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RESOURCES AND PRODUCTIVITY OF WOODLAND UNDER THE MANAGEMENT OF STATE FORESTS IN POLAND IN THE YEARS 1991-2005

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Abstract. The paper presents the productive potential of the State Forests woodland over the years 1991-2005. Changes that occurred in that period were also analysed and explained. The research showed a distinct increase in forest productivity as measured by stand volume, its net increment, and its average increment. There was a favourable change in the species and age structure of timber. Wood harvesting was also on the rise. This upward tendency was possible due to an increase in timber resources in the recent years and to a forest policy seeking to prevent any decrease in the timber quality of the standing crop.

Key words: woodland, forest resources, productivity, stand volume per hectare

INTRODUCTION

The progress of civilisation and the growing importance of the natural environment in human life boost the demand for forests to perform protective, recreational and sanitary functions. Still, whatever their non-productive functions, timber production plays, and will keep playing, a significant role in a multi-functional and balanced woodland management [cf. Prodan 1964]. As Smykała and Głaz [1994] state, a justified, progress-conditioned change in the societal attitude towards forests and the growing pressure for them to perform non-productive functions cannot lead to a significant limitation, or even abandonment, of their productive function – with the exception of protected areas. It should be kept in mind that timber production is not only the chief source of material for the domestic wood industry necessary for the manufacture of wood products that are socially useful and important for the progress of civilisation. The use of timber resources is also an instrument for achieving the adopted cultural-economic target by moulding the desired stand structure for sustained woodland conservation.

In the face of the above facts, the publication of information about the state of forests as well as their resources and productivity in the country and its individual regions

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is certainly useful. An assessment of productivity measures, in turn, supplies information about development trends in the given area, thus providing grounds for making right economic decisions in the future. The aim of this article is to present the state of forest resources, their yield capacity and productivity in Poland, and to identify changes that occurred over the years 1991-2005 in this respect. The focus is on the analysis and assessment of the dynamics of forest yield capacity, and hence on an insight into beneficial and detrimental effects of man's economic activity.

MATERIAL AND RESEARCH METHODS

The analysis of changes in the forest yield capacity was performed on the basis of figures from the beginning and close of the study period. The assessment of changes was made using the dynamics index.

The woodland resources were characterised in terms of: the proportion of area occupied by dominant species in age classes; the proportion of age classes in total area and stand volume; the mean age of stands and the rate of stand volume per ha.

The yield capacity of stands was estimated in terms of: the mean gross annual current increment of timber calculated as the difference between stand volumes at the end and start of the study period plus timber harvested; the mean gross annual current increment of the stand volume calculated as the mean stand volume per ha/mean age ratio; the mean annual increment of total production calculated as the sum of the mean annual current increment of stand volume per ha and mean annual intermediate cutting per ha.

To assess forest productivity, use was made of the annual interim and final harvest figures.

The source material was provided by the 1992 and 2006 Forestry Yearbooks. In the absence of current statistical data on private woodland, the analysis was restricted to that under the State Forests administration. The decision is fully justified because forests under this form of ownership occupy 78% of total woodland in Poland. The statistically processed factographic material was then illustrated by thematic maps (cartograms), which provided a basis for the analysis of spatial differences in the yield capacity and productivity of woodland in Poland.

As to methods of statistical analysis, use was made of Pearson's coefficient of linear correlation. It was employed to trace a correlation between the proportion of dominant species and that of forest habitat types, and to assess the strength and direction of this correlation. In the analysis of dynamics, fixed-base indices were used with the 1991 data as the base.

RESULTS AND DISCUSSION

Woodland resources

The basic leading species in the State Forests is the pine, which predominates over 69% of the woodland area. The oak predominates in stands occupying 7.3%, birch –

5.9%, spruce – 5.5%, beech – 5.0%, and alder – 4.4%. The woodland dominated by the remaining species covers negligible areas. Conifers occupy a total of 76.5%, and broadleaves, 23.5% of the woodland area.

Coniferous stands prevail or even dominate in all the voivodeships, although their proportions vary. The highest figures (in excess of 85%) are characteristic of Łódź, Lubuska Land and Kujawy-Pomerania; only in Podkarpacie, Małopolska and Lublin do they fall below 70%. In turn, broadleaves make up from 13.8% of woodland in Lubuska Land to 37.3% in Podkarpacie. The preservation of such extensive production areas of broadleaved species in the latter voivodeship is due to the occurrence of fertile soils there and a relief type (mountains and piedmont) unfavourable to timber felling.

