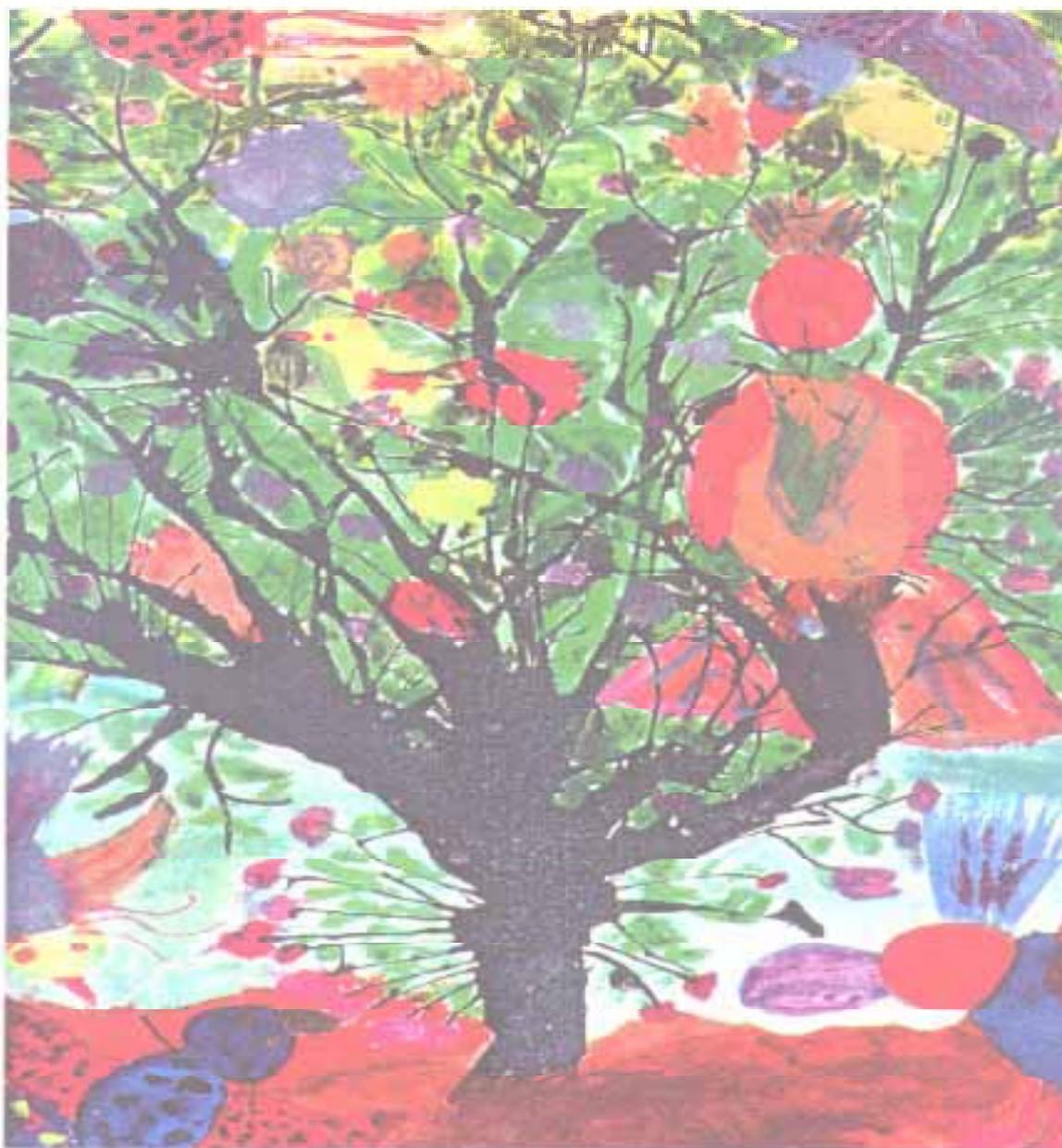


*National Report on Status and
Conservation of Biological Diversity
in Slovakia*



Ministry of the Environment of the Slovak Republic



1998

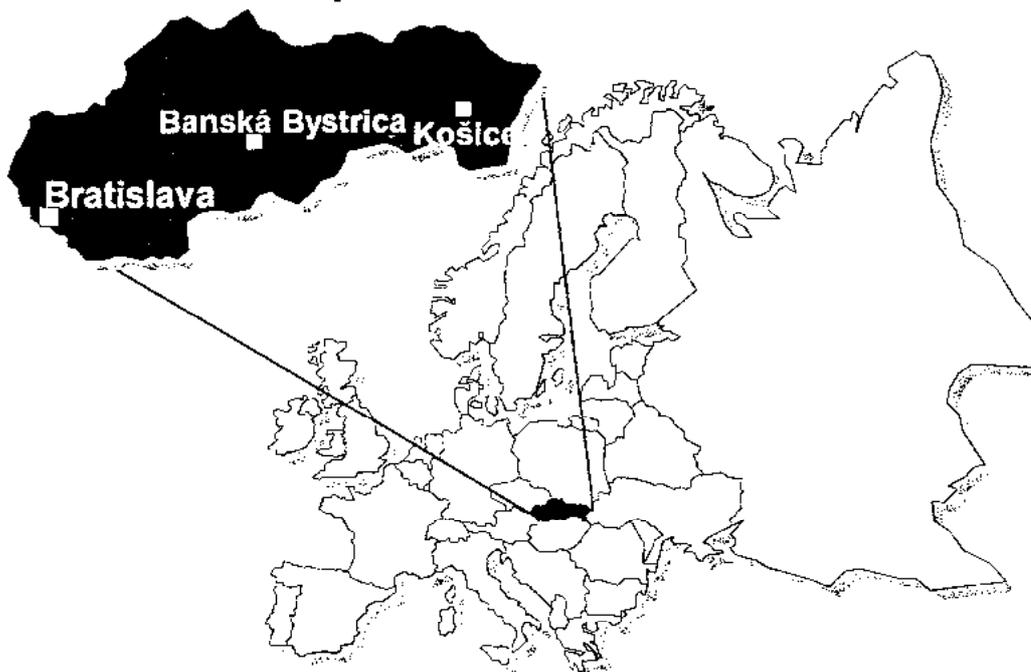
National Report on the Status and Conservation of Biological Diversity in Slovakia

CHAPTER 1

Basic Data on the Slovak Republic

The Slovak Republic was established as a new independent state on 1 January 1993. The country is one of the two legal successors to the Czech and Slovak Federative Republic and its legal existence goes back to the creation of the Czechoslovak Republic in 1918, after the spilt of the Austro-Hungarian monarchy. The Slovak Republic is a constitutional, democratic and parliamentary republic, the head of state being the president, and is based on the principles of stability and independence of three functional items - legislative, executive and juridical. its capital city is Bratislava.

Slovak Republic



The Slovak Republic is situated in Central Europe and shares borders with five states: the Czech Republic, Austria, Hungary, the Ukrainian Republic and Poland. The republic's longest frontier is with Hungary (631 km); its shortest with the Ukraine (96 km). The area of the Slovak Republic is 49,036 km² and its location expressed in geographical co-ordinates is between 49°37' and 47°44' northern latitude, the Slovak Republic's latitude zone being 153'. Slovakia's longitude zone is 5°44', situated between 16°50' and 22°34' eastern longitude. A small difference in the angle of incidence of sun rays means that there is no diversion in latitude climatic zone. Real temperature differences between the southern and northern areas are negligible and are caused by differences in altitude. Since the northern part of the territory is mountainous, as opposed to the southern part with its fertile plains, one may have a subjective impression that the climates of these two regions are

different. At the time of the spring and autumnal equinoxes, the sun's rays fall at an angle of approx. 42° , at the time of the summer and winter solstices at approx. $65,5^\circ$ and $18,5^\circ$, respectively. The effect of this is a cyclic change of four seasons, and the sun's radiation in summer being almost three times more intensive than during winter. The difference in longitude between the east to the west represents a 23-minute difference in the Sun's summit and the entire territory lies in the Central European time zone, subject to the 15° meridian local time of eastern longitude.

