

**FIFTH NATIONAL REPORT ON THE  
IMPLEMENTATION OF THE  
CONVENTION ON BIOLOGICAL DIVERSITY  
IN THE SLOVAK REPUBLIC**

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## ***Executive summary***

The Fifth National Report on the implementation of the Convention on Biological Diversity (CBD) in the Slovak Republic was prepared by the Ministry of Environment of the Slovak Republic using information published in National Reports on the State of the Environment of the Slovak Republic. The National Reports have been prepared annually with the involvement of a wide range of government, scientific and industrial organisations. The Fifth National Report includes three parts:

In Part 1, we have provided an update on the state and trends in biodiversity at ecosystem and species levels and on threats that may have negative effects on biodiversity. Despite the fact that a significant progress in the reduction and management of some major threats to biodiversity has been achieved (e.g. air pollution, water extractions, etc.), the proportion of endangered species for some taxa is high and the condition of most ecosystems has not improved. This might suggest, among others, that (i) the response of species and ecosystems occurs at a different time-scale than the change in measured threats and/or (ii) global threats to biodiversity we have been addressing and monitoring are not the main factors affecting biodiversity at the national level in our geographic region; therefore other factors should be explored.

In Part 2, we have provided an update on the national strategy for biodiversity and the action plan. The process of the development of the national strategy for biodiversity updated for the decisions of the Conference of Parties of CBD held in 2010, including the Aichi Targets, and the development of the new national action plan had been delayed in Slovakia. These documents were only adopted in January and August of 2014, respectively. Despite this delay, activities aiming to enhance the condition of biodiversity in Slovakia continued as part of obligations under national legislation, EU legislation or other international agreements. The evaluation of the previous action plan (adopted in 2002 and hereafter referred to as “Updated Action Plan”) has shown that most planned activities have been carried out successfully. The comparison of the Updated Action Plan (2002) and the new Action Plan (2014) has shown a major progress in national interests in the field of biodiversity protection, reflecting the global trend.

In Part 3, we have provided a brief summary of the progress towards the achievement of the Aichi Targets. Although an updated national biodiversity strategy and action plan was not in

place in 2010 – 2014, and therefore biodiversity-related activities in Slovakia were not targeted towards the achievement of the Aichi Targets, a brief evaluation of the progress has shown that Slovakia has met some of Aichi Targets.

## **Part 1      *Update on biodiversity status, trends and threats***

### **1.1. National indicators of biodiversity**

The first list of indicators of the state of biodiversity in Slovakia was adopted by Government Resolution No. 18/2001 and consisted of 166 indicators. This list was revised and an updated set consisting of 90 indicators was approved by Government Resolution 837/2008. The Revised Indicators of Biodiversity (2008) have been grouped in 3 categories (A. Indicators of the state of biodiversity; B. Indicators of pressures on biodiversity; C. Indicators of the response of biodiversity; see the Fourth National Report for the complete list). However, a closer analysis has revealed some redundancy (i.e. some indicators were closely related and therefore a strong correlation between pairs of indicators was expected). Secondly, a clear link/relationship between proposed indicators of biodiversity and the state of biodiversity was missing for several indicators. Thirdly, the evaluation of several indicators was not feasible. Therefore, the following sections focus on presenting variables for which a link between the variable and biodiversity had been established and for which available data on temporal trends were available at the time of the preparation of this report. The data presented below had predominantly been obtained (i) as part of the national monitoring system of the environment referred to as “ČMS” which has been established for the following components of the environment: Air, Water, Meteorology and Climatology, Geological Factors, Waste, Biota, Soil, Forests, Xenobiotics and Radioactivity; or (ii) as part of reporting for the EU.

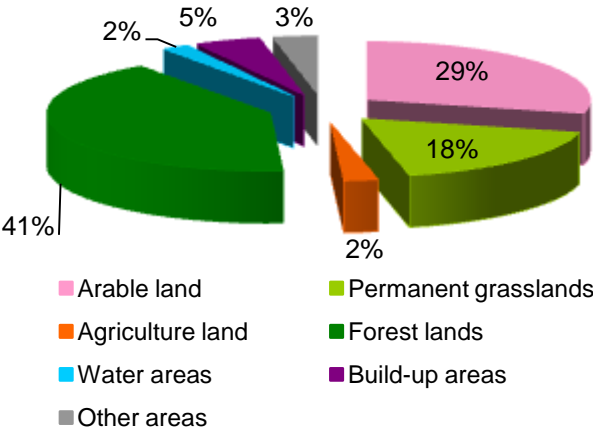
Given the adoption of Aichi Targets in 2010 and the inclusion of new aspects of biodiversity among the objectives of the Convention of biological Diversity (CBD), the current list of Slovak national biodiversity indicators will need to be revised in 2015 to enable us monitor our progress towards the achievement of the Aichi Targets. We aim to update the list of national indicators in accordance with the most recent update of the EU’s SEBI (Streamlining European Biodiversity Indicators) (<http://biodiversity.europa.eu/topics/sebi-indicators>) taking national circumstances into consideration.

### **1.2. The status of biodiversity**

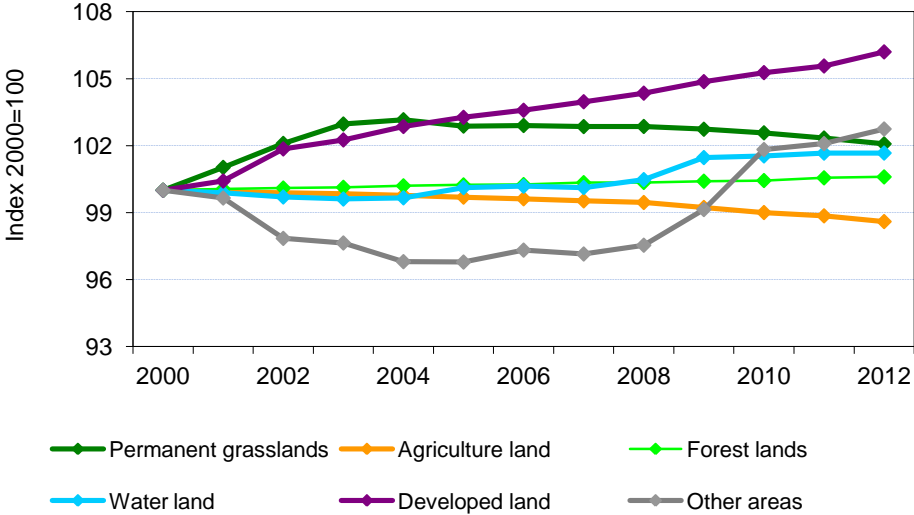
#### **Trends in land use**

Land use is a major control of biodiversity at all levels. The majority of land in Slovakia is covered by forests (41%), followed by arable land (29%) and permanent grasslands (18%)

(Figure 1), with both arable land and permanent grasslands showing a decrease in area, whereas forest showing a slight increase throughout the period of 2000 – 2012 (Figure 2). Developed land, although only accounting for 5% at the end of the monitoring period (Figure 1), has shown the greatest increase in land-cover of all considered land use types (by ca 7% since 2000) (Figure 2).



**Figure 1 Land use structure in Slovakia in 2012 (category agricultural land represents land used for agriculture other than arable land and pasture) (Source: ÚGKK SR)**



**Figure 2 Trends in land use in the period of 2000 – 2012 (area in 2000 = 100%) (Source: ÚGKK SR)**

The area of agricultural land under organic farming in Slovakia has increased as shown in Figure 3. In 1993, less than 1% of agricultural land was farmed using organic farming practices. This has increased to ca 3% in 2000 (no data are available for 1994 – 1999) and

remained stable until 2005, when a further increase has been observed. As of 2012, approximately 8.5% of the total area of agricultural land was under organic farming.

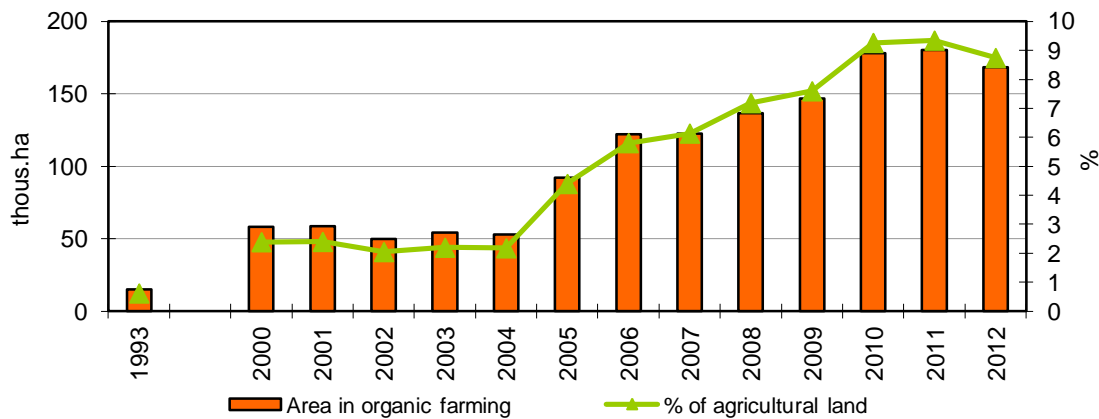


Figure 3 Trends in the area under organic farming for 1993 – 2012 (Source: ÚKSUP)

### Forest ecosystems and their condition

Slovakia is one of the most forested countries of Europe with ca 41% of the area of the country covered by forests and their area showing an increase (Figure 4). Consequently, forest management and monitoring has had a long history in Slovakia. The National Forestry Centre (NLC) has been monitoring an extensive number of ecological and commercial forest-management indicators. However, since approximately 96% of the total forest area has been used for timber-harvesting, the forests are often perceived through tree biomass and the assessment of the forest condition focuses on trees as opposed to the entire forest ecosystem.

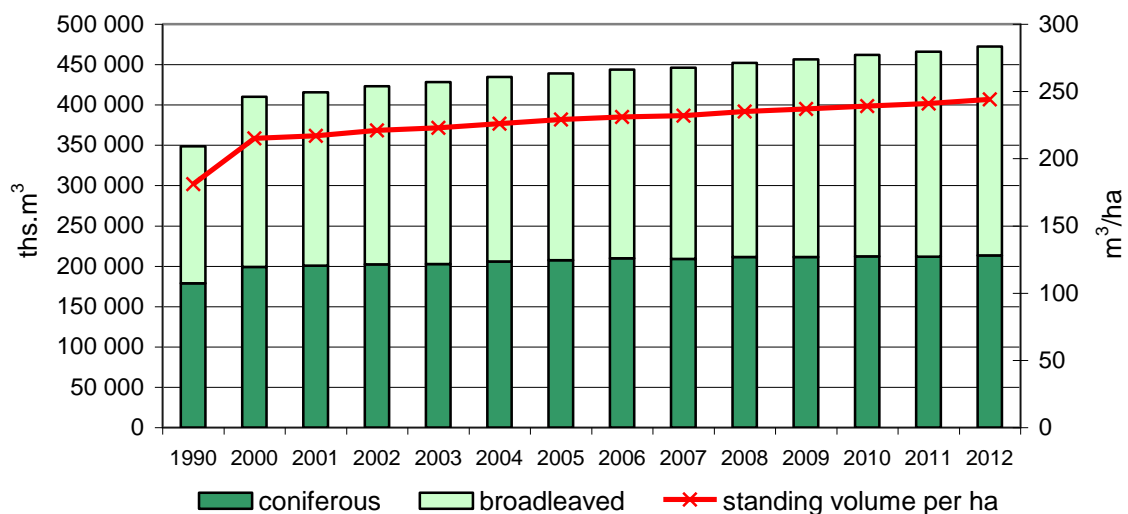
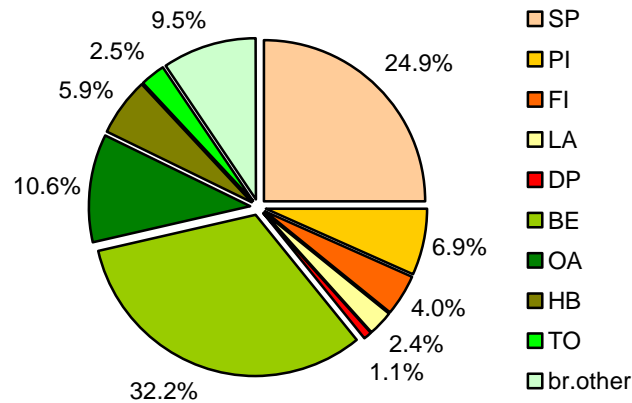


Figure 4 Trends in total standing volume for 1990 – 2012 (Source: NLC)

Tree species composition is currently dominated by broad-leaved trees (ca 60% as of 2012; Figure 5); however, originally they accounted for as much as 79%. The long-term objective of forest management in Slovakia is to increase the proportion of broad-leaved species to 63%.



**Figure 5** The proportion of most important tree species in Slovak forests in 2012 (SP - spruce, PI - pine, FI - fir, LA - larch, DP - dwarf pine, BE - beech, OA - oak, HB - hornbeam, TO - turkey oak, br. other – other broad-leaved) (Source: NLC)

The condition of forests in Slovakia has been monitored annually under the National Program of the Monitoring of the Condition of Forest Ecosystems. The assessment has been based on the extent of the loss of assimilative organs (i.e. defoliation) distinguishing five categories of forest health (0 – 4), three of which (2 – 4) represent a loss of leaves greater than 25% and indicate an unfavourable condition of trees (see information at Table 1). Overall, coniferous trees have shown a greater degree of damage than deciduous (broad-leaved) trees. The proportion of healthy trees (cat. 0) decreased from 18% and 29% for coniferous and broad-leaved trees respectively in 2000 to 7% and 15% in 2012. Contrarily, there was an increase in the proportion of trees in categories 2 – 4 (i.e. unfavourable condition) for both coniferous and broad-leaved species in the period of 2000 – 2012 (Figure 6).



**Table 1 Trends in the condition of trees assessed as the degree of defoliation in 2000 – 2012. Definition of categories of damage: 0 - healthy trees (defoliation of 0 - 10%); 1 - slightly damaged trees (defoliation of 11 - 25%); 2 - moderately damaged trees (defoliation of 26 - 60%); 3 - highly damaged trees (defoliation of 61 - 99%); 4 - dying and dead trees (defoliation of 100%) (Source: NLC)**

Year	Tree type	Proportion of trees in categories of damage 1-4 (%)							
		0	1	2	3	4	1-4	2-4	3-4
2000	Coniferous	18	44	35	2	1	82	38	3
	Broad-leaved	29	57	13	1	0	71	14	1
	Total	25	52	22	1	0	75	23	1
2001	Coniferous	12	49	37	1	1	88	39	2
	Broad-leaved	18	55	26	1	0	82	27	1
	Total	16	53	30	1	0	84	31	1
2002	Coniferous	8	51	38	2	0	92	40	3
	Broad-leaved	23	62	14	1	0	79	15	1
	Total	17	58	23	1	0	83	25	2
2003	Coniferous	4	56	39	1	0	96	40	1
	Broad-leaved	14	61	24	1	0	86	25	1
	Total	10	59	30	1	0	90	31	1
2004	Coniferous	4	60	35	1	0	96	36	1
	Broad-leaved	16	64	19	1	0	84	20	1
	Total	11	62	26	1	0	89	27	1
2005	Coniferous	6	59	33	2	0	94	35	2
	Broad-leaved	21	65	13	1	0	79	14	1
	Total	14	63	22	1	0	86	23	1
2006	Coniferous	5	53	41	1	0	95	42	1
	Broad-leaved	21	62	16	1	0	79	17	1
	Total	14	58	27	1	0	86	28	1
2007	Coniferous	5	58	36,1	1,1	0,3	95,3	37,5	1,4
	Broad-leaved	19	65	14,9	1,7	0,0	81,5	16,6	1,7
	Total	13	61,8	24,0	1,5	0,1	87,4	25,6	1,6
2008	Coniferous	3	55,9	39,7	1,4	0	97	41,1	1,4
	Broad-leaved	15	64,2	20,0	0,8	0	85	20,8	0,8
	Total	10	60,7	28,2	1,1	0	90	29,3	1,1
2009	Coniferous	2,1	55,2	40,7	1,5	0,5	97,9	42,7	2,0
	Broad-leaved	14,5	61,0	23,8	0,7	0	85,5	24,5	0,7
	Total	9,3	58,6	30,8	1,1	0,2	90,7	32,1	1,3
2010	Coniferous	6	48	44	2	0	94	46	2
	Broad-leaved	12	55	32	1	0	88	33	1
	Total	10	52	37	1	0	90	38	1
2011	Coniferous	4,3	49,1	43,2	1	2,4	95,7	46,6	3,4
	Broad-leaved	12,7	60,9	25,9	0,5	0	87,3	26,4	0,5
	Total	9,2	56,1	33	0,7	1	90,8	34,7	1,7
2012	Coniferous	6,7	49,8	41,8	1,5	0,2	93,3	43,5	1,7
	Broad-leaved	14,6	51,5	32,6	1,3	0,0	85,4	33,9	1,3
	Total	11,4	50,7	36,4	1,4	0,1	88,6	37,9	1,5

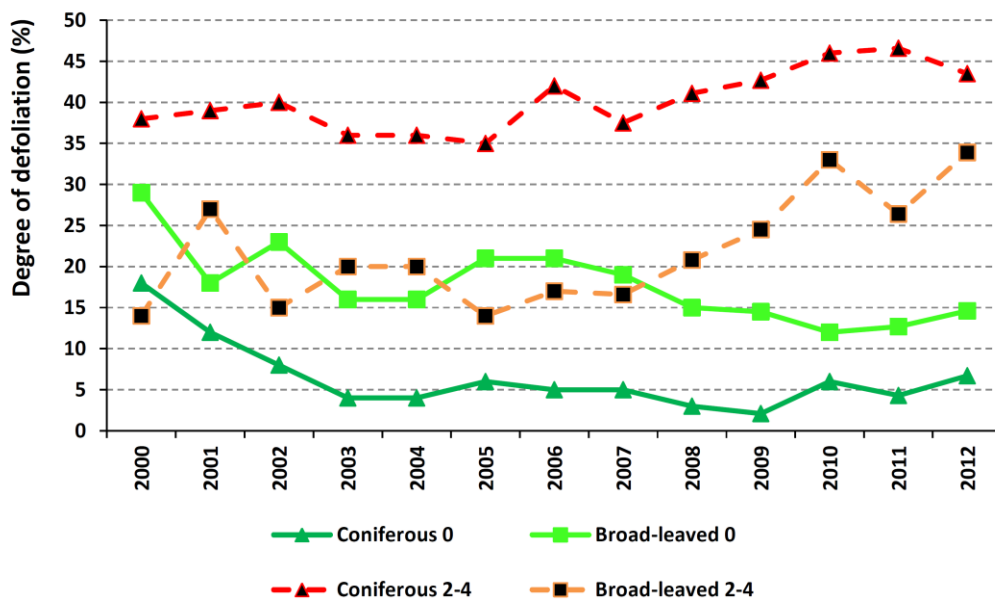


Figure 6 Condition of coniferous and broad-leaved trees assessed as the degree of defoliation in 2000 – 2012 (Category 0 = healthy trees, categories 2-4 = unfavourable condition) (Source: NLC)

There has been a large increase in the proportion of natural regeneration in the total forest regeneration from ca 8% in 1993 to ca 35% in 2004. This trend has slowed down since 2004 and the current (data for 2012) proportion of natural regeneration is approximately 37% of the total (Figure 7). According to the findings of the project „Protection of Old-growth Forests in Slovakia“ conducted in 2009 – 2010, only 10 104 ha of forests (0.47% of total forest area) can be considered as old-growth forests, as opposed to the original estimate of ca 20 000 ha (<http://en.pralesy.sk/projekt/>).

