

POLAND  The State Forests

THE STATE FORESTS IN FIGURES 2013



State Forests

The State Forests National Forest Holding (the State Forests) is an organisation which administers property on behalf of the Treasury and does not have legal personality. The State Forests is responsible for management, on a self-financing basis, of all state-owned forests, with the exception of national parks, land under the administration of the Agricultural Property Agency and forests leased under perpetual lease agreement. Its aims are to manage forests according to the principles of universal protection of forests, sustainable and continuous use of all forest functions and the increase of forest resources. These aims are pursued in accordance with forest management plans drawn up for each forest district for a ten-year period.

The State Forests, whenever natural, social and economic conditions allow, complies with international agreements which include: the Forestry Principles and Agenda 21 adopted at the 1992 Earth Summit in Rio de Janeiro; the Declaration of European Forestry Ministers with regard to the protection of European forests (Strasbourg 1990, Helsinki 1993, Lisbon 1998, Vienna 2003, Warsaw 2007, Oslo 2011); and the Kyoto Protocol of 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 been implementing, within its remit, the programme Natura 2000.

The State Forests National Forest Holding operates in accordance with the legal provisions of the Forest Act of 28 September 1991 (as amended), the Ordinance of the Council of Ministers of 6 December 1994 which outlines the principles of financial management in the State Forests and other regulations resulting from the Forest Act.

This brochure is based on the "Annual report on the condition of forests in Poland 2012", which was commissioned by the Directorate-General of the State Forests and was prepared by the Forest Research Institute, and on the "Annual financial and economic report of the State Forests 2012".

Forest functions

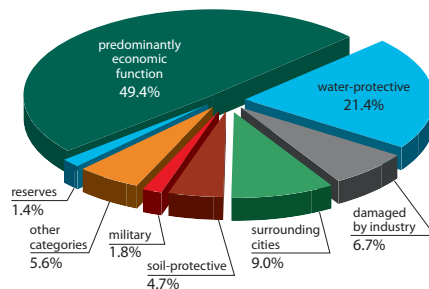
Forests fulfil diverse functions, either naturally or as a result of human activities:

- **Environmental (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 stepspisation;
- **Social functions:** providing health-enhancing and recreational conditions for society and contributing to the labour market;
- **Productive (economic) functions:** primary 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

Environmental and social functions of forests, often referred to as non-productive functions, have long been recognised in forest management which begun 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 1 January 2012, amounted to 3481 thousand hectares, which represents 49.2% of the total forest area, or 50.6% including 101 thousand hectares of nature reserves. The majority of protective forests are located in the mountain regions (90.3% of the territory of Kraków and 84.1% of Krosno RDSFs) and in areas affected by industry (83.7% of the territory of Katowice RDSF).



Share of protective forests in the State Forests in 2012 (DGSF)

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 their functions 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 (1997, in force since 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. The general principles of working out this balance are based on the Kyoto Protocol and decisions taken at the subsequent Conferences of the Parties. At the last Conference in Doha (Qatar) in 2012 it was decided to extend the commitment period for the second term, until 2020.

According to the estimates based on the available data on the size of timber resources, the forest biomass in Poland contains 1099 million tonnes of carbon, of which 26 million tonnes occur in deadwood (*State of Europe's Forests 2011*, SoEF 2011).

The State Forests' objectives resulting from the Forest Act are in line with the goals set out in the Kyoto Protocol. This is evident in the increase in the last decade of forest area by 93 thousand hectares and of resources by 408 million m³. The average standing volume in the same period increased from 215 to 270 m³/ha.

Aims and objectives of the State Forests

In accordance with the provisions of the Forest Act of 28 September 1991 (with later amendments) and the regulations and ordinances resulting from it, the main aims of the State Forests are to manage 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 for specified fragments of forests (stands) and methods of achieving them.

The State Forests administers all forests owned by the State Treasury, with the exception of national parks and 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 the size of forest area and timber resources, monitoring and forecasting the level of fire hazard and the occurrence of insect pests and 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 been implementing, within its remit, the programme Natura 2000.

Other important objectives of the State Forests are to make forests accessible to society and to increase awareness of environmental 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 who is assisted by the Directorate-General and the directors of regional directorates.

As of 31 December 2012, 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;
- 15 organisational units (departments) with regional authority reporting to the regional directors of the State Forests (3 storage complexes, 2 fisheries, 2 transport and logistics, 3 service and production, 2 forest transport, 2 forestry services, 1 training and recreation centre);
- 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 Centre for Co-ordinating Environmental Projects in

Warsaw). Two organisational units (the Kostrzyca Forest Gene Bank in Miłków and the Forest Culture Centre in Gołuchów) report to the directors of Wrocław and Poznań RDSF, respectively.

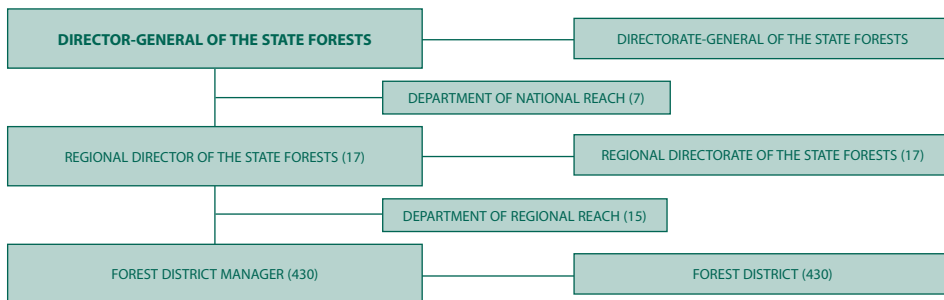
The remaining integral parts of the Directorate-General of the State Forests comprise 9 forest protection teams and 11 regional inspectorates.

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 according to the forest management plan and who is responsible for their condition. In 2012, as in the previous year, there were 430 forest districts with an average area of 17.5 thousand hectares. Two storage complexes merged and the Centre for Environmental Education and European Integration in Jedlnia-Letnisko closed.

Employment

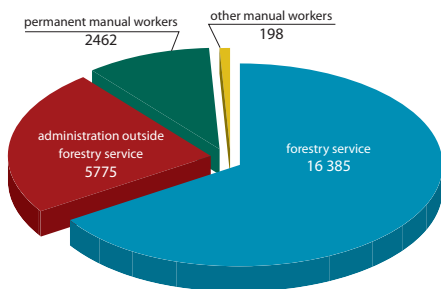
The average monthly employment in the State Forests in 2012 was 24 820 staff.