The Slovak Republic is situated on the boundary of the climatic influence of the ocean and continent, which results in relatively mild summers and winters. The continental character of the climate has more influence in the eastern areas of the territory. The long-term average temperatures are $20,5^\circ\text{C}$ and -3°C in the summer and winter periods, respectively. The temperature decreases by $0,52^\circ\text{C}$ on average per each 100 m of elevation.

For the Slovak Republic and the diversification of its internal ecosystems, its position within large mountain ranges is a very important factor. The arc of the Western Carpathians, broken into mountain ridges and basins, constitutes the axis of the Slovak Republic. Adjacent to the south is the Danubian system of lowlands and lowland basins. The entire system belongs to the Alpine-Himalayan system. The territory of Slovakia is covered mostly by the Western Carpathians with the Eastern Carpathians partially overlapping its eastern part. The general geological structure is extremely diverse and complicated. It has undergone several stages of development, including tectonic and morphological processes, reflected in a complicated structure and lithological content. With regard to age, the structure consists of a complete range of minerals, from the oldest from the pre-Cambrian era to recent minerals (approx. 50,000 year old volcanites). The dominant rocks include sedimentary formations (limestone, slates, flysch), the cores of the mountains are formed by granitoides (granites) and metamorphites. The youngest formations are minerals of volcanic origin.

The division and distribution of the Carpathians and Danubian lowlands create large contrasts in altitude, shape of relief, temperature, precipitation, soil, flora and fauna. The altitude ranges from 94 m (Bodrog) to 2,655 m above sea level (Gerlach peak). These extreme points 153 km apart, while the difference in elevation is 2,561 m.

The basic division of elevation is as follows:

1. plains, *the planary zone* (approx. up to 200, rarely to 300 m above sea-level)
2. hilly landscape, *coline zone* (approx. 200 - 500 m above sea-level)
3. hills, *sub-mountainous zone* (approx. 500 - 700 m above sea-level)
4. highlands, *mountainous zone* (approx. up to 1,100 - 1,200 m above sea-level)

5. mountainous landscape, *supramountainous zone* (approx. to 1,550 m above sea-level)
6. high mountain zone, *sub-a/pine zone* (approx. up to 1,800 - 1,850 m above sea-level)
7. lower alpine zone, *alpine zone* (approx. above 1,800 m above sea-level) developed only in the Low and High Tatras
8. lower snow zone, *sub-nival zone* (from approx. 2,400 m above sea level) developed only in extreme peak parts of the High Tatras.

The river network in the Slovak Republic is dense and prevailing of a mountainous character. The main European watershed between the Baltic and Black Seas passes through Slovakia, but only some 4% of waters with their source in the territory of Slovakia drain into the Baltic Sea. The total length of flows in Slovakia is 44,943 km. At present, approx. 400 m³.s⁻¹ of water has its source in Slovakia, but more than 3,300 m³.s⁻¹ flows through. Water management structures built on the rivers of Slovakia **have** caused gradual changes in natural ecosystems, out-flow rates and the general water regime. To date 70 dams, over 280 small and 47 large water reservoirs and 185 dikes have been built in Slovakia. Of these, the 39 largest cover over 200 km², with the volume of water totalling 1,787 billion m³. Other water management structures are under construction. Natural lakes are located only in high mountainous and mountainous areas of the Tatras and represent glacial relicts of the Ice Age.

Slovakia features relatively large reserves of underground and mineral waters, but due to its diverse and complicated geological structure, and distribution of precipitation and rivers, the distribution of its underground water reserves is uneven. The overall potential of underground water reserves has been assessed at approx. 35 billion m³ with a capacity of 75 m³.s⁻¹.

The diversity of components of nature, and varied geological structure in particular, influences the spacial distribution of soils, which thus create a varied mosaic of soil types within the territory of Slovakia. The quality of soils, including their fertility, has a direct influence on biodiversity and is a principal phenomenon for the existence of biological diversity.

CHAPTER 2

The Development of Settlements and its Influence on Biological Diversity

The territory of Slovakia has been populated for over 4,000 years. Similarly to other animal species, man has been a part of the ecosystems here for a long time. The situation changed some 2,000 years ago when this country started to be influenced by the man-farmer. Gradual deforestation, intensive agriculture, development of settlements, draining of the wetlands, regulation of rivers, and pollution of the water and air have resulted in the extinction of

several species of plant and animal, while others have become rare or endangered.

The oldest evidence of human existence in the territory of Slovakia are cave findings of Palaeolithic hunters and a carbonate cast of a Neolithic man's brain cavity found in travertine heaps near the village of Ganovce. The age of the latter is assessed to 80,000 years.

The initial influence of civilisation dates back to the early Iron Age - La Tene. In the 4th century BC, Celtic tribes settled on what is now the territory of Slovakia. They introduced already developed agriculture and thus they sparsely populated mainly the foothills and fertile lowlands of southern Slovakia. In the time of Christ, the Romans occupied the south-west. They intensively exploited forests for timber, but they also enriched the original flora with several new species and cultivars - e.g. vines. Their influence was mainly in the lowlands but spread up to the lower Povazie region (the Váh valley). The Romans supplied timber to large fortified settlements on the northern borders of their empire and processed large volumes of wood. Together with the Romans, the Germanic Markoman and Quad tribes captured this area. Further north, in the basins below the Tatras, the remains of the tribes of Celtic origin, mostly the Kotines, were still active.

The Slavs settled on the Carpathian territory in the 5th and 6th centuries. They lived mainly through agriculture, acquiring new lands by burning off and grubbing forests. In the 9th century, the Great Moravian Empire was created, featuring a relatively developed system of economy and trade. Its height dates back to the end of the 9th century. In the 10th century, pastoral nomadic Hungarian tribes came to the area.

In the 13th century, the territory of Slovakia was partly occupied and often attacked in Tartar invasions. The Tartars, trying to increase their power, burned off large areas, mostly forests. During the 12th and 13th centuries, colonisers coming mainly from Saxon Germany were invited to these depopulated areas. These people mainly developed the mining industry and processed timber needed in the mining and metallurgic industries. Numerous extensive areas around the main mining regions were totally deforested, thereby implicating changes in the structure of the landscape and biological diversity.

In the 15th and 16th centuries, nomadic shepherds from Moravia started to colonise the mountainous ridges of the Carpathians. They removed forests in higher zones of the mountains in order to acquire areas sufficiently large for grazing. Their activities are reflected in the present distribution of mountain meadows with biological diversity of extraordinary value.

In the 17th and 18th centuries, the process of populating the territory relatively diminished and stabilised. During feudalism, settlements were maintained

close to fortified places where the main economic activities were concentrated.

The further population of the territory of Slovakia and development of economic activities during the industrial revolution expressively intensified the pressure on the natural environment and exploitation of its natural resources. The original structure of the landscape was gradually interrupted by large melioration interventions, water pollution, inappropriate investments, and the construction of the transport network.

In the 20th century, the waves of the two world wars (1914-1918 and 1939-1945) broke through the territory of Slovakia leaving several imprints on its demographic distribution and landscape that could not be wiped out. After 1948, with socialism neglecting the country's natural potential and its historic frame, the last remains of the original territorial structures of Slovakia and development of its traditional settlements were gradually liquidated.

The population of Slovakia has gradually grown from 2,5 million in 1869 to 5,4 million in 1996, which, in this stated period of time, represents a more than two-fold increase in the number of its citizens in a relatively short time. This trend has also been promoted by the intensification of agriculture, development of industries and transport, large-scale urbanisation and irrational economic objectives with extremely negative effects on the environment, and especially on its biological diversity.