The lower proportion of broadleaved than coniferous species in forests results primarily from:

- clearing the land of broadleaved or mixed woods growing on better soils,
- ruthless felling of trees, especially the oak, and grazing livestock in the woods,
- the firing of charcoal, which has led to the destruction of the beech because beechwood used to be the most popular fuel for this purpose, and
- preference given by the wood industry to conifers, starting with the 19th century, and the resulting ill-considered protection of the pine and spruce over extensive areas because of their easy cultivation and rapid growth.

Although the proportion of broadleaved species increased over the years 1991-2005 (from 20.8% to 23.5%), conifers still predominate in Polish forests. The increase in the area occupied by broadleaves resulted from:

- regeneration operations and afforestation of new areas,
- years-long rebuilding of stands in order to improve their biological resistance and yield capacity,
- underplanting carried out in thinned and single-species stands, and
- spontaneous natural regeneration.

Over the study period, there was a decrease in the area occupied by coniferous species by 0.2% and an increase in that of broadleaves by 16.7% (Table 1). This shows a tendency for favourable, even if slow, changes to occur in the species composition of Polish forests. The increase in the area of broadleaves and in the proportion of broadleaved species in mixed stands took place because they had been given preference in economic operations. Another factor was the felling of old-growth coniferous stands and exposing subcanopy beech and oak saplings. As to the increased area of the alder and birch, it may also be a result of neglect [Grzesiak 1997].

The proportions of individual dominant species generally reflect the existing pattern of forest habitat types. It often happens, however, that comparatively good habitats are occupied by poor-quality coniferous monocultures, mostly pine[1], which require systematic rebuilding into mixed, uneven-aged stands.

The analysis of correlations between the chief species of forest trees and forest habitat types showed the State Forests woodland to receive proper management accommodating the habitat type (Table 2). This is connected with the managers' efforts to make the fullest use of the productive capacities of both, forest habitats and the trees they support.

[1] In Poland the pine has found the most favourable climatic and habitat conditions within its Eurasian range, as a result of which it has managed to develop many valuable ecotypes.

Table 1. Surface specification of dominant species and change indices
Tabela 1. Zestawienie powierzchni gatunków panujących i wskaźników zmian

Dominantig species Gatunek panujący	Area – Powierzchnia				Difference + increase – decrease Różnica + zwiększenie – zmniejszenie	Change index Wskaźnik zmian 1991 = 100%
	1991		2005			
	thous. ha tys. ha	%	thous. ha tys. ha	%	thous. ha tys. ha	%
Pine – Sosna	4 823.7	70.9	4 853.7	69.0	+30.0	100.6
Spruce – Świerk	428.6	6.3	386.3	5.5	-42.3	90.1
Fir – Jodła	142.9	2.1	137.7	2.0	-5.2	96.4
Oak – Dąb	421.8	6.2	514.9	7.3	+93.1	122.1
Beech – Buk	306.1	4.5	352.0	5.0	+45.9	115.0
Hornbeam – Grab	20.4	0.3	20.1	0.3	–0.3	98.5
Birch – Brzoza	353.8	5.2	412.3	5.9	+58.5	116.5
Alder – Olcha	285.7	4.2	310.0	4.4	24.3	108.5
Poplar – Topola	20.5	0.3	42.5	0.6	+22.0	207.3
Total – Razem	6 803.5	100.0	7 029.5	100.0	+226.0	103.3

Source: Calculated on the basis of Leśnictwo 1991 and 2006.
Źródło: Opracowano na podstawie roczników Leśnictwo 1991 i 2006.

Table 2. Correlations between types of forest habitat and chief woodland tree species in the State Forests ($\alpha = 0.05$)
Tabela 2. Związki korelacyjne pomiędzy typami siedliskowymi lasu a głównymi gatunkami drzew leśnych w Lasach Państwowych ($\alpha = 0{,}05$)

Forest site type Siedliskowy typ lasu	Dominantig species – Gatunek panujący						
	pine sosna	spruce świerk	oak dąb	beech buk	birch brzoza	alder olcha	poplar topola
Coniferous forest Bory	**0.913**	–0.379	–0.237	**–0.790**	0.111	–0.206	0.185
Forest Lasy	**–0.908**	0.385	0.214	**0.811**	–0.170	0.130	–0.205
Alder carr Olsy	0.194	–0.169	0.178	–0.437	**0.657**	**0.750**	0.267

Source: Own calculations.
Źródło: Obliczenia własne.

