.5 podporovať rozvoj priestorov – mikroregiónov mimo ťažísk osídlenia charakterizovaných ekonomickou a demografickou depresiou a tento princíp aplikovať aj pri tvorbe subregiónov,
   - 1.6 vytvárať priestorové podmienky na vedenie rozhodujúcich sietí technickej infraštruktúry a rezervovať plochy pre ekologické stavby regionálneho a nadregionálneho významu,
   - 1.7 rešpektovať podmienky vyplývajúce zo záujmov obrany štátu v okresoch Humenné, Kežmarok, Levoča, Poprad, Prešov a Stará Ľubovňa,
   - 1.8 rešpektovať poľnohospodársky pôdny fond a lesný pôdny fond ako faktor limitujúci urbanistický rozvoj kraja definovaný v záväznej časti územného plánu veľkého územného celku,
   - 1.9 v územnoplánovacích dokumentáciách a podkladoch sídiel na území národných parkov, v ich ochranných pásmach a chránených krajinných oblastiach posudzovať všetky novonavrhované zóny a väčšie stavebné komplexy z hľadiska ich vplyvu na životné prostredie.
2. V oblasti rozvoja rekreácie a turistiky
   - 2.1 považovať za hlavné rekreačné krajinné celky Bachureň, Belianske Tatry, Branisko, Busov, Čergov, Domašu, Duklu, Kozie chrbty, Levočské vrchy, Ľubické predhorie, Ľubovniansku vrchovinu, Nízke Beskydy, Pieniny, Slánske vrchy, Spišskú Maguru, Východné Karpaty a Vysoké Tatry,

2.2 za priestory spoločného záujmu pri zabezpečovaní ich rozvoja považovať rekreačné priestory v prihraničnej oblasti s Poľskou republikou a Ukrajinskou republikou,

2.3 v turistických strediskách ležiacich na území Tatranského národného parku

2.3.1 neprekračovať súčasné hranice zastavaného územia novou výstavbou,

2.3.2 nezvyšovať počet lôžok v turistických a športových zariadeniach,

2.3.3 regulovať prírastok bytov, povoliť ho výnimočne pre trvalo bývajúcich s cieľom zlepšiť bytovú situáciu pri súčasnom zvýšení architektonickej úrovne jestvujúcich budov,

2.4 v ochrannom pásme Tatranského národného parku nerozširovať existujúce a nezakladať nové urbanizované plochy v priamej nadväznosti na územie národného parku s výnimkou obcí Mlynčeky, Štôla, Tatranská Kotlina, Tatranská Štrba a Ždiar,

2.5 uskutočňovať novú výstavbu v nadväznosti na jestvujúce sídelné útvary v turistických strediskách ležiacich na území ochranného pásma Tatranského národného parku a na území Národného parku Nízkych Tatier, Národného parku Poloniny, Národného parku Slovenský raj, Pieninského národného parku a ich ochranných pásiem a na území chránených krajinných oblastí Vihorlat a Východné Karpaty,

2.6 zachovať typickú štruktúru krajiny na území národných parkov, chránených krajinných oblastí a ich ochranných pásem a v pripravovaných chránených krajinných oblastiach a pri novej výstavbe a rekonštrukciách rešpektovať tradičnú architektúru a z hľadiska krajinotvorby limitovať hmotu budov,

2.7 podporovať zvýšenie štandardu a ponuky rekreačných a športových aktivít v zastavanom území turistických stredísk ležiacich v národných parkoch,

2.8 rezervovať plochy na uskutočňovanie vrcholových športových podujatí na

2.8.1 športoviská a ubytovanie účastníkov podujatí v Kežmarku, Lučivnej, Poprade, vo Svite, na Štrbskom Plese a v Tatranskej Štrbe,

2.8.2 dobudovanie a modernizáciu medzinárodného letiska Poprad-Tatry,

2.8.3 medzinárodné telekomunikačné centrum v Poprade,

2.9 uprednostňovať budovanie infraštruktúry v sídlach bez ekonomického zázemia určených na rozvoj turistiky a rekreácie

3. V oblasti kúpeľníctva

3.1 dobudovať a modernizovať kúpele medzinárodného a celoštátneho významu – Bardejovské kúpele, Vysoké Tatry a Vyšné Ružbachy,

3.2 vytvoriť predpoklady na vybudovanie kúpeľov celoštátneho a regionálneho významu,

3.3 striktne zachovať súčasnú funkciu jestvujúcich zariadení v zdravotníckych zariadeniach kúpeľnej starostlivosti a v odborných liečebných ústavoch s možnosťou zväčšenia lôžkových kapacít

4. Ekostabilizačné opatrenia

4.1 postupne zabezpečovať ochranu najcennejších častí prírodného potenciálu formou vyhlásenia chránených území regiónu,

4.2 postupne odstraňovať environmentálne dlhy regiónu, najmä v priestore

4.2.1 Strážske – Humenné v lokalitách Bukóza, a. s., Vranov, Chemes, a. s., Humenné,

4.2.2 podtatranskej oblasti v lokalitách Chemosvit, a. s., Svit, Tatraľan, a. s., Kežmarok,

4.2.3 okolo vodnej nádrže Veľká Domaša,

4.2.4 ťažby nerastných surovín v blízkosti chránených území v lokalite lomu Brekov, lomu Dreveník, lomov Hranovnica-Dubina, Jarabina-Lysá Skala, lomu Vechec, lomu Vernár a ťažby štrku v lokalite Batizovce,

4.3 zabezpečiť funkčnosť prvkov územného systému ekologickej stability pri ďalšom využití a usporiadaní územia,

4.4 pri spracovávaní lesných hospodárskych plánov v oblastiach navrhovaných ako osobitne chránené menšieho plošného rozsahu rešpektovať také formy obhospodarovania lesa, ktoré zabezpečia funkčnosť zachovania a skvalitnenia hodnotných ekosystémov,

4.5 podporovať výsadbu plošnej a líniovej zelene, prirodzený spôsob obnovy a revitalizáciu krajiny v prvkoch územného systému ekologickej stability,

4.6 podporovať v podhorských oblastiach zmenu spôsobu využívania poľnohospodárskeho pôdneho fondu zatrávňovaním ornej pôdy ohrozenej vodnou eróziou,

4.7 uprednostňovať realizáciu ekologicky prijateľných premostení regionálnych biokoridorov a biocentier pri výstavbe líniových stavieb a prispôsobovať vedenie trás dopravnej a technickej infraštruktúry tak, aby sa netrieštil komplex lesov.

5. V oblasti dopravy

5.1 rezervovať koridor a priestory mimoúrovňových krížení pre trasu diaľnice D1 na území kraja,

5.2 chrániť v rámci nadradenej cestnej siete

5.2.1 cestný ťah E 50 v trase cesty I/18 Žilina – Poprad – Prešov a v trase cesty I/68 v úseku Prešov – Košice,

5.2.2 cestný ťah E 371 v trase ciest I/18 Prešov – Lipníky a I/73 Lipníky – Svidník – hranica s Poľskou republikou ako súčasť severojužného rýchlostného cestného prepojenia v nadväznosti na európsku cestu E 71 v trase cesty I/68 Košice – Seňa – hranica s Maďarskou republikou,

5.2.3 cestný ťah ciest I/18 a I/74 Prešov – Ubľa – štátna hranica s Ukrajinskou republikou pre výhľadovú rýchlostnú komunikáciu,

5.3 chrániť koridory ciest I. a II. triedy, ich preložiek a úprav vrátane prejazdných úsekov dotknutými sídlami na

5.3.1 cestu I/18

1. v úseku Svit – Poprad pre možnosť rozšírenia na štvorpruhovú cestu,
2. v súbehu s trasou diaľnice D1 v úseku Spišský Štvrtok – Behárovce,
3. v severnom obchvate mesta Prešov v trase Malý Šariš – Veľký Šariš – Kapušany podľa štúdie cestného ťahu Prešov – Ubľa,
4. v úseku Kapušany – Lipníky s územnou rezervou na obchvat obce Lada a súbežnú trasu cesty E 371,
5. v úseku Lipníky – Vranov nad Topľou – Strážske – Humenné s územnou rezervou na súbežnú trasu rýchlostnej komunikácie Prešov – Ubľa v úseku Lipníky – Vranov nad Topľou,

5.3.2 cestu I/74 v úseku Humenné – Snina – Ubľa s územnou rezervou na rýchlostnú komunikáciu Prešov – Ubľa s obchvatmi sídel Humenné, Hažín, Kamenica nad Cirochou, Bela nad Cirochou, Snina, Stakčín, Kolonica, Ladomírov a Ubľa,

5.3.3 cestu I/68

1. prieťahom mestom Prešov podľa zadania stavby „I/68 Prešov Nábrežná komunikácia" a s pokračovaním južným smerom v trase ulica Obrancov mieru – Dúbrava pozdĺž východného okraja železničnej trate Prešov – Plaveč,
2. v úseku Prešov – hranica Poľskej republiky s obchvatmi sídel Šarišské Michaľany, Sabinov (obchvat centra), Pečovská Nová Ves, Červenica, Lipany (obchvat centra), Pusté Pole a Plavnica,

5.3.4 cestu I/67

1. v úseku Poprad – Matejovce – Spišská Belá s územnou rezervou na štvorpruhovú cestu, v určitých úsekoch s obmedzeným prístupom (rýchlostná) s obchvatmi sídel Matejovce, Veľká Lomnica a Kežmarok,
2. v úseku Spišská Belá – Javorina s vylúčením kamiónov medzinárodnej cestnej (kamiónovej) dopravy z hraničných priechodov Javorina a Podspády,

5.3.5 cestu I/77

1. v úseku Spišská Belá – Podolínec – Stará Ľubovňa s územnou rezervou na obchvaty sídel Podolínec, Nižné Ružbachy a Hniezdne,
2. v úseku Ľubotín – Obručné – Bardejov – Nižná Polianka s územnou rezervou sídel Tarnov, Rokytov, Mokroluh, Lenartov, Malcov, Gerlachov a Bardejov (obchvat centra),
3. v úseku Nižná Polianka – Svidník,

5.3.6 cestu I/73 v celej dĺžke a jej koridor ako územnú rezervu na súbežnú trasu rýchlostnej komunikácie sever-juh v trase Vyšný Komárnik – Svidník – Stročín – Giraltovce – Lipníky (cesta E 371),

5.3.7 cestu I/79 v úseku Vranov nad Topľou – Sečovská Polianka s územnou rezervou na obchvaty týchto sídel,

5.3.8 cestu II/545

1. v úseku Kapušany – Bardejov s novým napojením na cestu I/18 s úpravou na cestu I. triedy a územnou rezervou na obchvaty sídel Zborov, Kobyly a Nižné Raslavice,
2. v úseku Bardejov – Becherov – hranica Poľskej republiky pre potreby turistiky a prihraničnej spolupráce,

5.3.9 cestu II/546 v trase Prešov – Margecany s územnou rezervou na úpravu trasy v prepojení na Bajerov – Kvačany – Klenov a Prešov – Cemjata,

5.3.10 cestu II/537 (Cesta slobody) v úseku Podbanské – Tatranská Kotlina s územnou rezervou na obchvaty sídel Starý Smokovec a Tatranská Lomnica,

5.3.11 cestu II/538 v úseku Štrba – Štrbské Pleso s územnou rezervou na jej predĺženie v trase III/018144 s napojením na diaľnicu D1 pri obci Štrba,

5.3.12 cestu II/539 Mengusovce – Vyšné Hágy,

5.3.13 cestu II/534 Poprad-mesto – Poprad, Veľká (napojenie na diaľnicu D1) – Starý Smokovec s územnou rezervou na úpravu jej napojenia na cestu II/537 v Starom Smokovci,

5.3.14 cestu II/536 Kežmarok – Jánovce s územnou rezervou na obchvaty sídel Ľubica, Vrbov a Vlková,

5.3.15 cestu II/540 Veľká Lomnica – Tatranské Matliare,

5.3.16 cestu II/542 Spišská Belá – Slovenská Ves – Spišská Stará Ves s územnou rezervou na obchvaty týchto sídel,

5.3.17 cestu II/543 s územnou rezervou na obchvaty sídel Červený Kláštor, Kamienka a Hniezdne,

5.3.18 cestu II/533 v úseku Levoča – napojenie na diaľnicu D1 – Spišská Nová Ves s územnou rezervou na úpravu na cestu I. triedy s funkciou diaľničného privádzača dvoch okresných sídel,

5.3.19 cestu II/547 Spišské Podhradie – Spišské Vlachy s územnou rezervou na obchvaty týchto sídel,

5.3.20 cestu II/556 v úseku Giraltovce – Hanušovce,

5.3.21 cestu III/5565 v trase Bardejovská Nová Ves – Kučín – Giraltovce s územnou rezervou na úpravu na cestu II. triedy,
5.3.22 cestu II/575 Stropkov – Havaj – Krásny Brod – Medzilaborce – Palota s územnou rezervou na obchvaty sídel Chotča, Bukovce, Makovce a Havaj,
5.3.23 cestu II/554 Havaj – Repejov – Ruská Kajňa – Košárovce – Tovarné – Nižný Hrušov,
5.3.24 cestu II/556 Turany nad Ondavou – Fijaš,
5.3.25 cestu II/559 Humenné – Čertižné s územnou rezervou na výhľadovú preložku Kochanovce – Lackovce – Humenné (Krámová),
5.3.26 cestu III/5516 v úseku Medzilaborce – Nižná Jablonka – Hostovice – Pčoliné – Snina s územnou rezervou na jej úpravu na cestu II. triedy a na obchvaty sídel Výrava a Nižná Jablonka,
5.3.27 cestu II/558 v úseku Humenné – Tovarné – Vranov nad Topľou s územnou rezervou na súbežnú rýchlostnú komunikáciu Prešov – Ubľa,
5.3.28 cestu II/566 v prepojení Ulič (hraničný priechod do Ukrajinskej republiky) – Brezovec – Ubľa – Ruský Hrabovec,
5.3.29 cestu III/5439 Sabinov – Ražňany – Jarovnice – Hermanovce – Bertotovce s územnou rezervou na jej úpravu na cestu II triedy s funkciou diaľničného privádzača na diaľnicu D1 pre sídla situované v hornotoryskej doline,
5.3.30 cestu v trase križovatka pred obcou Jalová po obec Prislop zosúladiť s požiadavkami prvého pásma hygienickej ochrany vodnej nádrže Starina,
5.3.31 priestor rezervovať na výhľadové vedenie trasy cesty II/557 v úseku Stročín – Stropkov – Turany nad Ondavou – Malá Domaša – Tovarné s územnou rezervou na obchvaty sídel Tisinec, Stropkov, Sitník, Turany nad Ondavou, Nová Kelča a Holčíkovce,

5.4 chrániť priestory na rozvoj existujúcich a výstavbu nových cestných hraničných priechodov do Poľskej republiky, a to,
5.4.1 hraničné priechody s neobmedzeným cestovným tovarovým stykom (diaľkové) Vyšný Komárnik – Barwinek v koridore medzinárodnej cesty E 371 a trasy cesty I/73 v okrese Svidník,
5.4.2 hraničné priechody pre obmedzený tovarový styk vozidlami do 3,5 t
1 Javorina-Lysá Poľana na ceste I/67, obmedzenie z dôvodu prejazdu chráneným územím Tatranského národného parku,
2 Podspády-Jurgow (Poľská republika) na ceste I/67, obmedzenie z dôvodu prejazdu chráneným územím Tatranského národného parku; aktivácia tohto priechodu formou poskytovania nadštandardných colných a pasových služieb ako hlavného priechodu v tomto priestore pre turistický ruch a prihraničnú spoluprácu.
a) Lysá nad Dunajcom-Niedzica (Poľská republika) na ceste II/543,
b) Mníšek nad Popradom-Piwniczna (Poľská republika) na ceste I/68,
c) Kurov-Muszynka (Poľská republika) na ceste III/5445,
d) Becherov-Konieczna (Poľská republika) na ceste II/545,
e) Palota-Radoszyce (Poľská republika) na ceste II/575,
5.4.3 hraničné priechody pre malý pohraničný styk
1. Červený Kláštor-Nižne Stromowce (Poľská republika),
2. Malý Lipník-Andrzejowka (Poľská republika) na ceste II/5436,
3. Legnava-Muszyna (Poľská republika) na ceste III/54332,
4 Čirč-Leluchow (Poľská republika) na ceste I/77,
5 Lesnica-Szcawnica (Poľská republika), turistický chodník,
6 Nižná Polianka-Krempna (Ožehna) na ceste III/55724,
7. Čertižné-Czeremcha (Poľská republika) na ceste II/559,
8 Ubľa-Malyj Bereznyj (Ukrajina) na ceste I/74 s obmedzeným tovarovým stykom 3,5 t,
9 Osadné-Balnica a Ruské-Rostoky Górne (Ukrajina), turistický chodník,
10 Ulič-smer Veľkyj Bereznyj (Ukrajina) na ceste II/566 s návrhom na malý pohraničný styk,

5.5 chrániť priestory na vnútroštátne regionálne cestné dopravné terminály Prešov – Šarišské Lúky a Vydrník (pre okresy Prešov a Poprad),

5.6 zabezpečiť územnú rezervu na
5.6.1 modernizáciu hlavného tranzitného ťahu Žilina – Poprad – Košice na rýchlosť 120-160 km/h,
5.6.2 modernizáciu a zdvojkoľajnenie severojužného ťahu úseku hranica s Poľskou republikou – Plaveč – Prešov – Kysak na rýchlosť 120 km/h a na preložku trate mimo mesta Prešov po roku 2015,
5.6.3 zdvojkoľajnenie železničnej trate v úseku Michalovce – Humenné,
5.6.4 zdvojkoľajnenie železničnej trate Tatranskej elektrickej železnice v úseku Poprad – Stary Smokovec,
5.6.5 novú železničnú trať v úseku Bardejov – Zborov – Vyšný Orlík – Svidník – Duplín – Stropkov – Lomne – Turany nad Ondavou – Holčíkovce – Sedliská – Hudcovce s napojením na železničnú trať Vranov nad Topľou – Strážske,
5.6.6 trate vnútroštátneho regionálneho významu s výhľadovou elektrifikáciou
1. Humenné – Medzilaborce – Palota (výhľadové s medzinarodným významom),

2. Prešov – Vranov nad Topľou – Strážske,
3 Prešov – Stará Ľubovňa – Kežmarok – Veľká Lomnica – Poprad a pripojený úsek Veľká Lomnica – Tatranská Lomnica,

5.6.7 trate miestne, vnútroregionálne a nekonvenčné v súčasnom rozsahu:
1. Humenné – Snina – Stakčín,
2. Vranov nad Topľou – Trebišov,
3. Kapušany pri Prešove – Bardejov,
4 Tatranská elektrická železnica: Tatranská Lomnica – Starý Smokovec – Štrbské Pleso,
5. Ozubnicová železnica: Štrba – Štrbské Pleso,

5 7 chrániť priestory na
5 7.1 dobudovanie a modernizáciu medzinárodného letiska Poprad-Tatry,
5.7.2 dobudovanie verejných regionálnych letísk s rozvojovými možnosťami Svidník, Prešov a Kamenica nad Cirochou.

6. V oblasti vodného hospodárstva

6.1 v záujme zabezpečenia zdrojov pitnej vody
6.1.1 využívať v maximálnej miere existujúce a zdokumentované zdroje pitnej vody,
6 1.2 zabezpečiť ochranu záujmových území vodných nádrží Tichý Potok, Lukov, Jakubany, Bušovce, Hanušovce nad Topľou, Nižná Jablonka, Adidovce a Pečovská Nová Ves,

6 2 chrániť priestory na líniové stavby
6 2 1 vo Východoslovenskej vodárenskej sústave
1. prívod zo sústavy do Bardejova v trase Giraltovce – Bzenov – Lascov – Marhaň – Harhaj – Porúbka – Nemcovce – Kurima – Poliakovce – Hrabovec – Komárov – Bardejovská Nová Ves – Bardejov,
2 rozšírenie Východoslovenskej vodárenskej sústavy
a) Koškovce – Zbucké Dlhé – Hrabovec nad Laborcom,
b) prívod do Slovenskej Volovej, Ohradzian, Baškoviec, Turcoviec, Hrubova s odbočkami do Ohradzian, Víťazoviec, Lukáčoviec, Baškoviec a Cerniny,
3 prívod do Krásneho Brodu zo Stropkova,
4. z prívodu vodárenskej nádrže Starina – Prešov odbočky do Chmeľova, do Vyšnej Šebastovej a do Nemcoviec – Tulčíka – Demjaty,
5. z prívodu vodárenskej nádrže Starina – Prešov odbočky do Bretejoviec, Janovíka, Lemešian, Drienovskej Novej Vsi, Petrovian, Kendic, Záborského, Dulovej Vsi a Ruskej Novej Vsi,
6 prívod do Fintic z vodojemu Šidlovec v Prešove,
7. zdvojenie prívodu do Humenného z úpravne vody Stakčín,
8. z úpravne vody Stakčín prívod do Ublianskej Doliny v trase Kolonica – Ladomírov – Ubľa a Kalná Rostoka – Klenová – Ubľa,
9 z úpravne vody Stakčín prívod do Stakčínskej Roztoky,
10. rozšírenie sústavy v trase Stropkov – Chotča – Bukovce – Makovce – Havaj – Malá Poľana s pokračovaním Rokytovce – Krásny Brod – Medzilaborce,
11. prepojenie na sústavu v Hanušovciach nad Topľou s pokračovaním v trase Mičákovce – Giraltovce – Matovce – Soboš – Okrúhle – Radoma – Rakovčík – Stročín s odbočením do Svidníka na sever a na juh v trase Duplín – Stropkov,
12. rozšírenie sústavy z prívodu Vranov – Trebišov s odbočkou do Sačurova, Davidova a do Sečovskej Polianky,
13. prívod Vranov – Prešov, odbočku do Čaklova, Zámutova, do Juskovej Vole, prívod do Komáran s odbočkami do Čičavy, Merníka a Nižného Kručova, odbočky Soľ – Rudlov a do Jastrabia, do Hlinného, odbočku do Žipova, Skrabského a do Čierneho nad Topľou a odbočku Radvánovce – Medzianky,

6.2.2 zo zdrojov Východoslovenskej vodárenskej sústavy
1. z vodárenskej nádrže Lukov
a) prívod do Bardejova v trase Lukov – Malcov – Gerlachov – Tarnov – Rokytov – Mokroluh – Bardejov s pripojením podzemných zdrojov v Lenártove v trase Lenártov – Malcov,
b) odbočky do Hrabského, Snakova a Kurova a v trase Kružľov – Krivé,
2. z Prešovského skupinového vodovodu s využitím podzemných zdrojov hornej Torysy a odberu v Tichom Potoku prívod v trase Sabinov – Ražňany, odbočku do Uzovského Šalgova, Ražňan a Jarovnic, odbočku do Uzovských Pekľan, Jarovnic a Hermanoviec a odbočku z Lipian do Ďačova a Dubovic,
3. prívod z vodárenskej nádrže Jakubany do Starej Ľubovne,
4. pripojenie z podzemných zdrojov v trase Plavnica-sever – Stará Ľubovňa,

6 2 3 v oblasti skupinových vodovodov na
1. rozšírenie skupinových vodovodov v trase Kurima – Kučín – Nemcovce – Porúbka Marhaň,
2 prívod zo skupinového vodovodu Hertník – Fričkovce – Osikov v trase Raslavice – Abrahámovce –

Buclovany – Lopúchov s prepojením na prívod z Východoslovenskej vodárenskej sústavy v trase Buclovany – Koprivnica – Marhaň,
3 napojenie vodného zdroja nad Hertníkom a povrchového zdroja Fričkovského potoka nad Fričkovcami na skupinový vodovod Hertník – Fričkovce – Osikov,
4 rozšírenie Popradského skupinového vodovodu prívod z Vrbového do Tvarožnej a po roku 2015 prívod Kežmarok – Spišská Belá – Bušovce – Podolínec,
5. výstavbu skupinového vodovodu Osturňa – Veľká Franková – Malá Franková,
6. prívod Kežmarok – Spišská Belá – Bušovce – Podolínec do roku 2015,
7. odbočky z prívodu Spišského skupinového vodovodu z vodojemu Hrabušice – Levoča do Draviec a Spišského Štvrtka,
8 prívod do Jablonova z nových vodných zdrojov západne od Lúčky pre prívodné potrubie z nových vodných zdrojov východne od Tatranskej Štrby na skupinový vodovod Tatranská Štrba – Štrba pre prepojovacie potrubie prívodu z vodárenskej nádrže Garajky s vodovodom Štrba,
9 napojenie vodných zdrojov v Tatranských Matliaroch a prívod z nich do Tatranskej Lomnice,
10 odbočku z prívodu Liptovská Teplička – Spišská Nová Ves z Hrabušic do Vydrníka,
11. z prívodu Poprad – Kežmarok odbočku Veľká Lomnica – Stará Lesná – Tatranská Lomnica a odbočku do Starého Smokovca, Nového Smokovca, Veľkého Smokovca a Malého Smokovca a prepojenie na Starú Lesnú,
12 hlavný diaľkový privádzač pre Spišsko-popradskú vodárenskú sústavu v trase vodárenská nádrž Garajky – Šuňava – Svit – Poprad a prepojenie do Smokovcov,
13 z Prešovského skupinového vodovodu na pokračovanie trasy Sabinov – Ražňany – Jarovnice – Hermanovce – Bertotovce s odbočkou do Fričoviec, Bertotovce – Miňany s odbočkami do Chmiňianskych Jakubovian a Ondrášoviec, Chmiňany – Chminianska Nová Ves – Svinia s odbočkou do Kojatic, Svinia – Župčany s odbočkou do Medzianok, Župčany – Malý Šariš s prepojením na prívod Prešovského skupinového vodovodu pri Veľkom Šariši,
14. nové skupinové vodovody
   a) Víťaz – Ovčie,
   b) v doline Svinky – Rokycany – Bzenov – Janov – Radatice,
15 skupinový vodovod v Zbojskej Doline – od odberov vody zo Zbojského potoka pri Novej Sedlici a z Bystrianskeho potoka pri Zboji prívod Nová Sedlica – Zboj – Uličské Krivé – Ulič,
16 rozšírenie skupinového vodovodu Stropkov
   a) nový vodný zdroj Sitníky s prívodom do Stropkova,
   b) prepojenie verejného vodovodu Stropkov so skupinovým vodovodom Miňovce v trase Breznica – Miňovce,
   c) rozšírenie vodovodu Miňovce v trase Miňovce – Mrázovce – Tokajík, Miňovce – Lomné – Kručov s odbočkou do Bžian,
17. nový skupinový vodovod predĺžením existujúceho vodovodu Medvedie do Šarbova a Korejoviec,
18. rozšírenie skupinového vodovodu rekreačnej oblasti Domaša do
   a) Holčíkoviec, Žalobina, Malej Domaše, Slovenskej Kajne, Benkoviec a do Kvakoviec,
   b) Nižnej Sitnice a Vyšnej Sitnice,

6.3 chrániť koridory pre líniové stavby kanalizácie v trasách pre
6.3.1 zberač skupinovej kanalizácie Bardejov v trase Bardejov – Mokroluh – Rokytov – Tarnov,
6.3.2 zberače skupinovej kanalizácie v trasách
   a) Koprivnica – Buclovany – Abrahámovce s bočnou trasou Koprivnica – Stuľany – Lopúchov – Brezov – Lascov,
   b) Zborov – Stebník,
   c) Osikov – Fričkovce,
   d) Kobyly – Tročany – Jánovce,
   e) Mikulášová – Nižná Polianka – Vyšná Polianka,
6.3.3 zberače skupinovej kanalizácie Humenné v trasách
   a) Humenné – Kochanovce s odbočkou Lackovce – Hažín nad Cirochou,
   b) Kochanovce – Udavské s odbočkou Vyšný Hrušov,
   c) Udavské – Veľopolie s odbočkou Ľubiša – Nižné Ladičkovce – Vyšné Ladičkovce,
   d) Veľopolie – Hankovce s odbočkou do Dedačova,
   e) Hankovce – Koškovce – Hrabovec nad Laborcom s napojením zberača Jabloň – Rokytov pri Humennom s odbočkou zo Slovenského Krivého,
   f) Humenné – Hažín nad Cirochou,
   g) Humenné – Chlmec – Porúbka s napojením zberača z Ptičieho,
   h) Humenné – Brestov,
6.3.4 zberače skupinovej kanalizácie
   a) Topoľovka – Závadka – Myslina – Lieskovec – Karná,
   b) Modrá nad Cirochou – Dlhé nad Cirochou (okres Snina),
   c) Zubné – Papín – Nižná Jablonka – Vyšná Jablonka,

d) Baškovce – Turcovce – Hrubkov,
e) Slovenská Volová – Ohradzany,
f) Kamenica nad Cirochou – Kamienka,

6.3.5 zberač z Malého Slavkova do skupinovej kanalizácie Kežmarok,

6.3.6 zberače skupinovej kanalizácie
a) Červený Kláštor – Lechnica,
b) Veľká Franková – Osturňa,
c) Jurské – Ihľany,
d) Veľká Lomnica – Poprad (okres Poprad),

6.3.7 zberače skupinovej kanalizácie
a) Spišské Podhradie – Studenec,
b) Granč-Petrovce – Behárovce – Korytné,

6.3.8 zberače skupinovej kanalizácie Radvaň nad Laborcom – Volica – Čabiny – Krásny Brod,

6.3.9 napojenie na skupinovú kanalizáciu Poprad – Svit – Spišská Teplica zberače z
a) Batizoviec, Veľkého Slavkova a Veľkej Lomnice (okres Kežmarok),
b) Lopušnej doliny,

6.3.10 zberače skupinovej kanalizácie
a) Hôrka – Kišovce – Švábovce – Hozelec,
b) Hrabušice (okres Spišská Nová Ves) – Vydrník,

6.3.11 skupinovú kanalizáciu Prešov zberače z Hanisky, Vyšnej Šebastovej, Nižnej Šebastovej, Podhradíka a z Ľubotíc,

6.3.12 zberače skupinovej kanalizácie
a) Čelovce – Pušovce – Proč,
b) Kokošovce – Abranovce,
c) Šarišské Bohdanovce – Mirkovce – Žehňa a Varhaňovce – Brestov,
d) Kapušany pri Prešove – Lada – Šarišská Poruba a zberač Lada – Trnkov – Okružná,
e) Chminianska Nová Ves – Chmiňany – Chminianske Jakubovany,
f) Nemcovce – Lipníky,
g) Bajerov – Kvačany,
h) Malý Šariš – Župčany,
i) Kojatice – Svinia,
j) Bertotovce – Hendrichovce – Štefanovce a Bertotovce – Hermanovce,
k) Fričovce – Široké a Fričovce – Šindliar – Lipovce,

6.3.13 skupinovú kanalizáciu Sabinov – Orkucany a pre zberač Pečovská Nová Ves a z Jakubovian,

6.3.14 zberače nových skupinových kanalizácií
a) Červenica – Jakubová Voľa,
b) Šarišské Sokolovce – Bodovce,
c) Lipany – Krivany a pre zberače z Dubovice a Dačova,
d) Torysa – Brezovica – Brezovička – Nižný Slavkov a pre zberače z Tichého Potoka a zo Šarišských Draviec,

6.3.15 zberače skupinových kanalizácií
a) Modra nad Cirochou (okres Humenné) – Dlhé nad Cirochou,
b) Belá nad Cirochou – Zemplínske Hámre,

6.3.16 napojenie na kanalizáciu Stará Ľubovňa zberač Stará Ľubovňa – Nová Ľubovňa – Jakubany a Stará Ľubovňa – Jarabina,

6.3.17 zberače skupinových kanalizácií
a) Ružbachy – Vyšné Ružbachy,
b) Podolínec – Lomnička,

6.3.18 napojenie na kanalizáciu Stropkov zberače z Chotče a Tisinca,

6.3.19 zberače skupinových kanalizácií
a) Nižná Olšava – Vyšná Olšava – Šandal,
b) Lomné – Bžany, Lomné – Turany nad Ondavou a Lomné – Kručov,
c) Nová Kelča (okres Vranov nad Topľou) – Vyšný Hrabovec – Tokajík a rekreačnú oblasť Valkov (pravá strana vodnej nádrže Domaša),

6.3.20 zberače zo skupinovej kanalizácie Svidník v trasách
a) Svidník – Nižný Orlík – Vyšný Orlík,
b) Nižný Orlík – Jurkova Voľa,
c) Svidník – Nižná Jedľová – Vyšná Jedľová – Belejovce,
d) Stročín – Nižná Polianka,
e) zberač Mestisko,

6.3.21 zberače skupinových kanalizácií v trasách
a) Kapišová – Kružlová,
b) Nižný Mirošov – Vyšný Mirošov,

c) Okrúhle – Radomka,
d) Kračúnovce – Lúčka – Kuková – Želmanovce – Dukovce,

6 3 22 zberače skupinových kanalizácií v trasách
a) Benkovce – Slovenská Kajňa – Žalobín s pripojením zberača Malá Domaša – Kvakovce,
b) Holčíkovce – rekreačná oblasť Poľany a Holčíkovce – rekreačná oblasť Dobrá,
c) Nižný Hrušov – Dlhé Klčovo,
d) Sečovská Polianka – Cabov,
e) Hanušovce nad Topľou – Petrovce,
f) Sačurov – Davidov,
g) Čaklov – Zámutov,
h) Soľ – Rudlov, Jastrabie,
i) Medzianky – Radvanovce a Medzianky – Pavlovce,
j) Vranov nad Topľou – Vechec,
k) Hencovce – Rodinná oblasť Vranov nad Topľou,

6 4 v oblasti zásobovania plynom chrániť koridory na výstavbu vysokotlakových plynovodov
1. VTL DN 500, Košice – Drienovská Nová Ves – Tatranská Štrba,
2. VTL DN 150, Ždiar – Spišská Stará Ves,
3 VTL DN 200, Lipany – Stará Ľubovňa,
4. VTL DN 200, Snina – Stakčín,
5 VTL DN 150, Kamenica – Krivany – Torysa,
6 VTL DN 100
a) Huncovce – Janovce,
b) Bardejov – Kružľovská Huta,
c) Hažlín – Mlynárovce – Radoma,
d) Havaj – Šarišské Čierne,
e) Snina – Pčoliné – Hostovice,
f) Ňagov – Vyrava,
g) Krásny Brod – Čabiny – Radvaň nad Laborcom.

7. V oblasti hospodárstva chrániť priestory ložísk vyhradených nerastov

II. Verejnoprospešné stavby

Verejnoprospešné stavby spojené s realizáciou uvedených záväzných regulatívov sú tieto

1. v oblasti dopravy
1.1 diaľnica D1 a mimoúrovňové križovanie ciest na území kraja
1.2 stavby nadradenej cestnej siete pre
1.2.1 medzinárodný cestný ťah E 50 v trase cesty I/18 Žilina – Poprad – Prešov a v trase cesty II/68 v úseku Prešov – Košice,
1.2.2 medzinárodný cestný ťah E 371 v trase ciest I/18 Prešov – Lipníky a II/73 Lipníky – Svidník – hranica s Poľskou republikou ako súčasť severojužného rýchlostného cestného prepojenia v nadväznosti na európsku cestu E 71 v trase cesty I/68 Košice – Seňa – hranica s Maďarskou republikou,
1.2.3 cestný ťah ciest I/18 a I/74 Prešov – Ubľa – štátna hranica s Ukrajinskou republikou,
1.2.4 cestu I/18
a) v úseku Svit – Poprad pre možnosť rozšírenia na štvorpruhovú cestu,
b) v súbehu s diaľnicou D1 v úseku Spišský Štvrtok – Behárovce,
c) severným obchvatom mesta Prešov v trase Malý Šariš – Veľký Šariš – Kapušany v zmysle štúdie cestného ťahu Prešov – Ubľa,
d) v úseku Kapušany – Lipníky s územnou rezervou na obchvat obce Lada a súbežnú trasu cesty E 371,
e) v úseku Lipníky – Vranov nad Topľou – Strážske – Humenné s územnou rezervou na súbežnú trasu rýchlostnej komunikácie Prešov – Ubľa v úseku Lipníky – Vranov nad Topľou,
1.2.5 cestu I/74 v úseku Humenné – Snina – Ubľa s územnou rezervou na rýchlostnú komunikáciu Prešov – Ubľa s obchvatmi sídel Humenné, Hažín, Kamenica nad Cirochou, Belá nad Cirochou, Snina, Stakčín, Kolonica, Ladomírov, Ubľa,
1.2 6 cestu I/68
a) v prieťahu mestom Prešov v zmysle zadania stavby „I/68 Prešov – Nábrežná komunikácia" a s pokračovaním južným smerom v trase ulica Obrancov mieru – Levočská – Dúbrava pozdĺž východného okraja železničnej trate Prešov – Plaveč,
b) v úseku Prešov – hranica s Poľskou republikou s obchvatmi sídel Šarišské Michaľany, Sabinov (obchvat centra), Pečovská Nová Ves, Červenica, Lipany (obchvat centra), Pusté Pole a Plavnica,
1.2 7 cestu I/67
a) v úseku Poprad – Matejovce – Spišská Belá s územnou rezervou na štvorpruhovú cestu v určitých úsekoch s obmedzeným prístupom, s obchvatmi sídel Matejovce, Veľká Lomnica a Kežmarok,

b) v úseku Spišská Belá - Javorina s vylúčením kamiónov TIR dopravy z hraničných priechodov Javorina a Podspády,

1.2.8 cestu I/77
a) v úseku Spišská Belá - Podolínec - Stara Ľubovňa s územnou rezervou na obchvaty sídel Podolínec, Nižné Ružbachy a Hniezdne,
b) v úseku Ľubotín - Obručné - Bardejov - Nižná Polianka s územnou rezervou pre sídla Tarnov, Rokytov, Mokroluh, Lenartov, Maľcov, Gerlachov a Bardejov (obchvat centra),
c) v úseku Nižná Polianka - Svidník,

1.2.9 cestu I/73 v celej dĺžke a jej koridor ako územnú rezervu na súbežnú trasu východoslovenskej rýchlostnej komunikácie sever-juh v trase Vyšný Komárnik - Svidník - Stročín - Giraltovce - Lipníky (cesta E 371),

1.2.10 cestu I/79 v úseku Vranov nad Topľou - Sečovská Polianka s územnou rezervou na obchvaty týchto sídel,

1.2.11 cestu II/545
a) v úseku Kapušany - Bardejov s novým napojením na cestu I/18, s úpravou na cestu I. triedy s územnou rezervou na obchvaty sídel Zborov, Kobyly a Nižné Raslavice,
b) v úseku Bardejov - Becherov - hranica s Poľskou republikou pre potreby turistiky a prihraničnej spolupráce,

1.2.12 cestu II/546 v trase Prešov - Margecany s územnou rezervou na úpravu trasy v prepojení Bajerov - Kvačany - Klenov a Prešov - Cemjata,

1.2.13 cestu II/537 (Cesta slobody) v úseku Podbanské - Tatranská Kotlina s územnou rezervou na obchvaty sídel Starý Smokovec a Tatranská Lomnica,

1.2.14 cestu II/538 v úseku Štrba - Štrbské Pleso s územnou rezervou na jej predĺženie v trase III/018144 s napojením na diaľnicu D1 pri obci Štrba,

1.2.15 cestu II/539 Mengusovce - Vyšné Hágy,

1.2.16 cestu II/534 Poprad mesto - Poprad, Veľká (napojenie na diaľnicu D1) - Starý Smokovec s územnou rezervou na úpravu jej napojenia na cestu II/537 v Starom Smokovci,

1.2.17 cestu II/536 Kežmarok - Jánovce s územnou rezervou na obchvaty sídel Ľubica, Vrbov a Vlkova,

1.2.18 cestu II/540 Veľká Lomnica - Tatranské Matliare,

1.2.19 cestu II/542 Spišská Bela - Slovenská Ves - Spišská Stará Ves s územnou rezervou na obchvaty týchto sídel,

1.2.20 cestu II/543 s územnou rezervou na obchvaty sídel Červený Kláštor, Kamienka a Hniezdne,

1.2.21 cestu II/533 v úseku Levoča - napojenie na diaľnicu D1 - Spišská Nová Ves s územnou rezervou na jej úpravu na cestu I triedy s funkciou diaľničného privádzača dvoch okresných sídel,

1.2.22 cestu II/547 Spišské Podhradie - Spišské Vlachy s územnou rezervou na obchvaty týchto sídel,

1.2.23 cestu II/556 v úseku Giraltovce - Hanušovce,

1.2.24 cestu III/5565 v trase Bardejovská Nová Ves - Kučín - Giraltovce s územnou rezervou na jej úpravu na cestu II triedy,

1.2.25 cestu II/557 v úseku Stročín - Stropkov - Turany nad Ondavou - Malá Domaša - Tovarné s územnou rezervou na obchvaty sídel Tisinec, Stropkov, Sitník, Turany nad Ondavou, Nová Kelča a Holčíkovce,

1.2.26 cestu II/575 Stropkov - Havaj - Krásny Brod - Medzilaborce - Palota s územnou rezervou na obchvaty sídel Chotča, Bukovce, Makovce a Havaj,

1.2.27 cestu II/554 Havaj - Repejov - Ruská Kajňa - Košárovce - Tovarné - Nižný Hrušov,

1.2.28 cestu III/55615 Turany nad Ondavou - Fijaš,

1.2.29 cestu II/559 Humenné - Čertižné s územnou rezervou na výhľadovú preložku Kochanovce - Lackovce - Humenné (Krámová),

1.2.30 cestu III/5516 v úseku Medzilaborce - Nižná Jablonka - Hostovice - Pčolíné - Snina s územnou rezervou na jej úpravu na cestu II triedy a na obchvaty sídel Vyrava a Nižná Jablonka,

1.2.31 cestu II/558 v úseku Humenné - Tovarné - Vranov nad Topľou s územnou rezervou na súbežnú rýchlostnú komunikáciu Prešov - Ubľa,

1.2.32 cestu II/566 v prepojení Ulič (hraničný priechod do Ukrajinskej republiky) - Brezovec - Ubľa - Ruský Hrabovec,

1.2.33 cestu III/5439 Sabinov - Ražňany - Jarovnice - Hermanovce - Bertotovce s územnou rezervou na jej úpravu na cestu II triedy s funkciou diaľničného privádzača na diaľnicu D1 pre sídla situované v hornotoryskej doline

2. V oblasti vodného hospodárstva

2.1 pre navrhované vodné nádrže

2.1.1 Tichý Potok (okres Kežmarok),
2.1.2 Lukov (okres Bardejov),
2.1.3 Jakubany (okres Stará Ľubovňa),
2.1.4 Bušovce (okres Poprad),
2.1.5 Hanušovce nad Toplou (okres Vranov nad Topľou),

2.1.6 Nižná Jablonka (okres Humenné),
2.1.7 Adidovce (okres Humenné),
2.1.8 Pečovská Nová Ves (okres Sabinov),

2.2 pre prevod vody Poprad – Torysa (kategória C) na trase Poprad – Kučmanovský potok – Torysa,

2.3 v rámci Východoslovenskej vodárenskej sústavy
2.3.1 prívod zo sústavy do Bardejova v trase Giraltovce – Bzenov – Lascov – Marhaň – Harhaj – Porúbka – Nemcovce – Kurima – Poliakovce – Hrabovec – Komárov – Bardejovská Nová Ves – Bardejov,
2.3.2 pre rozšírenie sústavy
a) Koškovce – Zbudské Dlhé – Hrabovec nad Laborcom,
b) prívod do Slovenskej Volovej, Ohradzian, Baškoviec, Turcoviec, Hrubova s odbočkami do Ohradzian, Víťazoviec, Lukáčoviec a Baškoviec-Cerniny,
2.3.3 prívod do Krásneho Brodu zo Stropkova,
2.3.4 z prívodu vodárenskej nádrže Starina – Prešov odbočky do Chmeľova, Vyšných Šebastoviec a v trase Nemcovce – Tulčík – Demjata,
2.3.5 z prívodu vodárenskej nádrže Starina – Prešov – Košice odbočky do Bretejoviec, Janovika, do Lemešian, Drienovskej Novej Vsi, Petrovian, Kendíc, Záborského, Dulovej Vsi a Ruskej Novej Vsi,
2.3.6 prívod do Fintíc z vodojemu Šidlovec v Prešove,
2.3.7 zdvojenie prívodu z úpravne vody Stakčín do Humenného,
2.3.8 z úpravne vody Stakčín prívod do Ublianskej Doliny v trase Kolonica – Ladomírov – Ubľa a Kalná Roztoka – Klenová – Ubľa,
2.3.9 z úpravne vody Stakčín prívod do Stakčínskej Roztoky,
2.3.10 rozšírenie sústavy v trase Stropkov – Chotča – Bukovce – Makovce – Havaj – Malá Poľana s pokračovaním Rokytovce – Krásny Brod – Medzilaborce,
2.3.11 prepojenie na sústavu v Hanušovciach nad Topľou s pokračovaním v trase Mičákovce – Giraltovce – Matovce – Soboš – Okrúhle – Radoma – Rakovčík – Stročín s odbočením do Svidníka na sever a na juh v trase Duplín – Stropkov,
2.3.12 rozšírenie sústavy z prívodu Vranov – Trebišov odbočkou Sačurov – Davidov a do Sečovskej Polianky,
2.3.13 z prívodu Vranov – Prešov odbočku do Čaklova – Zámutova a do Juskovej Vole, prívod do Komáran s odbočkami do Čičavy, Merníka a Nižného Kručova, odbočku Soľ – Rudlov a do Jastrabia, do Hlinného, odbočku do Žipova, Skrabského a do Čierneho nad Topľou a odbočku do Radvanoviec-Medzianok,
2.3.14 z vodárenskej nádrže Lukov
a) prívod do Bardejova v trase Lukov – Malcov – Gerlachov – Tarnov – Rokytov – Mokroluh – Bardejov s pripojením podzemných zdrojov v Lenartove v trase Lenártov – Malcov,
b) odbočky do Hrabského, Snakova a Kurova a v trase Kružľov – Krivé,
2.3.15 z Prešovského skupinového vodovodu s využitím podzemných zdrojov hornej Torysy a odberu v Tichom Potoku prívod v trase Sabinov – Ražňany, odbočku do Úzovského Šalgova, Ražňan a Jarovníc, odbočku do Úzovských Peklian, Jarovníc a Hermanoviec a odbočku z Lipian do Ďačova a Dubovice,
2.3.16 prívod z vodárenskej nádrže Jakubany do Starej Ľubovne,
2.3.17 pripojenie z podzemných zdrojov v trase Plavnica-sever – Stará Ľubovňa,

