

Forest functions

Forests fulfil diverse functions, either naturally or as a result of human activities:

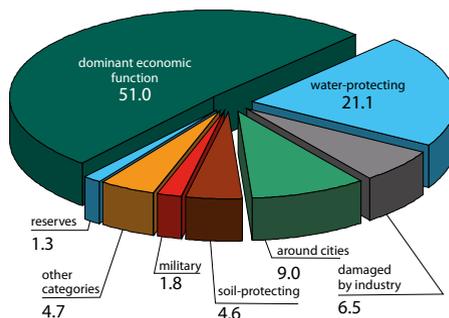
- **Ecological (protective) functions:** favourable impact on shaping of the local and global climate, regulation of water cycle in nature, prevention of floods, avalanches and landslides, protection of soil against erosion and landscape against steepization;
- **Social functions:** providing health-improving and recreational conditions for society and contributing to the labour market;
- **Productive (economic) functions:** primarily production of renewable biomass, including timber and non-timber products.

The statutory obligation of the State Forests is to pursue sustainable forest management in order to ensure preservation of forests, increase of forest resources and their continuous multifunctional utilisation.

Protective forests

Ecological and social functions of forests, often referred to as non-productive functions, have long been recognised in forest management which began to distinguish a category of protective forests as early as in 1957. The total area of protective forests managed by the State Forests, as of 31 December 2011, amounted to 3372 thousand hectares, which represents 47.7% of the total forest area, or 49.0% including nature reserves. Water-protecting forests occupy the largest area of 1490 thousand hectares, forests surrounding conurbations – 636 thousand hectares, forests in areas damaged by industry – 462 thousand hectares and soil-protecting forests – 324 thousand hectares. The majority of protective forests are located in

the mountain regions and in areas affected by industry.



Share of protective forests in the State Forests in 2011 (in %)

Depending on their predominant function, protective forests are subject to modified management procedures, including limits on clear-cutting, increase of rotation age, adjustment of species composition according to functions served and provision of recreational facilities.

Carbon sequestration

Assessment of the amount of carbon absorbed by ecosystems (including forests) was, until recently, of almost exclusively scientific interest. The growing threat of climate warming caused by the increased concentration of atmospheric CO₂ and the social awareness of this threat, have brought about a more practical approach which was expressed in the *Kyoto Protocol* (16 February 2005). The Protocol listed and evaluated various forestry-related actions aimed at increasing carbon sequestration and included them in the total balance of greenhouse gas emission and absorption.

According to the estimates based on the available data on timber resources, the forest

biomass in Poland contains 1099 million tonnes of carbon, of which 26 million tonnes occur in dead wood (*State of Europe's Forests 2011*, SoEF 2011).

Reduction of the concentrations of greenhouse gases can be achieved by appropriate forest management, for example by utilising post-agricultural land to increase afforested areas and by including fast-growing species in forest regeneration. The State Forests' aims resulting from the Forest Act are in line with the goals set out in the *Kyoto Protocol*. This is demonstrated by the increase in the last decade of forest area by 109 thousand hectares and of resources by 406 million m³. The average standing volume in the same period increased from 213 to 267 m³/ha.

Aims and objectives of the State Forests

In accordance with the provisions of the Forest Act of 28 September 1991 (with its later amendments) and the regulations and ordinances resulting from it, the main aim of the State Forests is to manage the forests according to the principles of universal protection of forests, maintaining their permanence, continuous and sustainable use of all forest functions and augmentation of forest resources.

This aim is pursued through sustainable, multifunctional forest management in accordance with forest management plans drawn up for each forest district for a ten-year period. Each plan sets out objectives of silvicultural management and protection of specified parts of forests (stands) and methods of achieving them.

The State Forests administers the state-owned forests (other than national parks, the land administered by the Agricultural Property Agency or leased under a perpetual lease agreement). This involves managing forests and other land and property, monitoring forest condition, keeping and updating data on forest area size and timber resources, monitoring and forecasting the level of fire hazard and the occurrence of insect pests and fungal diseases of trees.

The State Forests funds forest science research which contributes to the advancement of forestry and forest management methods. Whenever the natural, social and economic conditions allow, the State Forests implements the international agreements as laid down in:

- the *Forestry Principles and Agenda 21* adopted at the 1992 Earth Summit in Rio de Janeiro;
- the *Declaration of European Forestry Ministers* concerning the Protection of European Forests (Strasbourg 1990, Helsinki 1993, Lisbon 1998, Vienna 2003, Warsaw 2007, Oslo 2011);
- the *Kyoto Protocol (1997)* concerning the role of forests in carbon sequestration.

Since Poland's accession to the European Union on 1 May 2004, the State Forests has also been obliged, within its remit, to implement the European Natura 2000 programme resulting from:

- *Directive 79/409/EEC* of 2 April 1979 concerning the conservation of wild birds
- *Directive 92/43/EEC* of 21 May 1992 concerning the conservation of natural habitats and wild fauna and flora.

Other important objectives of the State Forests are to make forests accessible to society and to increase society's awareness of ecological issues by providing forest and nature education.

Structure, employment and research

Organisational structure

The State Forests is a state organisational unit which administers property on behalf of the Treasury and does not have legal personality. It operates on a self-financing basis.

The State Forests is headed by the Director-General, assisted by the Directorate-General and the directors of regional directorates.

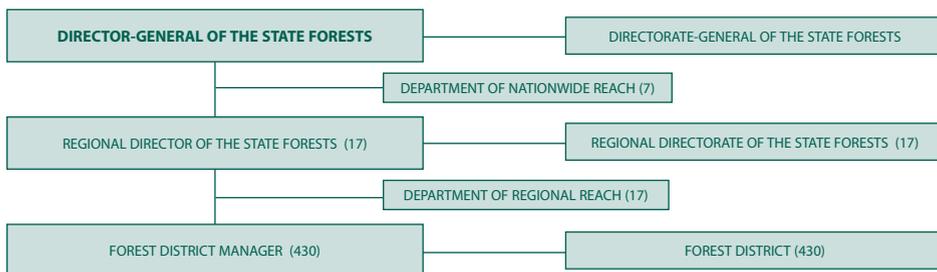
As of 31 December 2011, the State Forests comprised the following organisational units:

- Directorate-General of the State Forests (DGSF);
- 17 regional directorates of the State Forests (RDSF);
- 430 forest districts;
- 17 organisational units (departments) with regional authority reporting to the regional directors of the State Forests (transport and logistics – 2, forest transport – 2, forest services – 2, service and production – 3, storage complexes – 4, fisheries – 2, training and recreation centres – 2);

- 7 organisational units (departments) with national authority, five of which report to the Director-General of the State Forests (the Centre for Research and Implementation in Bedoń, the State Forests Information Centre in Warsaw, the Forest Technology Centre in Jarocin, the State Forests IT Department in Bedoń and the Environmental Projects Co-ordination Centre in Warsaw). Two organisational units (the Kostrzyca Forest Gene Bank in Miłków and the Forest Culture Centre in Gołuchów) report to the regional directors of Wrocław and Poznań RDSFs, respectively.

The remaining integral parts of the Directorate-General of the State Forests comprise 9 forest protection teams and 11 regional inspectorates.

Fundamental organisational units of the State Forests are forest districts. Each is led by a forest district manager who has the autonomy in managing forests in his area according to the forest management plan and who is responsible for their condition. In 2011 there were 430 forest districts with an average area of 17.5 thousand hectares. There were some changes made to the boundaries of four forest districts and one storage complex was closed.



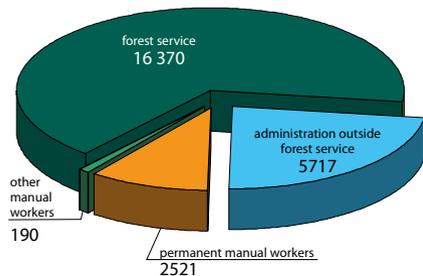
The three-tier structure of the State Forests (status as of 31 December 2011)

Employment

The average monthly employment in the State Forests in 2011 was 24 798 staff.

The employment structure was as follows (in number of staff):

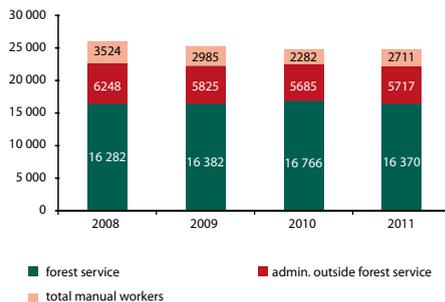
- | | |
|---------------------------------------------------------------------------------------------------------------------------|--------|
| 1. In forest districts | 22 576 |
| including: | |
| – forest service | 15 682 |
| – non-manual posts outside forest service | 4 720 |
| – manual posts | 2 174 |
| 2. In departments | 981 |
| Including non-manual posts | 505 |
| 3. In the Directorate-General and in regional directorates (including regional inspectorates and forest protection teams) | 1 241 |
| including forest service | 678 |



Employment structure in the State Forests in 2011

There has been a downward trend in the average employment in the State Forests in the period 2008-2010 but in 2011 the average monthly employment increased by 65 persons, as compared with the previous year.

As of 31 December 2011, the total of 24 777 people were employed in the State Forests, a decrease of 84 as compared with the last day of 2010.