The present population of Slovakia consists of 5,4 million people living in 2,853 settlements, of which 136 are municipalities. The national composition of the population is as follows:

Slovak:	85.7%	
Hungarian:	10.7%	
Czech:		1.3%
German:	0.1%	
Rusyn:		0.3%
Other nationalities:	0.4%	
Romany:	1.5%	

The average population density is 108 persons/km², determined by the factor that Slovakia is populated mostly in the lowlands and valleys in contrast to the very sparsely populated mountainous areas. Therefore, population density in the mostly populated areas reaches rather higher values (on average approx. 1,800 persons/km²).

The average life expectancy of the population of Slovakia is 73 years (68 for males and 76 for females) featuring a slight upward tendency. On average, the population is getting slowly older, with the natural increment gradually dropping.

CHAPTER 3

Diversity of Species

The geographical localisation of Slovakia in the centre of Europe and on the border between the Carpathians and the Pannonian plain determines the wealth of flora and fauna. Until today, in Slovakia, over 11,000 plant species (including algae and mushrooms), over 28,800 animal species (including invertebrates) and 1,000 species of protozoa have been determined. But the estimates are even higher; for instance, the number of animal species is estimated to 40,000.

The diversity of micro-organisms, an invisible part of all ecosystems, but inevitable for their existence, is also very important. Some 4,760 species of bacteria are currently registered, but their total number is estimated to be up to 40,000. Bacteria include cyanobacteria, from among which 353 species have already been found although their number is many times higher. Approximately 5,000 species from the total of the estimated number of 130,000 viruses have been detected in Slovakia. We still have insufficient knowledge of those groups of micro-organisms which are difficult to monitor and classify, for instance invertebrate animals and all microscopic organisms (bacteria, cyanobacteria, algae, micromycete, protozoa, infusorians and other single-cell organisms).

Overview of the Plant Groups :

Group	Global estimates	Slovakia
	Number of species	Number of species
Higher Plants	>250 000	3 124
Bryophytes	>14 000	902
Lichens	>17 000	1 493
Fungi	>70 000	2 162
Algae	>40 000	3 450

Synthesis based on: Marhold, K., Hindák, F., 1998 (in press)

Overview of the Animal Groups

Group	Global estimates	Slovakia
	Number of species	Number of species
Mammals	4 327	85
Birds	9 881	352
Reptiles	>6 500	20
Amphibians	>4 000	20
Fish	>8 500	78
Invertebrates	>1 220 000	>28 000

Overview of Invertebrates

Group	Global estimates	Slovakia	Threatened* number	Threatened %
Pseudoscorpionida	2500	53	29	55
Opilinida	2500	37	14	38
Acarina	10000	740	740	100
Crustacea	30000	383	94	25
Symphyla	170	7	0	0
Pauropoda	500	16	0	0
Chilopoda	2800	60	17	28
Diplopoda	10000	75	0	0
Collembola	10000	333	229	69
Protura	500	26	0	0
Diplura	800	20	0	0
Thysanura	720	6	0	0
Ephemeroptera	2000	112	44	39
Odonata	5667	69	47	68
Plecoptera	2000	97	28	29
Dermaptera	1400	6	3	50
Mantodea	1800	1	1	100
Blattodea	4000	11	3	27
Orthoptera	15000	122	56	46
Psocoptera	2000	50	0	0
Anoplura	540	23	0	0
Thysanoptera	4000	127	0	0
Heteroptera	30000	787	129	16
Auchenorrhyncha	30000	544	0	0
Psylloidea	107	0	0	0
Aleurodoidea	12	0	0	0
Aphidiidea	777	0	0	0
Coccoidea	98	0	0	0
Neuropteroidea	5500	93	28	30
Coleoptera	350000	6498	1504	23
Stresiptera	532	25	3	12
Hymenoptera	250000	4300	197	5
Trichoptera	7000	213	33	15
Lepidoptera	100000	3519	1147	33
Mecoptera	500	8	4	50
Diptera	150000	4635	47	1
Siphonaptera	2380	90	35	39
Bryozoa	4000	9	2	22

Synthesis based on: Ružičková et al., 1996

Includes Ex, E, V, R, I and K

Endemic species of plants and micro-organisms

From the lower flora species, coming from the territory of Slovakia, some tens of new species have been described, some of which have not yet been found in any other country. Due to our insufficient knowledge of the occurrence of

these mostly microscopic organisms, we can not be sure that these are really species endemic to Slovakia. The occurrence of such organisms is very probable in biotops with extreme temperatures, such as snow and warm mineral springs. Until now, they have only been found in superficial layers of the summer snow fields of the Tatras, e.g. the eucaryothic algae *Chloromonas rostafinskii* and *Koliella tatrae*, which, when densely populated, cause the snow to become green („green snow“). The species of thermophilic procaryothic cyanobacteria *Aphanothece thermicola* and *Siphononema thermiphila* were originally identified at the Jozef thermal spring at the Škliené Teplice spa, which has a temperature of almost 50°C (Hindák, F., 1978, Hindák et al., 1989).

From the total number of 3,124 higher plant species, 92 are classified as endemites. The endemic species occur only in certain geographical areas. Those regions in Slovakia with high endemism usually feature a great diversity of species. Two types of endemites are distinguished, according to their origin: paleoendemites, originating in the Tertiary, and the neoendemites, originating in the Quaternary Age. A known paleoendemite of the Western Carpathians is *Daphne arbuscula*, which occurs only in the Muránska plateau dolomites and nowhere else in the world. Another important endemic of Slovakia and the adjacent region of Hungary is *Onosma tornensis*. This is a Slovak Karst endemic with its locus *classicus* on the Turniansky castle hill. Both these species are recorded in the IUCN Red Book - the World Conservation Union.

The most important endemics of Slovakia are, by location, classified as:

* Carpathian (e.g. *Saxifraga wahlenbergii*, *Delphinium oxysepalum*, *Dianthus nitidus*, *Erysimum wahlenbergii*, *Campanula carpatica*, *Cochlearia tatrae*, *Papaver tatricum*)

* Pannonian (e.g. *Astragalus vesicarius* subsp. *albidus*, *Iris aphyiia* subsp. *hungarica*, *Thiaspi jankae*, *Coichicum arenarium*).

Endemic species of animals

In animal species, the Carpathian endemics, with 102 classified taxa, mostly the invertebrates, dominate. From among the molluscs, *Bieizia coeruians* could be mentioned.

The total number of 87 species of mammals include 5 endemics of geomorphologic formations, the major parts of which are spread on the territory of Slovakia. Three of these are at the sub-species level (*Marmota marmota iatirostris*, *Microtus nivaiis mirhanraini* and *Rupicapra rupicapra tatrica*, all of which are endemic to the Tatras) and one is at the species level (*Pitymys tatricus*). One sub-species (*Microtus oeconomus meheiyi*) is a Podunajska plain endemic. *Tritieia slovenica* and *Trichondrius tatricus* can be found in the mountainous lakes of the Tatras. The insect is represented by endemics of the River Danube - *Paiingenia iongicauda* and *Gaurotes excellens*.

Relic species

The present flora and fauna consist of taxa which were introduced to our territory during various geological and historical periods and survived in unfavourable conditions in their place of preservation, forming a part of their current area. Relic species are classified according to several existing factors: according to the time and climate of their introduction: pre-glacial (Tertiary) or glacial, resp. interglacial and post-glacial.

Tertiary plant relic species include: *Dianthus nitidus*, *Saxifraga wahlenbergii*, *Delphinium oxyspalum*, *Campanula pusilla*, *Campanula carpatica*, *Armeria alpina*, *Androsace lactea*, *Primula minima*, *Ranunculus alpestris*.

The largest group of is that of glacial relics, including: *Salix herbacea*, *Salix reticulata*, *Salix retusa*, *Bartsia alpina*, *Tofieldia pusilla*, *Carex atrata*, *Carex chordorrhiza*, *Carex limosa*, *Oxyria digyna*, *Polygonum viviparum*, *Juncus trifidus*, *Silene acaulis*, *Linnaea borealis*, *Saxifraga nivalis*, *Eriophorum vaginatum*, *Dryas octopetala*, *Ledum palustre*, *Pedicularis sceptrum-carolinae*.

