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Changes in land use structure of agricultural holdings in Kujavia-Pomerania voivodeship in light of comparative analysis of National Agricultural Censuses of 2002 and 2010¹

Abstract: The study presents the results of the spatial analysis of the total area of agricultural holdings as of 2010 and the changes in these figures as recorded in 2002 and 2010, whereby the agricultural acreage (including: arable lands, permanent crops and permanent grassland) and lands excluded from agricultural activities (including: forests, forestlands and other lands) are treated separately. It has been demonstrated that only in Kujavia-Pomerania region increased the total area of agricultural holdings, the agricultural acreage became slightly smaller (by 21 thousand ha) and the area of unutilised agricultural lands – in particular forests – enlarged (by 65.4 thousand ha in the case of forests and other land). The changes varied substantially across the regions as a result of both natural and historical conditions, on the one part, and the Common Agricultural Policy mechanisms, on the other part.

Key words: land use, agricultural holdings, Kujavia-Pomerania voivodeship

Introduction

The matters related to land use comprise an important field of geographical and agricultural studies. Initiated by J.W. Powell in the USA at the end of the 19th century, it was developed by L.D. Stamp in the UK (Falkowski, Kostrowicki 2001, pp. 17–18). In Poland it fell within the scope of scientific research carried out predominantly by Uhorczak (1963), Kostrowicki (1960), and Kulikowski (1969). At present it is further explored by such Polish researchers as: Bański (1997, 1998) and Głębocki (2007, in co-operation with Świdorski). Their studies they include not only the presentation of regional differences in relation to a particular land use form, but also the impact assessment of natural, historical, urban (and any other relevant) conditions.

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To a large extent, the contemporary changes in agriculture, including those in the land use structure of the agricultural holdings, are related to the mechanisms of the Common Agricultural Policy (CAP), which applies also to a notable improvement in the financial condition of the agricultural holdings and to the implementation of several aid programmes. As indicated by Rudnicki (2013, pp. 71–92), the agricultural holdings received approximately PLN 93 billion in the period of 2002–2010. These funds had a considerable influence on the land use due to both the area payment schemes (including the Single Area Payment Scheme and the Complementary National Direct Payments for lands in good agricultural condition) and a series of measures within the Rural Development Programme (RDP), in particular those related to afforestation. In order to assess the changes in the land use structure which happened in such conditions, a comparative analysis of the two most recent National Agricultural Censuses (2002 and 2010) was employed.

At that point it should be noted that due to the requirement imposed on the Polish agricultural statistics to comply with the Eurostat standards, the results of the National Agricultural Census of 2010 – the first to be concluded after the Polish accession to the EU – are presented according to another methodology. Unlike in the National Agricultural Census of 2002, that of 2010 treats the agricultural acreage in good agricultural condition as a separate category of land use (cf *Charakterystyka... 2012* and *Użytkowanie... 2002*).

For the purposes of this analysis the census data aggregated by holding headquarters only were used. Particular lands were ascribed to that administrative unit which encompassed the location of farm facilities and the land area or, if there were no building structures, they were attributed to the *gmina* (commune) whose boundaries enclosed the largest part of the land area.

On account of a different availability of and access to the statistical data, the author of the study concentrated on the assessment of transformations in the land use structure of agricultural holdings taking into consideration the division into agricultural acreage and unutilised agricultural lands, which are further divided into two categories: forests and forestlands; and other lands. The intraregional diversities were analysed on the level of *poviats*, whereby both natural and man-made conditions were investigated.

As far the former conditions are concerned, by means of the agricultural production area quality index (Polish: *WjRpp* – cf *Waloryzacja... 2000*) and on the basis of the RDP application criteria for the aid for farmers in Less Favoured Areas (LFA), the following division was developed:

1. Unfavourable conditions (below 52 points by *WjRpp*, lowland areas);
2. Moderate conditions (52–72 points by *WjRpp*, lowland areas);
3. Favourable conditions (over 72 points by *WjRpp*, areas excluded from the aid allocated for the LFA).