Employment in the State Forests in 2008–2011

Research

The Directorate-General of the State Forests sponsored various research projects in 2011, which were important to the development of all areas of forestry. Most research was carried out at the Forest Research Institute.

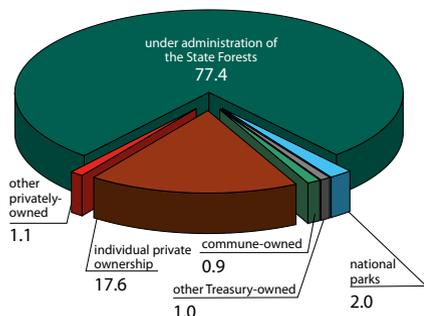
69 research themes were pursued in 2011, costing the State Forests PLN 29 368.6 thousand in total. Of these, 37 themes were executed at the Forest Research Institute, costing PLN 20 020.8 thousand, and the rest involved universities and other research institutions at a cost of PLN 9 347.8 thousand.

The results of the research were communicated to the relevant units of the State Forests and other organisations to be implemented as appropriate.

The resources of the State Forests

The forest area in Poland amounts to 9143.6 thousand hectares (as of 31 December 2011, Central Statistical Office), which puts the forest cover at

29.2%. The majority of forests (81.3%) are publicly-owned, including those administered by the State Forests (77.4%).



Ownership structure of forests in Poland in % (Central Statistical Office)

Land use structure

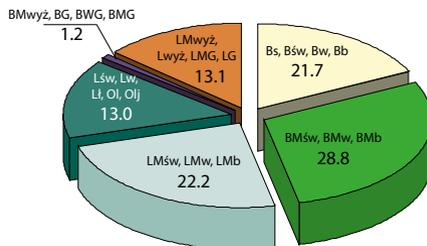
As of 31 December 2011, the total area of land administered by the State Forests amounted to 7 596 796 hectares and it was structured as follows:

– forests, total	7 277 128,01 ha
including: afforested land	6 972 127,69 ha
non-afforested land	104 502,47 ha
– agricultural land	147 286,04 ha
– wasteland	101 279,54 ha
– waters	8 957,97 ha
– landscape tree and shrub planting	12 166,78 ha.

Areal structure of habitats and dominant tree species

Forests in Poland mainly occur on the poorest soils, which is reflected in the structure of forest habitat types. Coniferous forest habitats predominate, accounting for 51.7% of the total forest area, while broadleaved forest habitats account

for 48.3%. In both groups, upland habitats occupy 5.7 % of the forest area and mountain habitats 8.6%.



Legend:

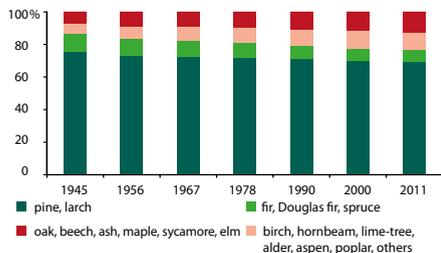
<i>Bb</i> – bog coniferous forest	<i>Lj</i> – riparian forest
<i>BG</i> – montane coniferous forest	<i>Lmb</i> – bog mixed broadleaved forest
<i>Bmb</i> – bog mixed coniferous forest	<i>LMG</i> – montane mixed broadleaved forest
<i>BMG</i> – montane mixed coniferous forest	<i>LMśw</i> – fresh mixed broadleaved forest
<i>BMśw</i> – fresh mixed coniferous forest	<i>LMw</i> – moist mixed broadleaved forest
<i>BMw</i> – moist mixed coniferous forest	<i>LMwyz</i> – upland mixed broadleaved forest
<i>BMwyz</i> – upland mixed coniferous forest	<i>Lśw</i> – fresh broadleaved forest
<i>Bs</i> – dry coniferous forest	<i>Bśw</i> – fresh coniferous forest
<i>Bśw</i> – fresh coniferous forest	<i>Lw</i> – moist broadleaved forest
<i>Bw</i> – moist coniferous forest	<i>Lwyz</i> – upland broadleaved forest
<i>BWG</i> – high-mountain coniferous forest	<i>Oj</i> – alder forest
<i>LG</i> – montane broadleaved forest	<i>Ojj</i> – alder-ash forest

Areal share (in %) of forest habitat types in forests in all ownership categories (Large-Scale Forest Inventory)

Coniferous species dominate in Polish forests, accounting for 70.3% of the total forest area. Poland offers optimal climatic and site conditions for pine (61.7% of the State Forests area) within its Euro-Asiatic natural range, which resulted in development of a number of important ecotypes (e.g. the Taborska pine or the Augustowska pine).

In the period 1945–2011, the species structure of Poland's forests substantially changed, resulting in an increase in the share of stands with the prevalence of broadleaved species. In the State

Forests the area of broadleaved stands increased from 13.0% to 23.2%.

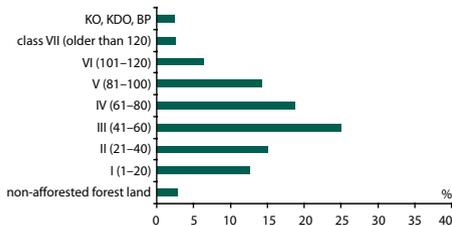


Areal share of dominant tree species in the forests administered by the State Forests in 1945–2011 (Forest Management and Geodesy Bureau, Central Statistical Office).

Age structure

Stands aged 41–80 years, representing age classes III and IV, prevail in the age structure of forests and cover 26.7% and 18.5% of the forest area, respectively. Stands older than 100 years, including stands in the restocking class (KO), stands in the class for restocking (KDO) and stands with selection structure (BP), account for 11.7% of the forest area managed by the State Forest. The share of non-afforested land accounts for 2.9%.

A steady increase in the share of stands older than 80 years from about 0.9 million hectares in



Areal share of stands by age class in the State Forests (Large-Scale Forest Inventory)

1945 to 1.93 million hectares (excluding the KO and KDO classes) in the period 2007–2011 indicates that the age structure of forests is changing. In the same period, according to the Large-Scale Forest Inventory, the average age of stands within the State Forests was 57 years.

Afforestation

The basis for all afforestation activities in Poland is the *National programme for the augmentation of forest cover*, which was commissioned by the Ministry of the Environment and prepared by the Forest Research Institute in 1995. The experience gained during the implementation necessitated some modification of the programme, which was completed in 2002. The area designated for afforestation in 2001–2020 was increased by 100 thousand hectares to 680 thousand hectares and afforestation preferences for each commune in Poland were revised.

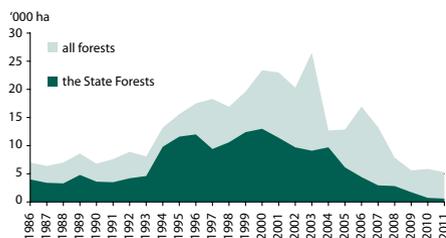
The programme's main aims are to increase the forest cover to 30% by 2020 and to 33% by 2050, to ensure an optimal spatial and temporal distribution of afforestation and to set ecological and economic priorities and tools for its implementation.

Afforestation of land under all ownership categories carried out in 2011 covered 5277.1 hectares. The largest area was afforested in the Warmińsko-Mazurskie province at 1045.2 hectares and in the Mazowieckie province at 763.9 hectares, while the smallest – in the Małopolskie province at 56 hectares and in Śląskie province at 76.1 hectares. The area afforested in 2011 was by 588 hectares (10%) smaller in comparison with the previous year. Afforestation resulting from natural succession occurred on about 169 hectares (209 hectares in 2010), according to the figures from the Central Statistical Office.

The current level of implementation of the *National program for the augmentation of forest cover* is shown in the table below:

Ownership category	1995–2000		2001–2010		2011–2020	
	plan ('000 ha)	imple-mentation (%)	plan ('000 ha)	imple-mentation (%)	plan ('000 ha)	imple-mentation to 2011 (%)
Treasury	50	140	90	69	40	2
Private and commune-owned	50	82	190	45	360	1
Total	100	111	280	53	400	1

Thanks to the subsidies from the state budget and a loan from the European Investment Bank, the afforestation process within the State Forests accelerated after 1994, in comparison with the period 1988–1993 when the average area of afforested post-agricultural land and wasteland was 3.9 thousand hectares per year. Between 1994 and 2004 the average afforested area stood at 10.8 thousand hectares. Since 2005, a steady decline in the afforestation rate has been noted, with 6.1 thousand hectares in 2005 and only 0.6 thousand hectares in 2011.



The level of artificial afforestation in Poland in the years 1986–2011 (Central Statistical Office)

The total area afforested between 1995 and 2010 amounted to 132.4 thousand hectares of the state-owned land, of which 127.7 thousand hectares were within the State Forests. Areas afforested by

way of natural succession were approximately 3.2 thousand hectares.

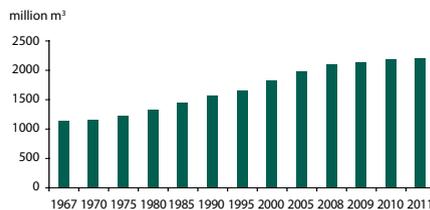
The main problem in implementing the *National programme for the augmentation of forest cover* on the state-owned land is a significant reduction in the area of post-agricultural land and wasteland designated for afforestation by the Agricultural Property Agency.