Overview of threatened plant groups

Group	Number of species	Threatened* number	Threatened %
Higher plants	3 124	1135	36
Bryophytes	902	540	60
Lichens	1 493	583	39
Fungi	2162		?
Algae	3 450		?

Overview of the threatened animal groups

Group	Number of species	Threatened* number	Threatened %
Mammals	85	55	65
Birds	352	114	32
Reptiles	20	20	100
Amphibians	20	20	100
Fish	78	35	45
Invertebrates	>28 000	502 1	18

*Includes Ex, E, V, R, I and K

Territorial units featuring a great diversity of species

The diversity of animal and plant species occurring in various territorial units of Slovakia depends on several determining factors, such as the substrate type, diversity of morphological shapes of the terrain, insulation of ecosystems, bio-geographical borders with various overlapping elements, degree of biotope disturbance and connected processes of succession, etc. The areas with the highest potential for the diversity of species are mountainous units with a rich mineral composition, crossed by bio-geographical borders, and alluvia of large lowland rivers with dynamically changing conditions.

Besides these natural active factors, the occurrence of animal and plant species is influenced by the degree to which human activities affect the landscape. Man has affected the diversity of species both negatively and positively. As a positive example we can mention the formation of meadow and pasture ecosystems rich in species, located in the mountainous degree below the upper tree line and in the floodplains of lowland rivers. The rich meadow communities are among those ecosystems with the highest possible diversity of species. The mountain meadows of the White Carpathians and the Slovak Karst include over 90 species of higher plants in an area of 25 m². Usually, human activity negatively affected the diversity of species and its value correlates to the degree of human intervention into the landscape. Highly valuable areas have been preserved mainly in mountainous regions.

The areas in Slovakia richest in species are the karst sections of the Western Carpathians. For instance, over 1,400 species of higher plants have been registered for a relatively small area in the Slovak Karst. The highest part of the Carpathians, formed by the complex of the Western, High and Belianske Tatras, belongs to the areas richest in species. So far, over 1,300 species of higher plants with a large number of endemics and relicts have been found here. These areas are comparable to the karst areas of the Muranska plateau (1,150 higher plant species) and of the Slovak Karst (930 plant species).

The lowlands of Slovakia were mostly affected by human civilisation, mainly by the regulation of large rivers, development of intensive agriculture and construction of settlements. In spite of this, these regions still contain several preserved areas with a wealth of species comparable to the mountainous areas. The Záhorská plain is most valuable, and the preserved Morava River floodplain, which is home to over 1,200 species of the higher plants. In the section of the Morava River flowing through our territory and in the Danube River, 512 and 755 plankton species of blue-green algae/cyanobacteria and algae have been found, respectively.

Endangered species

From the total number of 3,124 higher plants, 1,135 are recorded in the Red List of Ferns and Blooming Plants of Slovak Flora (Maglocký, Feráková, 1993).

The diversity of animal species has decreased, while from the total number of

555 wild living vertebrates, 244 are endangered. These animals include 35 species of fish, all species of amphibians and reptiles, 114 species of birds and 55 species of mammals.

With regard to microscopic organisms (bacteria, algae, protozoa, micromycetes, cyanobacteria) we still do not have enough available basic data and information to be able to assess their conservation status in the country. The protection of these groups therefore requires the protection of biotops in which they live. One problem is the exploitation of peat, which destroys typical biotops and eradicates the acidophilic species of micro-organisms.

CHAPTER 4

Diversity of Ecosystems

Although Slovakia can not compete with tropical countries in its wealth of flora and fauna, the diversity of ecosystems emphasises the high value of its territory as regards biodiversity. The natural diversity is influenced by three main factors:

1. Altitude and vertical diversity of the landscape resulting from it,
2. Geological conditions, with alternating limestone and dolomites with granites, volcanic minerals and flysh zones, to loesses and blown sands in the lowlands,
3. Availability of water, essential for life and influencing the character of ecosystems in all vertical zones and on every geological layer.

The classification of vegetation:

1. Lowland zone - occupies the lowest areas of Slovakia up to approx. 200 m above sea level. The original vegetation has been preserved only sparsely (soft and hard floodplain forests, communities of blown sands), with fields, meadows, vineyards and gardens prevailing.
2. Hilly landscape zone - reaches to approx. 500 m above sea level and features the abundant occurrence of oak forests. Rocky southern slopes are characterised by common „rocky steppes“ with very varied xerothermal flora. Northern slopes are covered with beech forests. Oak-hornbeam forests are also abundant. Fields occupy a large area here.
3. Sub-mountainous zone - reaches up to 900 - 1000 m above sea level with beech forests dominating. In its lower part on several locations one may find enclaves of oaks, the fir-tree grows in its upper part and in North Slovakia the spruce. Field cultures do not overlap this zone.
4. Mountainous zone - its upper border represents upper tree line, which varies according to the mountains, generally oscillating between 1,400 - 1,550 m above sea level. This zone is characterised **by** the prevalence of coniferous trees - spruce and fir. In its lower part, one may find beeches in several locations, and at an elevation of over 1,300 m the dominating spruce may descend to lower altitudes in some places. On the contrary, on several mountains, the beeches ascend very high while the spruces form only a very narrow zone.

5. Sub-alpine zone - also called the dwarf pine zone. In the High Tatras, this zone reaches up to 1,800 m above sea level, in other mountains lower altitudes. The physiognomy of this degree is determined by dense coverage of dwarf pines, if not destroyed by shepherds trying to extend the areas of mountainous pastures.
6. Alpine zone - extends from the upper border of the dwarfed pine zone up to the highest peaks. This zone is characterised by alpine meadows, small willows and rock formations.

Wetlands, the occurrence of which is undermined mainly by the accessibility of water preordaining their nature to such an extent that it moderates the influence of altitudes, can be found from the lowlands right up to the alpine degree.

Forest ecosystems

For Slovakia, forests represent not only great economic potential but are also an important feature of the landscape and help to stabilise the ecosystem. The forests also fulfil numerous extra-productive functions: water-economic, anti-erosion, land-protective, recreation, social-health, aesthetic, etc. Due to the great geographical variety of Slovakia, we find a large scale of the forest vegetation zones and within them a varied palette of the forest types on a relatively small territory.

The principal character of the territory up to the mountainous zone is determined by forests, which cover 1,999,000 ha of Slovakia, which, relatively expressed, represents 40.8% of the country's area. From the total area of forests, 40 - 45% are semi-natural forests, naturally restored and with a composition of species that only slightly differs from the original forests. This sets Slovakia apart from most countries of central and western Europe. In Slovakia, some 70 fragments of natural and virgin forests with a total area of as much as 20,000 ha (Korpel, 1995) have been preserved. One could assume that in Slovakia, without any human activity, forests would grow everywhere. Man started his deforestation in the fertile lowlands with a warm climate. In Southwest Slovakia, the area of woods is less than 10%, in hollows some 10 - 15%, but in Northeast and East Slovakia over 50% (Magic, 1986).

From the global point of view, at present the forests face two serious problems: large-scale deforestation and degradation of their quality and stability. Slovakia mainly has to solve the second problem, caused by the gradually declining health of the forests through air pollution and a globally changing climate. The forests are also negatively affected by inappropriate („non-ecological“) management.

The decline in the quality and stability of the forests in our geographical latitudes negatively affects biodiversity, causes destruction, resp. decomposition of the forest ecosystems, increases the number of extinct and critically endangered species and also reduces genetic diversity.

The accompanying effects of this factor are the extension of lands affected by erosion, unwanted oscillations in hydrological conditions and local climatic changes.

Spacial diversity of Slovakia's forests

It is assumed that as much as 90% of the territory of Slovakia was covered with woods before intensive human activities and interference into vegetation cover started. The largest and most notable reduction occurred in the oak and beech groves and in the area of the upper forest border which, due to these effects, has dropped down by 200 - 400 m in several locations.