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



The three-tier structure of the State Forests (status as of 31 December 2012)

1. In forest districts including:	22 605
– forestry service	15 699
– non-manual posts outside forestry service	4 774
– manual posts	2 132
2. In departments: Including non-manual posts	978
3. In the Directorate-General and in regional directorates (including regional inspectorates and forest protection teams) including forestry service	508
	1 237
	676



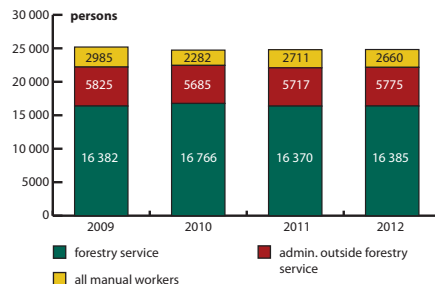
Employment structure in the State Forests in 2012

There had been a downward trend for several years in the average employment in the State Forests until 2010. In 2012, the average monthly employment increased by 73 persons compared with the previous year.

As of 31 December 2012, the total of 24 931 people were employed in the State Forests, an increase of 154 compared with the last day of 2011.

Research

Research commissioned by the Directorate-General of the State Forests in 2012 was signifi-



Employment in the State Forests in 2009–2012

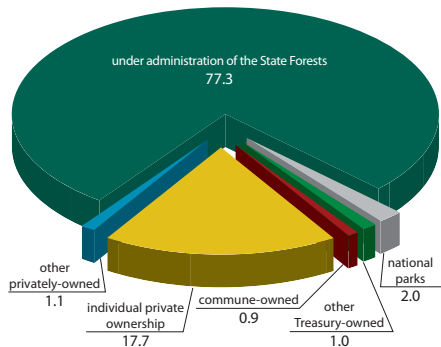
cant for the development of forestry. Large proportion of research was carried out at the Forest Research Institute.

In total, 97 research projects were pursued in 2012, costing PLN 42 252.8 thousand. Of these, 49 projects were conducted at the Forest Research Institute, costing PLN 29 520.5 thousand, and 48 projects involved universities and other research institutions at a cost of PLN 12 732.3 thousand.

The results of the research were communicated to the relevant units of the State Forests and to other organisations so that they could be appropriately implemented.

The resources of the State Forests

The forest area in Poland amounts to 9163.8 thousand hectares (as of 31 December 2012, Central Statistical Office), which puts the forest cover at 29.3%. The majority of forests (81.2%) are publically-owned, including those administered by the State Forests (77.3%).



Ownership structure of forests in Poland (Central Statistical Office)

Land use structure

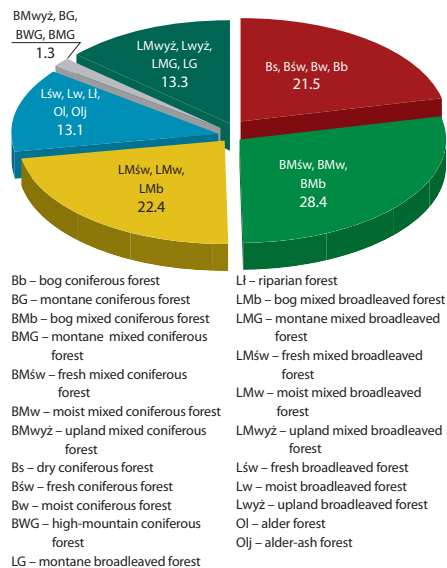
As of 31 December 2012, the total area of land administered by the State Forests amounted to 7 597 024.04 hectares and it was structured as follows:

– forests, total	7 279 653.67 ha
including: afforested land	6 975 204.02 ha
non-afforested land	104 158.13 ha
– agricultural land	145 682.94 ha
– wasteland	101 167.38 ha
– waters	9 017.59 ha
– landscape tree and shrub planting	12 146.98 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 51.2% of the total forest area, while broadleaved forest habitats account for 48.8%. In both groups, upland habitats occupy 5.9 % of the forest area and mountain habitats 8.7%.

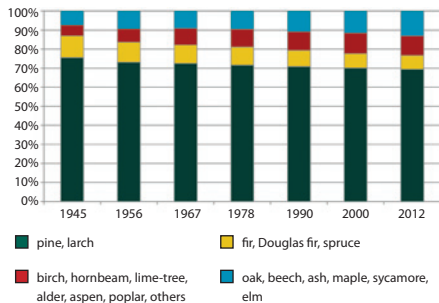
Coniferous species dominate on 69.9% of the forest area in Poland. Within the State Forests pine prevails on 61.3 % of the territory (data from Large-Scale Forest Inventory, but Forest Management and Geodesy Bureau gives their figure for 1 January 2012 as 69.4%). Poland offers optimal climatic and site conditions for pine within its Euro-Asiatic natural range, which resulted in the development of a number of important ecotypes (e.g. the Taborska pine or the Augustowska pine).



Bb – bog coniferous forest	Ll – riparian forest
BG – montane coniferous forest	LMb – bog mixed broadleaved forest
BMb – bog mixed coniferous forest	LMG – montane mixed broadleaved forest
BMG – montane mixed coniferous forest	LMśw – fresh mixed broadleaved forest
BMśw – fresh mixed coniferous forest	LMw – moist mixed broadleaved forest
BMw – moist mixed coniferous forest	LMwyż – upland mixed broadleaved forest
BMwyż – upland mixed coniferous forest	Lśw – fresh broadleaved forest
Bs – dry coniferous forest	Lw – moist broadleaved forest
Bśw – fresh coniferous forest	Lwyż – upland broadleaved forest
Bw – moist coniferous forest	Ol – alder forest
BWG – high-mountain coniferous forest	Olj – alder-ash forest
LG – montane broadleaved forest	

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

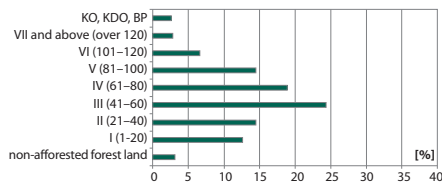
In the period 1945–2012, the species structure of Poland's forests substantially changed, which is evident in the increased share of stands with the prevalence of broadleaved species. In the State Forests the area of broadleaved stands increased from 13% to 23.2%.



Areal share of dominant tree species in the forests administered by the State Forests in 1945–2012 (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 26.4% and 18.7% 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 12% of the forest area managed by the State Forest. The share of non-afforested land accounts for 3.9%.



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

A steady increase in the share of stands older than 80 years, from about 0.9 million hectares in 1945 to 1.96 million hectares (excluding KO and KDO classes) in the period 2008–2012, 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 58 years.

Afforestation

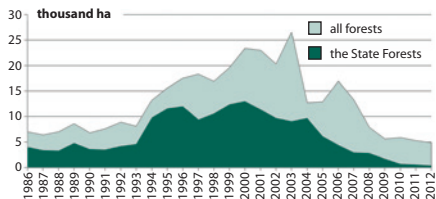
The basis for all afforestation in Poland is the “National programme for the augmentation of forest cover”, which was commissioned by the Ministry of the Environment, Natural Resources and Forestry and was prepared by the Forest Research Institute. The programme was adopted for implementation by the Council of Ministers on 23 June 1995

The main aims of the programme are to increase 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.