In addition to afforestation of post-agricultural land and wasteland, forest plantations are being established in areas cleared of mature stands. The area restocked in 2011 covered 51 182 hectares of land under all ownership categories, of which 6215.2 hectares (12.1%) were naturally regenerated.

Timber resources

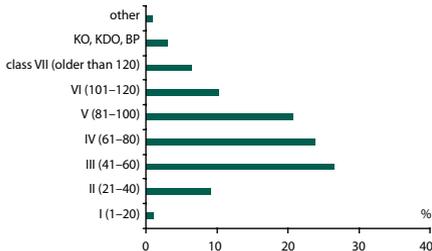
According to the Large-Scale Forest Inventory, the timber resources in forests under all forms of ownership in the years 2007–2011 totalled at 2372 million m³ gross merchantable timber, of which 1886 million m³ were in the State Forests. The most recent update of 1 January 2011 puts timber resources in the forests managed by the State Forests at 1772 million m³ of gross merchantable timber.

There has been a steady growth of timber resources since the first inventory in the State Forests took place in 1967.



Timber resources in the State Forests in 1967–2011, in million m³ of gross merchantable timber

Stands in the age class 41–80 years account for 50.4% of timber resources within the State Forests. The volume of stands older than 100 years, together with those in classes KO, KDO and BP, accounts for 18%.



Volume structure of timber resources by age class in the State Forests (Large-Scale Forest Inventory)

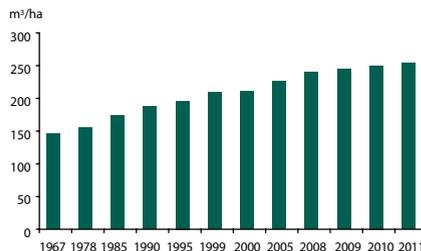
Pine has the largest share in the volume of timber resources in the State Forests and accounts for 64.3%. The share of broadleaved timber resources in the State Forests is smaller than in private forests.

According to the latest update of 1 January 2011, the average standing volume of afforested forest land in the State Forests was 254 m³/ha. The average standing volume in relation to the total forest area managed by the State Forests, based on the Large-Scale Forest Inventory data, was 267 m³/ha.

From January 1991 to January 2011, in the forests managed by the State Forests, the gross merchantable timber increment amounted to 1088 million m³. During that period 606 million m³ of merchantable timber was harvested, which means that 482 million m³ of gross merchantable timber, representing 44% of total increment, remained to augment the standing timber resources.

The current annual volume increment of gross merchantable timber, calculated for the last 20

years (1991–2011) from the difference in volume at the end (January 2011) and at the beginning (January 1991) of that period, including harvest and calculated per hectare of forest area administered by the State Forests, is 7.8 m³/ha. The current annual increment of gross merchantable timber calculated in the same way for the last five years is 9.4 m³/ha.



Average standing volume in the State Forests, 1967–2011 in m³/ha of gross merchantable timber (Central Statistical Office, Forest Management and Geodesy Bureau, Large-Scale Forest Inventory)

The steady increase in timber resources (standing volume per hectare) is evident in all age classes (except KO/KDO). In the State Forests it is achieved as a result of harvesting in accordance with the principle of forest sustainability and of persistent augmentation of the forest area. To some extent it may also be due to more accurate inventory methods.

Silviculture

Silvicultural aims and principles

The aim of silviculture is to ensure the sustainability and continuity of development of forest ecosystems. This is achieved by using

methods of stand regeneration and of profiling species and age structures, which are based on natural processes. These renewal, tending and protective methods are used at all stages of stand development.

In the State Forests much attention is being given to the ecological bases for the development of trees and forest stands. This is reflected in a thorough assessment of soil/site conditions, which is essential in preserving or restoring the compatibility of habitats with species composition and in protecting near-natural ecosystems (eg. riparian and alder forests, mid-forest water bodies and watercourses, mires, peatbogs, heather moors, habitats of rare plant species and animals refuges).

The most important forest management activities undertaken in the State Forests in 2011 were as follows (numbers in hectares):

1. Nursery production (total productive area of forest nurseries)	2 407
2. Restocking and afforestation (including filling gaps and introduction of the second storey)	54 926
including:	
– natural regeneration	5 063
– afforestation, in total	709
including: natural succession	167
3. Fill planting and supplementary planting	5 047
4. Forest tending, total	299 067
including:	
– underbrush	1 071
– soil preparation and weed control	148 634
– early cleaning	64 185
– late cleaning	85 034
5. Thinning, total	443 736
including:	
– early thinning	115 011

6. Land melioration, in total	63 265
including:	
– mineral fertilizing of forests	60
7. Stand conversion, total	9 776

Forest protection

Forests in Poland are among the most threatened in Europe due to a constant and simultaneous impact of a number of factors which have damaging influence on the health of forests. The negative phenomena, often called stress factors, can be classified with respect to:

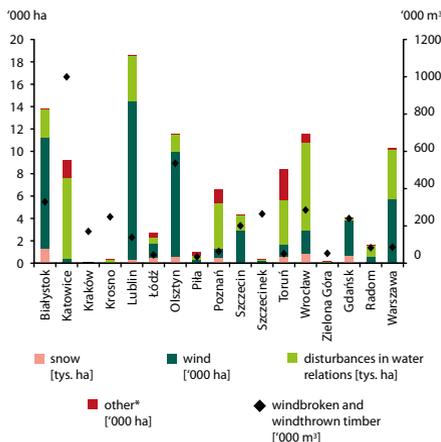
- their origin into: abiotic, biotic and anthropogenic;
- character of impact into: physiological, mechanical and chemical;
- duration of impact into: chronic and periodical;
- their role in morbidity into: predisposing, initiating and contributing.

The impact of stress factors on the forest environment is complex and frequently synergic. Moreover, the response to a stress factor can be delayed. This makes the interpretation of observed phenomena very difficult, particularly establishing direct cause-and-effect relationships.

Threats to forests posed by abiotic factors

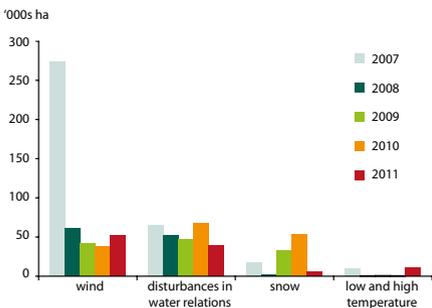
In 2011 (October 2010 – September 2011), damage caused by abiotic factors to the forests managed by the State Forests was reported on 104.6 thousand hectares of stands over the age of 20 years. Almost 52 thousand hectares of stands were damaged by wind, nearly 40 thousand hectares by groundwater level fluctuations, 5.5 thousand hectares by snowfall, 1.9 thousand

hectares by polluting emissions and 5.2 thousand hectares by low or high temperatures.



Area of damage caused by selected abiotic factors to stands over 20 years and the volume of harvested windbroken and windthrown timber, by RDSF, in 2011

* hail, emissions, low and high temperatures, fires



Area of damage caused by abiotic factors to the forests administered by the State Forests between 2007–2011

In 2011, the largest area (18.6 thousand hectares) of damage to forests caused by abiotic

factors was noted in the Lublin RDSF. Measured by the volume of harvested windbroken and windthrown timber, the greatest damage to stands occurred in the territories of regional directorates of Katowice (1 million m³), Olsztyn (536 thousand m³) and Białystok (329 thousand m³).

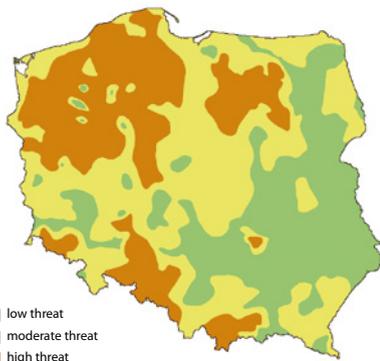
The data for the period 2007–2011 show that forests are exposed to a constant pressure associated with adverse thermal conditions and fluctuations in the groundwater level, as well as a random occurrence of other factors.

Threats to forests posed by biotic factors

Threat from insects

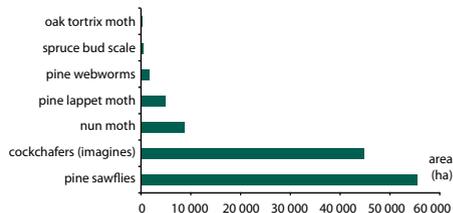
Poland is in the group of countries in which unfavourable phenomena in forests, such as mass outbreaks of insect pests or infectious fungal diseases, occur with large variety and high intensity. The geographical distribution of damage to forest stands by insect pests shows that most threatened are the stands in northern Poland (western part of the Mazury lakeland), in the north-west (the Pomorze and Wielkopolskie lakelands) and in three southern regions (the Sudety mountains, Śląsk Opolski and the Beskid Wysoki mountains). The threat to forests in southern Poland is almost entirely attributed to secondary pests and in other regions of the country – to primary pests (mainly nun moth).

The activity of insect pests in 2011 increased by nearly 180%, in comparison with the previous year. The control treatment aimed at reducing populations of almost 50 insect species covered an overall area of 128.2 thousand hectares, which is almost 114 thousand hectares more than in 2010. This increase was mainly due to yet another outbreak of cockchafer *Melolontha* spp. and to the growth in size of populations of sawflies *Diprionidae*, nun moth *Lymantria monacha* L. and pine lappet moth *Dendrolimus pini* L.