Since 1950, the area of forest land has been continuously increasing, by 12% in total. This increase was caused by the afforestation of less productive and infertile agricultural lands.

For economic purposes, we distinguish three categories of forest:

- * managed/commercial forests focused mainly on the production of timber, (67%)
- * protective forests, the function of which is to protect forest locations, (15%)
- * forests with a special function for public use (for health, water management, nature protection, etc.) (18%).

Another factor in the classification of forests is their shape and form. We distinguish:

- * Timber (standard) forests grown from seed,
- * Coppice forests,
- * Standard with coppices forests containing a combination of the preceding two types.

Distribution of habitats in Slovakia

1. Ploughed land	2 446 000 ha	49%
2. Forest land	1 930 000 ha	41%
3. Waters	93 000 ha	2%
4. Building areas	196 000 ha	5%
5. Others	177 000 ha	3%

Synthesis based on :Štatistický úrad SR, 1995:

Wetlands and water ecosystems

Wetlands globally belong to the most endangered ecosystems. In Slovakia, almost one tenth of its territory (4,500 km²) has been drained. The consequence of these activities focused on the construction of water works, regulation of flows and exploitation of peat, is that wetlands and water ecosystems have disappeared and no prerequisites for their restoration are being created. This phenomenon is accompanied by the eradication of numerous organisms and the loss of rare functions which contribute to the preservation of the ecological balance.

According to the manner of supplying water we classify Slovakia's inland wetlands to the three basic systems: marshy, fluvial and lake. With the fluvial and lake systems, the wetlands are directly influenced by the water level in rivers and lakes. Water penetrates the marshy wetlands as underground water springing up to the surface, during floods or by means of rain and snow.

Willow-poplar forests

Soft floodplain forests are spread in locations with regular, relatively high and longer lasting floods. The underground water level is relatively high, though it drops in drier periods. The lands are saturated, with a high content of nutrients, mainly nitrates introduced annually by floods. The soft floodplain forests belong to the mostly affected wetlands of Slovakia. The last remnants are preserved on the banks of the Morava, Danube and Latorica Rivers.

Oak-ash-elm forests

These forests are located on the river floodplains in locations in higher altitudes which are drier and away from regular floods. The floods last a shorter period than with the willow-poplar floodplain forest and the underground water level oscillates less in the course of the year. These forests are affected by forest management interventions and the planting of mono-cultures of non-native wood species. Their usual locations are river valleys in the lowlands and hollows.

Brook alder groves

When proceeding upstream along larger rivers, soft floodplain forests located at the lower course are gradually replaced by the sub-mountainous and mountainous alder groves. Such brook alder groves also border smaller flows. Besides the brook alder groves, the streams and rivers are also bordered by bushy willow groves. These forests are mainly affected by water management activities, the regulation of streams and clearing.

Ecosystems of stagnant and slowly flowing water

Their typical representatives are hydrophytes - plants fully accommodated to living in an aquatic environment. They grow in the water a maximum of two metres deep which oscillates during the year. The plants tolerate changes in the luminous, trophic and hydrological conditions. These ecosystems are mainly located in the lowlands, in cut-off river arms, depressions in terrain, shallow lakes, slowly running streams and canals. They are affected by the regulation of flows and eutrophication.

High-herbal floodplains

High-herbal floodplains are wetlands located at Slovakia's highest altitudes. The upper border of their spread is in the Tatras, the upper part of the alpine zone, at an altitude of over 2,000 m above sea level. The lower border is represented by the forest border. These floodplains can be found close to streams and mountain lakes, below rocky walls and in locations where snow cover is maintained for a long time.

Peat bogs

These represent important refuges for the arctic flora and fauna coming from the Ice Age. We classify them as high peat bogs, temporary and marsh peat bogs. These bogs are an important testimony of Nordic flora and vegetation.

High and temporary peat bogs are formed by overgrowth in water areas or permanently wet shallow depressions where the extinct remnants of plants, mainly mosses, are accumulated. A living high peat bog is characterised by present open water areas - so-called peat eyes. In Slovakia, high peat bogs occur in the mountainous to sub-alpine locations of the Tatras, Orava and sub-Tatra hollows, while temporary bogs also descend to lower altitudes

The holly peat **bogs** represent an extreme type of peat bog. They are characterised by extremely high soil (peat) acidity, lack of mineral substances and nitrogen, and full dependence on precipitation water. These location conditions are unsuitable for most plant species, and therefore only a limited number of plant species grow there.

Marsh peat bogs - marshes are spread along rivers and streams, in almost the whole territory of Slovakia. They can be found mainly in the sub-mountainous to lower alpine zone of the Tatras, and in the Orava, Liptov, Turiec, Spiš and Pohronie regions. They are very rare in the Záhorie region and Podunajská plain. Usually, they permanently require sufficient underground water volumes.

Meadow, pasture and xerothermal ecosystems

In the past, the major part of our territory was covered by forests. The meadows, pastures and fields are results of human activities.

Wet meadows and pastures

The most important factors influencing the existence of wet meadows are floods, the underground water level and regularity of mowing. Altitude undermines the occurrence of the plant and animal species, too. While grasses dominate in the lowlands, the ratio of grasses and herbs is balanced at middle altitudes, and high herbs are dominant in the sub-mountainous and mountainous areas. Presently, they most frequently occur on the plains of streams and rivers.

Dry sub-mountainous and mountain meadows

Thermophilic meadows on flysch are the most common. These are meadows of lower plants, rich in species and bloomy if appropriately managed. Slovakia's mountain meadows on limestone are among the richest European ecosystems with regard to diversity of species. For instance, on the Slovak Karst meadows 63 species per m² have been recorded. On an area of 25 m² over 90 higher species can be found (Drazil et al., 1996).

Xerothermal ecosystems

On more exposed southern slopes xerothermal grass communities combined with oak groves can be found. In several locations they form forest steppes.

Their optimum is reached at an altitude of 400 - 500 m above sea level, but can also be found up to 1,000 m above sea level on certain geological substrates. Numerous relict and endemic species occur in these ecosystems.

Alpine and sub-alpine ecosystems

The ecosystems of the high-mountainous zone were less affected by human activities in the past because of their inaccessibility and harsh climatic conditions.

The alpine zone - includes a varied palette of biotops - alpine meadows, rocky walls and cracks, snow beds, springs, streams and mountain lakes. The richest alpine meadows are based on dolomite and limestone, mainly with southern exposure.

The sub-alpine zone - its physiognomy is determined by dense groves of dwarfed pine, if not changed into mountainous pastures. It is a wood species of bushy growth capable of resisting strong winds and harsh winters. At very high altitudes exceeding the upper forest limit individual spruce trees with the trunks shaped into bizarre forms by strong winds can be found. The pine limba (*Pinus cembra*) grows in the lower part of the dwarfed pine groves and some individual trees are over 300 years old.

Mountain lakes are important water biotops. Lakes of the alpine zone are poor in nutrients, which undermines the character of biodiversity. The largest lake is Velké Hincovo Pleso in the High Tatras, which has an area of 20 ha and depth of approx. 50 m. Rohacske Pleso is the only location of *Sparganium angustifolium*, a plant which occurs mostly in boreal areas and is preserved in our country as a relict from the glacial period. From among the animals, the only glacial relict is *Branchinecta paludosa*.

CHAPTER 5

Landscape Diversity

The diversity of landscape units and structures has mostly been affected by long-term economic activities and exploitation of natural resources. Since the process of population and therefore also the main economic activities were mostly concentrated in the lowlands and hollows, the mountainous units have remained relatively scarcely populated and their structure has remained similar to that of the original ecosystems. Forest areas and the structures of meadows, pastures and other ecosystems have remained unchanged.