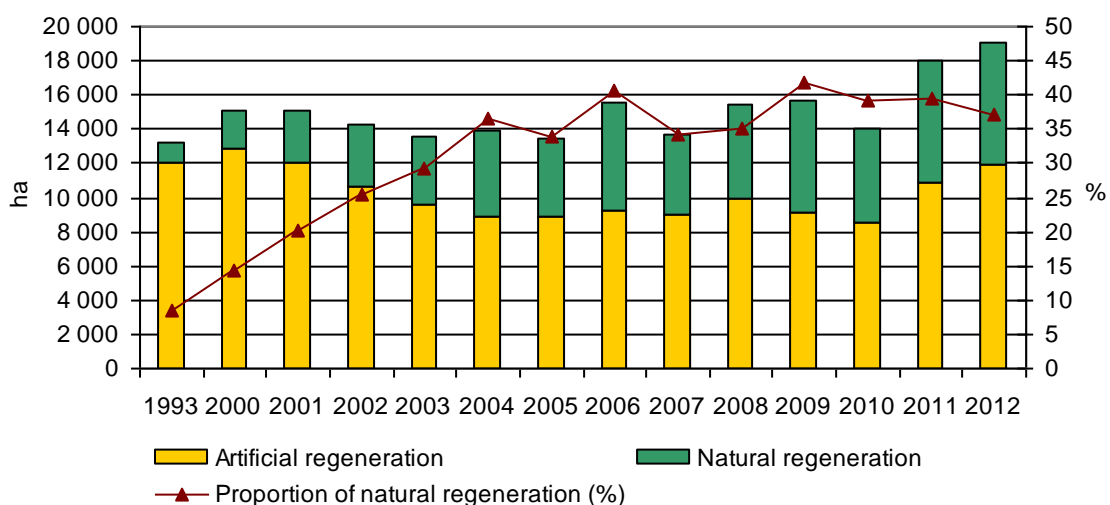
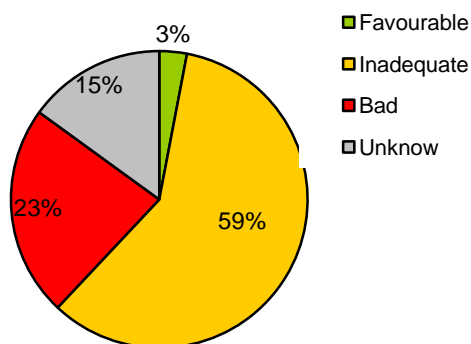


Figure 7 Trends in forest regeneration for 1993 – 2012 (Source: NLC)

## The condition of aquatic and wetland ecosystems

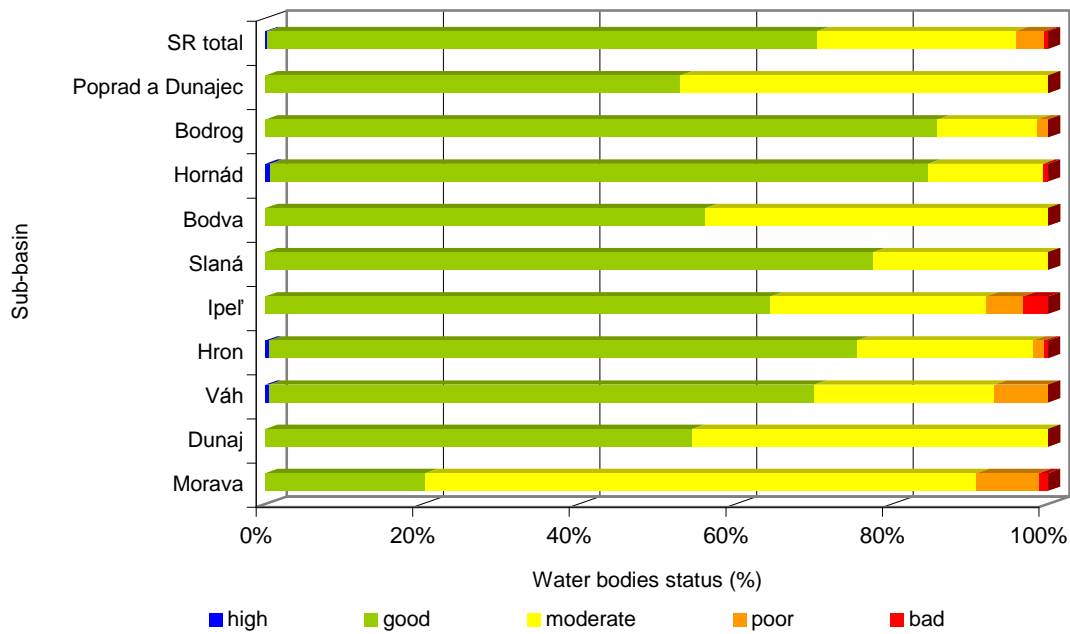
Wetlands are amongst the most threatened ecosystems worldwide. Wetlands comprise ca 4.2% (2 040 km<sup>2</sup>) of the total area of Slovakia and more than 80% of them is in an unfavourable condition, as classified using EU guidelines for the assessment of habitats of interest under the Habitat Directive (Council Directive 92/43/EEC ) (Figure 8). The condition of ca 15% of wetlands is unknown, thus leaving only 3% of wetlands in good condition. Fourteen wetlands of Slovakia, with a total area of 407 ha, have been declared Wetlands of International Importance under the Ramsar Convention in the period of 1990 – 2006. With respect to wetland conservation and management, Slovakia has adopted a revised National Wetland Management Program for 2008 – 2014, evaluated the Wetland Action Plan for 2008 – 2011 (in 2011) and adopted the Wetland Action Plan for 2012 – 2014.



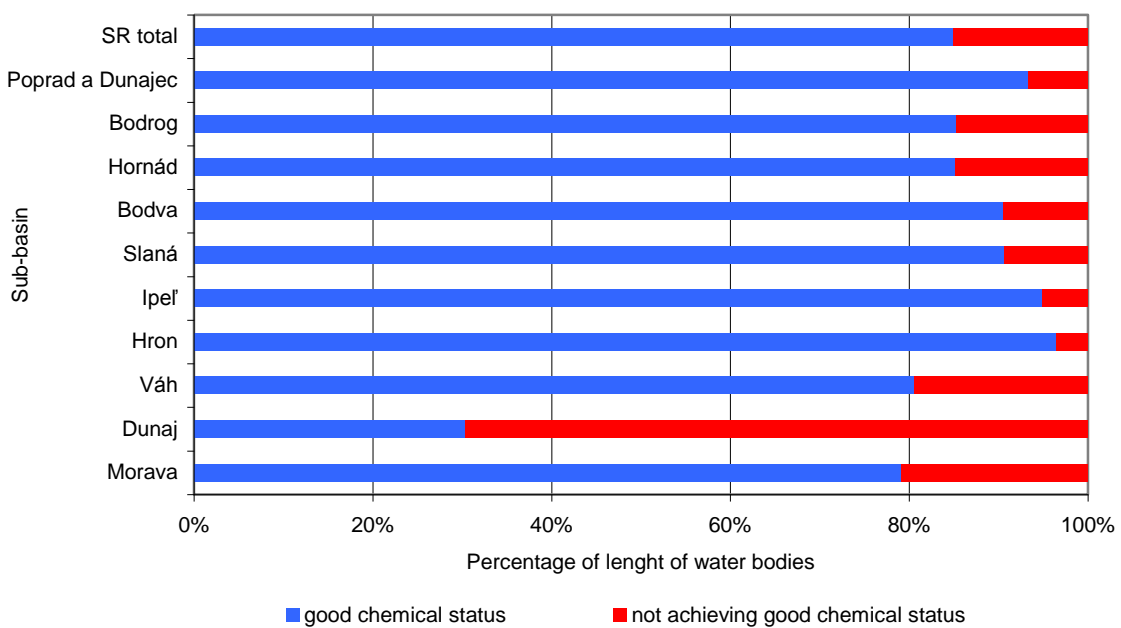
**Figure 8** The condition of wetlands (as of 2012) (Source: ŠOP SR)

In addition to the assessment of the condition of aquatic and wetland ecosystems required by the EU Habitat Directive, Slovakia is also obliged to monitor the ecological condition of all aquatic ecosystems and ecosystems dependent on water, and take measures for the improvement of their condition under the EU Water Framework Directive (Council Directive 2000/60/EC). Here, we report on the ecological potential and chemical balance of major Slovak watercourses for 2010 (i.e. the most recent assessment under the Water Framework Directive). High or good condition for over 50% of examined reaches was recorded for all sub-basins except for the Morava River sub-basin, where less than 20% of reaches were in high or good condition. (The ecological condition of sub-basins Poprad and Dunajec, Bodva and Dunaj (Danube) was marginal, with ca 50% of examined reaches being in high or good condition.) Overall, poor and bad ecological condition was recorded in 4.13% of all reaches, comprising a total length of 1 485.18 km (Figure 9). The poorest condition with respect to

physicochemical properties was recorded for the sub-basin of the Danube River (Dunaj) with only 30% of examined reaches showing good chemical balance. Overall, good chemical status was recorded for approximately 85% of examined reaches (Figure 10).



**Figure 9** The ecological potential of examined river reaches in major sub-basins of Slovakia in 2010 (Source VÚVH)



**Figure 10** The chemical balance of examined river reaches in major sub-basins of Slovakia in 2010 (Source VÚVH)

## **Protected areas and their condition**

Nature conservation in Slovakia is based on species and area protection, both of which are regulated by national (Act. No. 543/2002 on Nature and Landscape Protection, as amended) and EU legislation. The national legislation distinguishes five levels of nature protection:

1. The whole area of Slovakia (unless designated as an especially protected area); the least strict level of protection
2. Protected Landscape Areas
3. National Parks
4. – 5. Small-scale protected areas referred to as Nature Reserves, Natural Monuments, etc. These generally cover areas of less than 1000 ha (with many exceptions) and represent the strictest level of protection. They are often located within National Parks or Protected Landscape Areas, representing their core zones.

In total, there are 1128 protected areas in Slovakia (including 23 large-scale ones, i.e. 9 National Parks of a total area of 588 017 ha and 14 Protected Landscape Areas of a total area of 522 582 ha) covering an area of 1 142 151 ha (23.3% of the total area of Slovakia) (Figure 11).

The EU system of protected areas is independent of the network protected by national legislation. It is referred to as Natura 2000 network and in Slovakia it comprises Special Areas of Conservation (protected under the Council Directive 92/43/EEC, referred to as the Habitat Directive) and Special Protection Areas (protected under the Council Directive 2009/147/EC known as the Birds Directive). The total area of Natura 2000 sites in Slovakia is 1 444 725 ha. The Special Areas of Conservation (SAC) and Special Protection Areas (SPA) include 473 and 41 sites respectively, covering an area of 584 353 ha and 1 282 811 ha, which account for 11.9% and 26.16% of the area of Slovakia. The overlap between SAC and the national network of protected areas is ca 86% and the overlap between SPA and the national network of protected areas is ca 55% (Figure 11). More information on SAC and SPA is available at: <http://www.sopsr.sk/natura/>.



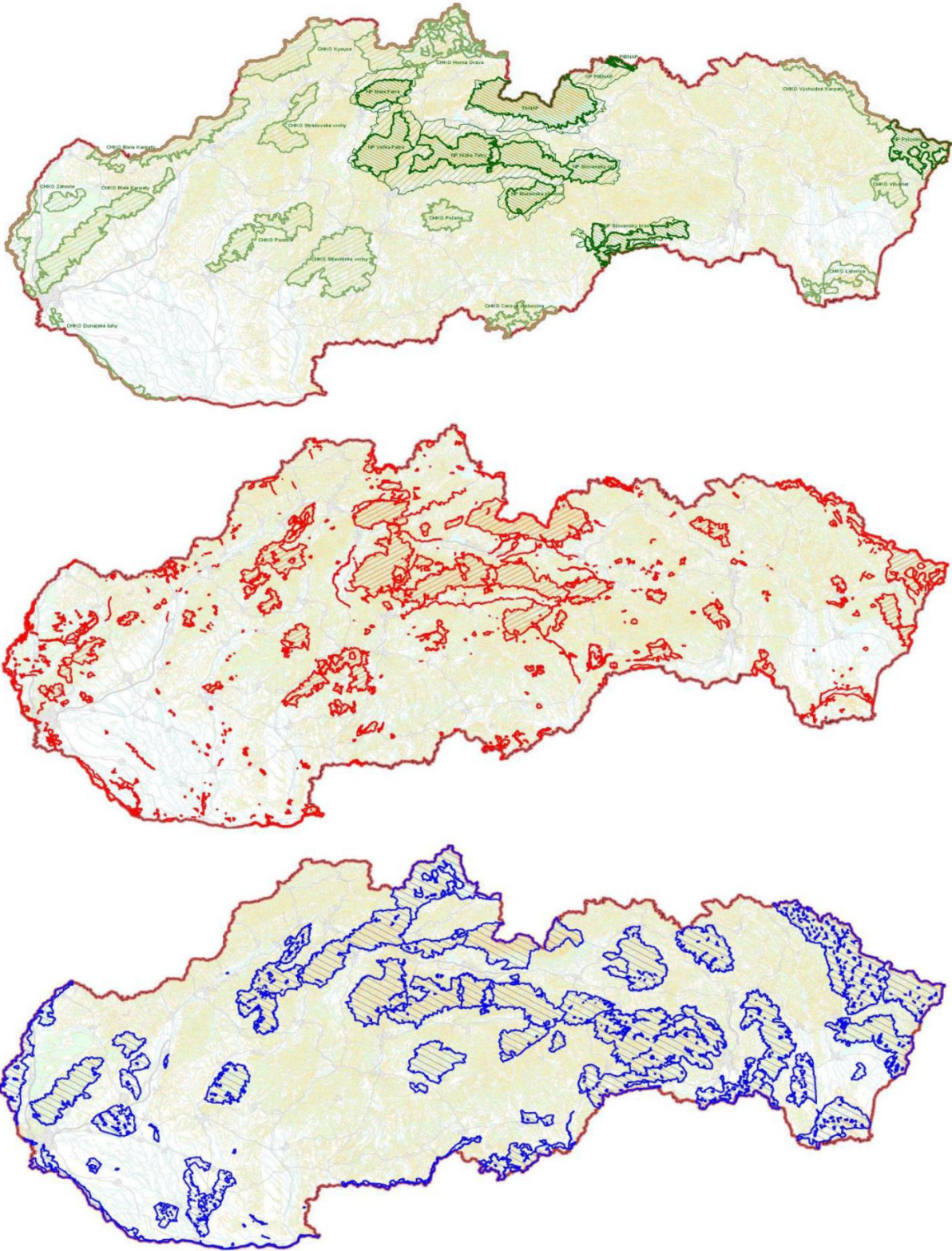


Figure 11 Maps of (i) large-scale protected areas protected under national legislation (darker-green = national parks (9); lighter-green = protected landscape areas (14)) (top); and EU (ii) Special Areas of Conservation (middle) and (iii) Special Protection Areas (bottom) (2012) (Source: ŠOP SR)

Trends in the condition of protected areas were assessed for small-scale protected areas (as defined by Act. No. 543/2002 on Nature and Landscape Protection) (Figure 12) and Natura 2000 Sites of Community Importance designated under the Habitat Directive (Council Directive 92/43 EEC) (Figure 13).

There was a slight increase in the total area of small-scale protected areas in Slovakia from 109 704 ha to 119 650 ha in the period of 2005 – 2012. The area of small-scale protected areas in good condition increased from ca 75% to ca 83%, whereas the area of degraded small-scale protected areas did not change significantly (approx. 0.25%) (Figure 12).

As for sites protected by EU Habitat Directive, rocky habitats and heath-lands appeared to be in the best condition of all assessed habitats and their condition did not change between the two assessment periods of 2004 – 2006 and 2007 – 2012 (although the condition of ca 20% of rocky habitats could not be determined due to insufficient data). There was an improvement in the condition of grasslands, while the condition of forests did not change and the condition of sclerophyllous scrublands deteriorated. There appeared to be an improvement in both the condition of and data quality for freshwater habitats. Salt marshes have been in the worst condition of all assessed habitats, followed by peat-lands and sandy habitats and there was no change in the condition of any of these three types of habitats between the two assessment periods (Figure 13).

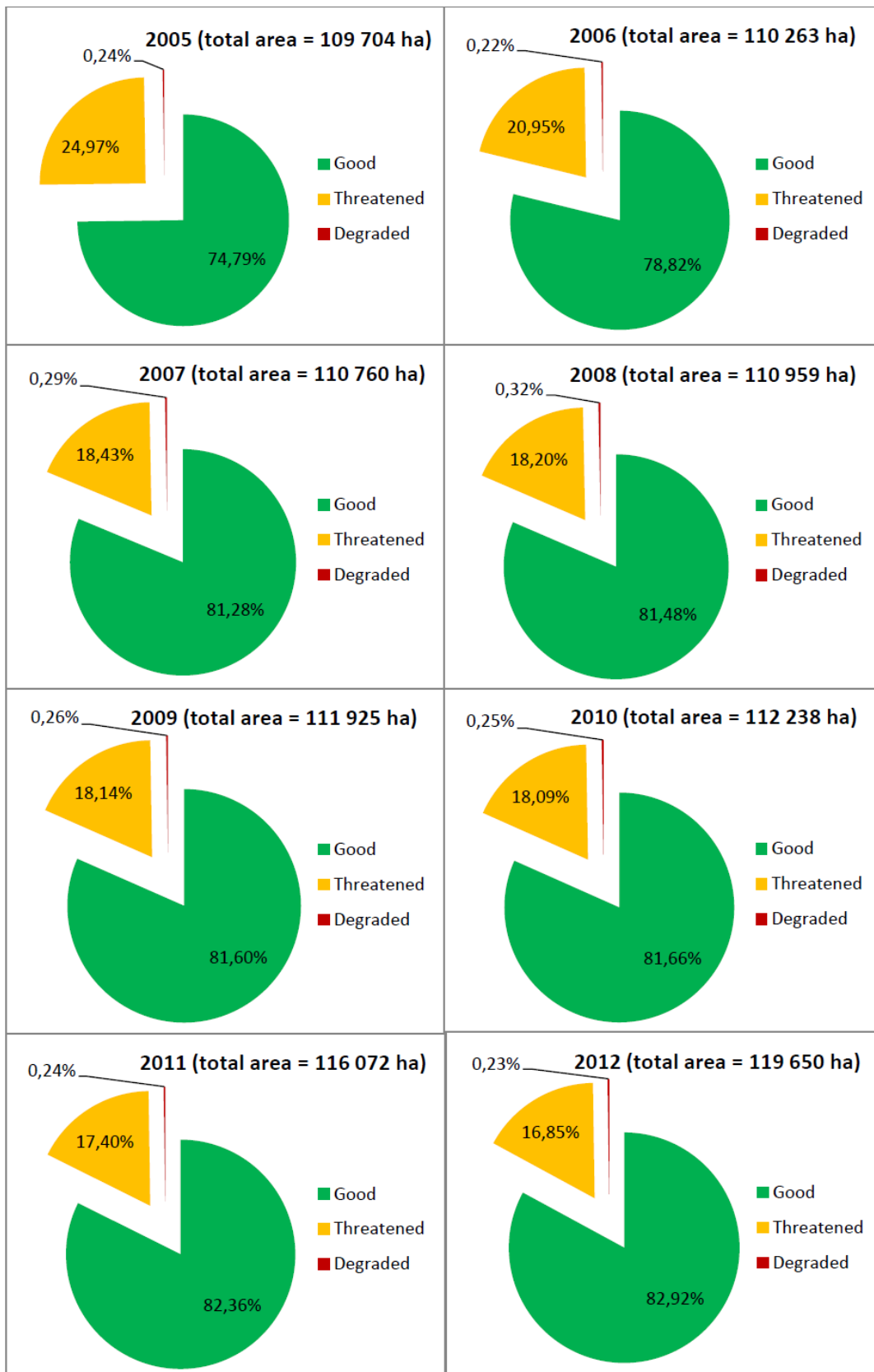
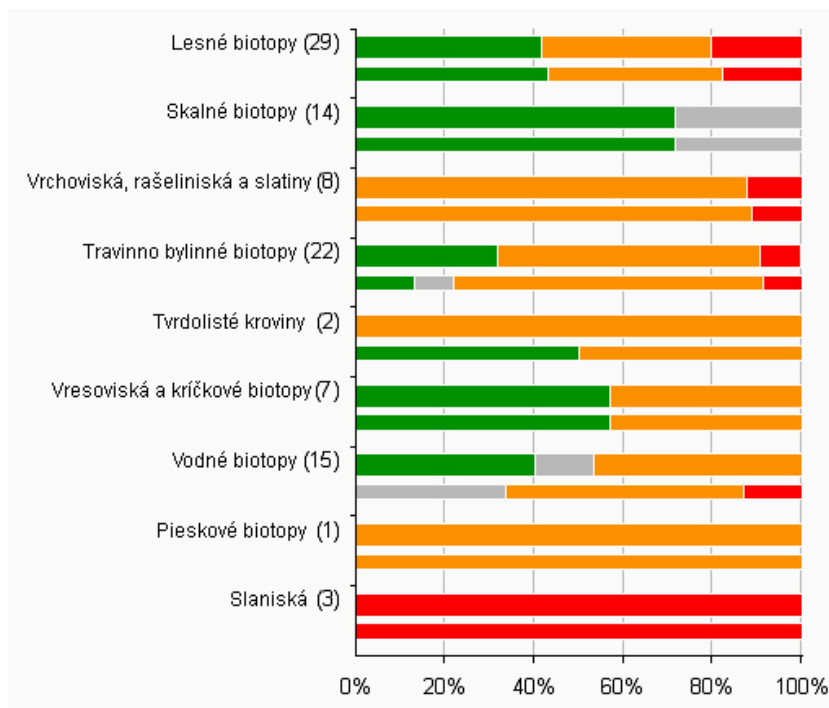


Figure 12 The condition of small-scale protected areas of Slovakia by area for 2005 – 2012





**Figure 13** The comparison of the condition of habitats protected by the Habitat Directive for the reporting period of 2004 – 2006 (narrow bottom bars) and 2007 – 2012 (wider top bars). Habitats are labelled from the top to the bottom as follows: forest habitats; rocky habitats; peat-lands; grasslands; sclerophyllous scrublands; heath-lands; freshwater habitats; sandy habitats; salt marshes. The number in the brackets refers to the number of assessments performed in 2007 – 2012. Colour coding: green = favourable; orange = inadequate; red = unfavourable; grey = unknown.