2.4 pre skupinové vodovody
2.4.1 rozšírenie skupinových vodovodov v trase Kurima – Kučín – Nemcovce – Porúbka – Marhaň,
2.4.2 prívod zo skupinového vodovodu Hertník – Fričkovce – Osikov v trase Raslavice – Abrahámovce – Buclovany – Lopuchov s prepojením na prívod z Východoslovenskej vodárenskej sústavy v trase Buclovany – Koprivnica – Marhaň,
2.4.3 napojenie vodného zdroja nad Hertníkom a povrchoveho zdroja Fričkovského potoka nad Fričkovcami na skupinový vodovod Hertník – Fričkovce – Osikov,
2.4.4 rozšírenie Popradského skupinového vodovodu prívod z Vrbového do Tvarožnej a po roku 2015 prívod Kežmarok – Spišská Belá – Bušovce – Podolínec,
2.4.5 výstavba skupinového vodovodu Osturňa – Veľká Franková – Malá Franková,
2.4.6 prívod Kežmarok – Spišská Belá – Bušovce – Podolínec do roku 2015,
2.4.7 odbočky z prívodu Spišského skupinového vodovodu z vodojemu Hrabušice – Levoča do Dravien a Spišského Štvrtka,
2.4.8 prívod do Jablonova z nových vodných zdrojov západne od Lúčky pre prívodné potrubie z nových vodných zdrojov východne od Tatranskej Štrby na skupinový vodovod Tatranská Štrba – Štrba, pre prepojovacie potrubie prívodu z vodárenskej nádrže Garajky s vodovodom Štrba,
2.4.9 napojenie vodných zdrojov v Tatranských Matliaroch a prívod z nich do Tatranskej Lomnice,
2.4.10 odbočka z prívodu Liptovská Teplička – Spišská Nová Ves z Hrabušic do Vydrnika,
2.4.11 prívod Poprad – Kežmarok, odbočku Veľká Lomnica – Stará Lesná – Tatranská Lomnica a odbočku do Smokovcov a prepojenie na Starú Lesnú,
2.4.12 hlavný diaľkový privádzač pre Spišsko-popradskú vodárenskú sústavu v trase vodárenská nádrž Garajky – Šuňava – Svit – Poprad a prepojenie do Smokovcov,

2 4.13 pokračovanie trasy Sabinov – Ražňany – Jarovnice – Hermanovce – Bertotovce s odbočkou do Fričoviec, Bertotovce – Miňany s odbočkami do Chminianskych Jakubovian a Ondrášoviec, Chmiňany – Chminianska Nová Ves – Svinia s odbočkou do Kojatíc, Svinia – Župčany s odbočkou do Medzianok, Župčany – Malý Šariš z Prešovského skupinového vodovodu s prepojením na prívod Prešovského skupinového vodovodu pri Veľkom Šariši,

2.4 14 nové skupinové vodovody
a) Víťaz – Ovčie,
b) v doline Svinky – Rokycany – Bzenov – Janov – Radatice,

2 4 15 skupinový vodovod v Zbojskej Doline od odberov vody zo Zbojského potoka pri Novej Sedlici a z Bystrianskeho potoka pri Zboji prívod Nová Sedlica – Zboj – Uličské Krivé – Ulič,

2 4.16 rozšírenie skupinového vodovodu Stropkov
a) nový vodný zdroj Sitníky s prívodom do Stropkova,
b) prepojenie vodovodu Stropkov so skupinovým vodovodom Miňovce v trase Breznica – Miňovce,
c) rozšírenie vodovodu Miňovce v trase Miňovce – Mrázovce – Tokajík, Miňovce – Lomné – Kručov s odbočkou do Bžian,

2.4.17 nový skupinový vodovod predĺžením existujúceho vodovodu Medvedie do Šarbova a Korejoviec,

2 4.18 rozšírenie skupinového vodovodu rekreačnej oblasti Domaša do
a) Holčíkoviec, Žalobína, Malej Domaše, Slovenskej Kajne – Benkoviec a do Kvakoviec,
b) Nižnej Sitnice a Vyšnej Sitnice,

2 5 stavby kanalizácie v trasách pre

2.5.1 zberač skupinovej kanalizácie Bardejov v trase Bardejov – Mokroluh – Rokytov – Tarnov,

2 5.2 zberače skupinovej kanalizácie
a) Koprivnice – Buclovany – Abrahámovce s bočnou trasou Koprivnice – Stuľany – Lopuchov,
b) Brezov – Lascov,
c) Zborov – Stebník,
d) Osikov – Fričkovce,
e) Kobyly – Tročany – Jánovce,
f) Mikulášová – Nižná Polianka – Vyšná Polianka,

2 5 3 zberače skupinovej kanalizácie Humenné v trasách
a) Humenné – Kochanovce – s odbočkou Lackovce – Hažín nad Cirochou,
b) Kochanovce – Udavské s odbočkou Vyšný Hrušov,
c) Udavské – Veľopolie s odbočkou Ľubiša – Nižné Ladičkovce – Vyšné Ladičkovce,
d) Veľopolie – Hankovce s odbočkou do Dedačova,
e) Hankovce – Koškovce – Hrabovec nad Laborcom s napojením zberača Jabloň – Rokytov pri Humennom s odbočkou zo Slovenského Kriveho,
f) Humenné – Hažín nad Cirochou,
g) Humenné – Chlmec – Porúbka s napojením zberača z Ptičieho,
h) Humenné – Brestov,

2 5 4 zberače skupinovej kanalizácie
a) Topoľovka – Závadka – Myslina – Lieskovec – Karná,
b) Modrá nad Cirochou – Dlhé nad Cirochou (okres Snina),
c) Zubné – Papín – Nižná Jablonka – Vyšná Jablonka,
d) Baškovce – Turcovce – Hrubkov,
e) Slovenská Volová – Ohradzany,
f) Kamenica nad Cirochou – Kamienka,

2.5.5 zberač z Malého Slavkova do skupinovej kanalizácie Kežmarok,

2 5.6 zberače skupinovej kanalizácie,
a) Červený Kláštor – Lechnica,
b) Veľká Franková – Osturňa,
c) Jurské – Ihľany,
d) Veľká Lomnica – Poprad (okres Poprad),

2 5 7 zberače skupinovej kanalizácie
a) Spišské Podhradie – Studenec,
b) Granč-Petrovce – Behárovce – Korytné,

2 5 8 zberače skupinovej kanalizácie Radvaň nad Laborcom – Volica Čabiny – Krásny Brod,

2.5 9 napojenie na skupinovú kanalizáciu Poprad – Svit – Spišská Teplica zberače z
a) Batizoviec, Veľkého Slavkova a Veľkej Lomnice (okres Kežmarok),
b) Lopušnej doliny,

2 5.10 zberače skupinovej kanalizácie
a) Hôrka – Kišovce – Švábovce – Hozelec,
b) Hrabušice (okres Spišská Nová Ves) – Vydrník,

2 5 11 skupinovú kanalizáciu Prešov zberače z Haniska, Vyšnej Šebastovej (vo výstavbe), Nižnej Šebastovej, Podhradíka a z Ľubotíc,

2.5.12 zberače skupinovej kanalizácie
a) Čelovce – Pušovce – Proč,
b) Kokošovce – Abranovce,
c) Šarišské Bohdanovce – Mirkovce – Žehňa a Varhaňovce – Brestov,
d) Kapušany pri Prešove – Lada – Šarišská Poruba a zberač Lada – Trnkov – Okružná,
e) Chminianska Nová Ves – Chmiňany – Chminianske Jakubovany,
f) Nemcovce – Lipníky,
g) Bajerov – Kvačany,
h) Malý Šariš – Župčany,
i) Kojatice – Svinia,
j) Bertotovce – Hendrichovce – Štefanovce a Bertotovce – Hermanovce,
k) Fričovce – Široké a Fričovce – Šindliar – Lipovce,

2.5.13 skupinovú kanalizáciu Sabinov – Orkucany a pre zberač Pečovská Nová Ves a z Jakubovian,

2.5.14 zberače nových skupinových kanalizácií
a) Červenica – Jakubová Voľa,
b) Šarišské Sokolovce – Bodovce,
c) Lipany – Krivany a pre zberače z Dubovice, Kamenice, Lúčka – Potoky, Dačov,
d) Torysa – Brezovica – Brezovička – Nižný Slavkov, Tichý Potok, Šarišské Dravce,

2.5.15 zberače skupinových kanalizácií
a) Modra nad Cirochou (okres Humenné) – Dlhé nad Cirochou,
b) Belá nad Cirochou – Zemplínske Hámre,

2.5.16 napojenie na kanalizáciu Stará Ľubovňa zberač Stará Ľubovňa – Nová Ľubovňa – Jakubany a Stará Ľubovňa – Jarabina,

2.5.17 zberače skupinových kanalizácií
a) Nižné Ružbachy – Vyšné Ružbachy,
b) Podolínec – Lomnička,

2.5.18 napojenie na kanalizáciu Stropkov zberače z Chotče a Tisinca,

2.5.19 zberače skupinových kanalizácií
a) Nižná Olšava – Vyšná Olšava – Šandal,
b) Lomné – Bžany, Lomné – Turany nad Ondavou a Lomné – Kručov,
c) Nová Kelča (okres Vranov nad Topľou) – Vyšný Hrabovec – Tokajík a rekreačná oblasť Valkov (pravá strana vodnej nádrže Domaša),

2.5.20 zberače zo skupinovej kanalizácie Svidník v trasách
a) Svidník – Nižný Orlík – Vyšný Orlík,
b) Nižný Orlík – Jurkova Voľa,
c) Svidník – Nižná Jedľová – Vyšná Jedľová – Belejovce,
d) Stročín – Nižná Polianka,
e) pre zberač Mestisko – Hrabovčík,

2.5.21 zberače skupinových kanalizácií
a) Kapišová – Kružlová,
b) Nižný Mirošov – Vyšný Mirošov,
c) Okrúhle – Radomka,
d) Kračúnovce – Lúčka – Kuková – Želmanovce – Dukovce,

2.5.22 zberače skupinových kanalizácií
a) Benkovce – Slovenská Kajňa – Žalobín s pripojením zberača malá Domaša – Kvakovce,
b) Holčíkovce – rekreačná oblasť Poľany a Holčíkovce – rekreačná oblasť Dobrá,
c) Nižný Hrušov – Dlhé Klčovo,
d) Sečovská Polianka – Cabov,
e) Hanušovce nad Topľou – Petrovce,
f) Sačurov – Davidov,
g) Čaklov – Zámutov,
h) Soľ – Rudlov, Jastrabie,
i) Medzianky – Radvanovce a Medzianky – Pavlovce,
j) Vranov nad Topľou – Vechec,
k) Hencovce – Rodinná oblasť Vranov nad Topľou.

3. V oblasti zásobovania plynom chrániť koridory na výstavbu vysokotlakových plynovodov

3.1 VTL DN 500, Košice – Drienovská Nová Ves – Tatranská Štrba,

3.2 VTL DN 150, Ždiar – Spišská Stará Ves,

3.3 VTL DN 200, Lipany – Stará Ľubovňa,

3.4 VTL DN 200, Snina – Stakčín,

3.5 VTL DN 150, Kamenica – Krivany – Torysa,

3.6 VTL DN 100
- a) Huncovce – Janovce,
- b) Bardejov – Kružľovská Huta,
- c) Hažlín – Mlynárovce – Radoma,
- d) Havaj – Šarišské Čierne,
- e) Snina – Pčoliné – Hostovice,
- f) Ňagov – Vyrava

Na uskutočnenie verejnoprospešných stavieb možno podľa § 108 zákona č. 50/1976 Zb. o územnom plánovaní a stavebnom poriadku (stavebný zákon) v znení zákona č. 262/1992 Zb., zákona Národnej rady Slovenskej republiky č. 199/1995 Z. z., zákona č. 229/1997 Z. z. a nálezu Ústavného súdu Slovenskej republiky č. 286/1996 Z. z. pozemky, stavby a práva k nim vyvlastniť alebo vlastnícke práva k pozemkom a stavbám obmedziť.

Vydavateľ: Ministerstvo spravodlivosti Slovenskej republiky, 813 11 Bratislava, Župné námestie 13, adresa redakcie Zbierky zákonov Slovenskej republiky: Námestie slobody 12, 811 06 Bratislava, telefón redakcie Zbierky zákonov Slovenskej republiky: 07/396 534, telefax 07/352 853 – Vychádza podľa potreby – **Tlač:** Danubiaprint, a. s., Bratislava – **Administrácia:** Poradca podnikateľa, spol. s r. o., Národna 13, 010 01 Žilina, telefon/telefax 089/625 880, 089/625 862 – **Bankový účet.** Ľudová banka, č. ú. 4220094000/3100 – **Reklamácie:** Poradca podnikateľa, spol. s r. o., Národna 13, 010 01 Žilina, telefon/telefax: 089/625 880, 089/625 862 – **Predajňa Zbierky zákonov Slovenskej republiky:** Námestie SNP 13, 811 06 Bratislava, telefon 07/306 55 52

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SPRAVA TNP SR
Biosfericka rezervacia Tatry

059 60 TATRANSKA LOMNICA

...dberateľom Cena Zbierky zakonov sa stanovuje za do... ...neho ročnika vrátane registra a od odberateľov sa vy... ...preddavkov vo výške oznámenej distributorom Zave... ...anie sa vykoná po dodaní kompletneho ročnika vratane ...kladu skutočneho počtu a rozsahu vydanych čiastok ...u určeného preddavku sa zasielanie Zbierky zakonov za... ...žiadavky na zasielanie Zbierky zákonov sa vybavujú prie... ...mic sa začína vždy po spracovaní objednávky a uhra... ...u Pri kontakte s administráciou uvádzajte vždy pridele... ...ý kod odberateľa **Reklamácie sa budú vybavovat do 30 dní od dátumu ich zaevidovania**

Mr. David Sheppard
Head – Programme of Protected Areas
IUCN – World Conservation Union
Gland – Switzerland

Dear Mr. Sheppard,

hereby we are sending you the explanations and clarifications with regard to the remarks and questions contained in your letter dated November 20, 2006. They represent the joint position of both Ukraine and the Slovak Republic.

EXPLANATIONS AND CLARIFICATIONS
WITH REGARD TO THE REMARKS AND QUESTIONS CONTAINED
IN THE LETTER OF MR. DAVID SHEPPARD
DATED NOVEMBER 20, 2006

1) Species Lists

1.1 <u>The discrepancies between the area figures in the Table 1 (Identification of the Property) and the dossier text</u> have resulted from omissions in the process of multiple text editing. The figures given in Table 1 are correct.

Site element No.	Name of the primeval forest	Country/Region	Coordinates of Centre point	Area of core zone (ha)	Buffer zone (ha)	Map Annex
1	Chornohora	Ukraine, Transcarpathian Region	48° 08’ 25” N 24° 23’ 35” E	2 476,8	12 925,0	7
2	Havešová	Slovak Republic, Prešov Self-Governing Region	49˚ 00’ 35” N 22˚ 20’ 20” E	171,3	63,99	8
3	Kuziy-Trybushany	Ukraine, Transcarpathian Region	47° 56’ 21” N 24° 08’ 26” E	1 369,6	3 163,4	9
4	Maramarosh	Ukraine, Transcarpathian Region	47° 56’ 12” N 24° 19’ 35” E	2 243,6	6 230,4	10
5	Rožok	Slovak Republic, Prešov Self-Governing Region	48˚ 58’ 30” N 22˚ 28’ 00” E	67,1	41,4	11
6	Stužica – Bukovské Vrchy	Slovak Republic, Prešov Self-Governing Region	49˚ 05’ 10” N 22˚ 32’ 10” E	2 950,0	11 300,0	12
7	Stuzhytsia – Uzhok	Ukraine, Transcarpathian Region	49° 04’ 14” E 22° 03’ 01” N	2 532,0	3 615,0	13
8	Svydovets	Ukraine, Transcarpathian Region	48° 11’ 21” N 24° 13’ 37” E	3 030,5	5 639,5	14
9	Uholka – Shyrokyi Luh	Ukraine, Transcarpathian Region	48° 18’ 22” N 23° 41’ 46” E	11 860,0	3 301,0	15
10	Vihorlat	Slovak Republic, Prešov Self-Governing Region	48° 55’ 45” N 22° 11’ 23” E	2 578,0	2 413,0	16
Total area				**29 278,9**	**48 692,7**	

1.2 The following figure was omitted in the dossier text, but mistakenly referred to as Table 3 (page 41).

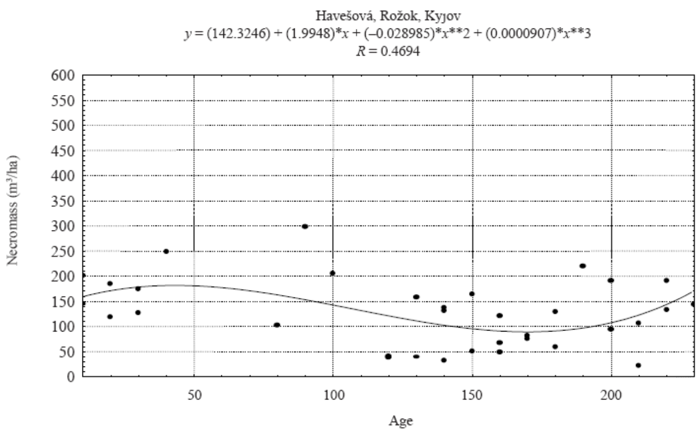


Fig. 3. The course of necromass volume within the development cycle in virgin forests Havešová, Rožok, Kyjov

Fig.: A comparatively large amplitude of CDW volume in some of the nominated beech primeval forests is also conditioned by a rapid decomposition of the trees necromass (Saniga, Schütz 2002).

1.3 <u>Only the list of Fungi is available. The number of Fungi species is 482 in the monodominant beech primeval forests.</u> There are around 1100 species found in the forests from oak up to the subalpine vegetation stage in the Eastern Carpathians (parts of them are in the marginal areas of the nominated properties' core zones).

1.4 More streamlined and amended <u>species lists</u> with total species counts <u>are included</u>. For nomination properties that are missing in the respective species lists, corresponding inventories have not been completed yet.

Tab. : Number of species

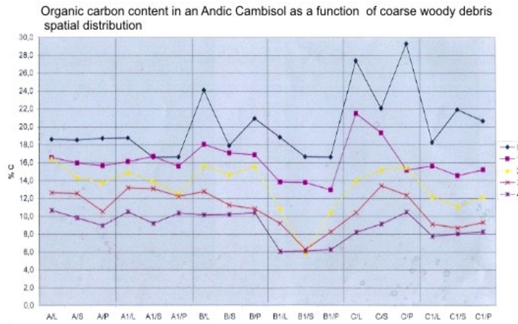
Locality/ Taxon	**VI**	**ST**	**HA**	**RO**	**KZ**	**SV**	**CH**	**MA**	**UH**	**SU**	**Species total**
Vascular plants Slovakia	28	490	271	389							**763**
Vascular plants Ukraine					599	399	581	491	717	491	**1067**
Mosses	152	143	145	141	95	108	259	233	158	102	**444**
Lichens Slovakia	62	123	42	126							**317**
Lichens Ukraine					42	132	291	90	165	32	**436**
Fungi Slovakia	55	663	235	118							**741**
Fungi Ukraine					59		93	16	103	60	**247**
Mammalia	33	36	35	33	50	41	44	44	54	65	**73**
Birds	69	72	66	68	68	65	65	60	76	46	**101**
Amphibia and Reptilia	11	10	10	10	15	14	14	15	17	10	**18**
Coleoptera	50	104	54	44	48	16	79	69	84	47	**206**
Lepidoptera	41	34	11	11	109	74	73	75	97	18	**165**
Mollusca	5	1*	11	2*	*	*	46	*	67	*	**74**
Araneidea	52	*	85	*	*	*	26	*	*	*	**127**
Myriapoda	5	3	5	4	7	2	1	4	5	2	**7**
Nematoda	6	2	9	2	12	2	5	4	11	8	**16**

VI- Vihorlat
ST- Stužica
HA- Havešová
RO- Rožok
KZ- Kuziy-Trybushany
SV- Svydovets
CH- Chornohora
MA- Maramorosh
UH- Uhol'ka-Shyrokyi Luh
SU- Stuzhytsia-Uzhok
* - no completed data

2) Endangered Species Lists

2.1 The biodiversity inventories are not available for all properties of the serial nomination proposed for nomination and the tables could therefore not be streamlined entirely. Some endangered species listed probably do merit in terms of outstanding value even if taken individually, e. g. Rosalia alpina and Myotis bechsteinii, but it also the presence of animal assemblages bound to hollow tress or dead wood is of a paramount importance, for instance the presence of numerous woodpecker species of the Palearctic realm across the nominated series. However, the research of affiliation of the listed endangered species with the beech primeval forests continues. E. g., with regard to the presence of dead wood, it is assumed that CWD not only generates new habitats for saproxylic species but also influences habitat structures of the nearby forest floor. According to the theory of spatial heterogeneity (Simpson 1964; Mac Arthur 1965) the presence of CWD increases the assemblage-wide carrying capacity, resulting in enhanced densities and higher species richness. According to Topp et al. (2006), the effect of CWD on litter dwelling beetles is apparently dependent of the forest type.

2.2 The rapid decomposition of coarse woody debris and intense biogeochemical cycling is documented by the figure bellow. The spikes in the organic carbon content down to the depth of almost 50 cm and their spatial coincidence with decaying logs indicate an extremely fast biogeochemical cycling in the Vihorlat beech primeval forest growing on an Andosol. In fact, the tree logs disappear within a few years when in contact with the soil, as opposed to a decade or more in beech primeval forests on other substrates. Indeed it may be such as specific combination of factors that features an unusual dynamics (vigorous natural regeneration) and richness of xylobiotic organisms (Pichler et al. 2006). The research on the patterns of mutual dependence and synergies continues.



3) Buffer Zones and Corridors

3.1 While the role of the buffer zones is to help ensure the integrity of the core zones, the importance of the connecting corridors rests with linking the nominated properties geographically and ecologically with several aims:

a) enable exchange of biological information;
b) designation of the corridors as areas to be converted into as close-to-nature as possible, ideally natural, contiguous complex of beech forest, eventually perhaps allowing for the extension of the core zones in the future.

It should be emphasized that the area-designation of the connecting corridors drew primarily on the existence of nature (primeval), natural and semi-natural forests (also managed) forests tesserae, combining into a mosaic, not entirely intact but still capable of fulfilling all functions expected to be provided by the corridors as defined in a) and b).

3.2 The management of the respective sectors within the connecting corridors will change irrespective of the nomination process outcome. Parts of them will be included within expanded or new national parks boundaries and nature protected areas in Ukraine. A dedicated project has been prepared and submitted in order to identify optimal conservation management regimes for the connecting corridors sectors (see the enclosed Compendium of Project Pre-Proposals and Call-Lines developed on the ERA ENV Platform, Pre-Proposal No. 3, page 22–30).

The status of the corridors will change irrespective of the nomination outcome. The connecting corridors on the Ukrainian territory will become an integral part of the Pan-European ecological network through the Ukrainian national ecological network according to the Law of Ukraine No. 1989–111 “On establishing of the Ukrainian national ecological network”. If the nomination is successful, the status of the connecting corridors will change on the Slovak territory in that their sectors falling into protected areas of any kind (specifically the B an C zones of the Poloniny National Park and Vihorlat Protected Landscape Area) will be upgraded as “protected areas of international significance” and their conservation management plans will be adjusted accordingly in compliance with the Law on Nature Protection No, 543/2002 Coll., § 54, Section 4). That conservation regime supercedes any other provisions.

4) Integrated Management Plan

4.1 The Coordination Councils in Ukraine are important elements of the management process. Because of their experience, they will be essential drivers in setting-up the Integrated Management Panel.

4.2 There are two ways for the Joint Management Committee to ensure that the Territorial Plans in Slovakia are, if necessary, changed as proposed: either through the representatives of the Prešov Self-Governing Region, who is a member of the Joint Management Committee, or through filing its respective proposals to the Prešov Self-Governing Region Administration by the way of the Ministry of Environment as its umbrella state authority. The self-governing region will then be obliged to start territorial proceedings that will result into issuing a territorial decision, according to § 39b, Act No. 50/1976 Coll., which is also subject to national government approval, in which the position of the Ministry of Environment is considered. However, the whole territory on which the nominated properties (Slovak part) are located belongs to the Prešov Self-Governing Region, which has had its binding Territorial Plan approved by the Government provision No. 216/1998 Coll. and no major changes in it are required as it does not foresee any infrastructural developments in the area containing the nominated properties, their buffer zones and connecting corridors. The areas are currently void of such infrastructure. More importantly, the Joint Management Committee will, in a close cooperation with the Integrated Management Panel, initiate or support changes, if necessary, in the territorial plans of communities in the areas adjacent to the buffer zones and connecting corridors.

4.3 The bottom-up approach during the 1st implementation stage of the he Integrated Management Plan is asserted mainly through the participation of elected members of municipal governments (independent of the state authorities, ministries etc.):

– Mr. Mykola Andrus, head of the Deputies Council of Zakarpatska Oblast, Ukraine
– Mr. Peter Chudík, head of the Prešov Self-governing Region, Slovakia.

During the 2nd stage of the IMP implementation, representatives of the Integrated Management Panel (citizens, NGOs, other stakeholders) will be delegated to the Joint Management Committee. The panel role is essential also for the appropriate management of the connecting corridors. The motivation of its members leans to a large extent on built-in components based on the self-interest of all stakeholders: the panel will serve, among other things, as a platform for empowering state, individual and collective forest owners and managers through providing them with solid quantitative data, instead of generally qualitative statements, e. g. informing them on the value of water regulation and carbon sequestration services provided to the society through the maintenance of forest estates and possibly increased through specific, nature-based forest management methods, expressed for instance in terms of quality water yield and carbon sequestration in forest soils; a provision of quantitative data on savings due possible substitution of labour through natural processes and owing to an increased forest stability; setting-up of incentive schemes in cooperation with other stakeholders in the forest-society chain (inc. utilities and safety), aimed at benefiting sensible forest management (through tailored forest stock insurance schemes, shares on income from providing customers with utilities (water, hydropower, carbon stock quatas, etc.). Such approach is appropriate in rural, comparatively disadvantaged regions.

5) Formal Recognition of Joint World Heritage Values by State Properties

Both in Ukraine and in Slovakia, there is a possibility that given the scarcity of World Heritage Sites in both countries, dedicated state legislation will be adopted to acknowledge and highlight the superior status of the transboundary serial nomination. Such is the case of Banská Štiavnica, a World Cultural Heritage site in the Slovak Republic (Law 100/2001 Coll. On Banská Štiavnca and its surroundings).
But given the existent legislation frameworks in both countries, such moves are only symbolical. In terms of formal acknowledgement, the nominated properties (Slovak part) will be, if the nomination is successful) automatically upgraded as “protected areas of international significance” and their conservation management plans will be adjusted accordingly in compliance with the Law on Nature Protection No, 543/2002 Coll., § 54, Section 4). That conservation regime supercedes any other provisions.

ERA ENV in the Slovak Republic
– getting an edge in the international cooperation on the EU FP 6 platform

COMPENDIUM OF PROJECT PRE-PROPOSALS AND CALL-LINES developed on the ERA ENV platform

in co-operation between the Technical University Zvolen
and ERA ENV clients for the EU FP 6
calls and towards EU FP 7

ERA ENV in the Slovak Republic

– Getting an edge in the international cooperation on the EU FP 6 platform

CATALOGUE OF PROJECT PRE-PROPOSALS DEVELOPED ON THE ERA ENV PLATFORM

in cooperation between Technical University Zvolen and ERA ENV clients for the EU FP6 calls and towards EU FP 7

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INTRODUCTION

The EU FP funded ERA ENV Specific Support Action has spawned a vital cooperation among researchers from the Technical University Zvolen as the ERA ENV Project Partner, and other research organizations in the Slovak Republic as its clients. During the project implementation, a number of project pre-proposals for specific FP 6 calls had been drafted. Despite an immense time pressure conditioned by the SSA timing, this activity has continued with an eye on the presumed EU FP 7 call lines. Presented materials were drafted during several dedicated expert meetings that took place from November 2005 till July 2006 at Skuratka, Chmelovska, as well as in Warsaw on the occasion of Integration4Water (EU FP6 SSA) workshop. They were conceived of either as self-contained preliminary project proposals, or modules offered for project compilation a la cárte.

Because of the value of the individual and collective inputs by contributing researchers and teams, as well as the subsequent synthesis by the editors, a decision was made to publish them as a Compendium of Pre-Proposals and Call-Lines. Its primary aim is to present them as solid components, from which future projects can be further developed, and, last but not least, in order to demonstrate the fruitfulness of the thematic networking, as promoted by the ERA ENV project. Topical expert groups are committed to a further elaboration of the presented pre-proposals, which, along with future contributions, are also available at www.virginforests.sk.

Credits shall be given to all contributing authors, who shared their ideas on the frontiers of environmental research.

Editors

About ERA ENV Project

ERA ENV (Extending European Research Area through Environmental Approaches) is a Specific Support Action under EU's Sixth Framework Programme, aiming at assisting the participation of organisations from New Member States and Candidate Countries in FP6 projects. More information and free registration: www.eraenv.com

CONTENTS

Pre-proposal No 1

MICKING PRIMEVAL FORESTS PATTERNS IN NATURE-BASED FOREST RESOURCES MANAGEMENT ("PRIMEFOR")

developed as a project outline in reference to

- FP 6, Human Resources and Mobility Activity
- Marie Curie Actions – Marie Curie Research Training Networks (RTN)

1. Network motivation and aims:

According to the Strategic Research Agenda of the Forests Based Sector's Technological Platform, the competitiveness of the sector depends entirely on ensuring the sustainable character of forestry, on using research to make wood a more predictable engineering material, and on reducing the input of material, energy and work per unit wood and wood based-products. All these assumptions seem to be seriously compromised: The burning of fossil fuels may lead to problems in applying the traditional concept of sustainable forestry, in which site factors are assumed steady-state (Wagonner 1994, Kauppi 1995). The predictability of wood as material is limited due to wood market volatility, amplified by wood availability being a delayed function of the demand. And finally, the profit margins from wood utilization are often not high enough to cover the necessary silvicultural measures in many countries (Commarmot et al. 2000). In this situation, nature-based management of forest resources becomes a principal doctrine aimed to narrow the gap between managed and nature forests patterns, to ensure higher forests stability, to provide for a diversified supply of wood and to achieve desired forests functions at lower costs. Therefore, the major scientific aim of this network is to find new ways of how substantially more natural patterns and processes normally taking place in the primeval forests can be harnessed for the benefit of forest resources management under global changes. Owing to the network structure, the early stage researcher (ESR) will for the first time get an integral view of nature forests ecosystems on distinct sites in the Temperate Zone of Europe. That experience accompanied by a highly interdisciplinary approach will create a new breed of scientists able to pose clear scientific questions even in the face of considerably complex ecosystem patterns and demands on forest functions. Trained under the supervision of acclaimed scientists, they will be able to resolve the challenge of a science-based and economically viable management of forest ecosystems in a possibly transient, non-steady-state environment.

2. Scientific objectives

The research training activities will unfold around the principal axis, constituted by the network's scientific objectives. These objectives will be achieved within the framework of tasks which are described in detail in the Work Plan section (4):

a) **To develop a comprehensive understanding of the causes for the variation in ecological patterns and processes within temperate primeval forests:** Some of the results from primeval forest research could have been generalized, such as the developmental independence of small forest segments in beech primeval forests on mesotrophic sites. Further and more complex research covering the entire spectrum of site conditions will yield exceptional data and provide ESR with a unique training opportunity in field methods.

b) **To form a self-contained picture of the temperate primeval forests functional capacity:** Most temperate primeval show an outstanding performance in terms of biomass production, the ecological resistance and resilience, biodiversity, preventing erosion, retention and carbon accumulation. Not always, however, these functions are provided simultaneously. In the light of increasing efforts to employ natural processes in forest management, there is an urgent need to determine the effects of natural patterns and processes on forest functions.

c) **To extract the past and assess the current and future global climate change impact on temperate forests:** Primeval forests, owing to a negligible human intervention, provide us with a window of opportunity to estimate the interference of climate fluctuations with the growth dynamics of tree populations. Any changes however must be evaluated and judged against the natural dynamics.

d) **To resolve the introduction and maintenance of natural forests patterns in managed forests:** The opportunities for a cost-effective and ecologically sound approach, based on the introduction of selected processes and patterns of the primeval forests ecosystems into the forest management toolbox, depend on the site conditions, its past use, previous forest management and its current and future goals. Further research shall therefore focus on what other forest structures are most suitable to benefit from self-regulating processes and how these structures can be achieved.

3. Current international state-of-the-art and scientific originality of the project

The network objectives have been set after a thorough evaluation of both successes and failures in primeval forest research and in the transfer of its results into sustainable forestry.

3.1 Conceptual foundations and the transfer of knowledge from primeval to managed forests

Brang (2005) reviewed the concept of virgin forests as a knowledge source for central European silviculture. Due to the case-study character of the available knowledge, there continues to be disagreement about the degree to which the processes observed in primeval forests can legitimately be incorporated into the managed forests dynamics. Small-scale regeneration methods, such as progressive felling by small groups and single tree or group selection systems correspond best to the natural regeneration processes in undisturbed beech forests. But a number of other patterns occurring in primeval forests can potentially be used in forest management after further research of the opening opportunities, for instance the substitution of tending and thinning by natural regeneration, suppression and released of target trees by auxiliary trees; growing of mosaic forests composed of small patches covered by bio-groups of different age, as devised from the textural primeval forests patterns or the mimicking of the biometric parameters of oak crowns able to sustain the maximum stem diameter increment while maintaining its quality in oak primeval forests. The natural growth and increment rhythm, as well as the production of higher quality and larger dimensions can be supported by an according initial suppression of certain species, such as fir and spruce. The response of other species, such as oak and beech must further be studied, similar to the question how much trees necromass should be retained in managed forests in order to provide habitats for stenoec organisms, microclimate-smoothing within forest stands, and contribute to carbon accumulation in the surface humus and ultimately in mineral soils. Thus, there is a widely recognized need to consolidate and extend the network of studied primeval forests to achieve necessary replications and thus overcome the site dependency, which currently presents the barrier to knowledge transfer. Also, no major breakthrough has yet been made in the synthesis of silviculture, hydrology, soil physics, ecology and biogeochemistry in particular, which is urgently needed in order to assess the impact of primeval forests patterns and processes on the environmental functions, including carbon sequestration, slope stability, runoff quantity and quality and erosion controls.

3.2 Project novelty and expected contributions

The highly integrated approach employed by the network goes far beyond of what has been achieved in this field thus far, and for the first time it has the ambition to shed light on the causes for the spatio-temporal variability so as to help bridge the limited, site- or region-specific character of the available information. This shall provide a major advance in this field, which is bedeviled by the dispersion and scarcity of primeval forests remnants and differences in data collection modes and methodology, making direct comparisons among studies, useful modeling and the transfer of knowledge into forest management difficult or impossible.

4. Workplan

The research conducted in this network has been structured into five distinct but interrelated research tasks. Tasks #1 and #4 provide the new empirical data basis for the network. Task #3 and #4 narrow the uncertainties in the development of the primeval forests mimicking toolbox within the task #5.

4.1 The research tasks

Task 1: Comparative study of current ecological patterns and processes in primeval forests and of their spatial variability in the temperate zone of Europe; Task description and approach: The task aims to reveal the causes of the differences in structure, texture, disturbances, regeneration and the overall dynamics under a range of environmental and genetic causes responsible for the variability of observed patterns. For that purpose, series of primeval forests on distinct sites will be composed in numbers assuring a proper replication. The respective patterns and processes will be studied using existing records and current or new observations; Task leader: ZVO; Involved partners: GOT, RAK, LJU, BRA, ZVO.

Task 2: Regulation capacity assessment of primeval forests ecosystems; Task description and approach: We will measure locally, model and on larger scales estimate the regulation functions of primeval forest, i. e. their capacity to sustain ecological processes and the vital environmental functions, such slope stability protection, torrent control, retention, accumulation, filtration and the carbon sequestration. Functions provided by primeval forests are often assumed superior to functions fulfilled by managed forest. However, this line argument deserves a scientific scrutiny, as there is a multiple evidence that certain combinations of these functions can not be achieved at the same time. The corresponding analysis will draws on results from task #1 and deliver a list of functions worth mimicking for the task #5. Task leader: DUB; Involved partners: DUB, ZVO, BRA.

Task 3: Analysis of possible temporal variations in temperate primeval forests patterns; Task description and approach: This task shall detect possible global climate change impacts on the patterns and dynamics in primeval forests on the backdrop of environmental stochasticity. Network partners (ZVO, RAK) avail of data from a 50-year-long continuous primeval forests research and so the approach will lean, beside dendrochronological analyses, on contrasting current patterns against data taken prior to the rapid onset of the global changes, and against site and genetic variations as identified in task #1. The results will enable capturing the emergent trends and making more specific predictions about the future fate of forests ecosystems. Task leader: TOR; Involved partners: TOR, ZVO, GOT, BRA

Task 4: Investigation of interactions between primeval forest patterns and organisms; Task description and approach: In compliance with Huston (1979), who predicted the highest species richness under intermediate perturbations, no significant differences in species richness between a beech primeval forest and a properly managed beech forest have been detected (Duelli et al. 2005). However, primeval forests patterns support saprophagous organisms groups, e. g. millipedes, gastropods, saproxylophagous beetles and xylobiont fungi, birds nesting in tree cavities and others. They in turn may strongly influence primeval forests traits, such as the spatial heterogeneity of surface humus and natural regeneration. Therefore, these and other important interactions, such as those between ungulates and their predators in relation to natural regeneration dynamics, will be studied. Comparatively less attention will be paid to biodiversity inventories. Task leader: RAK; Involved partners: ZVO, RAK, BRA

Task 5: Mimicking of primeval forests patterns in close to nature forestry; Task description and approach: Three teams in this network (GOT, ZVO, LJU) have made independently significant contributions to the study of primeval forests patterns and their incorporation into close-to nature silviculture. These teams join forces in this network to evaluate primeval forests patterns and experiments, as well as to emulate the underlying processes by means of computer modeling. In that way, new applications and recipes for nature-based management of forest resources will be developed. That approach will draw on findings from previous tasks. We envision that ESRs employed in the network are thoroughly exposed to both theory-building and empirical research. Task leader: GOT; Involved partners: ZVO, LJU, GOT, RAK, BRA

4.2 Research facilities

We have chosen approximately fifty primeval forests of outstanding authenticity and integrity. The group reflects the variability of climax forests across an area that extends from Central France to Western Ukraine and from Southern Sweden to the mountainous part of Central Italy. The group includes primeval forest in the Slovak republic (e. g. Kasivarova, Dobroc, Havesova,), in Ukraine (e. g. Uholka, Svydovets, Kuzyi-Trybushany) and in Slovenia (e. g. Strmec) They are composed mainly of sessile oak (Quercus petraea), European beech (Fagus sylvatica), silver fir (Abies alba) and Norway spruce (Picea excelsa). These species represent the backbone of the European forestry and some of the best studied tree species in Europe. The field sites were selected from areas close to the home institutions of the network partners. In these localities, advanced research methods will be applied. Besides, teams in Zvolen, Rakhiv, Ljubljana and Göttingen avail of series of experimental plots where close-to-nature forest management methods are applied, which enable comparative studies based on multiple replications.

4.3 Selected research methods

The research teams have further developed within collaborative research, e. g. by O’Linger et. al (1997), and successfully applied the following selection of methods: Site capacity determination: As opposed to usual site descriptions, the field method relies on the determination of site parameters in absolute terms, e. g. total amount of available nutrients instead of concentration only. This is achieved by the conversions using for instance the total volume of forest soil cover. The variables will be measured by advanced technology, such as electrical resistivity tomography, Time Domain Reflectometry, elemental analyzers and others owned by several teams (ZVO, DUB). Population genetics of forest tree species: Our groups (ZVO, GOT) have expertise in studying the genetic structuring of tree species populations using alloenzymes, isoenyzmes and DNA analyses. They are used to determine the postglacial migration of tree species in the Carpathians and the adjacent regions and will help determine the spatial variability of primeval forests patterns in the area of interest (Comps et al. 2001). Global change impact detection and modeling: The main methods to be applied are the measurement of the growth rate through basal area increments (TOR) and time series analysis of primeval forest dynamics over past 50 years (ZVO, RAK). Structural analysis of the primeval forests, including the gap analysis: A co-operation of two teams (GOT, ZVO) lead to the development of a standard method applied on 10 ha plots. The investigation includes determination of the site resources utilization, the crown volume, forest canopy gaps, trees necromass survey, natural regeneration and other parameters. The research will rely on ground measurements and the evaluation of aerial photographs or satellite images from IKONOS or Quickbird satellites. Growth models: Forest structure generators (SIBYLA) developed by two teams (ZO, GOT) within a co-operative research will be used to generate individual tree data from stand data and predict spatial structure. This is inasmuch significant that the close-to-nature forestry approach is increasingly concerned with individual trees, their production and stability. Thinning models (SIBYLA Cultivator, SIBYLA Prophesier) shall be employed to model autoselection as compared to tending, thinning and harvesting.

5. Collective experience and collaboration between the research teams

Our network includes complementary research skills from population genetics, biogeochemical cycling, forest ecology, silviculture and forest management, environmental sciences and mathematical modeling, which are required for successful accomplishment of the ultimate aim of the network. Task #1 involves the majority of teams, while each of the remaining tasks include 3 to 5 teams having the necessary expertise, with the network coordinator (BRA) being involved in each task. Thus, the network overcomes geographic and interdisciplinary fragmentation and establishes the critical mass of scientific capacity in order to significantly advance the theory and practice of nature based management of forest resources, capable of adapting to site conditions where it is applied and to new conditions yet to be experienced. The network partners are:

UKE – Institute of Landscape Ecology, Slovak Academy of Sciences, Bratislava, Slovakia: Network coordinator. The institute has been participating in nine projects within the 5th EU and 6th EU Framework Programs: BIOSCENE, BIOPRESS, CARBOMONT, BIOHAB, BIOPLATFORM, BIOFORUM, RURAL-ETINET, ALTERNET and SENSOR. The team under the leadership of Dr. J. Oszlányi, the institute's director, has co-operated with all network partners. The main contributions of this team to the network consist in investigations of biomass production, carbon accumulation and biodiversity survey in forest ecosystems, as well as regionalization of results and the network management.

Two key publications:

Oszlányi, J., 2001: Research in UNESCO Biosphere Reserves as one of the elements of the Seville Strategy. Ekológia – Bratislava. 20 (3): 45–53.

Oszlányi, J., Grodzinska, K., Badea, O., Sharpyk, Y.: Nature conservation in Central and Eastern Europe with a special emphasis on the Carpathian Mountains. Environmental Pollution. 130 (1): 17–32.

GOT – Faculty of Forest Sciences and Forest Ecology, Georg-August-University Göttingen, Germany: Partner #1, leader of task #5. The team of the Faculty of Forest Sciences and Forest Ecology in Göttingen contributes to the network by extraordinary complementary research in the fields of silviculture and forest ecology. They are represented by the group of. Prof. Dr. A. Dohrenbusch and it includes forest regeneration, competition-based control of young stands, ecological demands of forest trees species, ecological and economical aspects forest developments, e. g. carbon sequestration and water quality

Two key publications:

Dohrenbusch, a., 2000: forest management. In: Puhe, J. Ulrich, B.: Global Climate Change and Human Impacts on Forest Ecosystems. Springer Ecological Studies: 419–462.

Dohrenbusch, A.; Bartsch, N. (eds.) (2002) Forest development – succession, environmental stress and forest management. Springer, Berlin, 220 pp.

ZVO – Faculty of Forestry, Technical University Zvolen, Zvolen, Slovakia: Partner #2, leader of task #1. Results of to-date longest systematic research of the primeval forests in the Temperate Zone of Europe have been published by Korpeľ (1995), the co-founder of modern natural forests research in Europe. His work has become a reference for further primeval forest research results. Consequently, it has been cited one hundred and forty five times in the ISI-indexed journals and more than 1000 times in journals indexed by other databases. The team has been participating in several projects within the 5th and 6th EU Framework Programs: FRAXIGEN, FRAXINAS, Implementing Tree Growth Models (ITM), WARM.

Two key publications:

Saniga, M., Schütz, J.P., 2001: Dynamik des Totholzes in zwei gemischten Urwäldern der Westkarpaten im pflanzengeographischen Bereich der Tannen-Buchen- und der Buchenwälder in verschiedenen Entwicklungsstadien. Schweiz. Z. Forstwes. 152, (10): 407–416.

Comps, B., Gömöry, D., Letouzey, J., Thiébaut, B., Petit, R. J., 2001: Diverging Trends Between Heterozygosity and Allelic Richness During Postglacial Colonization in the European Beech. Genetics, Vol. 157: 389–397.

RAK – Carpathian Biosphere Reserve, Rakhiv; UA: Partner #3, leader of task #4. The research team of the Carpathian Biosphere Reserve, has a longstanding experience in performing the biodiversity inventories and has achieved remarkable results in comparative studies between biodiversity in primeval and managed forests. As a result, his team organized the scientific conference "Natural Forests in the Temperate Zone of Europe – Values and Utilisation" in 2003 in Rakhiv, during which one hundred and thirty contributions dealing with biological, social and economic aspects of natural forest ecosystems and thereof utilization were presented (Hamor, Commarmot 2003). The participation of the Rakhiv team is indispensable for the network as the team contributes its research plots in the largest European beech reserves, e. g. Uholka – 6200 ha in size, Kuzyi-Trybushany – 4200 ha in size. Carpathian Biosphere Reserve closely cooperates with Zvolen team on the research of permanent experimental plots in the Ukrainian primeval forests founded by prof. Zlatník (Zlatník et. al 1938, Vološčuk 2003). Their data records complete the series of observations needed for capturing spatial variety of primeval forests in the Temperate Zone of Europe and their temporal variations.

Two key publications:

Commarmot, B., Bachofen, H., Bundziak, Yo., Bürgi, A., Ramp, B., Shparyk, Yu., Sukhariuk, D., Viter, R., Zingg, A., 2005: Structures of virgin and managed forests in Uholka (Ukraine) and Sihlwald (Switzerland): a comparative study. For. Snow Landsc. Res. 79, 1/2: 45–56

Dovhanych Ya.E., 1986: Carnivores of the Carpathian Reserve. Moscow, 12–14.