As Table 3 shows, the age structure of Polish woodland is dominated by stands in the 3rd and 4th age classes, which occupy 23.9% and 19.2% of the State Forests area, respectively. Stands older than 100 years occupy 13.6%, and account for 17.3% of the stand volume.

Table 3. Specification of age class surfaces and change indices
Tabela 3. Zestawienie powierzchni klas wieku i wskaźników zmian

Age class Klasa wieku	Area – Powierzchnia				Difference + increase – decrease Różnica + zwiększenie – zmniejszenie	Change index Wskaźnik zmian 1991 = 100%
	1991		2005			
	thous. ha tys. ha	%	thous. ha tys. ha	%	thous. ha tys. ha	%
I (1-20)	966.1	14.2	773.9	11.0	–192.2	80.1
II (21-40)	1 680.5	24.7	1 228.8	17.5	–451.7	73.1
III (41-60)	1 394.7	20.5	1 683.9	23.9	+289.2	120.7
IV (61-80)	1 231.4	18.1	1 350.1	19.2	+118.7	109.6
V and older (from 81) V i starsze (81 i więcej)	1 231.4	18.1	1 558.2	22.2	+326.8	126.5
Total – Razem	6 803.5	100.0	7 029.5	100.0	+226.0	103.3

Source: Calculated on the basis of Leśnictwo 1991 and 2006.
Źródło: Opracowano na podstawie roczników Leśnictwo 1991 i 2006.

The areal structure of age classes is far from what it should be, given the proportion in it of the dominant species. The decided predominance of the pine would suggest a 100-year rotation cycle [cf. Magnuski 1984]; hence, in theory, in the desired age structure the stand of each age class (from 1st to 5th) should occupy 20% of total woodland area. The actual proportions diverge from the theoretical ones quite considerably, with a deficit in the youngest classes and the 4th class, and a surplus in the remaining classes: 3.9% of stand area in the 3rd class and 7.1% in the 5th and older classes. These are quite big surpluses taking into consideration the fact that the growing stock in those classes is decisive for the productivity of stands. This means that, despite an increase in regeneration measures and the area being afforested, the final cutting of the oldest stands has to be limited. True enough, a good side of a high accumulation of standing stock is a continuous increase in the stand volume, but over a long period such a high accumulation can cause depreciation of standing timber. Besides, a persistent unfavourable tendency in the areal structure of age classes may have grave consequences for the sustainability of woodland and its use. It may also have a detrimental impact, naturally extended over a number of years, on the timber market.

The mean age of stands, in accordance with the theoretical model adopted, should be equal to half a rotation cycle, or 50 years on average. Calculated as a weighted mean of the individual age subclasses, it amounted to 60 years in 2005, up from 54 years in 1991. This higher figure is a logical consequence of the greater proportion of older classes in the age structure of stands.

In 2005 total timber resources of the State Forests equalled about 1,586,300,000 m^3, of which conifers accounted for 1,252,400,000 m^3, or 79%, and broadleaves for a mere 333,800,000 m^3, i.e. about 21%. Such a distribution is primarily due to the existing species composition and the age structure of woodland.

In the years 1991-2005 there was an increase in the State Forests' standing timber resources by more than 301 million m^3 (from 1,285,000,000 m^3). Even so, the resource

figure is about 15% lower than the potential determined by natural conditions. This is a consequence of less-than-full use of the productive capacities of habitats, a lower increment as a result of air pollution, and excessive felling in the previous years.

The increase in timber resources in the State Forests woodland is largely due to the following factors:

- afforestation of former agricultural land, wasteland and reclaimed land,
- supplementary afforestation of gaps and thinnings in the stands, of whatever origin,
- favourable changes in the age structure,
- a systematic increase in the extent and improvement in the quality of stand tending,
- a more precise identification of forest habitats and as a result a better planning of the species composition of the stands being regenerated,
- a high accumulation of standing production stock,
- the use of regulation methods involving timber harvesting at a level lower than the increment in the volume of trees left standing.