Artificial afforestation carried out in 2012 covered 4853.7 hectares of land in all ownership categories. The largest areas were afforested in the warmińsko-mazurskie (878.7 hectares) and mazowieckie (701.2 hectares) provinces, while the smallest in the małopolskie (47.7 hectares) and śląskie (59.9 hectares) provinces. The total afforested area decreased in 2012 by 424 hectares (8%) compared with 2011. Afforestation resulting from natural succession occurred on about 167 hectares (169 hectares in 2011), according to the figures from the Central Statistical Office.

A subsidy from the state budget and a loan from the European Investment Bank made it possible to increase afforestation in the State Forests from 1994 onwards, 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 decrease

in the afforestation rate has been noted, from 6.1 thousand hectares in 2005 to only 0.4 thousand hectares in 2012.



The level of artificial afforestation in Poland in the years 1986–2012 (Central Statistical Office)

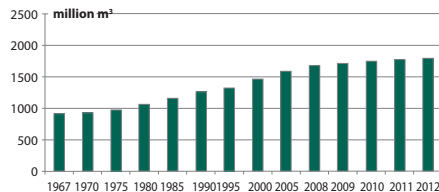
One of the main problems in implementing the “National programme for the augmentation of forest cover” on the state-owned land is a significant reduction in the area of post-agricultural land and wasteland designated for afforestation by the Agricultural Property Agency.

In addition to afforestation (relating to post-agricultural land and wasteland), plantations are being established as forest renewals in areas cleared of mature stands. The area renewed (without filling gaps and introducing understorey) in 2012 covered 52 808 hectares of land under all ownership categories, of which 5899 hectares (11.2%) were areas regenerated naturally.

Timber resources

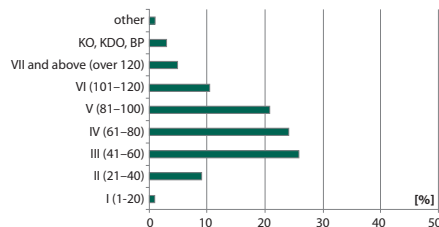
According to the Large-Scale Forest Inventory, the timber resources in forests under all forms of ownership in the years 2008–2012 totalled at 2405 million m³ gross merchantable timber, of which 1908 million m³ were in the State Forests. The most recent update of 1 January 2012 puts timber resources in the forests managed by the State Forests at 1795 million m³ of gross merchantable timber.

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



Timber resources in the State Forests in 1967–2012, in million m³ of gross merchantable timber (last update)

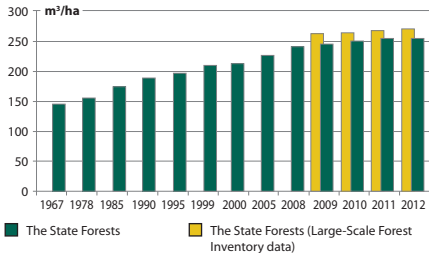
Stands in the age class III and IV (41–80 years) account for 50% of timber resources within the State Forests. The volume of stands older than 100 years, together with those in classes KO, KDO and BP, accounts for 18%.



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 63.9%. The share of broadleaved timber resources in the State Forests is smaller than in private forests.

According to the latest update of data on land area and timber resources of 1 January 2012, 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 270 m³/ha.



Average standing volume in the State Forests in 1967–2012, in m³/ha of gross merchantable timber (Central Statistical Office, Forest Management and Geodesy Bureau, Large-Scale Forest Inventory)

In the 20 years between January 1992 and January 2012, in the forests managed by the State Forests, the gross merchantable timber increment amounted to 1129 million m³. During that period 628 million m³ of merchantable timber was harvested, which means that 501 million m³ of gross merchantable timber, representing 44% of the total increment, remained to augment the standing timber resources.

The steady increase in timber resources (standing volume per hectare) is evident in all age classes (except KO/KDO). It is achieved by harvesting in accordance with the principle of forest sustainability and by persistent augmentation of the forest area.

Silviculture

Silvicultural aims and principles

The aim of silviculture is to ensure the sustainability and continuity 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 methods of renewal, tending and protection are used at all stages of stand development.

In the State Forests much attention is being given to the environmental conditions which determine the development of trees and forest stands. A thorough assessment of soil and site conditions is essential in preserving or restoring the compatibility of habitats with species composition and in protecting near-natural ecosystems (e.g. 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 2012 were as follows (numbers in hectares):

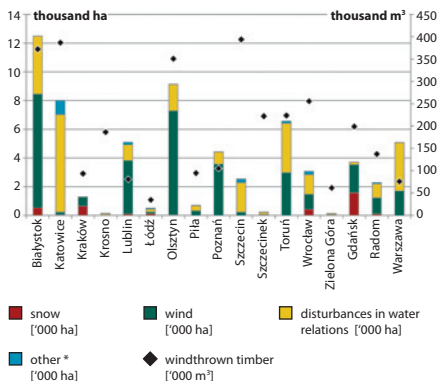
1. Nursery production
(total productive area of forest nurseries) 2 282
2. Restocking and afforestation
(including filling gaps and introduction of understorey) 56 255
including:
 - natural regeneration 4 964
 - afforestation, in total 533
including: natural succession 139
3. Fill planting
and supplementary planting 5 684
4. Forest tending, total 308 414
including:
 - underbrush 584
 - soil preparation and weed control 158 674
 - early cleaning 60 778
 - late cleaning 84 007
 - other tending 4 371
5. Thinning, total 440 235
including: early thinning 114 058
6. Land melioration, in total 57 193
including: mineral fertilising of forests 22
7. Stand conversion, total 9 718

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 detrimental effect on the health of forests. These negative phenomena, often called stress factors, can be classified with respect to their origin as abiotic, biotic and anthropogenic.

Threats to forests from abiotic factors

In 2012, damage caused by abiotic factors to the forests managed by the State Forests was reported on 65.3 thousand hectares of stands over the age of 20 years. Almost 33 thousand hectares of stands were damaged by wind, nearly 27 thousand hectares by groundwater level fluctuations, 3.7 thousand hectares by snow and 1.1 thousand hectares by hail.

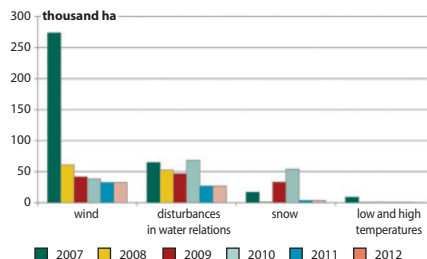


* hail, emissions, low and high temperatures, fires

Area of damage caused by selected abiotic factors and the volume of harvested windthrown timber in stands over 20 years old in 2012, by RDSF

The largest area of damage (12.5 thousand hectares) caused by abiotic factors occurred in the territory of Białystok RDSF. Measured by the volume of harvested windthrown timber, the greatest damage to stands occurred in the territory of Szczecin RDSF (394 thousand m³).

The data for the period 2007–2012 show that forests are exposed to a constant pressure associated with adverse thermal conditions and fluctuations in groundwater level, as well as to a random occurrence of other factors.