When it comes to the man-made conditions, the following two factors were differentiated:

- historical, i.e. division of *poviats* according to their location:

1. Territories of the Polish-Lithuanian Commonwealth acquired by the Kingdom of Prussia during the partitions of Poland and which remained within the Polish borders in the interwar period;
2. Territories of the Polish-Lithuanian Commonwealth acquired by the Russian Empire during the partitions of Poland and which remained within the Polish borders in the interwar period (signatures as in Table 1).

The other elements of the analysis, which comprise a detailed characterization of the land use structure of agricultural lands, forests and forestlands, were presented at the poviats level only.

Land use structure in general

The land use structure was determined on the basis of the total area of lands used by agricultural holdings, which fell into two categories: agricultural acreage and unutilised agricultural land.

The comparative analysis of the National Agricultural Censuses of 2002 and 2010 evinced that within the period under analysis the total area of agricultural holdings in Poland decreased dramatically: by 1,255 thousand ha. On average, the indicator of change in the agricultural holding areas for the period of 2002–2010 equalled 94 points (benchmark: 2002 = 100 points). Only in Kujavia-Pomerania voivodeship the total area of farms increased by 48.4 thousand ha. which accounted for 104 points (*cf* Table 1). Taking *poviats* into consideration, a large increase in the total agricultural holding area was noted in the poviats: Świecie-powiat (159 points), Inowrocław-powiat (127 points), Włocławek land powiat (112 points); which may be related to the take-over of lands previously belonging to the state farms (it may be an outcome of the SAPS implementation).

What is noteworthy at that point is that only the data by *GUS* relating to the holding headquarters were analysed. The comparative study for the period at issue showed particularly pronounced differences between selected entities at the *powiat* level, which applied both to a very high growth in the total area of agricultural holdings (with the highest growth recorded in the *powiat* of Świecie in the Kujavia-Pomerania voivodeship (47 thousand ha). Such big differences prove that the organizational changes related to the designation of a particular agricultural holding to a given *gmina* (or *powiat*, or region) has an increasing impact on the formation of the land use structure. Detailed information on such agricultural holdings is not published by *GUS* in compliance with the obligation on the part of *GUS* to keep statistical confidentiality.

Despite the figures confirming the slowly increasing trend of the total area of agricultural holdings, these areas still comprise the most important segment of the land development in the Kujavia-Pomerania voivodeship; agricultural holdings constituted 57.8% of the total area of Poland (2010) and near 70% in the Kujavia-Pomerania voivodeship. Large differences were recorded at the level of poviats below 50%: Bydgoszcz land powiat (43.7%) and Tuchola-powiat 43.6%), and above 80% in the poviats:

Table 1. Selected assessment elements related to changes in the area and land use structure of agricultural holdings in Kujavia-Pomerania voivodeship in period 2002–2010

Specification	Total area of agricultural holdings (TA)			Including						
			changes in period of 2002–2010 (2002=100 points)	agricultural acreage		forests and forestlands		other lands		
	thousand [ha]	[%] TA		[%] TA as of 2010	changes in period of 2002–2010 (2002=100 points)	[%] TA as of 2010	changes in period of 2002–2010 (2002=100 points)	[%] TA as of 2010	changes in period of 2002–2010 (2002=100 points)	
Kujavia-Pomerania	1257.1	69.9	104	85.6	98	5.2	202	9.2	139	
by poviats										
Aleksandrów	38.4	80.8	99	94.0	99	1.8	108	4.3	102	
Kujawski										
Brodnica	67.2	64.6	84	91.4	94	3.3	108	5.3	29	
Bydgoszcz*	69	43.7	101	89.2	99	3.4	115	7.4	122	
Chełmno	42.2	80.0	97	94.0	98	1.3	103	4.7	93	
Golub-Dobrzyń	46.3	75.5	95	91.6	94	2.6	112	5.8	116	
Grudziądz*	60.5	77.1	102	92.7	101	2.3	130	5.1	110	
Inowrocław	122.4	99.9	127	95.3	133	1.4	201	3.3	49	
Lipno	67.6	66.6	94	85.8	90	6.4	110	7.9	132	
Mogilno	45.1	66.8	94	94.1	94	1.9	152	4.0	93	
Nakło	73.1	65.2	96	90.5	96	2.6	114	6.9	95	
Radziejów	53.1	87.5	99	93.4	98	1.4	142	5.2	107	
Rypin	41.8	71.4	98	85.9	92	5.9	127	8.2	170	
Sępólno	49.7	62.9	97	90.4	96	3.4	120	6.2	116	
Świecie	126.1	85.5	159	53.7	94	25.0	1058	21.3	628	
Toruń*	71	52.7	100	88.7	96	3.2	115	8.1	172	
Tuchola	46.9	43.6	92	84.6	91	10.4	95	5.0	92	
Wąbrzeźno	43.2	85.9	99	92.5	98	2.1	147	5.4	110	
Włocławek*	121	77.4	112	75.9	95	1.9	135	22.2	274	
Żnin	73.2	74.3	88	87.0	88	1.7	75	11.3	87	
by natural conditions*										
WjRpp	1	280.9	X	101	79.9	96	5.3	107	14.8	148
	2	513.1	X	104	80.8	93	8.6	310	10.6	169
	3	463.1	X	104	94.3	105	1.4	152	4.3	86
by man-made conditions*										
historical	1	883.6	X	104	86.0	100	6.0	236	8.0	117
	2	373.5	X	102	84.7	95	3.3	115	12.0	197

