Ministry of Agriculture and Rural Development of the Slovak Republic
National Forest Centre

REPORT ON THE FOREST SECTOR OF THE SLOVAK REPUBLIC 2016

GREEN REPORT

MINISTRY
OF AGRICULTURE
AND RURAL DEVELOPMENT
OF THE SLOVAK REPUBLIC

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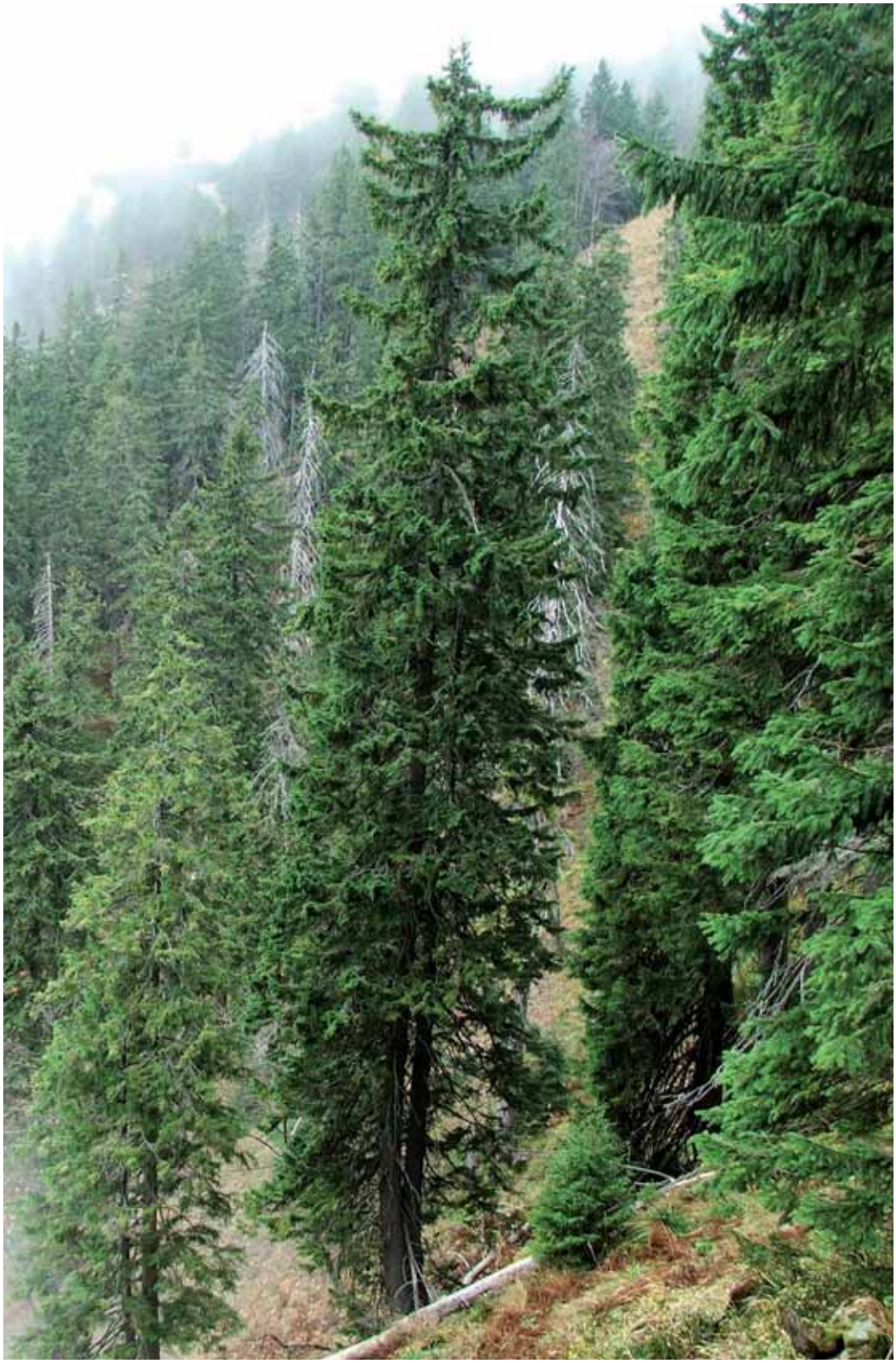


Dear Ladies and Gentlemen, Dear Colleagues,

It is my privilege to present this report to all forest and nature lovers and enthusiasts who deeply care for and are concerned about the future of forests. The report provides basic information on the management of forests in Slovakia in 2016.

What is a year in the life of a forest? It is barely a tiny fraction of its long life, during which it often outlives generations of people including its „fathers" and „carers," and provides a plethora of benefits including wood. Its years of growth recorded in the chronicle of its rings. Forests, however, can give so much more to man if they are looked after with love. I am not an advocate of the theory that all that nature does, it does well, and that therefore there is no need to help forests to grow into their best. Why do some of our fellow citizens not learn from the wealth of experience of our ancestors and why does this experience not connect with everyday reality and the latest results of research and forestry practice experience? Forests should meet the needs of human society whilst ensuring production sustainability and the ecological stability of forest ecosystems.

We must not forget that the forest also provides the benefits that each of us takes for granted. Forests provide many irreplaceable goods and services, the range and quality of which are closely related to the conservation of biological diversity. Numerous expectations of society would not be met should forest owners, managers and foresters not manage forests systematically. Forests maintain air quality, ensure stable climate and water purification. They also limit flooding and erosion and provide ample space and opportunities for recreation. At present, there is a high demand for ecosystem services and thus forest owners and managing enterprises should rightly be fairly rewarded for their provision.

It goes without saying that the forests are trees and that the trees provide wood. In 2016, Slovak forests sourced 9.32 million m^3 of raw timber. From the data presented in the report it is evident that timber production has been increasing in the long term. This increase in felling volumes is mainly due to the occurrence of unpredictable calamitous events for which one cannot plan. It is important to realise that calamity is not a normal condition - it is always a type of disaster, accident or natural disturbance with dire consequences which demand immediate attention and solutions. A detailed analysis of the timber production potential of Slovak forests clearly shows that the current age structure of forests results in a continual growth of available growing stock which in return increases felling volumes. This is especially true for older forests over 70 years of age, the area of which is disproportionately high. Despite these facts, the actual felling is lower than the annually accrued total current increment and thus the growing stock is continually increasing.

In 2016, forest managing enterprises supplied the domestic timber market with approximately 8.8 million m³ of timber (including their own consumption). Compared to 2015, the volume was 256 thousand m³ higher. Softwood supplies in particular were higher by approximately 505 thousand m³. Supplies of hardwood, on the contrary, decreased by about 249 thousand m³.

What forest owners and forest managing enterprises take from forests they must also return. In 2016, forest regeneration was carried out on a total area of 18,060 ha. Compared to 2015, the area of regenerated forest increased by 2,159 ha. The increase was chiefly the result of successful regeneration of calamitous areas.

The main goal of forest owners, foresters and managing enterprises is to exploit natural regeneration whenever possible and manage forests using close-to-nature practices. Last year, 7,133 ha of forest regenerated naturally, which was 4% more than in 2015. Still, 60.5% of forest in need of regeneration was regenerated artificially, but its rate is steadily decreasing. Since forestry is based on a long production cycle, whoever established the forest rarely sees it mature to its full fruition. Nevertheless, without the selfless efforts of generations of foresters the world would not be the same. Regenerating forests to ensure their perpetuity is one of the main missions and responsibilities of foresters.

The basic prerequisite for artificial regeneration of any forest is the sufficient stock of suitable seed material, especially of domestic origin. The total area of forest nurseries and their production plots remained unchanged in 2016 when compared to 2015. The production plots cover 361 ha. In total, approximately 234 million seedlings were produced in 2016.

Forests also need to be protected from the impact of various negative factors. In 2016, foresters implemented protective measures in high risk forests which were affected by bark beetle outbreaks, in particular the European spruce bark beetle. These measures helped to reduce both the severity and scale of these outbreaks. The measures implemented were compliant with the enforced generally binding legal regulations.

I have nothing but a great respect and admiration for those who work with the public, children in particular. In 2016, forestry organisations introduced a range of new programmes for kindergartens. At the same time, numerous excursions, lectures and forest walks were organised for more than 30,000 children. Children are a mirror of us, their parents and teachers, but also those who support their education and after school activities. I must pay tribute to all parents and teachers who support children to learn more about forests, their life and growth.

Without research and further development, forestry like any other industry could not further progress. The year 2016 saw the continuation of the implementation of the activities of the National Forest Programme 2014-2020 Action Plan and the Action Plan of the National Programme on the Utilization of Available Timber Resource. Implemented activities also included measures addressing current issues and thus having the potential to positively influence the development of both forest and wood-processing sectors in Slovakia.

Finally, I would like to thank all forest owners, managers, foresters and organisations under the auspices of the Ministry for Agriculture and Rural Development of the Slovak Republic for their work done in 2016. I would like to wish all of you many enjoyable days working in and caring for our forests. Likewise, I would like to encourage a general climate of understanding among all who love forests and nature. Last but not least, I would like to encourage all forest managing enterprises and owners to manage forests in accordance with best management practices to avoid activities that may generate criticism from some citizens and their groups.

Gabriela MATEČNÁ

Minister of Agriculture and Rural Development

CONTENTS

1 INTRODUCTION

The area of forest holdings in Slovakia reached 2,016,729 ha in 2016 of which forest crop land represented 1,944,123 ha. The forest cover was 41.1%. In terms of tree species composition, broadleaved species (62.5%) outnumbered coniferous species (37.5%). The most abundant tree species included beech (33.5%), spruce (23.1%), English and sessile oaks (10.6%) and pine (6.8%). The growing stock totalled 480.65 million m^3 of timber inside bark which was an increase of 2.53 million m^3 compared to 2015. The average stock was 248 m^3/ha of forest crop land.

Weed control measures were employed on almost 44,000 ha while preventive measures against game were implemented on 38,600 ha. Cleaning operations were performed on 30,729 ha. Compared to 2015, the volume of cleaning, weed control and anti-game measures marginally decreased, but the positive trend observed in previous years remained largely unchanged.

The volume of felling reached 9.32 million m^3 in 2016. It was 0.8% more than in 2015 (9.25 million m^3), but 1% less than in 2014 (9.42 million m^3). The volume of incidental felling was 4.69 million m^3 which represented 50.3% of the total felling. As for the tree species, conifers accounted for 55.2% of the felled timber of which 85% derived from incidental felling. The enterprises of the Forests of the Slovak Republic, s.e. felled 4.88 million m^3 (52.4%) of timber; the remaining volume being felled in non-state forests. The total area of regenerated forest reached 18,060 ha in 2016 of which natural processes accounted for 7,133 ha, or 39.5%. Compared to 2015, the area of naturally regenerated forest increased by 4%.

In 2016, total domestic timber supply reached 8,867,500 m^3 (including own consumption). Compared to 2015, supplies of timber to domestic market increased by 256,500 m^3. The increase was chiefly owing to a larger supply of softwood (505,000 m^3), whilst hardwood supplies fell by 249,000 m^3. Proceeds from timber represent the most important source of earnings and revenue in the forest sector. In 2016, earnings from trading timber reached €433.15 million which represented 85.2% of the total sectoral earnings and revenue.

The 2016 economic result came to €44.76 million which almost equalled the 2015 result (€44.8 million), but it represented a €7.2 million fall compared to 2014. Economic result was negatively impacted by falling average timber prices. Since 2012, average prices have been steadily decreasing to reach €46.74 in 2016, a fall of €1.6 compared to 2012.

In 2016, the sector contributed taxes to the national and municipal budgets totalling €52.87 million. The highest share of paid taxes was attributed to value added tax (€29.5 million), which represented 55.9% of all taxes paid, and income tax which contributed 26.5% (€14 million).

In 2016, the state owned 772,232 ha of forest crop land (39.7%), of which state forest enterprises managed 1,032,447 ha (53.1%). Ownership rights related to forest holdings have yet to be fully restored. In the majority of cases, forest holdings of individual owners and those in shared ownership with unclear forest borders are those pending restoration of lawful ownership rights.

Basic national and sectoral macro-economic indicators, including the overview of most important forest sector indicators in 2016 are given in Tables 1-1 and 1-2.

The value of gross domestic product (GDP) of forest sector given in current prices of 2016 came to €0.27 billion, representing a 3.6% decrease from the previous year. Sectoral GDP constituted 0.33% of national GDP. Investments into forest estate and production operations totalled €61 million, representing a 56.4% increase from the previous year. At a national level, the percentage of sectoral investment grew from 0.21 to 0.37% of national investment.

The sectoral workforce remained largely unchanged. In the near future, economic growth is predicted to follow the trend set in the previous year and thus we can expect stimulating macro-economic conditions benefiting the forest sector.

Table 1-1 Key macroeconomic indicators by country and forest sector (FS) SR

Indicator	Unit	Year				
		2010	2013	2014	2015	2016
GDP in current prices[3)]	billion €	67.39	73.84	75.56	78.07	80.96
of which forest sector		0.22	0.28	0.31	0.28	0.27
GDP growth	%	5.6	2.0	2.3	3.3	2.9
Investments in current prices[3)]	million €	14 910	15 292	15 766	17 969	16 332
of which forest sector		32	24	37	39	61
Workforce (employees)	1000 persons	2 170	2 192	2 223	2 267	2 321
of which forest sector		9[1)]	10[1)]	10[1)]	10[1)]	10[1)]
Average monthly earnings	€	769	824	858	883	912
of which forest sector		676	907[2)]	958[2)]	996[2)]	1 004[2)]
Workforce productivity out of the added value		27 543	29 958	30 799	29 099	31 423
of which forest sector		19 693	29 797	34 463	34 953	33 783

Source: Statistical Office of SR – Slovstat databases; National Bank of Slovakia; NFC-FRI Zvolen.

Notes: GDP was calculated using the production approach; GDP of FS does not include the added value of forestry services sector as not all necessary data were available.

[1)] Some 9000 persons were employed in non-state forestry enterprises and suppliers as self-employed.

[2)] Includes mainly technicians and administrative staff of forest enterprises, it does not include average earnings of employees of the suppliers.

[3)] 2016 data are preliminary

Table 1-2 Key indicators of forest sector in the Slovak republic

Indicator	Unit	Year				
		2010	2013	2014	2015	2016
Profit	1000 €	18 109	31 533	51 619	44 723	44 728
Funding from public sources		40 136	15 400	17 386	55 413	24 375
Immediate costs of silviculture		43 898	42 351	46 632	56 484	54 501
Total felling	1000 m^3	9 860	7 947	9 417	9 142	9 321
Total timber supply		9 599	7 955	9 168	8 995	9 267
Average timber prices	€.m^{-3}	39.40	48.36	47.44	47.03	46.74
Forest area	1000 ha	2 010.8	2 013.4	2 014.3	2 014.7	2 016.7

Source: NFC-FRI Zvolen; Prepared by: NFC-FRI Zvolen

2 FOREST CONDITION AND ITS CHANGES

2.1 FOREST AREA

The area of forest holdings in 2016 reached 2,016,729 ha, of which the area of forest crop land (forest stands) accounted for 1,944,123 ha.

Table 2.1 Trends in forest land area and forest crop land (forest stands)

Type	Year						
	1980	1990	2000	2005	2010	2015	2016
	Area (ha)						
Forest	1 952 656	1 976 538	1 997 961	2 006 172	2 010 817	2 014 731	2 016 729
Forest crop	1 861 642	1 921 705	1 921 414	1 931 645	1 938 904	1 942 567	1 944 123

Source: NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 1980 – 2017.

The long-term increase in the forest area further continues. In the last 10 years, the area of forest crop land increased by more than 11,000 ha. Forest cover, estimated as a percentage of forest land from the total country area, reached 41.1% in 2016.

In addition to forests on forest land, there is also a certain percentage of farming land and other land covered by forest (so-called „white plots“). Based on the preliminary results of the 2nd cycle of the National Forest Inventory and Monitoring (NFIM SR 2015-2016), the area of forest on farming/other land is estimated to be 288 ± 27 thousand ha. If this area was added to the official forest cover, the actual cover would be 45.1 ± 1%. The management of forests on non-forest land is not regulated by sectoral laws, but is subject to the provisions of §47 of the Act No. 543/2002 Coll. on nature and landscape protection.

2.2 FOREST STRUCTURE

Owing to a great diversity of natural conditions and habitats, Slovak forests are very diverse in terms of their tree species composition, spatial arrangements and age structure

Tree species composition

The most abundant tree species include European beech (33.5%), Norway spruce (23.1%) and English/sessile oak (10.6%). Broadleaved species with 62.5% prevail over coniferous species.

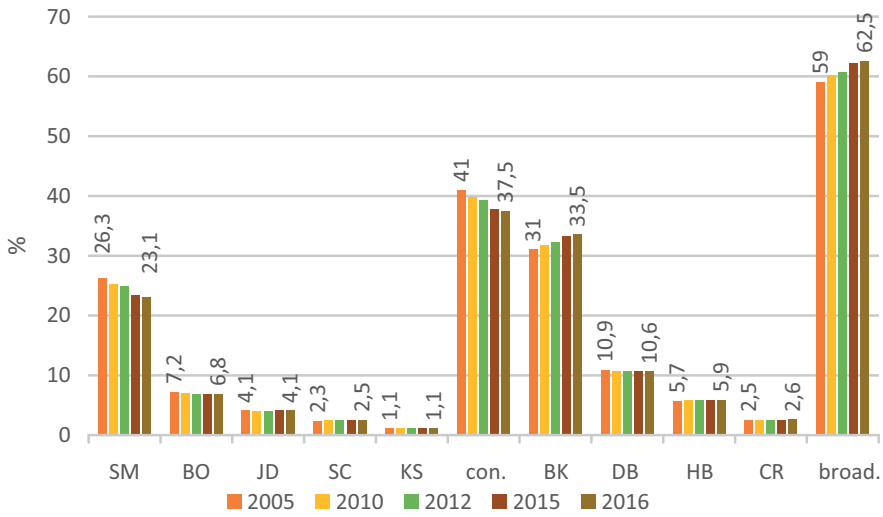


Figure 2.2-1 Trends in main tree species proportion in Slovak forests (%)

Source: NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 2005 – 2017.

Key: SM – Norway spruce, BO – Scots pine, JD – silver fir, SC – European larch, KS – dwarf pine, BK – European beech, DB – English and sessile oaks, HB – hornbeam, CR – Turkey oak, con. – coniferous, broad. – broadleaves

The percentage of coniferous tree species is declining; since 2005, their presence fell from 41% to 37.5%. This trend is most apparent for spruce, the percentage of which has fallen from 26.3% to 23.1% (3.2%) in the last decade due to the detrimental impact of harmful agents. Observed increase in the percentage of broadleaved species is seen as positive, especially in relation to improved forest stability. Since 2005, beech presence has increased by 2.5% whilst the presence of noble hardwoods (sycamore, maple and ash) increased from 3.3% to over 4%.

Spatial structure

The spatial structure is assessed using stocking as its main indicator. This indicator determines a relative level of forest density (cover of forest stand area and its production space by trees). Maintenance of the optimum stocking is crucial for both forest production and delivery of multiple environmental services. The average stocking level is 0.82, an increase of 0.02 compared to 2010.