LJU – Biotechnical Faculty, University of Ljubljana, Ljubljana, Slovenia: Partner #4, Tasks # 1, 5. Leader of the team, prof. J. Diaci made highly significant contributions to the "Nature-based Management of beech in Europe – a multifunctional approach to forestry", an international project supported by the EU fifth framework program. The project has delivered scientifically founded policy recommendations and management guidelines for sustainable forest management. His team specializes on ecophysiological research on gap dynamics in virgin forests and on indicators for monitoring and evaluation of forest biodiversity in Europe.

Two key publications:

Christensen, M., Hahn, K., Mountford, E. P., Odor, P., Standovar, T., Rozenbergar, D., Diaci, J., Wijdeven, S., Meyer, P., Winter, S., Vrska, T., 2005: Dead wood in European beech (Fagus sylvatica) forest reserves. Forest ecology and management, 210 (1–3): 267–282.

Diaci, J., Pisek, R., Boncina, A., 2005: Regeneration in experimental gaps of subalpine Picea abies forest in the Slovenian Alps. European journal of forest research 124 (1): 29–36.

TOR – Department of Agronomy, Silviculture and Land Management, University of Turin, Turin, Italy: Partner #5, leader of the task #3. The team headed by prof. R. Motta, an associate editor of Dendrochronologia, an interdisciplinary scientific journal of tree ring science, is devoted to dendroecological analysis of the conifer trees, the studies of forest stands histories, and the research on the impact of the global climate change on forests. They also conduct silvicultural experiments, such as small gaps or elongated cuts, established in order either to maintain the current status using natural regeneration or to improve the structures and the "naturalness" of the forest stands.

Two key publications:

Motta R, Garbarino F, 2003: Stand history and its consequences for the present and future dynamic in two silver fir (Abies alba Mill.) stands in the high Pesio Valley (Piedmont, Italy). Annals of Forest Science, 60 (4): 361–370.

Motta, R., Edouard, J., 2005: Stand structure and dynamics in a mixed and ultilayered forest in the Upper Susa Valley, Piedmont, Italypper Susa Valley, Piedmont, Italy. Canadian journal of forest research,35 (1): 21–36.

DUB – Department of Environmental Resource Management, Faculty of Agriculture, University College Dublin, Dublin, Ireland: Partner #6, leader of the task #2. The team of Prof. E. P. Farrell has made significant contribution on the assessment of forests environmental functions, mainly soil protection, the provision of clean water and carbon accumulation, under the global climate change. Prof. Farrell acts as Member of the COST Action E21 Management Committee (Contribution of Forests and Forestry to the Mitigation of Greenhouse Effects) and COST Action E25 Management Committee (European Network for a Long-term Forest Ecosystem and Landscape Research Programme).

Two key publications:

Goodale, C. L, Aber, J. D. , Farrell, E. P., 1998: Predicting the relative sensitivity of forest production in Ireland to site quality and climate change. Climate research 10 (1): 51–67.

Byrne, A. K., Farrell, E. P., 2005: The effect of afforestation on soil carbon dioxide emissions in blanket peatland in Ireland. Forestry 78 (3): 217–227.

6. Training

The research program will help to train ESR able to provide a scientifically sound basis for the implementation of the Resolution on Forestry Strategy for the EU, adopted by the European Council in 1998, and specifically for sustainable production of renewable resources and sound environmental practices as the main objectives. This new generation of scientists will also be essential for the development and implementation of the Strategic Research Agenda of the EU Forests Based Sector's Technological Platform, EU environmental policies and the EU Climate and Environment Program. These expectations are not unrealistic, as our network teams have had a long record of successful participation in the 5th and 6th EU FPs. Early stage researchers will benefit both directly from their network-specific activities and indirectly from operating in a creative, international and interactive scientific environment.

6.1 Training needs

From the viewpoint of human resources, the transfer of know-how from applied ecology of primeval forests ecosystems into practical management of forest ecosystems has been seriously hindered not only by the scarcity and dispersal of primeval forests remnants, but also by the lack of an interdisciplinary approach. Thus, most universities in Europe provide the training in nature-based forestry only of a facultative appendix. Though we cannot undertake to train new fully fledged experts in each area within this network, we can help the young researchers to become familiar with the purpose and use of methods applied in the particular fields. Only then can they attain the capacity to pose relevant questions, to capture the complexity of forest ecosystems and extract solutions for the practical, adaptive and nature-based management of forest ecosystems. We have identified training need for young European researchers especially in the following areas: Experimental designs: In forestry research, proper replication of studies is sometimes confused with pseudoreplication. ERSs shall receive training on setting up proper research designs in order to ensure opportunities for the transfer of knowledge. Methods of field work: There is little methodological standardization of field techniques employed in primeval forests and silvicultural studies, which makes comparative studies difficult. Thus, it is essential to develop comparable methods, widely applicable with minimum modification. Quantitative analyses of biogeochemical cycles: The biogeochemical cycling is often analyzed or modeled qualitatively, or quantitative analyses and modeling are performed on spatially very limited compartments. Such approach can essentially mask the overall patterns, such as the carrying capacity of sites. The use of absolute values shall be encouraged. Spatio-temporal variability: In studying heterogeneity, what we call ground noise (or residual variance) in classical statistical inference, actually may be the matter of our study in highly complex ecosystems. ESRs should become acquainted with a wide spectrum of statistical methods. Genetics applied to forestry studies: Though there is no lack of general expertise in the use of molecular techniques in population biology in Europe, there is an ever present need to help field researchers acquire a better understanding of the opportunities presently available via the application of current molecular techniques.

6. 2. Training programme

In this network, ERS will develop an ability to work in groups. On completion of the project, transferable and specific skills will enable them to overtake responsibilities in collaborative research, to understand and predict the direct and indirect effects of forest management.

6.2.1 Early stage researchers (ESRs)

Early stage researchers employed in this program will receive a contract for 1–3 years in one of the seven research teams in the network. It is foreseen that they will focus on the following topics: Genetic causes for spatial variations in production, structure, texture, natural disturbances and regeneration within a primeval forests sample: 2 ESR (ZVO, GOT); Site factors and variations in primeval forests patterns: 3 ESR (RAK, ZVO, GOT); Interactions between primeval forests patterns, biodiversity, populations and ecosystems fragmentation: 2 ESR (RAK, ZVO, BA, GOT); Regulation functions of primeval forests compared to managed forests (torrent control and flood avoidance, replenishment of water reservoirs, carbon accumulation in forest ecosystems, landslide and erosion control an others): 3 ESR (DUB, ZVO, BRA); Temporal changes and predictions of primeval forests dynamics: 3 ESR (TOR, ZVO); Emulating primeval forests processes and patterns in managed forests: 5 ESR (ZVO, RAK, GOT, TOR, DUB). The total estimated number of ESR is between 15 and 20 which corresponds to approximately 600 person months. Over the period of the contract, each ESR will spend at least two months with at least two other tams in compliance with his o her Personal Career Development Plan, elaborated in co-operation with personal supervisors recruited from among the respective partner faculty. During periods of intensive field work, ESR will work together at particular locations in association with the local task leader and scientists, post graduate students, and undergraduate assistants. During winter months, ESR will visit other laboratories and work closely with faculty and staff involved in the statistical analyses of material and data gathered in the field season and the modeling. The visits and secondments will be coordinated in order to fit the schedule of structured training courses provided by the network partners, summer schools, workshops and network wide training activities, including E-learning, data visualisation, as well as joint database development on web-platforms. A particularly strong emphasis will be put on a simple access to structured and, wherever possible, visualized data across the entire network. All relevant information and data will be available to the network partners, ESRs and ERs on the internet site currently under development (www.virginforests.sk). The teams will provide the ESRs with training in techniques presented in Training needs section (6.1).

6.2.2 Experienced researchers (ERs)

The ER will be given the opportunity to visit two other laboratories in the network for one month per year of their contract. This mobility is essential to the transfer of knowledge, research collaboration as well as to the training of ESR. Two meetings will be organized by the network (years 2 and 3) in which all ESR and ER in the network will give presentations and discuss progress and conclusions. All ESR and ER will be strongly encouraged to participate in staff development programs in the institutions where they are employed, annual career development appraisals will be carried out, and training progress will be subject to annual reports.

6.3 Procedure to hire early stage and experienced researchers

The vacancies will be advertised by informative folders sent to forest ecology, silviculture and forest management departments at the universities and scientific institutes across Europe, through the IUFRO Newsletter and its division and task force meetings, national Pro Silva organizations and ERA ENV (a new European initiative financed by the European Commission through the 6 th Framework Programme aimed at the integration of Associated Candidate Countries and new EU member states into European Research Area by environmental approaches). The selection will take place on a competitive base, but in case of equal scores female candidates will be preferred to achieve a minimum 40 % representation of female ESRs and ERs.

7. Literature

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SPATIAL VARIABILITY OF SOIL DEPTH AND TRANSPORT PROPERTIES AS THE PRINCIPAL INDICATORS OF ENVIRONMENTAL SOIL FUNCTIONS

developed as a module in reference to

- EU FP6, Global Changes and Ecosystems, 4th Call
- EU FP 7, Theme 6: Environment (including Climate Change)

Description

A soil acts as a physical, chemical and biological reactor {Richter 1987), which determines the functionality of ecosystems. Some of the most important forest soil functions include the biomass production, regulation of ecosystem processes and environmental interaction, i. e. mainly accumulation, filtration and transformation. Individual functions are most often approximated through certain attributes and their indicators, which are parameters relatively easily available from soil survey or mapping, such as textural composition, structure, pH and others. More complex indicators, termed as pedotransfer functions represent combinations of several variables and are based on various types of correlation analysis with the aim to extract transformation relationships. As important forest soils quality indicators, organic matter content, porosity and infiltration intensity have recently been proposed by international working groups. The most frequently used indicators however provide only a rough and little reliable approximation of soil functions, as they are based on intensity variables, instead of the capacity ones.

The estimation of forest soil functions based on the intensity-capacity approach requires a sufficient knowledge on the spatial variability of the forest soils depth, which is one of he least studied processes due to inherent technical difficulties. This problem is often solved by converting the intensity into capacity variables for deliberately selected top soil layers, by the assumption of an average depth without any knowledge on the type of its distribution, or by employing simple models rendering soil depth as a function of the elevation, slope curvature etc. Currently, methods for the prediction of soil depth based on soil-landscape regression models are constructed, and methods for non-destructive, geophysical measurement of soil depth, such as the ground penetration or electric resistivity tomography are being further developed.

The importance and connection between the soil depth and soil transport properties is well illustrated by the fact that variability in correlation relationships between the soil properties and topographic features at various depths may exist, conditioned by the declining hydraulic conductivity in the downward direction. Another reason, why even the intensity-capacity approach may not deliver expected reliability and accuracy in the estimation of forest soil functions, is the enormous spatial variability of the soil hydraulic conductivity and the susceptibility of forest soils to the preferential flow. Due to non-linear dependence of the water flow velocity on the porous volume properties and the occurrence of structural heterogeneity of forest soils, the pedotransfer functions do not allow for viable predictions of the soil hydraulic conductivity from static properties. As an alternative to a time consuming, labour intensive and little representative direct measurement on undisturbed samples, soil hydraulic conductivity is often predictions based on retention curves. The methods are being constantly improved, for instance by a model allowing for a bimodal distribution of the soil pores. For these reasons, no systematic data on the transport properties of forest soils are available either abroad, or in Slovakia.

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Project novelty

The presented project proposal has the capacity to characterize both qualitatively and quantitatively the mutually coupled processes of the spatial variability of soil depth, hydraulic conductivity and susceptibility to preferential flow in the most important forest soil types of the Western Carpathians. The project will also extract a set of regression relationships between the soil depth and landscape patterns, including both the abiotic environment and forest stands, as well as qualitatively new findings on the susceptibility of forests soils to the preferential flow as related to forest management.

Project objectives

- To characterize and quantitatively determine processes of the spatial variability of soil depth and transport properties in their capacity as important indicators the production, regulation and environmental functions of the main forest soil types of the West Carpathians
- To identify and extract presumed correlation between soil depth and the abiotic environment and the patterns of natural and managed forest ecosystems
- To clarify dependence between the susceptibility of forests soils to preferential flow and forest management

Particular stages objectives

Stage I: Spatial variability of the soil depth in the main forest soil types of the West Carpathians areas

Objectives

A. To characterize, based on direct measurements, the spatial variability along selected transects
B. To extract assumed correlations between the soil depth and both abiotic and biotic environments

Stage II: Modification of new fast method for the prediction of soil transport properties

Objectives:

C. To adapt new laboratory method of the soil hydraulic conductivity measurement for field measurement
D. To test the reliability, accuracy and robustness of the modified method

Stage III. Determining spatial variability of the transport properties of selected forest soils

Objectives:

E. To determine the spatial variability of the hydraulic conductivity of forest soils along selected transects
F. To establish the susceptibility of typical forest soil types to the preferntial flow phenomenon.

Scientific originality

The originality of project objectives consists in the key combination of the three variables, whose spatial variability will be studied. The question of possible correlation between the soil depth and easily observable taxation variables on has not been posed yet either. It is our hypothesis that such correlations exist on different scales. The innovative aspect of the objectives leans on the expected, considerable increase in the speed of the soil hydraulic conductivity prediction by the new method.

Methodology

Methods of achieving project objectives

Stage I: Spatial variability of the soil depth in the main forest soil types of the West Carpathians

Actions:

1.1 The measurement of the soil depth on transects within model areas

Representative localities have been selected based on criteria derived from the project objectives: homogenous bedrock, most typical forest soil types, i. e. cambisols, rendzic leptosols and podzols, as well as andosols that feature extraordinary production, ecosystem regulation and environmental propertioes, main tree species – beech, spruce, oak, fir. Equally important was in the process of selection the opportunity to place in the selected model areas transects 3–5 km long so as for the to capture the terrain geomorphology, vertical soil zonality, forest vegetation stages as well as forest stand and forest management types (non-intervention, shelterwood system, clear-cut system).

Table 1: Selected localities

Masív/Massi	Horstvo/Mountain range	Nadm. výška (m.n.m.)/ Elevation (a.s.l)	Geol. Podložie/ Bedrock	Hlavné pôdne typy/ Main soil types	Prevládajúce dreviny/ Main tree species
Vtáčnik	Vtáčnik	1346	Andezity/Andesites	Andozeme typické, kambizeme typické/ Andosols, Cambisols	Buk, jedľa/Beech, Fir
Babia hora	Oravské Beskydy	1725	Pieskovce, ílovce/ Sandstones, claystones	Podzoly typické, kambizeme dystrické	Smrek/Spruce
Veľký Tribeč	Tribeč	839	Granodiorites, diorites	Kambizeme dystrické/ Dystric Cambisols	Buk, dub, hrab/ Beech, Oak, Hornbeam
Tlstý javor	Veporské vrchy	1068	Pararuly, ruly, svory/ Gneiss, Paragneiss	Kambizeme dystrické/ Dystric Cambisols	Smrek, buk, jedľa/ Spruce, Beech, Fir
Tlstá	Veľká Fatra	1373	Vápence, dolomity/ Limestones, Dolomites	Rendziny vylúhované, rendziny organozemné, kambizeme rendzinové/ Rendzic Leptosols	Smrek, jedľa, buk/ Spruce, Beech, Fir

Soil depth will be measured by means of two methods:

- the electric resistivity tomography, which has been successfully applied in the Vtáčnik Massif already, along with the ground penetration radar and digging;
- measurement of soil depth at forest road cuts.

In the massifs given in Table 1, the soil depth will be measured by 2-Delectric resistivity tomography along transects running in the North-South direction parallel to the slope gradient. The electrodes arrays will be arranged so as to ensure the maximum resolution on the scale of tens of cm. One measurement will capture approximately a section 250 m long. In the case of dificulties in discriminating between soil cover and bedrock, 1-D electric sounding will be employed.

1.2 Characterization of soil depth spatial variability

The sets of measured data will be analyzed as realizations of random processes. Their statistical distribution will be determined, whereas deviations from the normal distribution will be screened by the Smirnov-Kolmogorov Test. The structure of spatial autocorrelation will be studied by geostatistical methods, and specifically semivariograms. It can be assumed that the data sets will be effected by a trend due to the growing thisckness of the slope deposits as a function of elevation and aspect. This possibility will be coped with by the application of universal kriging with an external drift, which, according to the autors, provided a 38 % higher accuracy in estimating a soil horizon thickness than the simple linera regression of the horizon depth and soil sloping.

1.3 Correlation with the abiotic environment

The topographic atributes will be calculated from a digital model of terrain. For the identification of factors, directly on indirectly effecting the measured soil depth, factor analysis will be used for the set of climatic-topographic characteristics. The extraction of factor will be performed by the principal component analysis. For any given data set, the number of used factors shall ensure that their cumulative share on the total variance exceeds 70 %. Subsequently, crossvalidation of the predicted values will be carried out.

1.4 Correlation with the biotic environment

A similar approach will be taken in observable variables, themselves conditioned by the soil depth – and by that virtue also through the total content of nutrients and water holding capacity. They are the tree species composition, the height of the medium stem in the forest stand at the age of 100 years. The transects however must avoid areas subject to random cutting which changes the distribution of tree heights and diameters in a non-systematic way. Under standard conditions and management systems, the height of medium tree at the age of 100 years in a forest stand represents a good denominator for a comparison. It will be determined by means of the height curves reproduced in the growth tables based on the upper height of the joint stand. It is known form literature that it is not sensitive to thinnings and well reflects the quality of individual sites. By means of the Sybilla tree growth model (Fabrika 2006), opportunities of further downscaling of the indicated approach will be studied.

Stage II: Modification of new fast method for the prediction of soil transport properties

Actions:

2.1 Derivation of mathematical relationships

The adaptation of new fast method for the prediction of the hydraulic conductivity of soils for field measurements will be carried out based on the stochastic-convective assumption for the transport of water and solutes. For this purpose, formulas for the calculation of _ (_) a K(_) from the indicator resident concentration will be derived leaning on the framework laid by Jury and Scotter (1994). It will enable alternative approaches based on experiments defined by initial or boundary conditions, which shall render breakthrough curves of the indicator (bromide) established by the Time Domain Reflectometry device connected to probes inserted horizontally into the soil profile in the depth z, or form the resident concentrations of the indicator at a given time t, or alternatively, from the resident concentration profiles of the Brilliant Blue dye tracer by means of image analysis.

2.2 Construction of the experimental apparatus

The breakthrough curves and concentration changes in the soil profile will be acquired through field measurements by means of an apparatus specially built for this purpose. As opposed to sprinklers employed by other authors, it will feature nature-like a technique of liquid indicator application in the form of drops similar to throughfall. The device will consist of an dispenser part, assembled from an array of 400 x 400 syringe needles embedded in a teflon plate attached to a vibrator. The needed sprinkling intensity will be achieved through a dosing pump operating in the range of 0,5–150,0 l.h–1.

The teflon plate in a wooden frame will be attached to a telescopic support, enabling its operation on slopes. The measurement of the indicator concentrations will be carried out by TTDR and though the image analysis of photographs taken on exposed profiles with colored stains.

2.3 Robustness analysis of the new method

We will perform tests, how soil hydraulic conductivity predictions obtained from concentration profiles of the bromide indicator at a given time t will compare with those extracted from breakthrough curves, or, alternatively, from resident concentrations of the Brilliant Blue dye tracer, established by means of image analysis. In such way, an optimum operational mode will be selected. Besides, soil hydraulic conductivities are usually measured at different depths. According to our hypothesis, the selected soils do not manifest a considerable differences in the hydraulic conductivity in the range of 0–70 cm, as reported by Pichler (1997). The results will also be compared to hydraulic conductivities established by the direct measurement according to standard methods and predicted form retention curves.

Stage III: Determining spatial variability of the transport properties of selected forest

3.1 Field measurements will be carried out by the method developed in Stage II on slected transects.

They will be conducted on different scales, i. e. at distance ranging from meters over tens of meters, several hundred meters up to cca. 3 km. Overall, soil hydraulic conductivity will be measured at approximately 60 sites along each individual transect. In that process, three sprinklers will be in use simultaneously. In order to secure gravity flow prior the experiment, the measurements will be carried out mostly following snowmelt.

3.2 Determination of the soil hydraulic conductivity spatial variability

The coefficient of variation of the hydraulic conductivity reaches 40–320 %. The acquired data sets will therefore most likely feature a high dispersion thus indicating non-symmetrical distribution. They will be analyzed for the best theoretical distribution – transformed normal distribution, lognormal distribution, gamma or beta distribution. Transformed data will undergo geostatistical analysis and cross-validation in order to identify the spatial autocorrelation structure.

3.3 Susceptibility of forest soils topreferntial flow

In each area, experimental micro-plots, 1 m x 1 m in size, will be selected. Each plot will be weekly treated with the Brilliant Blue dye tracer, repeatedly dispersed on the forest floor by a sift. Another series of micro-plots will be treated by dye tracer solute applied by a sprinkler developed during Stage II. Then, vertical soil profiles will be exposed, rendering dye patterns to be further analyzed. The profiles will be photographed, the total area of coloured stains will be determined for each 10 cm layer and contours of the stained patterns shall be extracted. The contours can be considered to some approximation fractals and their fractal dimension was estimated by the box-counting method. The fractal dimension, total stained area and colored area in soil layers at different depths will serve as quantitative indicators of susceptibility of preferential flow under different forest management. It is assumed that the single most important interface that determines the formation of preferential flow in forest soils is the surface humus. To understand the nature of underlying transport process, concentration profiles will be obtained form photographs by means of image analysis and then used for modeling using the CDE approach, stochastic-convective and DLA approach.

NATURE - BASED MANAGEMENT OF BIODIVERSITY, WATER AND CARBON IN FORESTS ECOSYSTEMS OF THE CARPATHIANS

developed as a module in reference to

- EU FP6, Global Changes and Ecosystems, 4th Call
- EU FP 7, Theme 6: Environment (including Climate Change)

Description

The main project priority is the scientific research, testing and model implemetation of selected primeval forests dynamics components into forestry toolbox with the aim to eliminate the risk of biodiversity loss, to avert the degradation and loss and elimination of biotopes in the carpathian forest ecosystems. The project goal is to resolve the dual optimisation problem of the integrated forest ecosystems management in compliance with two leading principles: stopping the biodiversity loss in accordance with the directive 92/43/CCE on biotopes and the convention on biodiversity conservation CBD 1992, as well as assuring the highest possible provision of ecological and environmental functions (The Framework UN Accord on Climate Change 1992, Kyoto Protocol 1997) on one hand; and economically viable production of quality wood, according to Forests Based Sector Technological Platform (2005) on the other hand. Given the framework conditions, the problem can only be resolved by the implementation of far more natural processes into every-day forestry than is the reality today. Within the project platform, elements of primeval forests structure, texture and developmental dynamics in the Carpathians, and their interactions with the abiotic environment and biodiversity will be analyzed in both qualitative and quantitative terms with an outlook on their potential transfer into forestry toolbox, while considering the generally volatile economic environment. Ecological demands of floral and animal species bound to primeval forests-type habitats will be throughly investigated. In-depth research will be conducted on the opportunities for reconstruction and sustainable existence of habitats under forest management. Subsequently, selected elements of primeval forests patterns and dynamics will be screened and tested by trees growth and economic models, in the assemblage of past research plots subject to low-intensity intervention. Subsequently, successful models will be implemented into proposals of protected areas maintenance programs and forest management plans for proposed ecological biocorridors connecting primeval forests into ecologically functional clusters, as well as for adjacent forest areas, in which a substantial increase of reliance on the natural dynamics is possible.

Thus the project will achieve: (1) Definition of selected endangered primeval forests species ecological demands, development of methods for ex-situ conservation of endangered tree species by micropropagation; (2) Validated models of retention, accumulation and filtration of water in forest ecosystems, based on the exploitation of natural forest structure, texture, trees necromass dynamics and surface humus patterns; (3) Validated models of increased organic carbon accumulation, based on the utilisation of surface humus and trees necromass spatial distribution patterns and solute transport in soils; (4) Validated models and routines of harmonization of forestry interventions with the natural dynamics in forest ecosystems, their maximum utilization for boosting the ecological and environmental functions of forests in a desired composition; (5) Increased stability of forest ecosystems and adjacent landscapes, incl. slope stability and erosion, landslides, windthrow, windbreak and forest fires suppresion. The project's added value also consists in the future direct transfer of knowledge into the management of forests in the neigbouring Transcarpathioan Region (Ukraine) as agreed with the Ukrainian authorities (Ministry of Environment of Ukraine, Carpathian Biosphere Reserve).

Multiple demands on forests are defined by both national law and international treaties and documents, mainly Act No. 543/2002 Coll. of the Slovak National Council on Nature and Landscape Protection, Act of the Slovak National Council No. č. 326/2005 Coll. on the forest management and state administration of forest management, Council Directive 92/43/EEC of 21 may 1992 on the conservation of natural habitats and of wild fauna and flora, Resolution No. 2 of the Third Ministerial Conference on the Protection of Forests in Europe held in Lisbon in 1998, and most recently by The Forests Based Sector Technological Platform and its Research Agenda (Beckmann et al. 2005). Such composition of demands is currently not secured: under global change, one of the main sustainable forestry premises on a steady-state abiotic site conditions is no longer valid (Wagonner 1994, Kauppi 1995). The wood market has become extremely volatile and the profit margins from wood and its products frequently are not sufficient to cover the costs of silvicultural and regeneration measures (Commarmot et al. 2000). The only feasible way out of this situation appears to be an increased reliance and controlled utilisation of nature forests dynamics for the purpose of securing the forests ecosystems stability, value production and both ecological and environmental functions. The related scientific research is possible owing to the combination of the existence of the most representative sample of nature forests in the Carpathians over a relatively small territory of the Slovak Republic, high biodiversity including xylobiotic species, cavity-nesting birds and large carnivores, as well as the preceding, 50-year-long research of the primeval forests structure and textural patterns (Korpel 1995, Bublinec, Pichler 2001). All the three factors taken together, they allow for overcoming the research fragmentation and reaching a critical capacity, when complemented by research on primeval forests ecological and environmenmental functions, including water and carbon retention, accumulation and transformation.

The threat of biodiversity loss ensues mainly from the fragmentation of primeval forests remnants and the management of forests of all categories (commercial, protective, special purposes). From the research conducted thus far it is known that the biodiversity loss can be countered by the creation of ecological corridors connecting the primeval forests reserves. In order to secure the existence and abundance of the corresponding habitats a possible migration, it is necessary to define far more precisely the ecological demands of species bound to primeval forests, as well as the natural dynamics that creates them, so as to enable their incorporation into forest management toolbox, in compliance, for instance, with the intermediate disturbance hypothesis (Connel 1978). To achieve the stated goal, it is equally necessary to identify and investigate natural patterns, processes and dynamics components in primeval forests, which can be incorporated into forest management theory and practice for the purpose of ensuring the stability of forests and their adjacent landscapes, provision of water, torrent control and carbon sequestration. E. g., Keim and Skaugset (2003) showed that complex forest structure almost intirely dissipates the kinetic energy of rain, decelerates infiltration and thus sustains the slope stability. These function may open new sources of income for forestry as an answer to wood market volatility, and thus generate resources for sustainable development of forested and mountain regions of Europe, which are usually less favoured in terms of economic strenght. The project will make a significant contribute to the advance of theory and practical aspects of the conservation of the primeval forests as the most pristine ecosystems of the Temperate Zone of Europe, whereas know-how will be amde available for forests owners and users in terms of models for transfering and inclusion of natural dynamics into practical forests management. Summary of thus far achievements in this field was made by Brang (2005), but further models are being proposed, making this issue a current research hot-spot (Saniga 2005).

Table 2: Log-frame matrix

	Description of objective	**Indicators (max three per objective)**	**Baseline (Indicator value at project start date)**
Overall Objective (long-term effects)	Maintaining of biodiversity and habitats in primeval forests, their extension into all forests categories, strenghtening the water management and enviro-nmental functions of Carpathian forests through research	Increase of biodiversity indexes in connecting corridors by 20%	Current biodiversity indexes
		Area with managm. plans ba-sed on nat. dynamics: 60000ha	Current area
		200% increase of peer-rev. publications for kowledge transf.	Nos. of ISI publications per year
Purpose (direct and immediate effects)	Spatial connection of prim. forests, proposals of managm. plans based on new sci. findings on the ecol. Demands of species, biogeochem. cycles, mainly those of of water and organic carbon	Identified of areas with possible biotopes conserv.: 120 000 ha	Current area of biotopes
		Proposed measures for redu-ction of end. species by 40%	Nos. of prim. forests endangered species
		Valid proposals for H_2O cycle deceler. and C accum. by 20%	Accum. amount of H_2O and C under curr. management
Results (goods and services produced)	Proposal of area-deignation, management plans and related proposals for ecological corridors and forests of all categories, representing the main forests types in the Slovak Republic	5 map works and corresp. ma-nagm. plans of ecocorridors	Management plans for biocorridors not available
		60% of natural processes in the proposed management	Current species compos., structure, texture of stands
		Joint Committee for the managemenet of ecocorridors	Consultation Platform of Carpath. Nat. Parks Assoc.
	Database of endangered species of primeval forests and species conservation ex-situ, models of increased CO2 accum. In forests and deceleration of matter cycling and ersosion	List of ecol. demands of 200 endang. and indicator species	List of ecol. demands not available
		5 endang. floral species with avail. micropropagation routine	1 species with routine micropropagation (U. glabra)
		Models of incr. water and C accum. in for. By 24 and 30%	Avg. run-off coeff., currently accum. amount of C
	Models of implementation of natural processes into forest management based on screening of research plots with a low intensity intervention, buffer zones and trees growth models	Assembling 15 res. plots + buff. zones suitable for screening	Plots scattered, some aban-doned, must be recoverd
		10 new models of nat. process. implement. into forest. mangm.	No verified models available
		4 manuals on forest managm. based on natural dynamics	Manuals not available

LIST OF PROJECT WORK PACKAGES AND ACTIONS

Work package 1:

Research of ecological demands of species as primeval forests patterns and dynamics indicators

Description:

The conservation of Carpathian primeval forests is not optimized specifically according the ecological demands of species. Under strong fragmentation, the question of a minimum contiguous protected area that can sustain the species is of a paramount importance. From the viewpoint of developmental independence of the trees layer, an area above 50 ha appears to suffice (Korpeľ 1989, 1995), in particular in countries like the Slovak Republic, because the populations of ungulates and their behaviour is checked by indigenous populations of big predators, such as brown bear, wolf or lynx. But from the perspective of trophic networks, some authors propose areas of millions of hectars (Schnitzler-Lenoble 2002). That however is not possible any more in the Temperate Zone of Europe, both because of land fragmentation and economic reasons. It is therefore indispensable to investigate the ecological demands of indicator species bound to primeval forests, mainly the xylobiotic ones, bird species nesting in trees cavities and others, in order to ensure their protection by creating connecting corridors encompassing the primeval forests remnants, and also through the creating or restoring the respective habitats in all forests categories.

Action 1.1:
Creation of metadatabase of the biodiversity contained in the Carpathian primeval forests

Description of work: The metadatabase will be constructed based on biodiversity inventories conducted before in connection with the nomination of primeval forests for inscription onto the List of World Natural Heritage UNESCO and provision of on-line access to all investigators involved in the project. Advanced environment, Oracle database management system will be employed for this purpose.

Indicator: Biodiversity metadatabase

Milestones:	• Database procurement finished	31. May 2007
	• Database completion	30. September 2007

Action 1.2:
Selection of key species as primeval forests dynamics indicators

Description of work: Through the data mining, comparative analysis and advanced multidimensional statistical methods applied to data available in the metadatabase set-up in Action 1.1, the key and most endangered species will be identified, for whose protection the actions of work packages 4 and 5 will aim through protection, restoration and creation of biotopes. The selected species will at the same time will serve as indicators of their status.

Indicator: Target list of 200 key and most endangered species

Milestones:	• Target list posted on the project internet page	30. November 2007

Action 1.3:
Establishing the effect of genetic variability and site conditions on biometric parameters and vitality of ecosystem edificators

Description of work: The differences in growth performance and vitality of trees as ecosystem edificators, as well as in their responses to management are determined by their genetic variability and site conditions. These differences and variability in main primeval forests consituents, i. e. beech, oak, fir, spruce and noble hardwoods will be investigated based on DNA and isoenzymes analyses with the aim to adjust and rectify the management of connecting corridors and forests of all categories, as planned in WP 4, WP 5, in which components of natural dynamics will be incorporated, e. g. support of resistant populations in Action 1.4.

Indicator: Differences in growth performance, transpiration and elemental content in edificator species;

Milestones: 1st peer-reviewed paper published 31. May 2008
2nd peer reviewed paper published 28. February 2009

Action 1.4:
Research on the indicator species ecological demands

Description of work: Findings from scientific literature will be summarized and complemented by own research of ecological demands and etology of selected indicator species, identified in Action 1.2, and under consideration of results from Action 1.3, supposedly mainly xylobiotic organisms and bird species nesting in cavities. Research will lean on a broad array of suitable methods, including telemetric tracking. Acquired findings will be directly utilized in WP 5 a WP 5, whose actions aim at the development of management models, which would ensure the saturation of identified demands within the corridors and forests of all categories.

Indicator: Compendium of ecological demands of 200 indicator species

Milestone:
- Publication of the compendium within a book: Slovak Primeval Forests – Diversity and Protection (2nd edition) 31. January 2010

Action 1.5:
In vitro micropropagation of selected floral species

Description of work: Opportunities for in-vitro micropropagation of endangered selected floral species will be investigated in order to ensure the conservation of endangered trees and herbs, based on successful micropropagation of whych elm (Biroščíková et al. 2004), whose population was devastated by the Dutch Elm Disease. The related expertise will be applied to further tree species, threatened by trachemycoses or plants reduced by illegal plucking (Drosera rotundifolia).

Indicator: micropropagation of four new endangered species

Milestone:
- 1st peer-reviewed paper published 30. April 2008
- 2nd peer reviewed paper published 28. February 2009
- plantlets available for field tests 31. January 2010

Work package 2:

Dynamics of primeval forests and its effect on the availability, and safety of water resources, carbon accumulation and ecological stability of landscapes

Description:

Scientific data records from are available from a number of primeval forests preserves in the Slovak part of the Carpathians, several of them spanning 50 years of a systematic research of primeval forests structure and texture (Korpeľ 1989, Bublinec, Pichler 2001, Vološčuk 2004). Contrary to that, only fragmented data are available on the effect of primeval forests dynamics on biodiversity, biogeochemical cycling, slope and landscape stability, although the results indicate very promising lines of research (Keim, Skaugset 2003, Kropil et al. 1995, Kropil 1996, Saniga, Schuetz 2001). This thematic and methodological fragmentation must be overcome in order to develop functioning models for the integration of natural processes into forest management toolbox, as planned in WP 4 and WP 5). The critical research capacity will be reached through actions 2.1–2.3.

Action 2.1:
Evaluation and synthesis of findings from own prior long–term primeval forests research

Description of work: The results of 50-years long research in the Slovak Carpathians primeval forests preserves have only been processed per partes, within individual thematic fields. This obstructs attempts to draw general far-reaching conclusions for forestry and, biodiversity conservation theory and practice, as well as in water and carbon accumulation management, although the critical mass of partial knowledge has already been most likely collected. The research will therefore concentrate within a Oracle DBMS platform, whereby large numbers of observations from various locations will constitute long-enough chronosequences for drawing conclusions on natural dynamics, disturbance regimes, spatio-temporal variability and interpretation of any new findings in this context from action 2.2.

Indicator: Time series of primeval forests dynamics for main forest types

Milestones:

- Metadatabase of results from 50-years long research — 31. December 2007
- Publication of three peer-reviewed sci. papers — 31. December 2009
- Publication of mean results in the book Slovak Primeval Forests – Diversity and Protection (2nd edition) — 31. January 2010

Action 2.2:
Field research on the effect of primeval forests structure, texture and developmental dynamics on water and solute transport in forest slopes and their stability

Description of work: The forests water regime features specific traits, e. g. nearly total dissipation of raindrops kinetic energy on the forest storeys and surface humus, retention of water in the trees necromass, moderation of forest microclimate, irregular infiltration and preferential flow in forest soils, efficient use of resources by forests indigenous to a given sites. Methods suitable for intensity–capacity approach, e. g. electric resistivity tomography, Time Domain Reflectometry, dye (Duasyne) tracing and others will be used to provide a quantitatively and qualitative description of processes that can be used for natural enhancement of water management, erosion and slope stability control in forest management. Results will be used in action 3.2.

Research will be conducted in the primeval forests of the following four clusters (see map, Annex VIII.):

1. NPR Vtáčnik, Badín, Mláčik, Svrčiník;
2. NPR Poľana, Hrončecký Grúň, Dobroč, Klenovský Vepor;
3. NPR Pod Latiborskou Hoľou, Ďumbier, Skalka;
4. NPR Havešová, Rožok, Stužica, Udava, Pľaša, Vihorlat.

Indicator: Estimates of the retention, accumulation, filtration and transformation capacity of main primeval forests ecosystems

Milestones:

- development of new rapid method for the measurement of soil hydraulic properties: — 31. December 2007
- dominant transport processes in forests soils determined — 31. December 2008
- four peer-reviewed sci. papers: — 31. August 2009

Action 2.3:
Field research of organic carbon spatial variability, accumulation and decomposition in forest ecosystems

Description of work: Spatial variability of carbon from the atmospheric CO_2 in primeval forests ecosystems, and mainly in their soil component, will be analyzed, because the main resident time of carbon in deep soil layers may well exceed several hundred years (Persson et al. 2000), and, unlike climax above earth biomass can hardly be increased, soils represent a reservoir still unsaturated. We ascertained that the organic carbon concentrations in soils copy the spatial distribution of trees necromass down to minimum 50 cm. A combination of these findings with the measurement of the soil and slope deposits thickness will facilitate development of models for nature based management of forests of all categories. Advanced sampling designs based on known processes and variograms will be employed, along with state-of-the-art devices (Vario Macro elemental analyzer, BIO-plates). Results will be used in action 3.2. The research will be conducted in same localities as above.

Indicator: Quantitative expression of the relationships between carbon content in soils and primeval forests patterns

Milestones:

- maps of carbon stock in primeval forests soils: — 31. December 2008
- three peer-reviewed sci. papers: — 30. June 2009

Work package 3:

Modeling and testing of a controlled application of additional new natural dynamics components

Description of work:

Controlled application of primeval forests dynamics in managed forests must be preceded by modeling with the help of advanced forest and trees growth models, such as Sibyla, and screening of forest functions in permanent research plots subject subject to past low-intensity management (for various reasons), but in particular in the buffer zones of nature preserves, where there has been a constant interaction between natural processes and human intervention. Thus the overall picture will be compiled from the results of modeling and forest functions screening performed at different times and in forests at various localities in various developmental stages.

Action 3.1:
Identification and screening of past research plots

Description of work: Past permanent research plots, either abandoned or still being subject subject to a low intensity management will be identified, tracked and their forest stands screened for the provision of various forest functions, biodiversity and environmental effects. Equally valuable will be similar observations in forests located in the buffer zones of primeval forest preserves, where a mix of natural dynamics and forestry intervention for various management purposes has led to development of patterns that may come close to patterns providing the desired forest functions. Results will be compared with the action 3.2 outputs.

Indicators:	• set of recovers past research plots	
	• inventory of forest functions	
Milestones:	• list and a map of suitable plots	30. June 2007
	• report on the plots inventories	31.December 2008

Action 3.2:
Modeling of the controlled incorporation of natural dynamics components into the forest management

Description of work: Advanced models, such as the Sibyla tree growth model (Fabrika, Ďurský 2005), Hydrus (Simunek et al. 2004) – a tool form modeling water and solutes transport in soils, as well as BIOME BGC (Thornton et al. 2002) model for studying biogeochemical cycles of carbon and nitrogen, leaning on data acquired in actions 2.1–2.3 as the model input. Results will be compared with the action 3.1 outputs.

Indicators:	• functional assessment of natural processes	
Milestones:	• modeling reports	30. June 2009
	• two-peer reviewed papers published	31.December 2009

Action 3.3:
Cost/benefit analysis of the controlled incorporation of natural dynamics components into the forest management

Description of work: Based on the results of actions 2.1–2.3 a 3.1. a 3.2, potential savings from the reliance on natural processes instead of the material, energy or work input will be modeled and calculated. Those concern mainly costs incurred during silvicultural operations, afforestations, which can be offset through the introduction value increment management, lowering the risk of forest stand destruction, as well as potential income from the increased volume and quality of provided forest ecological and environmental functions, mainly quality water production and carbon accumulation. The importance of this action also consists in the potential additional incomes being generated in less favoured regions. Advanced modeling techniques applied for calculating insurance premiums for forest properties will be used in this action.

Indicators:	• costs/benefits ratio	
Milestones:	• cost/benefits assessment of proposed measures	31. October 2009

Work Package 4:

Proposing area-designation and management plans based on primeval forests dynamics

Description of work:

Findings from WP 3 will be directly projected into the proposals of corridors connecting the Carpathian primeval forests threatened by the loss of biodiversity, as well as into proposed management plans adjusted to the fulfillment of ecological-production and environmental functions, as well as biodiversity support and conservation. Similarly, forest units will be identified within all forest categories (commercial, protective, special purposes), in the management of which components of natural dynamics can be incorporated and then implemented in a controlled manner with the ultimate goal of increasing the provision of desired composition of forest functions.

Action 4.1:
Area-designation of ecological corridors and forest units for amended forest management

Work description: The proposed area-designation of connecting corridors and suitable forest units. i. e. those across which a substantial increase in the implementation of natural processes is possible and desired, will be conducted based on the evaluation of the ecological survey formerly carried out by Lesoprojekt, remote sensing and GIS, as well as field inspections if necessary.

The ecological corridors will be set up to connect the primeval forests of the following four clusters (see map, Annex VIII.):

1. NPR Vtáčnik, Badín, Mláčik, Svrčiník;
2. NPR Poľana, Hrončecký Grúň, Dobroč, Klenovský Vepor;
3. NPR Pod Latiborskou Hoľou, Ďumbier, Skalka;
4. NPR Havešová, Rožok, Stužica, Udava, Pľaša, Vihorlat.

Indicators:	• number and area of proposed ecological corridors	
	• number and area of suitable forest units	
Milestones:	• maps of ecological corridors	31. December 2008
	• maps of suitable forest units	31. May 2009

Action 4.2:
Proposals of management principles and routines for nature-based management of biodiversity, water and carbon in forest ecosystems

Description of work: Principles and routines for updating and creation of forest management plans for forests of all categories, and management programs for protected areas, based on the reliance on a substantially increased role played by natural dynamics, according the results expected from WP 1 a WP 2.

Indicators:	• increase of natural dynamics ratio in the proposed forest management	
Milestones:	• proposals of the managm. plans of ecological corridors	31. December 2009
	• proposals of the managm. plans for suitable forest units	30. March 2010

Work package 5:

Project management

Action 5.1:
Management Committees meetings

Description of work: The Management Committee will consist of the project principal investigator (responsible for scientific matters and leadership), main technical manager (responsible for project logistics and technical support), project administrator (responsible for financial and legal matters), and leaders of individual work packages. The Management Committee will meet quarterly or more frequently, if necessary. Due to its primarily scientific character, the committee will be chaired by the principal investigator, Prof. Dr. Ladislav Tužinský, Faculty of Forestry, Technical University Zvolen. During the meetings, all key scientific, financial and technical issues.

Action 5.2:
Plenary meetings

Description of work: The meetings will be held twice a year and all scientists involved in the project are entitled to participation. The meetings will provide opportunities for mutual information transfer among work packages, discussion and rectification of methods if necessary

Action 5.3:
Annual reporting

Description of work: Annual reports on the progress of activities will be prepared by the Management Committee in order to provide all involved parties with information and the necessary reflection, to keep the team spirit and facilitate inner coherence and focus of the scientific team.

Work package 6:

Dissemination of Knowledge

TUZVO has a substantial record in disseminating knowledge among various target groups. Even prior to setting up the project own internet page, preliminary results and information will be transmitted through a page dedicated to the primeval forests research in Slovakia, administered by Joint Centre for the Research of Temperate Primeval Forests (www.virginforests.sk) at the Faculty of Forestry, TUZVO. The transfer of scientific findings across European scientific circles will be achieved through ISI and other peer-reviewed publications.
The target groups of forest users and owners will be informed through the internet site, leaflets, articles in forestry magazines, brochures, movies and a virtual, science shop. TUZVO will use its expertise in educational cinematography and movie-making, e. g. a movie on the successful micropropagation of whych elm trees, and another one on the Primeval Forests of the Carpathians, which was awarded at the international film festival Envirofilm 2000.
Project results will also be dispersed through the national Pro Silva network and practical training, and through workshops for ministerial staff, regional administration staff and regional forestry offices.
Timing of individual actions is given in the Annex VI., Project flow-chart

Action 6.1:
Internet page

Description of work: Setting up an highly informative and interactive internet page for all categories of users

Action 6.2:
Scientific papers

Description of work: Quality scientific papers will be published as outlined in the milestones of WP1–WP4.

Action 6.3:
Leaflets and brochures

Description of work: Leaflets will be prepared for particular target groups (big or small forest owners, forest users, farmers etc.)

Action 6.4:
Short movie

Description of work: A short movie (two editions: 8 and 25 min.) will be shot with the aim aim to disseminate crucial new findings. The movie will be aired during time slots on state-wide and regional TV stations. It will serve the purpose of rising and encouraging further interest.

Action 6.5:
Pro Silva

Description of work: TUZVO leading role in the national Pro Silva Network, and participation on the international level, will be used to spread the project message a findings through a excursions and field training.

Action 6.6:
Workshops

Description of work: Workshops will serve as a tool for communicating the project ideas and findings to ministerial staff, regional environment and forestry offices, land planners, municipal politicians and other relevant players.