Area of damage caused by abiotic factors to the forests administered by the State Forests in 2007–2012

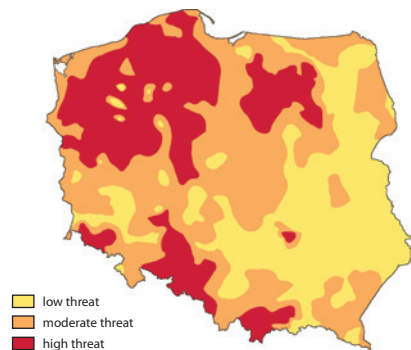
Threats to forests from biotic factors

Threat from insects

Forests in Poland are exposed to a continuing threat from a large number of biotic factors of which the most damaging are insects and pathogenic fungi, especially species occurring cyclically in mass outbreaks or epiphytotic. They cause different types of damage to forest stands and in extreme cases their total decline.

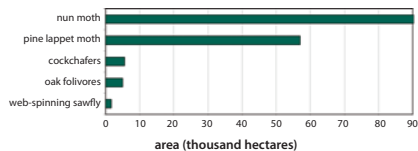
Poland has been divided into three zones with regard to the level of threat from insect pests, both primary and secondary, and from fungi pathogens. Most vulnerable to attacks from primary insect pests are stands in northern Poland (western part of Mazury Lake District) and in

the north-west (Pomorze and Wielkopolska Lake Districts). Secondary pests cause most damage in the three southern regions (Sudety, Śląsk Opolski and Beskid Wysoki).



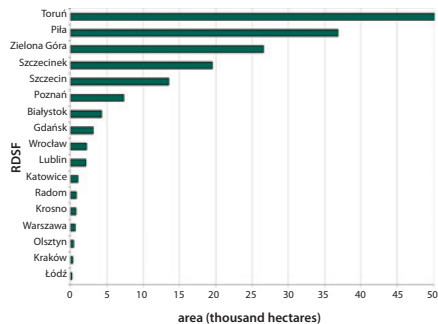
Risk zones of insect pests outbreak (both primary and secondary) in the forests of Poland (Forest Research Institute)

The activity of insect pests in 2012 increased by 23%, in comparison with the previous year. The control treatment aimed at reducing populations of almost 50 insect species covered an overall area of 170.3 thousand hectares, which was 32 thousand hectares more than in 2011. The most dynamic were populations of folivorous insects attacking pine stands and pests attacking roots of forest trees and shrubs.



There was a significant increase in the activity of both nun moth *Lymantria monacha* L. and pine lappet moth *Dendrolimus pini* L. Treatment aimed at reducing populations of folivorous pests

was carried out on the area of 148.9 thousand hectares of pine stands (78.3 thousand hectares more than in the previous year). Control treatment against nun moth covered 90.3 thousand hectares and against pine lappet moth 57 thousand hectares.



Insect population control in each RDSF in 2012 (Forest Research Institute)

Threat to broadleaved stands, especially from geometer moth *Geometridae* and tortrix moths *Tortricidae*, also increased and chemical treatment against these insects covered 5 thousand hectares, 4.8 thousand hectares more than in the previous year. However, there was a decrease in the threat from cockchafer imagines *Melolontha* spp., which resulted in a much smaller area having to be treated against them (a reduction from 44.9 thousand hectares in 2011 to 5.6 thousand hectares in 2012).

The total area of pine plantations and young stands subjected to pest control treatment was 10.2 thousand hectares, a decrease of 0.9 thousand hectares in comparison with 2011. The most destructive pest, large pine weevil (*Hyllobius abietis*) was treated in an area of 5824 hectares.

Salvation measures taken against root pests of forest trees and shrubs were applied to plantations and nurseries in the total area of 419 hectares. The most wide-spread were larvae of two species of cockchafer: *Melolontha melolontha* L. and *M. hippocastani* F.

Of secondary pests, the largest threat in 2012 was from the following insects: blue jewel beetle (*Phaenops cyanea* F.), weevils (*Pissodes* spp.) and pine shoot beetles (*Tomicus* spp.) in pine stands; spruce bark beetle (*Ips typographus* L.) and four-eyed spruce bark beetle (*Polygraphus poligraphus* L.) in spruce stands; and oak buprestid beetle (*Agrilus biguttatus* F.) in oak stands.

The volume of trees removed from conifer stands in sanitation cutting in 2012 was 3.8 million m³, of which 2.4 million m³ (63%) were windthrows. This was a 12% decrease on the previous year.

There was also less damage caused by secondary pests and abiotic factors to broadleaved stands in 2012. Sanitation cutting in those stands produced 1.1 million m³ of wood, of which 0.8 million m³ (70%) were windthrows.

Threats from infectious fungal diseases

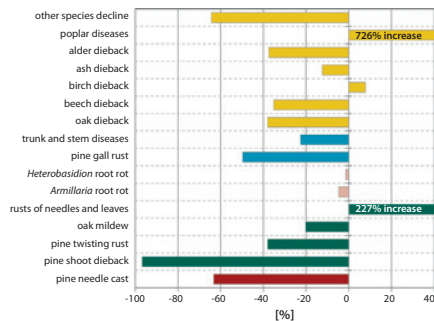
In 2012, infectious diseases were reported over a total area of 323.7 thousand hectares of stands, a decrease by 77.6 thousand hectares (or 19.3%) compared with 2011.

The most important change in the level of threat concerns the pine shoot dieback which was reported on a total area of only 1.25 thousand hectares, a decrease from 38.5 thousand hectares in the previous year. As in 2011, most of the affected areas (82%) were located in Toruń RDSF.

The area affected by pine needle cast *Lophodermium* decreased by two-thirds but the incidence of needle and leaf rust increased three-fold (particularly in Łódź RDSF). Other diseases of assimilatory apparatus (pine twisting rust, oak

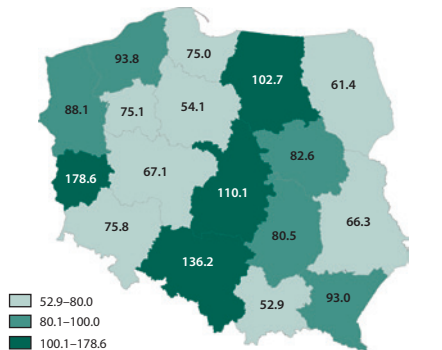
mildew) were reported on smaller areas than in 2011 (respectively by 38% and 20%).

The improvement in health condition of broadleaved stands continued in 2012. Areas affected by dieback of oak, beech, alder and ash decreased by, respectively, 38%, 35%, 37% and 12%. The area affected by birch dieback was only larger by 92 hectares than in 2011 and by poplar diseases taken together (cankers and tree dieback) by 380 hectares. A decrease was noted in forest areas affected by pine gall rust and trunk and stem diseases (by 50% and 23% respectively). On the whole, the occurrence of root rot diseases was reported in an area smaller by 7 thousand hectares. The area of stands affected by the *Armillaria* root rot decreased by nearly 5% and by *Heterobasidion* root rot by 1.5%.