The lowlands, hollows, most valleys and sub-mountainous regions have been completely modified because of the process of population, while the original ecosystems have been preserved only in islands and enclaves within the urbanised and economically utilised landscape. In this area of Slovakia, agriculture is dominant with the appearance of intensive cultivation of land. The lowland regions of South and East Slovakia and lower parts of the main river valleys (The Váh, Hron, Nitra, Bodrog, Torysa, Ipeľ and others) represent monotonous structures classified only according to the main agricultural activities to arable areas (fields), hop gardens, gardens and

orchards. Pastures and meadows dominate along rivers and their floodplains. Land of this type is typical of almost 50% of the territory of Slovakia. Even in intensively exploited areas, local and traditional activities have created the formation of specific structures characteristic of the given region. These characteristic structures have been formed mainly through the influence of grazing, mining, viticulture or small scale agriculture.

Grazing in the sub-mountainous area of the Tatras is a long tradition. In the past, it was the main source of economic activities within this region and, at the same time, provided the characteristic landscape of the countryside below the Tatras - large thin forests with islands of coniferous woody species and solitary trees.

Mining has been a tradition for many centuries in Slovakia. At its height, the mining industry very negatively affected the adjacent natural environment, often completely altering or destroying the original structure. After the main exploitation activities were stopped, the landscape partially regenerated but by this time it already had a different nature. The typical picture of a mining area is around the towns of Banská Stiaavnica and Kremnica (heaps, mud pits, numerous water reservoirs, large-scale deforestation, collapsed tunnels and landslides) or in the Spišsko-Gemerské Rudohorie mountains. Current problems are connected with the abandoned mines (outflow of strongly contaminated mining water) and with on-going mining activities - numerous quarries, pits and the increasing exploitation of magnesite.

Viticulture in Slovakia is very traditional, too. Favourable climatic and edaphic conditions supported the growth of viticulture and initiated the formation of large winery areas with a special landscape structure. These areas are mainly in the southern and south-eastern parts of Slovakia (foothills of the Small Carpathians, around the city of Nitra, Veľký Krtíš, and the Zemplin region) and produce wines of excellent quality.

A typical phenomenon mostly in North and Northeast Slovakia is the structure of narrow but long small fields and pastures divided by groups of bushes and trees. This structure is derived from the proprietary relationships of small farmers and their traditional management procedures, transferred from one generation to the next. Besides the stated landscape structures and urbanised areas sustained by traditional economic activities, in Slovakia there are numerous local landscape phenomena resulting from the cultural, historical and natural characteristics of the given region, which offers a large scale of landscape diversity. Recently, large areas of arable land have been gradually diversified, mainly through changes and rotation of types of economic activities, changes in the demand for products and a gradual introduction of progressive agricultural methods. Reduced application of chemical protective preparations and a return to biological protection, restoration of the importance of the creation of landscape features and intensification of the effects of biotechnology, all contribute to gradual diversification.

CHAPTER 6

The Protection of Biodiversity *In- Situ*

The protection of biodiversity in-situ is traditionally connected with the protection of nature. Heterogeneity of the landscape belonging to the Carpathian arch and more difficult accessibility during the process of population in the past allowed extremely valuable natural heritage to be preserved in a form which has not been preserved in the larger geographical region of central Europe, mainly because of rapid economic development of regions providing accessible natural, mostly raw material resources, and fertile land. The preservation and insufficient survey of the landscape, social level and traditions allowed the gradual development of historical settlement structures and relations towards the natural environment.

The protection of nature and creation of conditions for the legal existence of protected territories dates back to the time of feudal ownership of the land, the main objective of which was the protection of forests and game (the 13th and 15th centuries), protection of healing springs (The King's Patent dating from 1682 and 1715), and mainly the Teresian Forest Order dating from 1769. At the end of the 19th and at the beginning of the 20th century, the protection of nature was gradually anchored at the legal level and the first territories having the status of nature reserve as the general term for territorial protection were founded (the oldest reserve Ponická Huta dates from 1895). In 1955, the Act on the State Protection of Nature was adopted, based on which the protection of nature by state (government) started to be systematically performed.

The formal existence of the protection of nature by state (government) dates back to the establishment of the TANAP administration in 1952. The first protected territory - the Tatras National Park - was established based on Slovak National Council Act No. 11 from 1948. This act also determined the criteria for the protection and use of the national park's territory, while the forest groves were exclusively classified to the category of protected forests and forests with a special function. This act became the first act focused on the protection of nature in the territory of Slovakia.

The first years after the adoption of Slovak National Council Act No. 1/1955 Coll. on the State Protection of Nature were not favourable for the development of the territorial protection of nature. The act specified eight categories of the territorial protection of nature and defined the categories of species protection. The act did not allow for the protection of nature as a whole, did not define any relation to the protection of parts thereof and did not provide for a thorough system of state supervision of the protection of nature.

After 1990, the altered national legislation also modified the legal framework for nature and landscape protection. In 1994, National Council of the Slovak Republic Act No. 287 on Nature and Landscape Protection, effective from January 1, 1995, was passed, and consequently, the system of legal

standards directly or indirectly relating to it has been processed and updated. The new Act introduced a complete conception for the protection of nature based on the territorial system of ecological stability and classification of the entire territory to five degrees of protection and utilisation. In addition to others, the act provides special protection of flora and fauna species - 226 taxons of freely growing plants and 2 families, 24 genera and 176 species of wild animals are protected.

Besides the clearly determined territorial protection, the new Act on Nature and Landscape Protection also defines the principal rights and duties of the general protection of nature and the landscape, of protected flora and fauna species, protected minerals and fossils. It also defines sanctions for the violation of the conditions for the protection of nature and the landscape and the competencies of nature protection authorities.

The five degrees of the protection of nature and the landscape and categories of protected areas

The first degree of protection is valid in the whole territory of the country. The second degree of protection is applicable to protected landscape areas, and the third to the national parks. For the fourth and fifth degree of protection the Act defines those activities whose performance is prohibited. The fourth degree of protection refers to protected sites while the fifth degree refers to nature reserves and nature monuments.

A protected landscape area is a larger territory, usually with an area of over 1,000 ha, dispersed ecosystems, important for the preservation of biological diversity and ecological stability, with an appearance characteristic of the landscape or with specific forms of historical settlement (**the second degree**).

A national park is a larger territory, usually with the area of over 1,000 ha, mostly with ecosystems expressively not affected by human activities or in its unique and natural landscape structure, forming over-regional biocentres and the most important natural heritage in which the protection of nature is superior to other activities (**the third degree**).

A protected site is a smaller territory, usually with an area of up to 1,000 ha, including mostly bio-corridors, interactive elements or biocentres of local or regional importance (**the fourth degree**).

A nature reserve is a smaller territory, usually with an area of up to 1,000 ha, represented by original ecosystems or ecosystems only slightly affected by human activities, or biocentres (**the fifth degree**).

A nature monument is a spot, line or other small ecosystem. The area of its elements or components is usually up to 50 ha. A nature monument has scientific, cultural, ecological, aesthetic or landscape significance. These

ecosystems are mainly outcrops, rock formations, sea rock, narrow valleys, dunes, sections of water streams, springs, sinks or lakes **(the fifth degree)**.

The total area of protected areas in Slovakia, including protected zones, covers more than 22% of the territory of Slovakia, of which 943,641 ha represent the protected areas themselves and 244,127 ha their protected zones. Two national parks and two protected landscape areas are included in the World Network of Biosphere Reserves of the UNESCO „Man and the Biosphere” Programme.

In Slovakia, seven locations are included in the List of Internationally Important Wetlands pursuant to the Ramsar Convention, and two locations in the UNESCO World Natural Heritage List.