ENHANCEMENT OF CARBON AND WATER RELATED REGULATORY FUNCTIONS OF FORESTS THROUGH PATTERNS OF PRIMEVAL FORESTS DYNAMICS

developed as a module in reference to

- EF FP6, Global Changes and Ecosystems, 4th Call
- Call for SSA dedicated to international cooperation with developing countries, Mediterranean countries, Balkan countries, Russia and NIS, as well as multilateral cooperation
- EU FP 7, Theme 6: Environment (including Climate Change)

Medzinárodná spolupráca s rozvojovými krajinami, s krajinami v Stredozemí, s Balkánskymi krajinami, s Ruskom a novými nezávislými štátmi, multilaterálna koordinácia – len špecifická podporná činnosť: Výzva zo 17.12.05, Deadline 06.03.06

The main project goal is to determine the carbon and water retention, retardation and accumulation in nature forests. It is necessary to identify and investigate natural patterns, processes and dynamics components in unmanaged primeval forests, which can be incorporated into forest management theory and practise for the purpose of ensuring the stability of forests and their adjacent landscapes, provision of water, torrent control and carbon sequestration.The new models to decelerate water cycle, the maps of carbon stock in primeval forests soils and the validated proposals of enhancement of carbon accumulation by 20% will be developed. The field research will be conducted on the localities in Carpathian primeval forests of the Ukraine, including cooperation among the top-researchers from these three countries: Ukraine, Slovak Republic and Czech Republic.There will be used the new Methodology of the primeval forest structure development research and the Methodology of material and energy cycles and fluxes research.

The project priority is scientific research concerning water and carbon cycling in temperate forest ecosystems. The main project goal is to determine the carbon and water retention, retardation and accumulation in nature forests. The importance of this research project is sustained by the significance of biological carbon sinks, within the Kyoto Protocol (1997), and the global climate changes which influence the quality and quantity of the hydrological fluxes within forest ecosystems, including the impacts on carbon sequestration and down stream water users. Within the project platform, elements of managed and unmanaged forests structure, texture and development dynamics in the temperate Carpathian forests (Ukrainian Carpathians) and their interactions with the abiotic environment will be analysed in both qualitative and quantitative terms. Subsequently, selected elements of virgin forests patterns and dynamics will be screened and tested by Sibyla, Hydrus, Biome BGC models. Successful models will be proposed for implementation into forest management plans of Ukrainian Forestry.

The novel project contribution will consist in:

1) Validated models of retention, accumulation and filtration of water in forest ecosystems, based on the exploitation of natural forest structure, texture, trees necromass dynamics and surface humus patterns.
2) Verified datasets of increased organic carbon accumulation in forest biomass and soils, based on the utilisation of surface humus and trees necromass spatial distribution patterns and solute transport in soils.
3) Identified forest types offering the best opportunities for enhancement of water and carbon retention and accumulation, with respect to habitat conditions and type of forest management.
4) Proposed management practices to achieve increased and carbon water retention and accumulation in forests managed based by nature-based approaches.

Regions of the Ukrainian Carpathians (Transcarpathian region), Eastern Slovakia (Slovak Republic) and Moravia (Czech Republic), as well as the neighbouring European countries periodically suffer great human, material and moral losses from the catastrophic floods and other ecological disasters, so it is also trans-boundary problem. The opinion, that one of the main reasons of this flood disaster is the disturbance of ecological balance in the mountains, was completely supported at many scientific forums, in particular at the international scientific-practical conference, Rakhiv 1999, "Ecological and socialeconomic aspects of the catastrophic hazards in the Carpathian region (floods, mud flows and landslides)". 75 % of the Transcarpathian region is a mountainous area. 9429 rivers with the total length of 19866 km flow within its territory. The average density of their network is 1.7 km per 1 sq. km, and is the largest one in Ukraine. Without taking into account the specify of mountainous conditions, there was the unreasoned intensive management in the mountains and in the result of that, the woodlands of the Ukrainian Carpathians have decreased from 95 to 53 percent, the upper timber line has decreased in 200-300 meters. The age structure of tree stands is disturbed. More than 70 percent of their part constitutes young stands and middle aged stands, the water regulated role of which is much lower than in ripening and overmature forests.
Taking into account all this, Transcarpathia refers to the regions with a special ecological vulnerability and also declaration of the Transcarpathian region as a zone of emergency ecological situation is especially actual (F. D. Hamor, 1999, 2001). The eloquent confirmation of the fact, that from the regime of forest use depends to the great extent the degree of losses incurred by floods can serve the virgin forests of Uholsko- Shyrokoluzhanskyi massif of the Carpathian biosphere reserve. In zone of their location neither in previous years nor today, the flood has incurred such great losses.
Also, population in these mostly rural and underdeveloped has not yet had any opportunity to capitalize on their maintenance and provision of regulatory functions of forests to the society, e. g. slide protection, water management, carbon sequestration. It is therefore necessary to effect a correction by providing a solid reasoning to enable such participation on forest functions benefits, achieved through sound, services-oriented eco-

system management. The data are however very incomplete and by no means quantitative. E. g., Keim and Skaugset (2003) showed that complex forest structure almost entirely dissipates the kinetic energy of rain, decelerates infiltration and thus
sustains the slope stability. Knohl et al. (2003) were found unexpectedly high carbon uptake rates for an unmanaged 'advanced' beech forest (490–494 gCm_2 per year), which is in contrast to the widely spread hypothesis that 'advanced' forests are insignificant as carbon sinks. Unmanaged forests at a comparatively late stage of successional development can still act as significant carbon sinks with large implications for forest management practice and negotiations (CARBOEUROFLUX).
Because of the potential of forest regulatory functions in provision of services and the mitigation of adverse effects of climate changes, the project priority is the scientific research on water and carbon cycling in temperate forest ecosystems.
This is also consonant with the Forest code of Ukraine and with the facts that "if there is not reorganization of the national economic complex of the mountainous part of Transcarpathia in regard to the development of ecologically harmless types of activity (e.g. clear fellings of forest in the mountains, ...), this land will always be endangered not only with floods, but also other natural calamities. So, it is necessary to work out and introduce the State programme of anti-flood measures, especially in the upper flow of the Tysa river, taking into account the experience of foreign countries." (F.D. Hamor, director of the Carpathian Biosphere Reserve).

The research programme is based on scientific knowledge and long-term research of temperate forest ecosystems (e.g. Korpeľ 1989, Bublinec & Pichler 2001, Vološčuk 2004, Keim & Skaugset 2003, Saniga & Schuetz 2001, Saniga 2005) and cooperation among the top-researchers from these three countries: Ukrainian Research Team (URT), Slovakian Research Team (SRT), and Czech Research Team (CRT). The new models to decelerate water cycle, the maps of carbon stock in primeval forests soils and the validated proposals of enhancement of carbon accumulation by 20% will be developed. The enhanced rainfall and humidity prove to be the main controlling factors in increasing plant growth and carbon uptake.
The field research will be conducted on the selected localities in Carpathian primeval forests of the Ukraine (CHORNOHORA, KUZYI-TRIBUSHANY, MARAMOROSH, ROZOK, STUZHYTSIA-UZHOK, SVYDOVETS, UHOLKA-SHYROKYI LUH) and also in adjacent managed forests, for purpose to implement the nature forests dynamics, which may reduce watershed damage to a minimum, into Ukrainian forestry operations. The preparatory work was carried in the year of 2005 through numerous contacts and workshops among Slovakian, Czech and Ukrainian partners. The long-time cooperation
among these teams on relevant subject is recorded, e.g. International Conference in Mukachevo, Transcarpathia, Ukraine (October 13- 17, 2003): Natural Forests in the Temperate Zone of Europe – Values and Utilisation; many workshops; common research on Carpathian primeval forests in connection with serial nomination of these virgin forest ecosystems to Inscription into the List of World Nature Heritage of UNESCO. The study period will cover two years. There will be used the Methodology of the primeval forest structure development research and the Methodology of material and energy cycles and fluxes research. The new methodology to investigate the primeval forest structure was developed by the Department of Silviculture, Faculty of Forest Sciences and Forest Ecology, Georg-August University in Göttingen and the Department of Silviculture, the Forestry Faculty of the Technical University in Zvolen. This methodology is comprised from the components: the structure characteristics and their measuring, the production use of the available primeval forest area, the crown volume (Ck) of broadleaf species, the crown volume (Ck) of coniferous species, the primeval forest canopy gaps, the necromass survey, natural regeneration survey in the gaps, natural regeneration measuring in the gaps, the primeval forest height and diameter structure survey on the transect, survey of the remaining part of the ZP area. The investigation of water and carbon fluxes and cycles in forest ecosystems will involve: study of bedrock and soil properties, meteorological characteristics, water regime, solute transport and drainage, carbon accumulation and dynamics.
The advantage of using these methods is also in data compatibility, that the results can be compared to those obtained from the research of Slovak Carpathians and to create a scientific knowledge database.

4.2 Project Structure

4.2.1 Task Title :
Synthesis of prior knowledge and identification, selection and screening of permanent research plots

Task coordinator:
Prof. Ivan Vološčuk, belonging to team: SRT

Objectives :

The results of 50-years long research in the Slovak Carpathians primeval forests preserves and also long-running research in the White Carpathians of Czech Republic and Ukrainian Carpathians will be assembled. That is necessary to overcome a certain fragmentation and reach critical mass in knowledge. The data are available on the effect of primeval forests dynamics on biodiversity, biogeochemical cycling, slope and landscape stability and the results indicate very promising lines of research (Keim & Skaugset 2003, Kropil et al. 1995, Kropil 1996, Saniga & Schuetz 2001, Holubets 1994, Chubatyi 1984). The permanent research plots in virgin forests of Ukraine and adjacent forests will be identified, tracked and their forest stands screened for the provision of various forest functions, biodiversity and environmental effects. The similar observations in forests located in the buffer zones of primeval forest preserves, where a mix of natural dynamics and forestry intervention for various management purposes has led to development of patterns that may come close to patterns providing the desired forest functions.

Methodology :

Methodology of the primeval forest structure development research that was developed by the Department of Silviculture, Faculty of Forest Sciences and Forest Ecology, Georg-August University in Göttingen and the Department of Silviculture, the Forestry Faculty of the Technical University in Zvolen.

Task Input:

maps, experience on forest mapping, good knowledge of methodology

Result, milestones:

- list and a map of suitable plots (30. May 2007)
- report on the plots inventories (31.December 2007)
- Metadatabase of results from long-term research (31. December 2008)

4.2.2 Task Title:
Field research on water and solute transport in forest slopes and their stability

Task coordinator:

Prof. Jiří Kulhavý , belonging to team: CRT

Objectives:

The forests water regime features specific traits, e. g. nearly total dissipation of raindrops kinetic energy on the forest storeys and surface humus, retention of water in the trees necromass, moderation of forest microclimate, irregular infiltration and preferential flow in forest soils, efficient use of resources by forests indigenous to a given sites. Results will be used in action 4.

Methodology :

Methods suitable for intensity–capacity approach, e.g. electric resistivity tomography, Time Domain Reflectometry, dye (Duasyne) tracing and others will be used to provide a quantitatively and qualitative description of processes that can be used for natural enhancement of water management, erosion and slope stability control in forest management.

Task Input:

The task is depending on : Synthesis of prior knowledge and identification, selection and screening of permanent research plots

- set of the permanent research plots
- inventory of forest functions
- results of prior research

Result, milestones:

- development of new rapid method for the measurement of soil hydraulic properties (October 2007)
- dominant transport processes in forests soils determined (31. December, 2008)

4.2.3 Task Title:
Field research of organic carbon spatial variability, accumulation and decomposition in forests

Task coordinator:

Dymitrij Sukharyuk, belonging to team: URT

Objectives:

Spatial variability of carbon from the atmospheric CO2 in primeval forests ecosystems, and mainly in their soil component, will be analyzed, because the main resident time of carbon in deep soil layers may well exceed several hundred years (Persson et al. 2000), and, unlike climax above earth biomass can hardly be increased, soils represent a reservoir still unsaturated.
We ascertained that the organic carbon concentrations in soils copy the spatial INTAS Thematic Call with ESA 2006 Page 19 INTAS Ref. Nr 06-1000025-9144 distribution of trees necromass down to minimum 50 cm. A combination of these findings with the measurement of the soil and slope deposits thickness will facilitate development of models for nature based management of forests of all categories. Results will be used in action 5.

Methodology:

Advanced sampling designs based on known processes and variograms will be employed, along with state-of-the-art devices (Vario Macro elemental analyzer, BIO-plates).

Task Input:

The task is depending on: Synthesis of prior knowledge and identification, selection and screening of permanent research plots

- set of the permanent research plots
- inventory of forest functions
- results of prior research

Result, milestones:

- maps of carbon stock in primeval forests soils: 31 October 2008

4.2.4 Task Title:
Modelling of a controlled application of additional new natural dynamics components

Task coordinator:

Prof. Milan Saniga , belonging to team: SRT

Objectives:

Controlled application of primeval forests dynamics in managed forests must be preceded by modeling with the help of advanced forest models subject to past lowintensity management (for various reasons), but in particular in the buffer zones of nature preserves, where there has been a constant interaction between natural processes and human intervention. Thus the overall picture will be compiled from the results of modeling and forest functions screening performed at different times and in forests at various localities in various developmental stages.

Methodology:

Sibyla tree growth model (Fabrika, Ďurský 2005), Hydrus (Simunek et al. 2004) – a tool form modeling water and solutes transport in soils, as well as BIOME BGC (Thornton et al. 2002) model for studying biogeochemical cycles of carbon and nitrogen, and screening of forest functions in permanent research plots.

Task Input:

The task is depending on : Field research on water and solute transport in forest slopes and their stability, the models leaning on data acquired in actions 1., 2., 3., 4. as the model input.

Result, milestones:

Functional assessment of natural processes:

- modelling reports
- Validated proposals of enhancement of carbon accumulation by 20%,
- Validated model of retention and accumulation of water in forests
  (31 February 2009)

4.3 Project Management

4.3.1 Planning & Task allocation

4.3.1.1 List of Task Titles

1. Synthesis of prior knowledge and identification, selection and screening of permanent research plots
2. Field research on water and solute transport in forest slopes and their stability
3. Field research of organic carbon spatial variability, accumulation and decomposition in forests
4. Modelling of a controlled application of additional new natural dynamics components

Pre-proposal No 5

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ADAPTATION TO AND MITIGATION OF ADVERSE WATER-RELATED IMPACTS IN VULNERABLE SYSTEMS–ENHANCEMENT OF EFFECTIVENESS AND EFFICIENCY OF ADAPTATION STRATEGIES AND MEASURES UNDER UNCERTAINTY[1]

developed as a call-line in reference to

- EU FP 7, Theme 6: Environment (including Climate Change)

Justification

The premises on which this document builds are the following: climate changes impacts on terrestrial, aquatic, social and economic systems, modifying the interactions among them. Consequently, new equilibria will occur. Existing and in development climate changes models allow anticipation of more vulnerable regional areas and systems. Based on such information, adaptation and mitigation measures can be proactively taken aiming to prepare ecosystems and society to ensure ecosystems uses and services. Such adaptation and mitigations processes require integrated strategies on all intervening systems. National regulations may also need to be adapted. The ability to successfully implement adaptation and mitigation measures and strategies depends on knowledge and technical capacity.

Based on these premises and the Research Area a Call line under the title “Enhancement of effectiveness and efficiency of adaptation strategies and measures under uncertainty” was proposed.

Specific objectives from perspective of the New Member States

This call line reflects the. The identified objectives were as follows:

- Promoting sustainable development by enhancing nature-based and man-made infrastructure-based approaches to adaptation and mitigation.
- Aggregating and comparing adverse and positive impacts across different sectors for the development of adaptive capacities of decision making, harmonizing data and policies for planning, and adaptive management.
- Inclusion of all temporal scales from short-term (e. g. flood forecasting and warning, temporary dikes, projection of water quality) to long-term (e.g. decades for forestry or reservoir planning).
- Adaptation for cross-boundary cases (international watersheds) in the spirit of Water Framework Directive (River Basin District)
- Promoting robustness of adaptation and mitigation strategies by integration of stakeholder analysis and commercial viability to enable all-level stakeholders to benefit from the provision of water-related services.
- Adverse water-related impacts including changes in water surface, sub-surface and groundwater resources quantity and quality (low dilution at low flows, erosion and flushing chemicals by intense precipitation, overland flow, and snowmelt, preferential flow, temperature-induced eutrophication, changes in retention time and stratification in reservoirs, saltwater intrusion, and salinization of agricultural land)

Background / state-of-the-art

The participants agreed that within the suggested Call Line several specific research topics should be addressed based on the evaluation of the existing knowledge. The participants emphasized the existence of vulnerable systems: natural systems (semi-natural and managed aquatic, terrestrial ecosystems, in particular mountainous, lake, riparian, wetland, coastal systems); human systems (vulnerable regions, sectors, groups of people). Examples of vulnerable sectors were quoted: water management, agriculture, forestry, fisheries, industry, energy, health, tourism, transport. Current situation and projections for the future indicate decreasing precipitation, river flows, soil moisture, and groundwater levels in summer (in vegetation season) in much of Europe, changing means, seasonality and extremes, potential for higher intense precipitation, less snow cover, earlier and lower snowmelt – possibility of low flows and early spring droughts. Therefore, sectors have to adapt to the existing climate and every change induces a need for adaptation, involving costs.

In the State-of-the art assessment there was a general agreement among the participants that some adaptation to natural variability of water availability and changing demand has taken place. However, there are considerable differences in dealing with climate change and its possible impacts in various NMS/AC countries. Instead of fixed boundary conditions to be considered, interactions with exogenous drivers and multiple stressors, also besides the climate change (e. g. land-use, land-cover and land property changes in the transition period) have to be taken into account.

Ongoing and completed projects on issues raised

In respect to past and on-going research, it was unequivocally concluded that projects have addressed mainly the climate change, while the adaptation and mitigation issues in NMS and AC countries have been poorly covered, leaving many important issues unsolved but many opportunities to apply novel approaches omitted. The following list of past and on-going projects/programs was put together:

- ADAM (Adaptation and mitigation strategies) – 6FP IP. It was noted that the project mostly addressed Pan-European research
- National Climate Programmes exist in some countries (e.g., Slovakia, Hungary – VAHAVA, Bulgaria) but they deal mostly with impacts. Adaptation is on general not taken into consideration.
- Stormwater master plan, Malta
- Kyoto Clean Development Mechanism (CDM), Malta is the only EU Member State to have non-annex 1 status. Benefit from sale of carbon credits.
- Sector-specific projects on adaptation (Slovakia)
- WMO/UNESCO Flood Initiative
- Assessment of climate change impact on the hydrological cycle elements in South-Eastern European countries (UNESCO, UVO ROSTE)

Priorities of FP7 and WSSTP SRA addressed by objectives:

Besides the specifics of the NMS and ACC the proposed call line, in its objectives is closely related to the priorities defined in preliminary FP7 (of June 2006), as well on the WSSPT-SRA documents. In fact, adaptation and mitigation aspects are embedded in several places in the referred documents. The single most important linkage of the call line to the FP7 relates to the Theme 6, Environment (including Global Change), Activity I. Climate change, pollution, and risks, Priority Pressures on environment and climate, Subpriority 6 -Response strategies: Mitigation and adaptation. Moreover links also exist to Priority Natural hazards, Subpriority 4 - Risk management and mitigation. The call line is also concerned with Activity II. Sustainable management of resources - Priority Conservation and sustainable management of natural and man-made resources and Activity III - Environmental technologies. The call line also drew on the WSSTP SRA, Pilot theme 6: Proactive an corrective management of extreme hydro-climatic events and on the Generic RTD, parts G.6.1 Forecasting. The hydro-meteorological aspects; G.6.2 Warning systems, monitoring network and crisis management; G.6.3 Long term flood mitigation; G.6.4 Short and long-term drought management. Other relevant linkages are with enabling RTD: E.6.1 Regional-scale flooding; E.6.2 Local scale multiple hazard management and E.6.3 Drought, and river flow management.

Suggestion for most appropriate type of project:

- Collaborative Projects of different size

Existing expertise

- Ecology and ecohydrology
- Hydrology
- Risk assessment
- Hydrological Modelling
- Biomonitoring
- Protection of water resources
- Water management in agriculture
- Soil ecology

Required expertise

- Sociology
- Economy
- Spatial planning and engineering
- Expertise covering sectoral issues

Gaps in the knowledge

As an important result from the meeting an assemblage of the existing gaps in knowledge was compiled from the perspective of the New Member States and Candidate Countries:

- Need for approaches for assessing levels of confidence and uncertainty of adaptation strategies and identifying ways of efficient communicating these to the decision-makers and stakeholders
- Integrated models of total water consumption for incorporation into decision support tools and evaluation of uncertainty and confidence levels for the development of credible decision support systems in data sparse and low tech regions.
- Adapting stochastic water cycle concepts, methodologies and models especially with respect to extreme events (e.g., hydro-climatological predictions, projections, design values and associated uncertainties) to non-stationary conditions and transferring them into the management, planning, and design of water decision systems and infrastructure.
- Methods for managing conflicting demands on domestic and transboundary water resources for water consumption, ecological functions, industrial uses, and transport resulting from changes of water consumption patterns and trends in course of major climatic events, adaptation invoked technological innovation and economic conditions.
- Inventory of data for regional and sectoral studies, especially for data for which regional and river basin district bases repositories do not exist (e.g., water demand, use and consumption).
- Innovative ways to address sector-specific problems related to climate changes (e.g. rainwater capture and usage, adaptation of cooling water systems to climate change, organizational and legal solutions for implementation of adaptation and mitigation measures, regulatory function of natural (pristine) and close-to-nature ecosystems in the adaptation context, risk assessment and propagation mechanisms)

Societal, economical and European relevance

The call line is relevant for European society and economy, since understanding the vulnerability and adaptability of natural and managed eco- and water systems to climate change, evaluation and communication of uncertainty and levels of confidence of adaptation strategies is a crucial issue for the development of credible decision support resources. A basic requirement for achieving this goal is the development of frameworks for integrating the natural, technical and social science information necessary for multiple-objective decision making. Indeed, novel approaches for improvement of water management practices, economical benefits, health, food and water security, protection against extreme events are needed, as well as the expertises from climatology, hydrology, integrated Modelling, water management, spatial planning, economy, social sciences (sociology, politology), sector expertise (water sector, agriculture, fisheries, forestry, energy, transport, health).

SCIENTIFIC RESEARCH AT THE FACULTY OF FORESTRY, TU ZVOLEN

The Faculty of Forestry of the Technical University Zvolen further develops the traditions of higher forestry education on the Slovak territory. As early as 1807, Forestry Institute had been established within the former Mining Academy in the nearby Banská Štiavnica. Thirty nine years later, a joint Mining and Forestry Academy was founded there. Following turbulent social developments that swept across Europe during the 1st half of the XX century and the decline of mining industries, University of Forestry and Wood Technology was finally established in Zvolen in 1952. It had two faculties at that time: the Faculty of Forestry and the Faculty of Wood Technology. Since then, 5316 students have graduated from the Faculty of Forestry, 98 among them from abroad, and 412 candidates have earned their PhD degree from it. In 1991, the University of Forestry and Wood Technology was renamed to Technical University Zvolen.

The research base is determined by the world trends in forestry, game and natural resources management, own traditions, strengths and innovations, as well as the required profile of faculty graduates and co-operation with forestry business branch. The scientific research is carried out by all faculty members and staff, as well as graduate students with a resulting research capacity of 200 000 hours.

Owing to the long reproduction process of forest stands (90–120 years), forestry planning and management, the scientific basis is comparatively stable, with graduate students being its most dynamic component. Currently, the faculty consists of 16 full professors, 22 associate professors, 29 assistant professors and 26 scientific researchers.

The technical resources of the Faculty of Forestry lean on its state-of-the art scientific equipment. Advanced technical solutions have recently been acquired and partly concentrated within two centers established on the faculty platform: The Joint Laboratory of the Technical University Zvolen and National Forestry Centre Zvolen for DNA analyses and The Joint National Centre for the Research of Temperate Primeval Forests (www.virginforests.sk) as platforms for an interdisciplinary approach and cooperation.

Own institutional resources currently play only a minor role in the scientific research. The major part of funds for approved scientific projects is provided on a competitive basis by the Scientific Grant Agency of the Ministry of Education of the Slovak Republic and the Slovak Academy of Sciences (VEGA), Research and Development Agency (RDA) and the EU funds, mainly within the 5th and 6th framework programs.

The faculty is represented in two VEGA commissions (Commission for forestry, agricultural and veterinary sciences, Commission for ecological and biological science), in the RDA Board of governors and two RDA councils (Council for Agricultural and Forestry Sciences, Council for International Scientific Cooperation). Also, the Faculty of Forestry holds the position of the National expert for the 6th thematic priority "Sustainable Development, Global Change and Ecosystems (ECOTECH)" within the 6th framework program.

Amphibia and reptilia ; See bottom of the table for the codes of selected localities.

Druh - Amphibia	**HA**	**VI**	**ST**	**RO**	**KZ**	**SV**	**CH**	**MA**	**UH**	**SU**	
Bombina bombina (Linnaeus, 1761)											
Bombina variegata (Linnaeus, 1758)	H	H	H	H	H	H	H	H	H	H	LR: cd
Bufo bufo (Linnaeus, 1758)	H	H	H	H	H	H	H	H	H	H	LR: cd
Bufo viridis Laurenti, 1768	H	H	H	H	H				H		LR: cd
Hyla arborea (Linnaeus, 1758)	H	H	H	H	H	H	H	H	H		LR: nt
Rana arvalis Nilson, 1842					H	H	H	H	H		VU
Rana dalmatina Bonaparte, 1839		H		H					H	H	LR: lc
Rana kl. *Esculenta* Linnaeus, 1758											
Rana ridibunda Pallas, 1771											
Rana temporaria Linnaeus, 1758	H	H	H	H	H	H	H	H	H	H	LR: lc
Salamandra salamandra (Linnaeus, 1758)	H	H	H	H	H	H	H	H	H	H	LR: nt
Triturus alpestris (Laurenti, 1768)						H	H	H	H		VU
Triturus montandoni (Boulenger, 1880)					H	H	H	H	H	H	
Triturus vulgaris (Linnaeus, 1758)			H								
Druh - Reptilia											
Ablepharus kitaibelii Bibron et Bory, 1833											
Anguis fragilis Linnaeus, 1758	H	H	H	H	H	H	H	H	H		LR: nt
Coronella austriaca Laurenti, 1768	H	H			H	H	H	H	H		VU
Elaphe logissima (Laurenti, 1768)					H			H	H		LR: cd
Lacerta viridis (Laurenti, 1768)											
Lacerta agilis	H	H	H	H	H	H	H	H	H	H	
Natrix natrix (Linnaeus, 1758)					H	H	H	H	H	H	LR: lc
NAtrix tesselata (Laurenti, 1768)											
Podarcis (Lacerta) *muralis* (Laurenti, 1768)											
Vipera berus (Linnaeus, 1758)					H	H	H	H	H	H	VU
Zootoca (Lacerta) *vivipara* Jacquin, 1787	H	H	H	H	H	H	H	H	H	H	LR: nt

Σ Species (total)	**18**										
Number of Species/ Locality	**126**	10	11	10	10	15	14	14	15	17	10

Abbreviations:

Havesova	HA
Vihorlat	VI
Stuzica	ST

Rozok	RO
Kuziy-Trybushany	KZ
Svydovets	SV
Chornohora	CH
Maramorosh	MA
Uhol’ka-Shyrokyi Luh	UH
Stuzhytsia-Uzhok	SU

* species of conservation interest
Conservation cathegory (IUCN, Red Data Book, SR)
EN - endangered
VU - vulnerable
LR:nt - low risk, near threatened
LR:cd - low risk, conservation dependend
DD-data deficient
LR: lc - least concern

	Araneidea – list of species of the 3 primeval forests nominated for the World Natural Heritage					
	Druh / Species	**HA**	**VI**	**CH**	*****	
	Aculepeira ceropegia	1				
	Agelena gracilensis (C.L.Koch 1841)					
	Agelena labyrinthica (Clerck, 1758)					
	Agraecina striata					
	Agroeca brunnea					
	Achaeranea tepidariorum (C.L.Koch, 1841)					
	Alopecosa aculeata	1				
	Alopecosa trabalis	1				
	Amaurobius fenestralis	1	1			
	Amaurobius jugorum (C.L.Koch 1868)					
	Antistea elegans		1			
	Anyphaena accentuata					
	Araneus angulatus		1			
	Araneus bituberculatus (Walckenaer, 1802)					
	Araneus diadematus		1	1		
	Araniella alpica		1			
	Araniella cucurbitina	1				
	Asagena phalerata (Panzer, 1801)					
	Atea triguttata (Fabricius, 1775)					
	Aulonia albimana (Walckenaer, 1805)			1		
	Ballus depressus (Walckenaer, 1802)					
	Ballus chalybeius	1				
	Bathyphantes nigrinus	1	1			
	Bathyphantes torrentum					
	Berlandina cinerea (Menge, 1872)					
	Bianor aurocinctus	1				
	Bolyphantes alticeps	1				
	Boroechemus angustifrons (Westring, 1861)					
	Callobius claustrarius		1			
	Centromerus arcanus	1				
	Centromerus dilutus	1				
	Centromerus pabulator	1				
	Centromerus silvicola		1			
	Centromerus sp	1				
	Centromerus sylvaticus			1		
	Ceratinella major					
	Ceratinella scabrosa					
	Cercidia prominens (Westring, 1851)					
	Clubiona neglacta		1			
	Clubiona similis	1				
	Clubiona sp.	1				
	Coelotes atropos	1	1	1		
	Coelotes inermis		1	1		
	Coelotes terrestris		1	1		
	Cryphoeca silvicola		1	1		
	Cybaeus angustiarum	1	1	1		
	Cyclosa conica (Pallas, 1772)			1		
	Diaea dorsata	1	1			
	Dicimbium nigrum	1				
	Dictyna arundinacea (Linnaeus, 1758)					
	Dictyna pusilla					
	Dictyna uncinata					
	Dicymbium nigrum					
	Diplocephalus cristatus	1				

	Diplocephalus helleri					EN
	Diplocephalus latifrons	1	1			
	Diplocephalus picinus	1				
	Diplostyla concolor		1			
	Dipoena melanogaster					
	Drapetisca socialis					
	Drassodes lepidosus					
	Drassodes pubescens	1				
	Drassyllus pusillus	1				
	Dysdera erythrina (Walckenaer, 1802)					
	Dysdera ninii		1			
	Enoplognatha ovata		1			
	Enoplognatha thoracica					
	Entelecara congenera	1				
	Epiclubiona neglecta (Cambridge, 1862)					
	Episinus angulatus					
	Episinus truncatus (Latreille, 1809)					
	Ergatis viridissima (Walckenaer, 1802)					
	Erigone atra			1		
	Erigone dentipalpis	1	1	1		
	Erigone tirolensis					VU
	Evarcha flammata	1				
	Evarcha laetabunda	1				
	Evophrys obsoleta (Simon, 1868)					
	Gnaphosa lucifuga (Walckenaer, 1802)					
	Gnaphosa opaca (Herman, 1879)					
	Gnophosa montana	1				LR: nt
	Gonatium rubellum	1	1			
	Hahnia helveola					LR: lc
	Hahnia ononidum					
	Hahnia pusilla					
	Haplodrassus signifer	1				
	Harpactes hombergi					
	Harpactes rubicundus (C.L.Koch, 1839)					
	Heliophanus flavipes (Hahn, 1831)					
	Heliophanus kochi (Simon, 1868)					
	Helophora insignans		1			
	Heteroclubiona frutetorum (C.L. Koch, 1866)					
	Histopona torpida		1			
	Cheiracanthium elegans (Thorell, 1875)					
	Cheiracanthium pennyi (Cambridge, 1872)					
	Larinioides ixobolus (Thorell, 1873)					
	Lepthyphantes flavipes					
	Lepthyphantes tenebricola					
	Leptorchestes berolinensis	1				
	Leptyphantes alacris	1	1	1		
	Leptyphantes annulatus					VU
	Leptyphantes collinus C.L.Koch, 1872					
	Leptyphantes exiguus					
	Leptyphantes expunctus					
	Leptyphantes flavipes	1				
	Leptyphantes leprosus		1	1		
	Leptyphantes mengei	1				
	Leptyphantes minutus	1				
	Leptyphantes monticola	1				
	Leptyphantes mughi	1		1		

	Leptyphantes pallidus	1	1			
	Leptyphantes pulcher					
	Leptyphantes tenebricola	1	1			
	Leptyphantes tenuis		1			
	Leptyphantes varians					
	Lessertinella carpatica					
	Linyphia frutetorum C.L.Koch, 1834					
	Linyphia hortensis	1				
	Linyphia triangularis		1			
	Linyphiidae not det.	1				
	Linyphys triangularis					
	Lycosa radiata (Latreille, 1819)					
	Macrargus carpenteri	1				EN
	Macrargus rufus		1			
	Mangora acalypha	1				
	Maso sundevalli		1			
	Meioneta rurestris	1	1	1		
	Meta merianae (Scopoli, 1763)					
	Meta segmentata		1	1		
	Metellina marianae		1			
	Metellina mengei		1			
	Metellina segmentala		1			
	Micrargus herbigradus	1				
	Microcentria pusilla					
	Microlinyphia pusilla	1				
	Micrommata roseum (Clerck, 1758)					
	Microneta viaria	1	1			
	Minicia marginella (Wider, 1834)					
	Misumena vatia (Clerck, 1758)					
	Misumenops tricuspidatus (Fabricius, 1775)					
	Montitextrix glacialis					
	Neon reticulatus		1			
	Neottiura bimaculatum (Linnaeus, 1758)					
	Neriene clathrata	1				
	Nuctenea umbratica (Clerck, 1758)					
	Oedothorax apicatus		1			
	Oedothorax gibbifer	1	1			
	Oreonetides vaginata				VU	
	Oxyopes lineatus (Latreille, 1806)				LR: nt	
	Ozyptila praticola					
	Ozyptila simplex	1				
	Ozyptila trux		1			
	Pachygnatha clercki					
	Pachygnatha degeeri	1				
	Pachygnatha listeri	1				
	Panamomops inconspicuus	1				
	Pardosa amentata			1		
	Pardosa ferruginea				LR: nt	
	Pardosa hortensis	1				
	Pardosa lignaria	1				
	Pardosa lugubris	1		1		
	Pardosa monticola (Clerck, 1758)			1		
	Pardosa paludicola	1				
	Pardosa palustris	1		1		
	Pardosa riparia	1				
	Philodromus aureolus	1				

	Philodromus vagulus					
	Phlegra fasciata (Hahn, 1826)					
	Phlegra festiva (C.L. Koch, 1834)					
	Pholcus opilionoides (Schrank, 1781)					
	Phrurolithus festivus					
	Pirata higrophilus		1			
	Pisaura mirabilis (Clerck, 1758)					
	Pocadicnemis pumila	1				
	Porrhomma microphthalmum (Cambridge, 1871)					
	Porrhomma pygmaeum					
	Prrhomma microphthalmum		1			
	Pseudicius encarpatus (Walckenaer, 1802)					
	Rhaebothorax morulus					
	Robertus lividus					
	Saloca diceros	1				
	Saloca kulczynskii	1				
	Salticus cingulatus	1				
	Salticus olearii (Scopoli, 1763)					
	Scotinotylus antennatus					
	Scotophaeus quadripunctatus					
	Scotophaeus scutelatus (C.L. Koch, 1866)					
	Segestria senoculata	1	1			
	Singa hamata (Clerck, 1758)					
	Sitticus dzieduszyckii				VU	
	Sitticus floricola	1				
	Sitticus pubescens (Fabricius, 1775)					
	Sitticus rupicola	1		1		
	Steatoda bipunctata (Linnaeus, 1758)					
	Syedre gracilis					
	Tapinocyba insecta					
	Taranucnusbihari					
	Tarentula sulzeri (Pavesi, 1873)					
	Tegenaria agrestis (Walckenaer, 1802)					
	Tegenaria ferruginea		1			
	Tegenaria silvestris		1			
	Tenuiphantes alacris		1			
	Tenuiphantes cristatus		1			
	Tenuiphantes tenebricola		1			
	Tetragnatha pinicola	1	1			
	Teutana triangulosa (Walckenaer, 1802)					
	Theridion betteni	1				
	Theridion bimaculatum	1				
	Theridion leuconotum	1				
	Theridion varians					
	Thyreosthenius parasiticus	1				
	Titanoeca obscura (Walckenaer, 1802)					
	Titanoeca schineri (C.L.Koch 1872)					
	Trochosa terricola	1		1		
	Walckenaeria antica		1			
	Walckenaeria atrotibialis	1				
	Walckenaeria cucullata	1				
	Walckenaeria dysderoides					
	Xerolycosa nemoralis	1		1		
	Xysticus alpicola					VU
	Xysticus bifasciatus	1		1		
	Xysticus erraticus	1				

	Xysticus ferrugineus (Menge, 1876)					LR: nt
	Xysticus luctuosus	1				LR: lc
	Xysticus sp.	1				
	Xysticus ulmi					
	Zelotes apricorum	1	1			
	Zelotes clivicola	1				
	Zelotes erebeus (Thorell, 1871)			1		
	Zelotes subterraneus	1		1		
	Zodarium germanicum (C.L.Koch, 1837)					
	Zora pardalis (Simon, 1878)					
	Zora silvestris (Kulczynski, 1897)					
	Zora spinimana	1				
Σ dru	**Number of Species/ Locality 163**	85	52	26		

Σ Species (total) 127

Havesova HA
Vihorlat VI
Chornohora CH

* species of conservation interest
Conservation cathegory (IUCN, Red Data Book, SR)
EN - endangered
VU - vulnerable
LR:nt - low risk, near threatened
LR:cd - low risk, conservation dependend
DD-data deficient

Araneidea – list of species of the 3 primeval forests nominated for the World Natural Heritage

Druh / Species	**HA**	**VI**	**CH**	*	
Aculepeira ceropegia	1				
Agelena gracilensis (C.L.Koch 1841)					
Agelena labyrinthica (Clerck, 1758)					
Agraecina striata					
Agroeca brunnea					
Achaeranea tepidariorum (C.L.Koch, 1841)					
Alopecosa aculeata	1				
Alopecosa trabalis	1				
Amaurobius fenestralis	1	1			
Amaurobius jugorum (C.L.Koch 1868)					
Antistea elegans		1			
Anyphaena accentuata					
Araneus angulatus		1			
Araneus bituberculatus (Walckenaer, 1802)					
Araneus diadematus		1	1		
Araniella alpica		1			
Araniella cucurbitina	1				
Asagena phalerata (Panzer, 1801)					
Atea triguttata (Fabricius, 1775)					
Aulonia albimana (Walckenaer, 1805)			1		
Ballus depressus (Walckenaer, 1802)					
Ballus chalybeius	1				
Bathyphantes nigrinus	1	1			
Bathyphantes torrentum					
Berlandina cinerea (Menge, 1872)					
Bianor aurocinctus	1				
Bolyphantes alticeps	1				
Boroechemus angustifrons (Westring, 1861)					
Callobius claustrarius		1			
Centromerus arcanus	1				
Centromerus dilutus	1				
Centromerus pabulator	1				
Centromerus silvicola		1			
Centromerus sp	1				
Centromerus sylvaticus			1		
Ceratinella major					
Ceratinella scabrosa					
Cercidia prominens (Westring, 1851)					
Clubiona neglacta		1			
Clubiona similis	1				
Clubiona sp.	1				
Coelotes atropos	1	1	1		
Coelotes inermis		1	1		
Coelotes terrestris		1	1		
Cryphoeca silvicola		1	1		
Cybaeus angustiarum	1	1	1		
Cyclosa conica (Pallas, 1772)			1		
Diaea dorsata	1	1			
Dicimbium nigrum	1				
Dictyna arundinacea (Linnaeus, 1758)					
Dictyna pusilla					
Dictyna uncinata					
Dicymbium nigrum					
Diplocephalus cristatus	1				

	Diplocephalus helleri					EN
	Diplocephalus latifrons	1	1			
	Diplocephalus picinus	1				
	Diplostyla concolor		1			
	Dipoena melanogaster					
	Drapetisca socialis					
	Drassodes lepidosus					
	Drassodes pubescens	1				
	Drassyllus pusillus	1				
	Dysdera erythrina (Walckenaer, 1802)					
	Dysdera ninii		1			
	Enoplognatha ovata		1			
	Enoplognatha thoracica					
	Entelecara congenera	1				
	Epiclubiona neglecta (Cambridge, 1862)					
	Episinus angulatus					
	Episinus truncatus (Latreille, 1809)					
	Ergatis viridissima (Walckenaer, 1802)					
	Erigone atra			1		
	Erigone dentipalpis	1	1	1		
	Erigone tirolensis					VU
	Evarcha flammata	1				
	Evarcha laetabunda	1				
	Evophrys obsoleta (Simon, 1868)					
	Gnaphosa lucifuga (Walckenaer, 1802)					
	Gnaphosa opaca (Herman, 1879)					
	Gnophosa montana	1				LR: nt
	Gonatium rubellum	1	1			
	Hahnia helveola					LR: lc
	Hahnia ononidum					
	Hahnia pusilla					
	Haplodrassus signifer	1				
	Harpactes hombergi					
	Harpactes rubicundus (C.L.Koch, 1839)					
	Heliophanus flavipes (Hahn, 1831)					
	Heliophanus kochi (Simon, 1868)					
	Helophora insignans		1			
	Heteroclubiona frutetorum (C.L. Koch, 1866)					
	Histopona torpida		1			
	Cheiracanthium elegans (Thorell, 1875)					
	Cheiracanthium pennyi (Cambridge, 1872)					
	Larinioides ixobolus (Thorell, 1873)					
	Lepthyphantes flavipes					
	Lepthyphantes tenebricola					
	Leptorchestes berolinensis	1				
	Leptyphantes alacris	1	1	1		
	Leptyphantes annulatus					VU
	Leptyphantes collinus C.L.Koch, 1872					
	Leptyphantes exiguus					
	Leptyphantes expunctus					
	Leptyphantes flavipes	1				
	Leptyphantes leprosus		1	1		
	Leptyphantes mengei	1				
	Leptyphantes minutus	1				
	Leptyphantes monticola	1				
	Leptyphantes mughi	1		1		

	Leptyphantes pallidus	1	1			
	Leptyphantes pulcher					
	Leptyphantes tenebricola	1	1			
	Leptyphantes tenuis		1			
	Leptyphantes varians					
	Lessertinella carpatica					
	Linyphia frutetorum C.L.Koch, 1834					
	Linyphia hortensis	1				
	Linyphia triangularis		1			
	Linyphiidae not det.	1				
	Linyphys triangularis					
	Lycosa radiata (Latreille, 1819)					
	Macrargus carpenteri	1				EN
	Macrargus rufus		1			
	Mangora acalypha	1				
	Maso sundevalli		1			
	Meioneta rurestris	1	1	1		
	Meta merianae (Scopoli, 1763)					
	Meta segmentata		1	1		
	Metellina marianae		1			
	Metellina mengei		1			
	Metellina segmentala		1			
	Micrargus herbigradus	1				
	Microcentria pusilla					
	Microlinyphia pusilla	1				
	Micrommata roseum (Clerck, 1758)					
	Microneta viaria	1	1			
	Minicia marginella (Wider, 1834)					
	Misumena vatia (Clerck, 1758)					
	Misumenops tricuspidatus (Fabricius, 1775)					
	Montitextrix glacialis					
	Neon reticulatus		1			
	Neottiura bimaculatum (Linnaeus, 1758)					
	Neriene clathrata	1				
	Nuctenea umbratica (Clerck, 1758)					
	Oedothorax apicatus		1			
	Oedothorax gibbifer	1	1			
	Oreonetides vaginata				VU	
	Oxyopes lineatus (Latreille, 1806)				LR: nt	
	Ozyptila praticola					
	Ozyptila simplex	1				
	Ozyptila trux		1			
	Pachygnatha clercki					
	Pachygnatha degeeri	1				
	Pachygnatha listeri	1				
	Panamomops inconspicuus	1				
	Pardosa amentata			1		
	Pardosa ferruginea				LR: nt	
	Pardosa hortensis	1				
	Pardosa lignaria	1				
	Pardosa lugubris	1		1		
	Pardosa monticola (Clerck, 1758)			1		
	Pardosa paludicola	1				
	Pardosa palustris	1		1		
	Pardosa riparia	1				
	Philodromus aureolus	1				

	Philodromus vagulus					
	Phlegra fasciata (Hahn, 1826)					
	Phlegra festiva (C.L. Koch, 1834)					
	Pholcus opilionoides (Schrank, 1781)					
	Phrurolithus festivus					
	Pirata higrophilus		1			
	Pisaura mirabilis (Clerck, 1758)					
	Pocadicnemis pumila	1				
	Porrhomma microphthalmum (Cambridge, 1871)					
	Porrhomma pygmaeum					
	Prrhomma microphthalmum		1			
	Pseudicius encarpatus (Walckenaer, 1802)					
	Rhaebothorax morulus					
	Robertus lividus					
	Saloca diceros	1				
	Saloca kulczynskii	1				
	Salticus cingulatus	1				
	Salticus olearii (Scopoli, 1763)					
	Scotinotylus antennatus					
	Scotophaeus quadripunctatus					
	Scotophaeus scutelatus (C.L. Koch, 1866)					
	Segestria senoculata	1	1			
	Singa hamata (Clerck, 1758)					
	Sitticus dzieduszyckii				VU	
	Sitticus floricola	1				
	Sitticus pubescens (Fabricius, 1775)					
	Sitticus rupicola	1		1		
	Steatoda bipunctata (Linnaeus, 1758)					
	Syedre gracilis					
	Tapinocyba insecta					
	Taranucnusbihari					
	Tarentula sulzeri (Pavesi, 1873)					
	Tegenaria agrestis (Walckenaer, 1802)					
	Tegenaria ferruginea		1			
	Tegenaria silvestris		1			
	Tenuiphantes alacris		1			
	Tenuiphantes cristatus		1			
	Tenuiphantes tenebricola		1			
	Tetragnatha pinicola	1	1			
	Teutana triangulosa (Walckenaer, 1802)					
	Theridion betteni	1				
	Theridion bimaculatum	1				
	Theridion leuconotum	1				
	Theridion varians					
	Thyreosthenius parasiticus	1				
	Titanoeca obscura (Walckenaer, 1802)					
	Titanoeca schineri (C.L.Koch 1872)					
	Trochosa terricola	1		1		
	Walckenaeria antica		1			
	Walckenaeria atrotibialis	1				
	Walckenaeria cucullata	1				
	Walckenaeria dysderoides					
	Xerolycosa nemoralis	1		1		
	Xysticus alpicola					VU
	Xysticus bifasciatus	1		1		
	Xysticus erraticus	1				

	Xysticus ferrugineus (Menge, 1876)					LR: nt
	Xysticus luctuosus	1				LR: lc
	Xysticus sp.	1				
	Xysticus ulmi					
	Zelotes apricorum	1	1			
	Zelotes clivicola	1				
	Zelotes erebeus (Thorell, 1871)			1		
	Zelotes subterraneus	1		1		
	Zodarium germanicum (C.L.Koch, 1837)					
	Zora pardalis (Simon, 1878)					
	Zora silvestris (Kulczynski, 1897)					
	Zora spinimana	1				
Σ dru	**Number of Species/ Locality 163**	85	52	26		