Changes in the area of occurrence of infectious diseases in 2012, in comparison with 2011 (%)

Generally, the health condition of forests in each of the regional directorates of the State Forests improved in 2012. However, a significant increase in the area affected by disease (by 78.6%) was observed in Zielona Góra RDSF, which was entirely due to the spread of pine needle cast over an area of 2.8 thousand hectares compared to 130 hectares in 2011.



Changes in the area of occurrence of infectious diseases in 2012, expressed as a percentage of the area affected in the previous year

In nurseries, the area affected by diseases increased by 93.5 hectares compared with the previous year. However, the area of stands below the age of 20 years affected by disease reduced by 33% (17.5 thousand hectares). Diseases of assimilatory apparatus in mature stands were observed on an area smaller by 17% (60 thousand hectares), which was attributed to a significant drop (35 times) in the spread of pine shoot dieback.

Damage to forests caused by animals

In the season 2011/2012, damage to trees by animals in restocked forest areas occurred on 97 thousand hectares in total, including 37 thousand hectares of plantations, 39 thousand hectares of young stands and 21 thousand hectares of stands in older age classes.

The eight-year inventory of damage to reforested areas caused by deer shows that after a period of slow but steady decline, the trend changed in 2010. An increase in the area of damage to both young and older generations of forest has been observed since.

Threats to forests from anthropogenic factors

Forest fires

In 2012, there were 3112 forest fires in the State Forests (33.6% of all forest fires in Poland), which covered an area of 1216 hectares (16.8% of the total), excluding areas used by the military. The largest number of forest fires occurred in the territories of Katowice (516), Radom (389), Zielona Góra (350) and Wrocław (311) RDSFs. The largest affected areas were in Katowice (410 ha) and Radom (140 ha) RDSFs; they accounted for 45% of all burned areas in the State Forests.

The average area of a single fire in the State Forests was 0.39 hectare, while in the forests in other categories of ownership it was 0.98 hectare.

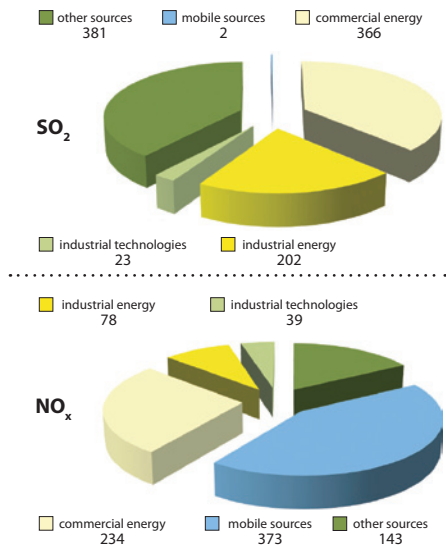
The most frequent causes of fires in the State Forests were arson (40%) and careless adults (20%). 8.5% of fires spread from areas other than forests (11% of burnt forest area). The number of fires of unknown origin (23.5% of all fires and 23.6% of burnt forest area) is still high.

The largest number of fires was recorded in March (26.3% of all fires) and the smallest (of the risk season) in June and September.

Air pollution

The Central Statistical Office estimates that the total emission of major air pollutants in Poland in 2010 amounted to over 974 thousand tonnes of sulphur dioxide and 867 thousand tonnes of nitrogen oxides, which was 64% and 103%, 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.



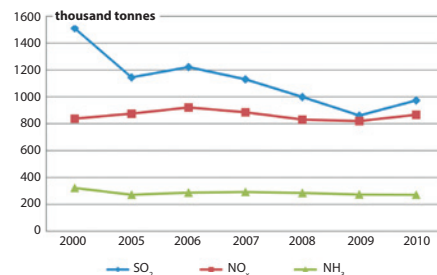
Total emission of sulphur dioxide and nitrogen oxides (calculated as NO_x) by source of pollution in 2010, in thousand tonnes (Central Statistical Office)

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

Information on major pollutants in forests in different regions of Poland is supplied by the intensive monitoring network. The network consists of 12 permanent observation plots, five of which are located in pine stands, three in spruce stands and two in each oak and beech stands.

Average monthly concentration of sulphur dioxide and nitrogen dioxide in the air measured on the observation plots were within

0,3–16 µgSO₂·m⁻³·m⁻¹ and 0,8–28 µgNO₂·m⁻³·m⁻¹. The lowest concentration of sulphur dioxide was observed in the north-east regions of the country while the highest occurred in the south, particularly in the foothill and mountain regions and in Upper Silesia. In central Poland these values were in the middle range.



Total emission of SO₂, NO_x (calculated as NO₂) and NH₃ in Poland in 2000–2010, in thousand tonnes (Central Statistical Office)

The level of concentration of nitrogen dioxide, as in previous years, was the highest in the central regions of Poland. Forests in the north-eastern regions and in the southern foothills and mountain areas had a significantly lower concentration of NO₂.

The chemical composition of the air changed with the seasons: the highest concentration of SO₂ and NO₂ was observed in winter months, particularly between November and February, which coincided with the heating season and therefore increased emissions.

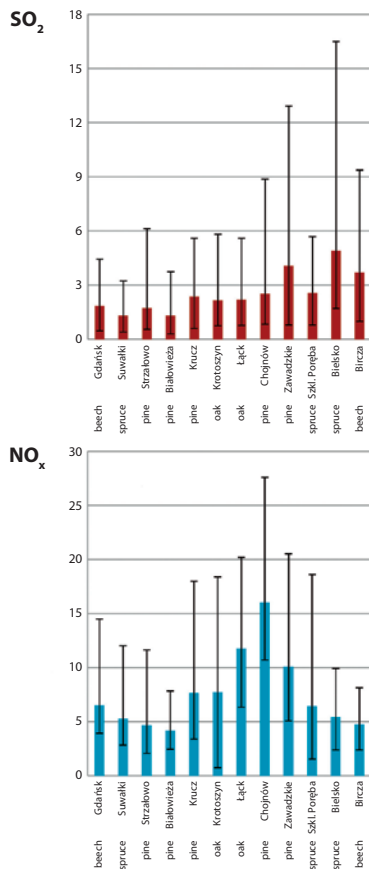
More than half of the monthly precipitation recorded on the permanent observation plots, as in 2011, was acidic with the pH value below 5.5.

Average monthly pH values of precipitation reaching tree crowns oscillated between 4.0 and 7.2 and between 4.2 and 7.2 for under-crown precipitation.





Deposition of heavy metals, i.e. zinc, copper, lead and cadmium (with the quantitative prevalence of zinc) ranged from 261 to 685 g·ha⁻¹·year⁻¹.