Areas threatened by forest insect pests, both primary and secondary (Forest Research Institute)

- Chemical treatment against folivorous insects was carried out on 70.6 thousand hectares of pine stands, an increase by 70.2 thousand hectares in comparison with 2010.
- Chemical treatment against folivorous insects covered nearly 45.3 thousand hectares of broadleaved stands, an increase by 42.9 thousand hectares in comparison with 2010.
- The total area of pine plantations and young stands subject to pest control treatment was 11.5 thousand hectares, an increase of 3.2 thousand hectares in comparison with 2010.
- Salvation measures taken against root pests of forest trees and shrubs were applied to plantations and nurseries in areas totalling 240 hectares.
- Of the major folivorous insect pests, pine sawflies were controlled on the largest area of 55 378 hectares, cockchafer imagines on 44 894 hectares, nun moth on 8640 hectares, pine lappet moth on 4915 hectares and pine webworm (*Acantholyda nemoralis* L.) on 1703 hectares.



Area of stands covered by protective treatment against major folivorous insect pests in 2011

In Poland, the greatest dynamic is observed among the folivorous species which attack older pine stands, mainly: nun moth (*Lymantria monacha* L.), sawflies (*Diprionidae*), pine lappet moth (*Dendrolimus pini* L.), pine looper moth (*Bupalus piniarius* L.), pine beauty moth (*Panolis flammea* Den. et Schiff.) and pine webworm (*Acantholyda nemoralis* L.). The outbreaks occur cyclically.

Among the most dangerous forest insect pests in the past few years have been cockchafers *Melolontha melolontha* L. and *M. hippocastani* Fabr. Treatment covered a total area of 45 thousand hectares, including 15.5 thousand hectares in Łódź RDSF, 9.5 thousand hectares in Radom RDSF, 9 thousand hectares in Lublin RDSF and 4.7 thousand hectares in Toruń RDSF.

In 2011, damage to stands caused by pests attacking root system was reported on 27 079 hectares of stands, of which 27 067 hectares were damaged by cockchafer larvae. The threat to forest nurseries and plantations from cockchafer larvae has remained at a high level in recent years.

In 2003, the area threatened by nun moth was about 320 thousand hectares (treatment covered 120 thousand hectares) but the threat from this pest steadily decreased over the next few years. This trend was reversed in 2010 when the threatened area increased to 31.3 thousand hectares. 2011 saw almost a four-fold increase on the previous

year – 115.5 thousand hectares were affected and treatment covered 8.6 thousand hectares.

In the last few years, the area affected by pine sawflies stayed between 20 and 25 thousand hectares. In 2011 the threat suddenly increased and the pest was reported on 98 thousand hectares of pine stands, of which 55 thousand hectares were treated.

In 2011, there was also an increase in the area of plantations and young stands threatened by insect pests – 22 thousand hectares were affected and 11.5 thousand hectares were treated (an increase of 3.5 and 3.2 thousand hectares, respectively, on 2010).

In the year between 1 October 2010 and 30 September 2011, the most active secondary insect pests were: *Phaenops cynaea*, weevils and pine-shoot beetles in pine stands, European spruce bark beetles and two-spotted oak borers. These outbreaks were associated with the weakening of stands by abiotic factors, such as changes in the groundwater level, wind, snow or low and high temperatures.

Threats from infectious fungal diseases

In 2011, infectious diseases were reported over a total area of 401.28 thousand hectares of stands, an increase by 17.2 thousand hectares as compared with 2010.

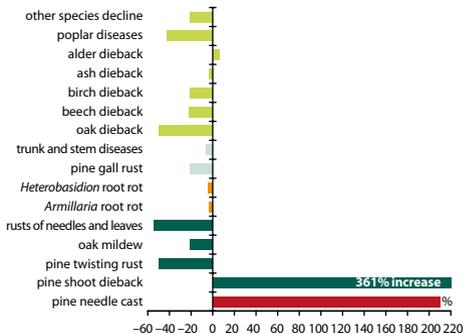
The most important change in the level of threat concerns the outbreak of pine shoot dieback which was reported on the total area of 38.5 thousand hectares. Compared with 2010, the affected area was 37 times larger and 96% of damage was located in the Toruń RDSF.

There was a threefold increase in the area affected by pine needle cast but other diseases of assimilatory apparatus (pine twisting rust, oak mildew, rust) were reported on smaller areas than in 2010 (respectively by 50%, 21% and 54%).

The improvement in health condition of broadleaved stands continued. Areas affected by

dieback of oak, beech, birch and ash decreased by, respectively, 50%, 22%, 20% and 3%. Poplar diseases taken together (cankers and tree dieback) decreased by 42%. Only alder dieback increased slightly, affecting an area larger by 190 hectares than in the previous year.

A decrease was also noted in the area of forests affected by pine gall rust and trunk and stem diseases (by 20% and 6% respectively). Generally, the occurrence of root rot diseases was reported in an area smaller by 9.5 thousand hectares. The area of stands affected by the *Armillaria* root rot decreased by nearly 3% and by *Heterobasidion* root rot by over 4%.



Changes in the area of occurrence of infectious diseases in 2011, in comparison with 2010 (in %)

Damage to forests caused by animals

In the 2010/2011 season damage to trees in restocked forest areas occurred on 183 thousand hectares in total, including 78 thousand hectares of plantations, 75 thousand hectares of young stands and 30 thousand hectares of stands in older age classes. The area of stands damaged by deer browsing or bark stripping increased by 13 thousand hectares in comparison with 2010.

The eight-year inventory of damage to reforested areas caused by deer shows that after a slow but steady decline, the situation in 2010 and 2011 was reversed. An increase in the area of damage to both young and older generations of forest was observed.

Threats to forests posed by anthropogenic factors

Forest fires

In 2011, there were 3007 forest fires in the State Forests (33% of all forest fires in Poland), which covered an area of 580 hectares (20% of the total), excluding areas used by the military. The largest number of forest fires occurred in the territories of RDSFs Zielona Góra (429), Katowice (397) and Szczecin (367). The largest burnt area (132 hectares, or 23% of all fire areas within the State Forests) was reported in the Katowice RDSF. As in 2010, there were no large fires (covering more than 10 hectares) in the territory of the State Forests, although 10 occurred elsewhere in the country.

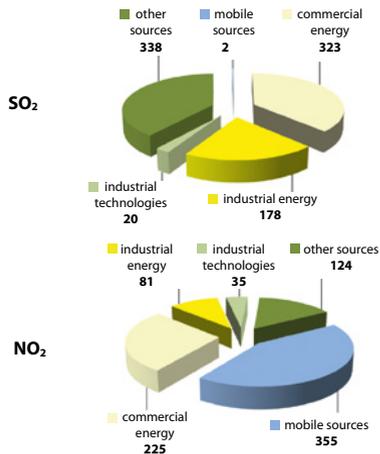
The average area of a single fire in the State Forests was 0.19 hectare, while in the forests in other categories of ownership it was 0.37 hectare.

The most frequent causes of fires in the State Forests were arson (43%) and careless adults (24%). Nearly 3% of fires spread from areas other than forests (5.2% of burnt forest area). The number of fires of unknown origin (22% of all fires and 22% of burnt forest area) is still high. The corresponding figures for forests under all ownership categories were: 43% fires caused by arson, 33% caused by careless adults and 16% of unknown causes.

Air pollution

The Central Statistical Office estimates that the total emission of major air pollutants in Poland in 2009 amounted to over 860 thousand tonnes of sulphur dioxide and 820 thousand tonnes of

nitrogen oxides (calculated as NO_2), which is 57% and 98%, respectively, of emissions recorded in 2000. Among the EU countries, Poland has one of the highest levels (in absolute values) of the total emission of main air pollutants.

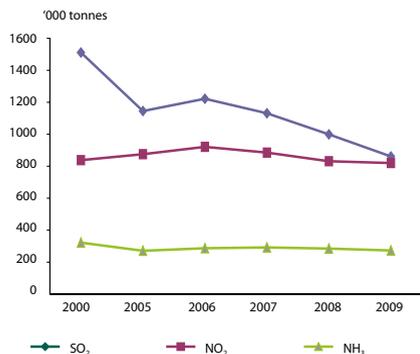


Total emission of sulphur dioxide and nitrogen oxides (calculated as NO_2) by source of pollution in 2009, in '000 tonnes (Central Statistical Office)

While the downward trends in the levels of emission of some pollutants (sulphur dioxide, ammonia and dust) have been observed over a period of several years, other gas pollutants, such as nitrogen oxides, still enter the atmosphere at levels essentially unchanged in the last decade.

The forest monitoring network provides information on major pollutants in forests in different regions of Poland. Data collection on main air pollutants, sulphur and nitrogen oxides, is based on monthly measurements using the passive method. In 2011, measuring of concentrations of ammonia and ozone in the air was abandoned and

the methodology of passive measurements of SO₂ and NO₂ was altered.