### Species diversity, their abundance and conservation status

Slovakia has over 11 200 known species of plants and 28 800 species of animals. Given its location on the boundary of the Pannonian and Alpine Biogeographic Regions and historic and socio-economic considerations (relatively low level of fragmentation and high proportion of natural habitats by European standards) Slovakia harbours communities and species threatened in many other EU countries.

The section below summarizes the conservation status of groups of plants and animals. However, we have not been able to determine any trends in the abundance or conservation status for most taxa, because national Red Lists of threatened taxa have not been updated during the period of reporting. Data presented below are based on the most recent Red List published as *BALÁŽ, D., MARHOLD, K. & URBAN, P. eds., 2001. Červený zoznam rastlín a živočíchov Slovenska. In Ochrana Prírody, 2001, 20 (suppl.), 160 pp.*; except for one set of data on fish and birds (see below).

The highest proportion of threatened species (i.e. IUCN categories CR, EN and VU) has been recorded for Lampreys (50%), Amphibians (44%) and Reptiles (42%) and the lowest proportion for Insects (Diptera, Lepidoptera and Heteroptera) (Table 2, Table 3 and Table 4).

**Table 2 Conservation status of selected vascular plants, mosses, lichens and algae (Source: ŠOP SR)**

Taxon/group of organisms	Total number of species in Slovakia	IUCN category						Number of endemic taxa	% of threatened taxa (CR+EN+VU)
		EX	CR	EN	VU	LR/NT	DD		
Cyanophytes and Algae	3 008	-	7	80	196	-	-	-	9,38
Lichens	1 585	88	140	48	169	114	14	-	23,67
Bryophytes	909	26	95	104	112	85	74	2	34,21
Vascular Plants	3 352	77	266	320	430	285	50	220	30,31

**Table 3 Conservation status of reptiles, amphibians and invertebrates (Source: ŠOP SR)**

Taxon/group of organisms	Total number of species in Slovakia	IUCN category						Number of endemic taxa	% of threatened taxa (CR+EN+VU)
		EX	CR	EN	VU	LR/NT	DD		
Mollusca	277	2	26	22	33	45	8	-	29,24
Aranea	934	16	73	90	101	97	45	-	28,27
Ephemeroptera	132	-	8	17	16	-	-	-	31,06
Odonata	75	4	-	14	11	13	5	-	33,33
Homoptera	118	-	6	7	10	20	10	-	19,49
Heteroptera	801	-	14	7	6	4	-	-	3,37
Coleoptera	6 498	2	15	128	490	81	2	-	9,74
Hymenoptera	5 779	-	23	59	203	16	-	-	4,93
Lepidoptera	3 500	6	21	15	41	17	11	-	2,20
Diptera	5 975	-	5	10	71	19	93	-	1,44
Amphibians	18	-	-	3	5	10	-	-	44,44
Reptiles	12	-	1	-	4	6	-	-	41,67

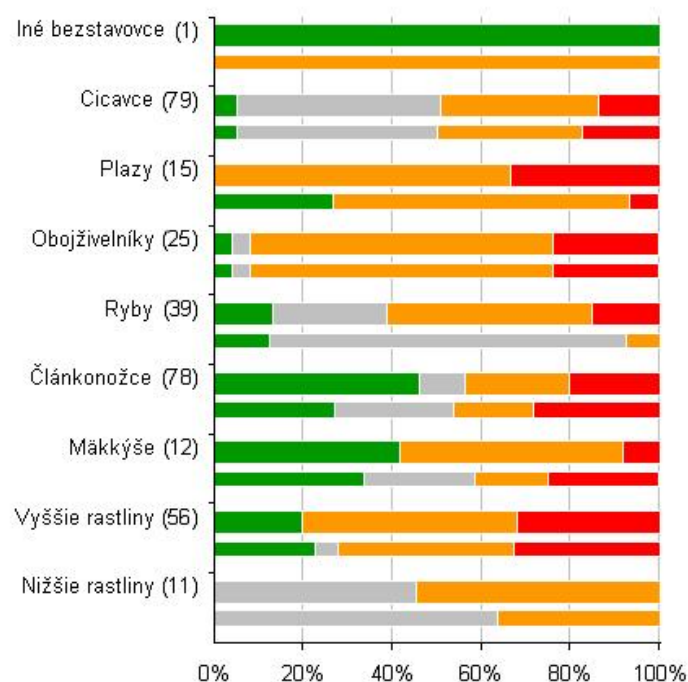
**Table 4 Conservation status of mammals, birds and fish. (Only nesting bird species were considered)**  
(Source: ŠOP SR, unless stated otherwise).

Taxon/group of organisms	Total number of species in Slovakia	IUCN category						Number of endemic taxa	% of threatened taxa (CR+EN+VU)
		EX	CR	EN	VU	LR/NT	DD		
Lampreys	4	0	0	1	1	1	-	50,00	
Fish	79	6	7	8	1	22	2	20,25	
Fish <sup>1)</sup>	79	4	0	6	9	40	-	18,99	
Birds	219	2	7	23	19	47	4	22,37	
Birds <sup>2)</sup>	211	4	10	24	17	24		24,17	
Mammals	90	2	2	6	12	27	15	22,22	

<sup>1)</sup> Source: Koščo, J., Holčík, J., 2008. Anotovaný červený zoznam mihúľ a rýb Slovenska – Verzia 2007. In Lusk, S., Lusková, V. (eds.). *Biodiverzita ichtyofauny ČR. VII.*, Brno : Ústav biologie obratlovců AV ČR, v.v.i. p. 119-132

<sup>2)</sup> Source: Demko, M., Krištín, A. and Puchala, P., 2013. Červený zoznam vtákov Slovenska (The Red List of birds in Slovakia), *Tichodroma* 25: 69-78.

In addition to national Red Lists, the condition of species of interest under the Habitat Directive was assessed as part of the regular reporting to the EU. Comparing the two reporting periods (2004 – 2006 and 2007 – 2012), there was an improvement in the condition of invertebrates including molluscs and arthropods. The condition of mammals, amphibians and vascular plants did not change while the condition of reptiles deteriorated. There was a large proportion of species with insufficient data for assessment in non-vascular plants and mammals. There was a large improvement in the assessment of fish with a significantly greater number of species assessed in the 2007 – 2012 period than in 2004 – 2006 (Figure 14).



**Figure 14** The comparison of the condition of taxa protected by the Habitat Directive for the reporting period of 2004 – 2006 (bottom narrow bars) and 2007 – 2012 (top wider bars). Taxa are labelled from the top to the bottom as follows: invertebrates (other than arthropods and molluscs); mammals; reptiles; amphibians; fish; arthropods; molluscs; vascular plants; non-vascular plants. The number in the brackets refers to the number of assessments performed in 2007 – 2012 (i.e. not the number of species). Colour coding: green = favourable; orange = inadequate; red = unfavourable; grey = unknown.

Species rescue and recovery plans are a crucial component of the management of threatened fauna and flora. The number of plant species and sites with a recovery plan in place has been declining in recent years in Slovakia (Table 5). However, this does not necessarily reflect an improvement in the abundance of threatened plant species, as it might be associated with the reduction in funding or changes in funding priorities.

**Table 5** Number of species and sites respectively with an existing recovery plan. (Source: ŠOP SR)

	2005	2006	2007	2008	2009
Number of plant species with an introduced recovery plan	29	21	14	14	15
Number of sites these species were recorded at	178	133	108	108	91

Table 6 shows data on rescue and recovery programs that have been introduced for 16 species and 1 genus of threatened fauna (<http://www.sopsr.sk/web/?cl=30>). The trend in the number of active recovery programs does not necessarily reflect the condition of species. The condition for some of these species is shown in Figure 15.

**Table 6 Implemented species recovery programs for animals and their duration**

	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13
<i>Crex crex</i>													
<i>Emys orbicularis</i>													
<i>Lutra lutra</i>													
<i>Falco peregrinus</i>													
<i>Falco cherrug</i>													
<i>Aquila chrysaetos</i>													
<i>Aquila pomarina</i>													
<i>Aquila heliaca</i>													
<i>Marmota marmota</i>													
<i>Parnassius apollo</i>													
<i>Otis tarda</i>													
<i>Umbra krameri</i>													
<i>Rupicapra rupicapra tatica</i>													
<i>Bison bonasus</i>													
<i>Castor fiber</i>													
<i>Mustela lutreola</i>													
Butterflies of the genus <i>Maculinea</i>													

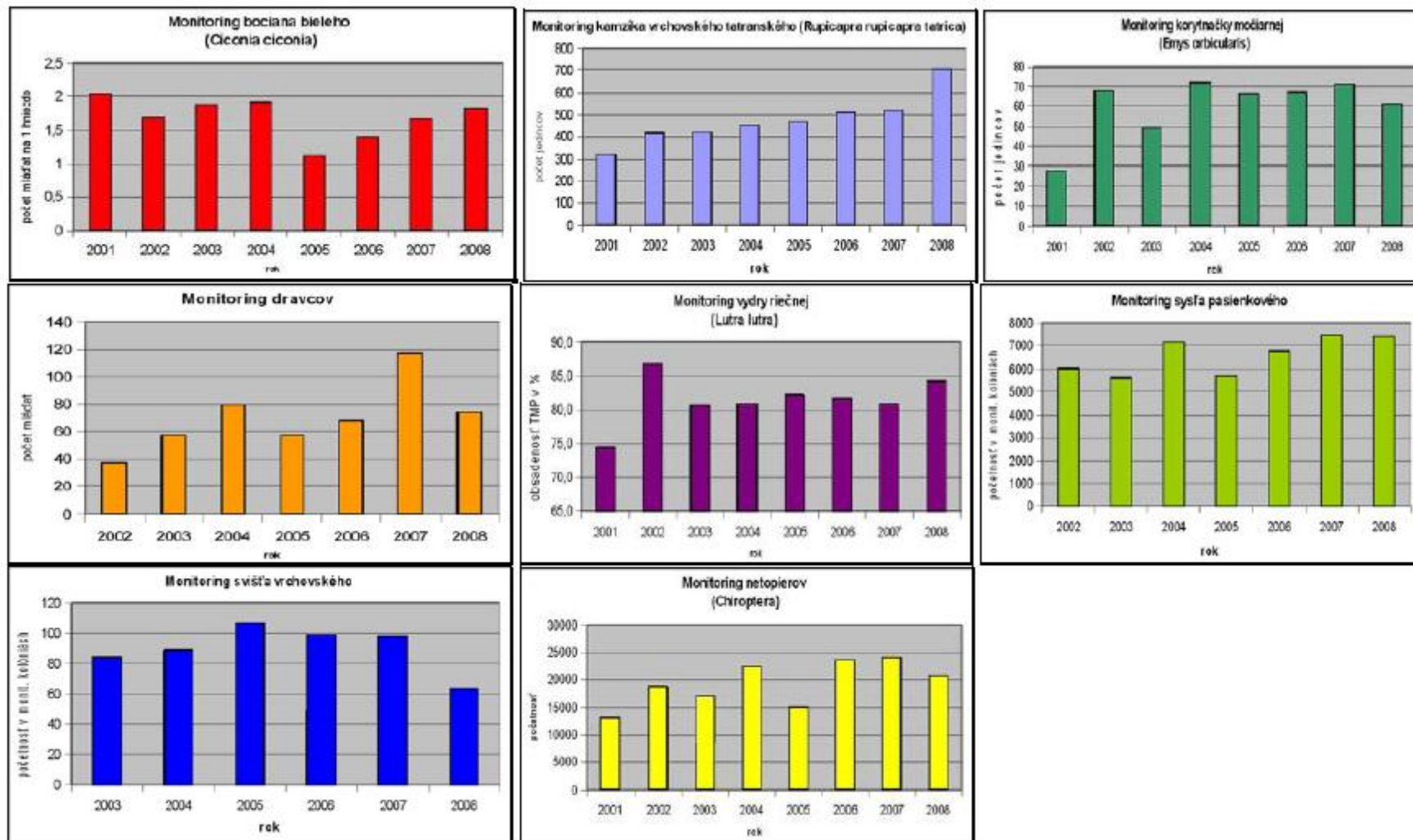
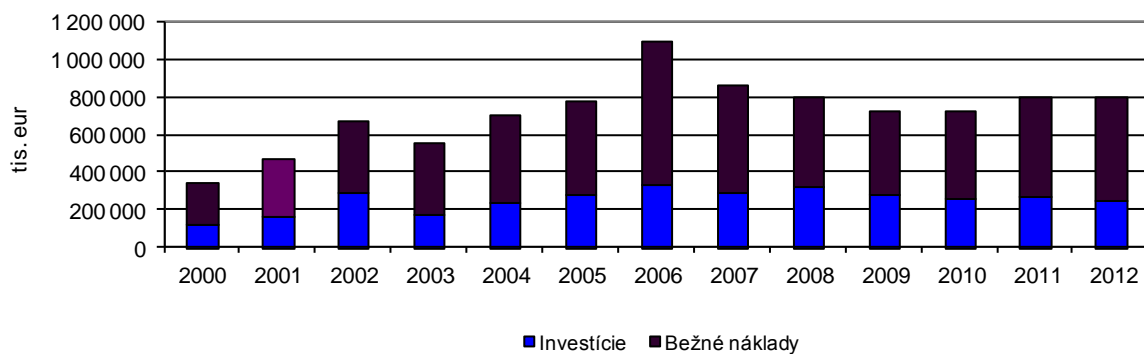


Figure 15 Trends in the abundance of selected taxa of EU importance – from top left to right: *Ciconia ciconia*; *Rupicapra rupicapra tatraca*; *Emys orbicularis*; birds of prey; *Lutra lutra*; *Spermophilus citellus*; *Marmota marmota*; Chiroptera (Source ŠOP SR)

## Financial indicators

Financial indicators of the protection of the environment in Slovakia include fees/payments for pollution and exploitation of natural resources, investments and expenses by the private sector and municipalities associated with the protection of the environment and the environmental tax. Greatest expenses by enterprises and municipalities for the protection of the environment were recorded in 2006. In 2012 they reached 802.764 million Euros which represented an increase of 0.2% and 129.4% compared to 2011 and 2000 respectively (Figure 16).



**Figure 16 Expenses by enterprises (with more than 20 employees) and municipalities for the protection of the environment (purple – general expenditure; blue – investment; scale: thousand Euros) (Source ŠÚ SR)**

The share of the total of environmental taxes in GDP has been showing a decrease since 2004 when it reached 2.5% (Figure 17). Compared to neighbouring EU countries, the share of environmental taxes in GDP in Slovakia was the lowest; however, its share in the total income from taxes was comparable with other countries, indicating that the lowest share of environmental tax in GDP is associated with lower share of taxes in GDP in general, rather than low income from environmental taxes (Figure 18).

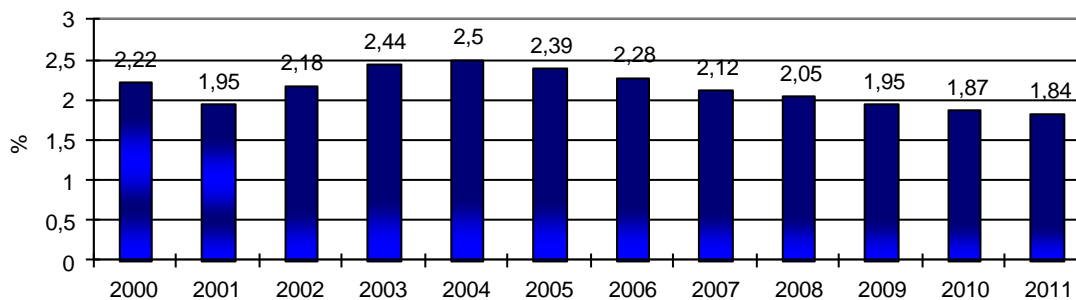


Figure 17 Trend in the share of environmental taxes in GDP in Slovakia (Source: Eurostat)

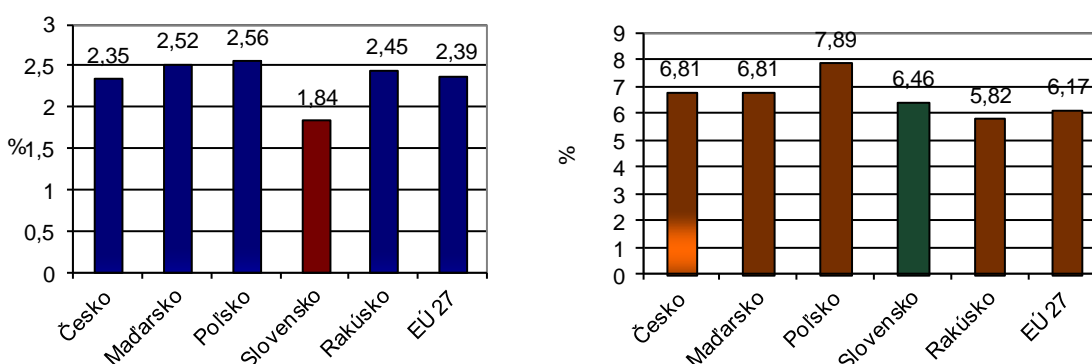


Figure 18 Comparison of the share of environmental taxes in GDP (left) and the share of environmental taxes in total tax income (right) in neighbouring EU countries in 2011 (countries from left to right: Czech Republic, Hungary, Poland, Slovakia, Austria and the mean of EU 27) (Source Eurostat)

### 1.3. Trends in major threats to biodiversity

#### Invasive alien species

Invasive species are considered to be one of the greatest threats to biodiversity. The latest and most complete list of alien and invasive plant species of Slovakia was published in 2002 as: *GOJDIČOVÁ, E., CVACHOVÁ, A., KARASOVÁ, E., 2002. Zoznam nepôvodných, invázných a expanzívnych cievnatých rastlín Slovenska 2. Ochrana prírody 21: 59-79* and it contains 125 species of archaeophytes and neophytes. The State Nature Conservancy (ŠOP SR) compiles data and manages a database of the distribution of 30 species of invasive plants (as of October 2014). The maps of their recorded distribution can be accessed at <http://www.sopsr.sk/publikacie/invazne/index.php?id=mapy>. However, Slovakia does not have an effective plan for the removal or management of invasive species in place. Although



the Decree of the Ministry of Environment No. 24/2003 (as amended) designated 7 priority species of invasive plants (*Ambrosia artemisiifolia*, *Fallopia* sp. (syn. *Reynoutria*), *Helianthus tuberosus*, *Heracleum mantegazzianum*, *Impatiens glandulifera*, *Solidago canadensis* and *Solidago gigantea*) and their recommended methods of removal or management, and the Nature and Landscape Protection Act No. 543/2002 (as amended) mandates the removal of these priority species from both public and private land, lack of allocated resources often prevents measures from being put into practice. Slovakia revised its National Strategy for Invasive Alien Species in 2012 and sections of the Nature and Landscape Protection Act No. 543/2002 dealing with invasive species will need to be amended to comply with new EU legislation on invasive species adopted in 2014 (Regulation (EU) No 1143/2014).