CHAPTER 7

The Protection of Biodiversity *Ex-Situ*

In Slovakia, there are various facilities for the preservation of native or introduced species of flora and fauna. The most traditional facilities are zoos, botanical gardens and arboreta established in the past mainly for scientific, cultural and educational purposes and objectives, but which have gradually also become sites for the protection of rare and endangered species of flora and fauna. Their predecessors were monasterial gardens; e.g. in the 14th century monks cultivated medical and aromatic plants in the Cervený Kláštor monastery. The botanical gardens were established later: in 1942 by the Faculty of Natural Sciences of Comenius University in Bratislava, in 1950 by the Faculty of Natural Sciences of the Pavol Jozef Šafárik University in Košice and by the Secondary School of Agriculture in Nitra. In 1990, just in the Botanical Garden of Comenius University in Bratislava approximately 2,000 taxons including 600 woody species were cultivated. The most famous historical gardens and arboreta are protected cultural monuments and at the same time represent important sources of knowledge and higher plant diversity. They include, for instance, the arboreta in Mlynany, Borová Hora and Kysihýbel, along with numerous other local parks and gardens.

Slovakia's four zoos, namely in Bojnice (founded in 1955, with an area of 42 ha and 244 species), Bratislava (founded in 1960, with an area of 97 ha and 167 species), Košice (founded in 1985, with an area of approx. 290 ha and 110 species) and Spišská Nova Ves (opened in 1992, with an area of 6.5 ha and 52 species), presently breed about 390 species and subspecies of animals including some 110 species of mammals, 145 species of birds, 63 species of fish and 56 species of reptiles. From the total number of these species, 19 are recorded in the IUCN Red Book in the category of critically endangered species, while 7 of them have reproduced. The zoos care for native and exotic species of animals, including several species which may become totally extinct. Slovakia's zoos also assist in the care of European species of fauna and several local animal breeds by breeding, for instance, Hucul horses in Košice and Bojnice.

The specialised breeding stations for endangered species of plants and rescue stations for animals play also a very important role. For instance, the breeding station for European bison - *Bison bonasus* in Topolcianky is very famous. Several other rescue and breeding stations have been founded for birds of prey (falcons, owls, eagles, etc.).

Old and regional varieties of, e.g., fruit trees and vine, have a special position in the genofund being preserved *ex-situ*. Their specific use has been connected with Man from the early beginnings of his existence, and therefore they are considered to be an important part not only of the genetic diversity but also of the natural wealth of each country and cultural heritage of each nation. Following the introduction of intensive agriculture this problem was ignored. The distribution of an usually small number of intensive varieties of individual plant species has caused a marked reduction of diversity at the level of other genetic forms of the relevant species. Therefore, their protection *ex-situ* is very important from the scientific, cultural and economic points of view.

Our largest deficit is in the area of *ex-situ* protection of the genofund of micro-organisms. After the split of the former Czech and Slovak Federative Republic, the territorial principle of division of property was applied, which meant that the federal collection of micro-organisms in Brno (mainly bacteria and micromycetes) belonged to the Czech Republic and Slovakia inherited only the yeast collection (the Chemical Institute of the Slovak Academy of Sciences, Bratislava). So, it is necessary to start a national collection of micro-organisms which would include the stored species and families of bacteria, cyanobacteria, micromycetes, single cell algae and protozoa present in the territory of Slovakia along with their mutants and genetically modified families used and applicable for research purposes and biotechnological practices.

The currently available registered microbial genofund in Slovakia is distributed in individual microbiological, biochemical, genetic and biotechnological laboratories for basic and applied research, including hospitals and production operations. These partial collections of cultures contain numerous rare families and types of bacteria, micromycetes, cyanobacteria, algae and protozoa, as well as viruses and bacteriophages. A certain risk of any eventual losses to this important genofund may be expected because micro-organisms are usually stored *ex-situ* only until needed in various scientific research projects or for other purposes.

CHAPTER 8

Diversity of Agricultural and Cultivated Species

The plant species genofund represents a very important part of biological diversity, very useful to mankind. In Slovakia, over 160 plant species are cultivated for economic purposes. The genofund of these cultivated species includes not only modern varieties, cultivars and hybrids utilised mainly in agriculture, but also restringed varieties, varieties used world-wide, old and

regional varieties, ecotypes of common plant species and their natural populations maintained and used by small-scale cultivators.

In Slovakia, stocktaking of all endangered populations of economic animal species has been carried out according to the FAO criteria. 23 breeds of seven species were assessed, while 5 breeds were registered in the World List of Diversity of Endangered Domesticated Species.

CHAPTER 9

Biotechnology and Genetically Modified Micro-organisms

Slovakia has a quality education system in the area of biological, biochemical and bioengineering preparation of specialists. This forms the basis of modern research of genetic modifications of micro-organisms, recombinant DNA technology and molecular cloning. Its centre contains institutes of the Slovak Academy of Sciences (The Chemical Institute, Institute of Molecular Biology, Institute of Experimental Oncology, Institute of Virology and Institute of Microbiology), university workplaces (The Faculty of Natural Sciences of Comenius University in Bratislava and The Chemical-Technological Faculty of the Slovak Technical University in Bratislava) and research institutes (The Research Institute of Animal Production in Nitra and The Research Institute of Plant Production in Piešťany). Laboratories of the scientific and research sphere in Slovakia dealing with genetically modified organisms are equipped with the standard technique for genetic manipulations ensuring biological safety at the P-2 or P-3 levels.

In the production sphere, the genetic manipulations are focused on mutations of microbial species which are required to increase the production of a final product (e.g. amino acids) or to increase the application of a certain substrate (e.g. lactose in whey). The results of these projects have not yet been fully published and several details are considered confidential. Genetically modified micro-organisms are used in the company Fermas s.r.o. (a joint venture of the Degussa company from Germany and Biotika, a.s., Slovenska Lupca) for the production of amino acids.

In 1997 the National Programme for the Development and Application of Biotechnology was developed in Slovakia. It is a comprehensive conceptual document following the international trend of using biotechnology products as well as protection against its misuse for any anti-social and amoral purposes. In the area of agro-biotechnology, its objective is to gradually replace chemical preparations used in the protection of plants with bio-preparations, objectives for the improvement of water and water source quality and the protection and restoration of the natural and living environment in agrarian and forestry activities. Environmental biotechnology is focused on a whole series of objectives designed to reduce the burden on the environment, especially by the use of bio-degradable materials and by an increased accumulation capability for heavy metals and degradation of oil products, by applying modern biotechnology and using biomass. The development of legislation in the area of biotechnology is thoroughly surveyed, mainly in the

sphere of its compatibility with EC/EU and OECD countries, when new legislation focused on the application and transfer of genetically modified micro-organisms and prohibition of any interference into the genetic identity of human germinal cells is prepared.

CHAPTER 10

Slovak Republic and the Convention on Biological Diversity

The Slovak Republic recognised the importance of the conclusions and recommendations of the United Nations Conference on the Environment and Development. On April 20, 1993, the Government of Slovakia approved the accession to the Convention by its Resolution No. 272/1993 and recommended the President of the Slovak Republic to ratify the Convention subject to approval by the National Council of the Slovak Republic. Permanent representative of the Slovak Republic to the United Nations signed the Convention on behalf of the Government of the Slovak Republic in May 1993.

Following the approval to ratification given by the National Council of the Slovak Republic by its resolution 561/1994 on August 18, 1994, the President of the Slovak Republic ratified the Convention on August 23, 1994. The Instrument of Ratification was deposited with the Secretary General of the United Nations on August 25, 1994 and 90 days later, in accordance with the Article 36 of the Convention, the Slovak Republic became the 79th Party to the Convention on November 23, 1994.

The text of the Convention (in both the English and Slovak) was published in the Code of Laws of the Slovak Republic, No 34/1996, Section 13. A number of relevant legal instruments support the implementation of the Convention on national level, among others the Law No. 287/1994 of the National Council of the Slovak Republic on Nature and Landscape Protection and the Law No, 17 on the Environment should be mentioned. However, an assessment of the national legislation is required to identify gaps and to provide for revision/evolving of legal instruments which would ensure a full implementation of the Convention.