From a viewpoint of vertical spatial structure, Slovak forests are divided into single-, two- and multi-storey stands. The most common are single-storey stands (76%). Two-storey stands account for 20.4% whilst multi-storey stands represent only 3.6% of all stands. The preliminary results from the 2nd cycle of the National Forest Inventory and Monitoring (NFIM SR 2015-2016) indicate a higher percentage of forests with a desired multi-storey structure.

Age structure

Sustainable and balanced timber production, delivery of other forest services and stable economic conditions for continual forest production cannot be secured unless the age structure of available forest resource is favourable and particular age classes are roughly evenly represented.

The actual age structure of forest is compared with a so-called normal distribution of age classes (one age class spans over 10 years). The actual age structure differs from the normal (ideal/optimal) structure. At present, the area of forest in age classes 1, 8, 9, 14 and 15+ is abnormally high. Younger forests of 11-70 years (2nd-7th age class) are, conversely, under-represented. The normal area of particular age classes is in the 10th -13th age classes (mature forest stands of 91-130 years of age).

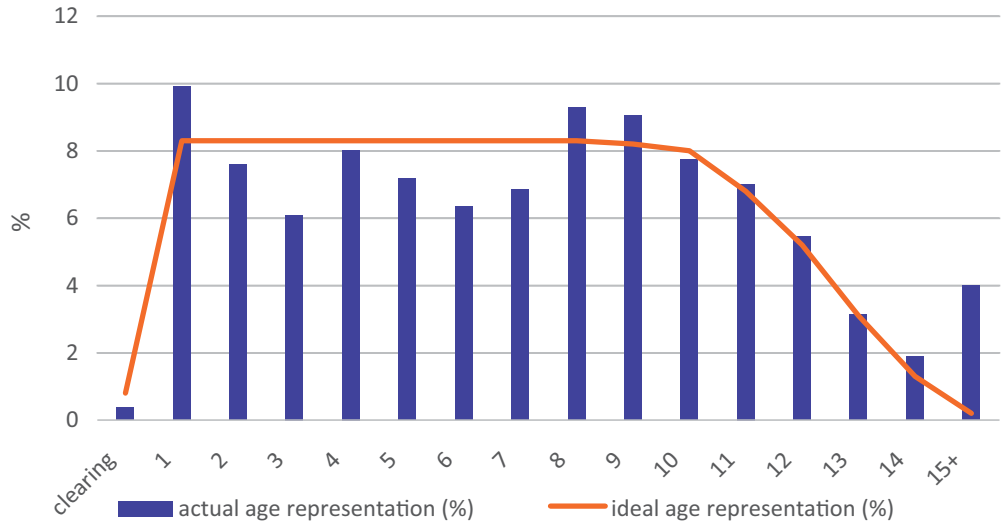


Figure 2.2-2 Proportion of age classes – actual and normal (ideal)

Source: NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 2017.

Abnormally large area of age classes 8, 9 and 14 together with almost normal (ideal/optimal) area of other mature stands predicts large volumes of regeneration felling for the coming decades. A large area of the 1st age class (young forest stands up to 10 years old) results from over-felling (particularly from 2004 onwards) caused by a high volume of incidental (unplanned) felling followed by forest regeneration. The majority of forests in the 15th and older age classes are protection forests and forests protected for their conservation value.

Figure 2.2-3 illustrates the shifts in the area of forest in particular age classes since 1970. It clearly shows an increase in the area of forest stands over 70 years of age and a decrease in the area of younger forest stands, except for the 1st age class, the area of which has been steadily increasing.

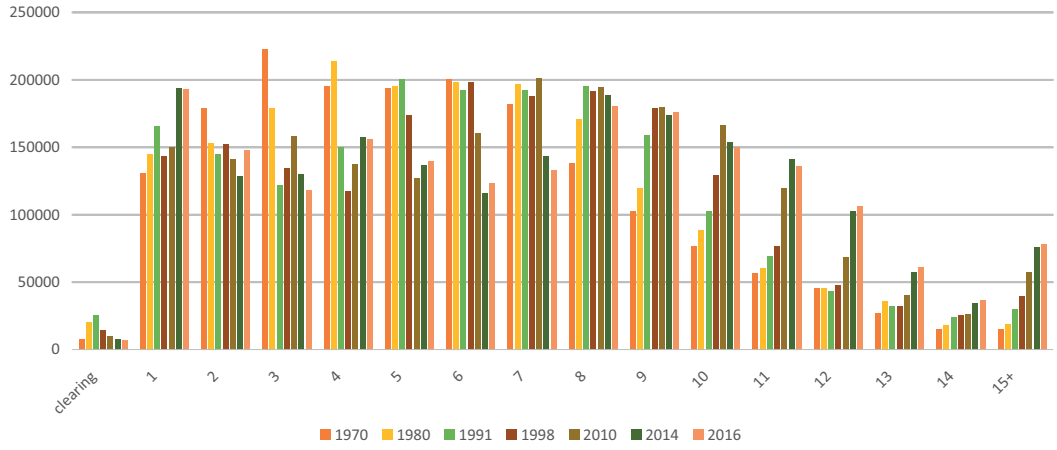


Figure 2.2-3 Forest crop area by age classes from 1970 onwards

The average age of all main tree species except for spruce is increasing. The average age of spruce stands is decreasing due to frequent natural disturbances, especially in older spruce forests.

Table 2.2 Trends in average age of main tree species

Year	Average age								
	SM	JD	BO	SC	DB	BK	HB	JV	JS
2016	65.6	77.7	72.4	55.2	85.7	73.5	68.9	56.6	64.0
2010	68.3	77.6	66.0	49.8	78.4	71.6	64.4	51.8	54.8
2000	66.2	76.1	60.8	44.9	72.1	70.1	62.5	51.7	51.8

Source: NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 2000-2012
Prepared by: NFC-FRI Zvolen

Key: SM – Norway spruce, JD – silver fir, BO – Scots pine, SC – European larch, DB – English and sessile oaks, BK – European beech, HB – hornbeam, JV – maple, JS – ash

2.3 GROWING STOCK

Recent age structure figures confirm a gradual increase in the growing stock of Slovak forests. In 2016, this reached 480.65 million m^3 of timber inside bark. The average stock per hectare was 248 m^3. The increase in the total growing stock has also been confirmed by the results of the 2nd cycle of the National Forest Inventory and Monitoring (NFIM SR) which shows an increase of 7.5% per hectare of forest in a 10-year period. Data released in the Compendium of Slovak Forestry Statistics give an increase of 7.4% (from 231 m^3 in 2006 to 248 m^3 in 2016).

The growing stock of broadleaved species is increasing. It reached 278.7 million m^3 in 2016, an increase of 19.1% on 2006 figures.Conversely, the stock of coniferous species has been falling since 2010 as a result of frequent natural disturbances in coniferous forests (spruce in particular). The coniferous stock fell by 3.7% in 10 years.

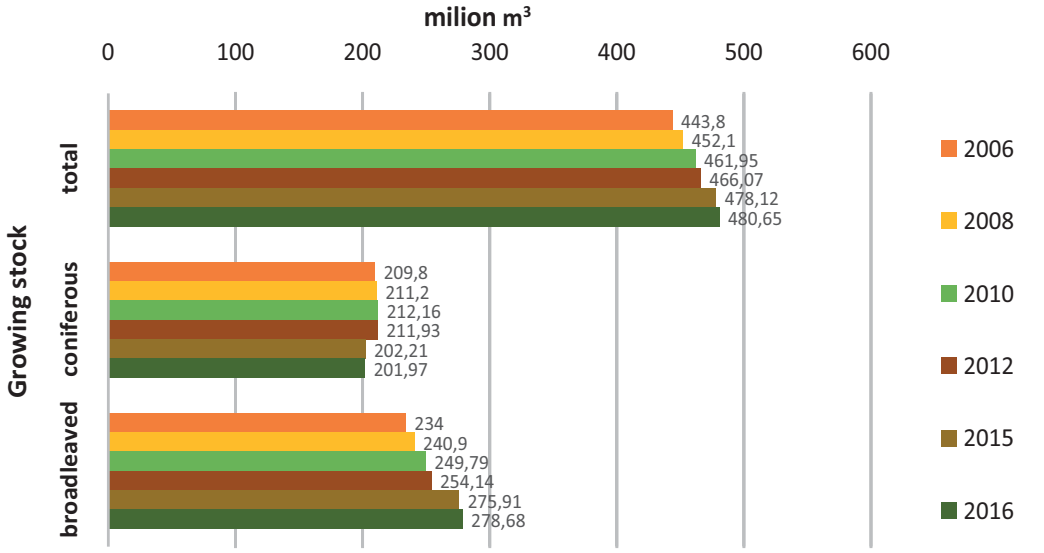


Figure 2.3-1 Growing stock in total and by main groups of tree species (conifers, broadleaves)

Source: NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 2017

Figure 2.3-2 illustrates trends in growing stock from 1970 onwards. It clearly shows a gradual increase in the volume of growing stock in higher age classes (mature stands) which directly translates into higher volumes of regeneration felling for the present and following few decades

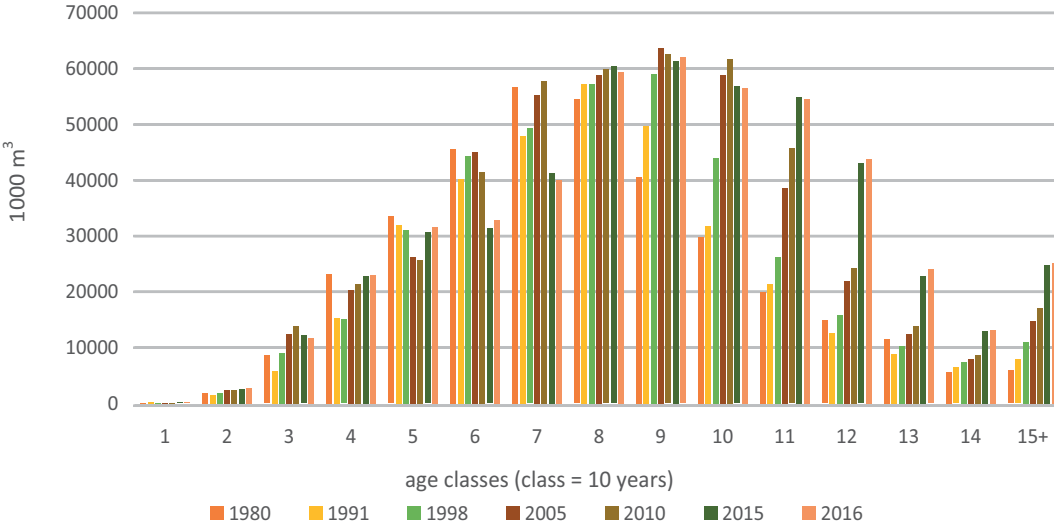


Figure 2.3-2 Growing stock by age classes

NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 1971 – 2017

The increase is also apparent in the volume of total current increment (TCI) which in 2016 reached 12.1 million m³ (6.3 m³/ha of forest crop land).

3 HARMFUL AGENTS AND FOREST HEALTH

3.1 ABIOTIC AGENTS

In 2016, an estimated 1.4 million m³ of timber was damaged by various abiotic agents including wind, snow, rime and drought. Of this volume, 785,000 m³ came from coniferous forests with spruce being the most affected (580,000 m³). Beech (512,000 m³) was the most affected broadleaved species. In addition, 122,000 m³ of timber was left behind in stands from the previous year. In 2016, 1.38 million m³ of timber was salvaged from damaged forests which was 10% below the 55-year average. The volume of unsalvaged timber stood at 175,000 m³.

Table 3.1 Abiotic agents

Agent	Volume of damaged timber (m³)			
	Volume to 1st January 2016	Increase in 2016	Removed in 2016	To be removed as of 31st December 2016
Wind	71 059	1 263 669	1 184 971	149 757
Drought and sunstroke	42 030	121 099	140 534	22 595
Snow	7 006	34 665	40 323	1 348
Flooding and waterlogging	30	2 791	1 986	835
Other	1 963	12 523	13 728	758
Total	**122 088**	**1 434 747**	**1 381 542**	**175 293**

Source: NFC; Forest Protection Service, 2017

The greatest proportion of calamitous timber was removed from the forests of Rožňava (136,000 m³), Revúca (124,000 m³), Rimavská Sobota (119,000 m³) and Poprad (83,000 m³) districts. In these four districts alone, 33% of the total calamitous timber was salvaged in the reported period (Figure 3.1).

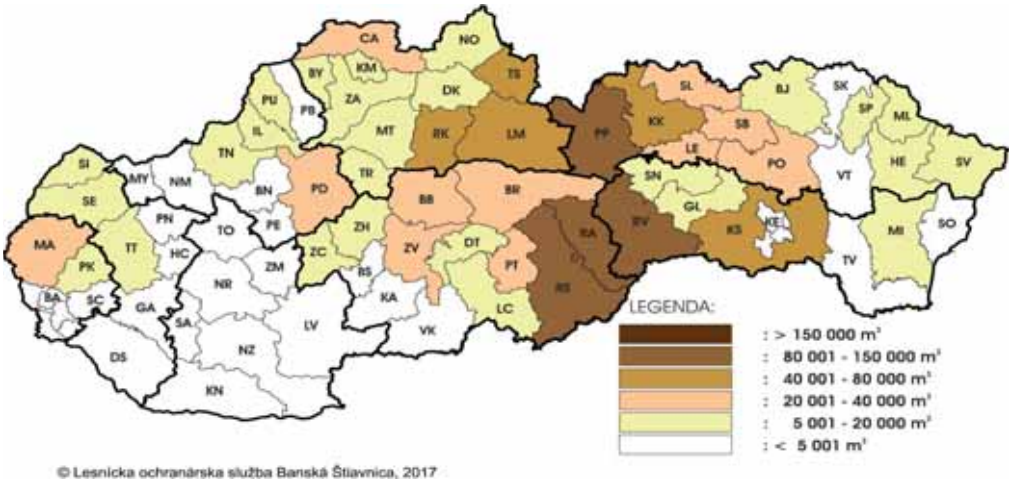


Figure 3.1 Forest damage by abiotic agents by district in 2016

3.2 BIOTIC AGENTS

In 2016, an estimated 3.2 million m³ of timber was damaged by various biotic agents. Of this total, bark beetle species alone were responsible for around 3 million m³ of damaged timber, of which 2.8 million m³ was damage caused by European spruce bark beetle, the most notorious pest in Slovak coniferous forests. The volume of calamitous timber was staggeringly 2.1 times higher than in 2015, chiefly due to extreme drought conditions throughout Central Europe. Three million m³ of damaged timber was removed from forests in 2016, another 376,000 m³ has yet to be removed.

Table 3.2 Bark beetle and wood-borer species

Species	Volume of damaged timber (m³)			
	Volume to 1st January 2016	Increase in 2016	Removed in 2016	To be removed as of 31st December 2016
European spruce bark beetle	26 501	2 811 623	2 726 376	111 748
Spruce wood engraver	4 104	18 014	20 194	1 924
Conifer ambrosia beetle	323	0	323	0
Fir bark beetles	272	3 408	3 334	346
Pine bark beetles	3 024	63 569	62 777	3 816
Large larch bark beetle	515	1 578	1 417	676
European oak bark beetle	2 206	917	1 110	2 013
Other bark beetles	266 514	108 354	225 874	148 994
Other animal pests	128 557	2 432	24 235	106 754
Total	**432 016**	**3 009 895**	**3 065 640**	**376 271**

Source: NFC; Forest Protection Service, 2017

The most affected districts were Brezno (349,000 m³ of calamitous timber was removed; 3.2 times higher volume compared to 2015), Rožňava (324,000 m³; 2.3 times higher), Poprad (256,000 m³; 4.2 times higher) and Liptovský Mikuláš (251,000 m³; 2.8 times higher).

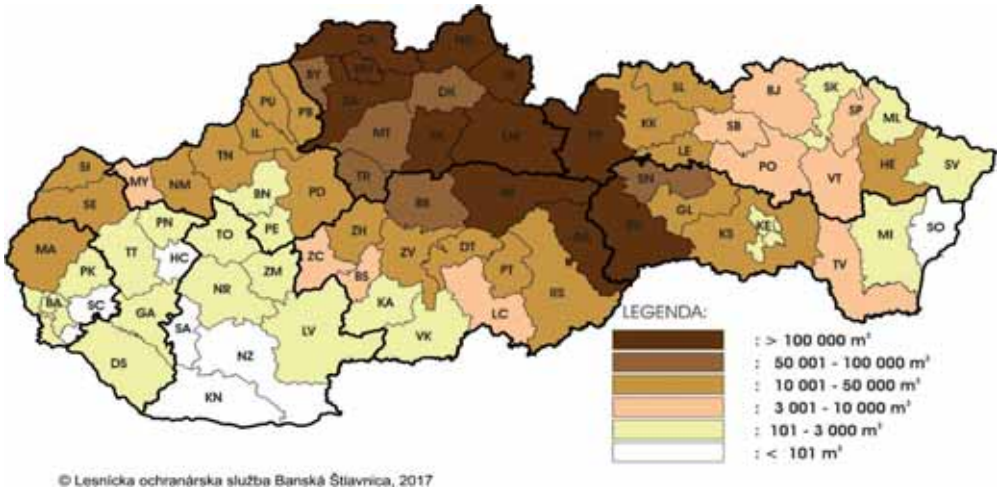


Figure 3.2 Forest damage by biotic agents by district in 2016

An increase in the occurrence of biotic agents was followed by a broader range of implemented protection and monitoring measures. To prevent the further spread of bark beetle, 33,000 trap trees were set up, a 1.4 times increase on 2015. In addition, 47,000 pheromone traps (a 1.1 times increase) were installed. Twelve thousand m^3 of calamitous timber (a 1.7 times increase on 2015) were debarked, a positive trend to follow. In 2016, 208,000 m^3 of timber was affected by phytopathogens, an almost 1.5 times increase compared to 2015. The increase was directly linked to forests being weakened by extreme drought in 2015. The most serious damage was caused by honey mushroom to which 65% of the phytopathogens affected timber was attributed. Coniferous tree species were subjected to significantly more attacks (85%) than broadleaved tree species.

Observed high numbers of ungulate species, red deer in particular, are highly undesirable because of extensive damage to forests and agricultural crops. Forest stands are most vulnerable to damage in their early stages when young growth can be completely destroyed by ungulates. Red deer populations most severely damage noble hardwoods (sycamore, maple and ash), but also oaks can be damaged in their early stages. Spruce is often damaged by browsing in small-pole and large-diameter stand stages.

In 2016, even-toed ungulates caused €1,376,000 worth of damage to forests and agricultural crops.