**Table 7 Removal of invasive plant species by the State Nature Conservancy (ŠOP SR) for 2006 – 2013**

	2006	2007	2008	2009	2010	2011	2012	2013
Number of sites of management of invasive plant species	110	123	131	119	99	99	145	127
Total area of invasive plant removal (ha)	130	126	505,5	NE	77	77	1201,5	68,3

Although invasive species of animals are not assessed or monitored on a regular basis in Slovakia, one species of turtle (*Trachemys scripta elegans*), the American mink (*Neovison vison*) and several species of fish (*Pseudorasbora parva*, *Carassius auratus*, *Ameiurus nebulosus*, *Ameiurus melas*, *Lepomis gibbosus*, *Perccottus glenni*, *Neogobius fluviatilis*, *Neogobius gymnotrachelus*, *Neogobius kessleri*, *Neogobius melanostomus*, *Proterorhinus marmoratus* and *Gasterosteus aculeatus*) are considered to be invasive (KOVÁČ V, HENSEL K, ČERNÝ J, KAUTMAN J & KOŠČO J, 2006: *Invázne druhy rýb v povodiach Slovenska – aktualizovaný zoznam 2004*. In: *Invázie a invázne organizmy V.*, Nitra, 26.-28.10.2004, *Conference Proceedings*).

## **Agriculture**

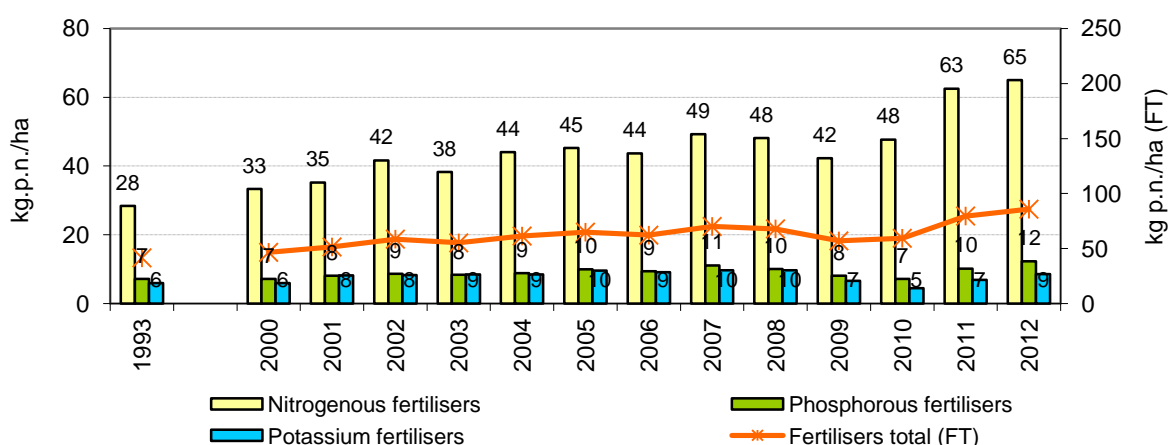
The total area of agricultural land in Slovakia is 2 405 971 ha, i.e. nearly 50% of the area of the area of the country (Table 8). Agriculture has been known to affect biodiversity in diverse ways ranging from the decrease in landscape heterogeneity, changes in vegetation structure

and associated loss of habitat for organisms, through excessive extraction of water to excessive input of nutrients and toxic compounds to control pest populations.

**Table 8 Classification of agricultural land by crops/activity in 2012 (Source: ÚGKK SR)**

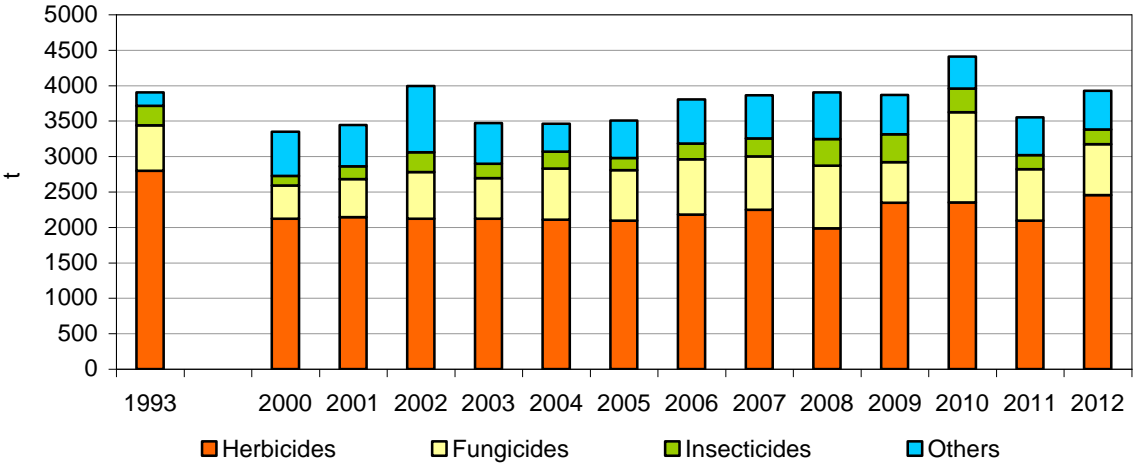
Description	Area (ha)	Share of agricultural land (%)
<b>Agricultural land total</b>	2 405 971	100.00
<b>Arable land</b>	1 413 739	58.76
<b>Hop-fields</b>	515	0.02
<b>Vineyards</b>	26 964	1.12
<b>Gardens</b>	76 568	3.18
<b>Orchards</b>	16 861	0.70
<b>Permanent grassland</b>	871 324	36.22
<b>Total area of Slovakia</b>	<b>4 903 557</b>	-

Excessive input of nutrients, particularly nitrogen and phosphorus, has a number of negative effects on biodiversity associated changes in soil properties and resulting changes in microbial communities (e.g. decline in mycorrhizal fungi). Discharge from agricultural land may cause eutrophication of aquatic systems which can trigger rapid growth of algae and cyanophyta/cyanobacteria and subsequent changes in the food chain of aquatic ecosystems. There has been an increase in the use of fertilisers per area of land over the period of 2000 – 2012. The use of nitrogenous fertilisers almost doubled and the use of potassium and phosphorous fertilisers increased by 43% and 71% respectively in 2012 compared to 2000 (Figure 19)



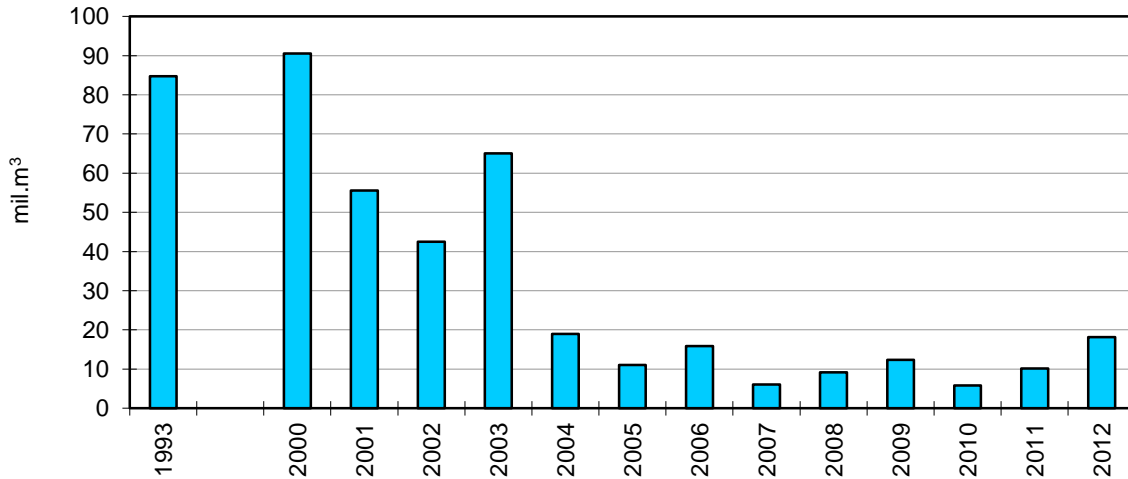
**Figure 19 Trends in the consumption of NPK fertilisers in agriculture per ha (Source: ŠÚ SR)**

Overall, there has been a slight increase in the use of pesticides in 2000 – 2012. With respect to the most recent changes, the consumption of pesticides increased by 372 t in 2012 as compared to 2011, as 3 925 t of toxic compounds were applied to protect crops, which included 2 457 t of herbicides, 713 t of fungicides, 212 t of insecticides, and 543 t of other agents. Although there does not appear to be a difference between the amount of pesticides used in the period of 2000 – 2012 and 1993, the data provided are not corrected for area and therefore a trend in the amount of pesticides applied per ha of agricultural land cannot be determined (Figure 20).

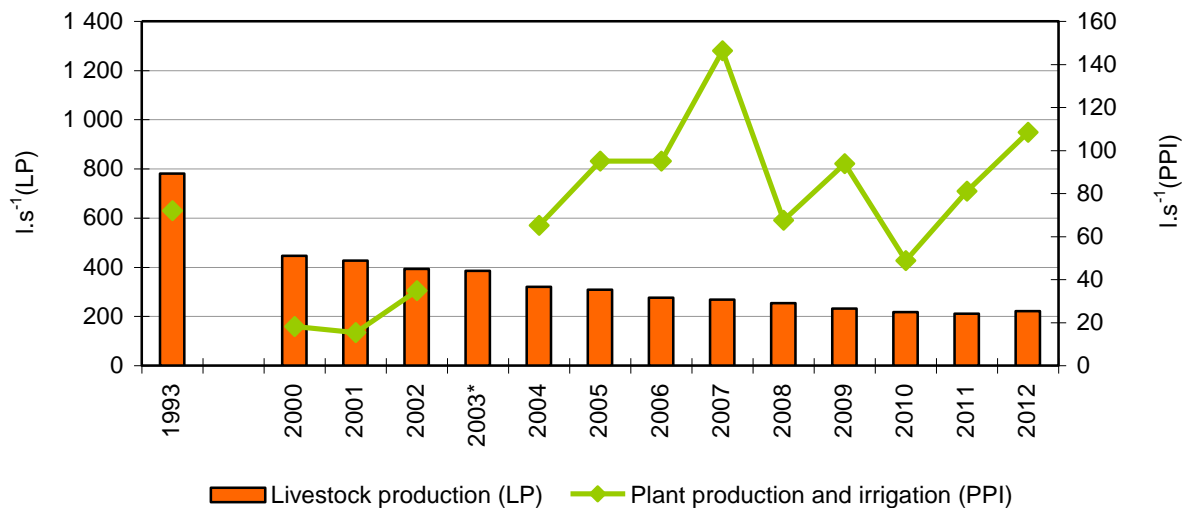


**Figure 20 Trends in the consumption of pesticides in 1993 – 2012 (Source: ÚKSÚP)**

There has been a significant decrease in the volume of surface water used for irrigation and the volume of ground water used for livestock production in the period on 2000 – 2012. However, in 2011 – 2012, the volume of surface water extraction for irrigation increased by 18.138 mil.m<sup>3</sup>, which represented an annual increase by 78.9%. The extraction of groundwater used in agriculture increased by 38.3 l/s in 2012 compared to 2011 (Figure 21 and Figure 22).



**Figure 21** Trend in the use of surface water for irrigation (Source: SHMÚ)



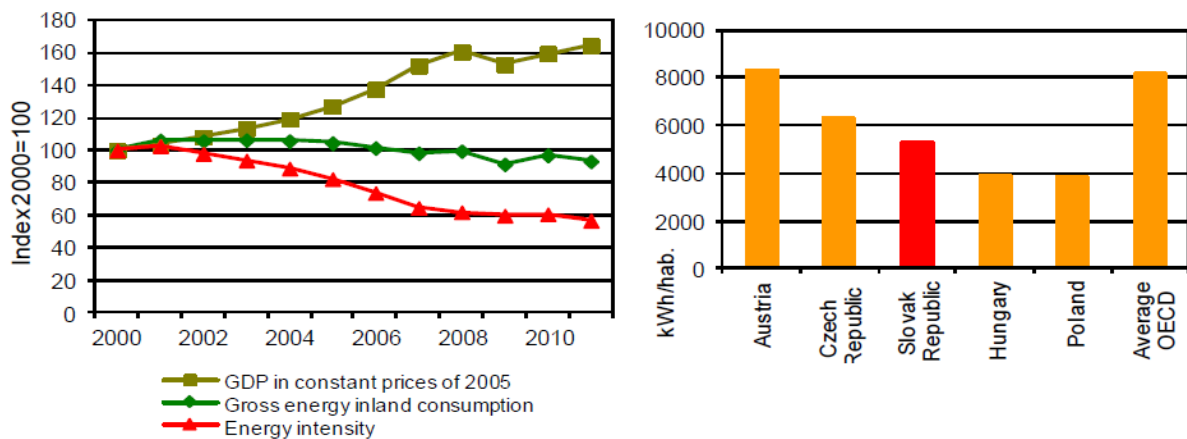
**Figure 22** Trend in the use of ground water for irrigation (Source: SHMÚ) (there was a change in the methodology to determine irrigation for plant production in 2003)

Agricultural production accounted for 6.9% of total emissions of greenhouse gases and more than 95% of all NH<sub>3</sub> emissions in Slovakia. There has been a long-term decrease in the emissions of greenhouse gasses from agriculture and NH<sub>3</sub> emissions since 1990, which can be attributed to the reduction in animal stocks.

### Energy industry

The energy industry has major negative effects on the environment and biodiversity including destruction of large natural areas by the extraction of minerals, disruption of longitudinal connectivity and flow regime of rivers used for power generation, heat pollution, etc.

Therefore, reducing the consumption of energy and electricity and increasing energy efficiency has a potential to reduced pressures and negative effects on biodiversity. The energy efficiency, expressed as energy intensity, i.e. a unit of energy consumed to produce a unit of GDP, of Slovakia has been decreasing in the period of 2000 – 2011. In spite of this fact, Slovakia remains one of EU member states with the lowest energy intensity. However, per capita electricity consumption in Slovakia is lower by approximately 30% than the mean of OECD countries (Figure 23).



**Figure 23 Trends in energy intensity (expressed as gross energy consumption/GDP) (left) and per capita electricity consumption in neighbouring OECD countries (right) (Source: SÚ SR)**

### Air pollution and acidification

Slovakia is a signatory to the Convention on Long-Range Transboundary Air Pollution and its Protocols (see figures below) which aim to reduce anthropogenic emissions of specific air pollutants contributing to global environmental problems. Under the Convention and its Protocols, Slovakia has committed itself to reduce NO<sub>2</sub> emissions by 42%, SO<sub>2</sub> emissions by 80%, NH<sub>3</sub> emissions by 37% and the VOC emissions by 6% by 2010 in comparison to 1990. As to date, the emissions of all the above mentioned compounds are below the target levels (Figure 24, Figure 25, Figure 26, Figure 27). Likewise, emissions of heavy metals and persistent organic pollutants have decreased in Slovakia when using their levels in 1990 as a reference (Figure 28 and Figure 29)

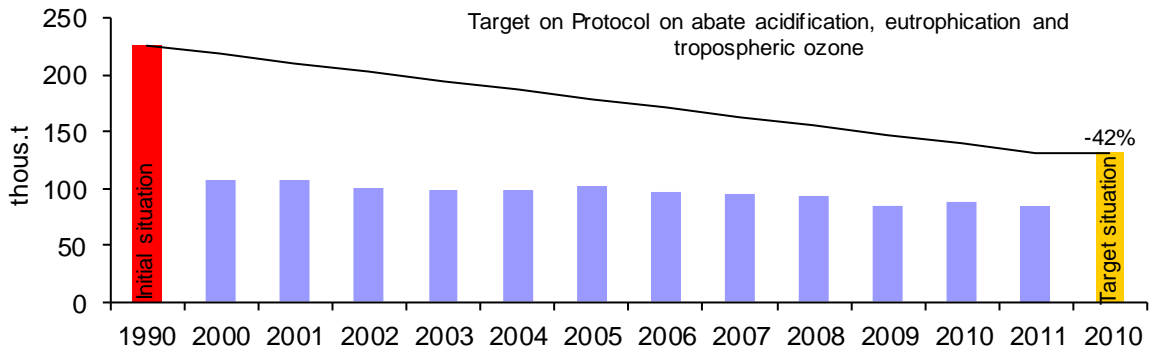


Figure 24 Trend in the emissions of NO<sub>x</sub> (Source: SHMÚ)

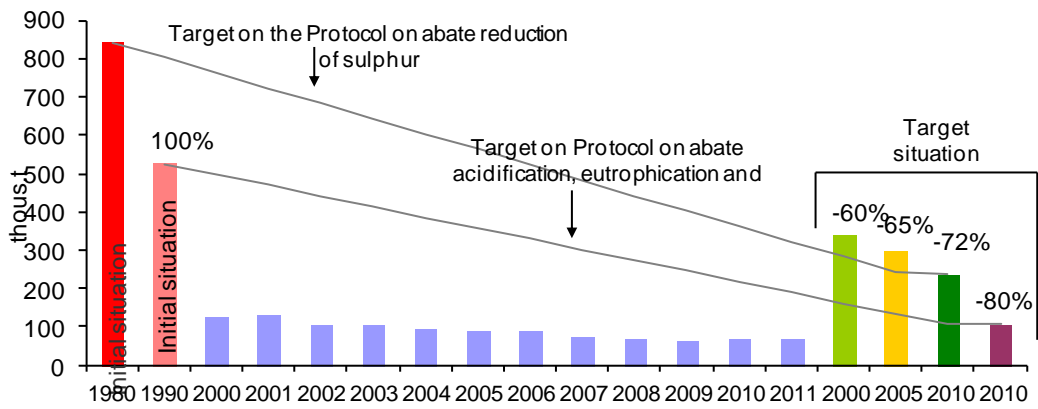


Figure 25 Trend in SO<sub>2</sub> emissions in reference to commitments under the 1994 Protocol on Further reduction of Sulphur Emissions and the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Source: SHMÚ)