Annual average and monthly minimum and maximum values of concentration (µg·m⁻³) of sulphur dioxide and nitrogen dioxide in the air, measured on intensive monitoring permanent observation plots in 2012

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. In order to protect the deforested areas from soil erosion and degradation, the State Forests carried out reforestation work, often in parallel with the control treatment against secondary pests. In the period 1981–1996, over 14 thousand hectares of forest land were reforested.

The ecological disaster in the Sudety focused attention on the necessity of establishing a body which would oversee the conservation of endangered ecosystems in Poland. Its remit was developed as a result of cooperation between the State Forests and the Institute of Dendrology of the Polish Academy of Sciences. The Kostrzyca Forest Gene Bank was officially opened in December 1995. It is located in Miłków, at the foothill of the Karkonosze Mountains which, like the Jizera Mountains, were severely affected by the ecological disaster in the early 1980s.

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.

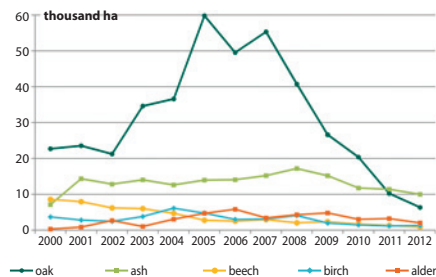
An example of such intervention were remedial actions with regard to the forests of Beskid Śląski and Żywiecki, which were prepared by the Katowice RDSF. In 2003, the “Programme for Beskid” was developed and implemented as part of the regional operational plan of the national policy on forests. It resulted in nearly 3 thousand hectares of spruce stands being subject to conversion.

Despite all the remedial measures, the tree dieback continued in the period 2006–2008, resulting in further stand decline. In 2006, in the State Forests’ territories of Beskid Śląski and Beskid Żywiecki, 0.8 million m³ of timber was harvested in sanitation cutting. The rate of decline only began to decrease in the years 2009–2011.

Unfavourable weather conditions in 2012 contributed to the deterioration in health condition of forests, especially of spruce stands. The harvest of wood affected by adverse weather in the mountain and foothill regions of Katowice, Kraków, Krosno and Wrocław RDSFs amounted to 444 thousand m³, almost 10% less than in 2011. There was an increase of about 7%, however, in the area of stands affected by the main factors contributing to their weakening: wind, snow, disturbances in water relations and root diseases. The level of sanitation cutting in spruce stands of the foothill and mountain regions was comparable to that of 2011 (545 thousand m³ in 2011 and 557 thousand m³ in 2012).

Simultaneous occurrence of multiple stress factors is also regarded as the cause of increased dieback of broadleaved trees in the last few years. 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 2012, the phenomenon of oak decline was observed on 6.3 thousand hectares, the smallest area since 2000.



Area of dieback of selected broadleaved tree species in the State Forests in the years 2000–2012

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 it steadily increased to 13–14 thousand hectares per year in the following years. The area of ash dieback reached 15 thousand hectares in 2007 and 17.2 thousand hectares in 2008. The affected area in 2012, at 10 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 2012 – only on 0.8 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 2 thousand hectares.

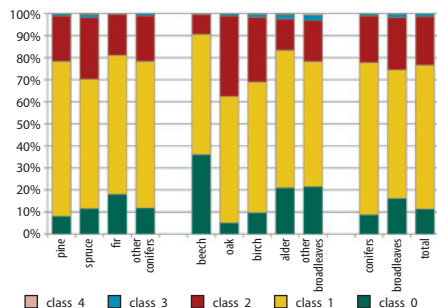
In total, the phenomenon of tree dieback in 2012 was observed on 21.5 thousand hectares, a decrease of 26% on the previous year.

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, forest monitoring was integrated with the Large-Scale Forest Inventory.

In 2012, an assessment of defoliation was carried out on a sample of 39 300 trees located on 1965 Level I permanent observation plots (20 trees per plot).

Among the assessed trees, 11.3% showed no defoliation (defoliation class 0 – healthy trees), including 8.7% of conifers and 16.1% of broadleaves. The largest share of coniferous trees without any defoliation was reported for fir (18% of trees), and the smallest – for pine (8% of trees). The largest share of healthy broadleaved trees was reported for beech (36% of trees) and the smallest – for oak (5.1% of trees)



Share of monitored tree species in defoliation classes on Level I permanent observation plots (forest monitoring) in 2012

The share of damaged trees of all species together with defoliation over 25% (defoliation classes 2–4) was 23.4%; the share of conifers was 22.2% and of broadleaves 25.5%. The lowest share among the conifers had fir (18.9%) and the highest spruce (29.8%). Among the broadleaves beech had the lowest share (9.5%) and oak the highest (37.6%).

In forests under the management of the State Forests the share of healthy trees (class 0), of all species was 11.8% and of damaged trees (classes 2–4) 21.8%.

The level of defoliation observed in the sample points to variation in health condition of trees in different regions of the country. Generally, forests in the north-west, west and parts of north-east regions, as well as the southern parts of Kraków and Krosno RDSFs are among the healthiest. Forests in the territories of Katowice and Olstzyn RDSFs, parts of the central regions and some areas in the south-east are significantly weaker.

Forest utilisation

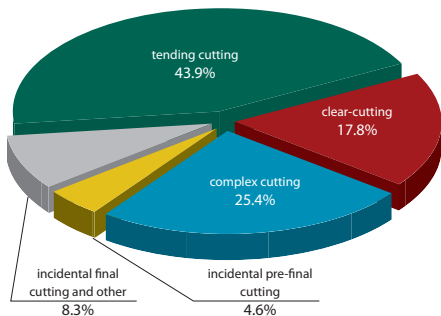
Timber harvest

Utilisation of forests as a renewable source of raw material is justified by silvicultural needs, principles of regulating the structure of forest resources, market demand for timber and wood products and by the necessity to create economic conditions for forestry. Forests are utilised at a level determined by natural conditions and by the principles of sustainability of forests and the augmentation of their resources.

In the State Forests the volume of timber harvest for a 10-year period is specified in the forest management plan and is known as the prescribed

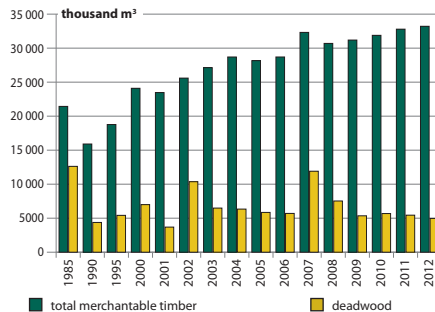
cut. In mature stands which are designated for renewal, the planned volume of harvest (prescribed cut in final cuts) is determined as a maximum volume for each forest district. However, the prescribed volume of harvest in pre-final cuts, which relates to younger stands and is associated with tending, gives an approximate volume and can be changed according to the current silvicultural and sanitary needs.

The volume of raw timber harvested in the State Forests in 2012 amounted to 35 267 thousand m³, of which 33 212 thousand m³ was net merchantable timber (about 99.6% of the approximate annual prescribed cut). In final cutting 16 017 thousand m³ was harvested (92.4% of the prescribed cut) and in pre-final cutting 17 195 thousand m³ (107.4% of the prescribed cut).