3.3 HUMAN FACTORS

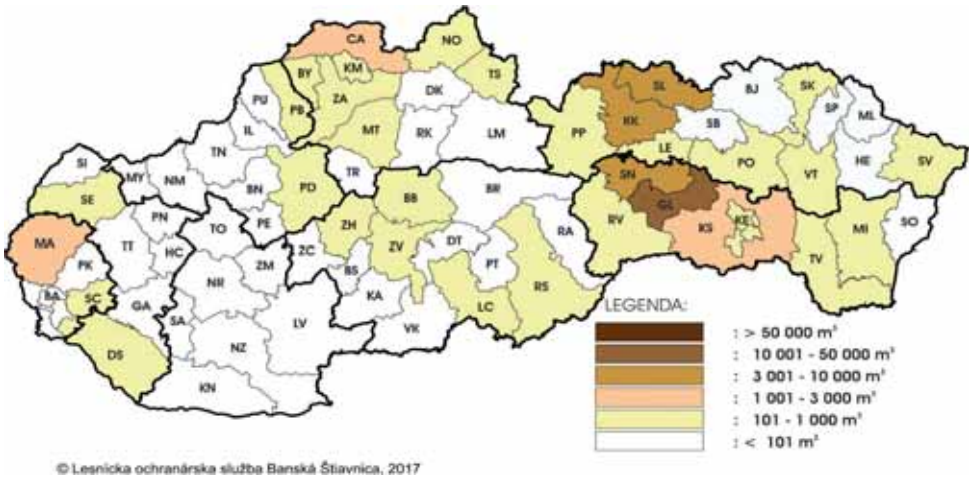
In 2016, these factors to varying degrees affected 45,000 m^3 of timber. When combined with the unsalvaged 2,000 m^3 from the previous year, the figure stood at 47,000 m^3, of which 45,000 m^3 was removed. The most significant human factors included air pollution (71%) and timber theft (18%). Primarily affected by this type of damage were coniferous tree species (87%).

Table 3.3 Anthropogenic factors

Factor	Volume of damaged timber (m^3)			
	Volume to 1st January 2016	Increase in 2016	Removed in 2016	To be removed as of 31st December 2016
Air pollution	1 420	32 191	32 270	1 341
Timber theft	0	8 293	8 293	0
Forest fires	0	2 363	1 931	432
Other anthropogenic	734	2 406	2 712	428
Total	**2 154**	**45 253**	**45 206**	**2 201**

Source: NFC; Forest Protection Service, 2017

The districts with the greatest volume of salvaged calamitous timber included Gelnica (15,000 m^3), Spišská Nová Ves (6,700 m^3) and Kežmarok (5,900 m^3).



3.3 Forest damage by anthropogenic factors by district in 2016

3.4 FOREST HEALTH

Forest health assessment is based on defoliation. In 2016, the largest percentage of trees (48.9%) was in the 1st defoliation class which includes trees with a limited loss of foliage ranging from 11 to 25%. Within this class, 50.8% of broadleaved species and 46.3% of coniferous species were included. The 2nd class (moderately defoliated trees with foliage loss of 25-60%) included 38.3% of trees, of which 35% were broadleaves and 43% conifers. No defoliation was reported in 10.8% of trees whilst 1.7% of trees suffered from a severe loss of foliage (61-99%). The number of dying/dead trees (100% foliage loss) reached 0.3%.

The health of coniferous species as a group and that of spruce and fir has been reported as continuously stable since 1996. This positive trend is mainly the result of implemented protection measures including the removal of trees invaded by bark beetle species. This trend has not, however, been observed in pine, the health of which has been in decline for some time. Based on the defoliation assessment, broadleaved species are in better health than coniferous species. Despite this fact, a dramatic decline in the health of beech and hornbeam has been observed since 2013. The health of oaks, conversely, has improved in the last two years.

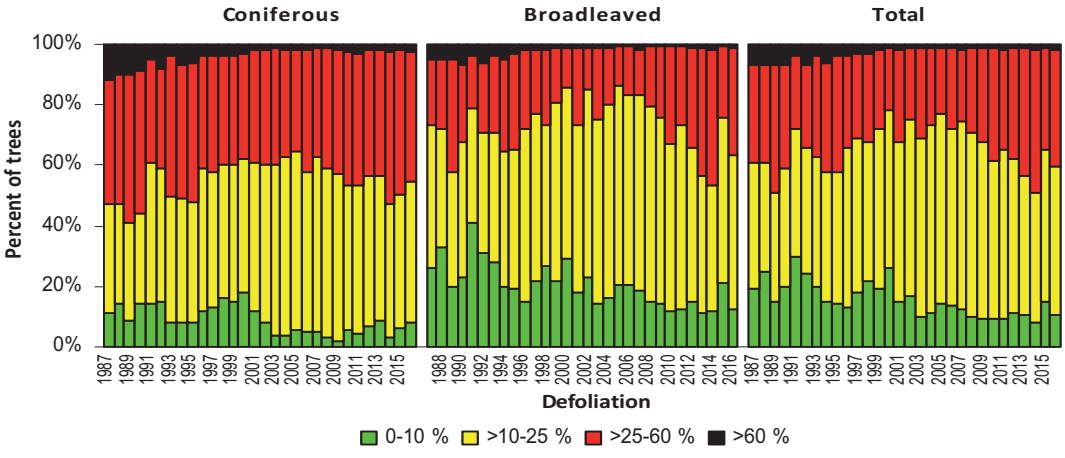


Figure 3.4 Defoliation classes

Source: NFC-FRI Zvolen; Monitoring of Slovak Forests. "ČMS Lesy report" 2016

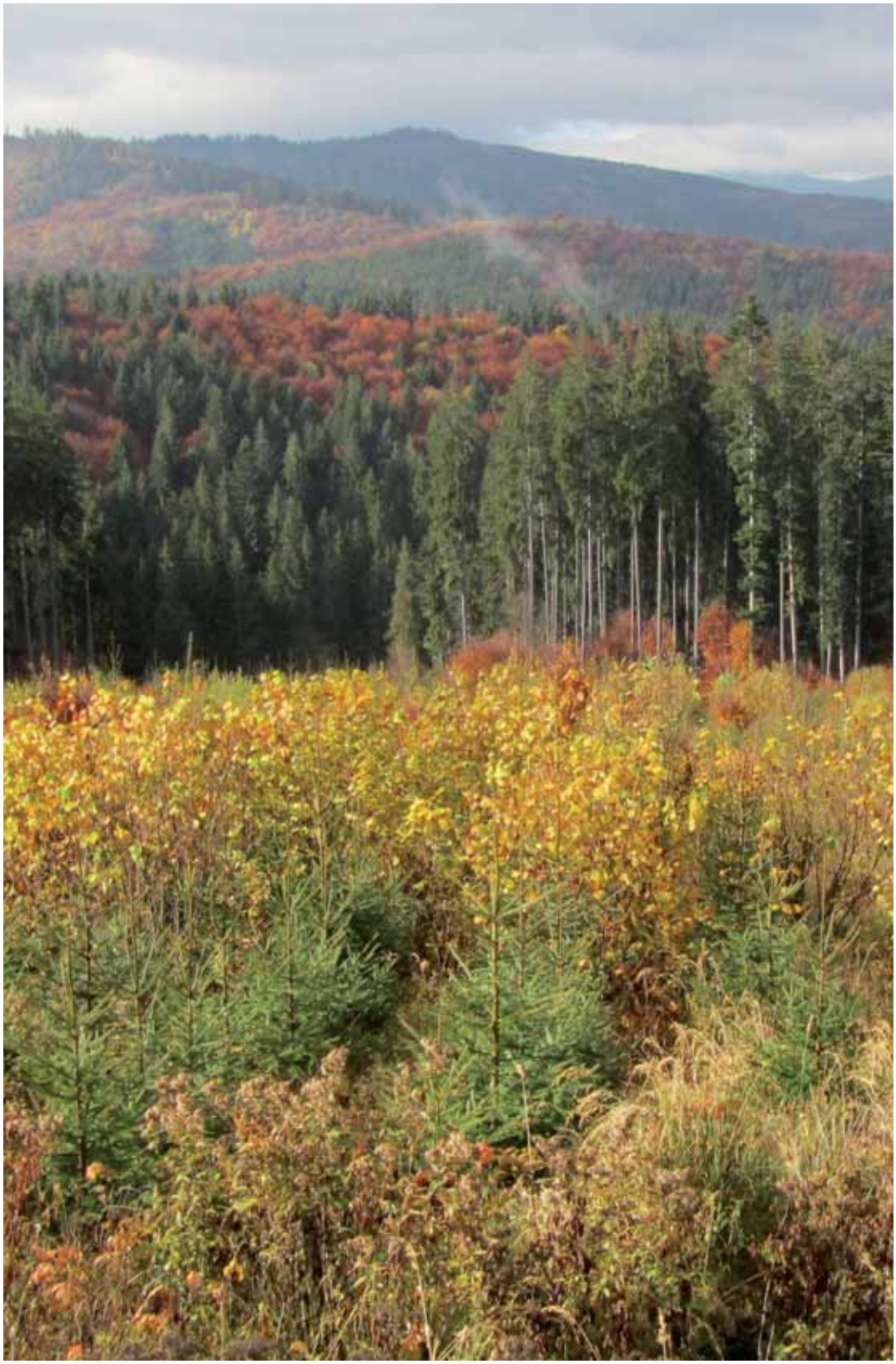
3.5 ASSESSMENT OF MEASURES IMPLEMENTED TO REDUCE FOREST HEALTH DECLINE

At present, the health and integrity of Slovak forests are most endangered by the aftermath of the windstorm Žofia from 15 May 2014, after which large volumes of calamitous timber were left in forests unsalvaged. The reasons why the timber was not promptly removed from affected stands were mostly related to restrictions imposed by the Act on Nature and Landscape Protection and extreme drought of the summer of 2015. The impact of the aforementioned factors was catastrophic - European spruce bark beetle damaged 2.3 times more trees than wind in 2016. European spruce bark beetle caused 2.1 times more damage in 2016 than all other bark beetle and wood-borer species in 2015.

To prevent a further decline of forests, in 2016 forest managing enterprises increased the number of pheromone traps and trap trees set up in damaged forests as well as the volume of debarking and removal operations following incidental felling (see Chapter 3.2). Despite all these efforts, the number of secondary harmful agents and damage caused by them are on the increase.

3.6 PROTECTION OF FORESTS AGAINST FIRE

In 2016, 136 forest fires were reported in Slovakia destroying 174.88 ha of forest with the total damage estimated at €96,665. One person was injured in the fires. The largest number of fires were reported from the districts of Čadca (11), Košice okolie/Poprad (9 each) and Malacky (8). The largest areas of fire-damaged forest were reported from the districts of Spišská Nová Ves (40 ha) Žarnovica (12.5 ha) and Malacky (12.4 ha). The most significant fire losses were reported from the districts of Žiar nad Hronom (€14,435), Stropkov (€9,900) and Rožňava (€9,250). The most common causes of forest fires included unknown causes (26), careless fire setting (23), and uncontrolled burning of grass and dry matter (21). The fires most commonly occurred in April (47), March (21), June/July (15 each), and August/September (10 each). The largest fire occurred in the Municipal Forests Krompachy on 24 March 2016. The fire destroyed 36 ha of broadleaved forest and surrounding grassland. The fire was caused by uncontrolled grass burning.



4 MANAGEMENT OF FOREST RESOURCES

4.1 FOREST CATEGORIES AND SERVICES PROVIDED BY FOREST ECOSYSTEMS

Given their primary functions, Slovak forests fall into three main categories: production, protection and special-purpose forests.

Most forests fall into the production category. Production forests cover 1,404,000 ha, or 72.2% of the total area of forest crop land. Their primary function is the production of high grade timber whilst still continuing to fulfill other important ecological and social functions, support for which is provided through integrated forest management. The percentage of production forests is higher in non-state forests (75.3%). In state forests, the percentage is 69.5.

Forests with primarily ecological functions are designated as protection forests. These forests are of high societal importance as they protect soils, water resources and infrastructure. Their area has been slowly increasing over the years and reached 335,200 ha (17.25%) in 2016. Their percentage is almost equal in both state (17%) and non-state (17.6%) forests.

Social and cultural functions are of primary importance in forests which, due to their specific societal or group benefits, have been designated as special-purpose forests.

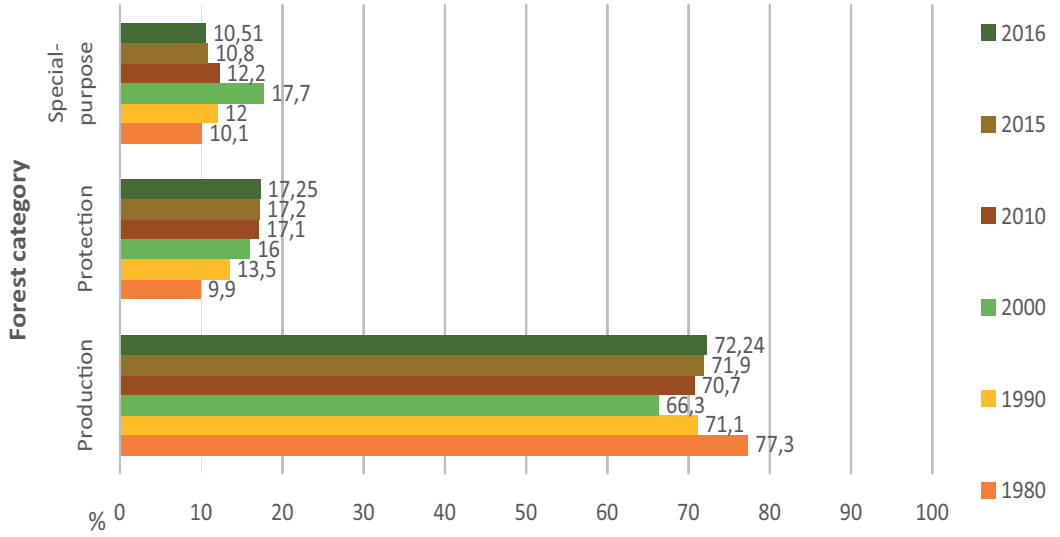


Figure 4.1 Forest categories (%)

Source: NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 1981 – 2017

These forests are under special (functionally differentiated) management with purposeful enhancement of one or more selected functions including water purification, recreation, nature conservation, spa & wellness, education & research, game husbandry, etc. The delivery of services and benefits associated with these functions to a large degree restricts standard management practices. The present area of these forests is 204,550 ha (10.5%). Their area has reduced since 2000, mainly due to the exclusion of the sub-category of air pollution damaged forests from this category, but also due to lower demand for the designation of these forests (they are designated based on the application for the duration of a particular forest management programme).

The proportion of special-purpose forests is higher in state forests (13.5%) than in non-state forests (7.1%). State forests are more often designated for defence reasons, protection of gene pool, hunting and nature conservation than non-state forests.

The present system of differentiated management of forests is no longer ideal despite having many undisputable advantages. It is necessary to review it using the newest trends in economics and funding support for various forest functions, especially with regard to payments for ecosystem services. A new model was drafted in 2016 which will form a basis for the framework mechanism providing forest owners with compensations for the delivery of ecosystem services to public.

4.2 GENE POOL AND REPRODUCTIVE MATERIAL

Sources of reproductive material

For artificial regeneration and afforestation, only approved forest reproductive material (FRM) originating from seed trees, approved forest stands, clones, seed orchards and other identified sources can be used. Upon meeting a specific set of criteria, seed stands can also be considered.

The most common designated source of FRM are approved forest stands. Their total area is currently 75,779 ha, an increase of 8,971.5 ha compared to 2015, chiefly due to the measures implemented by the Forests of the Slovak Republic, s.e. The area has increased for all main tree species.

To protect the gene pool of forest tree species, there were (at 31 December 2016) 115 gene reserves across a total area of 19,249 ha. In 2016, six new gene reserves were approved and five were reviewed for which new management guidelines were provided.

Table 4.2-1 Approved sources of forest reproductive material

Tree species	Approved stands	Gene reserves	Seed trees	Seed orchards		Seed stands	
	ha	ha	No	No	ha	NO	ha
Norway spruce	17 670	7 508	314	4	5,85	48	269,01
Silver fir	4 242	1 263	136	1	2,30	9	106,38
Scots pine	3 175	559	766	10	23,25	19	49,48
European larc	1 648	815	904	27	72,33	29	50,67
Other conifers	182	115	310	4	7,10	–	–
Oaks	11 364	2 106	503	1	1,00	10	58,04
European beech	35 287	6 355	37	–	–	14	183,50
Other broadleaves	2 211	528	1 443	11	10,20	1	1,00
Total	**75 779**	**19 249**	**4 413**	**58**	**122,03**	**130**	**718,08**

Source: NFC-FRI Zvolen; Updated to: 31 December 2016.

Forest seed stock

The 2016 collection season was marked by a low to medium seed crop for beech, Scots pine and fir. Zero to low seed crop was reported for oaks, spruce and larch. There is still a lack of available seed stock of beech for the vegetation zone (VZ) 2 and 6, oaks for the VZ 1 and 2, spruce for the VZ 6 and 7, and larch for the VZ 2.

Table 4.2-2 Collected seed crop and stock of forest tree species

Tree species	Collected seed	Seed stock		
		Total	In the National Forest Seed Bank	
			Basic stock	Operational stock
	kg			
Norway spruce	700	2 920	38,91	139,03
Silver fir	20 418	2 649	0	0
Scots pine	2 321	469	1,76	2.25
European larch	889	657	1.10	2.25
European beech	56 662	55 115	0	0
Oaks	98 892	27 402	0	0
Other	5 523	2 152	0	0

Source: NFC-FRI Zvolen; Forests of the Slovak Republic, s. e. Banská Bystrica; FE Semenoles Liptovský Hrádok; private producers

Seeds of forest tree species are primarily treated and stored by the Forest Enterprise (FE) Semenoles Liptovský Hrádok, a specialised seed unit of the Forests of the Slovak Republic, s.e. The Enterprise also stores seed stock of other state and non-state forest managing enterprises based on lease contracts.

The National Forest Seed Bank is managed by the National Forest Centre (NFC). In 2016, the Centre provided the Forests of the Slovak Republic, s.e. with 14.5 kg of spruce seed, 0.6 kg of Scots pine seed and 0.75 kg of larch seed from its operational stock to grow planting stock for gene reserves

Forest nurseries, production facilities and transplant production

The area of forest nurseries (361 ha) and their production plots remained unchanged since 2015. A marginal decrease was reported in the production of planting stock, the volume of which totalled 233.6 million pieces in 2016. The average number of transplants grown per hectare of the production plot was almost 647,000 pieces, a fall of 5,000 pieces compared to 2015.

Table 4.2-3 Forest nurseries and production facilities

Type	Central nursery	Nursery	Pollard nursery	Air-conditioned storage	Handling warehouse	Snow pit	Green house	PEK	Chilling box
Number	11	259	2	41	2	168	2	4	1

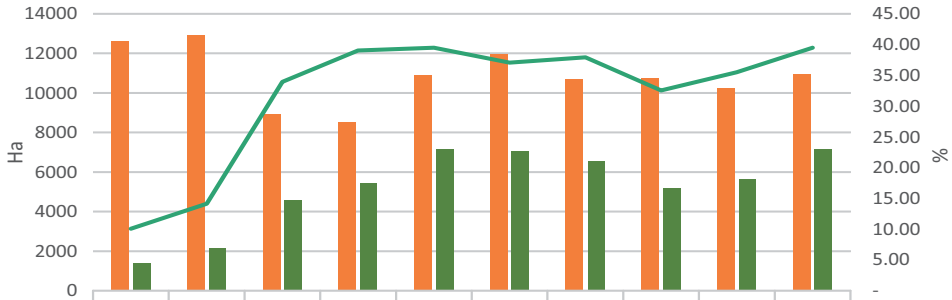
Source: NFC-FRI Zvolen; Updated to: 31 December 2016; Key: PEK – polythene-covered frames

4.3 SILVICULTURE

Forest regeneration

In 2016, the total area of regenerated forest reached 18,060 ha, a yearly increase of 2,159 ha, or 13.6%. The increase was chiefly a result of the regeneration of calamitous sites left behind by the windstorm Žofia (15 May 2014).