Woodland can be found in Poland largely on the poorest soils, which is reflected in the pattern of forest habitat types. Coniferous forest habitats occupy a total of 56.9% of the woodland area, as against 43.1% occupied by broadleaved forest habitats, including 3.9% under alder and riverside carrs.

It follows from a survey of forest habitat types that the natural production conditions are rather favourable, even though they are not always used correctly and to the full; stands may not be harmonised with the habitats in which they grow, or they may display a low degree of stocking. Still, a comparison of stand volumes per ha calculated for stands in the particular forest habitat types shows there to be a correlation between the fertility of habitats and the stand volume/ha they support: the better the conditions, the greater the volume. This relationship is reflected in the high national figure of mean stand volume per ha: 229 m^3/ha in 2005, a rise from the 1991 value of 191 m^3/ha (Table 4).

Table 4. Stand volume in age per 1 ha and change indices
Tabela 4. Miąższość drzewostanów według klas wieku w przeliczeniu na 1 ha i wskaźniki zmian

Age class Klasa wieku	Volume – Miąższość m^3/ha		Difference + increase Różnica + zwiększenie m^3	Change index Wskaźnik zmian 1991 = 100%
	1991	2005		
I (1-20)	10	12	+2	120.0
II (21-40)	109	139	+30	127.5
III (41-60)	229	243	+14	106.1
IV (61-80)	278	301	+23	108.3
V (81-100)	303	327	+24	107.9
VI (101-120)	317	342	+25	107.9
VII and older (from 121) VII i starsze (121 i więcej)	319	348	+29	109.1
Total – Razem	191	229	+38	120.0
Summary volume and its changes Sumaryczna miąższość i jej zmiany	1 285 043	1 586 263	+301 220	

Source: Calculated on the basis of Leśnictwo 1991 and 2006.
Źródło: Opracowano na podstawie roczników Leśnictwo 1991 i 2006.

An increase in stand volume per ha is one of the indicators of woodland management quality. It is worth noting that Polish forests are among the European leaders in this respect: in the 2005 statistics of the Forest Resources Assessment, the Polish mean of 203 m^3/ha almost doubled the figure for Europe as a whole (107 m^3/ha).

Stand volume per ha varied spatially and ranged from 204 m^3/ha in Lubuska Land to 260 m^3/ha in Warmia-Mazuria. It should be emphasised that only in five voivodeships (Lubuska Land, Wielkopolska, Łódź, Kujawy-Pomerania, and Silesia) were the figures lower than the national average.

Productivity

A significant index of the yield capacity of woodland is the gross annual current increment of timber calculated as the difference between stand volumes at the end and start of the year, plus timber harvested. According to Zabielski [1984], determining the current increment is useful primarily in the steering of the development of standing resources and assessing the effect of thinning on the growth of the stands being thinned[2]. Similarly, Magnuski [1989] is of the opinion that "people cannot merely extract a ready crop from a forest in final felling, but they should also take much care to ensure the proper production of standing timber resources".

The mean gross annual increment of the stand volume in the State Forests woodland calculated for the last 20 years equals 6.9 m^3/ha, and the gross mean annual increment of timber over the last five years, 8.1 m^3/ha. In 2005 the gross current annual increment of timber amounted to 66.7 million m^3, or 9.5 m^3/ha. Taking into consideration the present state of resources, this is a high figure. It can be explained by the fact that the stands predominating in the age structure of woodland in Poland are those of the younger and medium age classes which are at a stage of current increment culmination; hence their effect on the mean value of this yield capacity measure is substantial. It should be emphasised that over the period analysed, the current annual increment of stands increased by half, from 4.8 m^3/ha in 1991, and the index of change in the forest yield capacity defined by this measure, by 104% (Table 5).

The mean annual current increment of the stand volume in 2005 amounted to 3.8 m^3/ha, slightly up from the 1991 figure of 3.5 m^3/ha. In turn, the mean annual increment of total production in the State Forests woodland in 2005 equalled 6.1 m^3/ha of gross volume, this time definitely more than the 1991 value of 4.7 m^3/ha.

To make a synthetic assessment of the state of woodland and the demand of the national economy for timber, areas were distinguished that are raw material bases for the timber industry. The size of a base determines the quantity of raw material that can be harvested in a forest. A raw material base is crucial for spatial management and physical planning. It was assumed, after Łonkiewicz [1993], that a raw material base was primarily defined by its timber resources per unit area (stand volume per ha) and the level of spatial concentration of the forest base as measured by the index of woodiness. The basic unit adopted in the assessment of raw material bases was the voivodeship, with

[2] Zabielski [1984] explains that what he has in mind in this case is "primarily such a degree of intensity of this cultural practice which would ensure continuity and evenness of the process of increment of the stand volume".