Structure of merchantable timber harvest by type of forest utilisation in the State Forests in 2012

The volume of timber harvested in 2012 for sanitation reasons amounted to 4967 thousand m³, or 15% of the total harvest of merchantable timber and was the lowest in the last decade. Obtained deadwood resulted either from natural processes or from wind damage, outbreaks of pest insects, disturbances in water relations, air pollution and weather anomalies.



Share of deadwood in the total utilisation in the State Forests in 1985–2012, in thousand m³ of net merchantable timber (DGFS)

In 2012, under the clear-cut system, almost 5865 m³ of merchantable timber was harvested, which accounts for 17.7% of total harvest. The clear-cutting area totalled 25 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 25.6 thousand hectares. Reduction in size of the clear-cutting area is indicative of the progress in environmentally sound forest management.

Sale of timber

Sale of all timber in the State Forests in 2012 totalled 34.8 million m³, which is less by about 270 thousand m³ than in 2011 and 0.7% below the planned amount. Sale of gross merchantable timber totalled 32.8 million m³ (98.7% of the planned amount).

Sale of softwood sawn timber, which constitutes the main income of the State Forests, amounted to 10.7 million m³ (98.3% of the planned amount) and was below the 2011 figure by about 122 thousand m³. Sale of hardwood sawn timber was 2.3 million m³, of softwood

pulpwood – 11.7 million m³ and hardwood pulpwood – about 4.2 million m³.

Sale prices fell in 2012, compared with the previous year: the price of all timber decreased by 3%, softwood sawn timber by 3%, softwood pulpwood by 7–8% and hardwood pulpwood by 4%. Only the price of hardwood sawn timber increased by 4%.

The Director-General of the State Forests issued an order on 25 April 2012, which increased by 65% the amount of timber offered for sale through the internet auctions portal for the second half of that year.

Nature conservation in the State Forests

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

The majority of valuable and attractive objects and forms under protection are located in forests administered by the State Forests. Their presence, as well as the wealth of fauna, flora and fungi, demonstrates the positive impact of forest management on maintaining 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 2012, the State Forests inventory included:

- 1267 nature reserves covering an area of 121.7 thousand hectares, of which 104.2 thousand hectares are forests;

- Natura 2000 sites: 134 areas for protection of birds (SPAs) with a total area of 2214 thousand hectares (31.8% of the forest area) and 722 areas for protection of habitats (SCIs) with a total area of 1641 thousand hectares (23.5%);
- 10 997 natural monuments, including: 8532 single trees, 1484 groups of trees, 136 tree avenues, 469 erratic boulders, 193 rocks and caves, 191 areas under monument protection (317 hectares);
- 9027 areas of ecological utility with a total area of 29 029 hectares;
- 147 documentation sites with a total area of 1137 hectares;
- 126 nature-and-landscape complexes with a total area of 47 024 hectares.

Additionally, 3146 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 150 436 hectares, of which the largest area (29 891 hectares) is designated for all year protection of birds.

A form of nature conservation in the State Forests are forest stands under special protection: there are over 208 940 hectares of stands designated as the seed base (of which 15 496 hectares are selected seed stands and 187 194 hectares are economic seed stands), 1901 seed and seedling orchards and 4349 hectares of gene reserve stands and plantations. This base supplies material for promoting native ecotypes of forest-forming species in our forests.

The State Forests also initiates its own programmes aimed at maintaining biological diversity and protecting and restoring endangered species of flora and fauna. Among them are the “Programme for the preservation of forest genetic resources” and numerous projects such as the “Programme for the restitution of fir in Western

Sudety”, “Programme for the restitution of yew” and two projects focusing on preserving Capercaillie and black grouse. Other facilities include 6 botanical gardens, 4 arboreta and 9 animal rehabilitation centres ran by forest districts.

Other projects carried out in the State Forests, which are partly financed by the European Union, focus on the conservation of valuable elements of ecosystems. Examples are: “Protection of lesser spotted eagle in selected areas of Natura 2000” in Białystok RDSF, “Protection of biological diversity in forests, including Natura 2000 sites: promoting best practice” or “Active protection of lowland populations of Western Capercaillie in Bory Dolnośląskie and Augustowska Primeval Forest”.

Game animals, whose number in Poland is one of the highest in Europe, are indicative of the richness of species of the forest fauna. In the last decade the population of elk has increased by 523%, fallow deer by 267%, wild boar by 185%, mouflon by 183% and red deer by 165%. Only the partridge population continues to decrease (by 11%). In 2012, no changes in the size of populations were noted from the previous year.

Nature and forest education in the State Forests

Nature and forest education in all organisational units of the State Forests is based on the two documents resulting from the directive number 57 issued by the Director-General of the State Forests on 9 May 2003: “Directions of development of forest education in the State Forests” and “Programme for forest education of society in forest districts”. These documents ensure that all educational activities are properly planned and

delivered. The “Report on the education in the State Forests” is published annually.

In 2012, almost 3 million people took part in various educational events organised by foresters, an increase of 1 million on the previous year. The educational programme included outdoor lectures, meetings with foresters in schools and other locations, exhibitions and many other cultural or sporting events. The State Forests cooperated with other organisations which provide environmental education, such as national parks, cultural centres and museums, churches, the media and various non-governmental agencies.

A special role in providing forest education is played by the Forest Culture Centre in Gołuchów. Many educational and cultural events initiated by the Centre, such as the national story-telling competition, the national amateur art competition for foresters or the educational festival on the “Earth Day”, have become permanent items in the educational calendar of Poland. Last year alone, over 160 thousand people, mainly children and youngsters, participated in educational events, such as art and photographic competitions and various exhibitions.

An important component of the State Forests’ educational programme is the historic context associated with Polish forests. Foresters make sure that places such as cemeteries, graves, monuments and other sites (e.g. the museum in Spała) are maintained and the events associated with them remembered as part of our country’s difficult history.

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. In 2012, over 25 million PLN was spent on forest education.

The State Forests, including the PFCs, at present provide the following facilities to the visitors: 50 education centres, 250 forest exhibition

rooms, 517 teaching shelters and “green classes”, 957 educational trails, 1756 educational points and 2235 other facilities.

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

The State Forests also offer a wide range of tourist attractions which are available to visitors of any age and social group. 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. Additionally, the visitors can use designated bivouac and camping places, almost 100 sports facilities and over 650 other attractions. There are nearly 4.5 thousand beds available in recreation and training centres and in hunters’ lodges.

Information about the State Forests’ tourist facilities can be found at www.czaszwas.pl.

Promotional forest complexes

Promotional forest complexes (PFCs) were established within the State Forests as part of the national policy on forests and to comply with the provision of the Forest Act. The PFCs provide an excellent ground for pursuing the principles of forest management which integrate goals such as nature protection, sustainable utilisation of forest resources and participatory management of forests as a public resource. They create an opportunity for direct contact between the foresters, whose aim is to promote ecological and multifunctional forest management, and the public.