Natural regeneration was reported from 7,133 ha which represented 39.5% of the total area of regenerated forest (an increase of 4% compared to 2015). The rate of natural regeneration increased year on year in both state (from 40.1 to 45.6%) and non-state forests (31.0 to 33.9%). Tilling of the forest floor to encourage natural regeneration was implemented on 13,327 ha.



	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016
Artificial	12610	12920	8920	8520	10923	11964	10678	10751	10257	10927
Natural	1410	2130	4580	5460	7132	7047	6527	5183	5644	7133
% of natural	10.06	14.15	33.93	39.06	39.50	37.07	37.94	32.53	35.49	39.5

Figure 4.3-1 Forest regeneration

Source: NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 1996 – 2017

When assessing forest regeneration in the last decade using actual tree species composition and stocking in the 1st age class as given by the Compendium of Slovak Forestry Statistics, it showed a lower presence of fir, oak and partially also larch. More common are economically less important tree species (black locust, hornbeam, Turkey oak). Stocking in the 1st age class was 0.88. The growth and development of some tree species (noble hardwoods in particular) has been severely impacted by game damage.

Based on the preliminary results of NFIM SR 2015-2016, natural regeneration is more common than officially reported. The figure is underestimated in practice chiefly due to recording guidelines and the fact that it often appears only after the artificial afforestation of felled sites.

Treatment of young stands

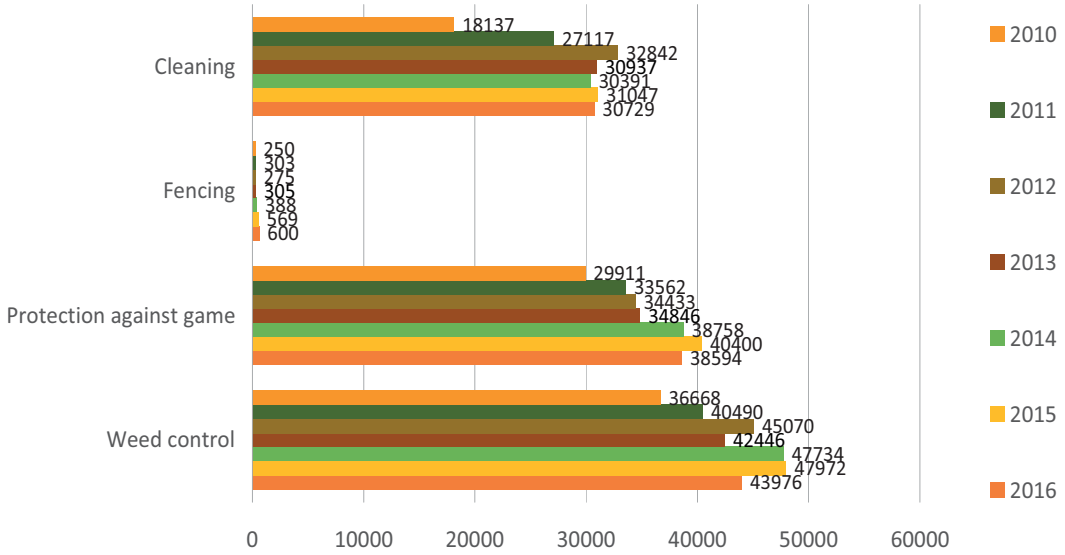


Figure 4.3-2 Treatment of young forests (ha)

Source: NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 2011 – 2017

Note: [1)]Annual proportion of cleaning area planned in forest management planes (FMPs)

Weed control measures were implemented on an area of almost 44,000 ha. Measures to limit game damage in young forests were performed on 38,600 ha. Compared to 2015, the volume of these measures slightly decreased; 4,000 ha less were weed controlled whilst 1,800 ha less were protected against game. As part of prevention measures, 600 ha of plantations were fenced off which was the largest area since 2010 (an increase of 350 ha). Positive trends in all major groups of measures applied in young forests observed from 2010 onwards continued in 2016 despite a minor decline in the volume of weed control and game protection measures compared to 2014-2015.

Cleaning and thinning

In 2016, cleaning operations were performed on an area of 30,729 ha, which was 111.8% of the planned volume. Compared to 2010, they were up by 69.4%. The higher than planned volume of cleaning operations is beneficial for the development of young stands as it encourages their vitality, resilience, site appropriate tree species composition, spatial structure and future timber quality.

Higher than planned volume of cleaning operations (reflecting genuine needs of young stands) has long been in place in state and municipal forests. In other categories of non-state forests, the actual volume of cleaning was lower than planned in 2016 including cleaning in community forests (86.6% of the planned volume), church forests (31.5%), agri co-op forests (27.5%), and private forests (26.7%).

In 2016, intermediate felling (thinning) was performed on an area of 42,071 ha (63.9% of the planned area). The volume of felled timber was 1,181,342 m^3 (68.5% of the planned volume). The difference in the volume of planned and realised felling was caused by the processing of incidental felling from intermediate forest stands damaged by natural disturbances and pests. For such reasons, planned felling can be abandoned either partially or fully

4.4 FELLING OPERATIONS

4.4.1 Timber felling

The total volume of timber felled in 2016 reached 9.32 million m^3. Compared to 2015, felling increased by 0.8%, but fell by 1% compared to 2014. Of the total felling, state forest enterprises felled 52.4%; the remaining 47.6% being felled by non-state enterprises. 55% of timber came from coniferous species, 45% from broadleaved species.

Table 4.4.1-1 Felling volumes in 2016

Forest ownership		Total felling[1)]		Of which realised incidental felling		Pending incidental felling[2)]	Incidental felling without timber remova[3)]
		m^3	%	m^3	%	m^3	m^3
State	Conifers	2 326 721	47.7	1 798 617	81.5	52 895	9 274
	Broadleaves	2 554 266	52.3	409 583	18.5	329	2 673
	Total	**4 880 987**	**100**	**2 208 200**	**100**	**53 224**	**11 947**
Non-state	Conifers	2 817 664	63.5	2 183 389	88.0	31 122	1 599
	Broadleaves	1 622 698	36.5	297 909	12.0	900	586
	Total	**4 440 362**	**100**	**2 481 298**	**100**	**32 022**	**2 185**
Total	Conifers	5 144 385	55.2	3 982 006	84.9	84 017	10 873
	Broadleaves	4 176 964	44.8	707 492	15.1	1 229	3 259
	Total	**9 321 349**	**100**	**4 689 498**	**100**	**85 246**	**14 132**

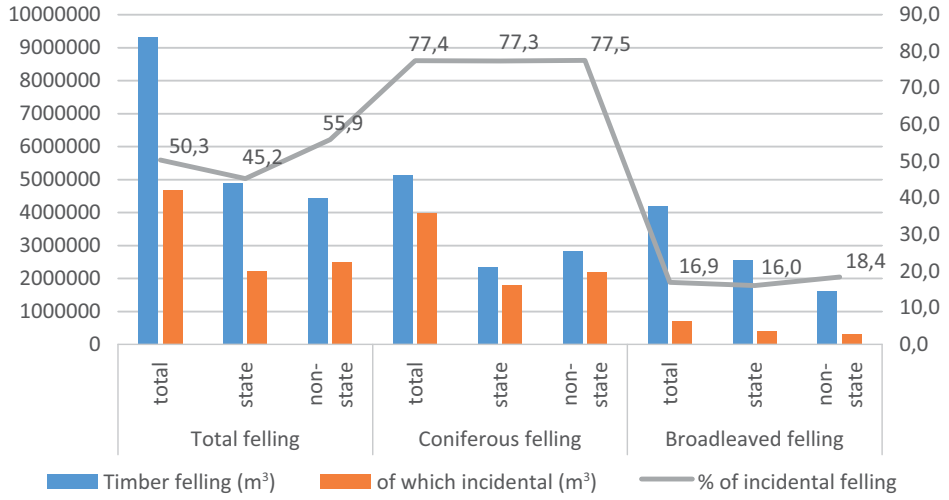


Figure 4.4.1-1 Actual felling and incidental (calamitous) felling in total and by main tree species and ownership groups

Source: NFC-IFRI Zvolen; Compendium of Slovak Forestry Statistics, 2017
Notes: [1)]Total felling as defined by § 22 Sec. 1 of the Act No 326/2005 Coll on forests; [2) 3)] Not included in the total felling following § 22 Sec. 1 of the Act No. 326/2005 Coll on forests

A high volume of incidental felling (4.69 million m³, or 50.3% of the total felling) was associated with the removal of calamitous timber from past natural disturbances in forests. Compared to 2014 and 2015, this felling decreased by 14.9% and 6.1% respectively. The majority of incidental felling was in coniferous forests (84.9% of the volume); the remaining 15.1% being felled in broadleaved forests..

Trends in timber felling

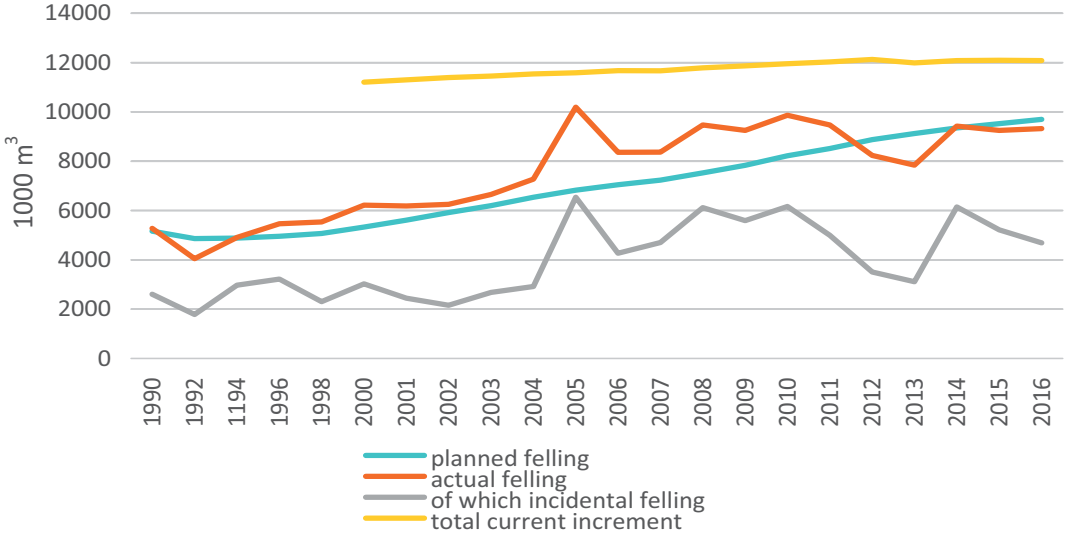


Figure 4.4.1-2 Trends in timber felling divided to planned, realised (actual), of which incidental, compared to total current increment

Source: NFC-FRI Zvolen; Compendium of Slovak Forestry Statistics, 2017

The actual felling in Slovakia has been increasing long-term. The annual share of incidental (calamitous) felling from the total felling has fluctuated from 42% to 65% since 1990 (from 1.8 million m^3 in 1992 to 6.5 million m^3 in 2005). This dramatic increase occurred after extensive damage to forests caused by windthrow Alžbeta (November 2004) which triggered mass outbreaks of bark beetle species in coniferous forests (spruce forests in particular).

Compared to the beginning of the 1990s, the volume of salvaged calamitous timber doubled or even tripled in some years following 2004. After a gradual decrease in the volume of incidental felling in 2013 to 3.11 million m^3, which was comparable to the period before 2005, the felling increased again in 2014 (6.14 million m^3) and 2015 (5.21 million m^3) following the catastrophic windstorm Žofia (15 May 2014).

As a result, the volume of incidental felling exceed the planned volume in some years - in 2005 (by almost 50%), 2008 (by over 25%) and in 2010 (by almost 20%).

Causes of increased felling

A detailed analysis of the production potential of Slovak forests indicates that the main factor behind increased felling capacity and consequent actual felling has been the current age structure of forests and their ever increasing growing stock, especially in more mature forests over 70 years of age (8th and above age classes). This is caused by a higher than normal area of forests in these age classes (Figures 2.2-2 and 2.2-3). These forests are mature and thus of felling age.

Figures 2.2-3 and 2.3-2, which illustrate the trends in forest area and total growing stock, clearly show the accumulation of a high volume of growing stock in the aforementioned age classes which continues to further grow. This fact confirms the increase of the actual felling potential in Slovak forests.

As a result, the volume of planned felling has gradually grown and reached 9.69 million m^3 in 2016. Over the last 20 years (compared to 1996), the planned felling almost doubled; it increased by 96%, or 4.74 million m^3 (Figure 4.4.1-2). In spite of these facts, realised felling is still lower when compared to the total current increment which represents the volume of timber annually accrued in forests. The total current increment was 12.1 million m^3 in 2016.

4.4.2 Forest accessibility

The total length of forest roads in 2016 was almost 37,700 km, of which 6,500 km were main paved forest roads (1L), 15,100 km were main partially paved forest roads (2L), 16,100 km were unpaved earth forest roads (3L) and permanent skidding roads. The density of these roads was 19.4 m/ha. Compared to 2015, the total length of forest roads increased by 65 km.

Since 2004, the EU public funding has provided support for construction and reconstruction of forest roads in the sum of €117.1 million. During this period, combined public and private funding increased the length of the forest road network by 614 km, increasing their density from 18.6 to 19.4 m/ha of forest land.

The optimal density of forest roads varies from 20 to 25 m/ha depending on the terrain. Currently available data suggest that the need to further extend the length of forest road network is limited to mountain forests. Insufficient accessibility persists in some of these forests, including forests ecologically heavily modified which limits the implementation of close-to-nature management practices, proper conservation measures and conduct of sanitation and other preventive measures in these forests. There are limited possibilities for the use of cableways, implementation of ecologically sound felling and regeneration methods and multi-operation felling machinery allowing for complex utilisation of felled timber. These limitations increase the cost of felling operations.

More accurate and reliable data on the extent and condition of the forest road network should be provided by a renewed forest road network survey, which was launched in 2016 as part of the forest management programme procedure.

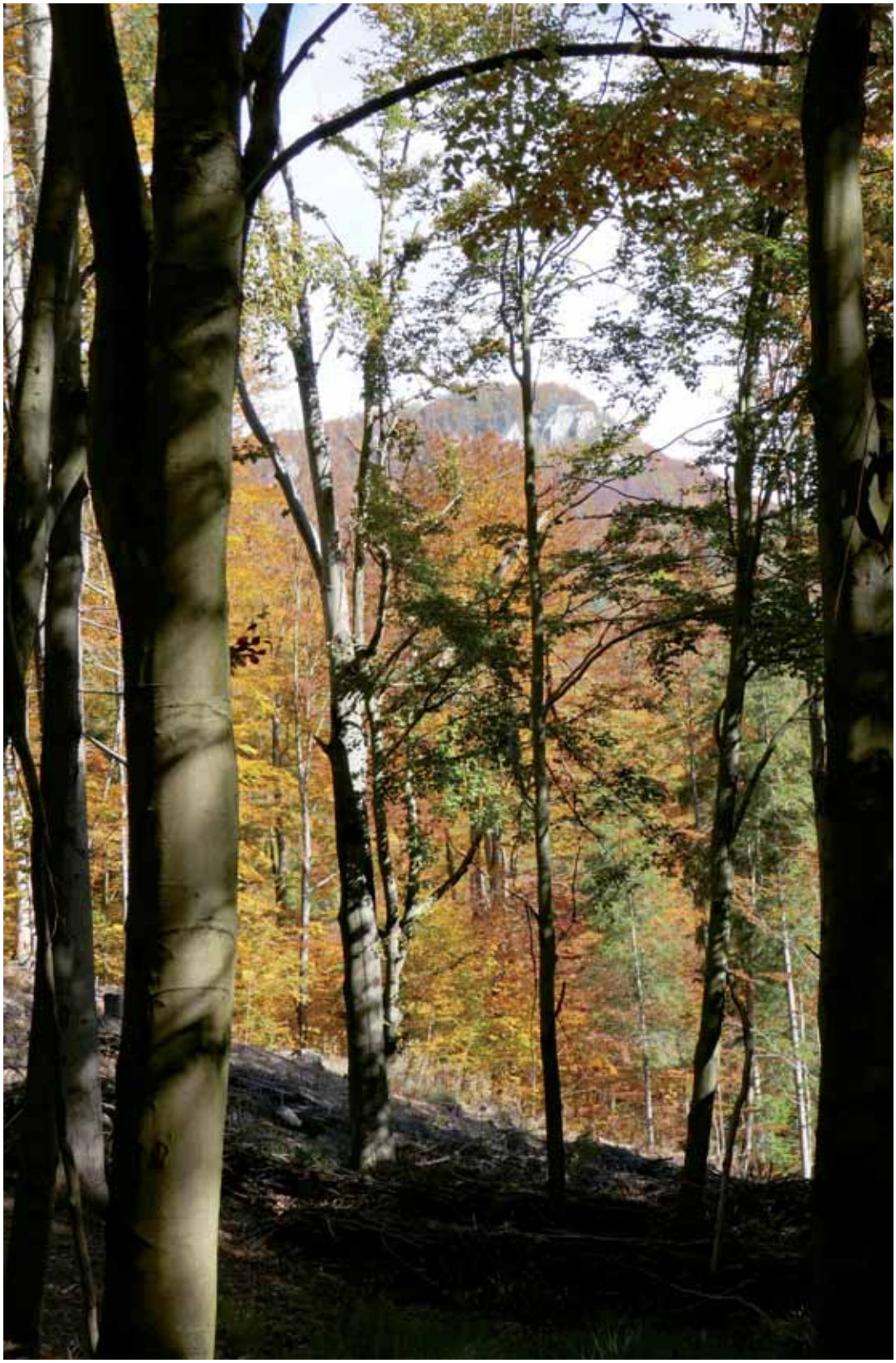
4.5 FOREST CERTIFICATION

Under the PEFC scheme, 1.229 million ha of forests, or 64.1% of the total forest area in Slovakia, were certified at 31 December 2016. The PEFC Slovakia had 19 members at 31 December 2016 in three chambers: Forest Owner (Lessee) Chamber, Chamber of Timber Processors and the Chamber of Other Stakeholders.

To date, 264 certificates have been issued on participation in forest certification under the PEFC scheme. In 2016, ten timber processors and business associates successfully passed the Chain of Custody (C-o-C) audit of forest products, bringing the number of valid C-o-C certificates to 74 and the number of certified C-o-C companies to 86. The other three companies operating in the Slovak market are certified through their parent companies abroad.

According to the 2016 FSC data, the area of forests certified under the FSC scheme in Slovakia was 146,271 ha.

Eight certificates were issued for this period (of which four were group certificates). A total of 32 forest managing enterprises are certified (including two state enterprises). Based on the official FSC data, 123 Chain of Custody certificates have been issued to date.



5 TIMBER TRADE

5.1 TIMBER SUPPLY

Proceeds from timber trading represent the most important source of sectoral earnings and revenue, which is primarily being used for maintaining important forest functions and the retention of sectoral workforce. In 2016, timber trading proceeds constituted 85.2% of the total sectoral earnings and revenue. Timber is not only a basic raw material in forestry, but also in the wood processing industry and thus secures earnings, revenue and employment in both sectors. In 2016, the total supply of raw timber (including export) reached a volume of 9,267,000 m^3, an increase of 3% compared to 2015 (Table 5.1).