Table 5. Indices of changes productivity
Tabela 5. Wskaźniki produkcyjności drzewostanów

Rodzaj przyrostu Kind of increment	1991		2005		Różnica Difference		Change index Wskaźnik zmian 1991 = 100%
	on total area na całej powierzchni	on 1 ha na 1 ha	on total area na całej powierzchni	on 1 ha na 1 ha	on total area na całej powierzchni	on 1 ha na 1 ha	
	m^3						%
Current annual increment of stands volume Przyrost bieżący roczny miąższości drzewostanów	32 659.0	4.8	66 732.25	9.5	+34 073	4.7	197.9
Average annual increment of actual stands volume Przyrost przeciętny roczny aktualnej miąższości drzewostanów	23 812.25	3.5	26 712.1	3.8	+2 900	0.3	108.6
Average annual increment of total stands production Przyrost przeciętny roczny całkowitej produkcji drzewostanów	31 976.45	4.7	42 880.0	6.1	+10 904	1.4	129.8

Source: Calculated on the basis of Leśnictwo 1991 and 2006.
Źródło: Opracowano na podstawie roczników Leśnictwo 1991 i 2006.

a point evaluation performed to distinguish elementary bases [cf. Sołowiej 1992][3]. The classification and point evaluation of the assessment criteria are presented in Table 6.

The indices of woodiness and stand volume per ha provided a basis for the classification of voivodeships in terms of the type of raw material base (Table 7). The classification spanned a range of 2 to 6 points for the elements distinguished, hence the total score allowed the spatial units classified to be divided as follows:

– 2-3 points – areas with a small forest production stock,
– 4 points – areas with an average forest production stock,
– 5-6 points – areas with a big forest production stock.

The analysis showed that there were areas in Poland with a big raw material base, primarily in the northern, south-western and south-eastern parts of the country (Fig. 1). This size of base is represented by three types of productive hinterland:

– 1 voivodeship with above-average woodiness and stand volume per ha,
– 4 voivodeships with stands with a high rate of stand volume per unit area and average woodiness,
– 2 voivodeships with a high concentration of woodland per unit area, but average stand volume per ha.

[3] A point evaluation is a change of qualitative variables into quantitative ones, or of a description of a phenomenon into its digital record [Sołowiej 1992].

Table 6. Criteria of distinguishing forest resource bases
Tabela 6. Kryteria wyróżniania leśnych baz surowcowych

Spatial class Klasy przestrzenne	Stand volume Zasobność m^3/ha	Woodiness Lesistość %	Stand quality points Bonitacja punktowa
Small – Mała	under 220 poniżej 220	under 26 poniżej 26	1
Medium – Średnia	220-240	26-30	2
Large – Duża	over 240 powyżej 240	over 30 powyżej 30	3

Source: Own compilation.
Źródło: Zestawienie własne.

Table 7. Types of resource bases
Tabela 7. Typy baz surowcowych

Stand volume Zasobność ha	Woodiness – Lesistość		
	low – niska	medium – średnia	large – duża
Low Niska	Łódzkie, Kujawsko-pomorskie, Wielkopolskie	–	Lubuskie, Śląskie
Medium Średnia	Lubelskie, Mazowieckie	Opolskie, Świętokrzyskie	Pomorskie, Zachodniopomorskie
Large Duża	–	Dolnośląskie, Małopolskie, Podlaskie, Warmińsko-mazurskie	Podkarpackie

Source: Calculated on the basis of Leśnictwo 2006.
Źródło: Opracowano na podstawie rocznika Leśnictwo 2006.

Thus, these are areas with the highest productive potential. That is why they should be of the greatest significance for factories of the timber, pulp and papermaking industries.

The productive hinterland of state-run forests is small in the central part of the country. These are voivodeships in which the criteria of distinguishing raw material bases (i.e. stand volume per ha and woodiness) occupy the lowest class interval, or in which one of the measures represents the average and the other the lowest class interval. Timber harvesting from those areas should be restricted in range because ill-considered management of the existing resources may lead to their substantial depletion and as a result, their exhaustion.