In September 1994, the National Secretariat for the Convention on Biological Diversity was established within the Ministry of the Environment as administrative and co-ordinating structure for the Convention in Slovakia. The Secretariat was entrusted with the following :

- keeping a documentation relevant to the Convention and its communication, as appropriate, on the national level
- communication with international Convention Secretariat and other relevant structures world-wide
- provision, as appropriate, of logistic support to implementation of activities required by the Convention
- provision of administrative support to the Slovak Commission for the Convention on Biological Diversity
- co-ordination of the activities of the National clearing-house mechanism

- implementation of other activities as required by the instrument by which it was established
- monitoring of implementation of the National Strategy for Conservation of Biodiversity in Slovakia
- co-ordination of preparation of action plans and national reports relevant to the Convention

In view of the necessity to provide for independent and cross-sectoral supervision, the Slovak Commission for the Convention on Biological Diversity was established by the Minister of the Environment on November 24, 1995 as a cross-sectoral advisory body entrusted, *inter alia*, with responsibility for co-ordination of implementation of the Convention in the Slovak Republic. Members of the Commission representing different sectors, including NGOs, feature a broad range of expertise relevant to the Convention and will ensure that the Convention is implemented by single sectors in objective and professional manner. The Commission acts pursuant to its Statute adopted by the Government on 25 June 1996.

National Strategy for the Conservation of Biodiversity in Slovakia was approved by the Government of the Slovak Republic by its resolution No. 231 of April 1, 1997. Subsequently, National Council of the Slovak Republic endorsed the Strategy by its resolution No. 676 of July 2, 1997. Thus the Strategy has become a principal programmatic document for the implementation of the Convention on Biological Diversity in Slovakia. The Strategy will be elaborated into action plans directing the implementation subject to approval by the Government. First draft Action Plan containing the activities up to time horizon of 2000 was completed in March 1998, the approval by the Government is pending.

National Strategy for the Conservation of Biodiversity in Slovakia.

Elaboration of National Strategy for the Conservation of Biodiversity in Slovakia was driven by the provisions of the Convention's Article 6 as well as by the absence in Slovakia of a comprehensive conceptual document dealing with nature and landscape protection, species and ecosystems diversity and genetic diversity as well. Elaboration of the Strategy was recognised as one the key objectives of the state environmental policy in the field of the nature and landscape protection as stated in the document „Strategy, Principles and Priorities of the State Environmental Policy” which was approved by National Council of the Slovak Republic by its resolution No. 339 of November 18, 1993 following the approval by the Government of Slovakia through its resolution No., 619 of September 7, 1993.

In 1994 - 1995, a comprehensive country studies on biodiversity in Slovakia were completed (Jedlička, L. 1995 (Ed.), Tóth, O. 1996 (Ed.)). Based on that, Ministry of the Environment of the Slovak Republic - National Secretariat for the Convention on Biological Diversity in cooperation with a broad team of experts, started a preparation of the National Strategy for the Conservation of Biological Diversity in Slovakia. As a first step, a Framework for the National Biodiversity

Strategy in the Slovak Republic was prepared in cooperation with UNEP Regional Office for Europe. Valuable input to the Strategy was also taken from the Proposal for the National Ecological Network in Slovakia (IUCN, 1995) elaborated by local experts in co-operation with the IUCN.

The National Strategy for the Conservation of Biodiversity in Slovakia identifies 24 goals which require national consensus in order to strengthen biodiversity conservation and promote sustainable use of its components. The Strategy shall be reflected in the near future into the sectoral strategies and programmes.

Guiding principles and strategic goals of the National Biodiversity Strategy in Slovakia

The following guiding principles have to be observed in implementing the National Biodiversity Strategy in Slovakia:

- ❖ **all biodiversity is to be conserved - preferably in-situ**
- ❖ **induced loss of biodiversity has to be compensated to the highest possible extent**
 - **3 diversified landscape has to be maintained in order to sustain the variety of life forms at all levels**
- ❖ **biological resources have always to be used in a sustainable way**
- ❖ **everyone must share the responsibility for conservation and sustainable use of biodiversity**

Strategic goals

The strategic pyramid below shows an understanding of different actions to be taken in response to the message of the Convention. As with any other pyramid, it can only be functional and solid if all parts are present and interacting.

Understanding and **cooperation** among nations and joined efforts to maintain the biodiversity of the Earth are needed if conservation and sustainable use of biodiversity are to be effective. There is no exemption from responsibility as it involves a solution of our common future without making any distinctions.

Various **general measures** have to be introduced in order to promote conservation, to manage threatening processes and to regulate the use of biological resources. The conservation of biodiversity, *in-situ* in particular, stems from the philosophy that only a minor part of the biodiversity of the Earth can be conserved without touching it. The major part is made used for the different needs of human society. However, to prevent biodiversity loss, a certain limitation of use is necessary. Also indirect human interference must be restricted.

Sustainable use of biodiversity is use and consumption that do not draw down its renewable potential. Productive capacity of biological resources is

thus retained indefinitely. Sustainable use may involve ecological, economic, social and political factors.

Conservation of biodiversity is the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations. Thus conservation is positive, embracing preservation, maintenance, sustainable utilisation, restoration and enhancement of the natural environment.

Strategic goals :

I. Conservation of biological diversity

Goal 1

Identify the status of biological diversity components

Goal 2

Manage threatening processes

Goal 3

Strengthen in-situ conservation of biodiversity

Goal 4

Strengthen conservation of genetic diversity

Goal 5

Strengthen national capacities for ex-situ conservation of biological diversity

Goal 6

Building-up a comprehensive system for monitoring of changes in biodiversity on all levels

II. Sustainable use

Goal 7

Ensure ecological/y sustainable forestry

Goal 8

Gradually replace inappropriate agricultural practices with ecologically sustainable agricultural and pastoral management

Goal 9

Complement biodiversity conservation by introducing sustainable hunting and fishing management practices

Goal 10

Ensure that game hunting and berry and mushroom picking consider the long-term viability of the species and populations concerned

Goal 11

Promote ecological/y sound and sustainable tourism concepts

Goal 12

Increase safety in biotechnologies and promote access to biotechnologies and/or benefits resulting from them

III. General Measures for Conservation and Sustainable Use

Goal 13

Reform existing policies to achieve compatibility between the biodiversity conservation and resources use

Goal 14

Evolve appropriate legislative tools to support the implementation of the Convention

Goal 15

Encourage cooperation between all stakeholders to prevent duplication of activities and to provide for more effective conservation of biodiversity and sustainable use of biological resources

Goal 16

Develop a widely applicable system of incentives for the conservation of biodiversity and sustainable use of its components

Goal 17

Incorporate strong biodiversity considerations into land-use planning

Goal 18

Encourage research aimed at the conservation and sustainable use of biodiversity

Goal 19

Promote building of national human and institutional capacities for the conservation and sustainable use of biodiversity

Goal 20

Promote all forms of education and awareness on the conservation of biodiversity and sustainable use of its components

Goal 21

Strengthen biodiversity principles within the Environmental Impact Assessment procedures

Goal 22

Establish a biodiversity relevant national clearing-house mechanism

Goal 23

Strengthen the support to financial mechanisms for the conservation and sustainable use of biodiversity at the national level

International Co-operation

Goal 24

Co-operate in implementation of the Convention on regional and international levels

Action plan for implementation of the National Strategy for the Conservation of Biological Diversity in Slovakia

Plan of Actions for the period of 1998-2010 represents initial plan for implementation of concrete tasks aimed at achieving strategic goals set forth by the Strategy. It will provide a baseline on which substance and timing of future plans will be elaborated, while ensuring long-term systematic and comprehensive contribution by the Slovak Republic to implementation of the

Convention on Biological Diversity and others relevant international and national instruments.

Action Plan has been prepared on the basis of inputs from different sectors, based on proposals elaborated by sectoral institutions dealing with conservation and use of biological diversity as well as in cooperation with the Slovak Academy of Sciences. Slovak Commission on Biological Diversity and individual experts, including from NGOs, were also involved.

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