Forest managing enterprises supplied the domestic market with 8,867,500 m^3 of timber including timber for their own consumption. Compared to 2015, it represented an increase of 256,500 m^3. The domestic softwood supply grew considerably by 505,500 m^3 whilst the hardwood supply fell by 249,000 m^3. Higher supply was chiefly caused by higher felling volumes, particularly in coniferous forests.

Table 5.1 Structure of timebr suppley by assortments

Assortment	2015 (m^3)				2016 (m^3)				(%)	
	Slovakia	Export	Own consumption	Total	Slovakia	Export	Own consumption	Total	2015	2016
SOFTWOOD										
I grade logs	12	3	0	**15**	4 385	34	0	**4 419**	0.00	0.09
IIgrade logs	268	80	0	**348**	1 821	109	0	**1 930**	0.01	0.04
III grade logs	2 637 627	52 324	60 042	**2 749 994**	2 877 851	49 631	45 359	**2 972 841**	58.98	57.24
Paper–pulp & abrasive timber	49	0	0	**49**	940	0	0	**940**	0.00	0.02
Mining timber	1 620	1 072	0	**2 692**	9 055	708	0	**9 763**	0.06	0.19
Thin poles	15 900	63	323	**16 286**	14 745	26	174	**14 945**	0.35	0.29
Pulpwood	1 176 242	8 404	17 865	**1 202 511**	1 394 181	28 048	6 179	**1 428 408**	25.79	27.50
Energy wood	23 079	0	9 525	**32 603**	22 826	915	5 484	**221 869**	0.70	4.27
Fuel wood	201 700	0	3 441	**205 141**	213 624	182	8 063	**29 225**	4.40	0.56
Stumpage	229 583	0	1 371	**230 954**	189 687	6 193	38	**195 919**	4.95	3.77
Raw trunks	214 766	6 581	317	**221 665**	303 139	8 577	1 662	**313 378**	4.75	6.03
Total	**4 500 846**	**68 527**	**92 885**	**4 662 259**	**5 032 255**	**94 422**	**66 959**	**5 193 637**	**100.00**	**100.00**
HARDWOOD										
I grade logs	2 548	1 212	0	**3 760**	2 047	2 362	0	**4 409**	0.09	0.11
IIgrade logs	11 888	6 930	0	**18 817**	13 911	6 753	0	**20 664**	0.43	0.51
III grade logs	1 294 217	107 807	25 961	**1 427 986**	1 299 663	105 292	5 773	**1 410 727**	32.96	34.63
Mining timber	751	0	242	**993**	1 219	0	0	**1 219**	0.02	0.03
Thin poles	2 551	0	137	**2 688**	4 565	0	385	**4 950**	0.06	0.12
Pulpwood	2 244 580	195 458	7 581	**2 447 618**	2 095 805	189 202	3 711	**2 288 719**	56.50	56.19

Assortment	2015 (m³)				2016 (m³)				(%)	
	Slovakia	Export	Own consumption	Total	Slovakia	Export	Own consumption	Total	2015	2016
HARDWOOD										
Energy wood	45 241	0	14 282	**59 523**	53 120	243	10 240	**63 603**	1.37	1.56
Fuel wood	253 027	3 657	5 843	**262 527**	195 622	1 115	3 739	**200 476**	6.06	4.92
Stumpage	92 141	0	455	**92 597**	49 516	0	44	**49 560**	2.14	1.22
Raw trunks	15 615	0	221	**15 836**	28 503	0	402	**28 905**	0.37	0.71
Total	**3 962 559**	**315 063**	**54 723**	**4 332 345**	**3743972**	**304 967**	**24 294**	**4073233**	**100.00**	**100.00**
Σ soft wood & hardwood	**8 463 405**	**383 591**	**147 608**	**8 994 603**	**8 776 227**	**399 389**	**91 253**	**9 266 870**	**–**	**–**
Softwood lumber	50 738	122	519	**51 379**	37 736	0	337	**38 073**	97.39	95.62
Hardwood lumber	383	969	23	**1 375**	445	1 286	14	**1 745**	2.61	4.38
Chipwood (tones)	77 456	0	714	**78 170**	90 324	0	355	**90 679**	–	–

Source: Quarterly timber supply statistics Les D (MARD SR) 2-04; Prepared by: NFC Zvolen.
Notes: The export volume includes only timber delivered directly by forest owners (or tenurers).
The difference between raw wood supplies and felling result from the increased timber volumes at forest owners' landings.

5.2 TIMBER PRICES ON DOMESTIC AND FOREIGN MARKET

In 2016, earnings from timber trading in softwood log grades were down on 2015 by €1.75/m³, or 3.4%. Conversely, hardwood log grades were on average selling for €1.75/m³, or 4.1%, more than in 2015. Average earnings from traded grades of raw timber show a stable development since 2011, characterised by a gradual moderate increase in the price of hardwood logs and a decrease in the price of softwood logs. Compared to 2015, average earnings declined by 0.6%

Table 5.2 Average timber prices in 2015 and 2016 (€/m³)

Assortment	Domestic price			Export price			Domestic + Export		
	2015	2016	2016/ 2015	2015	2016	2016/ 2015	2015	2016	2016/ 2015
SOFTWOOD									
I grade logs	157.93	62.26	0.39	153.00	202.22	1.32	156.94	63.34	0.40
IIgrade logs	114.41	81.88	0.72	125.67	118.07	0.94	117.00	83.93	0.72
III grade logs	64.39	62.90	0.98	71.02	65.97	0.93	64.51	62.95	0.98
Poles	50.67	46.14	0.91	–	–	–	50.67	46.14	0.91
Mining timber	61.95	58.54	0.94	50.55	42.59	0.84	57.41	57.38	1.00
Thin poles	38.57	36.04	0.93	40.04	47.60	1.19	38.58	36.06	0.93
Pulpwood	31.16	29.52	0.95	38.21	33.48	0.88	31.21	29.60	0.95
Energy wood	10.22	11.71	1.15	–	10.93	–	10.22	11.68	1.14
Fuel wood	20.02	20.29	1.01	–	22.34	–	20.02	20.30	1.01
Stumpage	27.12	29.68	1.09	–	47.57	–	27.12	30.24	1.12
Raw trunks	59.27	51.61	0.87	61.04	54.57	0.89	59.32	51.69	0.87
Softwood in total	**51.20**	**49.60**	**0.97**	**65.75**	**53.38**	**0.81**	**51.42**	**49.67**	**0.97**

HARDWOOD									
I grade logs	199.66	265.92	1.33	365.70	387.41	1.06	253.18	331.00	1.31
IIgrade logs	114.21	123.13	1.08	163.88	138.44	0.84	132.50	128.13	0.97
III grade logs	52.67	54.35	1.03	57.06	61.63	1.08	53.01	54.90	1.04
Mining timber	65.00	64.27	0.99	–	–	–	65.00	64.27	0.99
Thin poles	35.11	35.01	1.00	–	–	–	35.11	35.01	1.00
Pulpwood	37.03	37.67	1.02	41.07	41.07	1.00	37.35	37.95	1.02
Energy wood	14.36	13.40	0.93	–	17.02		14.36	13.42	0.93
Fuel wood	35.28	37.26	1.06	36.26	38.59	1.06	35.30	37.26	1.06
Stumpage	18.39	21.09	1.15	–	–	–	18.39	21.09	1.15
Raw trunks	43.06	43.79	1.02	–	–	–	43.06	43.79	1.02
Hardwood in total	**41.70**	**43.37**	**1.04**	**50.44**	**52.98**	**1.05**	**42.34**	**44.09**	**1.04**
Σ softwood & hardwood	**46.75**	**46.94**	**1.00**	**53.17**	**53.07**	**1.00**	**47.03**	**46.74**	**0.99**

Source: Quarterly timber supply statistics Les (MARD SR) 2-04; Prepared by: NFC Zvolen

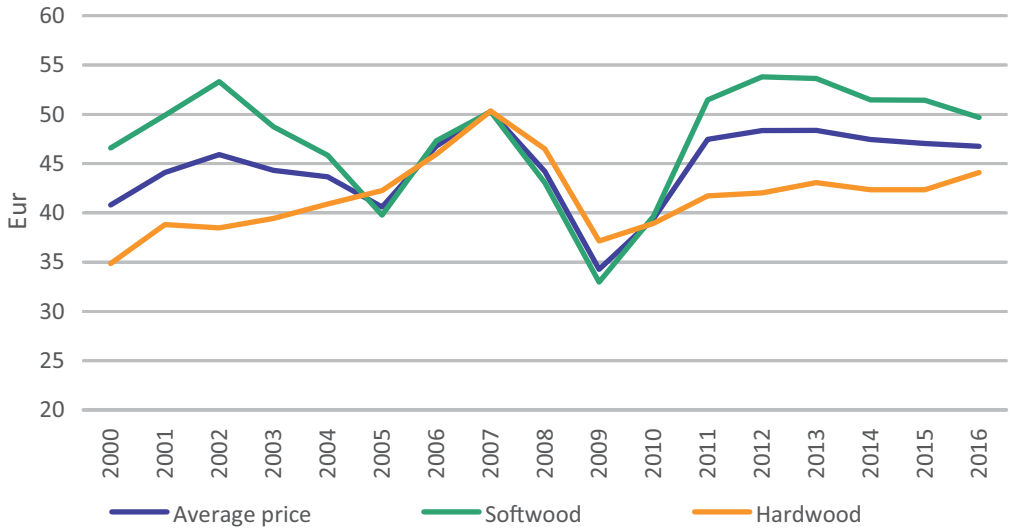


Figure 5.3-1 Average timber prices in the forest sector since 2000

Source: Quarterly timber supply statistics Les (MARD SR) 2-04; Prepared by: NFC Zvolen

6 FORESTRY ECONOMICS

6.1 SECTORAL EARNINGS AND REVENUE

In 2016, sectoral earnings and revenue reached the sum of €508.26 million, an increase of 3.4% compared to 2015. This annual rise was chiefly contributed to improved timber trading with earnings up by 4.1% owing to a higher supply of raw timber from both state and non-state forest enterprises. Other sectoral earnings and revenue were comparable to 2015, but their distribution changed. Earnings and revenue fell in state forest enterprises, but grew by 41% in non-state forest enterprises.

Other earnings and revenue represent income from the trading of forest products, transplants, by-products, hunting, tourism and forest services as well as income from leasing and the sale of forest properties and revenue from fiscal capital and bonds.

The decrease in earnings and revenue experienced by state forest enterprises is seen as a negative trend with respect to promoted diversification of forestry with emphasis on the ever increasing importance of paid public beneficial services provided by forests

Public funding

In 2016, the forest sector was granted €27,263,000 from various public sources (state budget, EU funds, etc.). In 2015, public sources provided the sector with €58,009,000. The decrease in funding was chiefly caused by lower funding from the Rural Development Programme of the Slovak Republic (RDP SR) 2014-2020 which represented the main source of public funding in forestry in 2016, contributing €19,421,000, or 71% of the total public funding. This amount also included funding under the following forestry measures: 4.3E Investments for infrastructure and access to forest land; 8.1 Support for afforestation/establishment of forested areas; 8.3 Support for the prevention and removal of damage in forests caused by forest fires and natural disturbances; and 8.4 Support for the regeneration of forests damaged by forest fires and natural disturbances. Funding from the RDP SR 2014-2020 was mostly secured by non-state forest enterprises.

From other sources (other than the Ministry of Agriculture and Rural Development of the Slovak Republic), funding was made available to the Military Forests and Estates of the Slovak Republic, s.e., Forests and Estates Ulič and the University Forest Enterprise of TU Zvolen.

Table 6.1 Sectoral public funding in 2016 (1000 €)

Source, benefactor	Current expenditures	Capital outlay (investments)	Total
Forest management			
Forest management in total	**19 687**	**4 688**	**24 375**
Chapter 08V0203 – Forest management plan renewals	1 142	0	**1 142**
Chapter 08V0206 – National park management	846	0	**846**
State aid	0	0	**0**
Rural development programme 2007-2013	15 079	4 342	**19 421**
Other source	2 620	346	**2 966**
Other			
National Forest Centre			
National Forest Centre in total	**2 451**	**111**	**2 562**
Chapter 08V0202 – Forest management development	1 099	111	**1 210**
Chapter 08V0301 – Research	324	0	**324**
Chapter 08V0302 – Support for sustainable forestry	919	0	**919**
Chapter 090010204 – Education	13	0	**13**
Chapter 090050101 – Statistical surveys	37	0	**37**
Chapter 090040101 – IT	59	0	**59**
Department of Forestry and Wood Processing of MARD SR			
Department of Forestry and Wood Processing of MARD SR in total	**8**	**0**	**8**
Chapter 08V0201 – specialised forestry actions	8	0	**8**
Museum Svätý Anton			
Museum Svätý Anton in total	**178**	**50**	**228**
Chapter 0920301 – museum activities	178	50	**228**
Slovak Hunters Chamber, Slovak Forestry Chamber			
Slovak Hunters Chamber, Slovak Forestry Chamber in total	**90**	**0**	**90**
State support – Decree 536/2011-100	90	0	**90**
Other in total			
Total other	**2 727**	**161**	**2 888**
Forestry in total			
Total: Forestry and other	**22 760**	**4 503**	**27 263**

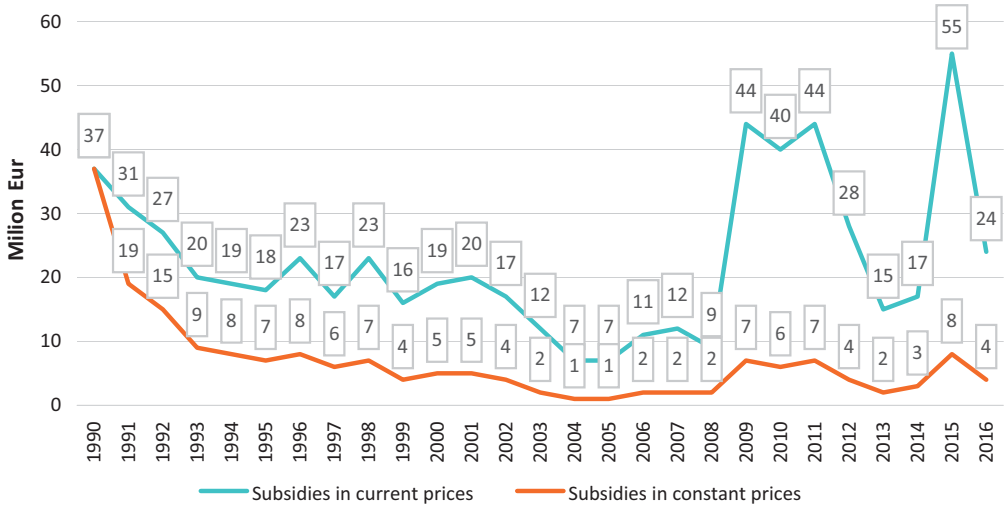


Figure 6.1 Sectoral public funding in current and constant prices since 1990

Source: Department of Forestry and Wood Processing of MARD SR; APA MARD SR; state forestry statistics.

6.2 OVERVIEW OF SECTORAL COSTS

In 2016, the total sectoral costs reached the sum of €463.53 million, an increase of 3.8% compared to 2015. The largest proportion of costs was for materials (68.2 % of the total costs). These also included depreciation and services. The sector also typically has high labour costs (€85.72 million) due to the labour intensive nature of many forestry operations.

Table 6.2 Sectoral costs by group (million €)

Indicator	2010	2013	2014	2015	2016
Total production costs	460.71	439.38	481.26	446.69	463.53
Material costs including depreciation and services	273.86	245.58	288.53	288.84	316.07
of which depreciation	26.82	29.22	27.19	23.69	27.33
Personnel costs	103.68	125.32	128.35	118.76	124.54
of which labour costs	75.02	88.30	90.33	82.82	85.72
Other	83.17	68.48	64.38	39.09	22.92

Source: Department of Forestry and Wood Processing of MARD SR; APA MARD SR; state forestry statistics; Prepared by: NFC

In the 2016 cost breakdown, forestry operations (silviculture and felling) comprised 52.7% of the total costs, followed by overhead costs (25.4%) and other costs (21.9%). In 2015 and 2016, an 18% increase in the direct costs of silviculture operations was recorded compared to 2014 due to a slight increase in the volume of almost all major silvicultural operations

In the long-term, the increase in the volume of silvicultural operations is a desirable trend as a higher return of provided forest benefits via improved forest management also benefits the finances of managing enterprises. In addition, the government should continue to partially cover the direct costs of silvicultural operations and the provision of public services by forests which are not currently traded by forest managing enterprises

6.3 ECONOMIC RESULT

In 2016, the forest sector made a profit of €44.76 million. The economic result (ER) was comparable to 2015. The difference between the economic result achieved by state and non-state enterprises is still apparent.

Table 6.3-1 Economic results (ER) by measurement unit

Indicator	Measurement unit	2010	2014	2015	2016
ER – state forest sector	€/ha of forest area	1.91	12.74	11.06	9.22
	€/ha of felling	0.36	2.85	2.43	1.95
ER – non-state forest sectorv	€/ha of forest area	18.57	39.51	36.69	38.62
	€/ha of felling	3.85	8.06	7.50	7.93

Source: NFC; Sectoral Statistical Record Les 5-01; Profit and Losses Record POD 2-01; Prepared by: NFC.

The comparatively worse economic result in state enterprises is mainly due to the costs incurred for the management of forests pending return to their original owners. These forests are often subject to felling bans, have limited opportunities for public funding and higher operation unit costs and overheads. Higher costs of state enterprises are the result of the costs associated with managing the state property including maintaining employment and providing public education activities.

The positive economic result with added depreciation provides internal sources for further investments of enterprises. In 2016, the sector increased its investments by almost 57%. Investments in state forest enterprises grew by 88.2% whilst in non-state enterprises they fell by 26.1%.

Table 6.3-2 Investments in 2015 and 2016 (1000 €)

Type	Forest sector		Of which			
			State forest enterprises		Non-state forest enterprises	
	2015	2016	2015	2016	2015	2016
Construction	20 236	32 544	17 135	25 754	3 101	6 790
Machinery and equipment	16 038	26 119	9 253	25 050	6 785	1 069
Other	2 452	1 979	1 643	1 939	809	40
Total	**38 726**	**60 642**	**28 031**	**52 743**	**10 695**	**7 899**

Source: Sectoral Statistical Record Les 5-01; Prepared by: NFC.

6.4 EKONOMIC TOOLS

In 2016, the sector contributed taxes to the state and municipal budgets in the amount of €52.87 million. The highest share of paid taxes came from the value added tax (balance of tax on inputs and outputs). This tax brought in €29.53 million, or 55.9% of the total tax. Property tax annually grew by 5.7%; the increase was more apparent in state enterprises. Income tax fell by 5.6%.