Σ Species (total) 127

Havesova HA
Vihorlat VI
Chornohora CH

* species of conservation interest
Conservation cathegory (IUCN, Red Data Book, SR)
EN - endangered
VU - vulnerable
LR:nt - low risk, near threatened
LR:cd - low risk, conservation dependend
DD-data deficient

Bird species – 101 species; See bottom of the table for the codes of selected localities.												
Druh / Species	**HA**	**VI**	**ST**	**RO**	**UH**	**CH**	**MA**	**SV**	**KZ**	**SU**	Conservation Status (Red Data Book, SR)	IUCN Red List
Accipiter gentilis (Linnaeus, 1758)	H	N	N	N	N	N	N	N	N	N	LR:lc	
Accipiter nisus (Linnaeus, 1758)	H	N	N	N	N	N	N	N	N	N	LR:lc	
Acrocephalus arundinaceus (Linnaeus, 1758)											LR:nt	
Acrocephalus palustris (Bechstein, 1798)												
Actitis hypoleucos (Linnaeus, 1758)					N				N		LR:lc	
Aegithalos caudatus (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N			
Aegolius funereus (Linnaeus, 1758)			N	N	N	N	N				NE	
Alcedo atthis (Linnaeus, 1758)					N						LR:nt	
Anas platyrhynchos Linnaeus, 1758					H	H	H	H	H			
Anser anser (Linnaeus,1758)					H	H	H	H	H		EN:B1	
Anthus pratensis (Linnaeus, 1758)			H	H								
Anthus spinoletta (Linnaeus, 1758)					N	N	N	N				
Anthus trivialis (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N			
Apus apus (Linnaeus, 1758)	N	H	H	H								
Aquila clanga Pallas, 1811			P									VU
Aquila heliaca Savigny, 1809											EN:B3,D	VU
Aquila chrysaetos (Linnaeus, 1758)	H	H				N		N			VU:B2acd	
Aquila pomarina Brehm, 1831	H	H	H	H	N	N	N	N			LR:nt	
Ardea cinerea Linnaeus, 1758											LR:nt	
Asio otus (Linnaeus, 1758)	H	H	H	H	N				N	N		
Athene noctua (Scopoli, 1769)								N	N		LR:nt	
Bombycilla garrulus (Linnaeus, 1758)												
Bonasa bonasia (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N		LR:nt	
Bubo bubo (Linnaeus, 1758)					N	N					NE	
Buteo buteo (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N	N	LR:lc	
Buteo lagopus (Pontoppidan, 1763)												
Caprimulgus europaeus Linnaeus, 1758)		H	H		N	N		N	N		NE	
Carduelis cannabina (Linnaeus, 1758)	H	H	H	H	N	N	N	N	N	N		
Carduelis carduelis (Linnaeus, 1758)	H	H	H	H	N				N	N		
Carduelis flammea (Linnaeus, 1758)											NE	
Carduelis flavirostris (Linnaeus, 1758)												

Carduelis chloris (Linnaeus, 1758)	H	H	H	H	N			N	N	N		
Carduelis spinus (Linnaeus, 1758)	P	P	P	P		N	N					
Certhia brachydactyla Brehm, 1820												
Certhia familiaris Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Ciconia ciconia (Linnaeus, 1758)											LR:lc	
Ciconia nigra (Linnaeus, 1758)	N	N	H	H	N					N	LR:nt	
Cinclus cinclus (Linnaeus, 1758)					N	N	N	N	N		LR:lc	
Circaetus gallicus (Gmelin, 1788)		H							N		EN:B2d,D	
Circus aeruginosus (Linnaeus, 1758)											LR:lc	
Circus cyaneus (Linnaeus, 1766)			P	P								
Circus pygargus (Linnaeus, 1758)											VU:B2acd	
Coccothraustes coccothraustes (Linnaeus, 1758)	N	N	N	N	N			N	N	N		
Columba oenas Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N	LR:lc	
Columba palumbus Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Coracias garrulus Linnaeus, 1758											EN:A1,B2d,D	
Corvus corax Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Corvus corone Linnaeus, 1758												
Corvus frugilegus Linnaeus, 1758												
Corvus monedula Linnaeus, 1758											LR:nt	
Coturnix coturnix (Linnaeus, 1758)											LR:nt	
Crex crex (Linnaeus, 1758)											LR:cd	VU
Cuculus canorus Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Delichon urbica (Linnaeus, 1758)	H	H	H	H								
Dendrocopos leucotos (Bechstein, 1803)	N	N	N	N	N	N		N	N	N	LR:nt	
Dendrocopos major (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N	N		
Dendrocopos medius (Linnaeus, 1758)	H				P							
Dendrocopos minor (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N	N		
Dendrocopos syriacus (Hem. Ehr., 1833)												
Dryocopus martius (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N	N		
Egretta alba (Linnaeus, 1758)											EN:B1	
Egretta garzetta (Linnaeus, 1766)											EN:B1	
Emberiza cia Linnaeus, 1766											LR:nt	
Emberiza citrinella Linnaeus, 1758												
Emberiza schoeniclus (Linnaeus, 1758)												
Erithacus rubecula (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N	N		

Falco columbarius Linnaeus, 1758												
Falco cherrug Gray, 1834											CR:A1c,B2acd	
Falco peregrinus Tunstall, 1771					N						EN:B1,D	
Falco subbuteo Linnaeus, 1758											LR:nt	
Falco tinnunculus Linnaeus, 1758											LR:lc	
Falco vespertinus Linnaeus, 1766											EN:B2acd	
Ficedula albicollis (Temminck, 1815)	N	N	N	N	N			N	N	N		
Ficedula hypoleuca (Pallas, 1764)	P	P	P	P					P	P		
Ficedula parva (Bechstein, 1794)	N	N	N	N	N	N	N	N	N	N	NE	
Fringilla coelebs Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Fringilla montifringilla Linnaeus, 1758	P	P	P	P	P	P	P	P	P			
Fulica atra Linnaeus, 1758												
Gallinago gallinago (Linnaeus, 1758)											VU:B2d	
Gallinula chloropus (Linnaeus, 1758)												
Garrulus glandarius (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N	N		
Glaucidium passerinum (Linnaeus, 1758)	N	H	N	N	N	N			N		NE	
Haliaeetus albicilla (Linnaeus, 1758)											CR:B1	LRnt
Hieraaetus pennatus (Gmelin, 1788)		H		H			N	N			CR:A1c,B1,D	
Hippolais icterina (Vieillot, 1817)												
Hirundo rustica Linnaeus, 1758	H	H	H	H						N		
Jynx torquilla Linnaeus, 1758					N	N	N	N	N	N		
Lanius collurio Linnaeus, 1758					N			N	N			
Lanius excubitor Linnaeus, 1758											LR:nt	
Larus ridibundus Linnaeus, 1766												
Locustella fluviatilis (Wolf, 1810)												
Loxia curvirostra Linnaeus, 1758				N		N	N	N	N			
Lullula arborea (Linnaeus, 1758)					N							
Luscinia megarhynchos Brehm, 1831												
Luscinia svecica (Linnaeus, 1758)											VU:B2c	
Merops apiaster Linnaeus, 1758											LR:nt	
Milvus migrans (Boddaert, 1783)											VU:B1,2c	LRlc
Milvus milvus (Linnaeus, 1758)		H		H							EN:A1c	
Monticola saxatilis (Linnaeus, 1766)						N		N			CR:A1,B2acd	
Motacilla alba Linnaeus, 1758					N	N	N	N	N	N		
Motacilla cinerea Tunstall, 1771	H	H	N	H	N	N	N	N	N	N		

Muscicapa striata (Pallas, 1764)	N	N	N	N					N			
Nucifraga caryocatactes (Linnaeus, 1758)	H	H	N	N		N	N	N	N			
Numenius arquata (Linnaeus, 1758)											CR:A1,B2d	
Oriolus oriolus (Linnaeus, 1758)					N							
Otus scops (Linnaeus, 1758)					N						EN:D	
Pandion haliaetus (Linnaeus, 1758)												
Panurus biarmicus (Linnaeus, 1758)											LR:nt	
Parus ater Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Parus caeruleus Linnaeus, 1758	N	N	N	N	N				N			
Parus cristatus Linnaeus, 1758			N			N	N	N	N			
Parus major Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Parus montanus Baldenstein, 1827	N	N	N	N	N	N	N	N	N	N		
Parus palustris Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Passer domesticus (Linnaeus, 1758)												
Passer montanus (Linnaeus, 1758)												
Perdix perdix (Linnaeus, 1758)											LR:nt	
Pernis apivorus (Linnaeus, 1758)	N	H	H	H	N	N	N	N	N		LR:lc	
Phalacrocorax carbo (Linnaeus, 1758)											NE	
Phasianus colchicus Linnaeus, 1758												
Phoenicurus ochruros (Gmelin, 1774)												
Phoenicurus phoenicurus (Linnaeus, 1758)	N	N	N								LR:nt	
Phylloscopus collybita (Vieillot, 1817)	N	N	N	N	N	N	N	N	N	N		
Phylloscopus sibilatrix (Bechstein, 1793)	N	N	N	N	N	N	N	N	N	N		
Phylloscopus trochiloides (Sundevall, 1838)											DD	
Phylloscopus trochilus (Linnaeus, 1758)	N	N	N	N		N	N	N				
Pica pica (Linnaeus, 1758)												
Picoides tridactylus (Linnaeus, 1758)			N			N	N					
Picus canus Gmelin, 1778	N	N	N	N	N	N	N	N	N	N		
Picus viridis Linnaeus, 1758	N	N	H	N	N		N	N	N	N		
Podiceps cristatus (Linnaeus, 1758)												
Prunella collaris (Scopoli, 1769)											LR:nt	
Prunella modularis (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N			
Pyrrhula pyrrhula (Linnaeus, 1758)	N	N	N	N	N	N	N	N		P		
Rallus aquaticus Linnaeus, 1758											NE	
Regulus ignicapillus (Temminck) 1820)												

Regulus regulus (Linnaeus, 1758)	H	N	N	H	H	N	N	N	N			
Remiz pendulinus (Linnaeus, 1758)												
Scolopax rusticola Linnaeus, 1758	N	N	N	N	N	N				N	LR:nt	
Serinus serinus (Linnaeus, 1766)												
Sitta europaea Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Streptopelia turtur (Linnaeus, 1758)					N							
Strix aluco Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Strix uralensis Pallas, 1771	N	N	N	N	N	N	N	N	N	N	LR:lc	
Sturnus vulgaris Linnaeus, 1758	N	N	N	N	N				N			
Sylvia atricapilla (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N	N		
Sylvia borin (Boddaert, 1783)					N				N			
Sylvia communis Latham, 1787					N				N			
Sylvia curruca (Linnaeus, 1758)	H	H	H	H		N	N	N				
Sylvia nisoria (Bechstein, 1795)												
Tetrao tetrix (Linnaeus, 1758)						N	N				VU:A1cd,B2acd	
Tetrao urogallus Linnaeus, 1758						N	N	N			VU:A1cd,B2acd	
Tichodroma muraria (Linnaeus, 1766)											LR:nt	
Tringa ochropus Linnaeus, 1758												
Troglodytes troglodytes (Linnaeus, 1758)	N	N	N	N	N	N	N	N	N	N		
Turdus iliacus Linnaeus, 1766		P	P		P				P			
Turdus merula Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Turdus philomelos Brehm, 1831	N	N	N	N	N	N	N	N	N	N		
Turdus pilaris Linnaeus, 1758												
Turdus torquatus Linnaeus, 1758	H		N		N	N	N	N			LR:lc	
Turdus viscivorus Linnaeus, 1758	N	N	N	N	N	N	N	N	N	N		
Upupa epops Linnaeus, 1758					N				N		VU:B2c	

Σ Species 101

Number of Species/ Locality	**655**	66	69	72	68	76	65	60	65	68	46

Explanation:

Havesova	HA
Vihorlat	VI
Stuzica	ST
Rozok	RO

Kuziy-Trybushany	KZ
Svydovets	SV
Chornohora	CH
Maramorosh	MA
Uhol’ka-Shyrokyi Luh	UH
Stuzhytsia-Uzhok	SU

Total of 162 species (this number accountns for 1,7% of the world avifauna, 28% European avifauna, 47,6% Slovak avifauna.
Out of the 162 species 113 are the nesting ones. 5 species are listed in the The IUCN Red List of Threatened Species.
N - nesting sp., H- hospites, P- permigrants

* species of conservation interest
Conservation cathegory (IUCN, Red Data Book, SR)
EN - endangered
VU - vulnerable
LR:nt - low risk, near threatened
LR:cd - low risk, conservation dependend
DD-data deficient

	Coleoptera											
	Druh/Species	HA	VI	ST	RO	UH	CH	MA	SV	KZ	SU	Conservation Status (Red Data Book, SR)
	Abax parallelepipedus		+	+			+	+			+	
	Abax parallelus	+		+		+						
	Abax schueppeli rendschmidtii		+	+						+	+	
	Abax ater	+	+	+	+						+	
	Abax ovalis	+	+	+	+						+	
	Acanthocinus reticulatus*			+							+	LR:cd
	Acanthoderes clavipes	+	+	+	+				+	+	+	
	Acupalpus meridianus							+				
	Agonum albipes					+						
	Agonum assimile			+		+		+		+		
	Agonum fuliginosum					+						
	Agonum metallicus						+	+				
	Agonum micropterus						+	+				
	Agonum sexpunctatum			+		+	+	+				
	Agonum viduum					+	+			+		
	Agrilus cyanescens			+						+		
	Agrilus gramminis	+								+		
	Agrilus integerrimus*			+			+			+		VU
	Agrilus olivicolor									+		
	Agrilus pratensis									+		
	Agrilus viridis		+	+	+	+	+			+		
	Agrilus aurichalceus									+		
	Agrilus convexicollis						+					
	Agrilus italicus						+					
	Amara aenea					+	+					
	Amara erratica					+	+	+				
	Amara misella						+	+				
	Amara schimperi							+				
	Amara spreta							+				
	Amara tibialis					+						
	Anaglyptus mysticus	+	+	+	+	+	+	+	+	+	+	

	Anisodactylus binotatus					+						
	Anisodactylus nemorivagus					+						
	Anthaxia quadripunctata			+		+	+	+		+		
	Anthaxia submontana						+					
	Bembidion atroviolaceum					+		+		+		
	Bembidion bipunctatum nivale						+	+				
	Bembidion doderoi					+		+		+		
	Bembidion geniculatum					+	+	+		+		
	Bembidion glaciale						+					
	Bembidion lampros					+						
	Bembidion millerianum							+				
	Bembidion monticula									+		
	Bembidion nitidulum					+	+	+				
	Bembidion properans					+	+					
	Bembidion quadrimaculatum					+						
	Bembidion stephensi					+						
	Bembidion subcostatum javurkovae									+		
	Bembidion tibiale					+		+		+		
	Bembidion tricolor							+				
	Bitoma crenata	+	+	+				+		+	+	
	Bostrychus capucinus		+	+	+				+		+	
	Brachyleptura tesserula*			+								requires special attention
	Buprestis haemorrhoidalis			+			+					
	Buprestis rustica			+			+					
	Byrrhus arietinus						+					
	Byrrhus fasciatus					+	+	+				
	Byrrhus glabratus						+	+				
	Byrrhus luniger					+	+					
	Byrrhus pilula					+	+	+				
	Calathus ftiscipes									+		
	Callidium violaceum			+							+	
	Callidium aeneum			+								
	Carabus arcensis	+		+		+		+				VU
	Carabus cancellatus	+	+	+	+	+	+					

	Carabus coriaceus		+			+	+		+			
	Carabus auronitens escheri	+	+	+	+	+	+	+	+	+		LR:nt
	Carabus hampei						+	+				
	Carabus intricatus	+	+	+	+	+					+	
	Carabus irregularis	+	+	+	+	+	+	+				
	Carabus linnaei	+	+	+	+		+	+				
	Carabus obsoletus*			+			+					LR:cd
	Carabus transsylvanicus						+					
	Carabus variolosus*	+	+	+	+	+					+	LR:cd
	Carabus violaceus	+	+	+	+	+	+	+			+	
	Carabus glabratus	+		+								
	Carabus scheidleri	+		+							+	
	Carabus zawadzkii					+						
	Carpathobyrrhulus transsylvanicus						+	+				
	Cerambyx scopolii	+	+	+	+				+			
	Cerylon histeroides	+	+	+	+	+	+				+	
	Chrysobothris affinis	+	+	+	+	+	+	+	+	+		
	Chrysobothris chrysostigma*			+			+			+		VU
	Cicindela campestris					+						
	Cicindela sylvicola			+		+				+		
	Cicones variegatus*	+	+		+						+	VU
	Clivina fossor					+						
	Clytus lama			+							+	
	Corymbia rubra	+	+	+	+						+	
	Cucujus cinnaberinus*	+	+	+								LR:nt
	Curimus erichsoni						+			+		
	Cychrus caraboides	+	+	+	+	+	+	+			+	
	Cymindis cingulata						+					
	Cytilus auricomus					+	+			+		
	Cytilus sericeus					+	+			+		
	Deltomerus carpathicus					+	+	+		+		
	Dictyoptera aurora	+	+	+	+						+	
	Duvalius corpulentus									+		
	Duvalius roubali						+	+				

	Duvalius ruthenus						+					
	Duvalius subterraneus			+		+	+	+				
	Duvalius transcarpathicus					+						
	Dyschirius roubali					+						
	Endomychus coccineus		+	+					+		+	
	Eurythyrea austriaca*			+						+		VU
	Evodinus calathratus	+	+	+	+						+	
	Harminius undulatus	+	+	+	+							
	Harpalus affinis			+		+		+				
	Harpalus latus					+	+			+	+	
	Hylecoetus dermestoides	+	+	+	+						+	
	Pachytodes (Judolia) cerambyciformis	+	+	+	+						+	
	Lacon lepidopterus*			+								VU
	Lamprohiza splendidula		+	+	+						+	
	Leistus baenningeri							+				
	Leistus piceus			+		+	+	+				
	Leptusa coronensis											
	Leptura erythroptera			+								
	Leptura (Strangalia) thoracica*		+	+							+?	EN, extremely threatened
	Licinus hoffmannseggii					+	+					
	Litargus connexus	+		+							+	
	Molorchus minor	+		+	+							
	Monochamus sartor			+							+	
	Monochamus sutor			+								
	Melandrya caraboides	+	+	+								
	Melanophila acuminata						+					
	Melasis buprestoides	+		+	+						+	
	Molops piceus			+		+	+					
	Mycetophagus quadripustulatus	+		+								
	Nebria brevicollis					+						
	Nebria fuscipes			+		+	+	+	+	+		
	Nebria jockischii hoepfneri					+		+		+		
	Nebria reitteri						+	+				
	Nebria rufescens					+		+		+		

	Nebria transsylvanica						+	+				
	Notiophilus biguttatus					+	+	+				
	Obrium brunneum			+								
	Oceoptoma thoracica	+	+	+	+							
	Ostoma ferruginea			+								
	Toxotus cursor			+								
	Paleocallidium coriaceum											
	Patrobus quadricollis			+			+	+				
	Peltis grossum			+							+	
	Phosphaenus hemipterus			+								
	Platycis minutus	+	+	+								
	Platyderus ruftis					+						
	Poecilus caerulescens					+	+					
	Poecilus cupreus							+				
	Poecilus lepidus					+				+		
	Pogonocherus fasciculatua											
	Pristonychus terricola					+						
	Prionus coriarius*	+	+	+	+						+	VU
	Pseudanophthalmus pilosellus					+	+					
	Pseudoophonus rufipes							+				
	Pterostichus anthracinus						+					
	Pterostichus cordatus					+	+	+				
	Pterostichus diligens					+						
	Pterostichus foveolatus			+		+	+	+				
	Pterostichus jurinei heydeni					+	+	+				
	Pterostichus niger			+		+		+		+		
	Pterostichus nigrita					+		+		+		
	Pterostichus oblongopunctatus							+				
	Pterostichus ovoideus					+						
	Pterostichus pilosus	+		+		+	+	+		+		
	Pterostichus strenuus					+		+				
	Pterostichus unctulatus					+	+	+		+		
	Pterostichus vernalis					+						
	Ptilinus pectinicornis	+	+	+	+	+	+	+		+	+	

	Rhizophagus bipustulatus	+	+	+	+						+	
	Rosalia alpina*	+	+	+	+						+	VU
	Rhagium sycophanta			+	+						+	
	Rhagium inquisitor			+								
	Rhopalopus macropus			+								VU
	Rhopalopus ungaricus	+	+	+	+							VU
	Rugilus mixtus			+								
	Rutpela maculata	+	+	+	+	+		+			+	
	Saperda scalaris										+	
	Serropalpus barbatus			+							+	LR:nt
	Simplocaria acuminata						+					
	Simplocaria deubeli						+					
	Stenus ludyi			+								
	Stenus maculiger			+								
	Stenus obscuripes			+								
	Stenolophus teutonus					+						
	Stictoleptura scuttelata	+	+	+	+						+	
	Stomis pumicatus					+						
	Syncalypta paleata									+		
	Synodendron cylindricum*	+	+	+	+	+	+	+	+	+	+	LR:nt
	Tetropium castaneum			+							+	
	Tetropium fuscum			+							+	
	Throscus dermestoides	+	+	+	+	+	+	+	+	+	+	
	Tillus elongatus			+	+							
	Trachys minuta	+	+	+						+		
	Trechus carpaticus							+				
	Trechus fontinalis						+	+				
	Trechus latus	+		+	+	+	+	+	+	+		
	Trechus plicatulus						+					
	Trechus pseudomontanellus					+				+		
	Trechus pulchellus	+		+	+	+	+			+		
	Trechus pulpani					+	+	+				
	Trechus striatulus	+	+	+			+	+				
	Trichotichnus laevicollis					+	+	+				

	Triplax russica	+		+					+		+	
	Xyleborus dispar	+	+	+	+			+	+		+	
	Xylophilus corticalis*		+	+								VU
	Xyloterus domesticus	+	+	+	+				+		+	
	Xylotrechus rusticus	+	+	+	+			+	+		+	
	Number of species	**54**	**50**	**104**	**44**	**84**	**79**	**69**	**16**	**48**	**47**	
	206											
	Explanations											
	* species of conservation interest											
	Conservation cathegory (IUCN, Red Data Book, SR)											
	EN - endangered											
	VU - vulnerable											
	LR:nt - low risk, near threatened											
	LR:cd - low risk, conservation dependend											

	Species list of Fungi				
	Druh / Species	**VI**	**ST**	**HA**	**RO**
	Abortiporus biennis		1		
	Agaricus essettei		1		
	Agaricus semotus			1	
	Agrocybe firma			1	
	Agrocybe praecox	1		1	1
	Aleuria aurantia		1		
	Aleuria cornubiensis		1		
	Aleurodiscus amorphus		1		1
	Amanita citrina		1	1	1
	Amanita excelsa		1		
	Amanita mappa		1	1	1
	Amanita muscaria			1	1
	Amanita phalloides			1	
	Amanita rubescens		1	1	1
	Amanita rubescens var. sulphureoannulata		1		
	Amanita spissa		1		
	Amanita vaginata		1		
	Amylostereum chailetii		1		
	Anthracobia maurilabra			1	
	Antrodia albida		1	1	1
	Antrodia heteromorpha		1		
	Antrodia lenis		1		
	Antrodia malicola		1		
	Antrodia mellita		1		
	Antrodia serialis		1		
	Antrodia sinuosa		1		
	Antrodiella citrinella		1		
	Antrodiella fissiliformis		1	1	1
	Antrodiella genistae		1		
	Antrodiella hoehnelii		1	1	1
	Antrodiella semisupina		1	1	1
	Aporpium caryae		1	1	1
	Armillaria cepistipes var. pseudobulbosa		1	1	1
	Armillaria mellea		1	1	1
	Armillaria oystoyae		1		
	Artomyces pyxidatus		1	1	1
	Ascocoryne cylichnium		1	1	1
	Ascocoryne sarcoides	1	1	1	1
	Ascotremella faginea		1		
	Auricularia mesenterica		1	1	1
	Baeospora myriadophylla		1		
	Basidioradulum radula		1		
	Belonidium leucophaeum		1		
	Bertia moriformis		1		
	Bisporella citrina	1	1	1	1
	Bjerkandera adusta		1	1	1
	Bjerkandera fumosa	1	1		
	Blumeria graminis		1		
	Bolbitius reticulatus			1	1
	Boletellus fragilipes		1	1	
	Boletus calopus		1		
	Boletus edulis			1	
	Boletus fragrans		1		

	Boletus luridus			1	
	Boletus pinophilus			1	
	Boletus pulverulentus		1	1	1
	Boletus reticulatus		1	1	1
	Bondarzewia mesenterica		1		
	Bondarzewia montana		1		
	Bourdortia galzini		1		
	Bulgaria inquinans	1	1		1
	Calocera cornea	1	1		
	Calocera viscose		1		
	Caloscypha fulgens		1		
	Calyptelopsis reticulata		1		
	Cantharellus cibarius		1		
	Cantharellus cinereus			1	
	Cantharellus friesii		1	1	
	Catinella olivacea		1		
	Ceratiomyxa fruticulosa		1		
	Ceriporia reticulata		1	1	1
	Ceriporiopsis gilvescens		1	1	1
	Ceriporiopsis pannocincta		1	1	1
	Cerrena unicolor		1		
	Clavidisculum acuum		1		
	Clavulina cinerea		1		
	Clavulina coralloides	1			
	Clavulina cristata		1		
	Clavulina rugosa		1		
	Clavulinopsis subtilis		1		
	Climacodon septentrionalis		1	1	1
	Clitocybe alnetorum		1		
	Clitocybe brumalis		1		
	Clitocybe clavipes		1		
	Clitocybe dealbata			1	
	Clitocybe diatreta		1		
	Clitocybe ditopa		1		
	Clitocybe fuligineipes		1	1	
	Clitocybe gibba		1		
	Clitocybe incilis		1		
	Clitocybe inornata		1	1	1
	Clitocybe odora		1		
	Clitocybe phyllophila			1	1
	Clitocybe pruinosa		1		
	Clitocybe radicellata		1		
	Clitocybe rivulosa			1	
	Clitocybe umbilicata		1	1	1
	Clitocybe vibecina		1		
	Clitocybula abundans		1		
	Clitocybula lacerata		1		
	Clitopilus hobsonii		1		
	Clitopilus punulus			1	
	Cochnatium cyathoideum		1		
	Collybia acervata		1	1	
	Collybia asema		1	1	
	Collybia butyracea		1		
	Collybia confluens		1	1	1
	Collybia cookei		1		

	Collybia cryophilla	1			
	Collybia distorta		1		
	Collybia dryophila		1		
	Collybia fodiens		1		
	Collybia hariolorum		1		
	Collybia impudica		1		
	Collybia maculata			1	
	Collybia peronata	1	1		
	Collybia porea		1		
	Coniophora olivacea		1		
	Conocybe ambigua		1		
	Conocybe dumetorum		1	1	
	Conocybe semiglobata		1		
	Conocybe subovalis		1		
	Conocybe tenera		1		
	Coprinus alopecia		1	1	1
	Coprinus angulatus		1		
	Coprinus atramentarius	1	1		
	Coprinus lagopus		1		
	Coprinus micaceus		1		
	Coprinus romagnesianus			1	
	Coprinus tardus		1		
	Cordyceps militaris	1	1		
	Coriolopsis gallica		1		
	Corticium roseum		1	1	1
	Cortinarius brunneofulvus		1		
	Cortinarius bulbiger				
	Cortinarius coerulescens		1		
	Cortinarius rufoolivaceus		1		
	Cortinarius violaceus			1	
	Cortinarius xanthocephalus		1		
	Cotylidia pannosa		1		
	Creolophus cirrhatus		1		
	Crepidotus applanatus		1	1	1
	Crepidotus cesatii		1	1	1
	Crepidotus epibryus		1	1	1
	Crepidotus haustelaris		1		
	Crepidotus herbarum			1	1
	Crepidotus mollis		1	1	1
	Crepidotus sphaerosporus		1	1	1
	Crepidotus variabilis		1		
	Crepisotus amygdalosporus		1		
	Crustomyces subabruptus		1		
	Cudoniella clavus		1	1	1
	Cyathicula cyathoidea		1		
	Cyathus striatus		1		
	Cyphella digitalis		1		
	Cystoderma amianthinum		1		
	Cystoderma carcharias		1		
	Cystoderma carpaticum		1		
	Cystoderma jasonis		1		
	Cystoderma terrei		1		
	Cystolepiota seminuda			1	
	Cystolepiota sistrata			1	
	Cystostereum murrayi		1		

	Dacrymyces nigricans		1		
	Dacrymyces stillatus		1		
	Daedalea quercina		1		
	Daedalopsis confragosa		1	1	1
	Daedalopsis tricolor		1	1	1
	Dasyscyphella crystallina		1	1	
	Dasyscyphus acuum		1		
	Dasyscyphus citrinescens		1		
	Dasyscyphus crystalinus		1		
	Datronia mollis		1	1	1
	Dentipellis fragilis		1	1	1
	Dermocybe punicea			1	
	Diatrype disciformis		1		
	Diatrype stigma		1	1	1
	Discina parma		1		
	Eichleriella deglubens			1	
	Entoloma cetratum		1		
	Entoloma conferendum		1		
	Entoloma dichroum		1		
	Entoloma icterinum		1		
	Entoloma nidorosum		1		
	Entoloma placidum		1		
	Entoloma pleopodium		1		
	Entoloma rhodopolium		1		
	Entoloma vernum		1		
	Entoloma xylophilum		1		
	Eocronartium muscicola		1		
	Erysiphe circaeae		1		
	Erysiphe cruciferarum		1		
	Erysiphe galeopsidis		1		
	Erysiphe heraclei		1		
	Erysiphe hyperici		1		
	Exidia sp.	1			
	Exidia glandulosa		1	1	1
	Exidia pithya		1		
	Exidiopsis calcea		1		
	Flammulaster carpophilus		1		
	Flammulaster erinacellus		1		
	Flammulaster muricatus		1		
	Flammulina velutipes		1		
	Fomes fomentarius	1	1		
	Fomitopsis pinicola	1	1		
	Fuligo septica		1		
	Funalia gallica		1		
	Galerina badipes		1		
	Galerina cinctula		1		
	Galerina hypnorum		1		
	Galerina marginata		1	1	
	Galerina nana		1	1	
	Galerina triscopa		1		
	Galerina unicolor		1	1	1
	Galerina vittaeformis		1		
	Ganoderma lipsiense	1	1		1
	Geastrum pectinatum		1		
	Geopyxis carbonaria			1	

	Gerronema umbilicatum		1		
	Gloeocystidiellum citrinum		1		
	Gloeophyllum abietinum		1		
	Gloeophyllum odoratum		1		
	Gloeophyllum sepiarium		1		
	Gloeoporus pannocinctus		1	1	1
	Grandinia nesporii		1		
	Gymnopilus bellulus		1		
	Gymnopilus hybridus		1		
	Gymnopilus penetrans		1		
	Gymnopilus sapineus		1		
	Gymnopus acervatus		1		
	Gymnopus aquosus		1		
	Gymnopus hariolorum		1		
	Gymnopus herinkii		1		
	Gymnopus impudicus		1		
	Gyromitra gigas		1		
	Gyroporus cyanescens		1	1	1
	Gyroporus cyaneus		1	1	1
	Haplotrichum aureum		1		
	Hebeloma sp.	1			
	Hebeloma mesophaeum			1	
	Helvella macropus		1		
	Helvella elastica		1	1	1
	Helvella lacunosa		1		
	Hemimycena cucullata			1	
	Hericium clathroides		1	1	1
	Hericium coralloides		1		
	Hericium erinaceus		1		
	Heterobasidion annosus		1		
	Hohenbuehelia abientina		1		
	Hohenbuehelia annosum		1		
	Hohenbuehelia atrocaerulea		1		
	Hohenbuehelia grisea		1		
	Hohenbuehelia mastrucata				
	Hohenbuehelia petaloides		1	1	1
	Hohenbuehelia spatulina			1	1
	Hydnum repandum		1		
	Hydnum rufescens		1		
	Hydropus atramentosus		1		
	Hydropus marginellus		1		
	Hydropus subalpinus		1		
	Hygrocybe calyptraeformis		1		
	Hygrocybe citrinovirens		1		
	Hygrocybe miniata		1		
	Hygrocybe reidii		1		
	Hygrocybe vitellina		1		
	Hygrophoropsis aurantiaca		1		
	Hygrophorus sp.	1			
	Hygrophorus eburneus		1	1	1
	Hygrophorus fagi			1	
	Hygrophorus karstenii			1	
	Hygrophorus penarius		1		
	Hygrophorus pudorinus		1		
	Hymenochaete carpatica		1		

	Hymenochaete cruenta		1		
	Hymenochaete fuliginosa			1	
	Hymenochaete rubiginosa		1	1	1
	Hymenoscyphus epiphyllus		1		
	Hymenoscyphus fructigenus		1		
	Hymenoscyphus imberbis		1		
	Hymenoscyphus scutula		1	1	1
	Hymenoscyphus serotinus		1		
	Hymenoscyphus vernus		1		
	Hyphoderma radula		1		
	Hyphoderma setigerum		1	1	1
	Hyphodontia nespori		1		
	Hypholoma capnoides	1	1		
	Hypholoma epixanthum		1		
	Hypholoma fasciculare		1		
	Hypholoma radicosum		1		
	Hypholoma sublateritium	1	1		
	Hypholoma subviride	1	1	1	
	Hypoxylon fragiforme		1		
	Hypoxylon fuscum	1			
	Hypsizygus circinatus		1		
	Hypsizygus tessulatus		1	1	
	Hypsizygus ulmarius		1		
	Cheilymenia stercorea		1		
	Chlorociboria aeruginascens		1	1	1
	Chlorosplenium aeruginascens		1	1	1
	Chondrostereum purpureum		1		
	Chondrostereum purpureum	1			
	Chrysomphalina chrysophyllum		1		
	Chrysophalina chrysophyllum		1		
	Inocybe argillacea			1	
	Inocybe brunnea		1		
	Inocybe calamistrata		1		
	Inocybe eutheles		1		
	Inocybe fastigiata		1		
	Inocybe geophylla			1	
	Inocybe glabrescens		1		
	Inocybe mixtilis		1		
	Inocybe napipes		1		
	Inocybe pudica		1		
	Inocybe rimosa		1		
	Inocybe sindonia		1		
	Inocybe whitei		1		
	Inocyne abietis		1		
	Inonotus cuticularis		1	1	1
	Inonotus hastifer		1		
	Inonotus nodulosus		1	1	1
	Inonotus radiatus		1		
	Ionomidotis irregularis		1		
	Irpex lacteus		1		
	Isaria cf. farinosa		1		
	Ischnoderma benzoinum		1		
	Ischnoderma resinosum		1	1	1
	Isosoma carnosum		1		
	Junghuhnia fimbriatella		1		

	Junghuhnia nitida			1	
	Kuehneromyces mutabilis		1	1	1
	Laccaria affinis var. intermedia		1	1	1
	Laccaria altaica			1	1
	Laccaria amethystina		1	1	1
	Laccaria laccata		1		
	Laccaria pumila			1	
	Lacrymaria pyrotricha		1	1	1
	Lactarius acris		1		
	Lactarius blennius		1	1	1
	Lactarius fulvissinus			1	
	Lactarius glutinopallens		1		
	Lactarius hepaticus		1		
	Lactarius ichoratus			1	
	Lactarius pallidus		1	1	1
	Lactarius picinus		1		
	Lactarius piperatus		1		
	Lactarius pterosporus		1		
	Lactarius rugatus		1		
	Lactarius salmonicolor		1		
	Lactarius serifluus		1		
	Lactarius subdulcis		1	1	1
	Lactarius torminosus		1		
	Lactarius vellereus		1		
	Lachnum abnorme		1		
	Lachnum cerinum		1		
	Lachnum citrinescens		1		
	Lachnum clandestinum		1		
	Lachnum mollisimum		1		
	Lanzia luteovirescens		1		
	Laxitextum bicolor		1	1	1
	Lentaria albovinacea		1		
	Lentaria delicata			1	
	Lentaria mucida		1		
	Lentinellus castoreus		1		
	Lentinellus cochleatus		1	1	1
	Lentinellus flabeliformis		1		
	Lentinus adhaerens		1		
	Lentinus strigosus		1	1	1
	Lenzites betulina		1		
	Leotia lubrica		1		
	Lepiota aspera			1	
	Lepiota clypeolaria		1		
	Lepiota felina		1		
	Lepiota fulvella		1		
	Lepiota ignivolvata		1		
	Lepiota perplexa		1	1	1
	Lepiota rhodorrhiza		1		
	Lepiota ventriosospora		1		
	Lepista flaccida		1		
	Lepista gilva		1		
	Lepista nebularis		1		
	Leucocortinarius bulbiger			1	
	Leucopaxillus gentianeus			1	
	Lopharia spadicea			1	

	Lycogala epidendrum	1	1		
	Lycoperdon echinatum			1	
	Lycoperdon foetidum		1		
	Lycoperdon perlatum	1	1	1	1
	Lycoperdon pyriforme	1	1		
	Lyophyllum connatum		1		
	Lyophyllum decastes		1	1	1
	Lyophyllum ulmarium		1		
	Macrolepiota gracilenta		1		
	Macrolepiota mastoidea		1		
	Macrolepiota procera		1	1	1
	Macrolepiota rhacodes		1	1	1
	Macrotyphula fistulosa		1		
	Marasmiellus perforans		1		
	Marasmius alliaceus	1	1	1	
	Marasmius cohaerens			1	
	Marasmius lupuletorum		1		
	Marasmius rotula		1	1	
	Marasmius setosus			1	
	Marasmius wynnei		1	1	
	Megacollybia platyphylla		1		
	Melanocua cognata		1		
	Melanocua verrucipes			1	1
	Melanoleuca cognata		1		
	Melastiza chateri		1		
	Melograma spiniferum		1		
	Meripilus giganteus	1	1	1	1
	Merulius tremellosus		1	1	
	Micromphale perforans		1		
	Mollisia cinerea		1		
	Mollisia ligni		1		
	Mutinus caninus			1	
	Mycelina salicina		1		
	Mycena abramsii		1		
	Mycena acicula		1		
	Mycena atrocyanea		1		
	Mycena aurantiomarginata		1		
	Mycena capillaris		1	1	
	Mycena citrinomarginata		1		
	Mycena coracina		1		
	Mycena crocata	1	1	1	1
	Mycena diosma		1		
	Mycena epipterygia		1		
	Mycena epipterygia var. viscosa		1		
	Mycena erubescens		1		
	Mycena fagetorum		1	1	
	Mycena filopes		1		
	Mycena flavescens		1		
	Mycena flavoalba			1	
	Mycena galericulata	1	1		
	Mycena galopus		1		
	Mycena haematopus	1	1	1	1
	Mycena laevigata		1		
	Mycena leptocephala		1		
	Mycena lohwagii		1		

	Mycena luteoalcalina		1		
	Mycena maculata		1		
	Mycena oortiana		1	1	1
	Mycena pelianthina		1		
	Mycena pseudocorticola		1		
	Mycena pura	1	1	1	
	Mycena purpureofusca		1		
	Mycena renati	1	1		
	Mycena rorida		1		
	Mycena rosea			1	
	Mycena rosella		1		
	Mycena rubromarginata		1		
	Mycena rugosa		1	1	
	Mycena rugulosipes		1	1	
	Mycena sanguinolenta		1		
	Mycena silvae-nigrae		1		
	Mycena speirea		1		
	Mycena stipata		1		
	Mycena stylobates	1	1		
	Mycena tintinnabulum			1	1
	Mycena viridimarginata		1		
	Mycena viscosa		1		
	Mycena vulgaris		1		
	Mycena zephirus		1		
	Mycenella salicina		1		
	Mycoacia aurea			1	
	Myxarium galzinii		1		
	Nectria cinnabarina		1		
	Nectria coccinea		1		
	Nectria fuckeliana		1		
	Neobulgaria pura	1	1	1	1
	Neobulgaria pura var. foliacea		1		
	Odontia bicolor		1		
	Oligoporus simanii		1		
	Oligoporus stipticus		1		
	Omphalina epichysium		1		
	Omphalina ericetorum		1		
	Omphalina grossula		1		
	Ossicaulis lignatilis		1	1	
	Oudemansiella mucida	1	1	1	1
	Oudemansiella radicata		1	1	1
	Oxyporus corticola		1		
	oxyporus populinus		1	1	
	Oxyporus ravidus		1		
	Panellus mitis		1		
	Panellus serotinus	1	1	1	1
	Panellus stipticus	1	1		
	Panelus violaceofulvus		1		
	Panus rudis		1	1	
	Paxillus involutus	1	1		
	Paxillus panuoides		1		
	Peziza sp.	1			
	Peziza micropus		1	1	1
	Peziza recedens		1		
	Phaeohelotium imberbe		1		

	Phaeolepiota aurea		1		
	Phaeolepiota lugubris		1		
	Phaeolus schweinitzii		1		
	Phanerochaete filamentosa		1		
	Phanerochaete velutina		1		
	Phellinus feruginosus		1	1	
	Phellinus hartigii		1		
	Phellinus pouzarii		1		
	Phellinus robustus		1		
	Phlebia centrifuga		1		
	Phlebia livida		1	1	1
	Phlebia radiata		1	1	
	Phlebia rufa		1	1	1
	Phlebia serialis		1		
	Pholiota adiposa	1	1	1	1
	Pholiota astragalina		1		
	Pholiota aurivella		1	1	
	Pholiota carbonaria		1		
	Pholiota flammans		1		
	Pholiota gummosa		1		
	Pholiota lenta		1		
	Pholiota scamba		1		
	Pholiota squarrosa	1	1		
	Pholiota squarrosoides		1	1	
	Pholiotina aporos		1		
	Pholiotina arrhenii		1		
	Pholiotina intermedia		1		
	Pholiotina teneroides			1	
	Phyllactinia guttata		1		
	Phyllotopsis nidulans		1	1	
	Physisporinus sanguinolentus		1	1	1
	Physisporinus vitreus		1	1	1
	Phytoconis ericetorum		1		
	Piptoporus betulinus		1		
	Pleurocybella porrigens		1		
	Pleurotus cornucopiae		1		
	Pleurotus dryinus		1		
	Pleurotus ostreatus		1	1	
	Pleurotus pulmonarius	1	1	1	1
	Plicaturopsis crispa	1	1	1	1
	Pluteus sp.	1			
	Pluteus atromarginatus		1		
	Pluteus cervinus	1	1	1	1
	Pluteus depauperatus		1		
	Pluteus galeroides		1		
	Pluteus godeyi		1		
	Pluteus granulatus		1		
	Pluteus hispidulus		1	1	
	Pluteus chrysophaeus		1	1	
	Pluteus leoninus		1	1	
	Pluteus luteovirens		1		
	Pluteus nanus		1	1	
	Pluteus pellitus		1		
	Pluteus petassatus		1	1	
	Pluteus phlebophorus		1	1	

	Pluteus plautus		1		
	Pluteus podospileus		1		
	Pluteus pouzarianus		1		
	Pluteus robertii		1		
	Pluteus romellii		1		
	Pluteus semibulbosus		1		
	Pluteus tricuspidatus		1		
	Pluteus umbrosus		1	1	
	Polyporus arcularius		1		
	Polyporus badius		1	1	
	Polyporus brumalis		1	1	
	Polyporus lentus			1	
	Polyporus melanopus		1	1	
	Polyporus squamosus	1	1		1
	Polyporus varius		1	1	
	Polyporus varius var. nummularius		1		
	Porostereum spadiceum			1	
	Porphyrellus porphyrosporus		1		
	Porpomyces mucidus		1	1	1
	Postia caesia		1		
	Postia caesia var. minor		1		
	Postia lactea		1		
	Postia stiptica		1		
	Postia tephroleuca		1	1	1
	Protodontia fascicularis		1		
	Psathyrella alympiana		1		
	Psathyrella artemisiae		1		
	Psathyrella candolleana		1	1	1
	Psathyrella caput-medusae		1		
	Psathyrella fusca		1		
	Psathyrella hydrophila		1	1	
	Psathyrella olympiana		1		
	Psathyrella pennata			1	
	Psathyrella piluliformis	1			
	Psathyrella pygmaea			1	
	Psathyrella pyrotricha		1	1	
	Psathyrella spadicea		1	1	
	Psathyrella spadiceogrisea		1		
	Psathyrella squamosa		1		
	Psathyrella subceurnua		1		
	Psathyrella subnuda		1		
	Psathyrella velutina		1	1	
	Psathyrella vernalis		1		
	Pseudoclitocybe beschidica		1	1	
	Pseudoclitocybe cyanthiformis		1	1	
	Pseudohydnum gelatinosum		1		
	Pseudoplectania melaena		1		
	Pseudoplectania vogesiaca		1		
	Pseudovasla spinifera		1		
	Psilocybe crobula		1	1	
	Psilocybe cyanescens		1		
	Psilocybe inquilina		1	1	
	Psilocybe semilanceata		1		
	Puccinia arenariae		1		
	Puccinia asarina		1		

	Puccinia poarum		1		
	Pycnoporellus fulgens		1		
	Pycnoporus cinnabarinus		1	1	
	Pyrenopeziza fuckelii		1		
	Pyrenopeziza petiolaris		1		
	Pyrenopeziza rubi		1		
	Radulomyces confluens		1		
	Radulomyces molaris		1	1	
	Ramaria bourdotiana		1		
	Ramaria flava		1		
	Ramaria fumigata		1		
	Ramaria stricta		1	1	1
	Resinicium bicolor		1		
	Rhodocollybia fodiens		1		
	Rhodocollybia maculata		1		
	Rhodocollybia melleopallens		1		
	Rhodocollybia prolixa		1		
	Rhodocybe melleopallens		1		
	Rhodocybe nitellina		1		
	Rhytisma acerinum		1		
	Rigidoporus crocatus		1	1	1
	Rigidoporus nigrescens		1	1	
	Ripartites helomorphus		1		
	Ripartites tricholoma		1	1	1
	Russula amethystina		1		
	Russula amoenicolor		1		
	Russula aurora		1		
	Russula brunneoviolacea		1		
	Russula curtipes		1		
	Russula cyanoxantha		1	1	
	Russula faginea		1		
	Russula fellea		1	1	
	Russula foetens		1		
	Russula fragilis		1		
	Russula grisea			1	
	Russula heterophylla		1		
	Russula chloroides		1		
	Russula integra		1		
	Russula laurocerasi		1		
	Russula lepida			1	
	Russula mairei		1	1	
	Russula nauseosa		1		
	Russula nigricans		1		
	Russula ochroleuca	1	1		
	Russula olivacea		1		
	Russula polychroma		1		
	Russula puellaris		1		
	Russula puellula		1		
	Russula raoultii		1		
	Russula rosea		1		
	Russula solaris		1	1	
	Russula turci		1		
	Russula velenovskyi		1		
	Russula vesca		1		
	Russula violeipes		1		