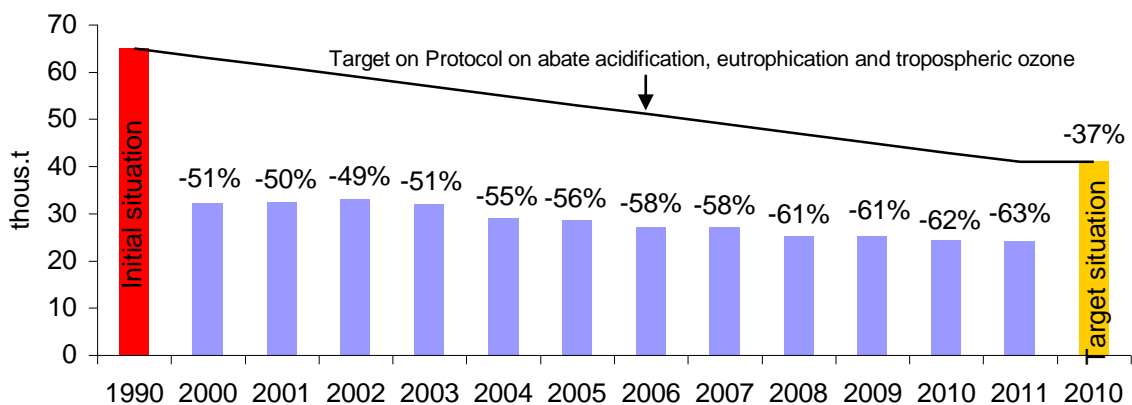


Figure 26 Trend in NH<sub>3</sub> emissions (Source: SHMÚ)

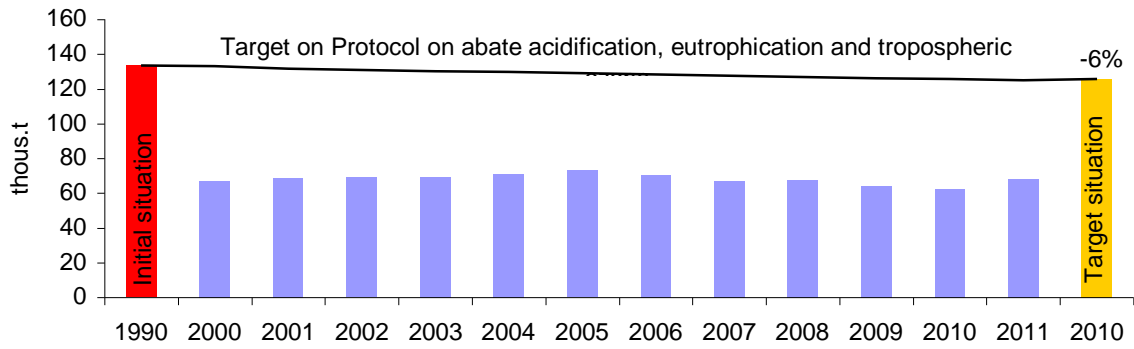


Figure 27 Trend in the emissions of non-methane volatile organic compounds (Source: SHMÚ)

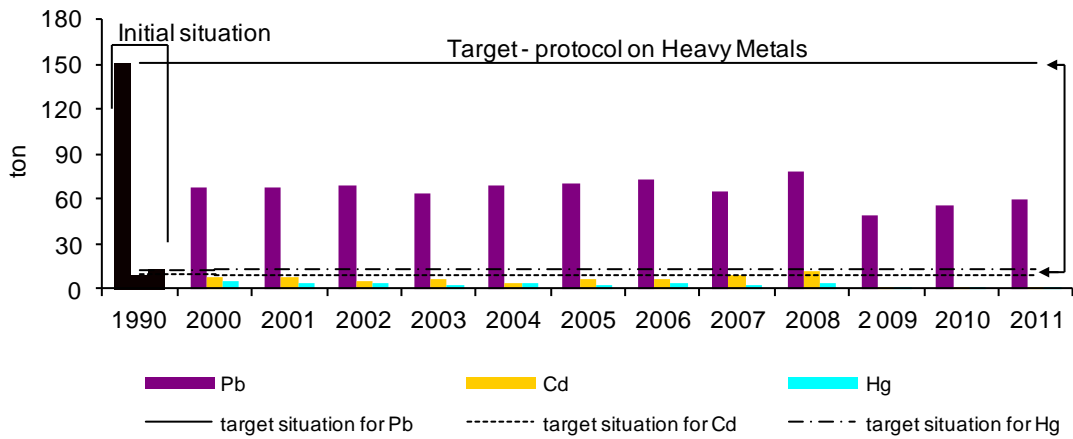


Figure 28 Trends in the emissions of heavy metals (Source: SHMÚ)

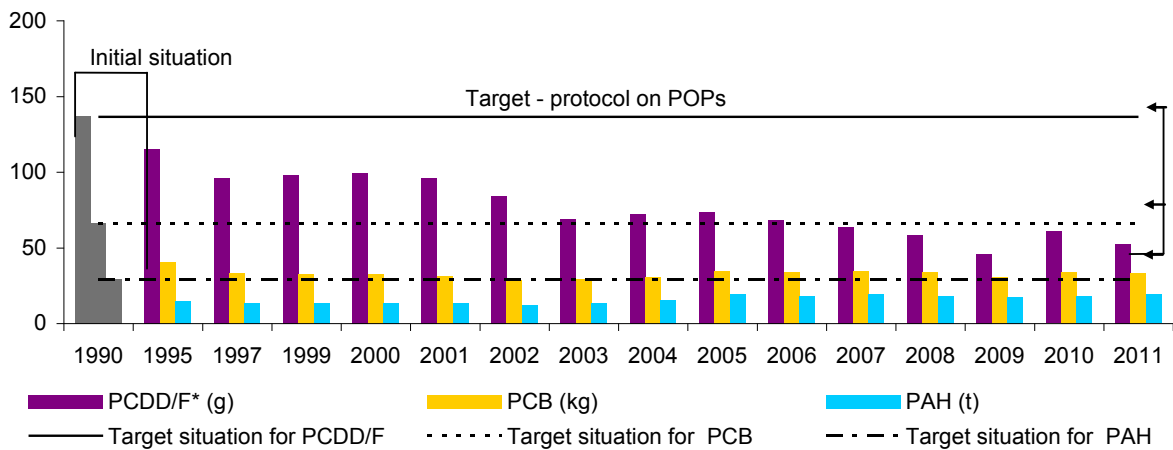


Figure 29 Trends in the emissions of persistent organic pollutants (Source: SHMÚ)

There has been an overall increase in the pH of precipitation in Slovakia in 2000 – 2012, as shown in Figure 30, which appears to be a result of global measures taken to combat acidification.

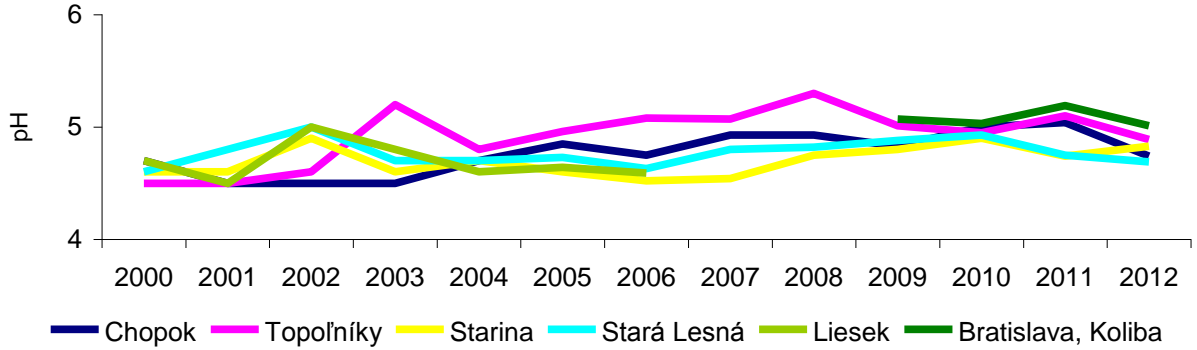


Figure 30 Trends in the pH of the precipitation (Source: SHMÚ)

**Climate change**

According to the Millennium Ecosystem Assessment, climate change and associated changes in natural habitats, might become one of the most significant drivers of biodiversity loss. Over the past 60 years, most climatic variable indicated changes in the climate of Slovakia. The lowland areas of Slovakia have shown a decline in total annual precipitation over 1951 – 2012 (8 mm for Hurbanovo), whereas upland areas have shown an increasing trend (94 mm for Liptovský Hrádok) (Figure 31).

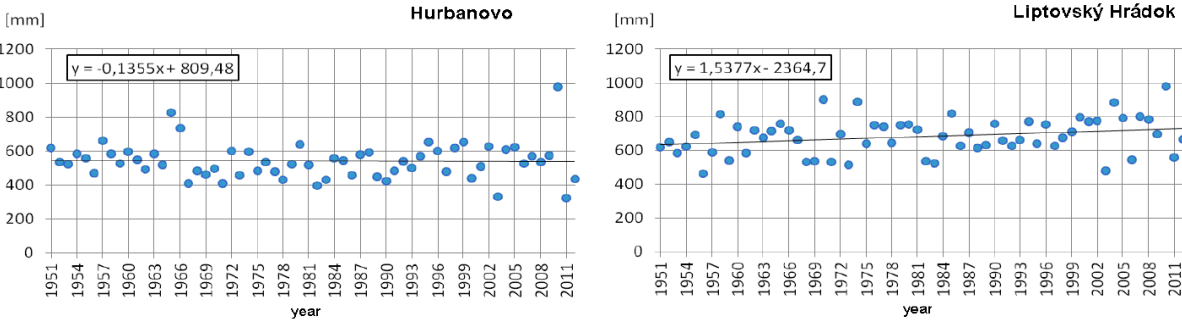
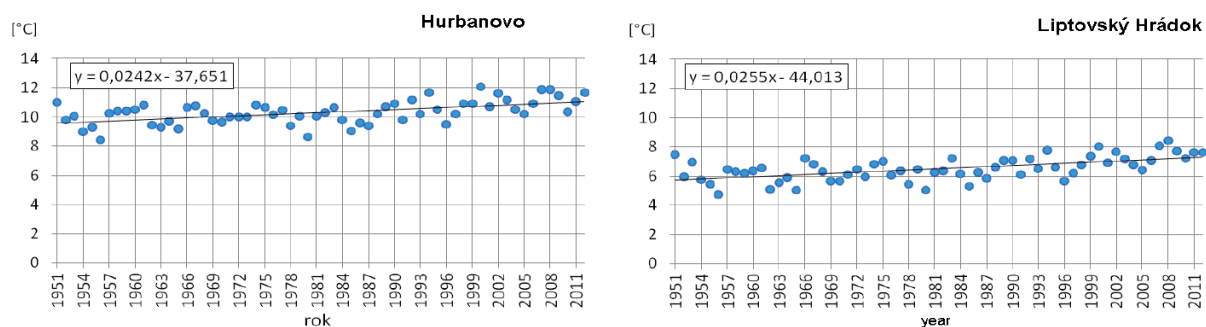


Figure 31 Trends in total annual precipitation in lowland (left) and upland (right) areas. (Source: SHMÚ)

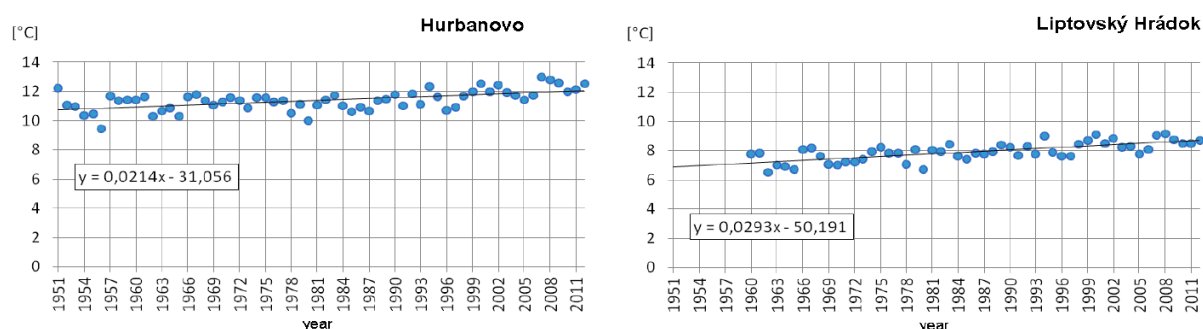
Both lowland and upland areas have shown a rising trend in the mean annual air temperature. (1.5 °C for Hurbanovo and 1.6 °C for Liptovský Hrádok) (Figure 32).





**Figure 32 Trends in the mean annual air temperature for lowland (left) and upland (right) areas (Source: SHMÚ)**

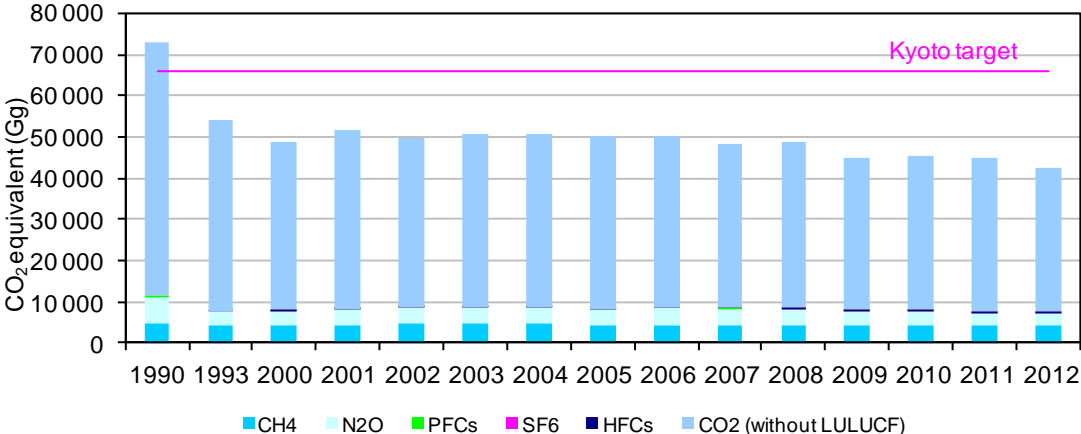
Both lowland and upland areas have shown an increase in the mean annual soil temperature in the depth of 10 cm (1.3 °C for Hurbanovo and 1.8 °C for Liptovský Hrádok) (Figure 33). As for other variables commonly used as indicators of climate change, there has been an increase in the drought index in lowland areas (0.34 for Hurbanovo; no change for upland areas); an increase in the number of tropical days for both lowland and upland areas; and a decrease in the number of heating days for both lowland and upland areas (by 20 for Hurbanovo and 17 for Liptovský Hrádok).



**Figure 33 Trends in the mean annual soil temperature in the depth of 10 cm for lowland (left) and upland (right) areas (Source: SHMÚ)**

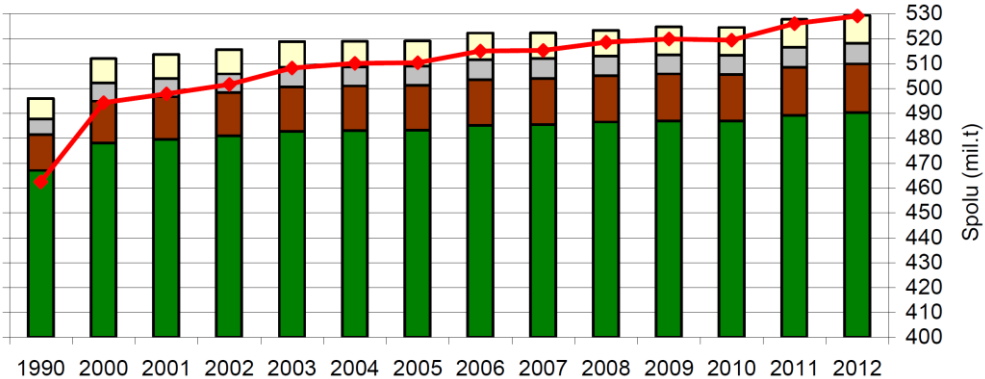
As a party to the Kyoto Protocol, Slovakia has committed itself to an 8% reduction in greenhouse-gas emissions in the period of 2008 – 2012 compared to the levels of 1990. In 2007, the European Parliament adopted an obligation to reduce greenhouse-gas emissions in the EU by at least 20% by 2020. Furthermore the EU offered to move to a „30% reduction by 2020 compared to 1990 levels, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities“. In 2011, greenhouse gas

emissions in Slovakia declined by 36.9% and 1.3% compared to 1990 and 2010 respectively (Figure 34). The initial decline in the early 1990s resulted from a sudden decline in the overall economic performance of the country; however, Slovakia was able to maintain the reduced level of greenhouse-gas emissions after 1997, e.g. during the period of revived economic growth. Following a significant decline in 2009 as a result of the global financial crisis, the trend in total anthropogenic emissions in 2010 and 2011 has remained relatively stable, not reaching levels from before 2009.



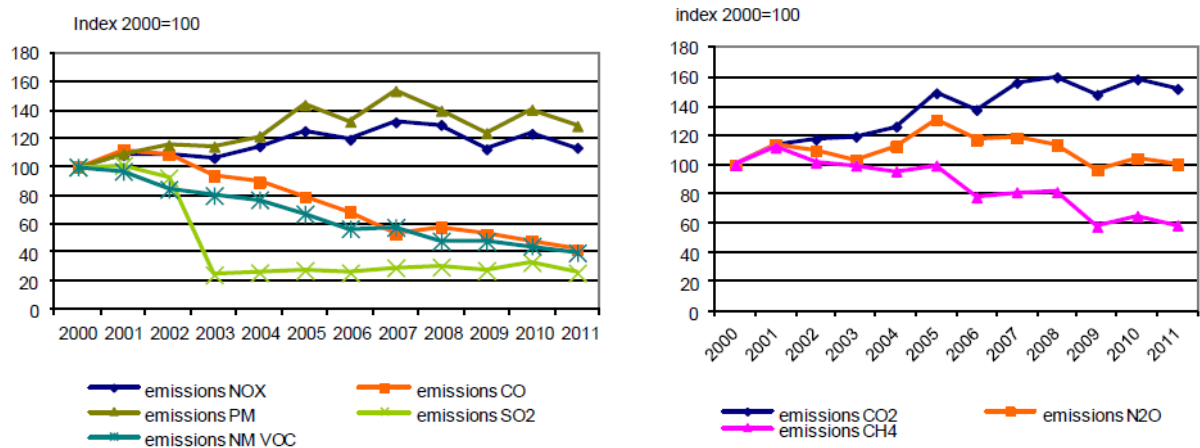
**Figure 34 Trends in anthropogenic emission of greenhouse gases under the compliance with the Kyoto protocol (Source: SHMÚ)**

With respect to climate change mitigation using ecosystem-based approaches, there has been an increase in total organic carbon stocks of forest ecosystems from ca 495 million t to 530 million t in the period of 1990 – 2012 (Figure 35).