Conditions: natural: 1 – unfavourable conditions (below 52 points by *WjRpp*); 2 – moderate conditions (52–72 points by *WjRpp*); 3 – favourable conditions (over 72 points by *WjRpp*); historical: 1 – territories of the Polish-Lithuanian Commonwealth acquired by the Kingdom of Prussia during the partitions of Poland and which remained within the Polish borders in the interwar period; 2 – territories of the Polish-Lithuanian Commonwealth acquired by the Russian Empire during the partitions of Poland and which remained within the Polish borders in the interwar period.

Source: own work on the basis of data by GUS [Central Statistical Office] (PSR 2002 [2002 NAC] and PSR 2010 [2010 NAC] by holding headquarters).

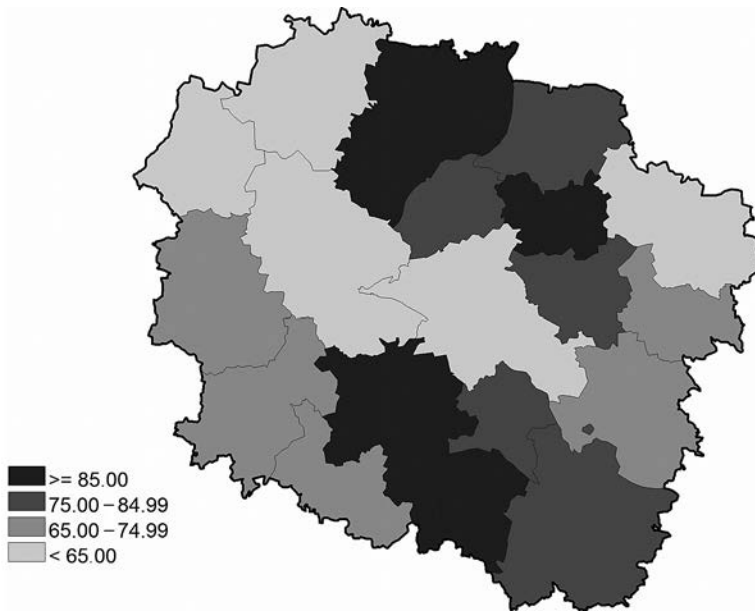


Fig. 1. Total area of agricultural holdings by holding headquarters in proportion to the total area of *poviats* (as of 2010)
 Source: own work on the basis of *BDL GUS* [Local Data Bank by Central Statistical Office].

Inowrocław-powiat, Radziejów-powiat, Wąbrzeźno-powiat, Aleksandrów Kujawski powiat and Chełmno-powiat. (cf Fig. 1).

Apart from the changes in the total area of agricultural holdings, the period of 2002–2010 saw changes in the land use. These applied mostly to the relation between agricultural acreage and unutilised agricultural lands.