	Russula viscida		1	1	
	Russula xerampelina		1		
	Sarcodon imbricatus		1		
	Scleroderma citrinum		1	1	
	Scutellinia crinita		1		
	Scutellinia diaboli		1		
	Scutellinia scutellata		1		
	Scutellinia trechispora		1		
	Scutellinia umbrorum		1		
	Sebacina incrustans		1		
	Schizophyllum commune	1	1	1	1
	Schizopora carneolutea		1	1	
	Schizopora flavipora		1	1	
	Schizopora paradoxa		1	1	1
	Schizopora radula		1	1	1
	Simocybe centunculus		1	1	1
	Simocybe rubi		1		
	Simocybe sumptuosa			1	
	Skeletocutis carneogrisea		1		
	Skeletocutis lenis		1		
	Skeletocutis nivea		1	1	1
	Sparassis nemecii		1		
	Sphaerotheca balsaminae		1		
	Sphaerotheca fusca		1		
	Spongipellis delectans		1		
	Steccherinum fimbriatum			1	
	Steccherinum ochraceum		1		
	Stemonitis ferruginea		1	1	
	Stereum hirsutum	1	1		
	Stereum insignitum			1	
	Stereum ostrea			1	
	Stereum rugosum		1		
	Stereum sanquinolentum		1		
	Stereum subtomentosum		1	1	
	Strobilurus esculentus		1		
	Stropharia aeruginosa		1		
	Stropharia hornemanii		1		
	Stropharia squamosa		1	1	1
	Suillus aeruginascens			1	
	Suillus grevillei			1	
	Thelephora palmata		1		
	Thelephora penicillata		1		
	Trametes cervina		1	1	
	Trametes gibbosa	1	1		
	Trametes hirsuta	1	1		
	Trametes multicolor		1	1	1
	Trametes pubescens		1	1	1
	Trametes suaveolens	1	1		
	Trametes versicolor	1	1	1	1
	Tremella encephala		1		
	Tremella foliacea		1		
	Tremella mycophaga		1		
	Trichaptum abietinum		1		
	Trichaptum biforme		1	1	1
	Trichaptum fuscoviolaceum		1		

	Trichia affinis de Bary		1		
	Tricholoma columbetta		1	1	1
	Tricholoma imbricatum		1		
	Tricholoma inocybeoides		1		
	Tricholoma lascivum		1	1	1
	Tricholoma saponaceum		1		
	Tricholoma sciodes			1	
	Tricholoma ustale		1		
	Tricholomopsis decora		1		
	Tricholomopsis rutilans		1		
	Tyromyces sp.	1			
	Tyromyces chioneus		1		
	Tyromyces kmetii		1	1	
	Tyromyces lacteus		1		
	Tyromyces mentschulensis		1	1	
	Uromyces rumicis		1		
	Ustulina deusta		1		
	Vesiculomyces citrinus		1		
	Vibrissea truncorum		1		
	Xerocomus badius		1		
	Xerocomus chrysenteron		1		
	Xerocomus subtomentosus		1		
	Xeromphalina campanella		1		
	Xylaria carpophila		1	1	
	Xylaria filiformys		1		
	Xylaria hypoxylon		1		
	Xylaria longipes		1		
	Xylaria polymorpha		1		
Σ species	**741**	**55**	**663**	**235**	**118**

Σ Species 741

Number of Species/ Locality (1071)

Havesova HA
Vihorlat VI
Stuzica ST
Rozok RO

List of lichens

		SU	KZ	SV	CH	MA	UH
1.	Acarospora fuscata				1		
2.	Acarospora badiofusca			1			
3.	Acarospora glaucocarpa			1			
4.	Acrocordia gemmata				1	1	1
5.	Acrocordia salweii			1			
6.	Acrocordia conoidea						1
7.	Adelolecia pilati				1		
8.	Alectoria ochroleuca				1		
9.	Alectoria sarmentosa			1	1		
10.	Amandinea punctata				1		
11.	Anaptychia ciliaris	1			1	1	1
12.	Arthonia dispersa					1	
13.	Arthonia leucopellaea					1	
14.	Arthonia radiata						1
15.	Arthonia radiata					1	
16.	Arthopyrenia persoonii						1
17.	Arthrorhaphis alpina				1		
18.	Arthrorhaphis citrinella				1		
19.	Aspicilia adunans			1			
20.	Aspicilia cinerea				1		
21.	Aspicilia cacarea						1
22.	Aspicilia flavida			1			
23.	Aspilidea myrinii				1		
24.	Bacidia imbrina			1			
25.	Bacidia rosella					1	
26.	Baeomyces rufus				1		1
27.	Baeomyces roseus			1			
28.	Bellemerea cinereorufescens				1		
29.	Belonia herculina			1	1		
30.	Belonia russula					1	
31.	Biatora sphaeroides				1		
32.	Biatora vernalis				1		
33.	Biatora turgidula			1			
34.	Brodoa intestiniformis				1		
35.	Bryoria bicolor			1	1		
36.	Bryoria capillaris			1			1
37.	Bryoria chalybeiformis			1			1
38.	Bryoria fuscescens						1
39.	Bryoria implexa			1	1		
40.	Bryoria jubatus			1			
41.	Bryoria smithi				1		
42.	Bryoria subcanus			1			
43.	Buellia disciformis				1		
44.	Buellia stellulata						1
45.	Byssolomas subdiscordans				1		
46.	Calicium abietinum				1	1	
47.	Calicium huculinum				1		
48.	Calicium lenticulare				1		
49.	Calicium viride				1		
50.	Caloplaca cerina			1	1	1	1
51.	Caloplaca citrina						1
52.	Caloplaca ferruginea				1		1

53.	Caloplaca flavovirescens						1
54.	Caloplaca holocarpa					1	1
55.	Caloplaca nivalis			1	1		
56.	Caloplaca saxicola						1
57.	Candelaria concolor						1
58.	Candelariella vitellina			1	1		1
59.	Candelariella xanthostigma						1
60.	Catapyrenium cinereum		1		1		
61.	Catapyrenium daedaleum		1				
62.	Catillaria chalybeia				1		
63.	Catillaria globulosa				1		
64.	Catillaria lenticularis						1
65.	Catillaria minuta						1
66.	Catolechia wahlenbergii				1		
67.	Cetraria chlorophyla			1	1		
68.	Cetraria kukullata			1	1	1	
69.	Cetraria hepatizon			1	1		
70.	Cetraria islandica			1	1	1	
71.	Cetraria laureri			1	1		
72.	Cetraria muricata				1		
73.	Cetraria nivalis			1	1		
74.	Cetraria oakesiana	1			1		
75.	Cetraria pinastri			1			
76.	Cetraria sepincola			1		1	
77.	Cetrelia olivetorum	1			1		
78.	Cetrelia setrarioides			1			
79.	Chaenotheca chysocephala				1		
80.	Chaenotheca furfuracea		1		1	1	
81.	Chaenotheca phaeocephala				1		
82.	Chaenotheca chlorella				1	1	
83.	Chaenothecopsis pusiola				1		
84.	Cladonia alpicola			1			
85.	Cladonia amaurocraea				1		
86.	Cladonia arbuscula				1		1
87.	Cladonia bellidiflora				1		
88.	Cladonia botrytes				1		
89.	Cladonia carneola				1		
90.	Cladonia chlorophaea			1			
91.	Cladonia cenotea				1		1
92.	Cladonia coccifera					1	
93.	Cladonia coniocraea		1	1	1		1
94.	Cladonia cornuta				1		
95.	Cladonia crispata						1
96.	Cladonia cyanipes				1		
97.	Cladonia glauca				1		
98.	Cladonia deformis			1	1		
99.	Cladonia digitata			1	1	1	
100.	Cladonia fimbriata		1	1			1
101.	Cladonia floerceana				1		
102.	Cladonia furcata	1	1	1		1	1
103.	Cladonia gracilis subsp. gracilis			1	1		
104.	Cladonia macilenta subsp. macilenta			1	1		
105.	Cladonia macroceras				1		
106.	Cladonia macrophylla				1		
107.	Cladonia macrophyllodes			1	1		

108.	Cladonia ochrochlora				1		1
109.	Cladonia pleurota			1	1	1	
110.	Cladonia pocillum			1	1		1
111.	Cladonia portentosa				1		
112.	Cladonia polydactyla				1		
113.	Cladonia pyxidata			1	1	1	1
114.	Cladonia rei				1		1
115.	Cladonia rangiferina			1			
116.	Cladonia rangiformis			1			
117.	Cladonia squamosa var. squamosa			1	1		
118.	Cladonia squamosa var. subsquamosa			1			
119.	Cladonia stygia				1		
120.	Cladonia subulata						1
121.	Cladonia sulphurina				1		
122.	Cladonia sylvatica			1			
123.	Cladonia uncialis			1	1		
124.	Collema auriforme						1
125.	Collema flaccidum		1		1		1
126.	Collema nigrescens				1		1
127.	Collema undullatum			1	1		
128.	Collema occultatum					1	
129.	Collema fasciculare			1	1		1
130.	Coriscium viride			1			
131.	Cornicularia normoerica				1	1	
132.	Cyphelium inquinans					1	
133.	Dermatocarpon intestiniforme				1		
134.	Dermatocarpon luridum				1		1
135.	Dermatocarpon miniatum		1	1	1	1	1
136.	Dermatocarpon rivulorum						
137.	Dibaeis baeomyces				1		1
138.	Dimerella pineti				1		
139.	Diploschistes muscorum				1		
140.	Diploschistes scruposus				1	1	1
141.	Diplotomma alboatrum				1		
142.	Eopyrenula leucoplaca		1				
143.	Evernia divaricata	1		1	1	1	
144.	Evernia prunastri		1	1	1		1
145.	Farnoldia jurana				1		
146.	Fuscidea kochiana					1	
147.	Graphis scripta				1	1	1
148.	Gyalecta flotowii				1		
149.	Gyalecta foveolaris				1		
150.	Gyalecta peziza				1		
151.	Gyalecta leucaspis			1			
152.	Gyalecta trunsigena			1			
153.	Gyalecta jenensis				1		1
154.	Gyalecta ulmi					1	
155.	Haematomma ochroleucum					1	
156.	Helocarpon crassipes						
157.	Heterodermia speciosa	1		1	1		
158.	Hypocenomyce scalaris				1	1	1
159.	Hypogymnia bitteri				1		
160.	Hypogymnia farinacea				1		
161.	Hypogymnia physodes	1	1	1	1	1	1
162.	Hypogymnia tubulosa		1		1	1	1

163.	Hypogymnia vittata	1		1			1
164.	Icmadophila ericetorum				1		
165.	Imshaugia aleurites					1	
166.	Immersaria athroocarpa				1		
167.	Lasallia pustulata				1		
168.	Lecania fuscella					1	
169.	Lecanora allophana				1		1
170.	Lecanora argentata						1
171.	Lecanora atra			1			
172.	Lecanora badia			1			
173.	Lecanora campestris				1		
174.	Lecanora carpinea		1		1		1
175.	Lecanora cenisia			1	1	1	
176.	Lecanora cinereofusca						
177.	Lecanora subcarpinea						1
178.	Lecanora dispersa				1		
179.	Lecanora expallens				1		1
180.	Lecanora gangaleoides				1		
181.	Lecanora glabrata						1
182.	Lecanora impudens						1
183.	Lecanora phaeostigma					1	
184.	Lecanora intricata				1	1	
185.	Lecanora intumescens				1		1
186.	Lecanora leptyrodes						1
187.	Lecanora marginata				1		
188.	Lecanora muralis		1	1	1		1
189.	Lecanora polytropa					1	
190.	Lecanora pulicaris				1		1
191.	Lecanora rupicola				1		
192.	Lecanora pallida			1	1		1
193.	Lecanora sulphurea			1	1		
194.	Lecanora rugosa				1		1
195.	Lecanora symmicta				1		1
196.	Lecanora sarcopidoides				1		
197.	Lecidea caecioatra			1	1		
198.	Lecidea confluens				1		
199.	´Lecidea fuliginosa				1	1	
200.	Lecidea promiscens				1		
201.	´Lecidea lymosa				1		
202.	Lecidea lapicida var. pantherina				1		
203.	Lecidea lithophila				1		
204.	Lecidea plana			1	1		
205.	Lecidea lurida				1		
206.	Lecidea pantherina			1			
207.	´Lecidea personata				1		
208.	Lecidea turgidula				1		
209.	Lecidella anomaloides				1		
210.	Lecidella elaeochroma				1		1
211.	Lecidella euphorea				1		1
212.	Lecidella wulfenii						
213.	Lecidoma demissum				1		
214.	Lepraria candelaris			1			
215.	Lepraria incana	1	1		1		
216.	Lepraria neglecta				1		
217.	Leptogium cyanescens				1		1

218.	Leptogium gelatinosum				1		1
219.	Leptogium lichenoides			1	1		1
220.	Leptogium saturninum				1		1
221.	Leptogium tenuissumum		1		1		
222.	Leptorhaphis atomaria				1		1
223.	Leptorhaphis epidermidis					1	
224.	Leptogium sabtille					1	1
225.	Lobaria amplissima			1	1	1	1
226.	Lobarina scrobiculata						1
227.	Lobothallia linita			1	1		
228.	Lobothallia melanaspis						
229.	Lobothallia pulmonaria		1	1	1	1	1
230.	Lopadium pezizoideum				1		
231.	Massalongia carnosa			1	1		
232.	Megalaria grossa				1		
233.	Melaspilea proximella				1		
234.	Menegazzia terebrata				1	1	1
235.	Micarea assimilata				1	1	
236.	Micarea lignaria				1		
237.	Micarea prasina		1				
238.	Miriquidica garovaglii				1		
239.	Mycobilimbia hypnorum				1		
240.	Mycobilimbia lobulata				1		
241.	Mycoblastus sanguinarius			1	1		
242.	Mycocalycium subtile				1		
243.	Nephroma bellum			1	1		1
244.	Nephroma parile				1		1
245.	Nephroma resupinatum			1	1	1	1
246.	Normandina pulchella	1		1			1
247.	Ochrolechia pallescens				1		1
248.	Ochrolechia androgyna				1		
249.	Ochrolechia parella						1
250.	Ochrolechia turneri				1		
251.	Ochrolechia tartarea				1		
252.	Omphalina hudsoniana				1		
253.	Orphniospora mosigii				1		
254.	Opegrapha atra				1	1	
255.	Opegrapha rufescens					1	1
256.	Opegrapha varia						1
257.	Opegrapha viridis					1	1
258.	Opegrapha vulgata				1		
259.	Ophioparma ventosa				1		
260.	Pannaria conoplea				1		1
261.	Pannaria mikrophylla			1			
262.	Pannaria pezzizoides				1	1	
263.	Pannaria rubiginosa						1
264.	Parmelia caperata	1	1	1	1		1
265.	Parmelia saxatilis		1	1	1	1	1
266.	Parmelia conspersa	1	1		1		1
267.	Parmelia elegantula	1			1		
268.	Parmelia exasperata		1		1		1
269.	Parmelia exasperatula			1	1		1
270.	Parmelia fuliginosa			1			
271.	Parmelia glabra	1		1	1		1
272.	Parmelia glabratula	1	1		1	1	

273.	Parmelia laevigata	1	1				1
274.	Parmelia perlata			1			
275.	Parmelia revoluta		1	1	1		1
276.	Parmelia scortea			1			
277.	Parmelia sinuosa	1			1		1
278.	Parmelia sorediosa				1		
279.	Parmelia subargentifera						1
280.	Parmelia subaurifera			1			1
281.	Parmelia subrudecta	1			1		1
282.	Parmelia tiliace	1	1			1	1
283.	Parmelia verruculifera			1			1
284.	Parmelia stygia				1		
285.	Parmelia quercina	1					1
286.	Parmelia sulcata	1	1	1	1	1	1
287.	Parmeliella triptophylla		1		1		1
288.	Parmeliopsis ambigua	1			1		1
289.	Parmeliopsis hyperopta				1		
290.	Parmotrema arnaldii						1
291.	Parmotrema crinitum	1			1		
292.	Parmotrema chinense				1	1	1
293.	Peltigera aphthosa			1	1	1	
294.	Peltigera canina	1	1	1	1	1	1
295.	Peltigera collina					1	
296.	Peltigera degenii			1	1		
297.	Peltigera horizontalis			1	1		1
298.	Peltigera hymenina						
299.	Peltigera lepidophora		1	1	1		
300.	Peltigera leucophlebia			1	1		
301.	Peltigera malacea				1		
302.	Peltigera polydactylon			1	1	1	1
303.	Peltigera praetextata		1	1	1		1
304.	Peltigera rufescens		1	1	1		1
305.	Peltigera scabrosa				1		
306.	Peltigera venosa			1	1		
307.	Pertusaria albescens				1	1	1
308.	Pertusaria alpina						1
309.	Pertusaria amara	1		1	1		1
310.	Pertusaria trachythalliana						1
311.	Pertusaria coccodes						1
312.	Pertusaria corallina				1		
313.	Pertusaria constricta				1		1
314.	Pertusaria flavida			1			
315.	Pertusaria multipuncta			1			
316.	Pertusaria hemisphaerica						1
317.	Pertusaria leucostoma			1	1		
318.	Pertusaria lactea			1	1		
319.	Pertusaria oculata				1		
320.	Pertusaria pertusa						1
321.	Pertusaria servitiana				1		
322.	Phaeocalicium praecedens				1		
323.	Phaeophyscia ciliata						1
324.	Phaeophyscia orbicularis					1	1
325.	Phlyctis agelaea	1			1		1
326.	Phlyctis argena	1			1	1	1
327.	Physcia adscendens						1

328.	Physcia aipolia						1
329.	Physcia caesia					1	
330.	Physcia dubia						1
331.	Physcia stellaris			1	1	1	
332.	Physcia tenella						1
333.	Physconia distorta						1
334.	Physconia grisea						1
335.	Placynthium nigrum		1		1		1
336.	Placynthiella uliginosa						
337.	Platismatia glauca	1		1	1	1	1
338.	Polyblastia lojkana					1	
339.	Polyblastia muralis			1			
340.	Polyblastia plicata						1
341.	Polyblastia cupularis				1		
342.	Polyblastia terrestris			1			
343.	Porpidia crustulata				1	1	
344.	Porpidia macrocarpa				1		
345.	Porpidia musiva				1		
346.	Porpidia speirea				1		
347.	Porpidia superba				1		
348.	Porpidia hidrophila				1		
349.	Protoblastenia rupestris		1				1
350.	Protoblastenia incrustans				1		
351.	Protoparmelia badia				1		
352.	Protothelenella sphinctrinoidela				1		
353.	Pseudephebe pubescens				1		
354.	Pseudevernia furfuracea	1		1	1	1	
355.	Psoroma hypnorum				1		
356.	Pyrenula laevigata					1	1
357.	Pyrenula nitida						1
358.	Pyrenula nitidella						1
359.	Ramalina capitata				1		
360.	Ramalina baltica			1	1		
361.	Ramalina calicaris		1	1	1		1
362.	Ramalina fraxinea			1			1
363.	Ramalina fastigiata				1		
364.	Ramalina pollinaria	1			1	1	1
365.	Ramalina thrausta			1	1		
366.	Ramalina roesleri			1	1		
367.	Ramallina farinacea			1	1		1
368.	Rhizocarpon alpicola			1	1		
369.	Rhizocarpon badioatrum			1	1	1	
370.	Rhizocarpon concentricum			1			
371.	Rhizocarpon geographicum			1	1	1	
372.	Rhizocarpon grande			1			
373.	Rhizocarpon obscuratum				1		
374.	Rhizocarpon petraeum				1		
375.	Rhizocarpon umbilicatum						1
376.	Rhizocarpon hchstetteri				1	1	
377.	Rinodina archaea						1
378.	Rinodina pyrina					1	1
379.	Rinodina bischoffii						1
380.	Rinodina confragosa		1		1		
381.	Rinodina exigua						1
382.	Rinodina niaraea				1		

383.	Ropalospora lugubris				1		
384.	Saccomorpha uliginosa				1		
385.	Sarcogyne regularis				1		
386.	Scoliciosporum umbrinum				1		
387.	Solorina bispora			1	1		
388.	Solorina octospora						
389.	Solorina saccata			1		1	1
390.	Sphaerophorus fragilis				1	1	1
391.	Sphaerophorus globosus				1		
392.	Stereocaulon alpinum				1		
393.	Stereocaulon vesuvianum				1		
394.	Sticta sylvatica			1	1		
395.	Sticta fuliginosa	1			1		1
396.	Tephromela atra				1		1
397.	Tephromela armeniaca				1		
398.	Thamnolia vermicularis var. subuliformis				1	1	
399.	Thelidium aenovinosum				1		1
400.	Thelidium minutulum				1		
401.	Thelidium papulare		1				1
402.	Thelidium piceum					1	
403.	Thelidium decipiens				1		
404.	Thelopsis rubella				1		
405.	Thelotrema lepadinum				1	1	1
406.	Thyrea confusa						
407.	Toninia candida						1
408.	Trapeliopsis granulosa				1		
409.	Tremolecia atrata				1		
410.	Umbilicaria crustulosa				1		
411.	Umbilicaria cylindrica			1	1	1	
412.	Umbilicaria deusta			1	1		
413.	Usnea carpatica			1			
414.	Usnea ceratina				1		
415.	Usnea dacypoga			1			
416.	Usnea fulvoreagens			1			
417.	Usnea florida		1	1	1	1	1
418.	Usnea glabrata				1		
419.	Usnea glabrescens				1		
420.	Usnea hirta				1	1	
421.	Usnea lapponica			1			
422.	Usnea scabrata				1		1
423.	Usnea longissima			1	1	1	
424.	Usnea plicata var. pendulina				1		
425.	Usnea subfloridana				1		1
426.	Verrucaria aethiobola		1		1		1
427.	Verrucaria caerulea					1	
428.	Verrucaria calciseda		1			1	
429.	Verrucaria fusca						1
430.	Verrucaria hidrela					1	
431.	Verrucaria ceissleri					1	1
432.	Verrucaria murina						1
433.	Verrucaria muralis		1				1
434.	Verrucaria fuscella						1
435.	Verrucaria margacea				1		
436.	Verrucaria nigrescens		1		1		1
437.	Vulpicida pinastri	1			1	1	

438.	Xanthoria fallax			1	1		1
439.	Xanthoria candelaria						1
440.	Xanthoria parietina				1		1
441.	Xanthoria polycarpa					1	
442.	Xylographa abietina				1		
	Number of Species/ Locality (752)	**32**	**42**	**132**	**291**	**90**	**165**
	Total Species 436						

Kuziy-Trybushany	KZ
Svydovets	SV
Chornohora	CH
Maramorosh	MA
Uhol'ka-Shyrokyi Luh	UH
Stuzhytsia-Uzhok	SU

Tab. 3. List of mammals – 73 species; See bottom of the table for the codes of selected localities.

Latin name	**Taxon - slovak name**	**Conservation Status, Red Data Book (SR)**	HA	VI	ST	RO	KZ	SV	CH	MA	UH	SU
Alces alces (Linnaeus, 1758)	los mokradovy	EN			H							
Apodemus agrarius (Pallas, 1771)	rysavka tmavopasa	LR:lc		H			H		H		H	H
Apodemus flavicollis (Melchior, 1834)	rysavka zltohrdla	LR:lc	H	H	H	H	H	H	H	H	H	H
Apodemus sylvaticus (Linnaeus, 1758)	rysavka krovinna	LR:lc	H	H	H	H	H		H		H	H
Apodemus uralensis (A. microps) (Pallas, 1811)	rysavka mysovita	LR:lc		H		H						H
Arvicola terrestris (Linnaeus, 1758)	hryzec vodny	LR:lc										H
Barbastella barbastellus (Schreber, 1774)	uchana cierna	LR:cd	H	H	H	H	H				H	H
Bison bonasus (Linnaeus, 1758)	zubor europsky	NE			H							
Canis lupus Linnaeus, 1758	vlk dravy	LR:nt	H	H	H	H	H	H	H	H	H	H
Capreolus capreolus (Linnaeus, 1758)	srnec lesny	NE	H	H	H	H	H	H	H	H	H	H
Castor fiber Linnaeus, 1758	bobor eurazijsky	LR:nt										H
Cervus elaphus Linnaeus, 1758	jelen lesny	NE	H	H	H	H	H	H	H	H	H	H
Chionomys (Microtus) nivalis (Martins, 1842)	hrabos snezny	VU										H
Clethrionomys glareolus (Schreber, 1780)	hrdziak lesny	NE	H	H	H	H	H	H	H	H	H	H
Crocidura leucodon (Hermann, 1780)	bielozubka bielobrucha	LR:lc										H
Crocidura suaveolens (Pallas, 1811)	bielozubka krpata	LR:lc										H
Dama dama (Linnaeus, 1758)	daniel skvrnity	NE										H
Dryomys nitedula (Pallas, 1778)	plch lesny	LR:nt	H	H	H	H		H	H	H		
Eptesicus nilssoni (Keyserling Blasius, 1839)	vecernica severska	LR:lc					H	H	H	H	H	H
Eptesicus serotinus (Schreber, 1774)	vecernica pozdna	DD	H	H	H	H	H	H	H	H	H	H
Erinaceus concolor Martin, 1838	jez vychodny	DD	H	H	H	H	H	H	H	H	H	H
Felis silvestris Schreber, 1775	macka diva	VU	H	H	H	H	H	H	H	H	H	H
Lepus europaeus Pallas, 1778	zajac polny	LR:lc					H	H	H	H	H	H
Lutra lutra (Linnaeus, 1758)	vydra riecna	VU					H	H	H	H	H	
Lynx lynx (Linnaeus, 1758)	rys ostrovid	EN	H	H	H	H	H	H	H	H	H	H
Marmota marmota (Linnaeus, 1758)	svist vrchovsky	EN										
Martes foina (Erxleben, 1777)	kuna skalna	DD	H	H	H	H	H	H	H	H	H	H
Martes martes (Linnaeus, 1758)	kuna lesna	DD	H	H	H	H	H	H	H	H	H	H

Latin name	Taxon - slovak name	Conservation Status, Red Data Book (SR)	HA	VI	ST	RO	KZ	SV	CH	MA	UH	SU
Meles meles (Linnaeus, 1758)	jazvec lesny	VU	H	H	H	H	H	H	H	H	H	H
Micromys minutus (Pallas, 1771)	myska drobna	LR:lc										
Microtus (Pitymys) tatricus Kratochvil, 1952	hrabos tatransky	VU							H			H
Microtus agrestis (Linnaeus, 1761)	hrabos mociarny	NE					H	H	H	H	H	H
Microtus arvalis (Pallas, 1778)	hrabos polny	NE					H				H	
Microtus subterraneus (de Selys-Longchamps, 1836)	hrabac podzemny	NE					H	H	H	H	H	
Miniopterus schreibersi (Kuhl, 1817)	netopier stahovavy	CR										
Mus musculus Linnaeus, 1758	mys domova	NE					H	H	H		H	H
Muscardinus avellanarius (Linnaeus, 1758)	plsik lieskovy	LR:lc	H	H	H	H	H	H	H	H	H	H
Mustela erminea Linnaeus, 1758	hranostaj ciernochvosty	NE					H	H	H	H	H	H
Mustela eversmanni Lesson, 1827	tchor stepny	DD										H
Mustela nivalis Linnaeus, 1766	lasica mysozrava	LR:lc	H	H	H	H	H	H	H	H	H	H
Mustela putorius (Linnaeus, 1758)	tchor tmavy	DD					H	H	H	H	H	H
Myotis bechsteini (Kuhl, 1817)	netopier Bechsteinov	LR:lc					H				H	H
Myotis blythi (Tomes, 1857)	netopier ostrouchy	LR:cd					H				H	H
Myotis brandti (Eversmann, 1845)	netopier Brandtov	VU									H	H
Myotis dasycneme (Boie, 1825)	netopier pobrezny	VU										H
Myotis daubentoni (Kuhl, 1817)	netopier vodny	LR:lc	H	H	H	H	H	H	H	H	H	H
Myotis emarginatus (E. Geoffroy, 1806)	netopier brvity	VU									H	H
Myotis myotis (Borkhausen, 1797)	netopier velky	LR:cd)	H	H	H	H	H	H		H	H	H
Myotis mystacinus (Kuhl, 1817)	netopier fuzaty	VU	H	H	H		H	H	H	H	H	H
Myotis nattereri (Kuhl, 1817)	netopier riasnaty	LR:nt									H	H
Myoxus (Glis) glis (Linnaeus, 1766)	plch sivy	LR:lc	H	H	H	H	H	H	H	H	H	H
Neomys anomalus Cabrera, 1907	dulovnica mensia	LR:nt	H	H	H	H						H
Neomys fodiens (Pennant, 1771)	dulovnica vacsia	LR:nt	H	H	H	H	H	H	H	H	H	H
Nyctalus leisleri (Kuhl, 1817)	netopier stromovy	DD	H		H	H					H	H
Nyctalus noctula (Schreber, 1774)	netopier hrdzavy	LR:lc	H	H	H		H	H	H	H	H	H
Nyctereutes procyonoides (Gray, 1834)	psik medvedikovity	NE										H
Ondatra zibethicus (Linnaeus, 1766)	ondatra pizmova	NE									H	H

Latin name	Taxon - slovak name	Conservation Status, Red Data Book (SR)	HA	VI	ST	RO	KZ	SV	CH	MA	UH	SU
Ovis ammon (Linnaeus, 1758)	muflon lesny	NE										H
Pipistrellus nathusii (Keyserling et Blasius, 1839)	vecernica parkova	DD					H	H	H	H	H	H
Pipistrellus pipistrellus (Schreber, 1774)	netopier hvizdavy	LR:lc	H			H	H	H	H	H	H	H
Plecotus auritus (Linnaeus, 1758)	netopier svetly	LR:nt					H	H	H	H	H	H
Plecotus austriacus (Fischer, 1829)	netopier sivy	LR:nt	H	H	H	H	H			H	H	H
Rattus rattus (Linnaeus, 1758)	potkan tmavy	NE					H	H	H	H	H	H
Rhinolophus ferrumequinum (Schreber, 1774)	podkovar stihlokridly	EN					H			H	H	H
Rhinolophus hipposideros (Bechstein, 1800)	podkovar krpaty	LR:cd					H			H	H	
Rupicapra rupicapra rupicapra (Linnaeus, 1758)	kamzik vrchovsky alpsky	NE										
Rupicapra rupicapra tatrica (Blahout, 1972)	kamzik vrchovsky tatransky	CR										H
Sciurus vulgaris Linnaeus, 1758	veverica stromova	LR:lc	H	H	H	H	H	H	H	H	H	H
Sicista betulina (Pallas, 1779)	mysovka horska	VU							H			
Sorex alpinus Schintz, 1837	piskor vrchovsky	VU	H		H	H	H	H	H	H	H	H
Sorex araneus Linnaeus, 1758	piskor obycajny	NE	H	H	H	H	H	H	H	H	H	H
Sorex minutus Linnaeus, 1766	piskor maly	NE	H	H	H	H	H	H	H	H	H	H
Sus scrofa Linnaeus, 1758	diviak lesny	NE	H	H	H	H	H	H	H	H	H	H
Talpa europaea Linnaeus, 1758	krt obycajny	NE	H	H	H	H	H	H	H	H	H	H
Ursus arctos Linnaeus, 1758	medved hnedy	LR:cd	H		H		H	H	H	H	H	H
Vespertilio murinus Linnaeus, 1758	vecernica tmava	DD					H			H		H
Vulpes vulpes (Linnaeus, 1758)	liska hrdzava	NE	H	H	H	H	H	H	H	H	H	H
Σ Species 73												
Number of Species/ Locality	435		35	33	36	33	50	41	44	44	54	65

Explanations

Havesova	HA
Vihorlat	VI
Stuzica	ST

Latin name	Taxon - slovak name	Conservation Status, Red Data Book (SR)	HA	VI	ST	RO	KZ	SV	CH	MA	UH	SU
Rozok	RO											
Kuziy-Trybushany	KZ											
Svydovets	SV											
Chornohora	CH											
Maramorosh	MA											
Uhol’ka-Shyrokyi Luh	UH											
Stuzhytsia-Uzhok	SU											

* species of conservation interest
Conservation cathegory (IUCN, Red Data Book, SR)
EN - endangered
VU - vulnerable
LR:nt - low risk, near threatened
LR:cd - low risk, conservation dependend
DD-data deficient

List of Mollusca										
Druh/Species	**ST**	**KZ**	**SV**	**CH**	**MA**	**UH**	**HA**	**VI**	**ST**	**RO**
Abida frumentum										
Aegopinella sp.							1	1		
Aegopinella epipedostoma						1				
Aegopinella minor										
Aegopinella pura				1		1	1	1		
Anisus leucostomus										
Anisus spirorbis										
Anisus vortex										
Anisus vorticulus										
Aplexa hypnorum										
Arianta arbustorum				1		1				
Arianta arbustorum ssp. alpicola										
Arion fasciatus										
Arion rufus										
Arion subfuscus				1		1				
Balea biplicata										
Bathyomphalus contortus										
Bielzia coerulens				1		1				
Bithynia leachi										
Bithynia tentaculata										
Carychium minimum						1				
Cecilioides acicula										
Cepaea vindobonensis										
Cepea hortensis										
Clausilia cruciata				1		1				
Clausilia dubia						1				
Clausilia pumila ssp. succosa						1				
Cochlicopa lubrica						1				
Cochlicopa lubricella						1				
Cochlodina laminata						1				
Columella edentula								1		
Deroceras reticulatum										
Discus rotundatus										1
Discus ruderatus										
Ena montana				1		1				
Ena obscura										
Eucobresia nivalis				1		1				
Euconulus fulvus				1		1			1	
Euomphalia strigella										
Fruticicola fruticum										
Fusulus varians										
Galba truncatula										
Gyraulus albus										
Helicella obvia										
Helix pomatia				1		1				
Chondrula tridens										
Iphigena plicatula										
Iphigena tumida										
Isognomostoma isognomostoma				1		1				1

Jamania tridens										
Limax maximus										
Limax tennelus										
Lymnaea palustris										
Lymnaea peregra										
Lymnaea stagnalis										
Macrogastra ventricosa										
Milax budapestensis										
Monacha cartusiana										
Monachoides incarnata										
Monachoides incarnatus incarnatus										
Monachoides vicina				1		1		1		
Nesovitrea hammonis				1		1				
Oxychilus cellarius										
Oxychilus depressus				1		1				
Oxychilus glaber										
Oxyloma elegans										
Perforatella incarnata										
Perforatella rubiginosa										
Physa fontinalis										
Pisidium obtusale										
Planorbarius corneus										
Planorbis planorbis										
Pseudalinda turgida										
Pseudotrichia rubiginosa										
Punctum pygmaeum				1		1				
Pupilla muscorum										
Radix auricularia										
Radix ovata										
Segmentina nitida										
Semilimax kotulae				1		1		1		
Semilimax semilimax				1		1				
Sphaerium lacustre										
Stagnicola palustris										
Stagnicola turricula										
Succinea oblonga				1		1				
Succinea putris										
Trichia hispida										
Trichia striolata danubialis										
Truncatellina cylindrica				1		1	1			
Vallonia costata						1				
Vallonia excentrica										
Vallonia pulchella						1				
Valvata cristata										
Valvata piscinalis										
Valvata pulchella										
Vertigo pygmaea						1				
Vitrea crystallina				1		1				
Vitrea diaphana				1		1				
Vitrina pellucida				1		1				
Viviparus contectus										

Zebrina detrita										
Zonitoides nitidus										
Acanthinula aculeata				1		1	1			
Acicula polita						1				
Aegopinella nitens				1						
Arcna bielzi						1				
Arianta aethiops petrii				1						
Arion silvaticus				1		1				
Balea stabilis				1		1				
Bradybaena fruticum						1				
Bulgarica cana				1		1	1			
Carpathica calophana				1		1				
Carychium tridentatum elongatum				1		1				
Chondrina avenacea				1		1				
Chondrula bielzi						1				
Coclodina orthostoma						1				
Columella colemella				1		1				
Deroceras laeve						1				
Deroceras moldavicum						1				
Deroceras occidentale				1						
Deroceras rodnae				1		1				
Edentiella bakowskii				1		1	1			
Faustina faustina				1		1				
Granaria frumentum				1		1				
Idmax cinereoniger						1				
Lehmannia macroflagellata				1		1	1			
Lehmannia marginata				1		1				
Macrohastra latestriata				1		1				
Macrohastra tumida				1		1	1			
Merdigera obscura						1				
Oxychilus orientalis				1		1	1			
Perforatella dibothrion						1				
Pupilla sterri						1				
Puramidula rupestris				1		1	1			
Ruthenica filohrana						1				
Serrulina serrulata						1				
Vertigo modesta alpestris						1				
Vertigo substriata				1		1				
Vestia gulo				1		1	1			
Vestia turgida procera						1				
Vestia turgida turgida				1						
Vitrea transsylvanica				1		1				
Number of Species/ Locality 132				46		67	11	5	1	2

Σ Species 74

Havesova HA
Vihorlat VI
Stuzica ST
Rozok RO

Kuziy-Trybushany	KZ
Svydovets	SV
Chornohora	CH
Maramorosh	MA
Uhol’ka-Shyrokyi Luh	UH
Stuzhytsia-Uzhok	SU

	List of mosses	SU	KZ	SV	CH	MA	UH	HA	VI	ST	RO	*
1.	Aloina rigida				1			1				
2.	Amblystegium confervoides				1		1	1	1			
3.	Amblystegium juratzkanum		1									
4.	Amblystegium reparium				1							
5.	Amblystegium serpens	1	1	1	1		1	1	1	1	1	
6.	Amblystegium subtilis				1		1					
7.	Amblystegium tenax				1	1	1	1	1		1	
8.	Amblystegium varium		1				1					
9.	Amphidium lapponucum				1	1		1		1		
10.	Amphidium mougeotii			1	1	1		1	1	1	1	
11.	Anastrepta. orcadensis						1					
12.	Anastrophyllum michauxii			1	1							Lr:nt
13.	Anastrophyllum minutum				1	1		1		1		
14.	Andrea rupestis					1						
15.	Aneura pinguis					1						
16.	Anoectangium aestivum			1							1	Vu
17.	Anomodon attenuatus		1	1			1		1	1	1	
18.	Anomodon longifolius		1		1	1	1	1	1	1		
19.	Anomodon rugelii			1	1		1		1		1	Vu
20.	Anomodon viticulosus	1	1	1			1					
21.	Anthelia juratzcana				1	1			1		1	
22.	Antitrichia curtipendula				1	1			1			Vu
23.	Arctoa fulvela			1								En
24.	Atrichum hausscanechtii				1	1	1	1	1	1	1	
25.	Atrichum tenellum	1			1		1					
26.	Atrichum undulatum	1			1	1	1	1	1	1	1	
27.	Aulacomnium androgynum				1							
28.	Aulacomnium palustre				1	1		1	1			
29.	Barbilophozia floerkei			1		1		1	1			
30.	Barbilophozia hatcheri											
31.	Barbilophozia lycopodioides					1					1	
32.	Barbilophozia attenuata				1							

33.	Barbilophozia barbata						1					
34.	Barbula convoluta	1										
35.	Barbula crocea					1					1	
36.	Barbula unquiculata			1	1			1			1	
37.	Barbula vinealis		1									
38.	Bartramia hallerana					1						
39.	Bartramia ithyphylla			1		1		1		1		
40.	Bartramia pomiformis		1		1	1	1	1	1	1	1	
41.	Bazzania tricrenata			1	1	1		1	1		1	
42.	Bazzania trilobata			1	1			1		1		
43.	Blasia pusilla				1	1		1	1	1		
44.	Blepharostoma trichofyllum			1	1	1	1	1	1	1	1	
45.	Blindia acuta				1	1						Vu
46.	Brachythecium geheebii	1	1		1		1	1		1	1	
47.	Brachythecium glareosum	1					1					
48.	Brachythecium plumosum	1			1	1						
49.	Brachythecium populeum	1	1		1		1	1		1	1	
50.	Brachythecium reflexum	1	1	1	1	1	1	1	1	1	1	
51.	Brachythecium rivulare				1	1	1		1	1		
52.	Brachythecium rutabulum	1	1		1	1	1	1	1	1	1	
53.	Brachythecium salebrosum	1	1	1	1	1	1	1	1	1	1	
54.	Brachythecium starkei				1		1					
55.	Brachythecium velutinum	1	1	1	1	1	1	1	1	1	1	
56.	Bryoerythrophyllum recurvirostrum	1	1	1	1	1	1	1	1	1	1	
57.	Bryum argenteum	1			1							
58.	Bryum caespiticium	1		1	1		1	1		1	1	
59.	Bryum capillare	1		1	1	1	1	1	1	1	1	
60.	Bryum cappillare var. latifolium				1							
61.	Bryum elegans			1	1	1			1	1		
62.	Bryum gemmiparum	1										
63.	Bryum pallens				1						1	
64.	Bryum pallescens			1	1	1		1	1	1		
65.	Bryum pseudotriquetrum	1			1	1				1		
66.	Bryum schleicheri				1							Vu
67.	Bryum turbinatum			1						1	1	Vu
68.	Bryum uliginosum				1							En

69.	Bryum weigelii					1						LR: nt
70.	Buxbaumi viridis				1							VU
71.	Buxbaumii aphylla				1							LR: nt
72.	Callicladium haldanianum	1			1	1		1	1			VU
73.	Calliergon giganteum				1							LR: nt
74.	Calliergon stramineum				1							
75.	Calliergonella cuspidata	1	1	1	1	1	1	1	1	1	1	
76.	Calypogeia azurea	1			1	1						
77.	Calypogeia muelleriana			1								
78.	Calypogeia neesiana				1							
79.	Calypogeia suecisa			1								
80.	Campylium halleri		1		1	1	1	1	1	1	1	
81.	Campylium sommerfeltii	1			1		1					DD
82.	Campylium stellatum	1			1	1	1	1			1	
83.	Campylopus pyriformis				1							CR
84.	Campylopus schwarzii				1							DD
85.	Cephalozia ambigua				1							
86.	Cephalozia bicuspidata				1	1	1	1	1	1		
87.	Cephalozia catenulata			1	1	1		1		1	1	
88.	Cephalozia lunulifolia				1	1				1		
89.	Cephalozia pleniceps											
90.	Ceratodon purpureus				1	1			1	1		
91.	Chiloscyphus coadunatus				1							
92.	Chiloscyphus pallescens				1		1		1			
93.	Chiloscyphus polyanthos			1		1						
94.	Cinclidium stygium						1			1		CR
95.	Cirriphvllum cirrosum	1					1			1		EN
96.	Cirriphvllum crassinervium						1					
97.	Cirriphvllum piliferum	1				1	1	1	1			
98.	Cirriphvllum reichenbachianum	1					1					
99.	Climacium dendroides	1	1	1			1	1		1	1	
100.	Cnestrum schisti					1						
101.	Cololejeunea calcarea						1					
102.	Cololejeunea rossetiana						1					

103.	Conocephalum conicum		1	1		1		1		1	1	
104.	Cratoneuron commutatum	1	1		1	1		1	1		1	
105.	Cratoneuron decipiens					1						
106.	Cratoneuron filicinum	1	1	1	1	1	1	1	1	1	1	
107.	Ctenidium molluscum		1	1		1	1		1	1	1	
108.	Cynodontium bruntonii					1						DD
109.	Cynodontium polycarpon	1		1								
111.	Cynodontium strumiferum					1						
112.	Cynodontium tenelum			1	1			1	1			Cr
113.	Desmatodon latifolius			1		1						
114.	Dichodontium pellucidum			1	1	1	1	1	1	1		
115.	Dicranella cerviculata				1							VU
116.	Dicranella heteromalla	1		1	1	1	1	1	1	1	1	
117.	Dicranella palustris				1							
118.	Dicranella rufescens			1								Lr: nt
119.	Dicranella schreberana				1							
120.	Dicranella subulata				1	1						
121.	Dicranella varia		1	1		1			1	1	1	
122.	Dicranodontium asperulum				1							En
123.	Dicranodontium denudatum	1		1	1	1	1	1	1	1	1	
124.	Dicranoweisia crispula			1		1						
125.	Dicranum affine			1								
126.	Dicranum bongieanii	1			1	1		1				Lr: nt
127.	Dicranum elongatun				1			1				

128.	Dicranum flagellare				1							VU
129.	Dicranum fulvum			1		1						
130.	Dicranum fusceccens			1	1	1		1	1	1	1	
131.	Dicranum majus				1	1	1	1	1	1		Vu
132.	Dicranum montana	1		1	1	1		1	1	1	1	
133.	Dicranum muehlenbeckii			1		1						
134.	Dicranum scoparium			1	1	1	1	1	1	1	1	
135.	Dicranum viride				1		1		1		1	En
136.	Didymodon acutus				1							
137.	Didymodon insulans						1	1				Ex
138.	Didymodon rigidulus		1	1			1	1	1			
139.	Didymodon spadiceus					1					1	Vu
140.	Didymodon tophaceus					1						Lr: nt
141.	Didymodon vinealis	1			1							Lr: nt
142.	Difiscium foliosum			1	1					1	1	
143.	Diplophyllum albicans				1							
144.	Diplophyllum taxifolium			1	1	1		1		1	1	
145.	Distichium capillaceum			1	1	1		1	1			
146.	Ditrichum cylindricum		1									
147.	Ditrichum flexicaule			1	1	1	1	1	1	1	1	
148.	Ditrichum heteromalium		1									
149.	Ditrichum pallidum		1									
150.	Ditrichum pusillum				1							
151.	Drepanocladus aduncus		1	1	1			1	1	1		