**Figure 35 Trends in stocks of organic carbon in the forest ecosystem in 1990 – 2012. (green = organic carbon in above-ground living biomass; brown = organic carbon in underground living biomass; grey = organic carbon in non-living biomass; yellow = organic carbon in soil; scale = million tons) (Source: NLC)**

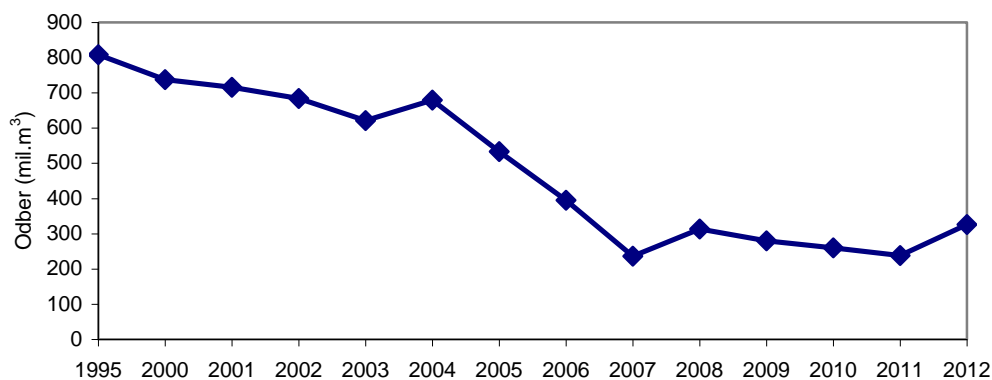
Unlike emissions of greenhouse gases from stationary sources, which have declined significantly, there has been an increase in emissions of greenhouse gases from transport. In 2011, greenhouse gases from transport accounted for 14% of the total (when expressed as CO<sub>2</sub> equivalents) and this amount represented an increase in emissions of greenhouse gases by 27%, compared to 1990. Likewise, emissions of NO<sub>x</sub> and particulate matter (PM) from transport increased over 2000 – 2011 (Figure 36).



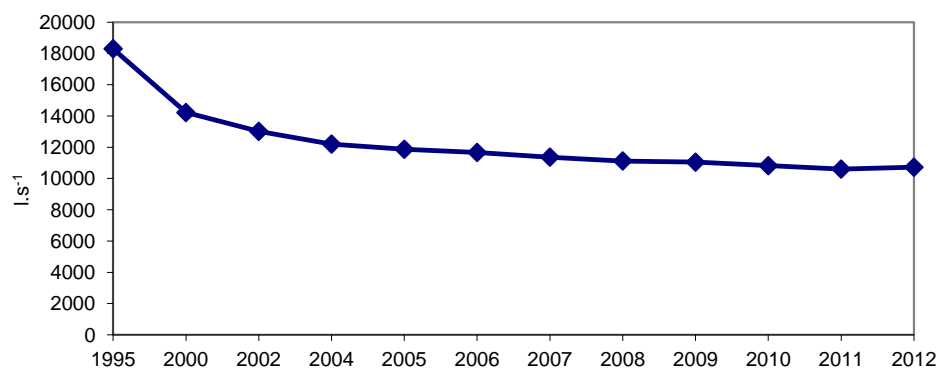
**Figure 36 Trends in emissions of greenhouse gases (right) and other air pollutants (left) from transport (Source: SHMÚ)**

### Water use and pollution

Although the volume of exploitable water fluctuates depending on climate condition, the volume of extracted water in Slovakia was less than 10% of exploitable water in 2000 – 2012, with the exception of 2003, which was an extremely dry year. Surface water extraction declined in the period of 1995 – 2007 and has not changed significantly in the period of 2007 – 2012. In 2012, the volume of extracted surface water was 56% of the volume in 2000. However, the volume of extracted surface water increased in 2011 – 2012 by 38% (Figure 37). Groundwater abstraction also declined after 1995 and its volume has been stable since 2000. In 2012, the volume of abstracted groundwater was 25% of the volume in 2000. Compared to 2011, abstraction of ground water in 2012 increased by 1% (Figure 38). In 2012, this volume represented 14% of known exploitable volume of ground water in Slovakia.



**Figure 37** Trend in total abstractions of surface water in 1995 – 2012 (y axis = Abstraction in mil. m<sup>3</sup>) (Source: SHMÚ).



**Figure 38** Trend in total abstractions of ground water in 1995 – 2012 (Source: SHMÚ).

The Slovak Environment Inspection (SIŽP) recorded 2388 events of emergency water quality over the period of 1993 – 2012. Overall, there has been an increase in the incidence of emergency water quality events for ground water and a decrease for surface water in the period of 2000 – 2012 with a relatively little change in the period of 2008 – 2012 (Figure 39). Oil substances, excrements of farm animals, waste-water spills and unidentified substances with detrimental effect on water quality have been the major cases of recorded emergency water quality conditions. Of these, the SIŽP has recorded a temporal change (decrease) in the incidence of emergency water quality caused by excrements of farm animals, waste-water spills and unidentified substances with detrimental effect on water quality (Table 9).

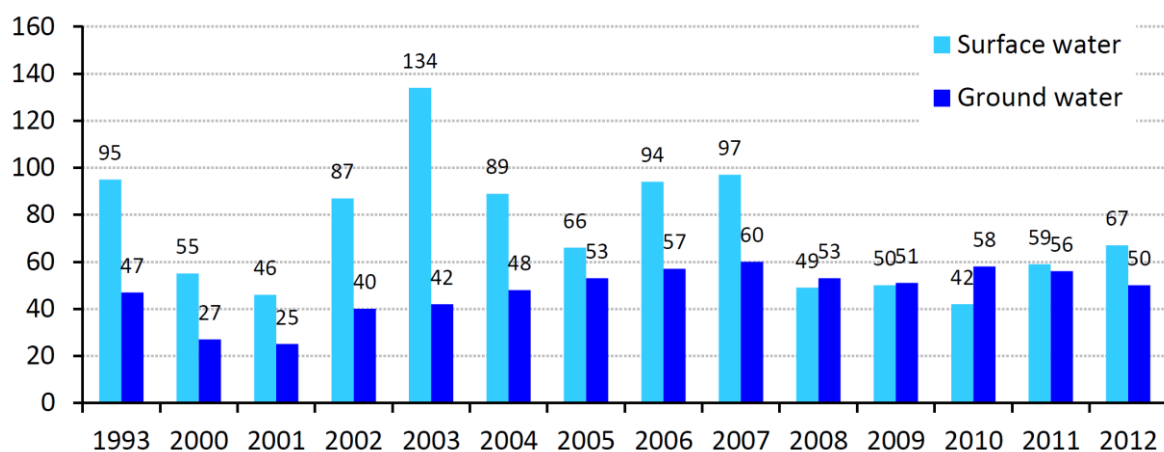
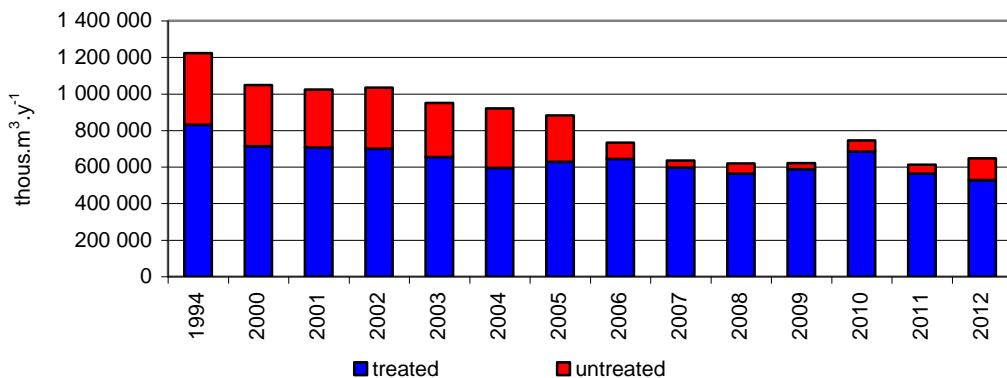


Figure 39 Trends in the incidence of emergency water quality events (Source: SIŽP)

Table 9 Trends in the origin of substances causing emergency water quality conditions (Source: SIŽP)

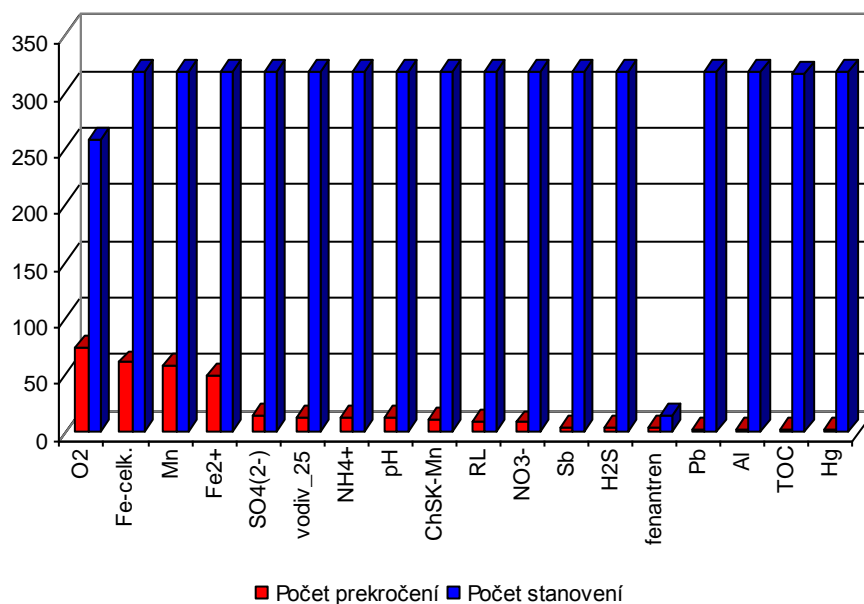
Origin of water pollution causing emergency water quality conditions	'93	'00	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12
Oil substances	70	33	64	59	70	63	69	76	65	65	60	76	66
Corrosive substances	5	2	5	3	1	0	3	4	2	0	3	0	1
Pesticides	2	0	1	0	3	0	2	0	0	0	0	0	0
Excrements of farm animals	8	5	9	21	15	14	14	12	7	2	10	10	13
Silage fluids	0	4	2	1	1	0	0	0	0	0	0	0	0
Industrial fertilisers	0	0	0	1	0	0	0	0	0	0	1	0	0
Other toxic substances	5	12	3	3	0	4	4	5	2	1	1	3	3
Insoluble substances	11	5	6	11	3	4	3	3	2	2	4	0	3
Waste water	8	10	17	35	20	10	28	24	15	17	12	14	14
Other substances	4	2	3	7	10	8	6	7	3	1	6	7	3
Unidentified detrimental substances	29	9	17	35	14	10	22	24	6	1	3	5	14

Waste-water discharge into surface water has decreased by 47% and 38% in 2012, as compared to 1994 and 2002, respectively. However, this amount represented an increase by almost 6% compared to 2011. There has also been a large decrease in the proportion of untreated water in the total volume of waste water released into surface water (Figure 40).



**Figure 40 Trends in the release of waste water into surface water in 1994, 2000 – 2012 (Source: SHMÚ)**

Ground-water quality was monitored at 171 monitoring facilities of the Slovak Hydro-Meteorological Institute (SHMÚ) in 2012. Exceedance of guidelines was recorded for all measured compounds; however, this was only observed in a couple of measurements for most compounds. The greatest number of exceedances of guideline concentrations was recorded for oxygen saturation (75, i.e. 28% of samples), total Fe (61), Mn (58) and Fe<sup>2+</sup> (49). Recommended values for NH<sup>4+</sup> and NO<sup>3-</sup> were exceeded on 13 and 8 occasions, respectively. Concentrations of the majority of organic substances were found to be within the recommended guideline or below the detection limit, except for phenanthren, the concentration of which exceeded the limit on 3 (20%) occasions (Figure 41).



**Figure 41 Monitoring of ground water quality in 2012 (blue = number of measurements, red = number of cases of exceedance of guideline concentrations) (Source: SHMÚ)**

## ***Part 2 National Biodiversity Strategies and Action Plans and their implementation***

The Slovak Republic became a member state of the EU in 2004 and as such it is required to comply with EU legislation. Following a failure to meet the global biodiversity target agreed to in 2002 “*to achieve a significant reduction in the rate of biodiversity loss by 2010*” and the adoption of Aichi Target in 2010, the EU Commission adopted a new biodiversity strategy “*Our life insurance, our natural capital: EU biodiversity strategy to 2020*” in 2011. According to its headline target, the EU is committed to “*Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while increasing the EU contribution to averting global biodiversity loss*”. The EU Biodiversity Strategy includes six main targets which are mapped to the 20 Aichi Targets at <http://biodiversity.europa.eu/policy/target-1-and-related-aichi-targets>.

Prior to the membership of Slovakia in the EU, the Convention on Biological Diversity was implemented in the Slovak legislation by the National Biodiversity Strategy (NBS) adopted by Government Resolution No. 231/1997 and endorsed by Parliamentary Resolution No. 676/1997. The NBS set 24 objectives for strengthening the protection of biodiversity and sustainable use of resources in Slovakia and defined 126 strategic directions (tasks) to achieve these objectives. The targets specified in NBS were implemented through the Action Plan for the Implementation of the National Biodiversity Strategy in Slovakia for 1998–2010 (Government Resolution No. 515/1998), which was revised and adopted as the Updated Action Plan for the Implementation of the National Biodiversity Strategy in Slovakia for 2003 – 2010 (Government Resolution No. 1209/2002). The number of objectives and tasks in the Updated Action Plan was reduced from 24 to 21 and from 126 to 82, respectively. The Government Resolution No. 1209/2002 also called for the development of evaluation reports on the implementation of the Updated Action Plan. Two evaluation reports have been prepared: the first one, for the period of 2003 – 2007 had been summarized in the Fourth National Report on the Implementation of the Convention on Biological Diversity, the second, for the period of 2007 – 2010 is summarized in Table 10, Table 11, Table 12 and Table 13.

**Table 10 The evaluation of the Updated Action Plan for 2003-2010 (evaluation for the period of 2007-2010) I – Protection of biodiversity**

Goal	Task	Performance of the tasks
1. Assess the state of biological diversity	1. Strengthen institutional capacities for the identification of the components of biological diversity	<ul style="list-style-type: none"> <li>• Update of databases and information systems: land ownership in protected area; Information System of Taxa and Biotopes (with the focus on invasive species, protected species and biotopes; <a href="http://www.soprs.sk/istb/">http://www.soprs.sk/istb/</a>); State Inventory of Specially Protected Parts of Nature and Landscape (<a href="http://uzemia.enviroportal.sk/">http://uzemia.enviroportal.sk/</a>); update of GIS layers and databases of areas protected by national legislation and Natura 2000 sites; development of databases under the Directive 2007/2/EC (INSPIRE)</li> <li>• Strengthening the research capacity in the fields of botany and zoology: establishment of the Centre of Excellence for the Protection and Use of Landscape and Biodiversity; establishment of a national scientific platform for research on biodiversity (<a href="http://www.uke.sav.sk/bioplatform/index.htm">http://www.uke.sav.sk/bioplatform/index.htm</a>; currently operating under the Institute for Landscape Ecology, Slovak Academy of Science: <a href="http://www.uke.sav.sk/index.php?option=com_content&amp;view=article&amp;id=73&amp;lang=sk">http://www.uke.sav.sk/index.php?option=com_content&amp;view=article&amp;id=73&amp;lang=sk</a>) as part of the EU initiative “European Platform for Biodiversity Research Strategy” (EPBRS)</li> </ul>
	2. Identify knowledge gaps in the state of the components of biodiversity	<ul style="list-style-type: none"> <li>• Scientific publications: e.g. journals “Nature Conservation in Slovakia”, “Protected Areas of Slovakia”; annuals “Nature Conservation”, annuals for the most important Slovak national parks; books “Birds of Prey of Slovakia”, “30 Years after the Wildfire in Kysel’ Nature Reserve, Slovak Paradise National Park”, “Flora of Slovakia – Vascular Plants”, “Flora of Slovakia – Non-vascular Plants”, “Plant Communities of Slovakia – Alpine Vegetation”; collection of papers “Research and Protection of Mammals in Slovakia”; brochures, posters, etc.</li> <li>• Monitoring of Natura 2000 habitats</li> <li>• Assessment of the species composition of Slovak forests, as repositories of biodiversity, and functions they provide</li> </ul>
	3. Ensure regular assessments of the state of the components of biodiversity	<ul style="list-style-type: none"> <li>• preparation of methods for the update of national red lists of taxa of plants and animals in accordance with IUCN guidelines</li> <li>• monitoring and inventory of native and regional varieties of selected cultivated species: research projects on the determination, maintenance and sustainable use of the genetic base of agricultural plants</li> </ul>
	4. Link inventories of species and biotopes with surveys of soil, climate, and other abiotic components	<ul style="list-style-type: none"> <li>• Research on the methods of classification and structural models of favourable condition of forest ecosystems – assessment using remote sensing (satellite imagery) (<a href="http://strumodekos.nlc.sk/">http://strumodekos.nlc.sk/</a>)</li> </ul>



	<p>5. Finalize the Mapping of Biotopes and Mapping of Wetlands programs to complete the database of biotopes</p>	<ul style="list-style-type: none"> <li>• mapping of selected aquatic, wetland and peatland habitats in various parts of Slovakia,</li> <li>• Research projects “Diversity of macrophytes along ecological gradients of water-courses and adjacent wetlands”, „Distribution and diversity of macrophytes in reservoirs of Slovakia and their relationship to environmental conditions and human disturbances“</li> </ul>
	<p>6. Improve the knowledge of endangered species and ecosystems, less known taxonomic groups and taxonomic groups of economic importance</p>	<ul style="list-style-type: none"> <li>• Research on the European beaver including changes in biodiversity in areas re-colonized by beavers: „Program for the recovery of the European beaver (<i>Castor fiber</i>)“</li> </ul>
<p>2. Manage processes which have negative effects on biodiversity</p>	<p>1. Identify processes threatening biodiversity and assess their impact</p>	<ul style="list-style-type: none"> <li>• Monitoring of the distribution of bats in human settlements, implementation of practical measures for the management of bats,</li> <li>• Assessment of the condition of forests in Slovakia in the past and present using LANDSAT (results available on <a href="http://lvu.nlcsk.org/stavlesa/">http://lvu.nlcsk.org/stavlesa/</a>)</li> <li>• Assessment of the sensitivity of forest ecosystems to air pollution (as part of the long-term national monitoring system – Partial Monitoring System Forests (ČMS Lesy))</li> <li>• Quantitative assessment of chemical changes in the assimilative apparatus of forest woody species</li> <li>• Quantitative assessment of changes in the chemistry of soil and soil solutions in forest ecosystems (as part of the BioSoil project, the European Forest Focus scheme and part of the long-term national monitoring system Partial Monitoring System Forests (ČMS Lesy))</li> </ul>
	<p>2. Control pollution which has an adverse effect on biodiversity</p>	<ul style="list-style-type: none"> <li>• Project “Identification of environmental hazards in the Slovak Republic” which identified 1819 sites of environmental hazards (<a href="http://envirozataze.enviroportal.sk/">http://envirozataze.enviroportal.sk/</a>)</li> <li>• Adoption of Act no. 569/2007 on Geological Works, and Act no. 409/2011 on certain measures in the field of environmental hazards</li> </ul>
	<p>3. Prevent the introduction of invasive species and control or eradicate those alien species which may threaten ecosystems or native species</p>	<ul style="list-style-type: none"> <li>• Priority invasive species (see the section on invasive species above) have been removed from protected and non-protected areas (see Table 7 for details) using Guidelines developed in the previous period of the implementation of the Updated Action Plan (2003 - 2007)</li> <li>• Research on the ecology of weeds (agricultural pest species): “Restoration of grasslands invaded by weeds”, “Restoration of pastures in Slovak national parks invaded by ruderal species”, “Diversity, distribution and biology of threatened archaeophyte weeds in Slovakia”</li> <li>• Research on the effect of invasive species on biodiversity of native plant species: monitoring at permanent monitoring site on the</li> </ul>