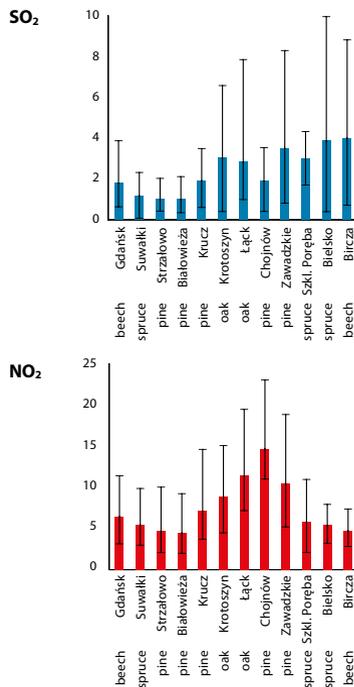
Total emission of SO₂, NO_x (calculated as NO₂) and NH₃ in Poland in 2000–2009, in '000 tonnes (Central Statistical Office)

The intensive monitoring network is comprised of 12 permanent observation plots (POPs), five of which are located in pine forests in the following forest districts: Chojnów (Warszawa RDSF), Strzałowo (Olsztyn RDSF), Białowieża (Białystok RDSF), Krucz (Piła RDSF) and Zawadzkie (Katowice RDSF). Three POPs are located in the spruce stands in Suwałki (Białystok RDSF), Bielsko (Katowice RDSF) and Szklarska Poręba (Wrocław RDSF) forest districts, two – in the oak stands in Łąck (Łódź RDSF) and Krotoszyn (Poznań RDSF) forest districts and another two – in the beech stands in Gdańsk (Gdańsk RDSF) and Bircza (Krosno RDSF) forest districts.

Average monthly concentration of sulphur dioxide and nitrogen dioxide in the air, measured on the observation plots, were within 0.1–10 µg·m⁻³ SO₂ and 2.0–23 µg·m⁻³ NO₂

The chemical composition of the air changed with the seasons: the highest concentration of SO₂ and NO₂ was observed in winter months, particularly

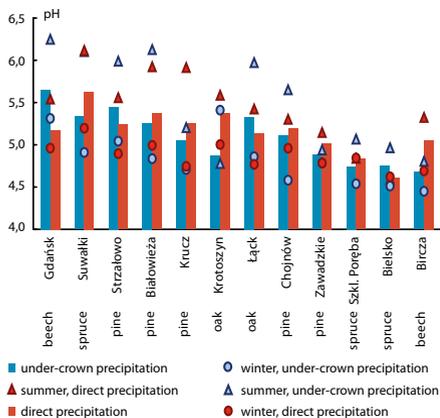
in January, February, November and December, which coincided with the heating season and therefore increased emissions.



Annual average and monthly minimum and maximum values of concentration (µg·m⁻³) of sulphur dioxide and nitrogen dioxide in the air, measured on permanent observation plots (intensive monitoring) in 2011.

The atmosphere is cleared of pollutants through precipitation (rain, snow, drizzle, mist, etc.). Acid precipitation is defined by pH value of less than 5.6. More than half of the monthly precipitation recorded on the permanent observation plots in 2011, as in 2010, had a pH below 5.5.

The average monthly pH values of precipitation reaching tree crowns oscillated between 4.2 and 7.0 and between 3.9 and 7.1 for under-crown precipitation.



Acidity level of direct and under-crown precipitation measured in areas of intensive monitoring in 2011. Average annual pH for the summer season (May–Oct) and the winter season (Jan–Apr, Nov–Dec)

Deposition of heavy metals, *i.e.* zinc, copper, lead and cadmium (with the quantitative prevalence of zinc) ranged from 223 to 770 g·ha⁻¹·year⁻¹, which is at a slightly lower level than in 2010.

Threats to forest sustainability

The impact of stress factors on forests already suffering from reduced resistance of their ecosystems (due, for example, to unsuitable species

composition for the habitat conditions or introduction of tree ecotypes of foreign origin) may, in extreme cases, lead to a total decline of stands. Such situation occurred in 1980–1991 in the Sudety mountains where a combination of effects of a long lasting drought and a large-scale infestation by secondary pests had a disastrous effect on forests already weakened by industrial pollution. Through sanitation cutting, 15 thousand hectares of affected stands were completely removed from the State Forests land and over 4 million m³ of deadwood was harvested.

The ecological disaster in the Sudety mountains prompted the establishment of an institution which would oversee the conservation of endangered ecosystems in Poland. Its remit was developed as a result of cooperation between the representatives of the State Forests and of the Institute of Dendrology of the Polish Academy of Sciences. The Kostrzyca Forest Gene Bank officially opened in December 1995. It is located in Miłków, at the foothill of the Karkonosze mountains which, like the Izerskie mountains, were severely affected by the ecological disaster in the early 1980s.

The Forest Gene Bank contains 7263 genetic resources comprising 41 species of forest plants, of which 29 species are forest-forming trees and shrubs, *eg.* Scots pine, common spruce, European larch, Douglas fir, black pine, black alder, common beech, weymouth pine, ash. The remaining 12 species are of protected plants, which are registered in the “Polish Red Book of Plants”. The Bank’s resources include whole populations as well as individual items.

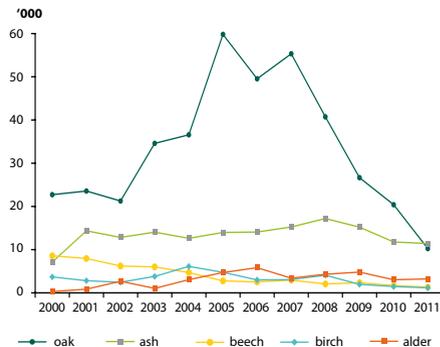
The Kostrzyca Forest Gene Bank was established in response to the emerging threat to the sustainability of forests from various abiotic, biotic and anthropogenic factors. Regrettably, these threats still continue, and the role of foresters is to take any possible action to minimise their effects.

An example of such intervention is the *Programme for the Beskidly forests* which was developed and implemented as part of the regional operational plan in 2003. The document outlines a protective and silvicultural treatment strategy for the Beskidly forests and recommends reconstruction of stands (reduction in the share of spruce in stands) to improve their condition. Implementation of this programme resulted in nearly 3000 hectares of spruce stands being subject to conversion.

Despite all the preventive measures, the tree dieback continued in the period 2006–2008, resulting in stand decline. In 2006 in the State Forests' territory in Beskid Śląski and Beskid Żywiecki, 0.8 million m³ of timber was harvested in sanitation cutting. Favourable weather conditions in the growing season of 2009 contributed to the improvement in health condition of the Beskidly forests and reduction of the rate of spruce stand decline. The harvest of wood affected by secondary pests in the five forest districts of Beskidly amounted to 153 thousand m³ in 2011.

Increased decline of broadleaved trees, observed in recent years, has also been attributed to a combination of several stress factors. The cyclic occurrence of oak decline, observed since the 1970s, has been attributed to extreme climate conditions, such as unusually high or low temperatures, long-lasting droughts and changes in groundwater level. Recent scientific reports point to a significant role of fungi of the genus *Phytophthora* in the decline of broadleaved stands. In 2011, the phenomenon of oak decline was observed on 10.2 thousand hectares, half of the area affected in 2010 and the smallest area since 2000.

Ash dieback has been observed in Poland for more than a decade. In 1999, the affected area amounted to about 2.3 thousand hectares and was steadily growing in the next few years. In 2008 the area of ash dieback reached 17.2 thousand hectares but from the following year a steady decrease was



Area of dieback of selected broadleaved tree species in the State Forests in the years 2000–2011

noted and in 2011 the affected area, at 11.4 thousand hectares, was the smallest since 2000.

Recent years have seen a steady improvement in the condition of beech stands. In 2000, beech dieback was recorded in an area of 8.6 thousand hectares, while in 2011 – only on 1.3 thousand hectares.

The dieback of alder was for the first time reported in 1999 in an area of 31 thousand hectares. Currently, the area of threatened alder stands amounts to 3.2 thousand hectares.

In total, the phenomenon of tree dieback in 2011 was observed on 29 thousand hectares, a decrease of 28% on the previous year.

The level of damage to forests

The level of damage to forests in Poland has been assessed every year since 1989 as part of the forest monitoring programme, which is one of the

elements of the National Environment Monitoring System

In the years 2006-2009, the forest monitoring programme was integrated with the Large-Scale Forest Inventory. A network of Level I Permanent Observation Plots (POPs) with grid density 16 x 16 km was established in accordance with recommendations by the International Co-operative Programme (ICP-Forests). In 2009 the grid density was reduced to 8 x 8 km. Monitored are forests under different forms of ownership and different protection regimes. The observation plots are located in stands over 20 years old and sample trees of all woody species are selected for assessment.

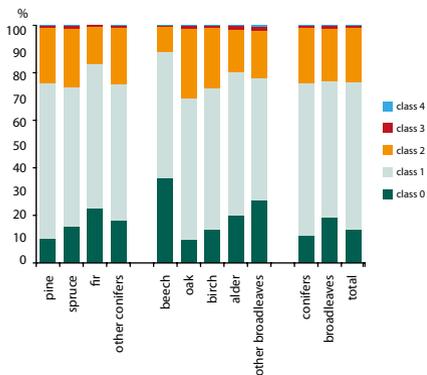
In 2011, the assessment of defoliation covered 38 940 trees over the age of 20 years, which were located on 1947 Level I Permanent Observation Plots (20 trees per plot).