152.	Drepanocladus exannulatus				1							
153.	Drepanocladus fluitans				1							
154.	Drepanocladus lycopodioides				1							Cr
155.	Drepanocladus revolvens					1		1				
156.	Drepanocladus sendetneri				1		1	1	1			En
157.	Drepanocladus uncinatus	1	1	1	1	1	1	1	1	1	1	
158.	Drepanocladus vernicosus			1	1							
159.	Encalypta ciliata				1							
160.	Encalypta rabdocarpa			1	1							Lr: nt
161.	Encalypta streptocarpa		1		1		1		1	1		
162.	Encalypta vulgaris		1									
163.	Entodon concinnus	1										Lr: nt
164.	Eurhynchium anguslirete		1		1	1	1		1	1	1	
165.	Eurhynchium hians	1	1				1	1	1			
166.	Eurhynchium praelongum				1	1		1			1	VU
167.	Eurhynchium speciosum				1		1			1		
168.	Eurhynchium striatum	1	1	1		1	1	1	1	1	1	
169.	Fissidens adianthoides	1		1	1		1	1		1	1	
170.	Fissidens bryoides			1	1	1			1	1	1	
171.	Fissidens cristatus	1	1	1			1	1				
172.	Fissidens limbatus						1	1				DD
173.	Fissidens pussillus	1			1							
174.	Fissidens taxifolius	1			1	1	1	1	1	1	1	
175.	Frullania dilatata						1					

176.	Frullania fragilifolia		1	1		1			1	1		
177.	Frullania tamarisci				1							
178.	Funaria hygrometrica	1	1	1	1			1		1	1	
179.	Grimmia alpestris					1						Lr: nt
180.	Grimmia anodon	1										Lr: nt
181.	Grimmia atrata	1										
182.	Grimmia decipiens	1										
183.	Grimmia donniana					1			1			Lr: nt
184.	Grimmia elatior					1						DD
185.	Grimmia elongata				1	1					1	DD
186.	Grimmia hartmanii			1		1	1		1			
187.	Grimmia Incurva				1	1						
188.	Grimmia ovalis				1	1			1			VU
189.	Grimmia pulvinata					1						
190.	Gymnostomum aeruginosum			1								
191.	Gyroweisia tenuis						1				1	Lr: nt
192.	Harpanthus flotowianus			1								
193.	Harpanthus scutatus			1	1				1	1		
194.	Hedwigia ciliata			1								
195.	Herzogiella seligeri	1	1	1	1	1	1	1	1	1	1	
196.	Herzogiella striatella			1	1	1	1					En
197.	Heterocladium dimorphum			1								
198.	Heterocladium heteropterum					1						
199.	Homalia trichomanoides		1		1	1	1	1	1			

200.	Homalothecium lutescens	1	1	1		1	1	1	1	1		
201.	Homalothecium nitens					1						
202.	Homalothecium philippeanum	1		1	1		1			1	1	
203.	Homalothecium sericeum	1	1		1	1	1	1	1	1	1	
204.	Homomallium incurvatum	1	1				1					
205.	Hookeria lucens			1		1	1	1	1		1	Ex
206.	Hygrohypnum luridum	1	1		1	1	1	1	1	1	1	Lr: nt
207.	Hygrohypnum molle					1						VU
208.	Hygrohypnum ochraraceum					1			1			
209.	Hylocomium pyrenaicum		1	1	1	1		1	1	1	1	
210.	Hylocomium splendens			1	1	1						
211.	Hylocomium umbratum				1	1	1	1	1			
212.	Hypnum bambergeri						1					Lr: nt
213.	Hypnum callichroum		1	1	1		1	1		1		VU
214.	Hypnum cupressiforme	1	1	1	1	1	1	1	1	1	1	
215.	Hypnum fertile			1		1	1	1		1	1	DD
216.	Hypnum imponens	1										
217.	Hypnum lindbergii	1	1									
218.	Hypnum pallescens	1	1	1	1	1	1	1	1	1	1	
219.	Hypnum recurvatum	1					1					
220.	Hypnum revolutum	1										Vu
221.	Isoptervgium pulchellum		1		1	1		1		1		
222.	Isothecium alopecuroides	1	1		1		1					
223.	Isothecium myoruroides			1		1	1	1		1		

224.	Jamesoniella autumnalis											
225.	Jungermannia atrovirens				1							
226.	Jungermannia gracillima				1							
227.	Jungermannia hyalina				1	1				1	1	
228.	Jungermannia leiantha						1					
229.	Jungermannia obovata					1						
230.	Jungermannia sphaerocarpa				1	1				1	1	
231.	Kiaeria blyttii					1						
232.	Kiaeria falcata					1						Lr: nt
233.	Kiaeria starkei			1	1	1						
234.	Lejeunea cavifolia			1	1	1		1			1	
235.	Lepidozia reptans			1	1	1		1	1	1		
236.	Leptobrium pyryforme					1		1				
237.	Lescea polycarpa						1					
238.	Lescuraea incurvata			1		1			1			
239.	Lescuraea mutabilis			1	1	1				1	1	
240.	Lescuraea patens		1			1						
241.	Lescuraea plicata				1							
242.	Lescuraea radicosa				1							
243.	Leucobryum glaucum					1	1			1	1	
244.	Leucodon sciuroides			1	1		1	1		1	1	
245.	Lophozia ventricosa			1		1						
246.	Lophozia wenzelii			1	1	1						
247.	Lophozia alpestris			1								

248.	Lophozia ascendens											
249.	Lophozia badensis						1					
250.	Lophozia bantriensis					1	1			1	1	
251.	Lophozia heterocolpos				1	1				1	1	
252.	Lophozia incisa			1	1	1						
253.	Lophozia longiflora				1	1			1	1		
254.	Lophozia sudetica				1	1			1			
255.	Mannia triandra				1							
256.	Marchantia polymorpha		1	1	1	1	1	1	1	1	1	
257.	Marsupella emarginata					1						
258.	Marsupella funckii			1		1		1				
259.	Marsupella sphacelata					1			1			LR: nt
260.	Marsupella ustulata			1								
261.	Metzgeria furcata			1	1	1	1	1	1	1		
262.	Metzgeria conjugata		1	1			1					
263.	Metzgeria fruticulosa				1	1	1		1	1	1	
264.	Mnium ambiguum					1						
265.	Mnium marginatum						1					
266.	Mnium spinosum			1		1		1	1			
267.	Mnium spinulosum			1								
268.	Mnium stellare	1	1				1	1	1			
269.	Mnium thomsonii			1	1	1	1	1	1	1		
270.	Moerckia blyttii					1	1		1			
271.	Mvurella julacea	1					1	1			1	

272.	Mylia anomala					1						
273.	Mylia taylori			1	1	1						
274.	Nardia scalaris				1	1						
275.	Neckera complanata		1		1		1	1		1	1	
276.	Neckera crispa		1		1	1	1		1	1	1	
277.	Neckera pennata		1	1	1		1	1		1	1	En
278.	Neckera webbiana		1				1	1			1	
279.	Novelia curvifolia	1	1	1	1	1	1	1	1	1	1	
280.	Oligotrichum hercinicum			1	1	1					1	
281.	Onchophorus vahlenbergii				1							
282.	Onchophorus virens					1				1		Lr: nt
283.	Orthothecium intricatum		1	1	1	1		1	1	1		
284.	Orthotrichum affine						1					
285.	Orthotrichum alpestre					1						Cr
286.	Orthotrichum lyellii						1					Lr: nt
287.	Orthotrichum patens			1							1	Cr
288.	Orthotrichum pumillum				1							
289.	Orthotrichum speciosum				1	1		1				Lr: nt
290.	Orthotrichum stramineum				1							DD
291.	Orthotrichum striatum					1						Vu
292.	Oxystegus tenuirostris			1	1		1	1		1	1	Lr: nt
293.	Pallavicinia lyellii											
294.	Paraleucobrium enerve					1						Lr: nt
295.	Paraleucobrium longifolium	1		1	1		1					

296.	Paraleucobrium sauteri			1								Vu
297.	Pedinophyllum interruptum			1			1		1		1	
298.	Pellia endiviifolia		1		1							
299.	Pellia ephyphilla					1						
300.	Pellia nisiana			1		1					1	
301.	Philonotis caespitosa				1	1					1	En
302.	Philonotis calcarea				1	1						
303.	Philonotis marchica	1	1		1				1			Vu
304.	Philonotis seriata			1	1	1			1	1	1	
305.	Philonotis tomentella		1		1							
306.	Philonotis. fontana	1			1	1			1		1	
307.	Plagiochila asplenioides			1	1		1		1			
308.	Plagiomnium affine	1				1	1					
309.	Plagiomnium cuspidatum	1	1		1		1	1		1	1	
310.	Plagiomnium elatum			1	1							
311.	Plagiomnium ellipticum				1			1				DD
312.	Plagiomnium medium				1	1					1	
313.	Plagiomnium rostratum				1		1					
314.	Plagiomnium undulatum		1	1	1	1		1		1	1	
315.	Plagiopus oederi			1	1		1			1	1	
316.	Plagiothecium curvifolium			1		1	1			1	1	
317.	Plagiothecium denticulatum			1	1	1	1	1	1	1		
318.	Plagiothecium laetum		1		1	1			1	1		
319.	Plagiothecium neckeroideum	1		1		1						

320.	Plagiothecium nemorale	1		1		1			1	1		
321.	Plagiothecium platyphyllum	1		1		1						
322.	Plagiothecium succulentum	1	1		1		1		1	1	1	
323.	Plagiothecium undulatum			1	1	1	1	1	1	1	1	
324.	Platygyrium repens	1					1					
325.	Pleurozium schreberi	1		1	1	1	1	1	1	1	1	
326.	Pogonatum aloides			1	1	1	1		1	1	1	
327.	Pogonatum nanum					1						DD
328.	Pogonatum urnigenum			1	1	1		1	1			
329.	Pohlia ambigua		1									Vu
330.	Pohlia cruda			1		1			1			
331.	Pohlia elongata			1	1	1			1	1	1	
332.	Pohlia longicollis	1		1	1	1						Vu
333.	Pohlia nutans	1		1	1	1	1	1	1	1	1	
334.	Pohlia obtusifolia			1								Vu
335.	Pohlia wahlenbergii	1	1			1		1		1		
336.	Polytrichum alpinum			1		1		1	1		1	
337.	Polytrichum commune	1		1	1	1						
338.	Polytrichum formosum	1		1	1	1	1	1	1	1		
339.	Polytrichum juniperinum			1	1	1						
340.	Polytrichum longisetum	1			1							Vu
341.	Polytrichum pallidisetum				1							Vu
342.	Polytrichum piliferum	1		1		1		1		1		
343.	Polytrichum secsangulare				1	1						

344.	Polytrichum strictum			1	1	1			1	1	1	
345.	Porella arbovis-vitae						1					
346.	Porella plathyphylla			1	1		1					
347.	Preissia quadrata		1	1	1	1		1	1	1	1	
348.	Pseudephemerum nitidum				1							Vu
349.	Pseudoleskeella catenulata	1		1			1	1		1	1	
350.	Pseudoleskeella nervosa	1	1	1		1	1		1	1	1	
351.	Pteriginandrum filiforme				1	1	1		1	1	1	
352.	Ptilidium ciliare			1	1							
353.	Ptilidium pulcherrimum			1		1			1		1	
354.	Ptilium crista castrensis		1	1	1	1			1	1	1	
355.	Pylaisia polyantha	1	1			1		1	1		1	
356.	Racomitrium aciculare			1		1			1		1	
357.	Racomitrium affine				1	1					1	
358.	Racomitrium canescens	1			1	1		1		1	1	
359.	Racomitrium heterostichum			1	1	1		1	1		1	
360.	Racomitrium lanuginosus	1			1	1					1	
361.	Racomitrium microcarpon	1				1		1		1		Vu
362.	Racomitrium sudeticum	1		1	1	1		1	1	1		
363.	Radula complanata			1	1		1	1	1		1	
364.	Radula lindbergiana				1							
365.	Reboulia chemisphaaerica		1									
366.	Rhizomnium magnifolium		1		1	1			1		1	
367.	Rhizomnium pseudopunctatum				1	1		1	1			Lr: nt

368.	Rhizomnium punctatum	1	1	1	1	1	1	1	1	1	1	
369.	Rhodobrium roseum		1									
370.	Rhynchostegium murale		1									
371.	Rhynchostegium riparioides		1				1	1			1	
372.	Rhytidiadelphus loreus			1	1	1			1	1	1	
373.	Rhytidiadelphus squarrosus	1		1	1	1	1	1	1	1	1	
374.	Rhytidiadelphus subpinnatus		1		1		1					
375.	Rhytidiadelphus triquetrus		1		1	1	1	1	1	1		
376.	Rhytidium rugosum	1		1		1		1	1		1	
377.	Riccardia chamaedryfolia					1						
378.	Riccardia latyfrons			1	1				1	1		
379.	Riccardia myltyfida			1	1							
380.	Riccardia palmata			1	1		1			1	1	
381.	Saelania glaucescens			1								Lr: nt
382.	Sauteria alpina		1		1					1	1	Lr: nt
383.	Scapania apiculata				1		1		1			
384.	Scapania curta				1							
385.	Scapania Irrigiu				1	1					1	
386.	Scapania mucronata				1					1		
387.	Scapania nemorea			1	1	1			1		1	
388.	Scapania parvifolia			1								Vu
389.	Scapania uliginosa					1			1			
390.	Scapania undulata					1						
391.	Scapania verrucosa			1	1							

392.	Schistidium agassizii				1	1			1			DD
393.	Schistidium apocarpum	1	1	1	1	1	1	1	1	1	1	
394.	Schistostega pennata					1		1				En
395.	Scleropodium purum						1					
396.	Seligeria calcarea				1							Lr: nt
397.	Seligeria doniana		1				1		1			
398.	Seligeria recurvata			1	1	1		1	1	1	1	
399.	Sphagnum angustifolium			1								DD
400.	Sphagnum balticum				1					1		Cr
401.	Sphagnum capillifolium	1	1	1	1	1	1	1	1	1	1	
402.	Sphagnum centrale			1		1		1		1	1	
403.	Sphagnum compactum			1								Lr: nt
404.	Sphagnum contortum				1							Vu
405.	Sphagnum cuspidatum					1						Vu
406.	Sphagnum fallax				1							
407.	Sphagnum fimbriatum					1						Vu
408.	Sphagnum gingefarium	1	1	1	1	1	1	1	1	1	1	
409.	Sphagnum girgensohnii		1		1	1						
410.	Sphagnum magellanicum					1						
411.	Sphagnum palustre			1	1	1	1	1	1			
412.	Sphagnum papillosum			1								Vu
413.	Sphagnum riparium				1							Vu
414.	Sphagnum russowii			1		1						
415.	Sphagnum squarrosum				1	1		1	1			

416.	Sphagnum subsecundum				1							
417.	Sphagnum teres					1					1	
418.	Splachnum ovatum					1						
419.	Tayloria serrata			1								En
420.	Tayloria tenuis					1			1			Cr
421.	Tetraphys pellucida		1	1	1	1	1	1	1	1	1	
422.	Tetrodontium brounianum			1		1						Ex
423.	Thamnobryum alopecurum			1			1					
424.	Thuidium abietinum						1		1			
425.	Thuidium erectum		1			1	1			1	1	
426.	Thuidium philibertii		1				1		1			
427.	Thuidium recognitum	1					1					
428.	Thuidium tamariscinum	1	1	1	1	1	1	1	1	1	1	
429.	Timmia bavarica					1					1	
430.	Tortella inclinata			1								
431.	Tortella tortuosa	1	1		1	1	1	1	1	1	1	
432.	Tortula aestiva	1										
433.	Tortula canescens				1		1					
434.	Tortula intermedia	1		1	1	1	1	1	1	1	1	
435.	Tortula norvegica			1								Vu
436.	Tortula ruraliformis	1					1					
437.	Tortula ruralis			1	1		1	1	1		1	
438.	Tortula subulata				1							
439.	Tortula tirescens			1	1			1	1			

440.	Trichostomum brachydontium		1		1			1			1	DD
441.	Trichostomum crispulum	1	1		1		1	1	1			Vu
442.	Tritomaria exsectiformis				1							VU
443.	Tritomaria exsecta				1	1		1	1	1		
444.	Tritomaria qinqedentata			1	1	1		1	1	1		
445.	Ulota coarctata.			1	1				1			
446.	Ulota crispa		1	1	1	1	1	1	1	1	1	Vu
447.	Ulota hutchinsiae.				1			1				Cr
448.	Weissia condensa			1			1		1	1	1	
449.	Zigodon viridissimus				1							Cr
	Number of Species/ Locality 1608	102	95	180	259	233	158	145	152	143	141	1608

Σ Species (total) 444

Kuziy-Trybushany	KZ
Svydovets	SV
Chornohora	CH
Maramorosh	MA
Uhol’ka-Shyrokyi Luh	UH
Stuzhytsia-Uzhok	SU
Havesova	HA
Vihorlat	VI
Stuzica	ST
Rozok	RO

* species of conservation interest
Conservation cathegory (IUCN, Red Data Book, SR)
EN - endangered
VU - vulnerable

LR:nt - low risk, near threatened
LR:cd - low risk, conservation dependend
DD-data deficient
Ex - extinct

Myriapoda

Druh/Species	**HA**	**VI**	**ST**	**RO**	**KZ**	**SV**	**CH**	**MA**	**UH**	**SU**
Cvlindroiulus burzenlandicus	+	+		+	+	+		+	+	+
Glomeris connexa			+		+			+	+	
Leptophvllum trilobatus polonicus	+	+		+	+			+	+	
Megaphyllum projectum kochi	+	+			+				+	
Polydesmus complanatus	+	+	+	+	+	+	+	+	+	+
Polydesmus polonicus			+		+					
Unciger foetidus	+	+		+	+					
Number of Species/ Locality 38	5	5	3	4	7	2	1	4	5	2

Species **7**

Havesova	HA
Vihorlat	VI
Stuzica	ST
Rozok	RO
Kuziy-Trybushany	KZ
Svydovets	SV
Chornohora	CH
Maramorosh	MA
Uhol’ka-Shyrokyi Luh	UH
Stuzhytsia-Uzhok	SU

Vestia turgida turgida	+	
Vitrea transsylvanica	+	+

Nematoda										
Druh/Species	**HA**	**VI**	**ST**	**RO**	**KZ**	**SV**	**CH**	**MA**	**UH**	**SU**
Anatonchus istvani	+				+					
Anatonchus tridentatus							+		+	+
Clarcus papillatus					+		+	+	+	+
Clarcus patricius									+	
Coomansus menzeli	+	+		+	+	+	+	+	+	
Coomansus parvus					+					
Coomansus zschokkei	+	+			+			+	+	+
Miconchus studeri	+				+				+	+
Miconchus vliconchus hopperi										
Mininchus sp.					+					
Mononchus aquaticus					+					
Mononchus truncatus	+	+			+				+	+
Mylonchulus brachyuris	+	+			+				+	
Mylonchulus sigmaturus	+				+					
Prionchulus auritus	+	+	+				+		+	+
Prionchulus muscorum									+	+
Prionchulus punctatus	+	+	+	+	+	+	+	+	+	+
	9	6	2	2	12	2	5	4	11	8

Σ Species 16

Number of Species/ Locality 61 **9 6 2 2 12 2 5 4 11 8**

Havesova HA
Vihorlat VI
Stuzica ST
Rozok RO
Kuziy-Trybushany KZ
Svydovets SV
Chornohora CH
Maramorosh MA
Uhol’ka-Shyrokyi Luh UH
Stuzhytsia-Uzhok SU

Nematoda										
Druh/Species	**HA**	**VI**	**ST**	**RO**	**KZ**	**SV**	**CH**	**MA**	**UH**	**SU**
Anatonchus istvani	+				+					
Anatonchus tridentatus							+		+	+
Clarcus papillatus					+		+	+	+	+
Clarcus patricius									+	
Coomansus menzeli	+	+		+	+	+	+	+	+	
Coomansus parvus					+					
Coomansus zschokkei	+	+			+			+	+	+
Miconchus studeri	+				+				+	+
Miconchus vliconchus hopperi										
Mininchus sp.					+					
Mononchus aquaticus					+					
Mononchus truncatus	+	+			+				+	+
Mylonchulus brachyuris	+	+			+				+	
Mylonchulus sigmaturus	+				+					
Prionchulus auritus	+	+	+				+		+	+
Prionchulus muscorum									+	+
Prionchulus punctatus	+	+	+	+	+	+	+	+	+	+
	9	6	2	2	12	2	5	4	11	8

Σ Species 16

Number of Species/ Locality 61 **9 6 2 2 12 2 5 4 11 8**

Havesova HA
Vihorlat VI
Stuzica ST
Rozok RO
Kuziy-Trybushany KZ
Svydovets SV
Chornohora CH
Maramorosh MA
Uhol’ka-Shyrokyi Luh UH
Stuzhytsia-Uzhok SU

Tab. 7: Species list of Lepidoptera for primeval forests that are parts of the serial nomination and for which a relatively complete inventory is available as of today. See bottom of the table for the codes of selected localities.

Druh / Species	HA	VI	ST	RO	UH	CH	MA	SV	KZ	SU	Conservation Status, Red Data Book (SR)
Abarax sylvestris		1									
Adaina microdactyla		1									
Adcita statices					1	1	1	1	1		
Aglais urticae		1			1	1	1	1	1	1	
Aglia tau	1	1	1	1	1	1	1	1	1	1	
Agrius convolvuli					1			1	1		
Agrodiaetus amanda					1						
Agrochola lota	1		1	1							
Argynnis laodice		1									LR:nt
Acherontia atropos									1		
Alcis repandata	1		1	1							
Amphipyra livida		1									
Anthocharis cardamines		1			1	1	1		1	1	
Apatura ilia		1			1		1		1		
Apatura iris		1			1	1	1	1	1	1	
Aphantopus hyperantus		1			1	1	1	1	1		
Aplocera plagiata		1									
Aplocera praeformata			1		1	1	1	1	1		
Araschnia levana		1	1		1	1	1	1	1	1	
Arctia caja					1				1		
Argynnis paphia		1			1	1	1	1	1		
Archinemapogon yildizae			1								
Autographa gamma		1			1	1	1	1	1		
Brenthis daphne		1									
Callimorpha dominula		1			1	1	1	1	1	1	
Callimorpha quadripunctaria		1			1				1		
Callophris rubi					1	1	1	1	1		
Catocala electa					1				1		
Catocala elocata					1			1	1		
Catocala fraxini									1		
Catocala nupta					1			1	1		

Catocala promissa								1	1		
Catocala sponsa									1		
Celastrina argiolus					1	1	1	1	1		
Cerura vinula					1			1	1		
Clossiana euphorsyne					1	1	1				
Clossiana selene					1	1	1	1	1		
Coenonympha pamphilus		1			1	1	1	1	1		
Cochylidia rupicola		1									
Colias crocea					1	1	1	1	1		
Colias hyale					1				1		
Cossus cossus					1			1	1		
Cupido minimus					1	1	1	1	1		
Cyaniris semiargus					1			1	1		
Cydia fagiglandana	1		1	1							
Cynthia cardui					1	1	1	1	1		
Dasychira pudibunda	1		1	1	1	1	1	1	1	1	
Deilephila elpenor					1	1	1	1	1		
Deilephila porcellus					1	1	1	1	1		
Dendrolimus pini						1	1	1	1		
Dioryctria abietella			1							1	
Diurnea fagella	1		1	1						1	
Diurnea lipsiella	1		1	1						1	
Drepana falcataria			1								
Eilema complana		1									
Eligmodonta ziczac								1	1		
Endromis versicolora					1						
Epinotia nanana			1							1	
Epinotia tedella			1							1	
Epirrita autumnata	1		1	1						1	
Erebia aethiops									1		
Erebia euryale			1			1	1				
Erebia ligea					1	1	1		1		
Erebia manto						1					VU
Erebia medusa					1	1	1	1	1		

Erynnis tages					1	1	1	1	1		
Eudia pavonia					1						
Fabriciana adippe					1	1	1	1	1		
Fabriciana niobe					1	1	1	1	1		
Gastropacha populifolia					1						
Genopteryx rhamni		1									
Geometra papilionaria			1								
Glaucopsyche alexis					1						
Gonepteryx rhamni					1	1	1	1	1		
Hamearis lucina					1						
Hepialus humuli					1	1	1	1	1		
Hesperia comma					1				1		
Hydriomena furcata			1								
Hylaea fasciaria			1								
Hyles euphorbiae									1		VU
Hyles gallii									1		VU
Hyloicus pinastri					1	1	1	1	1		
Chloroclysta truncata	1		1	1							
Idaea emarginata		1									
Inachis io			1		1	1	1	1	1	1	
Iphiclides podalirius					1				1		
Issoria lathonia					1	1	1	1	1		
Laothae populi					1	1	1	1	1		
Lasiocampa quercus						1	1		1		
Lasiommata maera					1	1	1	1	1		
Leptidea sinapis					1	1	1	1	1		
Leucoma salicis					1						
Limenitis camilla							1		1		
Limenitis populi			1						1		LR:lc
Lycaena alciphron					1				1		VU
Lycaena hippothoe									1		
Lycaena phlaeas					1	1	1	1	1		
Lyceana tityrus						1	1		1		
Lyceana virgaureae					1	1	1	1	1		

Lymantria monacha					1	1	1	1	1		
Macroglossum stellatarum					1	1	1	1	1		
Macrothylacia rubi					1	1	1	1	1		
Maniola jurtina					1	1	1	1	1		
Melanargia galathea					1	1	1	1	1		
Melitaea athalia		1					1		1		
Mesoacidalia aglaja		1			1	1	1	1	1		
Mimas tiliae					1	1	1	1	1		
Neptis rivularis					1	1	1		1		LR:nt
Noctua comes		1									
Nothocasis sertata			1								
Notocelia uddmanniana		1									
Notodonta dromedarius					1			1	1		
Nymphalis antiopa		1			1	1	1	1	1		
Nymphalis polychloros		1			1	1	1	1	1		
Ochlodes venatus					1	1	1	1	1		
Operopthera brumata					1	1	1	1	1		
Papilio machaon					1	1	1	1	1		
Pararge aegeria					1	1	1	1	1		
Pararge megera					1	1	1	1	1		
Parasemia plantaginis					1	1					
Parnassius mnemosyne		1			1		1	1	1		VU
Pericallia matronula									1		EN
Phalera bucephala					1	1	1	1	1		
Pheosia tremula					1			1	1		
Pieris brassicae		1			1	1	1	1	1		
Pieris bryoniae		1				1	1		1		
Pieris napi		1			1	1	1	1	1		
Pieris rapae		1			1	1	1	1	1		
Plebejus agrus					1				1		
Poecilocampa populi					1				1		
Polia bombycina		1									
Polygonia c-album		1			1	1	1	1	1		
Polyommatus icarus					1	1	1	1	1		

Ponthia daplidice					1	1	1	1	1		
Protodeltote pygarga			1								
Proxenus lepigone		1									
Pseudoips fagana	1		1	1						1	
Pseudopanthera macularia			1							1	
Pterostoma palpinum					1		1	1	1		
Ptilophora plumigera			1								
Pyrausta falcatalis		1									
Pyrgus malvae					1	1	1	1	1		
Quercusia quercus									1		
Satyrium w-album					1				1		VU
Scoparia ingratella			1								
Scopula nigropunctata		1									
Scotopteryx chenopodiata			1								
Smerinthus ocellatus					1	1	1	1	1		
Spilosoma lubricipeda					1				1		
Spilosoma menthastri					1				1		
Stauropus fagi	1		1	1	1	1	1	1	1		
Strumonidia spina									1		
Talaeporia tubulosa		1									
Thecla betulae									1		
Thera variata			1							1	
Thymelicus lineolus					1	1			1		
Thyria jacobaeae									1		
Trisateles emortualis			1								
Udea alpinalis					1	1	1	1	1		
Udea decrepitalis		1									
Udea olivalis			1								
Watsonalla cultraria			1							1	
Xestia baja		1									
Zeuzera pyrina					1	1	1	1	1		
Zygaena filipendulae					1	1	1	1	1		
Number of species	**11**	**41**	**34**	**11**	**97**	**73**	**75**	**74**	**109**	**18**	

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Explanations

LR:lc	Lower risk: least concern
LR:nt	Lower risk: near threatened
VU	Vulnerable
EN	Endangered

	Vascular plants – list of species of the 4 Slovak primeval forests nominated for the World Natural Heritage				
	Druhy / Species	**VI**	**ST**	**HA**	**RO**
	(Abies balsamea)				
	(Abies concolor)				
	(Picea excelsa)				
	(Picea pungens)				
	Abies alba		1		1
	Acer campestre				
	Acer campestre ssp. leiocarpon		1		
	Acer platanoides		1	1	
	Acer pseudoplatanus		1	1	1
	Acer tataricum				
	Acetosa alpestris				
	Acetosa arifolia		1		1
	Acetosa carpatica		1		
	Acetosa pratensis		1	1	
	Acetosa scutata				
	Acetosa thyrsiflora				
	Acetosella vulgaris		1		
	Acinos alpinus				1
	Acinos arvensis			1	
	Aconitum anthora				
	Aconitum firmum				
	Aconitum firmum ssp. firmum				
	Aconitum firmum ssp. moravicum				
	Aconitum lasiocarpum		1		
	Aconitum moldavicum		1		
	Aconitum napellus				
	Aconitum napellus ssp. firmum				
	Aconitum toxicum ssp. lasiocarpum	1			
	Aconitum variegatum				1
	Aconitum variegatum ssp. gracile				
	Aconitum vulparia				1
	Acosta rhenana				
	Actaea spicata		1	1	1
	Adenophora liliifolia				
	Adenostyles alliariae		1		1
	Adonis flammea				
	Adoxa moschatellina		1	1	1
	Aegilops cylindrica				
	Aegonychon arvense				
	Aegopodium podagraria		1		1
	Aethusa cynapium				
	Agrimonia eupatoria				
	Agropyron caninum				1
	Agropyron cristatus				
	Agropyron pectinatum				
	Agropyron repens				1
	Agrostis alpina				
	Agrostis canina		1	1	
	Agrostis capillaris		1	1	1
	Agrostis gigantea		1	1	

	Agrostis rupestris				
	Agrostis stolonifera		1	1	1
	Agrostis tenuis		1		1
	Agrostis vulgaris				
	Achillea collina				
	Achillea crithmifolia				
	Achillea distans		1	1	1
	Achillea millefolium		1	1	
	Achillea millefolium ssp. sudetica				1
	Achillea millefolium ssp. alpestris				1
	Achillea millefolium ssp. eumillefolium				
	Achillea neilrechii				
	Achillea nobilis				
	Achillea ochroleuca				
	Achillea pannonica				
	Achillea setacea				
	Achillea stricta		1	1	1
	Achillea tanacetifolia				
	Achyrophorus maculatus				
	Achyrophorus uniflorus				
	Ajuga genevensis		1		
	Ajuga reptans		1	1	1
	Alchemilla sp.				
	Alchemilla baltica		1		
	Alchemilla fissa				
	Alchemilla flabellata				
	Alchemilla incisa		1		
	Alchemilla monticola				
	Alchemilla silvestris				
	Alchemilla vulgaris		1		
	Alchemilla xanthochlora				
	Alisma plantago-aquatica				
	Alliaria petiolata				
	Alliaria officinalis				
	Allium angulosum				
	Allium carinarum ssp. carinatum				
	Allium flavum				
	Allium montanum				
	Allium montanum ssp. glaucum				
	Allium ochroleucum				1
	Allium oleraceum			1	
	Allium rotundum				
	Allium senescens ssp. montanum				
	Allium schoenoprasum				
	Allium ursinum		1		
	Allium ursinum ssp. ucrainicum		1		1
	Allium victoralis				1
	Alnus glutinosa				
	Alnus incana		1		
	Alopecurus aequalis				
	Alopecurus pratensis			1	
	Alsinula media		1		
	Althaea cannabina				

	Althaea officinalis				
	Althaea pallida				
	Althaea taurinensis				
	Alyssum alyssoides				
	Alyssum desertorum				
	Alyssum montanum				
	Amelanchier ovalis				1
	Amygdalus nana				
	Anagallis arvensis				
	Androsace elongata				
	Androsace lactea				1
	Androsace maxima				
	Androsace obtusifolia				
	Androsace villosa				
	Anemone narcissiflora				
	Anemone nemorosa		1	1	1
	Anemone ranunculoides		1	1	
	Angelica sylvestris		1	1	1
	Anchusa barrlieri				
	Anchusa italica				
	Anchusa officinalis				
	Antenaria dioica		1		1
	Antennaria carpatica				
	Anthemis arvensis		1		
	Anthemis tinctoria				
	Anthericum ramosum				1
	Anthoxanthum alpinum		1		
	Anthoxanthum odoratum		1	1	1
	Anthriscus cerefolium				
	Anthriscus nitidus		1		1
	Anthriscus sylvestris		1	1	
	Anthyllis vulneraria				1
	Aphanes arvensis				
	Aposeris foetida		1		
	Aquilegia vulgaris				1
	Arabidopsis thaliana				
	Arabis alpina				
	Arabis auriculata				1
	Arabis hirsuta		1		1
	Arabis nemorensis		1		
	Arabis recta				
	Arabis sagittata				
	Arabis soyeri ssp. subcoriacea				1
	Arabis turrita				
	Arctium lappa		1		
	Arctium nemorosum			1	
	Arctium vulgare		1		
	Arctostaphylos uva-ursi				1
	Arenaria leptoclados				
	Arenaria leptoclados ssp. leptoclados				
	Arenaria serpyllifolia				
	Arenaria tenella				
	Archangelica officinalis				

	Aristolochia clematitis				
	Arrhenatherum elatius			1	
	Artemisia absinthium				
	Artemisia campestris				
	Artemisia eriantha				
	Artemisia pontica				
	Artemisia santonicum ssp.monogyna				
	Artemisia scoparia				
	Artemisia vulgaris		1		
	Arum alpinum				
	Aruncus dioicus				1
	Aruncus silvestris				
	Aruncus vulgaris		1		1
	Asarum europaeum		1	1	1
	Asparagus officinalis				
	Asperula cynanchica				
	Asperula glauca				
	Asperula neilreichii				
	Asperula odorata	1	1		
	Asperula rivalis				
	Asperula tinctoria				1
	Asplenium adiantum				
	Asplenium ruta-muraria				1
	Asplenium septentrionale				
	Asplenium trichomanes		1		1
	Asplenium viride		1		1
	Aster alpinus subsp. glabratus				
	Aster amelloides				
	Aster amelus				
	Aster bellidiastrum				1
	Aster linosyris				
	Aster novi-belgii agg.				
	Aster serpentimontanus				
	Astragalus glycyphyllos		1	1	
	Astragalus onobrychis				
	Astrantia major		1	1	1
	Athyrium alpestre				
	Athyrium distentifolium		1		1
	Athyrium filix femina		1	1	1
	Atragena alpina	1			
	Atriplex patula				
	Atropa bella-donna		1	1	
	Aurinia saxatilis ssp. arduinii				
	Avena fatua				
	Avenella flexuosa				
	Avenula planiculmis				
	Avenula pratensis				
	Avenula pubescens				
	Avenula versicolor				
	Baeotryon alpinum				
	Baeotryon caespitosum				
	Ballota nigra				
	Barbarea vulgaris		1		

	Bartsia alpina				1
	Bassia scoparia				
	Bellidiastrum michelii				1
	Bellis perennis				1
	Berberis vulgaris				1
	Berula erecta				
	Betonica officinalis		1	1	
	Betula pendula		1	1	
	Betula pendula ssp. pendula		1		
	Betula pubescens				
	Betula pubescens ssp. Carpatica				
	Betula verrucosa				
	Bidens cernua		1		
	Bidens frondosa				
	Bidens tripartita			1	
	Biscutella laevigata				1
	Bistorta major				
	Bistorta vivipara				
	Blackstonia perfoliata ssp. serotina				
	Blechnum spicant		1		
	Blysmus compressus				1
	Bombycilaena erecta				
	Botriochloa ischaemum				
	Botrychium lunaria				1
	Brachypodium pinnatum			1	
	Brachypodium silvaticum		1	1	1
	Briza media		1	1	1
	Bromopsis bennekenii			1	
	Bromus arvensis				
	Bromus benekenii		1		1
	Bromus commutatus		1		
	Bromus commutatus ssp. commutatus				
	Bromus hordeaceus				
	Bromus japonicus				
	Bromus monocladus				1
	Bromus racemosus				
	Bromus ramosus		1		
	Bromus squarrosus				
	Bromus sterilis				
	Bromus tectorum				1
	Buglossoides arvensis				
	Buglossoides purpureocaerulea				
	Buphtalmum salicifolium				1
	Bupleurum affine				
	Bupleurum falcatum				
	Bupleurum longifolium subsp. vapincense				
	Bupleurum praealtum				
	Bupleurum rotundifolium				
	Bupleurum tenuissimum				
	Butomus umbellatus				
	Calamagrostis arundinacea		1	1	1
	Calamagrostis canescens	1		1	
	Calamagrostis epigeios		1	1	1

	Calamagrostis varia				1
	Calamagrostis villosa		1		1
	Calamintha acinos				
	Calathiana nivalis				
	Calathiana verna				
	Callianthemum coriandrifolium				
	Callitriche sp.				
	Callitriche cophocarpa				
	Callitriche palustris agg.				
	Calluna vulgaris				
	Caltha laeta		1		
	Caltha palustris		1	1	1
	Caltha palustris ssp. laeta		1		
	Calystegia sepium				
	Camelina microcarpa				
	Campanula abietina		1		
	Campanula alpina				
	Campanula bononiensis				
	Campanula cervicaria				
	Campanula cocheariifolia		1	1	1
	Campanula glomerata		1	1	1
	Campanula glomerata ssp. elliptica				1
	Campanula latifolia		1		
	Campanula moravica				
	Campanula patula			1	
	Campanula patula ssp. eupatula				
	Campanula persicifolia			1	1
	Campanula rapunculoides		1	1	1
	Campanula rotundifolia				
	Campanula serrata		1		1
	Campanula sibirica				
	Campanula tatrae				
	Campanula trachelium		1		1
	Capsella bursa-pastoris		1		
	Carastium arvense				
	Cardamine amara		1	1	1
	Cardamine amara ssp. opizii				
	Cardamine arenosa				
	Cardamine dentata				
	Cardamine flexuosa		1		1
	Cardamine impatiens		1	1	
	Cardamine pratensis		1		1
	Cardaminopsis arenosa				
	Cardaminopsis borbasii				1
	Cardaminopsis halleri		1	1	
	Cardaminopsis neglecta				
	Carduus acanthoides				
	Carduus collinus				
	Carduus glaucinus				
	Carduus nuttans				
	Carduus personata				1
	Carex sp.				
	Carex acuta				

	Carex acutiformis				
	Carex alba				1
	Carex aterrima				
	Carex atrata				
	Carex atrata ssp aterrima				
	Carex atrata ssp atrata				
	Carex atrata ssp sterrima				
	Carex brachystachys				1
	Carex brizoides		1		
	Carex caespitosa				
	Carex canescens		1	1	
	Carex caryophyllea		1		
	Carex contigua				
	Carex davalliana				1
	Carex digitata		1		1
	Carex dioica				
	Carex disticha				
	Carex echinata		1		
	Carex elata				
	Carex elongata				
	Carex ericetorum subsp. approximata				
	Carex firma				1
	Carex flacca ssp. claviformis				1
	Carex flacca ssp. flacca		1		1
	Carex flava		1		1
	Carex fuliginosa				
	Carex gracilis				
	Carex hirta		1	1	
	Carex hostiana				
	Carex humilis				1
	Carex chabertii				
	Carex lachenalii				
	Carex lepidocarpa				1
	Carex limosa				
	Carex liparocarpos				
	Carex melanostachya				
	Carex michelii				
	Carex montana				1
	Carex muricata				
	Carex nigra		1		1
	Carex oederi				
	Carex ornithopoda				
	Carex ovalis		1		
	Carex pairae				
	Carex pallens			1	
	Carex pallescens		1		
	Carex panicea		1		1
	Carex paniculata				
	Carex pauciflora				
	Carex pendula		1	1	
	Carex pilosa		1	1	1
	Carex pilulifera		1		
	Carex praecox		1		

	Carex pseudocyperus				
	Carex remota		1	1	1
	Carex riparia				
	Carex rostrata		1		1
	Carex rupestris				
	Carex sempervirens				
	Carex sempervirens ssp. tatrorum				1
	Carex spicata				
	Carex stellulata		1		
	Carex stenophylla				
	Carex strigosa				
	Carex supina				
	Carex sylvatica		1	1	1
	Carex tomentosa				1
	Carex vesicaria		1		
	Carex viridula				
	Carex vulpina				
	Carlina acaulis		1	1	1
	Carlina vulgaris				
	Carpinus betulus		1	1	
	Carthamus lanatus				
	Carthamus tinctorius				
	Carum carvi				1
	Caucalis platycarpos				
	Centaurea cyanus				
	Centaurea jacea			1	
	Centaurea jacea ssp. oxylepis				
	Centaurea melanocalathia		1		
	Centaurea montana ssp. mollis	1			1
	Centaurea phrygia		1		
	Centaurea scabiosa ssp. alpestris				1
	Centaurea triumfettii				1
	Centaurium erythraea		1	1	
	Centaurium pulchellum				
	Cephalanthera damasonium				1
	Cephalanthera longifolia		1	1	1
	Cephalanthera rubra				1
	Cephalaria transsylvanica				
	Cerastium sp.				
	Cerastium alpinum				
	Cerastium arvense				
	Cerastium arvense ssp. strictum				
	Cerastium brachypetalum				
	Cerastium brachypetalum ssp. tauricum				
	Cerastium fontanum				
	Cerastium holosteoides		1	1	
	Cerastium lanatum				
	Cerastium strictum				
	Cerastium strictum ssp. tatrae				
	Cerastium uniflorum				
	Cerasus avium				
	Cerasus fruticosa				
	Cerasus mahaleb				

	Cerasus vulgaris				
	Ceratocephala orthoceras				
	Cerinthe minor				
	Cicerbita alpina		1	1	1
	Cicuta virosa				
	Cichorium intybus			1	
	Circaea alpina		1	1	1
	Circaea intermedia		1	1	1
	Circaea lutetiana		1	1	1
	Circaea x intermedia			1	
	Cirsium acaule				
	Cirsium arvense		1	1	
	Cirsium brachycephalum				
	Cirsium campestre				
	Cirsium canum				
	Cirsium eriophorum				
	Cirsium erisithales		1		1
	Cirsium erisithales x C. oleraceum				
	Cirsium oleraceum			1	1
	Cirsium palustre		1	1	
	Cirsium pannonicum				
	Cirsium rivulare		1		
	Cirsium rivulare x C. palustre				
	Cirsium rivulare x oleraceum		1		
	Cirsium vulgare			1	
	Cirsium waldstenii		1		
	Cleistogenes serotina				
	Clematis alpina	1			1
	Clematis integrifolia				
	Clematis recta				
	Clematis vitalba				
	Clinopodium vulgare		1		
	Cnidium dubium				
	Coeloglossum viride		1		1
	Cochlearia tatrae				
	Colchicum autumnale				
	Colutea arborescens				
	Colymbada alpestris				1
	Colymbada sadleriana				
	Colymbada scabiosa			1	
	Conioselinum tataricum				
	Conringia austriaca				
	Consolida regalis				
	Convallaria majalis				
	Convolvulus arvensis				
	Convolvulus cantabrica				
	Conyza canadensis			1	
	Corallorhiza trifida		1		1
	Corispermum nitidum				
	Cornus mas				
	Cornus sanguinea		1		
	Coronilla coronata				
	Coronilla vaginalis				

	Coronilla varia			1	
	Coronopus squamatus				
	Cortusa matthioli				1
	Corydalis cava		1	1	
	Corydalis intermedia				
	Corydalis pumila				
	Corydalis solida		1	1	1
	Corylus avellana		1	1	1
	Cota tinctoria				
	Cotoneaster sp.		1		
	Cotonaster integerrima				
	Cotonaster melanocarpa				
	Cotoneaster cf. alaunicus				
	Cotoneaster integerrimus				1
	Cotoneaster tomentosus				1
	Crateagus sp.				
	Crataegus curvisepala		1		
	Crataegus laevigata				
	Crataegus monogyna		1		
	Crataegus rhipidophylla				
	Crepis alpestris				
	Crepis biennis			1	
	Crepis conyzifolia		1		
	Crepis foetida ssp. rhoeadifolia		1		
	Crepis jacquinii				1
	Crepis mollis		1		
	Crepis paludosa		1		1
	Crepis praemorsa				
	Crepis pulchra				
	Crinitina linosyris				
	Crocus discolor				
	Crocus heuffelianus				
	Crocus scepusiensis				
	Cruciata glabra		1	1	1
	Cruciata laevipes		1		
	Cruciata pedemontana				
	Crupina vulgaris				
	Crystopteris fragilis		1		
	Cucubalus baccifer				
	Cuscuta epithymum			1	
	Cuscuta europaea				
	Cyanus mollis				1
	Cyanus segetum				
	Cyanus triumfettii				1
	Cyclamen fatrense				
	Cynoglossum germanicum				
	Cynoglossum officinale				
	Cynosurus cristatus			1	
	Cyperus fuscus				
	Cypripedium calceolus				1
	Cystopteris alpina				
	Cystopteris fragilis		1		1
	Cystopteris montana				1

	Cystopteris regia				
	Dactylis glomerata		1	1	
	Dactylis glomerata ssp. euglomerata				
	Dactylis glomerata ssp. slovenica				1
	Dactylis polygama		1		
	Dactylohriza fuchsii ssp. psyschrophylla				
	Dactylorhiza incarnata ssp. incarnata				
	Dactylorhiza maculata s. lat.		1		1
	Dactylorhiza majalis		1		1
	Dactylorhiza sambucina		1	1	
	Dactylorhiza x ruppertii				
	Danthonia decumbens				
	Daphne cneorum				
	Daphne mezereum		1	1	1
	Datura stramonium				
	Daucus carota			1	
	Delphinium elatum ssp. elatum				1
	Delphinium oxysepalum				
	Dentaria bulbifera		1	1	1
	Dentaria enneaphyllos		1	1	1
	Dentaria glandulosa		1	1	
	Dentaria glandulosa x D. enneaphyllos				
	Descurainia sophia				
	Deschampsia caespitosa		1		1
	Deschampsia caespitosa f.aurea		1		
	Deschampsia caespitosa ssp. caespitosa		1		
	Deschampsia flexuosa				
	Dianthus armeria		1		
	Dianthus barbatus		1		
	Dianthus barbatus ssp. compactus		1		
	Dianthus carthusianorum				
	Dianthus carthusianorum ssp. latifolius				
	Dianthus carthusianorum ssp. montivagus				
	Dianthus carthusianorum ssp. vulgaris				
	Dianthus collinus				
	Dianthus deltoides			1	
	Dianthus glacialis				
	Dianthus hungaricus				
	Dianthus nitidus				1
	Dianthus pontederae				
	Dianthus praecox ssp. praecox				
	Dianthus superbus				
	Dianthus superbus ssp. alpestris				
	Dictamnus albus				
	Digitalis grandiflora		1	1	1
	Dichanthium ischaeum				
	Dichodon cerastoides				
	Dichodon viscidum				
	Diphasiastrum alpinum		1		
	Diphasiastrum complanatum		1		
	Dipsacus fullonum				
	Doronicum austriacum	1	1		
	Doronicum hungaricum				