		floodplain of the Morava River
	4. Prevent the loss of biodiversity resulting from land fragmentation and abandonment	<ul style="list-style-type: none"> <li>• development of 18 local spatial plans of ecological stability (MÚSES)</li> <li>• update of regional spatial plans of ecological stability (RÚSES)</li> <li>• proposal of measures for the restoration and sustainable use of permanent grasslands: research project “Semi-natural grassland as a source of biodiversity improvement”; “Multifunctional use of grasslands in upland and montane regions”, etc.</li> </ul>
	5. Strengthen the control of processes associated with the use and release of genetically modified organisms	<ul style="list-style-type: none"> <li>• Inspectors for biosafety conducted 116 inspections of the use of GMOs in enclosed spaces and 805 inspections of the use of GMOs after their release in 2007 - 2010</li> </ul>
	6. Strengthen the application of appropriate mitigation measures	<ul style="list-style-type: none"> <li>• Development of region-specific strategies for the installation of bird guards on 22 kV power lines in collaboration with leading electricity providers in Slovakia</li> <li>• Monitoring of bird mortality along power lines in selected locations in Slovakia</li> <li>• Installation of bird guards on 22 kV power lines</li> <li>• Monitoring of the effectiveness of adopted measures</li> <li>• Implementation of approved programs of restoration and management for 9 protected areas</li> <li>• Proposal for the strategy and measures for the conservation of biodiversity of forest ecosystems with respect to climate change</li> <li>• Development of the Water Plan of the Slovak Republic, including management plans for catchments and sub-catchments covering the area of the whole country and including proposals for measures to increase the retentive capacity of the landscape and measures to prevent erosion</li> <li>• Research on the effectiveness of small-scale measures to improve the condition of soils (e.g. application of calcium to manage soil acidification and addition of organic matter)</li> <li>• Land rehabilitation after mining: management of mine effluents, sludge fields; assessment of soil and groundwater contamination in the vicinity of the mining area and other rehabilitation works in 9 mining areas were conducted</li> </ul>
	7. Integrate biodiversity conservation into all concepts, plans and strategies related to water management, transportation, mining and energy production	<ul style="list-style-type: none"> <li>• Transport: the principle of minimizing adverse effects on the environment has been incorporated into the “Transport Policy of the Slovak Republic to 2015” and the “Strategy for Transport Development to 2020”; negative effects of transport development are also assessed in accordance with the Slovak EIA legislation Act No. 24/2006 as amended</li> </ul>
	8. Develop an effective strategy to	<ul style="list-style-type: none"> <li>• development and operation of four quarantine stations for seized</li> </ul>

	control the trade in native and protected species	animals (at 3 ZOOs and one university)
3. Strengthen in-situ conservation of biodiversity	1. Deliver effective nature conservation based on the concept of the European Ecological Network	<ul style="list-style-type: none"> <li>re-evaluation of the categories of protected areas (national parks and protected landscape areas), development of management plans for protected areas and proposals for the zoning of national parks</li> </ul>
	3. Establish legislative instruments to ensure the protection of all types of biotopes and establish an effective ecological conservation network	<ul style="list-style-type: none"> <li>Declaration of 45 protected Natura 2000 sites in the period of 2007 - 2010</li> </ul>
	4. Deliver appropriate protection of representative areas, which is a prerequisite to the preservation of typical forms of biological diversity	<ul style="list-style-type: none"> <li>Re-evaluation of existing biocentres and their level of protection in relation to the national system of spatial plans of ecological stability (ÚSES)</li> </ul>
	5. Introduce a national ecosystem restoration program	<ul style="list-style-type: none"> <li>Development of the “Management plan for the sub-catchments of the rivers Poprad and Dunajec”</li> <li>Restoration works in 10 protected areas</li> </ul>
	6. Provide conditions to ensure the maintenance of viable populations of species in-situ	<ul style="list-style-type: none"> <li>Development, implementation and evaluation of programs for species recovery for selected species of plants and animals (see Table 5 and Table 6)</li> <li>Adoption of Government resolutions No. 556/2010 „Principles and frameworks for the prevention of flood damage, mitigation of flood risks, risks of drought and other natural disasters and for an integrated catchment management“; and No. 744/2010 „Program for landscape restoration and integrated catchment management, and the proposal for its implementation“ (implementation started in 2011)</li> <li>Construction of structures on the motorway network that will increase landscape connectivity and enable wildlife migration – construction of new transport infrastructure is performed in accordance with the “Transport Policy of the Slovak Republic to 2015” and the “Strategy for Transport Development to 2020”; negative effects of transport development are also assessed in accordance with the Slovak EIA legislation Act No. 24/2006 as amended</li> </ul>
	7. Promote the implementation of species recovery	<ul style="list-style-type: none"> <li>Development, implementation and evaluation of programs of species rescue and recovery for selected species of plants and animals (see Table 5 and Table 6)</li> </ul>

	programs	<ul style="list-style-type: none"> <li>• Management projects for selected steppe, montane, grassland and aquatic biotopes: “Conservation and management of floodplain forests of the Danube”, “Restoration of wetlands in the Zahorská plain, Protected Landscape Area Záhorie”, “Restoration and management of sand dunes in the Military Training Area Záhorie”, “Protection, restoration and sustainable use of salt marshes in the Slovak Republic”</li> <li>• Project “Anthropogenic structures in cultural landscapes for the maintenance of biodiversity” for agricultural landscapes</li> <li>• Inventory of animal species richness and the review of knowledge on biodiversity protection in Slovakia: 15 research projects</li> </ul>
	8. Undertake measures for the protection and recovery of threatened species and populations	<ul style="list-style-type: none"> <li>• Relocations and reintroduction of animal species and populations (<i>Spermophilus citellus</i>, <i>Acipenser ruthenus</i>, <i>Umbra krameri</i>, <i>Castor fiber</i>, <i>Marmota marmota</i>, <i>Felis silvestris</i>)</li> </ul>
	12. Prevent any violation of legal norms or destructive actions threatening biodiversity	<ul style="list-style-type: none"> <li>• Guarding of nests of birds of prey (ca 30 nests of <i>Aquila heliaca</i>, <i>Falco vespertinus</i>, <i>Circus pygargus</i>, <i>Circus aeruginosus</i>, <i>Haliaeetus albicilla</i>, <i>Pernis apivorus</i>, <i>Milvus milvus</i>) and lek sites of <i>Tetrao urogallus</i> and <i>Tetrao tetrix</i></li> <li>• Increase public awareness on CITES: development of a website</li> </ul>
4. Strengthen the conservation of genetic diversity	1. Improve inventories of genetic resources for the assessment of genetic diversity of domesticated and non-domesticated species to maximise the conservation and economic use of genetic resources	<ul style="list-style-type: none"> <li>• Update of the Catalogue of seed sources of forest trees species for the purposes of research, and domestic and international trade</li> <li>• Research projects on genetic diversity of endangered forest tree species (Institute for Genetics and Biotechnology in Nitra, University of Technology in Zvolen and the National Forestry Centre)</li> </ul>
	2. Establish a collection of genotypes of old cultivars, landraces and ecotypes within natural populations and subsequently evaluate them and ensure their long-term preservation	<ul style="list-style-type: none"> <li>• Research projects on the identification, selection and preservation of genotypes of old native cultivars of economically important plant species</li> <li>• Field survey of orchards and fruit gardens in Slovakia</li> </ul>
	4. Establish special long-term repositories for valuable genotypes of vegetatively propagated species	<ul style="list-style-type: none"> <li>• Securing staff and technical resources necessary for long-term preservation of genetic material from native plant species and important regional cultivars in the Gene Bank at the Research Institute of Plant Production (VÚRV) Piešťany</li> <li>• Transfer of threatened specimen/samples of genetic resources to better equipped repositories</li> <li>• Development of the Bank of Seeds of Forest Tree Species</li> </ul>

		<ul style="list-style-type: none"> <li>• Maintenance of the collection of old and regionally-specific cultivars, and less-known plant species in the Botanical Garden of Nitra University</li> <li>• Maintenance of old orchards Hont Hrušov, Komus Revúca and Gemera Mokrá Lúka</li> <li>• Construction of the Central Clone Archive in Ostrá Lúka had been abandoned due to disputes over land ownership and the construction of regional clone archives could not be finalized by 2010</li> </ul>
5. Capacity building to strengthen ex-situ conservation	1. Develop a comprehensive program for ex-situ conservation of genetic resources	<ul style="list-style-type: none"> <li>• Involvement of Slovak ZOOs in a number of recovery programs, e.g. European Endangered Species Program, European Studbook;</li> <li>• Maintenance of existing samples in the Gene Bank and obtaining additional samples</li> <li>• Maintenance and revision of the collection of herbs (herbarium) and databases at the Institute of Botany of the Slovak Academy of Sciences</li> </ul>
	2. Improve the existing network of ex-situ conservation facilities and adopt related legislation	<ul style="list-style-type: none"> <li>• Further development of the Seed Bank of Forest Trees; the development of the gene bank (including pollen and tissues) could not be finalized</li> </ul>
	3. Identify priorities in terms of filling in gaps in collections	<ul style="list-style-type: none"> <li>• Assessment of genetic resources of old and regional varieties of fruit species, vegetables and vine, endangered species including exotic species of plants</li> <li>• Monitoring of endangered plant communities of calcareous substrates</li> <li>• Experimental cultivation of endangered and disappearing species of plants</li> <li>• Research on introduction and acclimatisation of woody species, biotechnology, ecological genetics and pathology of woody species (Arboretum Mlyňany)</li> </ul>
	4. Establish a collection of cultures of microorganism recorded in Slovakia, including the ones genetically engineered in laboratories	<ul style="list-style-type: none"> <li>• This task was only partly carried out due to insufficient resources: the Institute of Chemistry of the Slovak Academy of Sciences has been maintaining one of the largest collections of yeasts in the world (<a href="http://www.chem.sk/activities/yeast/ccy/">www.chem.sk/activities/yeast/ccy/</a>)</li> </ul>
	5. Develop low-cost conservation techniques for plant-genetic resources, including in-vitro methods and cryo-preservation	<ul style="list-style-type: none"> <li>• Development of in-vitro conservation methods for hop and potatoes</li> </ul>
	6. Provide for the	<ul style="list-style-type: none"> <li>• Task was partially fulfilled through the projects of the Slovak</li> </ul>

	duplication of crop and other important species preserved in collections	Agricultural University in Nitra; however, the conservation of pollen using cryopreservation has not been established in Slovakia during the period of 2007 - 2010
	7. Improve the database and relevant records and documents	<ul style="list-style-type: none"> <li>• Continuous entry of biochemical data on genetic resources into descriptive databases of the national program for the conservation of genetic resources of cultured plants in Slovakia</li> </ul>
6. Establishment of a comprehensive system for the monitoring of changes in biodiversity at all levels	1. Setup a comprehensive program for the monitoring of biodiversity	<ul style="list-style-type: none"> <li>• Update of the Partial Monitoring System Biota (ČMS Biota) so that it includes collection of data on species and biotopes required under the EU Habitat and Species Directive (Natura 2000 network)</li> <li>• Monitoring of selected species of EU importance (37 plant species and species of animals for which recovery programs had been implemented)</li> <li>• Activities under the Global Biodiversity Information Facility (GBIF) initiative – taxonomy related research of the National Taxonomy Facility (a partnership of the Slovak Academy of Sciences, two Slovak universities and the Slovak National Museum); in 2007 Slovakia became a member of the GBIF</li> <li>• Update of the Information system of forests in Slovakia</li> </ul>
	2. Introduce new monitoring methods for a better understanding of ecosystem changes	<ul style="list-style-type: none"> <li>• Hydrological, hydrogeological, geological, geomorphological and biospeleological surveys of more than 20 caves</li> <li>• Biomonitoring of heavy metals and other pollutants in the environment</li> <li>• Monitoring of the microflora of the River Danube and its tributaries: project “Assessment of the ecological effects of pollution at the level of microbial genetics”</li> <li>• Monitoring of the effects of GMOs on ecosystems – a laboratory for the study of GMOs and products made of GMOs was setup at the Institute for Molecular Biology, Slovak Academy of Sciences</li> <li>• Detection of GMOs in food and animal feed (since EU legislation requires the labelling of all agricultural and food products containing more than 0,9% of GMO)</li> </ul>
	3. Promote the use of biodiversity indicators in monitoring	<ul style="list-style-type: none"> <li>• Monitoring of wetland vegetation as a bioindicator in projects of water management (e.g. research projects “Temporal changes in aquatic macrophyte vegetation in a lowland groundwater feed eutrophic course”; ”Macrophytes of the Ipel River: effect of flood on species composition and distribution)</li> <li>• Use of fish parasites as indicators of the pollution status of aquatic ecosystems</li> </ul>
	4. Facilitate the inter-connetcion of monitoring systems	<ul style="list-style-type: none"> <li>• Linking the monitoring program UN/ECE ICP Forests with the national Partial Monitoring Sytem – Forests (ČMS – Lesy)</li> </ul>

**Table 11 The evaluation of the Updated Action Plan for 2003-2010 (evaluation for the period of 2007-2010) II – Sustainable use**

<b>Goals</b>	<b>Strategic directions</b>	<b>Performance of the tasks</b>
7. Ensure sustainable forestry	1. Complete national criteria for- and indicators of sustainable forest management and enforce their use	<ul style="list-style-type: none"> <li>• Assessment of species composition of Slovak forests with respect to biodiversity conservation and forest functions</li> <li>• Update current criteria for- and indicators of sustainable forest management so that they are in line with EU standards and legislation</li> </ul>
	2. Increase the proportion of natural regeneration in forest areas	<ul style="list-style-type: none"> <li>• Determine the possibilities of natural regeneration of forests and their economic benefits to develop the most appropriate management practices for the protection of biodiversity in managed forests</li> </ul>
	5. Promote less intensive forest management to ensure sustainable use of forests as one of the most important renewable resources	<ul style="list-style-type: none"> <li>• Identify ecological thresholds for the use of harvesting machinery, with respect to biodiversity protection</li> </ul>
	6. Promote ecosystem approach in forestry planning processes	<ul style="list-style-type: none"> <li>• Development of a system of indicators of the condition and development of forest ecosystems: task incorporated into the strategic goals of the National Forestry Program</li> </ul>
	7. Ensure continuous monitoring of the condition and development of forests and promote research on changes and effects of forest management on the development of forest ecosystems	<ul style="list-style-type: none"> <li>• Monitoring provided by the National Forest Centre</li> </ul>
8. Gradually replace inappropriate agricultural practices with sustainable agricultural and pastoral management	4. Promote the use of biomass as a renewable source of energy	<ul style="list-style-type: none"> <li>• Development of the “National action plan for renewable energy source” which expect an increase in the proportion of energy from renewable sources in the total electricity and energy production to 14% by 2020.</li> </ul>
	5. Promote the establishment of a national market with certified bio-products	<ul style="list-style-type: none"> <li>• Continuation of forest certification in accordance with PEFC and FSC certification systems</li> </ul>
9. Introduce sustainable hunting and fishing	4. Maintain populations of game species within the ecosystem carrying	<ul style="list-style-type: none"> <li>• Development of methods (including training of field staff) for large-scale surveys of the abundance of large carnivores for the following ranges: Poľana, Nízke Tatry, Malá and Veľká Fatra; the surveys themselves were not carried out in the period of</li> </ul>

practices	capacity	<p>2007 - 2010.</p> <ul style="list-style-type: none"> <li>• Project “Survey and monitoring of populations of large carnivores and the Wild cat (<i>Felis silvestris</i>) in Slovakia”, conducted by the State Nature Conservancy (ŠOP SR)</li> <li>• Research to determine ecosystem carrying capacity with respect to populations of game species: project “Large-scale ecological management of the most important and protected game species in game areas and the protection of their gene pool”</li> </ul>
11. Promote ecologically sound and sustainable tourism	2. Develop a national strategy of sustainable tourism	<ul style="list-style-type: none"> <li>• Survey “Reconciliation of interests of sports and recreational use of protected areas in the Malá Fatra National Park”, which included the monitoring of climate, flora and fauna, number of visitors, a survey on the effect of skiing and ski-slope preparation on small ground mammals and a survey of invertebrate species including endemic species and glacial relicts (<i>Nebria tatica</i>, <i>Trechus matejkai</i>)</li> <li>• The Ministry of Economy prepared a document „Regionalisation of Tourism in the Slovak Republic“ which is the core document for development in the field of tourism and it takes sustainable development into account</li> </ul>
	3. Promote forms of tourism in protected areas that are in harmony with the protection of biodiversity	<ul style="list-style-type: none"> <li>• Identification of discrepancies between the interests of commercial tourism and the objectives of protected areas</li> </ul>
	4. Strengthen regulatory measures (seasonal restrictions, entrance fees, transport infrastructure, etc.) to keep the number of visitors in balance with the carrying capacity of protected areas	<ul style="list-style-type: none"> <li>• Seasonal restrictions on hunting have been applied in some national parks</li> </ul>
12. Increase safety in biotechnologies and promote access to biotechnologies and/or benefits resulting from them	1. Initiate programs for the transfer of biotechnology, including transfer of technologies to developing countries	<ul style="list-style-type: none"> <li>• Establishment of the Institute for the Protection of Biodiversity and Biological Safety at the Slovak Agricultural University in Nitra, which coordinates integrated research and development in the fields of biodiversity and biotechnology</li> </ul>
	2. Develop appropriate administrative procedures to promote access to knowledge resulting from the use of biotechnologies	



	3. Introduce general standards for the testing, import, export and commercial use of living GMOs	<ul style="list-style-type: none"> <li>• Second edition of the “Methods to evaluate the risks associated with the use of GMOs”</li> </ul>
	4. Designate authorities for biosafety including the early warning system	<ul style="list-style-type: none"> <li>• Organize regular workshops and training sessions for the employees of designated authorities, including the workshop on the implementation of the Cartagena Protocol and the use of the Biosafety Clearing House; training on microarray techniques, sampling and analysis of DNA for the detection of GMOs</li> </ul>
	5. Develop elaborate procedures for the assessment of risks associated with the release of GMOs	<ul style="list-style-type: none"> <li>• Development of methods for the operation of GMO laboratories, published as “Biological Safety” by the Slovak University of Agriculture in Nitra, 2007 and “Control of the Use of GMOs in the Slovak Republic” in Veda, 2008</li> <li>• Development of “Guidelines for the Development of Emergency plans” by the Ministry of Environment, Institute for Molecular Biology at the Slovak Academy of Sciences and the Faculty of Natural Sciences, Comenius University</li> </ul>

**Table 12 The evaluation of the Updated Action Plan for 2003-2010 (evaluation for the period of 2007-2010) III – General Measures for Conservation and Sustainable Use**