The remaining area of the country shows an average level of the production stock of stands. There are 4 spatial units here which received a total score of 4 points each.

In 2005, a total of 28,164,000 m^3 of timber were harvested in the State Forests woodland, i.e. 105.6% of the approximate annual yield determination by volume. This was

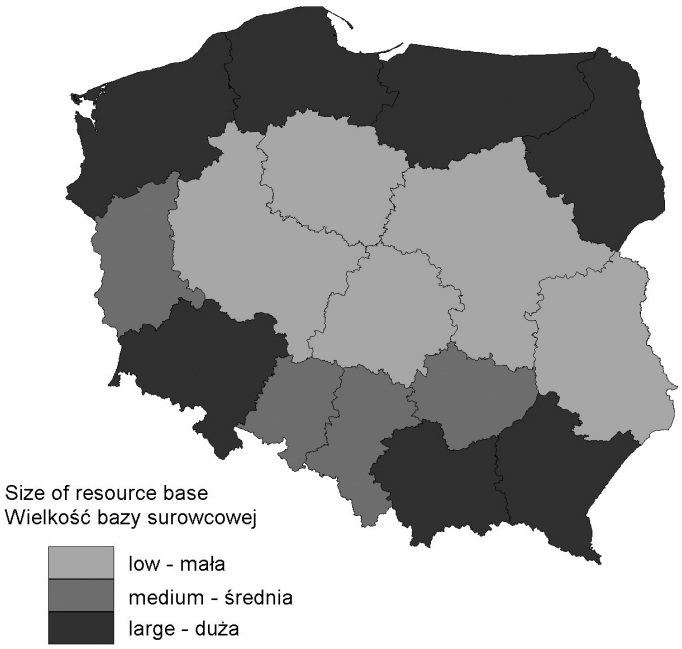

Fig. 1. Woodland resources base in 2005
Source: Own calculated on the basis of Leśnictwo 2006.
Rys. 1. Leśna baza surowcowa w 2005 r.
Źródło: opracowanie własne na podstawie rocznika Leśnictwo 2006.

almost half the 1991 figure of 15,471,000 m^3 of timber (89.7% of yield determination). Due to the age structure of stands in the Polish forests, the range of tending and protection practices they require is especially wide. Hence there was a considerable proportion of intermediate (tending) cuttings (53.5% in 1991 and 56.6% in 2005) as well as incidental cuttings and salvage harvesting designed to remove timber damaged by disastrous occurrences. Clear felling was limited to 5.6 million m^3 of timber, i.e. to 19.9% of the total timber harvested.

It follows from the analysis of Table 8 that in 1991 the felling load per 100 ha of woodland equalled 228 m^3, including 106 m^3 in final cutting and 227 m^3 in intermediate cutting. In the successive years the increase in timber resources resulted in the crop growing in 2005 to 400 m^3/100 per ha of woodland, of which final cutting accounted for 174 m^3 and intermediate cutting, for 227 m^3.

Forest productivity shows great spatial variability. In 2005 the lowest productivity was recorded in the voivodeship of Podkarpacie – 344 m^3/100 ha of woodland, and the highest in Silesia – 476 m^3/100 ha. In spatial terms, the zone of the lowest forest productivity (below 380 m^3/100 ha) extended from Lubuska Land in the west through Wielkopolska, Łódź and Świętokrzyska Land to Podkarpacie in the east. The regions where timber harvesting exceeded 420 m^3/100 ha could be found in the south and north-east of the country (Fig. 2).

Table 8. Changes annual amount of cut
Tabela 8. Zmiany rocznego rozmiaru użytkowania

Kind of yield Rodzaj użytku	Annual utilization from 100 ha of forest surface Roczne użytkowanie ze 100 ha powierzchni leśnej		Difference Różnica	Change index Wskaźnik zmian 1991 = 100%
	1991	2005		
	m^3			%
Final yield Użytki rębne	106	174	+68	164.1
Thinning yield Użytki przedrębne	122	227	+105	186.1
Total Razem	228	400	+172	175.4
Summary annual utitization Sumaryczne roczne użytkowanie	15 511	28 164	+12 653	

Source: Calculated on the basis of Leśnictwo 1991 and 2006.
Źródło: Opracowano na podstawie roczników Leśnictwo 1991 i 2006.