	Doronicum styriacum				
	Dorycnium sp.				
	Dorycnium pentaphyllum agg.				
	Draba aizoides				1
	Draba dubia				
	Draba muralis				
	Drosera rotundifolia	1			
	Dryas octopetala				
	Dryopteris austriaca ssp. dilatata				
	Dryopteris carthusiana		1	1	1
	Dryopteris cristata		1	1	
	Dryopteris dilatata		1	1	1
	Dryopteris expansa		1		
	Dryopteris filix-mas		1	1	1
	Dryopteris oreopteris		1		
	Dryopteris pseudomas		1		
	Dryopteris spinulosa ssp. dilatata				
	Echinocystis lobata				
	Echinochloa crus-galli		1		
	Echinops ritro				
	Echinum italicum				
	Echium russicum				
	Echium vulgare				
	Eleocharis carniolica		1		
	Eleocharis palustris		1		
	Eleocharis quinqueflora				
	Elytrigia repens				1
	Empetrum hermaphroditum				1
	Epilobium alpestre		1		1
	Epilobium alsinifolium				
	Epilobium anagallidifolium				
	Epilobium ciliatum		1		
	Epilobium colinum		1		
	Epilobium hirsutum		1	1	
	Epilobium lamyi				
	Epilobium montanum		1	1	1
	Epilobium obscurum				
	Epilobium palustre		1		
	Epilobium parviflorum			1	
	Epilobium roseum				
	Epipactis atrorubens				1
	Epipactis helleborine				1
	Epipactis latifolia		1		
	Epipactis leptochila				
	Epipactis microphylla				
	Epipactis palustris				
	Epipogium aphyllum				1
	Equisetum arvense		1	1	
	Equisetum fluviatile		1		
	Equisetum palustre		1	1	1
	Equisetum pratense			1	
	Equisetum sylvaticum		1	1	
	Equisetum telmateia		1	1	

	Eragrostis pilosa				
	Eremogone micradenia				
	Erigeron acre				
	Erigeron uniflorus				
	Eriophorum angustifolium		1		
	Eriophorum latifolium				1
	Eriophorum vaginatum				
	Erodium ciconium				
	Erodium cicutarium				
	Erodium neilreichii				
	Erophila verna				
	Erygnium planum				
	Eryngium campestre				
	Erysimum odoratum				
	Erysimum repandum				
	Erysimum witmannii				1
	Euclidium syriacum				
	Euonymus europaeus			1	
	Euonymus verrucosus				
	Eupatorium cannabinum		1	1	1
	Euphorbia amygdaloides		1		1
	Euphorbia cyparissias				1
	Euphorbia polychroma				
	Euphrasia picta				
	Euphrasia rostkoviana		1		
	Euphrasia salisburgensis				1
	Euphrasia stricta				
	Euphrasia tatrae				
	Fagus sylvatica		1	1	1
	Falcaria vulgaris				
	Fallopia convolvulus				
	Fallopia dumetorum				
	Festuca altissima		1		1
	Festuca amethystina				1
	Festuca carpathica				1
	Festuca drymeja		1	1	
	Festuca gigantea		1	1	1
	Festuca heterophylla				
	Festuca longifolia				
	Festuca ovina				
	Festuca pallens				1
	Festuca picta				
	Festuca picturata				
	Festuca pratensis		1	1	
	Festuca pseudodalmatica				
	Festuca pseudovina				
	Festuca rubra		1	1	
	Festuca rupicola				
	Festuca supina				
	Festuca tatrae				1
	Festuca valesiaca				
	Festuca versicolor				
	Festuca versicolor ssp versicolor				

	Ficaria bulbifera				
	Ficaria calthifolia				
	Ficaria verna				
	Filaginella uliginosa		1		
	Filago arvensis				
	Filipendula ulmaria		1	1	1
	Filipendula ulmaria ssp. denudata		1		
	Filipendula vulgaris			1	
	Fragaria moschata				
	Fragaria vesca		1	1	1
	Fragaria viridis				
	Frangula alnus				
	Fraxinus americana				
	Fraxinus angustifolia				
	Fraxinus excelsior		1	1	
	Fraxinus ornus				
	Fumana procumbens				
	Fumaria schleicheri				
	Fumaria vaillantii				
	Gagea lutea				
	Gagea minima				
	Gagea pusilla				
	Gagea villosa				
	Galanthus nivalis		1	1	
	Galatella cana				
	Galeobdolon luteum		1	1	1
	Galeobdolon montanum				1
	Galeopsis angustifolia				
	Galeopsis bifida			1	
	Galeopsis grandiflora				
	Galeopsis pubescens				
	Galeopsis speciosa		1	1	
	Galeopsis tetrahit		1		1
	Galeopsis tetrahit ssp.tetrahit				
	Galim cruciata				
	Galinsoga cruciata				
	Galium album		1		
	Galium album ssp. album				1
	Galium anisophyllon				
	Galium aparine				
	Galium austriacum				
	Galium boreale				1
	Galium glaucum				
	Galium mollugo agg.				1
	Galium odoratum		1	1	
	Galium palustre		1		
	Galium pumilum				
	Galium rivale				
	Galium rotundifolium		1	1	
	Galium schultesii		1	1	
	Galium spurium				
	Galium spurium subsp. vaillantii				
	Galium tenuissimum				

	Galium uliginosum				
	Galium vernum				
	Galium verum		1	1	
	Galium verum x G. album				
	Galium wirtgenii				
	Genista germanica				
	Genista ovata				
	Genista pilosa				
	Genista tinctoria		1	1	
	Genista tinctoria ssp. elatior				
	Gentiana asclepiadea		1	1	1
	Gentiana clusii				1
	Gentiana cruciata				1
	Gentiana frigida				
	Gentiana pneumonanthe				
	Gentiana punctata				
	Gentianella amarella				1
	Gentianella austriaca				1
	Gentianella ciliata				1
	Gentianella fatrae				1
	Gentianella lutescens		1		
	Gentianella lutescens ssp. carpatica				
	Geranium columbinum		1		
	Geranium divaricatum				
	Geranium palustre		1		1
	Geranium phaeum		1		
	Geranium phaeum ssp. phaeum		1		
	Geranium pratense				
	Geranium pusillum				
	Geranium robertianum		1	1	1
	Geranium rotundifolium				
	Geranium sanguineum				
	Geranium sylvaticum		1		
	Geum montanum				
	Geum rivale		1		1
	Geum urbanum		1	1	
	Glaucium corniculatum				
	Glechoma hederacea		1	1	
	Glechoma hederacea ssp. hirsuta				
	Glechoma hederacea ssp. glabriuscula				
	Glechoma hirsuta		1	1	
	Globularia cordifolia				1
	Globularia punctata				
	Glyceria declinata		1		
	Glyceria fluitans				
	Glyceria maxima				
	Glyceria nemoralis				
	Glyceria notata				
	Glyceria plicata		1	1	
	Gnaphalium norvegicum		1		
	Gnaphalium sylvaticum		1	1	1
	Goodyera repens				1
	Gratiola officinalis				

	Grossularia uva-crispa				
	Gymnademia conopsea		1		1
	Gymnademia conopsea ssp. conopsea				1
	Gymnadenia conopsea ssp. densiflora				
	Gymnadenia odoratissima				1
	Gymnocarpium dryopteris		1	1	1
	Gymnocarpium robertianum		1		1
	Gypsophila sp.			1	
	Gypsophila repens				
	Hacquetia epipactis				
	Hedera helix				1
	Hedysarum hedysaroides				
	Heleochloa alopecuroides				
	Heleochloa schoenoides				
	Helianthemum grandiflorum ssp. obscurum				1
	Helianthemum nummularium				
	Helianthemum ovatum				1
	Helianthemum rupifragum				
	Heliotropium europaeum				
	Heloscandium repens				
	Heracleum sphondylium		1	1	
	Heracleum sphondylium ssp. trachycarpum				1
	Herniaria incana				
	Hesiodia montana				
	Hesperis matronalis subsp. nivea				1
	Hesperis nivea				
	Hesperis tristis				
	Hibiscus trionum				
	Hieacium racemosum				
	Hieracium argillaceum				
	Hieracium alpinum				
	Hieracium atratum				
	Hieracium aurantiacum		1		
	Hieracium bauhinii		1		
	Hieracium bifidum				1
	Hieracium bupleroides				1
	Hieracium coespitosum				
	Hieracium cymosum				
	Hieracium laevicaule				
	Hieracium lachenalii		1		
	Hieracium murorum		1	1	
	Hieracium pilosella		1		
	Hieracium sabaudum		1	1	
	Hieracium sylvaticum				
	Hieracium umbellatum				
	Hieracium villosum				
	Hieracium vulgatum		1		
	Hierochloe odorata				
	Himantoglossum sp.				
	Hippocrepis comosa				
	Holcus lanatus		1		
	Holcus mollis		1	1	
	Holosteum umbellatum				

	Homogyne alpina	1	1		1
	Hordelymus europaeus		1	1	1
	Hordeum europaeum		1	1	
	Hottonia palustris				
	Humulus lupulus			1	
	Huperzia selago		1		1
	Hutchinsia alpina ssp. dubia				
	Hydrocharis morsus-ranae				
	Hylotelephium argutum				
	Hylotelephium maximum agg.		1		
	Hypericum hirsutum			1	
	Hypericum humifusum		1		
	Hypericum maculatum		1	1	1
	Hypericum montanum				
	Hypericum perforatum		1	1	
	Hypericum tetrapterum				1
	Hypochoeris maculata				
	Hypochoeris radicata		1	1	
	Hypochoeris uniflora				
	Chaenarrhinum minus				
	Chaerophyllum aromaticum		1		1
	Chaerophyllum hirsutum		1		1
	Chaerophyllum temulum				
	Chamaecytisus austriacus				
	Chamaecytisus hirsutus				
	Chamaecytisus supinus				
	Chamaepitys chia ssp. trifida				
	Chamenerion angustifolium				
	Chamerion angustifolium		1	1	
	Chamerion dodonaei				
	Chamerion palustre				
	Chamomilla recutita				
	Chelidonium majus		1		
	Chenopodium album			1	
	Chenopodium bonus-henricus				
	Chenopodium foliosum				
	Chenopodium polyspermum				
	Chenopodium rubrum				
	Chenopodium strictum				
	Cherleria sedoides				
	Chondrilla juncea				
	Chrysanthemum corymbosum		1		
	Chrysanthemum leucanthemum		1		
	Chrysaspis aurea		1		
	Chrysaspis spadicea				
	Chrysopogon gryllus				
	Chrysosplenium alternifolium		1	1	1
	Impatiens noli-tangere		1	1	
	Impatiens parviflora				
	Inula conyzae				
	Inula ensifolia				
	Inula germanica				
	Inula hirta				

	Inula oculus-christi				
	Inula salicina				
	Inula stricta				
	Iris aphylla				
	Iris graminea				
	Iris pseudacorus				
	Iris pumila				
	Iris sibirica				
	Iris variegata				
	Isopyrum thalictroides		1	1	1
	Jacea macroptilon ssp. oxylepis				
	Jacea pannonica				
	Jacea phrygia agg.				
	Jacea phrygia ssp. phrygia		1		
	Jacea pratensis				
	Jacea vulgaris				
	Jovibarba globifera ssp. glabrescens				
	Jovibarba globifera ssp. hirta				1
	Jovibarba globifera ssp. tatrensis				
	Jovibarba hirta				
	Jovibarba hirta ssp. glabrescens				
	Juncus acutiflorus				
	Juncus alpinoarticulatus				1
	Juncus articulatus		1	1	1
	Juncus atratus				
	Juncus buffonius agg.				1
	Juncus castaneus				
	Juncus compressus		1		
	Juncus conglomeratus		1	1	
	Juncus effusus		1	1	
	Juncus filiformis				
	Juncus gerardii ssp. geragdii				
	Juncus inflexus		1	1	1
	Juncus squarrosus				
	Juncus tenuis			1	
	Juncus trifidus				
	Juniperus communis		1		1
	Juniperus communis ssp. alpina				
	Juniperus nana				
	Juniperus sibirica				
	Jurinea mollis				
	Kernera saxatilis				1
	Kickxia elatine ssp. elatine				
	Kickxia spuria				
	Knautia arvensis		1	1	
	Knautia dipacifolia		1		1
	Knautia kitaibelii				1
	Knautia maxima		1		1
	Knautia sylvatica		1		
	Koeleria gracilis				
	Koeleria macrantha				
	Koeleria tristis				
	Kohlrauschia prolifera				

	Lactuca muralis				
	Lactuca perennis				
	Lactuca quercina				
	Lactuca salinga				
	Lactuca serriola				
	Lactuca viminea				
	Lamiastrum galeobdolon				1
	Lamiastrum montanum				1
	Lamium amplexicaule				
	Lamium galeobdolon				
	Lamium luteum				
	Lamium maculatum		1		
	Lamium maculatum ssp. cupreum		1		
	Lamium purpureum				
	Lappula deflexa				1
	Lappula heteracantha ssp. heterocarpa				
	Lappula squarosa				
	Lapsana communis		1	1	1
	Larix decidua				1
	Laser trilobum				
	Laserpitium alpinum	1			
	Laserpitium archangelica				1
	Laserpitium latifolium				1
	Lastrea limbosperma		1		
	Lathraea squamaria				
	Lathraea squamaria ssp. tatrica				1
	Lathyrus hirsutus				
	Lathyrus lacteus				
	Lathyrus laevigatus		1		
	Lathyrus latifolius				
	Lathyrus niger				
	Lathyrus nissolia				
	Lathyrus palustris				
	Lathyrus pannonicus				
	Lathyrus pannonicus ssp. pannonicus				
	Lathyrus pratensis		1	1	
	Lathyrus sylvestris			1	
	Lathyrus vernus				1
	Lavatera thuringiaca				
	Leersia oryzoides		1		
	Lembotropis nigricans				
	Lemna minor				
	Lemna trisulca				
	Leontodon autumnalis				
	Leontodon hastilis			1	
	Leontodon hispidus		1		1
	Leontodon hispidus ssp. danubialis				
	Leontodon hispidus ssp. hastilis				1
	Leontodon hispidus ssp. hispidus				
	Leontodon montanus ssp. pseudoteraxaci				
	Leontopodium alpinum				1
	Leonurus cardiaca				
	Leopoldia comosa				

	Leopoldia tenuiflora				
	Leucanthemella serotina				
	Leucanthemopsis alpina				
	Leucanthemopsis alpina ssp tatrae				
	Leucanthemum gaudinii ssp. gaudinii				
	Leucanthemum ircutianum		1	1	
	Leucanthemum margaritae				1
	Leucanthemum rotundifolium		1		
	Leucanthemum vulgare				
	Leucanthemum waldsteinii		1		
	Leucojum aestivum				
	Leucorchis albida		1		
	Libanotis pyrenaica				1
	Ligusticum mutellina				1
	Ligustrum vulgare				
	Lilium martagon	1	1	1	1
	Lilium martagon				
	Linaria genistifolia				
	Linaria vulgaris		1	1	
	Linnaea borealis				
	Linum austriacum				
	Linum catharticum		1	1	1
	Linum extraaxillare				
	Linum flavum				
	Linum hirsutum				
	Linum perene ssp. extraaxillare				
	Linum tenuifolium				
	Listera cordata				1
	Listera ovata		1	1	1
	Lithospermum arvense				
	Lithospermum officinale				
	Lithospermum purpurocaeruleum				
	Lloydia serotina				
	Logfia arvensis				
	Loiseleuria procumbens				
	Lolium perenne			1	
	Lonicera caprifolium				
	Lonicera nigra	1	1		1
	Lonicera xylosteum				
	Loranthus europaeus				
	Lotus borbasii				
	Lotus corniculatus		1	1	1
	Lunaria rediviva		1	1	1
	Lupinus polyphyllus				
	Luzula sp.				
	Luzula albida		1		
	Luzula alpino-pilosa				
	Luzula alpino-pilosa ssp obscura				
	Luzula campestris				
	Luzula luzulina		1	1	
	Luzula luzuloides		1	1	
	Luzula multiflora		1	1	
	Luzula nemorosa				

	Luzula pallidula				
	Luzula pilosa		1	1	
	Luzula spicata				
	Luzula spicata ssp. mutabilis				
	Luzula sudetica				
	Luzula sudetica ssp. alpina				
	Luzula sylvatica		1	1	1
	Lycopodium alpinum				
	Lycopodium annotinum		1		1
	Lycopodium clavatum		1		
	Lycopodium inundatum	1			
	Lycopodium selago				
	Lycopus europaeus		1	1	
	Lycopus exaltatus				
	Lychnis coronaria				
	Lychnis flos-cuculi		1	1	
	Linosiris vulgaris				
	Lysimachia nemorum		1	1	
	Lysimachia nummularia			1	
	Lysimachia punctata				
	Lysimachia vulgaris				
	Lythrum hyssopifolia				
	Lythrum salicaria		1		
	Maianthemum bifolium		1	1	1
	Malachium aquaticum		1		
	Malaxis monophyllos		1		1
	Malus sylvestris				
	Marrubium peregrinum				
	Marrubium x paniculatum				
	Matricaria discoidea				
	Matricaria maritima ssp. inodora			1	
	Medicago falcata				
	Medicago lupulina			1	
	Medicago minima				
	Medicago monspeliaca				
	Medicago prostrata				
	Medicago rigidula				
	Melampyrum arvense				
	Melampyrum barbatum				
	Melampyrum cristatum				
	Melampyrum herbichii		1		
	Melampyrum nemorosum				
	Melampyrum pratense				
	Melampyrum pratense ssp. tatrense				
	Melampyrum sylvaticum		1		1
	Melampyrum sylvaticum ssp. carpaticum				
	Melampyrum tatrense				
	Melandrium album				
	Melandrium diurnum				
	Melandrium pratense		1		
	Melandrium rubrum		1		
	Melandrium sylvestre		1		
	Melandrium x dubium		1		

	Melica ciliata				
	Melica nutans		1	1	1
	Melica picta		1	1	
	Melica transsilvanica				
	Melica uniflora		1		
	Melilotus alba			1	
	Melilotus altissimus				
	Melilotus officinalis			1	
	Melittis melissophyllum				
	Mentha aquatica				
	Mentha arvensis			1	
	Mentha longifolia		1	1	1
	Mentha pulegium				
	Menyanthes trifoliata	1			
	Mercurialis longistipes				
	Mercurialis paxii				
	Mercurialis perennis	1	1	1	1
	Milium effusum	1	1	1	1
	Minuartia fastigiata				
	Minuartia gerardii				
	Minuartia glomerata				
	Minuartia hirsuta				
	Minuartia hirsuta ssp. frutescens				
	Minuartia kitaibelli				1
	Minuartia langii				1
	Minuartia rubra				
	Minuartia sedoides				
	Moehringia muscosa				1
	Moehringia trinervia		1	1	1
	Molinia arundinacea				
	Molinia coerulea		1		1
	Moneses uniflora				
	Monotropa hypophegea				
	Monotropa hypopitis		1		1
	Montia arvensis				
	Mulgedium alpinum		1		
	Muscari botryoides				
	Muscari comosa				
	Muscari neglectum				
	Muscari racemosa ssp. Euracemosa				
	Muscari ranossima				
	Mycelis muralis		1	1	1
	Myosotis alpestris				
	Myosotis arvensis				
	Myosotis caespitosa				
	Myosotis hispida				
	Myosotis micrantha				
	Myosotis nemorosa		1	1	
	Myosotis nemorosa ssp. brevisetacea				
	Myosoris nemorosa ssp. nemorosa var. nemorosa				
	Myosotis palustris				
	Myosotis palustris ssp. palustris				
	Myosotis parviflora		1		

	Myosotis pratensis				
	Myosotis radicans				
	Myosotis scorpioides agg.				
	Myosotis sparsiflora				
	Myosotis stricta		1		
	Myosotis sylvatica		1	1	1
	Myosoton aquaticum			1	
	Myosurus minimus				
	Myriophyllum verticillatum				
	Najas marina				
	Najas minor				
	Nardus stricta		1	1	
	Nasturtium officinale				
	Negundo aceroides				
	Neottia nidus-avis		1	1	1
	Nepeta pannonica				
	Nigella arvensis				
	Nonnea pulla				
	Nuphar lutea				
	Nymphaea alba				
	Odontites rubra				
	Oenanthe silaifolia ssp. silaifolia				
	Omalotheca norvegica				
	Omalotheca supina				
	Omalotheca sylvatica				1
	Omalotheca sylvatica ssp. alpestre				
	Onobrychis arenaria				
	Ononis arvensis		1		
	Ononis hircina		1		
	Ononis spinosa		1		
	Onosma arenaria				
	Onosma pseudoarenaria				
	Onosma visianii				
	Ophioglossum vulgatum		1		
	Ophrys insectifera				
	Oreogeum montanum				
	Oreochloa disticha				
	Oreopteris limbosperma		1		
	Orchis latifolia				
	Orchis laxiflora ssp. palustris				
	Orchis mascula		1		
	Orchis mascula ssp. signifera				1
	Orchis militaris				
	Orchis morio				
	Orchis morio ssp. morio				
	Orchis muscala				
	Orchis palens		1		
	Orchis palustris				
	Orchis purpurea				
	Orchis sambucina		1		
	Origanum vulgare		1		
	Orlaya grandiflora				
	Ornithogalum gussonei				

	Orobanche sp.				
	Orobanche alsatica				
	Orobanche flava				
	Orobanche reticulata				1
	Orthantha lutea				
	Orthilia secunda				1
	Ostericum palustre				
	Otites borysthenica				
	Oxalis acetosella		1	1	1
	Oxycoccus microcarpus				
	Oxycoccus palustris				
	Oxyria digyna				
	Oxytropis albus				
	Padus avium				
	Padus avium ssp. petrea		1		
	Padus racemosa				
	Pachypleurum simplex				
	Papaver argemone				
	Papaver dubium				
	Papaver rhoeas				
	Papaver tatricum				
	Papaver tatricum ssp. fatraemagnae				
	Parageum reptans				
	Parietaria officinalis				
	Paris quadrifolia	1	1	1	1
	Parnassia palustris				1
	Parthenocissus quinquefolia		1		
	Pastinaca sativa				
	Pedicularis hacquetii				
	Pedicularis oederi				
	Pedicularis palustris				
	Pedicularis verticillata				
	Persicaria amphibia				1
	Persicaria hydropiper				
	Persicaria lapathifolia				
	Persicaria maculosa				1
	Petasites albus		1	1	1
	Petasites hybridus		1	1	1
	Petasites kablikianus		1		1
	Petrorhagia prolifera				
	Peucedanum alsaticum				
	Peucedanum cervaria				1
	Peucedanum palustre		1		
	Phalaroides arundinacea				
	Phegopteris connectilis		1	1	1
	Phegopteris dryopteris				
	Phegopteris polypodioides		1		
	Phelipanche arenaria				
	Phelipanche purpurea				
	Phellandrium aquaticum				
	Phleum alpinum		1		
	Phleum boehmerii				
	Phleum phleoides				

	Phleum pratense		1	1	
	Phleum rhaeticum		1		
	Phlomis tuberosa				
	Pholiurus pannonicus				
	Phragmites australis				
	Phyllitis scolopandrium		1		1
	Physalis alkekengi				
	Phyteuma orbiculare				1
	Phyteuma spicatum		1		1
	Phytolacca americana				
	Picea abies		1		1
	Picris hieracioides			1	
	Pilosella alpicola				
	Pilosella aurantiaca		1		
	Pilosella bauhinii				
	Pilosella blyttiana		1		
	Pilosella caespitosa		1		
	Pilosella cymosa				
	Pilosella floribunda				
	Pilosella glaucescens		1		
	Pilosella lactucella		1		
	Pilosella macrantha				
	Pilosella officinarum			1	
	Pilosella piloselloides				
	Pilosella vulgaris				
	Pimpinella major		1		
	Pimpinella major ssp. major				1
	Pimpinella major ssp. rubra				1
	Pimpinella saxifraga		1	1	
	Pinguicula alpina				1
	Pinguicula vulgaris				1
	Pinus cembra				
	Pinus mugo				1
	Pinus mugo ssp. pumilio				
	Pinus nigra				
	Pinus sylvestris				1
	Pirus communis				
	Pistolochia digitata				
	Pistolochia solida				
	Plantago altissima				
	Plantago lanceolata		1	1	
	Plantago lanceolata ssp. sphaerostachya				
	Plantago major		1	1	
	Plantago major ssp. intermedia				
	Plantago major ssp. major				
	Plantago maritima				
	Plantago media		1	1	
	Plantago media ssp. media				
	Plantago uliginosa				
	Plantago uliginosa ssp. leptostachya				
	Platanthera bifolia		1		
	Platanthera bifolia ssp. latiflora		1		1
	Platanthera chlorantha				1

	Pleurospermum austriacum				1
	Poa alpina				1
	Poa angustifolia				
	Poa annua		1	1	
	Poa annua ssp. mutabilis				
	Poa bulbosa				
	Poa compressa		1	1	
	Poa glauca agg.				
	Poa granitica				
	Poa granitica ssp. granitica				
	Poa chaixii		1		
	Poa laxa				
	Poa mutabilis				
	Poa nemoralis		1	1	1
	Poa nobilis				
	Poa palustris				1
	Poa pannonica				
	Poa pannonica ssp. scabra				
	Poa pratensis		1		
	Poa remota				1
	Poa scabra				
	Poa sterilis				
	Poa stiriaca				1
	Poa supina				
	Poa trivialis		1	1	1
	Podospermum canum				
	Podospermum laciniatum				
	Polygala amara				
	Polygala amara ssp. brachyptera				1
	Polygala amarella				1
	Polygala comosa				
	Polygala vulgaris		1	1	
	Polygonatum latifolium				
	Polygonatum multiflorum				
	Polygonatum odoratum				1
	Polygonatum verticillatum		1	1	1
	Polygonum minus			1	
	Polygonum persicaria			1	1
	Polygonum viviparum				1
	Polypodium interjectum				
	Polypodium vulgare		1		1
	Polystichum aculeatum		1		1
	Polystichum lobatum				
	Polystichum lonchitis				1
	Populus alba				
	Populus nigra				
	Populus tremula		1	1	
	Populus x canescens				
	Potamogeton pusillus				
	Potamogeton trichoides				
	Potentilla alba				
	Potentilla anserina		1	1	
	Potentilla arenaria				

	Potentilla arenaria ssp. tommasiniana				
	Potentilla argentea			1	
	Potentilla aurea		1		
	Potentilla collina				
	Potentilla crantzii				
	Potentilla erecta		1	1	1
	Potentilla heptaphylla				
	Potentilla micrantha				
	Potentilla neumanniana				
	Potentilla norvegica		1		
	Potentilla patula				
	Potentilla pedata				
	Potentilla recta				
	Potentilla reptans				
	Potentilla rupestris				
	Potentilla sterilis				
	Potentilla tabernaemontani				
	Potentilla tommasiniana				
	Potentilla verna				
	Prenanthes purpurea	1	1	1	1
	Primula auricula				1
	Primula elatior		1	1	1
	Primula elatior ssp tetrensis				
	Primula elatior x P. vulgaris				
	Primula farinosa ssp. farinosa				1
	Primula minima				
	Primula veris				
	Primula veris ssp. canescens				
	Primula veris ssp. genuina				
	Primula vulgaris				1
	Prunella grandiflora				
	Prunella grandifolia				
	Prunella laciniata				
	Prunella vulgaris		1	1	1
	Prunus cerasifera				
	Prunus fruticosa				
	Prunus mahaleb				
	Prunus spinosa				
	Prunus spinosa ssp. dasyphylla				
	Psammophiliella muralis			1	
	Pseudolysimachion orchideum				
	Pseudolysimachion spicatum				
	Pseudoorchis albida				1
	Pteridium aquilinum		1		1
	Pulicaria dysenterica				
	Pulmonaria mollis		1		
	Pulmonaria mollis ssp. mollis				
	Pulmonaria mollissima				
	Pulmonaria montana				
	Pulmonaria murini				
	Pulmonaria obscura		1		1
	Pulmonaria officinalis				
	Pulmonaria officinalis ssp. obscura				

	Pulsatila alba				
	Pulsatilla grandis				
	Pulsatilla pratensis ssp. bohemica				
	Pulsatilla scherfelii				
	Pulsatilla slavica				1
	Pulsatilla subslavica				
	Pulsatilla vernalis				
	Pycreus flavescens		1		
	Pyrethrum clusii				
	Pyrethrum corymbosum				
	Pyrola carpatica				
	Pyrola chlorantha				
	Pyrola media				1
	Pyrola minor		1		
	Pyrola rotundifolia		1		
	Pyrus communis				
	Pyrus pyraster				
	Quercus cerris				
	Quercus petraea				
	Quercus pubescens				
	Quercus robur				
	Ranunculus acer				
	Ranunculus aconitifolius				
	Ranunculus acris		1	1	
	Ranunculus acris ssp. acris				
	Ranunculus alpestris				1
	Ranunculus auricomus agg.		1		1
	Ranunculus bulbosus				
	Ranunculus cassubicus		1		
	Ranunculus ficaria ssp. ficaria				
	Ranunculus flammula		1		
	Ranunculus glacialis				
	Ranunculus illyricus				
	Ranunculus lanuginosus		1		1
	Ranunculus lateriflorus				
	Ranunculus lingua				
	Ranunculus nemorosus		1		1
	Ranunculus oreophilus				1
	Ranunculus pedatus				
	Ranunculus platanifolius		1		
	Ranunculus polyanthemos		1		
	Ranunculus polyphyllus				
	Ranunculus pseudomontanus				1
	Ranunculus pygmaeus				
	Ranunculus repens		1	1	1
	Rapistrum perenne				
	Reseda lutea				
	Reseda phyteuma				
	Rhamnus catharticus				
	Rhinanthus minor		1	1	
	Rhinanthus minor ssp. stenophyllus				
	Rhinanthus pulcher		1		
	Rhinanthus serotinus		1		

	Rhinantus minor				
	Rhodax rupifragus				
	Rhodiola rosea				
	Rhytitiadelphus squarrosus				
	Ribes alpinum		1		1
	Ribes grossularia				1
	Ribes nigrum				
	Ribes petraeum		1		
	Ribes petraeum var. carpaticus				
	Ribes uva-crispa				1
	Ribes uva-crispa ssp. grossularia				
	Roegneria canina			1	1
	Rorippa amphibia				
	Rorippa palustris				
	Rosa sp.				
	Rosa agrestis				
	Rosa alpina				
	Rosa andegavensis				
	Rosa arvensis				
	Rosa canina				
	Rosa gallica				
	Rosa gizellae				
	Rosa glauca				
	Rosa granensis				
	Rosa kmetiana				
	Rosa pendulina		1		1
	Rosa pimpinellifolia				
	Rosa spinisissima				
	Rosa subcanina				
	Rubus sp.				
	Rubus caesius				
	Rubus fruticosus				
	Rubus hirtus s. lat.		1	1	
	Rubus idaeus		1	1	1
	Rubus nessensis		1		
	Rubus saxatilis				1
	Rumex acetosa				
	Rumex acetosella				
	Rumex alpestris				1
	Rumex alpinus		1		
	Rumex arifolius		1		
	Rumex confertus		1		
	Rumex crispus				
	Rumex hydrolapathum				
	Rumex maritimus				
	Rumex obtusifolius			1	
	Rumex obtusifolius ssp. obtusifolius				
	Rumex sanguineus				
	Rumex thyrsiflorus				
	Sagina apetala				
	Sagina procumbens				
	Sagina saginoides				
	Sagina subulata				

	Salix alba		1		
	Salix aurita		1		
	Salix bicolor				
	Salix caprea		1	1	1
	Salix cinerea				
	Salix fragilis		1		
	Salix helvetica				
	Salix herbacea				
	Salix kitaibelliana				
	Salix pentandra				
	Salix purpurea		1		
	Salix repens				
	Salix reticulata				
	Salix silesiaca		1		1
	Salix triandra				
	Salvia aethiopsis				
	Salvia austriaca				
	Salvia glutinosa	1	1	1	
	Salvia nemorosa				
	Salvia pratensis				
	Salvia verticillata				
	Sambucus ebulus			1	
	Sambucus nigra		1	1	
	Sambucus racemosa		1	1	1
	Sanguisorba minor				
	Sanguisorba officinalis				1
	Sanicula europaea		1	1	1
	Saponaria officinalis		1		
	Sarothamnus scoparius				
	Saussurea alpina				
	Saussurea discolor				1
	Saussurea pygmaea				
	Saxifraga adscedens				
	Saxifraga aizoides				
	Saxifraga aizoom				
	Saxifraga androsacea				
	Saxifraga bryoides				
	Saxifraga bulbifera				
	Saxifraga caesia				1
	Saxifraga carpatica				
	Saxifraga decipiens				
	Saxifraga hieraciifolia				
	Saxifraga moschata				
	Saxifraga moschata ssp. kotulea				
	Saxifraga moschata var. dominii				
	Saxifraga oppositifolia ssp. oppositifolia				
	Saxifraga paniculata				1
	Saxifraga retusa				
	Saxifraga retusa ssp retusa				
	Saxifraga tridactylites				
	Saxifraga wahlenbergii				
	Scabiosa columbaria ssp. lucida				
	Scabiosa lucida				1

	Scabiosa ochroleuca				
	Scilla bifolia agg.				
	Scilla Kladnii		1	1	
	Scilla vindobonensis				
	Scirpoides holoschoenus				
	Scirpus sylvaticus		1	1	1
	Scleranthus annuus				
	Scleranthus polycarpos				
	Scopolia carniolica	1			
	Scorsonera purpurea				
	Scorzonera austriaca				
	Scorzonera hispanica				
	Scorzonera humilis				
	Scorzonera parviflora				
	Scrophularia canina				
	Scrophularia nodosa		1	1	
	Scrophularia scopoli		1		
	Scrophularia umbrosa				
	Scrophularia vernalis				
	Scutellaria galericulata				
	Scutellaria hastifolia				
	Securigera varia				
	Sedum acre				
	Sedum album				
	Sedum alpestre				
	Sedum anum	1			
	Sedum argutum		1		
	Sedum carpatica		1		
	Sedum maximum				
	Sedum neglectum				
	Sedum saxangulare				
	Sedum saxangulare ssp. boloniense				
	Sedum telephium				
	Sedum telephium ssp. maximum				
	Selaginella selaginoides				1
	Selinum carvifolia				
	Sempervirum montanum				
	Sempervivum hirsutum ssp. pressianum				
	Sempervivum hirtum ssp. glabrescens				
	Sempervivum marmoreum				
	Sempervivum matricum				
	Sempervivum montanum ssp. carpaticum				
	Sempervivum wettsteinii				
	Sempervivum wettsteinii ssp. heterophyllum				
	Sempervivum wettsteinii ssp. wettsteinii				
	Senecio abrotanifolius				
	Senecio abrotanifolius ssp. carpthicus				
	Senecio aurantiacus				
	Senecio carniolicus				
	Senecio carpatica				
	Senecio erraticus				
	Senecio erucifolius				
	Senecio fuchsii	1	1	1	1

	Senecio germanicus				
	Senecio hercynicus				
	Senecio incanus				
	Senecio incanus subsp. carniolicus				
	Senecio integrifolius				
	Senecio jacobaea				
	Senecio jacquinianus				
	Senecio nemorensis agg.		1	1	1
	Senecio nemorensis ssp. fuchsii				
	Senecio nemorensis ssp. jacquinianus				
	Senecio ovatus				
	Senecio paludosus				
	Senecio rivularis	1			
	Senecio subalpinus				1
	Senecio sylvaticus			1	
	Senecio ucrainicus				
	Senecio umbrosus				1
	Senecio vulgaris				
	Serratula tinctoria				
	Seseli elatum				
	Seseli hipomarathum				
	Seseli libanotis ssp. libanotis				1
	Seseli osseum				
	Sesleria coerulea				1
	Sesleria tatrae				1
	Sesleria uliginosa (coerulea)				1
	Sesleria varia				
	Scheuchzeria palustris				
	Schoenoplectus lacustris				
	Schoenus nigricans				
	Sieglingia decumbens		1		
	Silene acaulis				
	Silene borysthenica				
	Silene bupleuroides				
	Silene dioica				
	Silene inflata				
	Silene latifolia				
	Silene latifolia ssp. alba				
	Silene nemoralis				
	Silene nutans		1		
	Silene otites				
	Silene pusilla				1
	Silene viridiflora				
	Silene vulgaris		1		
	Silene vulgaris ssp. alpina				
	Silene vulgaris ssp. glareosa				1
	Silene vulgaris ssp. vulgaris				1
	Siler montanum				
	Sisymbrium altissimum				
	Sisymbrium austriacum				
	Sisymbrium orientale				
	Sisymbrium strictissimum				
	Sium latifolium				

	Solanum dulcamara			1	
	Solanum nigrum				
	Soldanella carpatica				1
	Soldanella hungarica				
	Soldanella hungarica ssp. hungarica				
	Soldanella hungarica ssp. major				
	Soldanella montana				
	Soldanella montana ssp. eumontana				
	Soldanella montana ssp. hungarica				
	Soldanella pseudomontana				
	Solidago alpestris		1		
	Solidago gigantea				
	Solidago virgaurea		1	1	
	Solidago virgaurea ssp. virgaurea		1		
	Solidago virgaurea ssp. minuta				1
	Sonchus arvensis			1	
	Sorbus aria				
	Sorbus aria x S. aucuparia				
	Sorbus aucuparia		1		
	Sorbus aucuparia ssp. aucuparia		1		1
	Sorbus aucuparia ssp. glabrata		1		
	Sorbus aucuparia ssp. lanuginosa				
	Sorbus diversicolor				1
	Sorbus chamaemespilus				1
	Sorbus torminalis				
	Spiraea media				
	Spirea media ssp. oblongifolia				
	Stachys alpina		1		1
	Stachys arvensis				
	Stachys palustris				
	Stachys recta				
	Stachys sylvatica		1	1	1
	Staphylea pinnata				
	Stelaria nemorum				
	Stellaria alsine				
	Stellaria graminea		1	1	1
	Stellaria holostea		1	1	
	Stellaria media				
	Stellaria nemorum		1	1	
	Stellaria nemorum ssp. montana				
	Stellaria nemorum ssp. nemorum				1
	Stellaria palustris				
	Stellaria uliginosa		1		
	Stenactis annua			1	
	Stenactis anua ssp. septentrionalis			1	
	Steris viscaria				
	Stipa capillata				
	Stipa crassiculmis				
	Stipa dasyphylla				
	Stipa joannis				
	Stipa pulcherrima				
	Stipa tirsa				
	Streptopus amplexifolius		1		1

	Succisa pratensis		1	1	
	Swertia perennis ssp. alpestris				1
	Swida alba				
	Swida australis				
	Swida sanguinea				
	Symphytum cordatum		1		
	Symphytum nodosum				
	Symphytum officinale		1		
	Symphytum tuberosum				
	Tanacetum corymbosum				
	Tanacetum corymbosum ssp. clusii		1		
	Tanacetum vulgare			1	
	Taraxacum erythrospermum				
	Taraxacum laevigatum				
	Taraxacum officinale			1	
	Taraxacum sect. Ruderalia		1		
	Taraxacum serotinum				
	Taraxacum silesiacum				
	Taraxacum telmatophilum				
	Taxus baccata				1
	Telekia speciosa	1	1		
	Tephroseris aurantiaca				
	Tephroseris crispa				
	Tephroseris integrifolia				
	Tetragonobolus maritimus				
	Teucrium botrys				
	Teucrium chamaedrys				1
	Teucrium scordium ssp. scordium				
	Teurium montanum				1
	Thalictrum aquilegifolium		1		1
	Thalictrum flavum				
	Thalictrum minus				1
	Thalictrum perfoliatum				
	Thalictrum simplex				
	Thelypteris palustris	1			
	Thelypteris phegopteris				1
	Thesium alpinum		1		1
	Thesium dollineri ssp. simplex				
	Thesium linophyllon				
	Thesium ramosum				
	Thlapsi caerulescens				
	Thlaspi montanum				
	Thlaspi perfoliatum				
	Thymelaea passerina				
	Thymus alpestris		1		
	Thymus glabrescens				
	Thymus ovatus				
	Thymus pannonicus				
	Thymus praecox				
	Thymus pulegioides			1	
	Thymus serpyllum				
	Thymus sudeticus				1
	Thymus vulgaris				

	Tilia cordata				
	Tilia platyphyllos		1	1	
	Tithymalus amygdaloides			1	1
	Tithymalus austriacus ssp. sojakii		1		
	Tithymalus caparissias		1	1	1
	Tithymalus epithymoides				
	Tithymalus exiguus				
	Tithymalus falcatus				
	Tithymalus glareosus				
	Tithymalus palustris				
	Tithymalus platyphyllos		1		
	Tithymalus polychroma				
	Tithymalus seguierianus				
	Tofieldia calyculata				1
	Torilis arvensis				
	Torilis japonica				
	Tozzia alpina ssp. carpatica		1		
	Tragopogon dubius				
	Tragopogon orientalis			1	1
	Tragopogon pratensis				
	Tragus racemosus				
	Traunsreinera globulosa		1		1
	Trientalis europaea		1		
	Trifolium alpestre				
	Trifolium arvense				
	Trifolium aureum			1	
	Trifolium campestre				
	Trifolium dubium				
	Trifolium flexuosum		1		
	Trifolium fragiferum				
	Trifolium hybridum				
	Trifolium medium			1	
	Trifolium montanum		1	1	
	Trifolium ochroleucon				
	Trifolium pratense		1	1	
	Trifolium repens			1	
	Trifolium rubens				
	Trifolium spadiceum				
	Trifolium striatum				
	Triglochin palustre				1
	Trichophorum alpinum				
	Trichophorum cespitosum				
	Tripleurospermum inidorum				
	Tripolium pannonicum				
	Trisetum alpestre				1
	Trisetum ciliare				
	Trisetum flavescens		1	1	
	Trisetum fuscum				
	Trollius altissimus				1
	Trollius europaeus				1
	Trollius europaeus ssp. tatrae				
	Trommsdorffia maculata				
	Trommsdorffia uniflora				

	Turgenia latifolia				
	Tussilago farfara		1	1	1
	Typha angustifolia		1		
	Typha latifolia				
	Ulmus glabra		1	1	
	Ulmus laevis				
	Ulmus minor				
	Urtica dioica		1	1	1
	Urtica dioica ssp. dioica				
	Urtica dioica ssp. vulgaris				
	Urtica kioviensis				
	Urticularia vulgaris				
	Vaccinium gaultheroides				
	Vaccinium myrtillus		1		1
	Vaccinium uliginosum				
	Vaccinium vitis-idaea		1		1
	Valeriana collina				
	Valeriana dioica		1		
	Valeriana montana		1		
	Valeriana officinalis		1		
	Valeriana sambucifolia				1
	Valeriana simplicifolia		1		
	Valeriana stolonifera ssp. angustifolia				
	Valeriana tripteris	1	1		1
	Valerianella carinata				
	Valerianella coronata				
	Valerianella locusta				
	Valerianella pumila				
	Valerianella rimosa				
	Veratrum album	1	1		
	Veratrum album ssp. lobelianum	1	1		1
	Veratrum lobelianum		1		
	Verbascum austriacum				
	Verbascum blattaria				
	Verbascum densiflorum				
	Verbascum chaixii ssp. austriacum				
	Verbascum lychnitis				
	Verbascum nigrum		1		
	Verbascum nigrum ssp. abietinum		1		
	Verbascum phoeniceum				
	Verbascum thapsiforme				
	Verbascum thapsus				
	Veronica anagallis-aquatica		1		
	Veronica anagalloides		1		
	Veronica aphylla				
	Veronica arvensis			1	
	Veronica austriaca				
	Veronica beccabunga		1		1
	Veronica dentata				
	Veronica fruticans				1
	Veronica hederifolia				
	Veronica chamaedrys		1	1	1
	Veronica chamaedrys ssp. chamaedrys				

	Veronica montana		1	1	1
	Veronica officinalis		1	1	
	Veronica pumila				
	Veronica scutellata				
	Veronica serpyllifolia				
	Veronica serpyllifolia ssp. humufusa				
	Veronica spicata				
	Veronica sublobata				
	Veronica teucrium				
	Veronica urticifolia				
	Veronica verna				
	Veronica vindobonensis				
	Viburnum lantana				1
	Viburnum opulus				
	Vicia cassubica				
	Vicia cracca		1	1	
	Vicia dumetorum				
	Vicia grandiflora				
	Vicia hirsuta				
	Vicia lathyroides				
	Vicia lutea				
	Vicia oreophila				
	Vicia pannonica				
	Vicia pisiformis				
	Vicia sepium				
	Vicia sparsiflora				
	Vicia tenuifolia				
	Vicia tetrasperma				
	Vicia villosa				
	Vinca herbacea				
	Vinca minor				
	Vincetoxicum hirundinaria				1
	Viola alba				
	Viola ambigua				
	Viola arvensis				
	Viola biflora		1		1
	Viola canina		1	1	
	Viola canina ssp. montana				
	Viola collina				
	Viola dacica		1		
	Viola hirta				
	Viola lutea				
	Viola lutea ssp. sudetica				
	Viola mirabilis				
	Viola odorata				
	Viola reichenbachiana		1	1	1
	Viola riviniana				
	Viola saxatilis				
	Viola stagnina				
	Viola sudetica				
	Viola sylvatica				
	Viola tricolor		1		
	Virga pilosa				

	Viscaria vulgaris				
	Viscum album				
	Waldsteinia geoides				
	Woodsia ilvensis ssp. rifidula				
	Xanthium albinum				
	Xeranthemum annuum				
	Xeroloma cylindracea				
	Zannichellia palustris				
Σ druhov	*Number of Species/ Locality /1178/*	*28*	*490*	*271*	*389*

Σ Species (total) 763

EXPLANATION:

Havesova HA
Vihorlat VI
Stuzica ST
Rozok RO