Table 6.4 Overview of taxes contributed to national and municipal budgets (million €)

Type		Year					
		2010	2012	2013	2014	2015	2016
VAT (given as a difference between collected and refunded)	State	17.25	18.26	18.50	17.01	18.28	18.13
	Non-state	13.31	13.20	13.23	14.78	12.32	11.40
	Total	**30.56**	**31.46**	**31.73**	**31.79**	**30.60**	**29.53**
Property tax	State	5.38	5.94	7.14	6.57	6.35	6.73
	Non-state	1.50	1.60	1.93	1.90	2.00	2.10
	Total	**6.88**	**7.54**	**9.07**	**8.47**	**8.35**	**8.83**
Road tax	State	0.57	0.53	0.56	0.55	0.31	0.18
	Non-state	0.32	0.40	0.42	0.41	0.40	0.30
	Total	**0.89**	**0.93**	**0.98**	**0.96**	**0.71**	**0.48**
Income tax [1)]	State	5.67	8.14	4.87	6.82	8.68	7.79
	Non-state	5.06	6.30	5.55	5.73	6.19	6.24
	Total	**10.74**	**14.44**	**10.42**	**12.55**	**14.87**	**14.03**
Total	State	28.87	32.87	31.07	30.95	33.62	32.83
	Non-state	20.19	21.50	21.13	22.82	20.91	20.04
	Total	**49.07**	**54.37**	**52.20**	**53.77**	**54.53**	**52.87**

Source: Sectoral Statistical Record Les 5-01; MARD SR questionnaire; Prepared by: NFC.
Note: 1) for non-state forest enterprises calculated from the disbursed personal earnings and gross profit.

The respective authority of the state administration on forests (SAF) decides on the use of forest land for purposes other than forestry. Levy for the exclusion of forest land from the forest land registry (compensations for the loss of non-production forest functions) is one of the economic instruments of the government to protect forest land. In 2016, the SAF bodies ordered that €1.107 million be paid for the exclusion of forest properties, of which 96% was actually paid.

Financial penalties imposed for the breach of statutory obligations totalled €85.1 thousand, which was 52.8% more than in the previous year. Of this sum, €32,900, or 39%, was actually paid.

6.5 ECONOMIC ACCOUNTS FOR FORESTRY

The Economic Accounts for Forestry (EAF) describe and analyze the generation of sectoral pension using four factors: production, pension, profit and capital. In 2016, the total production of the sector reached €493.2 million. At the same time, the gross added value for the sector was €241.2 million, which provided net added value of €213.8 million. Net profit totalled €44.7 million.

6.6 SOCIO-ECONOMIC STATISTICS AND SECTORAL EMPLOYMENT

Labour and job motivation

Based on the data of the Statistical Office of the Slovak Republic (SO SR), the sector employed in 2016 (SK NACE 02 Forestry and logging) 10,600 employees, of which 8,600 were male. The largest share of the workforce (8,400) had high school education followed by 1,600 with university education and 600 with basic education. The average monthly salary of technical/administrative staff of forest enterprises (excluding average monthly earnings of contracting employees - mostly manual labourers) was €1,004 in 2016.

Sickness and occupational injuries

Sectoral workforce is subjected to a number of work related risk factors including excess vibrations, noise, chemical substances and long-term unilateral physical burden. In 2016, fourteen new cases of occupational diseases were reported.

At the same time, 71 work related injuries were reported in the sector two of which were serious causing life-long disability. The number of work related injuries has been falling since 2012.

Except for the National Labour Inspectorate, serious injuries are also recorded by state forest enterprises. In 2016, the Forests of the Slovak Republic, s.e. reported nine work related injuries among the staff of their contractors, of which four were fatal and four serious.

7 ORGANISATIONAL AND INSTITUTIONAL STRUCTURE

7.1 STATE ADMINISTRATION ON FORESTS

The Ministry of Agriculture and Rural Development of the Slovak Republic (MARD SR) is the supreme national authority on forests. At the district level, there are eight Departments of Agriculture attached to district offices in particular regions and forty nine Land and Forestry Departments based at district offices. In military forests and forests important for national defence, the Ministry of Defence of the Slovak Republic (MOD SR) executes the state supervision through its Forestry and Hunting Office..

State administration on forests (SAF) is governed by the following legislations:

- Act No. 326/2005 Coll. on forests in the wording of the pursuant regulations;
- Act No. 318/2010 Coll. on forest reproductive material in the wording of the pursuant regulations;
- Act No. 97/2013 Coll. on land associations in the wording of the Act No. 34/2014 Coll.;
- Act No. 274/2009 Coll. on hunting and on amendments of particular laws in the wording of the pursuant regulations;
- other legislations under which the authorities of state administration on forests act as concerned authorities of the state administration.

The authorities of SAF primarily deal with procedures based on the Act No. 71/1967 Coll. on administrative proceedings in the wording of the pursuant regulations (Administrative Code), especially procedures on the compilation and approval of forest management plans (FMP) including their amendments, and procedures related to game management.

Of equal importance are the advisory services on forests and game management and the release of forestry related information. In addition, SAF also conducts state supervision of forests and hunting activities including tasks such as issuing permits for interventions compromising the integrity of forest properties and their protection, issuing exemptions to banned activities in forests, dealing with legal offences and other infringements associated with forests, hunting and game management. Likewise, it oversees agendas related to forest reproductive material and land associations.

The state administration at the first and second level is organised through particular departments of district offices under the auspices of the Ministry of Defence. Practical guidance and inspection of various authorities of SAF is provided by the Department of Forestry and Wood Processing of MARD SR.

In 2016, SAF authorities conducted 51,500 individual procedures, of which 4,400 were governed by the Administrative Code and 47,100 were procedures not regulated by the Code

7.2 OWNERSHIP AND MANAGEMENT OF FORESTS

In 2016, the state owned 772,232 ha of forest crop land, or 39.7% of the total forest crop land. State forest enterprises managed 1,032,447 ha of forest, or 53.1% of the total area.

Table 7.2-1 Basic data on forests managed by state enterprises

Indicator	State enterprise				
	LESY SR	ŠL TANAPu	LPM Ulič	VLM SR	SOŠ, SOLŠ,
Forest crop land (ha)	894 850	37 734	24 647	63 247	11 942
Growing stock (1000 m³)	224 768	5 049	6 373	14 220	3 501
Area of mature stands (ha)	202 918	3 453	6 434	14 998	2 826
Growing stock in mature stands (1000 m³)	83 841	1 239	2 502	5 027	1 467
Total current increment (1000 m³)	5 704.8	110.6	183.4	418.6	89.4
TCI (m³/ha)	6.42	3.81	7.44	6.68	7.49

Source: NFC; Compendium of Slovak Forestry Statistics, 2017; Prepared by: NFC.

The remaining percentage of forest crop land was managed by non-state forest enterprises, which owned and managed private, community, church, municipal and agri co-op forests.

Table 7.2-2 Basic data on forests managed by non-state enterprises

Indicator	Ownership type				
	Private	Community	Church	Agri co-o	Municipal
Forest crop land (ha)	150 204	573 401	16 058	6 695	165 318
Growing stock (1000 m³)	39 215	140 507	3 889	1 694	41 437
Area of mature stands (ha)	43 440	134 905	3 814	1 554	36 447
Growing stock in mature stands (1000 m³)	18 264	53 721	1 417	626	16 011
Total current increment (1000 m³)	959.0	3 481.6	90.6	x	998.7
TCI (m³/ha)	6.45	6.18	5.66	x	6.09

Source: NFC; Compendium of Slovak Forestry Statistics, 2017; Prepared by: NFC.

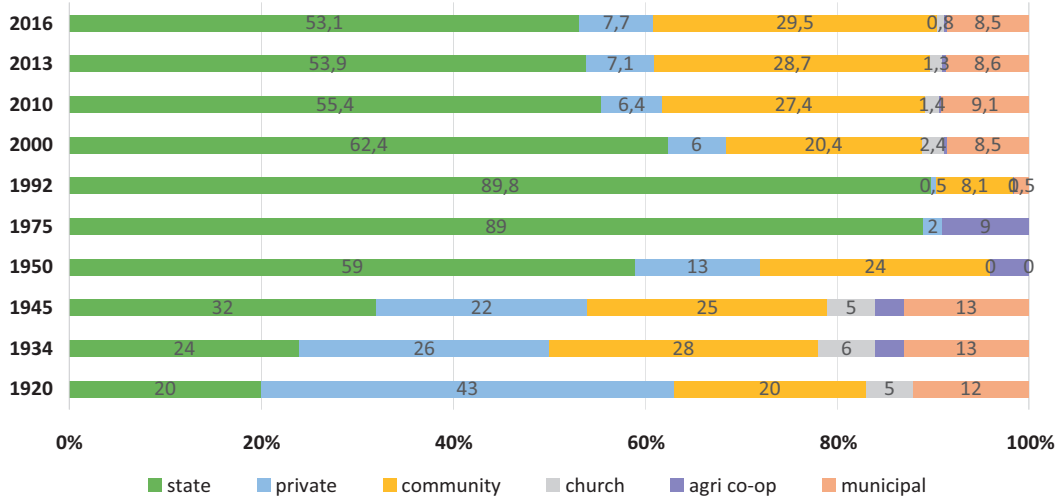


Figure 7.2-1 Structure of forest managers since 1920 (%)

Source: NFC; Compendium of Slovak Forestry Statistics, 2017; Prepared by: NFC.

7.3 OTHER ORGANIZATIONS OF THE SECTOR

- The ***National Forest Centre*** (NFC) performs sectoral tasks and provides services in the following areas: forest research, education, public relations, public procurement of forest management plans (FMP) including the preparation of supporting materials, advisory and technical assistance, management and release of forest data and information and the processing and administration of the National Thematic Map Set on Forests. The aforementioned tasks and services are provided by four specialised institutes: Forest Research Institute (FRI), Institute for Forest Consulting and Education (IFCE), Institute for Forest Resources and Information (IFRI) and Forest Management Planning Institute (FMPI).

  From a number of important activities of the Centre in 2016, the following are worth mentioning: establishment of the FOREST EUROPE Secretariat as a separate unit of the NFC under the name "Liaison Unit Bratislava" (LUB) - the unit will operate until the ministerial conference in Bratislava in 2020; completion of the 2nd cycle of the National Forest Inventory and Monitoring (NFIM SR 2015- 2016); organisation of numerous public activities including forest pedagogy, further education and consulting.

- ***Research Station of the Forests of the High Tatras National Park***
  The Station conducts research and monitoring of forests and biodiversity in the TANAP.

- ***Educational bodies*** – The provision of high school educated staff is ensured through a network of forestry apprenticeship schools and colleges (Banská Štiavnica, Bijacovce, Ivanka pri Dunaji, Tvrdošín and Poltár) and specialised forestry colleges (Banská Štiavnica, Liptovský Hrádok and Prešov). The colleges and schools were attended by 1,290 students in 2015-2016. The undergraduate and graduate courses are offered by the Faculty of Forestry of the Technical University in Zvolen which is also involved in forest-related research. The courses were attended by 824 students last year.

- ***Svätý Anton Museum*** – The Museum houses a unique exposition of historic and hunting artefacts of national importance. In 2016, the Museum released a prestigious publication on the Svätý Anton Manor House and organised an annual St Hubert's Day Festival – a national celebration of hunting and its traditions which attracted 16,400 visitors in 2016.

- ***Slovak Forestry Chamber*** (SFCH) – The SFCH is a non-state, non-political, independent entity which enforces and protects legal, professional, social and economic interests of its members. These include 360 individuals and 16 legal entities employing more than 6,000 people. In 2016, the Chamber primarily focused its activities on the further education of forestry professionals and the promotion of forestry and forest pedagogy.
- ***Council of the Non-state Forest Owner Associations*** (CNFOA) – The CNFOA is an official umbrella body of non-state forest owners including owners of private, municipal and church forests. The Council represents the interests of the following associations of non-state forest owners:
  - Slovak Union of Diocese Forests
  - Slovak Association of Municipal Forests
  - Union of Owners of Private, Community and Municipal Forests of Banská Bystrica Region
  - Slovak Union of Regional Associations of Non-state Forest Owners

  In 2016, the Council took an active part in proceedings on legislative requirements and objections related to the Act on Nature and Landscape Protection, the NP Poloniny management plan and the Act on Invasive Species of Plants and Animals. It also participated in negotiations on the prevention of double taxation of dividends and the inadequacy of taxes on land with young forest stands.
- ***Association of Forest Sector Employers*** (AFSE) – At 31 December 2016, the AFSE had 22 legal entities representing 4,526 forest sector employees. Its members included three state forest enterprises, one research institute, two college forest enterprises, fourteen different organizations of municipal forests and two commercial forest enterprises. It took an active part in organising a number of public events and provided funding for the following competitions: Green Lens; Best Forest Warden; Logger; Venerovský Skiing Competition. It also supported a media campaign and the official opening of the Forestry Days 2016 including publication of promotional and information materials for the event.

7.4 PUBLIC RELATIONS

In 2016, the 10th year of the Forestry Days was organised. The main events took place in Zvolen, Kežmarok, Bratislava, Košice, Vydrovská dolina whilst selected accompanying events were also held in Banská Bystrica, Revúca, Humenné and Svätý Anton. The events were coordinated by the NFC in cooperation with six major and 42 other partners. Events were attended by around ten thousand visitors. In addition, other traditional events and activities were held including the Tree Day, Green Lens, St Hubert's Day, Wooden Crafts, Children Forestry University, Know and Protect, Owl, Forest Hidden in the Book, The Jozef Dekrét Matejovie Award, Best Forest Warden, Logger, and Venerovský Skiing Competition.

Throughout the year, forestry organisations offered a range of forest pedagogy activities. New programmes for kindergartens were prepared and excursions, lectures and forest walks were organised, attended by more than 30,000 children. More than 51,000 people from 24 different countries visited the forestry museum in Vydrovská dolina (Vydrovská Valley). Within the framework of the project „Forests for the Society - Forests Without Barriers," educational trails in Spišská Teplica (including barrier-free structures) and Zbojnícke studničky in Nová Baňa were built and opened. In 2016, 315 employees of forestry organisations hold the certificate of forest teachers and nineteen new forest guides were trained from the staff of these organisations.

Financial support was provided for the documentaries promoting the protection of forests and the environment. In addition, a number of press releases were issued together with media outputs and contributions to the Halali TV programme. Brief clips for commercial TV channels and articles for regional newspapers were also prepared.

In 2016, the idea of "Zvolen - the Town of Forestry" was formulated. The Memorandum on Cooperation in the Promotion of Zvolen as a Town of Forestry was signed between the Zvolen Town Council and eleven forestry institutions based in Zvolen.

8 INTERNATIONAL COOPERATION

The most important activities and events in the field of international forestry policy with a direct impact on global, and hence also European forests included:

- Working group of the **United Nations Forum on Forests** (UNFF) drew up in 2016 the United Nations **Strategic Plan for Forests 2017-2030** and the Quadrennial Programme of Work of the Forum for 2017-2020 adopted by the Special Session of the UN Forum on Forests on 20 January 2017.
- 23rd Session of the **FAO Committee on Forestry** (COFO) was held at the FAO Headquarters in Rome, Italy from 18 to 22 July 2016. At the same time, 5th World Forest Week was held. The main objective of the session was to propose a new agenda on forests following the key 2015 agreements, in particular ensuring that forests and forestry contribute to the achievement of the Sustainable Development Goals (SDGs) of the 2030 Agenda, mitigation of the climate change impact, food security, employment, gender equality and other local development goals.
- 74th Session of the **ECE Committee on Forests and the Forest Industry** (COFFI) was held in Geneva, Switzerland from 18 to 20 October 2016. Discussions were aimed at understanding and maximising the role of wood in sustainable development and working with related sectors in exploiting its potential in the transition to a green economy. The Committee also paid special attention to the relationship between the different types of forest ownership and the creation of "green jobs" in the UNECE region. The session was followed by a workshop "Measuring the value of forests in a green economy."
- 22nd Session of the **Conference of the Parties** (COP 22) to the United Nations Framework Convention on Climate Change (UNFCCC) was held in Marrakech, Morocco from 7 to 18 November 2016. The session was attended by 15,000 participants. COP 22 has been a milestone in the UN Framework Convention on Climate Change following the entry into force of the Paris Agreement, which aims to strengthen countries' capacity to cope with the consequences of climate change by introducing appropriate financial flows, a new technological framework and capacity building to support, in particular, developing and vulnerable countries. The Paris Agreement requires all Parties to put forward their best efforts through "nationally determined contributions" and regularly report on their implementation.

In 2016, a number of important international events took place with the active participation of the Slovak Republic, which from the beginning of 2016 became the „political leader" of the FOREST EUROPE process and a host to its secretariat, „Liaison Unit Bratislava," based at the NFC in Zvolen. In the second half of the year, Slovakia took over the Presidency of the Council of the EU.

FOREST EUROPE

From 1 January 2016, the Slovak Republic took over the chairmanship of FOREST EUROPE (FE), the most important pan-European political process on forest policies. Starting from 2014, the Slovak Republic was its vice-chairman. The FE is the highest political forum of European forestry ministers who have been meeting regularly at the Ministerial Conferences on the Protection of Forests in Europe since 1990.

The agenda and tasks of the Secretariat are conducted by a separate unit called "Liaison Unit Bratislava" (LUB) created at the NFC. During its mandate (until the Bratislava Ministerial Conference in 2020) the unit will organise and arrange meetings and workshops, prepare reports and all necessary documentation related to the FE process jointly with the General Coordinating Committee GCC.

Its first important task was to develop a detailed FOREST EUROPE Work Programme for 2016-2020, which was submitted for discussion and approval to the Expert Level Meeting held in Bratislava on 11-12 May 2016. The meeting approved the submitted work programme which included seven

basic activities. In 2016, the LUB initiated and secured the establishment of expert working groups to carry out the tasks of the work programme.

In October 2016, the first meeting of the working group on the future of FE was held in Bratislava. The LUB designed a new FE website, intensified social media communication, established and launched a communication platform to facilitate discussions on main issues related to individual programme items with invited experts.

Slovak Presidency of the Council of the EU (SK PRES): Implementation of the EU Forest Strategy

The ambition of SK PRES was to prepare and adopt common EU positions for the meetings of intergovernmental multilateral organisations and to adopt a clear stance on the current developments in the international dialogue on forests. For the COFO meeting held in Rome in July 2016, SK PRES drafted a common stance of the EU which was subsequently approved by the working group (WG). SK PRES also drafted a common stance of the EU to the United Nations Strategic Plan for Forests 2017-2030, which was approved by the working group (WG) on 15 September 2016 and later submitted to the UNFF Secretariat. The implementation of EU Forestry Strategy was dealt with by the Directors General responsible for forests in the EU at the informal meeting in Bratislava on 7-9 November 2016. At the end of the meeting, the participants approved the Bratislava Forest Declaration, the ambition of which is to provide guidelines for further implementation of the strategy. SK PRES initiated the resumption of the EU's internal discussions on a possible legally binding agreement on European forests. At the initial stage, informal discussions were held at the meetings of the Directors General responsible for forests. Later on, discussions followed in working groups on forests within the Council of the EU. In the field of forests and climate change, SK PRES co-organised in the European Parliament a seminar on the role of forests and the timber industry in the fight against climate change after COP21 (15 November 2016).

During the SK PRES, the Slovak Republic coordinated the common stance of the EU member states to the Annual Meeting of the OECD Forest Seed and Plant Scheme which was held in Paris, France on 4-5 October 2016. The ambition of SK PRES to improve the coordination of the EU member states within the OECD was fulfilled.