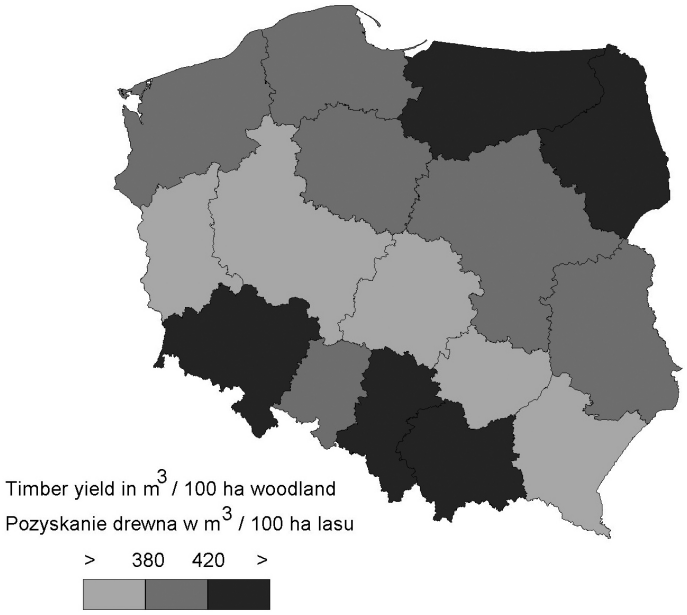

Fig. 2. Productivity of woodland in 2005
Source: Own calculated on the basis of Leśnictwo 2006.
Rys. 2. Produktywność lasów w 2005 r.
Źródło: opracowanie własne na podstawie rocznika Leśnictwo 2006.

It follows from a comparison of the annual size of felling per ha of woodland with an average current increment produced yearly in this area in 1991 that the final and intermediate cutting accounted for 59% of this increment, while the remaining 41% contributed to the existing production and potential stock; in 2005 this index grew to 49%. These facts show forest management to be correct. They are also very favourable to the future status of forests and their fulfilment of a variety of functions.

CONCLUSIONS

The above analysis allows several general conclusions to be formed:

1. Over the study period, the State Forests woodland resources kept increasing steadily as reflected in the gross increase in the growing stock of timber from 1.3 billion m^3 in 1991 to about 1.6 billion m^3 in 2005. This was due to a constant improvement in the age structure of stands and rational management manifesting itself in timber harvesting kept to a level lower than the increment in the stand volume.

2. The species and age structure of timber resources had undergone favourable changes. There was an increase in the proportion of broadleaved stands and those of the older age classes.

3. Ever better use was made of the natural conditions of production, which are relatively favourable. This was reflected in the rise in mean stand volume per ha from 191 m^3/ha in 1991 to 226 m^3/ha in 2005, another indicator of the quality of woodland management.

4. In terms of yield capacity, the State Forests woodland can be considered good. All the yield capacity indices were high, surpassing the 1991 figures.

5. Timber harvesting in the State Forests woodland shows an upward tendency. This is due to the increase in timber resources in the recent years and the adoption of a management policy seeking to prevent any deterioration in the quality of standing timber.

6. The use of the productive capacity of State Forests woodland as expressed by the timber harvesting /timber increment ratio is kept to a level guaranteeing a steady increase in the stock of standing timber and in the productive potential of the woodland.

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ZASOBY, PRODUKCYJNOŚĆ I PRODUKTYWNOŚĆ LASÓW W ZARZĄDZIE LASÓW PAŃSTWOWYCH W POLSCE W LATACH 1991-2005

Streszczenie. W pracy przedstawiono potencjał produkcyjny lasów PGL Lasy Państwowe w latach 1991-2005. Ponadto przeanalizowano zmiany, które wystąpiły w badanych latach i uzasadniono ich przyczyny. Badania wykazały ewidentny wzrost produkcyjności lasu mierzonej miąższością, przyrostem bieżącym i przeciętnym miąższości drzewostanów. Pozytywnym zmianom ulega struktura gatunkowa i wiekowa zasobów drzewnych. Pozyskanie drewna również cechuje tendencja wzrostowa. Wzrost ten jest możliwy dzięki zwiększeniu się zasobów drzewnych w ostatnich latach oraz prowadzeniu polityki leśnej mającej na celu niedopuszczenie do zmniejszenia jakości drewna na pniu.

Słowa kluczowe: lasy, zasoby leśne, produkcyjność, produktywność, zasobność drzewostanów

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