In order to achieve these goals the PFCs have developed a sizeable educational and tourist in-

frastructure, which is available to the public largely free of charge. It comprises: environmental education centres (23), forest exhibition rooms (55), teaching shelters for use as “green classes” (93), educational trails (166), educational points (305), dendrology parks and gardens (22), cultural and heritage centres (48), a “green school” and also overnight accommodation.

Promotional forest complexes provide ground for scientific research; their knowledge base of the forest environment is used for interdisciplinary research which, in turn, informs the improvement of forest management methods and defines the boundaries of economic interference in the forest ecosystems. The PFCs also provide an alternative to the overcrowded national parks where tourist traffic is regulated by strict rules.

There are 25 promotional forest complexes located in each of the 17 regional directorates of the State Forests. Their total area is almost 1208 thousand hectares, of which 1180 thousand hectares are administered by the State Forests (nearly 15.5% of its territory).

Promoting sustainable forestry

Promotional work in the State Forests is coordinated by the Information Centre (CILP).

In 2012, the promotional work of CILP focused on the strengthening of public perception that Polish forests are well managed and that foresters look after and protect the natural environment. A new campaign was launched under the title “The State Forests: an invitation”. The aim of the on-going campaign, which mainly targets families living in larger towns and cities, is to



Promotional forest complexes in Poland in 2012

demonstrate that Polish forests are well prepared to offer active and attractive forms of recreation. The State Forests foresters organised various events within this campaign, such as open days, “Summer in the forest” or “Mushroom picking”, both at national and regional levels.

In 2012, the State Forests Information Centre either organised or participated in the following major events:

- Scientific picnic – organised by the Polish Radio and the Copernicus Science Centre, it is the biggest event of this type in Europe.

- Educational festival promoting nature conservation under the symbol of the Polish forget-me-not, organised at the Forest Education Centre in Jedlnia-Letnisko.
- Festival “Earth Day” in Pole Mokotowskie in Warsaw, during which the State Forests representatives gave away 10 thousand saplings to visitors who were encouraged to “plant your own tree”.
- Charity events “Christmas tree of hope” organised in cooperation with the Arka Foundation.

In May 2012, the State Forests participated in the events associated with a large safety awareness campaign under the title “Your friends’ numbers”, which took place in 11 Polish cities and included seminars and concerts.

The State Forests Information Centre publishes educational and promotional literature and in 2012 it published 21 non-periodical titles, mainly of professional interest or promotional nature. Printing varied from a few hundred to even 11 thousand copies (e.g. instructions). It also published three periodical titles: “Głos Lasu”, an internal circulation monthly magazine, another monthly “Biuletyn Informacyjny Lasów Państwowych” and a quarterly “Echa Leśne”.

Promotional work is also carried out on the Internet. The State Forests website (www.lasy.gov.pl) is the main source of information about the organisation and its activities. It was visited by 1.187 million users in 2012, an increase of 750 thousand on the previous year. The Information Centre also runs two services at: www.czaswlas.pl and www.erys.pl and supervises the web pages of the Public Information Bulletin (www.bip.lasy.gov.pl).

One of the most popular pages on the State Forests website in 2012 was a live transmission from the nest of a pair of white-tailed eagles and later from the bison feeding station.

The Information Centre supported forest districts in maintaining their profiles on Facebook. It also engaged with the traditional media such as television, radio and the press. In addition to regular features on television or radio, foresters took part in many other programmes in order to promote the State Forests. It also collaborated with the State Forests Centre for Development and Implementation in Bedoń on the production of films on the natural world.

Projects partly funded by the European Union

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 and the refunded amount PLN 136 million. The contract provided for the completion of 3300 facilities with a storage capacity of 31 million m³ of water. The planned expenditure in 2012 for all regional directorates amounted to PLN 72.5 million (42.5% of the total 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 in four RDSFs. It provides for building of 3500 small-scale retention facilities, includ-

ing 410 reservoirs. 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 2012 was PLN 22.4 million (16%).

3. “Biological rehabilitation of degraded land, former military land and military training grounds administered by the State Forests”. The project involves 57 forest districts in 15 regional directorates. The area subject to rehabilitation will be 24.3 thousand hectares. The total cost of the project amounts to PLN 130.7 million, the maximum amount of qualified expenses is PLN 113.4 and the amount of refund PLN 96.4 million. The amount of planned expenditure in 2012 was PLN 14.1 million (12.4%).

The Centre for Co-ordinating Environmental Projects is leading a project under the title “Conservation of biological diversity in forests, including within the network Natura 2000: promoting the best practice”, which is financed partly from the EU LIFE+ Programme and from the national fund for environmental protection. The project, which started in 2012, is planned for two years and its total cost is estimated at EUR 2 million (of which 90% is eligible for a refund). The amount spent in 2012 was PLN 634.5 thousand (about 8% of the total cost).

In 2010-2013, the Directorate-General of the State Forests has been working on two projects which are part of the educational and information campaign under the title “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 and people visiting forests. Both projects are partially funded by the LIFE+ Programme. The amount spent on this campaign in 2012 was almost PLN 6.3 million but its total cost is estimated at EUR 3.5 million (90% of which is eligible for a refund).

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 measure of utilisation of forests in a given year, as set out in forest management plans. It is calculated as a sum of final and pre-final (intermediate) cuts for any 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 any 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 agreed for every forest district; the volume of harvest is set out in the forest management plan (usually established for a 10-year period) 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 agreed for every 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,

ecological 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 structure of stands in which there is simultaneous utilisation 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 procedures aimed at adjusting the composition of species in stands, their structure, density and improving quality of young trees;

early cleaning – cleaning in plantations prior to crown closure,

late cleaning – cleaning during the period from crown closure to the beginning of self-thinning.

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

Deadwood – trees dead or dying 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 indicate that seeds harvested

from them will produce valuable progeny thus ensuring long-lasting production of timber of satisfactory 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 deforestation as a result of a change in land-use; the wood obtained from final felling is known as the final cut timber.

Folivores (folivorous species) – leaf-eating animals.

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, infestation) – a mass occurrence of insect pests as a consequence of environmental factors which are favourable to the given species.

Pathogens – factors causing diseases; primary pathogens attack vigorous healthy organisms while secondary pathogens attack already damaged or weakened 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 promoting sustainable forest management and protection of natural resources.

Protective forests – forests under special protection because of their functions or vulnerability to threats.

Regeneration (renewal, restocking, reforestation): new forest stands established after the removal of previous stands by felling or as a result of damage by natural causes;

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

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

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

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

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 a diameter (with bark) over 7 cm at breast height. Standing volume 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 all trees in a forest, most often equated with an estimated volume of merchantable timber

Abbreviations

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

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Territories of forest districts and regional directorates of the State Forests



- RDSF boundaries
- forest district boundaries
- national parks
- forests



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