9 TIMBER INDUSTRY

9.1 TIMBER PROCESSING INDUSTRY

Last year saw the continuation of moderate growth in demand for wood products, especially mechanically processed products. This trend was reflected in the increased volume of domestic timber processing, which grew from 6.857 to 7.394 million m^3, or 7.8%, compared to 2015. At the same time, timber export fell from 2.687 to 2.449 million m^3, or 8.9%, whilst timber import figures increased from 0.549 to 0.576 million m^3, or 4.9%.

Table 9.1 Production, import, export and consumption of raw timber in 2016

Log grade	Production	Import	Export	Consumption
Conifer I - III log grades	3 488.49	86.97	1 028.80	2 546.66
Conifer IV log grade	25.65	1.54	7.14	20.05
Conifer V log grade	1 428.41	25.21	365.60	1 088.02
Broadleaved I - III log grades	1 514.27	67.95	307.09	1 275.13
Broadleaved IV log grade	6.17	63.98	24.41	45.74
Broadleaved V log grade	2 288.72	293.11	424.20	2 157.63
Fuelwood	515.17	37.49	291.72	260.94
Total	**9 266.87**	**576.25**	**2 448.96**	**7 394.16**

Source: Quarterly Timber Supply Record Les D (MARD SR) 2-04; Statisti cal Office of the SR – unverified 2016 data. Prepared by: NFC.

In 2016, consumption of high quality I-III log grades increased from 3.411 to 3.822 million m^3, or 12%, whilst the demand for logs of IV-VI grades remained unchanged. Growth in domestic timber processing was also reflected in an improved economic performance of the sector and moderate employment growth. Total revenue of the industry increased by 8.5% compared to 2015 with a 6.8% growth in costs. The overall economic result before tax increased by 41.9%.

Despite the positive development of economic indicators and the growth of domestic timber processing volumes, there was no significant increase in the competitiveness of the majority of timber processing businesses and the added value also struggled to grow. Production was mostly sub-deliveries of semi-finished products with a lower level of finalisation for foreign companies. Processed volume of the highest quality roundwood, the domestic production capacity of which is around 0.3 million m^3, is still low. With the exception of a few multinational companies operating in Slovakia, no significant investments in the modernisation of processing technologies were made. Pulp and papermaking sectors belong to the best performing industries of the national economy and 11 companies associated in the Pulp and Paper Industry Federation of the Slovak Republic cover 100% of the national paper production and majority of other pulp/paper based products.

9.2 WOOD FOR ENERGY PRODUCTION

Forest land is the largest potential source of fuelwood biomass in Slovakia. Its annual available volume is 2.8 million tonnes which accounts for about 60% of the total available annual volume of this raw material in Slovakia. The volume of fuelwood and wood chips supplied by forest sector enterprises reached 1,440,000 tonnes in 2016, which was 10,000 tonnes less than in 2015. Slovak companies produced 610,000 tonnes of wood chips and 830,000 tonnes of fuelwood in 2016. The supply of these products accounted for only 48.8% of the total domestic consumption of woody fuels. Wood used for energy was additionally sourced from the residue of timber processing and woody biomass from forest vegetation on non-forest land. Almost 50% of the available forest woody biomass remained unused due to higher production costs when compared to sources on non-forest land and felling residue.

Table 9.2 Use of biomass for energy production

Year	Chips [1)]		Fuelwood and others [2)]		Total	
	1000 tones	TJ	1000 tones	TJ	1000 tones	TJ
2016	610	5 795	830	7 885	**1 440**	**13 680**
2015	615	5 843	835	7 933	**1 450**	**13 776**
2014	620	5 890	830	7 885	**1 450**	**13 775**
2012	530	5 035	780	7 410	**1 310**	**12 445**
2010	250	2 375	695	6 602	**945**	**8 977**
2005	120	1 140	640	6 080	**760**	**7 220**
2000	5	48	471	4 475	**476**	**4 523**
1990	2	19	368	3 496	**370**	**3 515**

Source: NFC, 1991-2017.
Note: [1)]Chips and woody biomass for the production of chips; [2)]Fuelwood and wood used for energy from woody residue, felling debris and dead trees.

In 2016, the total consumption of solid fuelwood biomass (fuelwood, wood chips, fine and coarse timber processing residue) reached 2.95 million tonnes. Its major consumers included the housing/communal sector (e.g. municipal heat units), residential properties, timber processing units and the energy sector. Compared to 2015, consumption decreased by about 0.2 million tonnes, mainly due to changing climatic conditions and energy savings (thermal insulation of residential buildings). Despite the decline in the consumption of fuelwood biomass, the number of consumers slightly increased. The share of woody biomass in the total consumption of primary energy sources in the Slovak Republic remained at 1.8%.

10 SECTORS ASSOCIATED WITH FORESTS AND THEIR FUNCTIONS

10.1 NATURE PROTECTION

The European network of protected areas NATURA 2000

(Table 10.1-1) includes two partially overlapping networks of the Special Protection Areas (SPAs) and Sites of Community Importance (SCIs), the designation and management of which is monitored and guided by the European Commission.

Borders of SPAs remained unchanged in 2016. The area of forests in SPAs also remained largely stable, although there is a trend of its slow gradual increase caused by growing forest cover in these areas. As of 2016, the total area of SPAs reached 836,000 ha. Based on the provisions of §50 of the Act No. 543/2002 Coll., management plans for the following SPAs were publicly consulted in 2016: Horná Orava, Sĺňava, Veľkoblahovské rybníky, Špačinsko-nižnianske polia, Kráľová and Dolné Pohronie.

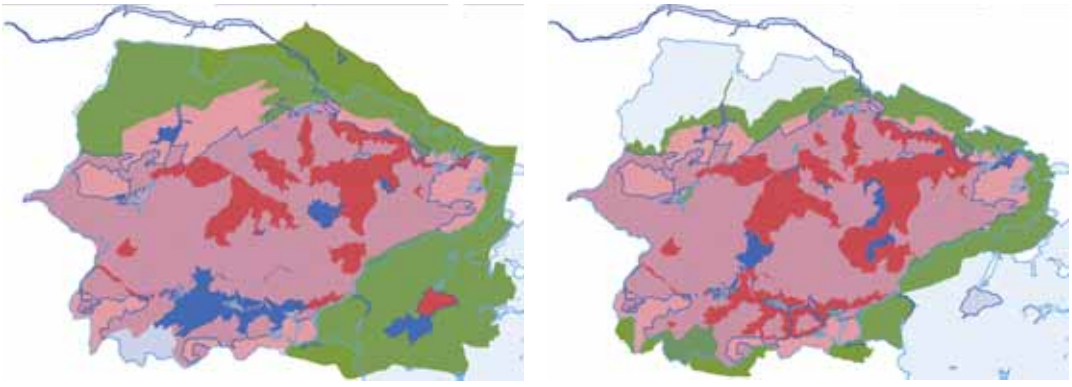
The area of SCIs remained unchanged last year. A proposal was negotiated for a second amendment of the national SCI list as requested by the European Commission. The EC requirement covered 21 habitats and 33 species of European importance including forest habitats that are under-represented in the existing SCIs. The amendment will result in the enlargement of the existing forest area in the Slanské vrchy, Volovské vrchy, Čergov, lowlands of Slovakia and some other SCIs.

The area of forests currently included in SCIs is around 479,000 ha. No progress was made in the designation of existing SCIs into the current national categories of protected areas (PAs). Nevertheless, a number of proposals were drafted and several sites were negotiated in line with enforced legislation.

National network of protected areas

The national network of protected areas (Table 10.1-2) includes large-scale protected areas (LSPAs) such as national parks (NPs) and protected landscape areas (PLAs). In addition, it includes several categories of small-scale protected areas (SSPAs) such as nature reserves (NRs), national nature reserves (NNRs), nature monuments (NMs), and protected sites (PSs).

A number of protected areas had their boundaries adjusted in 2016. The majority of changes resulted from the newly approved zonation of the Slovenský Raj NP (Slovak Paradise NP) which saw SSPAs within its boundaries being replaced by zones (A, B, C and D) with different levels of protection (5,4,3 and 2). Zones A and B are not fully compatible with the former SSPAs. In the process, the area under the 5th level of protection slightly increased compared to that of the past. Simultaneously, the NP area somewhat decreased while the buffer zone of the NP was reduced dramatically (by 7,500 ha).



Slovenský Raj National Park before zoning **Zoned Slovenský Raj National Park**

Figure 10.1-1 NP Slovenský raj zoning took place in 2016

Source: ME SR, 2017. Prepared by: NFC-FRI Zvolen, 2016

In addition to the zonation of Slovenský raj NP, a new nature reserve of Borsukov vrch was designated on an area of 147 ha. The reserve links the old reserves of Stužica and Jarabá skala in eastern Slovakia (in order to declare the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe for one of the UNESCO World Heritage Sites the area of these forests had to remain intact). The total area of forest land in protected areas of the national network is currently around 784,000 ha.

In the near future, an increase in the area of national network is predicted as SCIs are being gradually included into the existing network (473 SCIs plus the newly proposed NATURA 2000 sites). This step will substantially increase the overlap of both networks.

Overlap between the national network and both networks of NATURA 2000

The total area of NATURA 2000 in Slovakia is approximately 1,445,000 ha. An area of mutually overlapping SPAs and SCIs is included only once. Of the total area, 940,000 ha are forest land. The overlap between NATURA 2000 network and a national network of PAs is around 773,000 ha.

The existing system is rather confusing for the practical management of forests in these areas (see also Table 10.1-2). Overlapping areas are typical

for an overlap of requirements and restrictions imposed by the Act on Nature and Landscape Protection with the requirements of EU directives. These requirements are often in conflict with multiple procedures for granting approvals and exemptions needed for the systematic management of forests. Additionally, it is important to realise that both NATURA 2000 and the national network of PAs also overlap in places with sites protected under other international agreements on nature conservation, e.g. UNESCO biosphere reserves (MaB), Ramsar sites and natural UNESCO World Heritage Sites. Boundaries of sites protected by international agreements are not often marked in the field (except for SCIs which do not overlap with any protected area of the national network).

Table 10.1-1 Overlap of the national network of protected areas and Natura 2000

Category	Total area of Natura 2000[1]	Of which overlap with national network	Forest crop land in Natura 2000	Of which overlap with national network
	1000 ha / % [2)]	1000 ha / % [2)]	1000 ha / % [3)]	1000 ha / % [3)]
Sites of Community Importance (SCI)	584	504	479	411
	11.9	10.3	24.7	21.2
Special Protection Areas (SPA)	1 311	660	836	486
	26.7	13.4	43.0	25.3
Overlap of SCI and SPA	450	391	375	296
	9.2	8.0	19.3	15.2
Total area of Natura 2000 (Overlapping areas are counted only once)	**1 445**	**773**	**940**	**601**
	29.5	**15.8**	**48.4**	**31.2**

ME SR 2016; Updated to: 31 December 2016; Prepared by: NFC-FRI Zvolen, 2017.

Notes: [1)]Total area of forest and non-forest land; [2)]Percentage of the country area; [3)]Percentage of the total forest crop land in Slovakia

Activities and management in particular protected areas are to a various degree restricted by the provisions of the Act on Nature and Landscape Protection from the 2nd level of protection onwards. The only exceptions are those LSPAs which are entirely regulated by management plans.

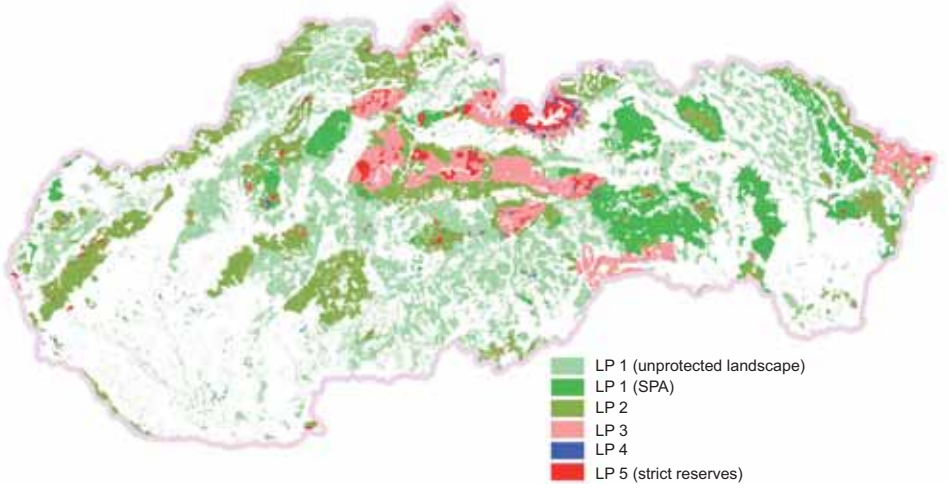


Figure 10.1-2 Forest land under different levels of protection

Source: ME SR 2017; NFC-IFRI Zvolen; Prepared by: NFC-FRI Zvolen, 2017; Updated to: 31 December 2016.

The 1st level of protection (the fewest restrictions apply) is used in the countryside outside PAs and in LSPAs. With each increasing level of protection, more restrictions are introduced. Forest management is entirely prohibited in areas under the strictest 5th level of protection. In lower protection levels, restrictions mostly apply to chemical pest control, forest road construction and clearcuts (Table and Figure 10.1-2). In overlapping PAs, the level of protection is specified by recently updated regulation.

Table 10.1-2 Protected areas by category and level of protection (forest crop land areas)

Protected area		SLevel of protection (ha)					Total
		1	2	3	4	5	
Protected Landscape Areas (PLA) [1)]		–	325.5	–	–	–	325.5
National Parks (NP)[1)]		–	–	191.7	–	–	191.7
NP buffer zones		–	127.6	–	–	–	127.6
ZZoned PLA[2)] and NP [3)]	LP 5	–	–	–	–	6.1	6.1
	LP 4	–	–	–	2.8	–	2.8
	LP 3	–	–	27.9	–	–	27.9
	LP 2	–	18.1	–	–	–	18.1
Small-scale Protected Areas (SSPA)	(National) Nature Reserves ((N)NR)[3)]	–	0	0	3.2	71.4	74.6
	(National) Nature Monuments ((N)NM)	–	0	0	0.5	0.5	1.0
	Protected Landscape Elements (PLE)	–	0	0	0	–	0.0
	Protected Sites (PS)	–	1.0	2.1	0.8	–	3.9
	SSPA buffer zones	–	0.1	0.4	4.2	–	4.7
Sites of Community Importance (SCI) – outside the national PA network		–	67.8	–	–	–	67.8
Special Protection Areas (SPA) – outside SCI and national PA network		291.3	–	–	–	–	291.32
Total		291.3	540	222.1	11.5	78.0	1142.9

Source: ME SR 2017 Updated to: 31 December 2016 Prepared by: NFC-FRI Zvolen, 20167
Note: [1)]Area without SSPA and zoned PLAs and NPs; [2)] Zoned PLA: Horná Orava; [3)]Zoned NP: PIENAP, Slovenský Raj

Compensations for restrictions in the management of forests on forest land and implemented forest protection measures based on §28, Sec. 3 of the Act No. 326/2005 Coll. on forests in the wording of the pursuant regulations

According to data provided by the Ministry of Defence of the Slovak Republic, compensations totalling €4,589,528 were granted in 2016 for the management restrictions imposed in forests on forest land. The sum was largely the same as in 2015.

In addition, the State Nature Conservancy of the Slovak Republic (SNC SR) implemented forest protection measures in buffer zones of 51 SSPAs, in which measures to control pest outbreaks and their spreading from the areas under the 5th level of protection were banned. To 31 January 2016, the SNC SR had to adjudicate on proposals of measures submitted by certified forest managers. The results were later submitted to the Forest Protection Service in Banská Štiavnica for approval. Approved measures were implemented by the SNC SR staff and/or contractors.

The following measures were implemented:

- pest monitoring in buffer zones of particular SSPAs (April-September) using 1,307 pheromone traps;
- salvage of infested trees and their assembly at forest depots (14,496 m^3), 809 m^3 were left in forest;
- set up of 200 trap trees;
- removal of 14,052 m^3 of sanitation debris (broken crown tops, debarked branches) to control pests in residual dendromass.

The measures were implemented under the supervision of forest managers responsible for particular forests and the SNC SR staff. They primarily focused on the protection of forests invaded and damaged by European spruce bark beetle (Ips typographus).

Based on the regulation jointly drafted by the Ministry of Agriculture and Rural Development of the Slovak Republic (No. 1856/2008-700) and the Ministry of the Environment of the Slovak Republic (No. 14037/2008-sopk), a list of endangered sites complete with proposed measures was compiled for 2017. Subsequently, the SNC SR prepared a report including the application for funding from the Environment Fund for 2017. Costs of implemented protection measures were covered by the Environment Fund (€450,900) and state budget (€23,732).

10.2 MANAGEMENT OF SMALL WATERCOURSES

The total length of watercourses in Slovakia is 61,100 km of which state forest enterprises manage over 19,400 km of small watercourses (SW). These flow not only through forests but also through residential areas and farmland. Decisions from 1997 on the management of watercourses made the Slovak Water Management Company, s.e. responsible for a number of watercourses previously managed by state forest enterprises. Transfer of management responsibilities has never been fully completed due to disputable ownership rights to land beneath water structures. As a result, the Company refuses to assume responsibility for these watercourses. Parts of small watercourses which flow through villages can be leased or loaned to interested villages that stand a better chance of securing funding for their regulation or flood prevention.

Table 10.2 Management of small watercourses

Length of watercourses managed by enterprise [1)]		Length of watercourses handed over to Slovak Water Management Company		Length of watercourses leased or lent to municipalities or other entities	
Status to 1 January 2016	Status to 31 December 2016	In 2016	Since 1997	In 2016	In 2004
km	km	km	km	km	km
19 407	19 442	0	3 802	52	530

Source: 2016 data provided by: 1)Forests of the Slovak Republic, s. e. Banská Bystrica; State Forests of TANAP; Military Forests and Estates, s. e. Pliešovce; Forests and Estates Uličˇ, s. e.; University Forest Enterprise Zvolen; State Forests Cemjata; State Forests Kysihýbel

The majority of funding available for repair and maintenance of these watercourses is used for flood damage repairs. Investments in maintenance and flood prevention are very limited due to the budget constraints of managing companies. State forest enterprises spent €566,000 on investments and maintenance of small watercourses in 2016. Costs of forest amelioration, mountain torrent regulation and protection of water regime totalled €31,000.

10.3 HUNTING

Hunting grounds

The total area of hunting grounds was 4.5 million ha, of which 2.3 million were on farmland and 2 million on forest land. Hunting grounds also included 51,000 ha of waterbodies and 66,000 ha of other land. There were 1,883 hunting grounds in Slovakia in 2016 with an average area of 2,366 ha.

Table 10.3-1 Hunting grounds

Indicator	Forests of the Slovak Republic, s. e	Other state enterprises	Non-state bodies	Leased grounds		Reserved grounds	Total
				Slovak Hunting Union	Other bodies		
Number	76	21	66	1 210	504	6	**1 883**
Total area (ha)	324 536	115 180	164 336	2 698 316	1 095 243	57 771	**4 455 382**
Average area (ha)	4 270	5 485	2 490	2 230	2 173	9 629	**2 366**

Source: Slovak Hunting Yearbook 2016;

Prepared by: NFC.