Goals	Strategic directions	Performance of the tasks
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	1. Enable and promote active participation of the private sector and non-governmental organisations in planning processes at all levels	<ul style="list-style-type: none"> <li>• Awareness-building: operation of Information Centres for Nature Conservation (Informačné Strediská Ochrany Prírody) in ca 10 cities; operation of the Information System Natura 2000; organisation of exhibits and seminars for various audiences and the “Envirofilm” film festival; operation of the outdoor nature-conservation educational centre in Varín; other outdoor activities for the public</li> </ul>
	4. Develop mechanisms for the co-operation of all stakeholders involved in the conservation of biodiversity and the sustainable use of biological resources	<ul style="list-style-type: none"> <li>• Application of economic instruments to increase the participation of land owners and land holders in protected areas in the management of these areas in 2007 - 2008; this activity had not been included in the budget for 2009 - 2010</li> </ul>
16. Develop a widely applicable	3. Determine the monetary value of ecosystem services	<ul style="list-style-type: none"> <li>• Report “Models, methods and algorithms for the assessment and evaluation of non-commercial functions of forests” by the</li> </ul>

system of incentives for the conservation of biodiversity and its sustainable use		National Forestry Centre in Zvolen  • Project “Prevention and reparation of environmental damage – Implementation of the Act no. 359/2007” (Slovak Environment Agency (SAŽP)), which included the preparation of related legislation and guidelines, establishment of the Information System on the Prevention and Reparation of Environmental Damage, ect.
17. Incorporate biodiversity conservation into land-use planning	1. Ensure that biodiversity becomes a fundamental and limiting factor in land-use planning processes  3. Introduce binding environmental regulations into the landscape planning, based on ecological stability, carrying capacity and vulnerability of ecosystems	  • Implementation of the European Landscape Convention into Slovak legislation – determination of the types of landscape in Slovakia (expected to be finalized in 2013) • Models of forest management incorporating regulations related to nature conservation, which integrate landscape planning and forest management
18. Support research on the conservation and sustainable use of biodiversity	1. Develop a long-term comprehensive national biodiversity research program  2. Improve existing methods of research on biodiversity  3. Introduce new methods for the assessment of biodiversity  4. Strengthen ecosystem and microbiological research	• The task has not been carried out since 1999, since no resources had been allocated for it  • Evaluation of the resistance of selected agricultural crops to selected diseases and the study of genetic determination of the susceptibility of seeds to pathogens (in 2007 only) • Taxonomic research using molecular methods (Institute of Botany, Institute of Molecular Biology, Slovak Academy of Sciences; National Forestry Centre in Zvolen) • Development of the key for the identification of ferns and phanerogams of Slovakia (Institute of Botany, Slovak Academy of Sciences)  • Research: Development and application of molecular techniques for the assessment of biodiversity  • Publication: Marhold, K., Mártonfi, P., Mered’a, P. & Mráz, P. (eds.), 2007: Chromosome number survey of the ferns and flowering plants of Slovakia. – VEDA, Bratislava. (Karyological database accessible on <a href="http://www.chromosomes.sav.sk/">http://www.chromosomes.sav.sk/</a> ) • Research projects on the effect of heavy-metal pollution on bacterial diversity; effects of environmental pollution on microbial catalase genes

	5. Strengthen research in the field of population biology	<ul style="list-style-type: none"> <li>Four research projects of the National Forestry Centre on the populations of forest tree species and communities in relation to abiotic conditions, especially climate change</li> </ul>
	9. Support participation in international research projects	
19. Promote capacity building and the development of institutional capacities for the conservation and sustainable use of biodiversity	1. Strengthen the capacity of institutions involved in biodiversity research, monitoring and management, in particular those engaged in in-situ conservation	<ul style="list-style-type: none"> <li>Monitoring of selected endangered species of flora and fauna</li> <li>Initial steps in the development of an electronic database of the collections of biological samples of Slovak museums</li> </ul>
	4. Strengthen the capacity of non-governmental, non-profit organisations working in the field of biodiversity conservation	<ul style="list-style-type: none"> <li>Small grant schemes to support NGOs working on biodiversity-related issues: grant programs of the Pontis Foundation supported 20 small projects (approx. 330 Euro each); several grant programs of the Ekopolis Foundation, and the GEF SGP, which funded projects on climate change adaptations</li> </ul>
	6. Maintain and strengthen the capacity of research institutions working on scientific description, classification and collection of specimens, and enhance their ability to effectively disseminate data and information	<ul style="list-style-type: none"> <li>Providing support for arboreta in Borová Hora, Banská Štiavnica and Mlyňany</li> </ul>
20. Promote all forms of education and awareness-raising on the conservation and sustainable use of biodiversity	2. Develop effective communication among educational institutions and individuals involved in education on biodiversity	<ul style="list-style-type: none"> <li>Publications: e.g. journals “Nature Conservation in Slovakia”, “Protected Areas of Slovakia”; annuals “Nature Conservation”, annuals for the most important Slovak national parks; books “Birds of Prey of Slovakia”, “30 Years after the Wildfire in Kysel’ Nature Reserve, Slovak Paradise National Park”, “Flora of Slovakia – Vascular Plants”, “Flora of Slovakia – Non-vascular Plants”, “Plant Communities of Slovakia – Alpine Vegetation”; collection of papers “Research and Protection of Mammals in Slovakia”; brochures, posters, etc.</li> <li>Operation of the outdoor nature conservation education centre in Varín for schools and educators</li> <li>Short programs, including interviews and debates in national and local television and radio networks</li> </ul>
	3. Develop new	<ul style="list-style-type: none"> <li>Training for the employees of the Ministry of Environment, the</li> </ul>

	biodiversity-specific training programs for different sectors and administrative levels	<p>State Nature Conservancy and other organisations, on new legislation, research methods and advances in the field of biodiversity conservation; participation at conferences and seminars on various biodiversity-related topics</p> <ul style="list-style-type: none"> <li>• Special training for the employees of the Customs and Biosafety Inspectors</li> <li>• Training on education and public outreach for the employees of forestry institutions</li> <li>• Seminars for the public</li> </ul>
	4. Provide private land owners with training on more sustainable management practices	<ul style="list-style-type: none"> <li>• Educational projects for private land-owners by the Ministry of Agriculture and Rural Development: “Nature-friendly forest management”; “Establishment of Forests in Changing Ecological Conditions”; “Management of Forests in Various Ecological Conditions” (all of the above included seminars and publications for private forest owners)</li> <li>• Public courses on the following topics: the use of permaculture, alternative practices of grassland and pastures management (Slovak University of Agriculture in Nitra)</li> </ul>
	5. Promote the use of new techniques and technologies in education, including distant education	<ul style="list-style-type: none"> <li>• Courses on the protection of the environment and biodiversity within the program of lifelong learning provided by the Slovak University of Agriculture, Nitra</li> </ul>
	6. Develop and maintain information and education centres and interpretive walking trails	<ul style="list-style-type: none"> <li>• Development and operation of Information Centres of Nature Conservation</li> <li>• Review of the network of interpretive walking trails and educational sites, maintenance and renovation of the network, construction of new interpretive trails (<a href="http://www.naucnechodniky.sk/">http://www.naucnechodniky.sk/</a>)</li> <li>• Opening of new permanent exhibits “The Miracle of Nature – Biodiversity of Slovakia”; “The Miracle of Nature – The Story of Life on Earth”, “The Miracle of Nature – Biodiversity of Earth”, in the Slovak National Museum in 2011</li> <li>• Opening and operation of a Discovery Centre at the Slovak National Museum for the youth</li> </ul>
	7. Introduce the topic of ethical aspects of the conservation and sustainable use of biodiversity into educational curricula at all levels of education	<ul style="list-style-type: none"> <li>• Development of a database of strategic crops using fingerprinting</li> <li>• Publication of brochures on laws on the protection of biodiversity (CITES, GMO, etc) for primary and secondary schools</li> </ul>
21. Strengthen the principles of biodiversity in the	1. Ensure active involvement of the public in the process of EIA	

process of Environmental Impact Assessment		
22. Establish a national clearing-house on biodiversity	4. Adopt appropriate regulations to ensure access to information for all stakeholders	<ul style="list-style-type: none"> <li>Update and improvement of the Information System on Taxa and Biotopes (State Nature Conservancy; ŠOP)</li> <li>Finalisation and regular updates of the website on forest monitoring as part of the Partial Monitoring Systems – Forests (ČMS – Lesy; <a href="http://www.nlcsk.sk/nlc_sk/ustavy/lvu/vyskum/oeble/sluzby/cms_lesy_-_monitoring_lesov.aspx">http://www.nlcsk.sk/nlc_sk/ustavy/lvu/vyskum/oeble/sluzby/cms_lesy_-_monitoring_lesov.aspx</a>)</li> </ul>
	6. Fill the gaps in databases of biodiversity by establishing national databases on flora and microorganisms	<ul style="list-style-type: none"> <li>Development of the database of flora of Slovakia <a href="http://www.dataflos.sav.sk">www.dataflos.sav.sk</a> was finalized in 2010 (Institute of Botany, Slovak Academy of Sciences)</li> </ul>
	7. Promote the use of technologies in data management	
23. Strengthen financial mechanisms for the conservation and sustainable use of biodiversity at the national level	1. Increase investment in projects on the protection, restoration and sustainable use of biodiversity	<ul style="list-style-type: none"> <li>Implementation of the Agri-environmental program of the Slovak Republic: measures for the sustainable use of agricultural soil; Financial compensation for the management of agricultural land in upland and montane areas; agri-environment payments; payments within the Natura 2000 scheme, etc.</li> </ul>
	3. Promote the establishment of community funds on the protection and sustainable use of biodiversity	

**Table 13 The evaluation of the Updated Action Plan for 2003-2010 (evaluation for the period of 2007-2010) IV – International Collaboration**

Goals	Strategic directions	Performance of the tasks
24. Collaboration in the implementation of the Convention on Biological Diversity at regional and	1. Promote technical and scientific collaboration with other Parties of the Convention	<ul style="list-style-type: none"> <li>The Slovak Republic participated in the activities of Bioversity International, in Phase 8 of the European Cooperative Programme for Plant Genetic Resources</li> <li>The Slovak Republic participated in the activities of the European Forest Genetic Resources Programme (EUFORGEN)</li> </ul>
	2. Actively participate in all regional initiatives related to the	<ul style="list-style-type: none"> <li>Performance of various tasks under resolutions of the Ministerial Conference on the Protection of Forests in Europe</li> <li>Participation in the activities of the Carpathian Convention and its</li> </ul>

international levels	conservation and sustainable use of biodiversity, particularly in the implementation of the Pan-European Landscape and Biological Diversity Strategy	Protocol on Biodiversity
	4. Strengthen collaboration with organisations in charge of the implementation of the CBD and similar conventions in other countries	<ul style="list-style-type: none"> <li>• Tasks carried out as part of Slovakia's participation in EUFORGEN and participation in the EUFGIS project (Establishment of a European Information System on Forest Genetic Resources)</li> </ul>
	5. Promote collaboration with ex-situ conservation institutions in other countries (especially neighbouring countries)	<ul style="list-style-type: none"> <li>• Collaboration between the Gene Bank of the Slovak Republic and the Gene Bank of the Czech Republic including storage of each other's safety collections</li> <li>• Participation in the activities of Bioversity International</li> <li>• Collaboration of the Plant Production Research Institute in Piešťany with gene banks of central Europe (Bulgaria, Slovenia, Poland, Czech Republic and Azerbaijan), including collection of specimen and research</li> </ul>

An important moment in the implementation of the objectives of the CBD in Slovakia came in 2010 when the Ministry of Environment was abolished and its competencies were transferred to the Ministry of Agriculture, Environment and Regional Development (Act No. 37/2010). Although the Ministry of Environment was re-established with some changes after 4 months, this event has caused a disruption in the continuity of work, including work in the field of biodiversity protection.

The current national biodiversity strategy, which reflects the objectives of the EU Biodiversity Strategy to 2020, was adopted in January 2014 as the Updated National Strategy for the Protection of Biodiversity to 2020 (Government Resolution No. 12/2014). Table 15 shows nine national targets A.1 – F. 9, defined in the Updated National Strategy, in relation to Aichi Targets.

The Action Plan for the Implementation of the Updated National Strategy for the Protection of Biodiversity to 2020 was adopted in September 2014 (Government Resolution No. 442/2014). The Action Plan includes 167 tasks under 33 sub-targets and 9 main targets in 6

areas. The comparison of “priorities of national interest” as stated in the Updated Action Plan from 2002 and “areas of interest” of current Action Plan from 2014 clearly shows a significant progress in national interests in the field of biodiversity protection from description and inventories to action, from only national to both national and international scope, from purely traditional to both traditional and novel issues (Table 14). In comparison with the Updated Action Plan from 2002, the current Action Plan from 2014 has an improved structure in terms of budgeting – each of the 167 proposed tasks has been categorised according to the availability of resources as 1) activities that had been accounted for in the state budget; 2) activities funding for which has been undergoing an approval process; and 3) activities that will be undertaken only if financial resources are secured. However, like the Updated Action Plan from 2002, the Action Plan from 2014 includes predominantly non-quantitative goals, the evaluation of which might be subjective. According to the Government Resolution No. 442/2014, the current Action Plan (2014) will be evaluated by the end of 2016, in 2018 (midterm report) and the final report is to be presented in 2021.

**Table 14 Comparison of areas of interest of the earlier Updated Action Plan (2002) and current Action Plan (2014)**

<b>Updated Action Plan 2002</b>	<b>Action Plan 2014</b>
I Monitoring of the state of biodiversity, analysis of baseline conditions and relevant legislation	A Nature conservation
II Completion of the database of wild and domesticated organisms	B Preservation and enhancement of ecosystems and their services
III Indicators of biodiversity	C Protection of biodiversity under national policies for agriculture, forestry and fisheries
IV Programs for species recovery and biodiversity protection	D Combat the spread of invasive species
V Programs for the restoration/rehabilitation and preservation of components of biodiversity	E Reducing the pressure on biodiversity and supporting rational use of genetic resources
VI Educational programs	F Enhance the integration of environmental and other policies to reduce the ecological footprint, promote international cooperation, education and research in this field

**Table 15 National biodiversity targets outlined in the Updated National Strategy for the Protection of Biodiversity to 2020 in relation to Aichi Targets**

<b>A.1 Stop the deterioration of the status of all species and habitats, especially those covered by EU legislation and achieve a significant and measurable improvement in their condition.</b>
Aichi 11 By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.
Aichi 12 By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.
<b>A.2 Ensure that both general public and professionals are aware of the importance of biodiversity and the steps towards its protection and sustainable use</b>
Aichi 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
<b>B.3 By 2020, ensure the preservation of ecosystems and the enhancement of ecosystem services by means of green infrastructure and the restoration of at least 15% of degraded ecosystems</b>
Aichi 5 By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
Aichi 8 By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.
Aichi 10 By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning..
Aichi 14 By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.
Aichi 15 By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.
<b>C.4 By 2020, implement the measures of the Common Agricultural Policy that have positive effects on biodiversity at all cultivated areas so as to measurably improve the condition of species and habitat</b>
Aichi 7 By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
Aichi 13 By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.
<b>C.5 Implement national programs of forest management so as to achieve a measurable improvement in the condition of species and habitats dependent on suitable forest environment and those, which are significantly affected by forestry practices, and to ensure a measurable improvement in the provision of ecosystem services in accordance with sustainable forestry practices as compared to the EU reference condition (2010)</b>



Aichi 5 By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
Aichi 7 By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
<b>C.6 Ensure adequate protection for water and water- dependent habitats and species to achieve a good condition of aquatic ecosystems by 2020, and ensure that the development of aquaculture does not have adverse effects on aquatic species and ecosystems</b>
Aichi 5 By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
Aichi 6 By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.
Aichi 7 By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
<b>D.7 Ensure the reduction of negative effects of invasive species on biodiversity and ecosystems in Slovakia by 2020</b>
Aichi 9 By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.
<b>E.8 Reduce the intensity of negative factors affecting biodiversity; finalize, for this purpose, an effective legal framework and tools ensuring compliance with relevant legislation, and ensure fair and equitable sharing of benefits arising from the utilization of genetic resources</b>
Aichi 2 By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.
Aichi 3 By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.
Aichi 16 By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.
Aichi 4 By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.
<b>F.9 Engage a wide range of stakeholders and establish or re-establish partnerships to support the implementation of the national strategy for biodiversity; promote education, training, research and participation</b>
Aichi 17 By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.
Aichi 19 By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.
<b>Cross-cutting issues: Financing and resource mobilisation</b>

Aichi 20 By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties..

Not included in the table:

Aichi 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels

Explanation/Context: Slovakia does not have indigenous peoples and local communities *sensu* CBD. However, the Updated National Strategy for the Protection of Biodiversity to 2020 states that the objective of the strategy is to “*support the use of traditional agricultural varieties of crops and animals*” and “*support traditional agricultural landscape management*”.

### ***Part 3 Progress towards the 2020 Aichi Biodiversity Targets***

A revised National Strategy (“Updated National Strategy for the Protection of Biodiversity to 2020”) and an Action Plan for its implementation (Action Plan for the Implementation of the Updated National Strategy for the Protection of Biodiversity to 2020) were only adopted in 2014; therefore, no formal evaluation of the progress towards the achievement of Aichi Targets has been carried out in Slovakia up to date. However, based on quantitative data provided in Part 1 of this report, we can make the following conclusions with respect to some Aichi Targets:

Aichi Target 5: The area of forests has been increasing in Slovakia; however, the proportion of forests (trees) showing signs of poor health has increased, too. Likewise, there appears to be a large proportion of sites in inadequate condition for most types of biotopes, with no/little progress within the last decade.

Aichi Target 8: Slovakia has met its obligations for the reduction of air pollution under international conventions. Further improvement is required with regards to the pollution of aquatic ecosystems.

Aichi Target 10: Slovakia has reduced its emissions of greenhouse gases below the level of its international commitments under the Kyoto Protocol. In addition, the stores of organic carbon in forest ecosystems have increased in the past 20 years.

Aichi Target 11: Slovakia has met the target with respect to terrestrial ecosystems, as over 25% of the area of the country has been protected by law. However, the protection of some protected areas, including some national parks, in practice is insufficient and does not comply with international standards. More progress needs to be done in the protection of inland waters

Aichi Target 16: Slovakia has taken steps towards the accession to the Nagoya Protocol.

Aichi Target 17: Slovakia has adopted a National Strategy and an Action Plan for the implementation of the CBD and achieving Aichi Targets.

Although Slovakia did not have an Action Plan for the protection of biodiversity in place in the period of 2010 – 2014, activities reported in the present and previous National Reports to

the CBD continued as part of obligations under the national legislation, EU legislation or other international agreements Slovakia has been a Party to (although, these activities were not necessarily targeted to meet the Aichi Targets). In addition to activities and tasks included in the Updated Action Plan (2002), this included the adoption of new concepts and methodologies, which can be demonstrated on the example of the work undertaken in the field of ecosystem services:

The mapping and assessment of ecosystem services had not been included in the Updated Action Plan (2002) as its adoption had preceded the adoption of the Aichi Targets and consequent EU legislation. However, under the EU Biodiversity Strategy to 2020, member states are required to Improve knowledge of ecosystems and their services in the EU (Action 5 under Target 2), in particular *„map and assess the state of ecosystems and their services in their national territory by 2014, assess the economic value of such services, and promote the integration of these values into accounting and reporting systems at EU and national level by 2020“*. Therefore, a formal expert group for the mapping and the assessment of ecosystem services in Slovakia (MAES – SK) has been established in 2014. In addition, assessments of ecosystem services for selected ecosystems had been performed in four national parks – Slovenský raj, Tatra, Veľká Fatra and Muránska planina – before the establishment of the expert group, as independent initiatives. Slovakia is committed to finalize the pilot phase of MAES – SK by the end of 2014. With respect to ecosystem services and their integration into the national accounting system, the new Action Plan (2014) contains the following commitments:

**Table 16 Tasks related to ecosystem services included in the Action Plan for the Implementation of the Updated National Strategy for Biodiversity to 2020**

Task	Target year
Develop a catalogue of ecosystem services focusing on services provided by protected areas	2015
Develop a methodology for the assessment of ecosystem services and implement it in model areas (pilot projects)	2016
Assess ecosystem services in Slovakia (outside of model areas)	2018
Prepare a national report on the state of ecosystems, create an online Internet portal on ecosystems, organize exhibits on ecosystem services for the public	2019
Develop a methodology on the quantification of the value of ecosystem services	2016
Propose a system of payments for ecosystem services	2016
Conduct case studies on the evaluation of ecosystem services, focusing on protected areas	2020
Re-evaluate the social value of biotopes of European and national importance based on the economic evaluation of ecosystem services	2016

## ***Part 4      Abbreviations***

ČMS – Partial Monitoring System

NLC – National Forest Management Centre

SHMÚ – Slovak Hydro-Meteorological Institute

SIŽP – Slovak Environment Inspection

ŠOP SR – State Nature Conservancy of the Slovak Republic

ŠÚ SR – Statistical Office of the Slovak Republic

ÚGKK SR – Geography, Cartography and Cadastre Authority of the Slovak Republic

ÚKSUP – Central Controlling and Testing Institute in Agriculture

VÚVH – Water Research Institute