Among the assessed trees, 14.0% showed no defoliation (defoliation class 0 – healthy trees),

including 11.3% of conifers and 19.1% of broadleaves. The largest share of coniferous trees without any defoliation was reported for fir (23.2% of trees), and the smallest – for pine (10.3% of trees). The largest share of healthy broadleaved trees was reported for beech (35.5% of trees) and the smallest – for oak (9.8% of trees)

The share of damaged trees with defoliation over 25% (defoliation classes 2–4) was 24.0%; the share of conifers was 24.2% and of broadleaves 23.5%. The lowest share among the conifers had fir (16.3%) and the highest spruce (26.2%). Among the broadleaves beech had the lowest share (11.2%) and oak the highest (30.6%).

In forests under the management of the State Forests the share of healthy trees (class 0), of all species was 14.5% and of damaged trees (classes 2–4) 22.3%.



Share of monitored tree species in defoliation classes on Level I Permanent Observation Plots (forest monitoring) in 2011, in stands aged over 20 years, in all ownership categories (Forest Research Institute)

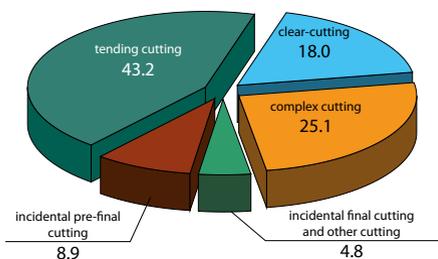
Forest utilisation

Structure of timber harvest

The use of forests as a renewable source of raw material is justified not only by the need to create economic conditions for forest management but also by the market demand for timber and wood products, silvicultural needs and the principles of regulating the structure of forest resources. Forests are utilised at a level determined by natural conditions and according to the principles of sustainability of forests and augmentation of their resources.

The volume of raw timber harvested in the State Forests in 2011 amounted to 35 075 thousand m³, of which 32 789 thousand m³ was net merchantable timber (about 101.2% of the approximate annual prescribed cut). In final cutting 15 703 thousand m³

was harvested (93.9% of the prescribed cut) and in intermediate cutting 17 086 thousand m³ (109.1% of the prescribed cut).

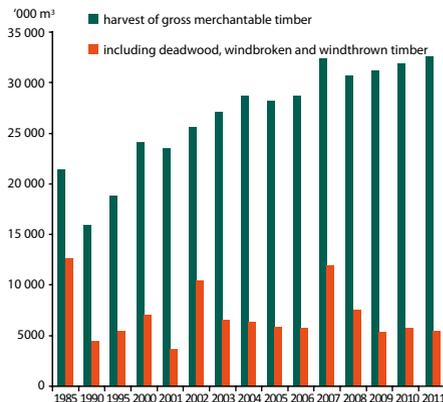


Structure of merchantable timber harvest by the type of forest utilisation in the State Forests in 2011 (in %)

The volume harvested in sanitation cutting, i.e. deadwood obtained as a result of natural processes and from wind damage, outbreaks of pest insects, disturbances in water relations, air pollution and weather anomalies, in 2011 amounted to 5445 thousand m³, or 16.6% of the total harvest of merchantable timber and was the lowest in the last decade.

In 2011, under the clear-cut system, less than 5.9 million m³ of merchantable timber was harvested, which accounts for 18.0% of total harvest. The clear-cutting area totalled 26.7 thousand hectares and was one of the smallest since the early 1980s when it reached nearly 43 thousand hectares, while the average for the past decade was just over 26.9 thousand hectares. Reduction in size of the clear-cutting area is indicative of the progress in the 'ecologization' of forest management. The use of clear-cuts is often necessitated by large-scale damage to forests caused by wind, drought, fungal infection or insect outbreak.

Over the last five years the volume of timber harvest in the State Forests, expressed in net



Share of deadwood, windbroken and windthrown timber in total utilisation in the State Forests in 1985-2011, in '000 m³ of net merchantable timber (DGSF)

merchantable timber per hectare of forest area, was around 4.5 m³/ha (in 2007 – 4.58 m³/ha, in 2010 – 4.51 m³/ha, in 2011 – 4.63 m³/ha) and did not exceed the allowable amount of cut. This demonstrates a relative stability of forest utilisation.

Sale of timber

The sale of timber in the State Forests in 2011 totalled 35 million m³, which is an increase of about 1.3 million m³ on the previous year and 2% above the planned amount. Sale of gross merchantable timber totalled 32.8 million m³ (100.6% of the planned amount), an increase of 860 thousand m³ in comparison with 2010.

The sale of softwood saw timber, which constitutes the main income of the State Forests, amounted to 10.8 million m³ (99.85% of the planned amount) and exceeded the 2010 figure by about 25 thousand m³. The sale of hardwood saw timber was 2.4 million m³, of softwood pulpwood

– 11.7 million m³ and hardwood pulpwood – about 4 million m³.

There was a significant increase in sale prices in 2011, as compared with the previous year: the price of all timber increased by 19.7%, of softwood saw timber by 26.2%, and of hardwood saw timber by 18.2%. The prices of both softwood and hardwood pulpwood have also gone up by similar percentage.

Nature conservation in the State Forests

Of all forms of nature and landscape protection, forests are the most valuable and best-represented category.

The State Forests plays an important role in protecting nature in forest areas, as the majority of most valuable and attractive objects and forms of nature conservation are located in the territories under its administration. Their presence there demonstrates the positive impact of forest management on maintaining the biological diversity.

The State Forests, in compliance with the Forest Act and the national policy on forests, has for many years been carrying out an inventory of all forms of nature protection, which is kept up to date and includes the current data from all forest districts.

As of 31 December 2011, the State Forests inventory included:

- 1255 nature reserves with an area of 124 thousand hectares, of which more than half are forest reserves (696) covering 61.7 thousand hectares;
- 11 498 natural monuments, including: 8831 single trees, 1551 groups of trees, 182 tree

avenues, 476 erratic boulders, 226 rocks and caves, 232 areas under monument protection (356 hectares);

- 9262 areas of ecological utility with a total area of 29 485 hectares;
- 370 documentation sites with a total area of 1630 hectares;
- 130 nature-and-landscape complexes with a total area of 46 837 hectares.

Additionally, 3091 protective zones have been created within the State Forests in order to protect refuges of rare birds, mammals, reptiles, insects and lichens. They cover an overall area of 149 042 hectares, of which the largest area (31 145 hectares) is designated for all year protection of birds.

The State Forests also maintains over 212 474 hectares of stands designated as the seed base (of which 15 740 hectares are selected seed stands and 192 496 hectares are economic seed stands) and 4238 hectares of gene reserve stands and plantations. This allows propagation of the native ecotypes of forest-forming species in our forests.

The State Forests has also been implementing its own programmes aimed at preservation of biological diversity and restoration of the endangered species of flora and fauna. Some of the most important initiatives are: *Programme for the preservation of forest genetic resources*, *Programme for the restitution of fir in the West Sudety mountains*, *Programme for the restitution of yew and* *Programme for the reintroduction of Capercaillie*. Forest districts benefit from external funding, eg. EU subsidies, to develop and implement this type of conservation projects. Nine centres for rehabilitation of wild animals have already been established.

Six of the 33 botanical gardens in Poland are managed by the State Forests. These are:

- Forest arboretum of Warmia and Mazury in the Kudypy forest district near Olsztyn;

- Wirty arboretum in the Kaliska forest district (the oldest dendrology forest in Poland);
- Dendrology garden in Glinna in the Gryfino forest district;
- Forest arboretum in Syców;
- Park-arboretum in the Forest Culture Centre in Gołuchów;
- Forest botanical garden "Marszewo" in the Gdańsk forest district, opened in 2010.

Game animals, whose number in Poland is one of the highest in Europe, are indicative of the richness of species of the forest fauna. The number of most ungulates (elk, red deer, fallow deer) remains at a high level and in some cases has even increased, posing a threat to forests. Only populations of hare, pheasant and partridge have decreased and are now, respectively, at 41%, 74% and 38% of their sizes recorded in 1980.

Natura 2000 network

The aim of the European network of protected areas Natura 2000 is to prevent the extinction of endangered plant and animal species and to protect the biological diversity in Europe. All member states of the European Union are obliged to implement the network. The legal basis for the implementation are two EU directives: *Birds Directive* and *Habitats Directive*. Both were incorporated into the Polish legislation as one of the forms of nature protection by the *Nature Conservation Act* of 16 April 2004.

The Natura 2000 network comprises two types of protection areas:

- Special Protection Areas (SPAs) designated for the conservation of populations of wild birds;
- Sites of Community Importance (SCIs) for protection of natural habitats and rare flora and fauna species.

In Poland, by the end of 2011, 144 Special Protection Areas covering 5571 thousand hectares, and 823 Sites of Community Importance covering

3792 thousand hectares have been established (General Directorate of Nature Protection). Together, these areas cover nearly 20% of the country's land area.