Main game species

Spring stocks of ungulates have annually increased. High numbers of red deer, fallow deer, mouflon and wild boar are largely undesirable due to the amount of damage they cause to forests and farmland. Conversely, the increase in roe deer population was very encouraging, especially following years of decline. Spring stocks of small game also marginally improved following years of steady decline. Compared to 2015, more specimens of red deer, fallow deer and roe deer were shot. The number of shot mouflon and wild boar remained unchanged.

Table 10.3-2 Management of ungulates and small game

Species	Number						
	Spring stock	Shooting plan	Shot	Trapped	Mortality	Total	Restocking
Red deer	67 225	38 262	35 268	83	2 646	37 997	30
Fallow deer	17 456	11 607	10 593	94	529	11 216	24
Mouflon	14 141	6 746	5 384	205	253	5 842	148
Roe deer	108 505	36 972	25 627	19	9 579	35 225	2
Wild boar	42 285	54 864	53 788	114	1 034	54 936	95
Pheasant	159 053	103 822	83 077	19	6 945	90 041	62 474
Hare	163 528	18 740	13 550	1 763	1 872	17 185	166
Rabbit	249	0	4	0	0	4	10
Partridge	4 384	1 465	1 195	0	87	1 282	1 462
Wild duck	53 860	0	14 915	242	649	15 806	1 904
Wild turkey	55	0	18	0	0	18	0
Hazel grouse	3 062	9	0	0	29	29	0

Source: Slovak Hunting Yearbook 2016; Prepared by: NFC.

Ever increasing numbers of ungulates jeopardise regeneration and development of young forests and result in substantial ecological and economic losses for the sector. Similarly detrimental is the impact of ungulates and wild boar populations on agricultural crops. High spring stocks of ungulates are a direct result of their inefficient management and misplanning when proposed shooting is not on a par with actual stocks. Likewise, proposed shooting numbers are not always met and game is often overfed with pellets and other food. This at a time when winters are getting milder and the need for additional fodder is less than before. Changes in farming practices and increased cultivation of corn, oilseed rape and sorghum also increase crop losses caused by game.

Other game species

The figures for large predators slightly increased. Chamois population in the High Tatra Mountains grew by 234 specimens. On the increase are common raven and other species of corvids while populations of capercaillie and black grouse are declining. Also on the increase are numbers of introduced species of golden jackal and raccoon dog

Table 10.3-3 Rare game species

Species	Number				
	Spring stock estimate to 31 March 2016	Shooting plan	Úbytok zver		
			Shot	Trapped	Mortality
Chamois subspecies tatrica	1 262	0	0	0	4
Chamois subspecies rupicapra	184	13	10	0	0
Brown bear	2 235	35	18	0	16
Grey wolf	2 540	0	48	0	7
Eurasian lynx	1 739	0	0	0	2
Wild cat	3 895	0	0	0	11
Capercaillie	1 121	0	0	0	1
Black grouse	749	0	0	0	0
Eurasian beaver	3 006	0	0	1	11

Source: Slovak Hunting Yearbook 2016; Prepared by: NFC.

Losses caused by ungulates and large predators

In 2016, losses caused by ungulates in forests and on farmland reached €1,376,000 which was €109,000 less than in 2015. Of the total loss, only 10% (€138,000) was compensated.

Table 10.3-4 Damage by ungulates

Sector	Damage (€)	Compensated (€)
Agriculture	907 874	89 461
Forestry	468 331	48 309
Total	**1 376 205**	**137 770**

Source: Slovak Hunting Yearbook 2015; Prepared by: NFC.

Contrary to ungulates, losses attributed to large predators annually increased by €341,000 and reached €1,752,000. The largest losses were caused by gray wolf (€1,292,000), Eurasian lynx (€323,000) and brown bear (€136,000). Most of the total loss occurred on game (€1,637,000). Losses in farming, horticulture and beekeeping came to €107,000. Of the total loss, only €64,800 was financially settled.

In order to decrease losses caused by ungulates it is vital to responsibly regulate spring stocks to ensure their numbers correspond with those recommended. It is important to regulate species composition and density of species as well as their social and age structure. Equally important is to achieve a balance between game breeding, forest management and growing farming crops. Numbers of brown bear and gray wolf must also be regulated, not only because of increasing losses in livestock, but also because of their high density in certain regions and consequent loss of shyness to humans. Last year, there were 38 reported attacks of brown bear on humans, of which 36 were only attempted attacks. There were six more brown bear attacks than in 2015.

Table 10.3-5 Damage by large predators

Damage			Predator species		
			Brown bear	Wolf	Lynx
Agriculture, gardens, allotments, bee keeping		Hodnota, €	80 050	26 302	600
		Uhradené, €	32 805	9 012	0
Game management and game species themselves		Hodnota, €	48 903	1 266 002	322 408
		Uhradené, €	1 388	17 870	509
Total	Damage (€)		**128 953**	**1 292 304**	**323 008**
	Compensated (€)		**34 193**	**26 882**	**509**
Attacks on humans		Attempted (No.)	36	0	0
		Completed (No.)	2	0	0

Source: Slovak Hunting Yearbook 2015; Prepared by: NFC.

Hunting economics

Fiscal profit for 2016 was €1,473,000. Total earnings were €14,546,000, total expenditure was €13,073,000. Profit was reported from leased hunting grounds of the Slovak Hunting Union (€1,532,000), hunting grounds of the Forests of the Slovak Republic, s.e. (€481,000), hunting grounds of other state enterprises (€133,000) and grounds of non-state enterprises (€23,000).

11 CONCLUSIONS AND RECOMMENDATIONS

11.1 CONCLUSIONS

Forests, their condition and development

- The area of forest land and forests have been increasing long-term.
- Tree vegetation which meets the international definition for forest can also be found on non-forest land (so-called "white plots"). The area of these forests (based on preliminary results of the 2nd cycle of the National Forest Inventory and Monitoring 2015-2016) is 288 ± 27 thousand ha.
- Forests on forest land are dominated by broadleaved tree species, European beech and oaks in particular. The share of coniferous species has been declining, chiefly due to the detrimental impact of harmful agents which is most apparent in spruce forests.
- Slovak forests are aging. The average age of all main tree species except for spruce is increasing. The decreasing average age of spruce is a direct result of a catastrophic decline of older spruce forests devastated by natural disturbances (windstorms, pest outbreaks).
- Actual age structure of Slovak forests is uneven. Higher than optimal is the percentage of forests above 70 years of age whilst percentage of younger forests is below optimal. This fact alone has increased regeneration felling as the area of forest coming to rotation age is higher than before.
- Growing stock is increasing as forests are getting older, but there are differences between the species. Growing stock of broadleaves is increasing, but that of conifers has been in steady decline since 2010 due to frequent natural disturbances, in spruce forests in particular.
- Increasing trend in growing stock has been confirmed by the results of the 2nd cycle of National Forest Inventory and Monitoring (2015-2016).
- Global climate change is expected to increase the frequency of climatic and weather extremes and bring a gradual decline in the occurrence of less resilient tree species.
- Contrary to the past, most damage in forests is caused by bark beetle and wood borer species which primarily infest coniferous forests. These pests are followed by abiotic agents (wind, snow, rime and drought). The most affected species are spruce and beech. This trend is expected to continue.
- Data on forests and their condition/development are provided through regular updates of forest management plans (summarised data) or via selective mathematical-statistical method used in the National Forest Inventory and Monitoring (NFIM SR). Both these sources provide a wide range of data on forests which are standardised to meet international requirements. The opportunity to compare data obtained by different methods from two independent sources is very valuable.

Forest management

- The majority of Slovak forests are production forests (72.2%). Second most common are protection forests (17.25%) in which ecological functions are of prime importance. Lastly, there are special-purpose forests (10.5%) in which social and cultural functions prevail. Current forest categories, which represent a basic tool for differentiated management of forests, need to be improved to incorporate the latest knowledge in systematics, financing and economics of forest functions and their sustainable exploitation.

- Successful regeneration of forests also depends on the availability of high quality forest reproductive material from approved sources for seed/fruit collection. The total area of approved forest stands is over 75,000 ha and has increased compared to 2015. The area of gene reserves is over 19,000 ha. Due to changing climatic conditions, it is recommended to re-assess the area and structure of available sources.
- More than 18,000 ha of forest were regenerated in 2016. Whenever possible, natural regeneration took priority and accounted for almost 40% of the regeneration. Natural regeneration needs to be directed towards future targeted tree species composition. Attention needs to be paid to achieve site suitable tree species composition of young forests and reduce the negative impact of ungulates.
- The extent of treatment of young stands (weed/game control, fencing and cleaning) has been on the increase since 2010, although a slight decrease was recorded in 2016 compared to 2015.
- Cleaning in state and municipal forests reflects the true needs of young stands and the actual volume exceeds the plan. In other categories of non-state forests, the cleaning volume is generally lower than planned. Thinning was realised on a lower than planned area (64% of the plan) due to a high volume of incidental felling.
- The density and quality of the forest road network are insufficient, especially in mountain areas. Limited accessibility of forests severely restricts the implementation of close-to-nature management practices and technologies.
- Felling is increasing mainly due to aging forests. The total felling reached 9.32 million m3 in 2016, of which 55% were softwoods and 45% hardwoods.
- Despite higher felling volumes, total current increment (timber volume accrued in forests per year) is consistently higher than felling. In 2016, the increment was 12.1 million m3.
- Incidental felling is consistently high. In 2016, it constituted 50.3% of the total felling. The main contributing factors are windthrow and subsequent calamitous outbreaks of secondary pests, European spruce bark beetle in particular.
- Incidental felling, in combination with higher planned and regeneration felling (owing to increasing growing stock), leads to an increase in the area of young forests of the 1st age class (≤ 10 years old) and further exacerbates the trend in the uneven age structure of Slovak forests.

Timber supply and economics of the forest sector

- The volume and value of raw timber supply are increasing. Compared to 2015, the supply of raw timber grew by 3%. Supplies of softwood increased, especially those for the domestic market, but hardwood supplies decreased.
- Raw timber export fell by 8.9% compared to 2015; the majority of exported timber went to EU countries. In the segment of softwood logs, the majority of exported logs were grades I-III. In hardwoods, most exports were logs of IV-V grades.
- Raw timber was exported mainly by non-forest timber trading companies and other enterprises which together exported 84% of the total export volume. Forest managing enterprises exported less than 400,000 m3, or 16%.
- The trend in average log grade prices remained largely stable; a marginal decline of 0.6% was reported compared to 2015.
- Sectoral earnings and revenue annually grew by 3.4%, chiefly due to increased earnings from timber trading.
- Other earnings and revenue in state forest enterprises decreased. This is in conflict with the desired sectoral diversification of activities/operations aimed at providing an extended range of paid beneficial services to the public.

- Sectoral costs slightly increased in 2016 mainly due to a higher percentage of silvicultural and felling operations.
- Profit of the sector reached €44.76 million in 2016. This economic result is comparable with the previous year. The economic result of state forest enterprises remained lower than that of non-state forest enterprises.
- Investments in the sector grew by 57% last year, chiefly due to funding available from the Rural Development Programme of the Slovak Republic 2014-2020 (RDP SR). The current programme presents opportunities for the funding of a number of forestry measures

Other conclusions

- In 2016, the Slovak Republic assumed the chairmanship of FOREST EUROPE, the most important pan-European political process on forest policies. Its Secretariat „Liaison Unit Bratislava" is based at the NFC in Zvolen. The ongoing chairmanship has strengthened the position of Slovakia in international forest politics.
- There is a disproportionately high percentage of forests in protected areas. Overlap of the national network of protected areas with the NATURA 2000 networks (SPA/SCI areas), their mutual incompatibility, insufficient identification of boundaries and their marking in the field, combined with unpredictable escalation of nature conservation requirements, burden forest managers with excess bureaucracy and create confusion concerning nature conservation restrictions in forest management.
- There is still a lack of effective methods of nature conservation which would balance sustainable use of natural resources with sustainable management of species and habitats through active management of protected areas.
- Despite economic indicators trending positive recently, no major growth in the competitiveness of the majority of timber processing units has been observed and that includes a lack of growth in the production of added value products. Production mostly consists of intermediate products supplied to foreign companies.
- Contrary to timber processing, the pulp and papermaking sector belongs to one of the most profitable and competitive sectors of the national economy.
- There is a lack of facilities for the processing of the highest quality softwood/hardwood roundwood.
- Organisations of the forest sector organised a wide range of public events in 2016 including forest education activities

11.2 RECOMMENDATIONS

- Implement the following forest policy documents: the Action Plan of the National Forest Programme 2014-2020 and the Action Plan of the National Programme on the Utilization of Available Timber Resource which also include measures on current forest-related issues and provide opportunities for the further development of both forest and timber processing sectors.
- Ensure sufficient funding is available for forest research from domestic sources and international research programmes.
- Process and release results from the 2nd cycle of the National Forest Inventory and Monitoring (NFIM SR 2015-2016); continue the monitoring of forests and development of its methods in line with the ongoing integration process.

- Evaluate possibilities and introduce systematic felling regulation to effectively manage growing felling possibilities and high rates of incidental felling. For this purpose, use methods of mathematic modelling to gradually improve the current uneven age structure of Slovak forests.
- Promote mechanical and biological methods of forest protection in place of chemical methods, making use of the funding available through RDP SR 2014-2020.
- Ensure regular monitoring of harmful agents including those which are less important or introduced; make better use of the Forest Protection Service expertise and share data through the electronic forest protection information system.
- Draft measures to reduce high spring stocks of ungulates to a manageable level.
- Intensify cooperation with the State Nature Conservancy of the Slovak Republic to achieve nature conservation goals through active management of protected areas and forests.
- Gradually optimise density and increase the quality of the forest road network by constructing new roads and reconstructing existing forest roads using RDP SR 2014-2020 funding.
- Create conditions and improve possibilities for the implementation of innovative approaches in the area of non-timber products and services to encourage income diversification.
- Introduce a new system of forest property taxation which would better reflect the production capacity of forests and restrict the excessively high tax burden of forest enterprises.
- Improve public awareness on the importance of sustainable management of forests and the practical advantages of using wood compared to other materials.
- Continue in organising public activities/events with an emphasis on forest education and assess possibilities for its regular funding..

12 ACRONYMS AND ABBREVIATIONS

- AFSE – Association of Forest Sector Employers
- APA – Agricultural Paying Agency
- CFM – Certified forest manager
- CNFOA – Council of the Non-state Forest Owner Associations
- COFFI– Committee of Forests and the Forest Industry
- COFO – Committee on Forestry (FAO)
- COP – Conference of Parties
- EFI – European Forestry Institute
- ELM – Expert Level Meeting
- EU – European Union
- FAO – Food and Agriculture Organisation
- FCL – forest cropland
- FE – Forest enterprise
- FE – FOREST EUROPE
- FM – Forest management
- FM – Forest Management
- FMP – forest management programme (plan)
- FRM – forest reproductive material (planting and seeding stock)
- FSC – Forest Stewardship Council
- FU – Forest unit
- GCC – General Coordinating Committee
- GDP – Gross Domestic Product
- GIS – Geographic information system
- IF – Incidental felling
- IP – Inventory plot
- ISTA – International Seed Testing Association
- LPM – Forests and Estates Uličˇ, state enterprise
- LSPA – large-scale protected area
- LUB – Liaison Unit Bratislava (of FOREST EUROPE)
- LULUCF – Land Use, Land-Use Change and Forestry
- MARD SR – Ministry of Agriculture and Rural Development of the SR
- MCPFE – Ministerial Conference on Protection of Forests in Europe
- ME SR – Ministry of the Environment of the SR
- MFE SR – Military Forests and Estates of the Slovak Republic, state enterprise
- NATURA 2000 – European Union network of protected areas
- NFC – National Forest Centre
- NFC-FRI – National Forest Centre – Forestry research institute
- NFC-IFRI – National Forest Centre – Institute for Forest Resources and Information
- NFIM SR – National Forest Inventory and Monitoring of SR
- NNM – National nature monument
- NNR – National nature reserve
- NP – National park
- NPUATR SR – National Programme on the Utilization of Available Timber Resource of the SR
- NR – Nature reserve
- NSF – non-state forests; non-state forest enterprises
- OECD – Organisation for Economic Co-operation and Development
- PA – Protected area
- PEFC – Programme for the Endorsement of Forest Certification
- PLA – Protected landscape area
- PMP – permanent monitoring plot
- PPI – pulp and papermaking industry
- PS – Protected site
- RDP SR – Rural Development Programme of the Slovak Republic
- RES – renewable energy sources
- SAF – state administration on forests

- SAFH – state administration on forests and hunting
- SCI – Site of Community Importance (Natura 2000)
- SF TANAP – State Forests of Tatra National Park
- SFE – state forest enterprise
- SFCH – Slovak Forestry Chamber
- SFM – sustainable forest management
- SFMU – spatial forest management unit
- SHA – Slovak Hunting Association
- SHCH – Slovak Hunting Chamber
- SK PRES – Slovak Presidency of the Council of the EU
- SLF – Slovak Land Fund
- SLHaSD – Department of Forestry and Wood Processing
- SO SR – Statistical Office of SR
- SPA – Special Protection Area (Natura 2000)
- SS – spring stock
- SSPA – Small-scale Protected Area
- TANAP – Tatra National Park
- TCI – total current increment
- timber. i. b. – timber inside bark
- TU – Technical University in Zvolen
- UFE – University Forest Enterprise of the Technical University in Zvolen
- UN – United Nations (Organisation)
- UNECE – United Nations Economic Commission for Europe
- UNESCO – United Nations Educational, Scientific and Cultural Organization
- UNFCCC – United Nations Framework Convention on Climate Change
- UNFF – United Nations Forum on Forests
- WPI – wood processing industry
- WWF – World Wildlife Fund

Responsible organization
National Forest Centre

Authors of National Forest Centre
Ing. Martin Moravčík, CSc., Ing. Miroslav Kovalčík, PhD., Ing. Dagmar Bednárová, PhD.,
Ing. Bc. Ľuboš Halvoň, PhD., Ing. Peter Kaštier, PhD., Ing. Andrej Kunca, PhD.,
Ing. Valéria Longauerová, PhD., Ing. Anna Miková, Ing. Milan Oravec, CSc., Ing. Jozef Pajtík, PhD.,
Ing. Pavel Pavlenda, PhD., Ing. Zuzana Sarvašová, PhD., Ing. Matej Schwarz

Photographs
Ing. Marián Slamka, PhD., Ing. Matej Schwarz

Graphics & design
Alexandra Koštialová

Contributing partners
Ministerstvo pôdohospodárstva a rozvoja vidieka Slovenskej republiky
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Štatistický úrad Slovenskej republiky
Pôdohospodárska platobná agentúra, Bratislava
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Lesy Slovenskej republiky, štátny podnik, Banská Bystrica
Lesopoľnohospodársky majetok Ulič, štátny podnik
Štátne lesy Tatranského národného parku Tatranská Lomnica
Vojenské lesy a majetky SR, štátny podnik Pliešovce
Rada združení vlastníkov neštátnych lesov, Zvolen
Technická univerzita vo Zvolene a Vysokoškolský lesnícky podnik vo Zvolene
Ústav ekológie lesa pri Slovenskej akadémii vied vo Zvolene
Stredná odborná škola lesnícka, Liptovský Hrádok
Stredná odborná škola lesnícka, Banská Štiavnica
Stredná lesnícka škole, Prešov; Školské lesy Cemjata
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