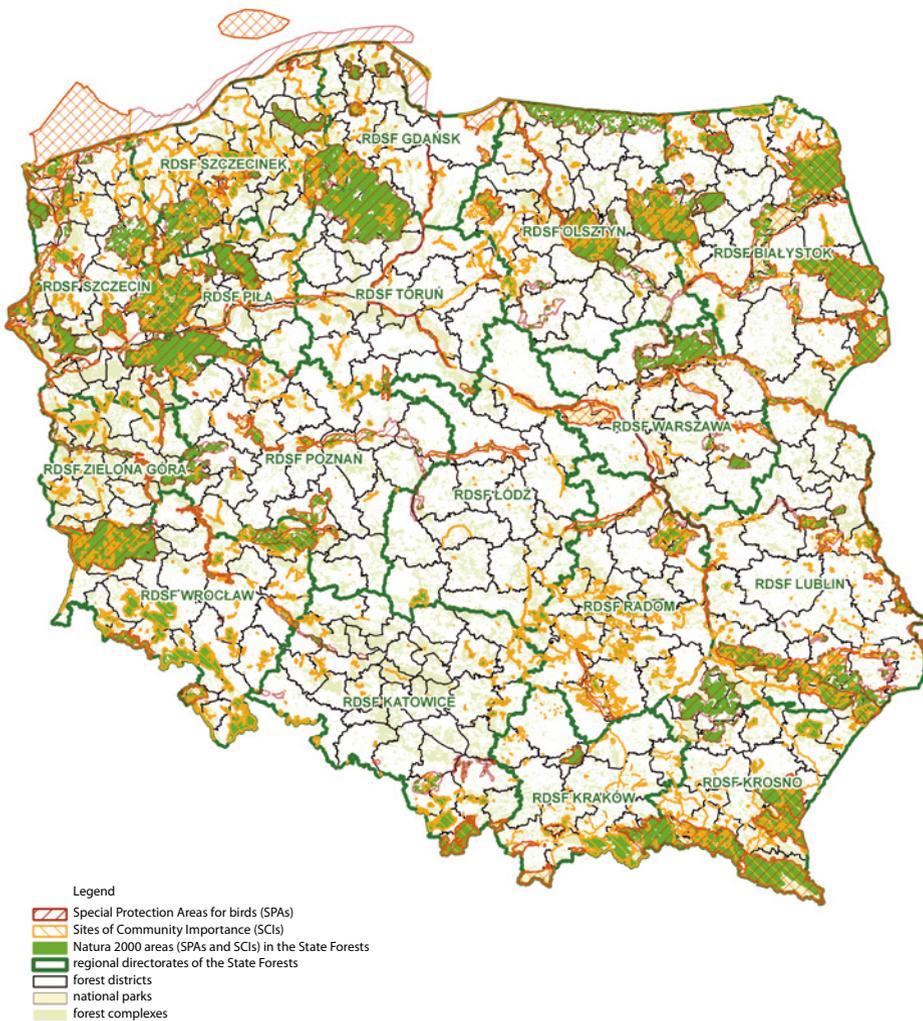
Natura 2000 areas account for 40% of the total area under the management of the State Forests. This means that the foresters are charged with the responsibility for the condition of habitats and species populations. At present, within the State Forests, there are 124 Special Protection Areas for Birds covering 2207 thousand hectares (31.2% of the forest area) and 662 Sites of Community Importance covering 1623 thousand hectares (22.9%).

Nature and forest education in the State Forests

Nature and forest education in all organizational units of the State Forests is based on the *Programme for forest education of society in forest districts*, in force since 1 January 2004.

In 2011, over 2 million people took part in various educational events organised by foresters, including 753 thousand who visited the Promotional Forest Complexes. The educational programme usually includes: outdoor lectures and guided tours, outdoor classes, meetings with foresters in schools and other locations, exhibitions, competitions, festivals and many other events. The State Forests cooperates with other organisations which provide environmental education, such as national parks, cultural centres and museums, churches, the media and various non-governmental agencies.

The Forest Culture Centre in Gołuchów plays a special role in providing forest education. Many educational and cultural events initiated by the



Natura 2000 areas in the territory administered by the State Forests (DGSF)

Centre, such as the national story-telling competition "Tales from the Forest Clearing", the national amateur art competition for foresters, the educational festival "Meeting with Forest" and the "Earth Day" celebrations have become permanent items in the educational calendar of Poland. In 2011 alone, nearly 170 thousand people, mainly children and youngsters, participated in educational events, such as art and photographic competitions and various exhibitions.

A popular form of forest and nature education is an educational portal provided by the State Forests at www.erys.pl, which attracts several hundred thousand visitors each year.

Many educational events of 2011 were inspired by the International Year of Forests, declared by the United Nations. In Poland, the events celebrating the Year of Forests were mainly organised by the State Forests.

The educational activity of the State Forests is financed mainly from the forest districts' own resources and from the national and regional funds for environmental protection. The State Forests, including the PFCs, at present offers the following facilities to the visitors: 50 education centres, 246 forest exhibition rooms, 509 teaching shelters and "green classes", 935 educational trails, 1681 educational points and 3142 other facilities.

The State Forests also offers a wide range of tourist facilities which are available to visitors of any age and social group. There are nearly 4.5 thousand beds available in recreation and training centres and in foresters' and hunters' lodges. They provide a welcome rest after a day of walking, cycling or horse riding. There are over 20 thousand kilometres of walking routes, nearly 4 thousand kilometres of cycling routes and about 7 thousand kilometres of horse riding routes. There are also over 300 in-forest bivouac sites, 500 other bivouac locations, 200 camping sites, 300 locations where campfires are permitted, as well as 87 forest car

parks and parking spaces for nearly 3 thousand cars. Additionally, the visitors can use almost 100 sports facilities and 650 other facilities.

Information about the State Forests' tourist facilities can be found at www.czaswlas.pl.

Promotional Forest Complexes

The Promotional Forest Complexes (PFCs) were established within the State Forests as part of the national policy on forests and in compliance with the provision of the Forest Act. The PFCs provide an excellent ground for implementing and pursuing the principles of management planning which integrate goals such as general nature protection, support for the environment-shaping functions of forests, sustainable utilisation of forest resources, economic stabilisation of forest management and participatory management of forests as a public resource. Their main aim, however, is to provide educational programmes promoting ecological and multifunctional forest management and to give the opportunity for direct contact with foresters to society as a whole and particularly to children and young people. In order to achieve this aim, the PFCs have developed a sizeable educational and tourist infrastructure which is usually available to the public free of charge. It comprises: environmental education centres (24), nature exhibition rooms (56), teaching shelters for use as "green classes" (73), educational trails (150), education points (316), dendrology parks and gardens (18), a "green school" and also overnight accommodation.

The Promotional Forest Complexes also provide ground for scientific research; their knowledge base



Promotional Forest Complexes in Poland in 2011

of the forest environment is used for interdisciplinary research which, in turn, informs the improvement of the forest management methods and defines the boundaries of economic interference in the forest ecosystems. They also provide an alternative to the overcrowded national parks where tourist traffic is regulated by strict rules.

There are 25 Promotional Forest Complexes which are located in each of the 17 regional directorates of the State Forests. At present, their total area is 1211 thousand hectares, of which 1190 thousand hectares are within the area administered by the State Forests (16.7% of its total area).

Promoting sustainable forestry

The United Nations declared 2011 as the International Year of Forests (IYF) (resolution 61/193/2006). Its motto was “Forests for the people” and it was intended to increase social awareness of how important forests are for our lives and how necessary they are for the survival and wellbeing of people in the whole world.

The State Forests were actively involved in promoting forests and sustainable forestry in Poland. Five themes based on the UN motif were used to promote the important role forests play in human life:

- More forests in Poland,
- Forests in Poland are for everyone,
- Forests protect lives,
- Forests as employer and business partner,
- Wood as sustainable resource.

The promotional campaign during the International Year of Forests was co-ordinated by the State Forests Information Centre. It was the largest and most coherent campaign to date, in which all units within the State Forests actively participated. Many special events took place across the country throughout the year, including those sponsored by other organisations.

The State Forests’ website included a page at www.lasy.gov.pl/mrl, which turned out to be one of the most frequently visited pages related to forests. It contained information about the main ideas behind the International Year of Forests, listed associated events and provided related links. There were over 1500 fans following the IYF’s pages on Facebook.

A large part of the State Forest Information Centre’s activity is publishing professional and promotional literature, amounting to several dozen

book publications annually and several periodicals. In 2011 the publishing plan included the leading ideas of the International Year of Forests and most educational and promotional publications carried its logo.

The Information Centre also engages the media in its promotional work. In 2011 there were numerous TV broadcasts promoting forests, natural world and forestry on the main TV channels and several programmes on the Polish Radio. The Centre also ensured that foresters appeared on regular radio and TV programmes to raise the State Forests’ profile.

The Information Centre maintains or sponsors several internet sites, which are the most frequently used source of information about the State Forests. In 2011 they were visited by almost 3.7 million users.

Internal communication in the State Forests

Communication within an organization means passing information in many different directions. It is a necessary condition for success and development of an organization as it creates a knowledge base, aids effectiveness of work, helps to create the trust and commitment of the workforce and increases job satisfaction among the employees.

In the State Forests, the role of internal communication was formally recognised in 2010 in a document on the information policy and later in the *“Strategy for internal communication in the State Forests”*, which outlined the main objectives of developing an effective system of internal communication. The main issues addressed were:

- distribution of current information to all employees,

- creating the opportunity for employees to express their views and opinions,
- linking together staff working in different locations across the country to facilitate exchange of knowledge and experience.

The practical approach to enhancing the internal communication was expressed in Regulation no 44 issued by the Director-General on 14 October 2011. It described the tools which may be used to develop effective communication within the State Forests and defined the main target groups of staff. The main recommended tools were:

- developing management communication with staff,
- creating staff portal, which should be the main tool of communication among staff, given their dispersion around the country,
- adapting the monthly magazine "Głos Lasu" to reflect the current professional needs and interests of staff and encouraging greater contribution from staff, eg. as field correspondents; a new appearance and better distribution were also recommended,
- publishing a weekly newsletter reviewing main events in the State Forests,
- using mailing lists.

Projects partly funded by the EU

The State Forests is the beneficiary of three infrastructure projects from the list of individual projects of the Operational Programme Infrastructure and Environment 2007-2013:

1. *Increasing water storage capacity and counteracting floods and droughts in forest ecosystems in the lowlands.* The total cost of this

project involving 178 forest districts across the country is PLN 196.6 million. The maximum amount of qualified expenses is PLN 160 million, while the refunded amount will be PLN 136 million. The agreement provided for the completion of 3300 facilities with a storage capacity of 31 million m³ of water. In 2011 the planned expenditure for all regional directorates amounted to PLN 61.8 million, of which PLN 26.3 million was actually spent (42.5% of the planned expenditure).

2. *Counteracting the effects of rainwater outflow in the mountain regions. Increasing the retention capacity and maintaining streams and related infrastructure in good condition.* The project is based in the southern regions of the country and covers the area of 55 forest districts. It provides for building of 3 500 small-scale retention facilities, including 410 reservoirs. The volume of retained water will be approximately 1.3 million m³. The total cost is PLN 172.2 million, of which PLN 119 million will be refunded from the Cohesion Fund; the maximum amount of qualified expenses is PLN 140 million. The amount of planned expenditure in 2011 was PLN 47.6 million, of which PLN 13.5 million was spent (28.4% of the planned expenditure).

3. *Biological rehabilitation of degraded land, former military land and military training grounds administered by the State Forests.* The project involves 55 forest districts in 15 regional directorates. The area subject to rehabilitation will be 24 thousand hectares. The total cost of the project amounts to PLN 161.1 million, of which PLN 110.5 million will be refunded from the Cohesion Fund; the maximum amount of qualified expenses is PLN 130 million. The amount of planned expenditure in 2011 was PLN 41.1 million but only PLN 1.8 million was spent (4.5% of planned expenditure).

Since 2010, the Directorate-General of the State Forests has been working on two projects which are part of the educational and information campaign named "Being aware of the threat". Both

projects aim to raise public awareness of fire hazards in forests and how to minimize them. They target residents of rural areas, school children and tourists visiting forests and cover central and eastern regions of the country. Both projects have been partially funded by the LIFE+ Programme. The amount spent on this campaign in 2011 was almost PLN 4 million.

Glossary

Afforestation – the establishment of new forests on the land previously used for agriculture or on wasteland.

Age class – an agreed period, usually 20 years, which allows the grouping of stands by age; for example, stands aged up to 20 years form class I, stands ranging from 21 to 40 years form class II, and so on.

Amount of cut, yield – the amount (volume) of timber that may be harvested in accordance with management objectives and financial plans.

Annual prescribed cut by volume in the State Forests – a volume to be harvested in the forest in a given year, as set out in a forest management plan. It is calculated as a sum of final and pre-final (intermediate) cuts for a given forest district (approximately equalling 1/10 of the cut prescribed for a 10-year period). The annual quotas may vary depending on forest condition, but the overall harvest in a given district must balance over a 10-year period during which the current forest management plan is in force.

– **annual prescribed cut in final cuts in the State Forests** – an annually averaged sum of final cuts in a given forest district; the volume of harvest is set out in the forest management plan (usually established for a 10-year period) for a given forest district and should not be exceeded.

– **annual prescribed cut in pre-final cuts in the State Forests** – an annually averaged sum of approximate pre-final cuts in a given forest district.

Bark stripping (peeling) – a method of feeding by ungulate animals using their teeth to strip off the bark from standing or cut trees.

Biological diversity (or biodiversity) – the variety of life forms on Earth or in a given area, usually related to three levels of nature organisation:

- **species diversity** – a variety of species,
- **ecosystem diversity** – a variety of community types (biocoenoses, ecosystems),
- **diversity of genetic resources** – a variety of genes forming a gene pool of a population.

Class for restocking (KDO) – a type of vertical stand structure in which there is simultaneous utilisation of the stand and regeneration under the canopy of the parent stand, and in which the level of regeneration does not yet meet the adopted requirements.

Cleaning – a series of tending treatments aimed at adjusting the composition of species and the structure and density of stands in order to improve the quality of young trees.

early cleaning – cuts performed in plantations prior to crown closure;

late cleaning – cuts performed in the period from crown closure to the beginning of self-thinning of trees.

Clear-cuts – an area from which all trees were removed in one operation (final cut) and which is designated for reforestation within the period of two years.

Deadwood – trees dying or dead as a result of excessive crowding in the stand, attacks by primary or secondary insect pests, the impact of industrial emissions, changes in water relations, etc.

Defoliation – loss of leaves or needles which intensifies with a worsening health condition of a tree.

Diameter at breast height – the diameter (thickness) of a standing tree measured at the standard height of 1.3 m above ground level.

Economic seed stands – stands whose origin and quality allow to anticipate that seeds harvested from them will produce valuable progeny, thus ensuring long-lasting production of timber of good quality and quantity.

Ecotype – *race, ecological form* – the entire population of one plant species found in a specific location; it develops as a result of long-term conditioning by the specific (local) properties of the environment; ecotypes vary with regard to their physiological and, less frequently, morphological characteristics.

Final cutting (felling) – the harvest of wood associated with the restocking of a stand or with deforestation as a result of a change in land-use; the wood obtained from final felling is known as the final cut timber.

Foliophages (folivorous species) – leaf-eating insects.

Forest cover (or index thereof) – percentage of the area covered by forests in the country's total land area.

Forest habitat (site) type – a generalised concept of the group of stands on sites of similar suitability for forest production; the basic unit of the typological classification applied in Poland.

Gene conservation stands (*in situ* conservation stands)

–stands selected for preservation of the gene pool of endangered populations of the indigenous tree species.

Managed forests – forests which are managed according to a plan and whose function is to produce wood and other forest products, while applying the principles of spatial and temporal order.

Merchantable timber (large timber) – (1) the volume of a tree above stump with a diameter at the thinner end of at least 7 cm with bark (refers to standing timber), (2) round wood with a diameter at the thinner end of at least 5 cm without bark (refers to harvested timber).

– **gross merchantable** – timber with bark,

– **net merchantable** – timber without bark and without losses during harvest.

Outbreak (gradation) – a mass occurrence of insect pests as a consequence of ecological factors which are favourable to the given species.

Pathogens – factors causing diseases; primary pathogens attack living organisms while secondary pathogens attack already damaged trees.

pH – indicator of acidity level, e.g. of soil.

Pre-final (pre-commercial, intermediate) cutting (felling)

– harvesting of wood associated with stand tending procedure.

Promotional Forest Complex (PFC) – a forest area of special ecological, educational and social value, established for the purpose of promotion of sustainable forest management and protection of natural resources.

Protective forests – forests under special protection because of their functions or the degree of threat they face.

Reforestation (renewal, regeneration); new forest stands established after the removal of previous stands by felling or as a result of damage by natural causes;

natural regeneration – stands established as a result of self-seeding or suckering;

artificial regeneration – stands established by man by planting or seeding.

Restocking class (KO) – a type of vertical stand structure in which there is simultaneous utilisation of the stand and regeneration under the canopy of the parent stand, and in which the level of regeneration allows subsequent stages of tending to proceed.

Selected seed stand – a stand of high quality trees whose main purpose is seed production; they are excluded from cutting for a defined period of time (excluded from final cutting).

Selection structure (BP) – a type of vertical structure of stands, representing groups and clumps of trees of uneven age and size.

Small-sized timber – round wood with a diameter at the thicker end (under bark) of up to 5 cm.

Standing volume – the volume of all live trees in a given area (stand, province, country, etc.) with diameter (with bark) over 7 cm at breast height. The standing (growing) stock is often calculated per hectare.

Thinning – cuts made in immature stands after they have passed through the cleaning period, during which economically undesirable trees are removed. Thinning has a positive effect on the quality of stands as it allows the trees to increase their volume, height and crown size.

– **early thinning** – cuts covering a period of intensive natural self-thinning process;

– **late thinning** – cuts following early thinning.

Timber resources – the total volume of trees in a forest, most often equated with an estimated volume of merchantable timber in stands.

Tree volume – the amount of wood expressed in cubic metres (m³).

Volume increment – an increase in the volume of 1) a tree, 2) a stand (including harvested timber) over a period of time;

– **current increment** – an increase in volume over a specified period of time; depending on the length of time interval it can be:

– current annual increment,

– periodic current increment (more than one year),

– current increment over the whole period (from origin to a specified age);

– **mean annual increment** – quotient of the current increment and the length of the period of time:

– mean annual increment over a specified period,

– mean annual increment over the whole period (from origin to a specified age).

Abbreviations

DGSF	Directorate-General of the State Forests
KDO	Class for restocking
KO	Restocking class
KDO	Class for restocking
PFC	Promotional Forest Complex
RDSF	Regional Directorate of the State Forests
SoEF 2011	<i>SoEF 2011 State of Europe's Forests 2011. Status & Trends in Sustainable Forest Management in Europe.</i>

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