Agricultural acreage

According to the National Agricultural Censuses of 2002 and 2010, the agricultural acreage decreased by 21.9 thousand ha. The period under analysis saw the indicator of change in agricultural acreage at the level of 92 points (benchmark: 2002 = 100 points) and 98 points in Kujavia-Pomerania voivodeship. As far as the analysis of *poviats* is concerned, the scale of differences stretched from below 90 points only in the Żnin-powiat to over 100 points in two *poviats*: Grudziądz and Inowrocław, cf Fig. 2).

Taking into account the natural conditions (*WjRpp*), the analysis of changes in agricultural acreage demonstrated a positive trend for the acreage in the *poviats* characterised by favourable natural conditions – 105 points (with the figure for the *poviats* with less-favourable natural conditions being 93–96 points; cf Table 1).

As a result of the above-described changes in 2010, the share of agricultural acreage in the total area of agricultural holdings amounted to 85.6%. A low share

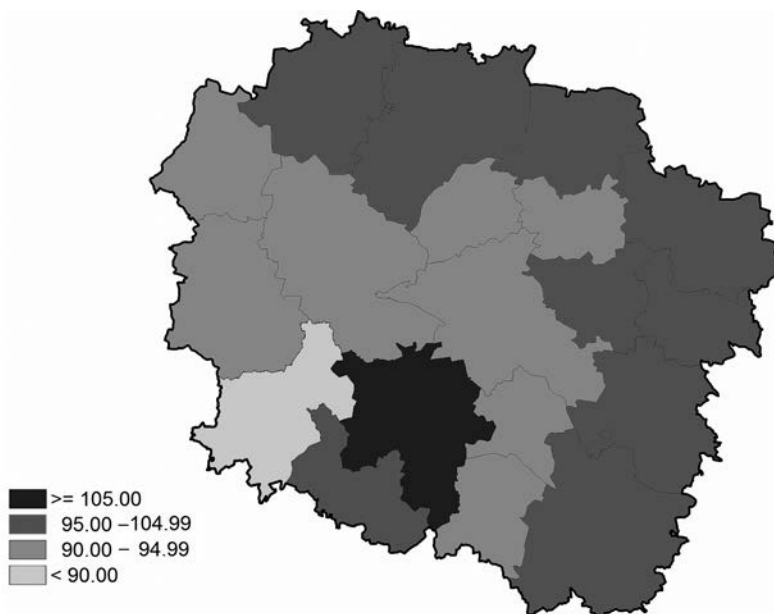


Fig. 2. Changes in agricultural acreage of agricultural holdings in period 2002–2010 (benchmark: 2002 = 100 points)

Source: own work on the basis of data by GUS [Central Statistical Office] (PSR 2002 [2002 NAC] and PSR 2010 [2010 NAC]).

of agricultural acreage (below 75%) in the total area of a *powiat* was noted only in one *powiat* – *świecki*, which is located in the areas less-favoured by natural conditions. On the other hand, the agricultural acreage predominated in the land use structure of agricultural holdings (above 90%) in 10 *poviats* which, as a rule, were situated in the areas with favourable natural conditions, e.g.: *Inowrocław-powiat*, *Mogilno-powiat*, *Aleksandrów Kujawski-powiat*, *Chełmno-powiat*; cf Fig. 3).

The impact of natural conditions on the territorial differences in the said indicator was confirmed by a large share of agricultural acreage in the areas with favourable natural conditions (94,3%), especially when set beside the areas with unfavourable natural conditions (79.9%). However, the latter figure points to the fact that too much land in the areas with unfavourable natural conditions in Poland was dedicated to agricultural acreage.

The analysis also involved the issues of the agricultural land use. None the less, due to the introduction of lands in good agricultural condition (which comply with the required minimum of environmental protection standards) into the agricultural statistics (*Rozporządzenie...* 2004), particular types of agricultural acreage are incomparable with the results of the National Agricultural Census of 2002 (PSR 2002 [2002 NAC]). Therefore, the analysis of that matter encompassed the data on intraregional differences presented in 2010 NAC (cf Table 2). The inability to compare the area of arable lands, orchards, meadows and pastures as given in the National Agricultural Census of 2002 (which presents the

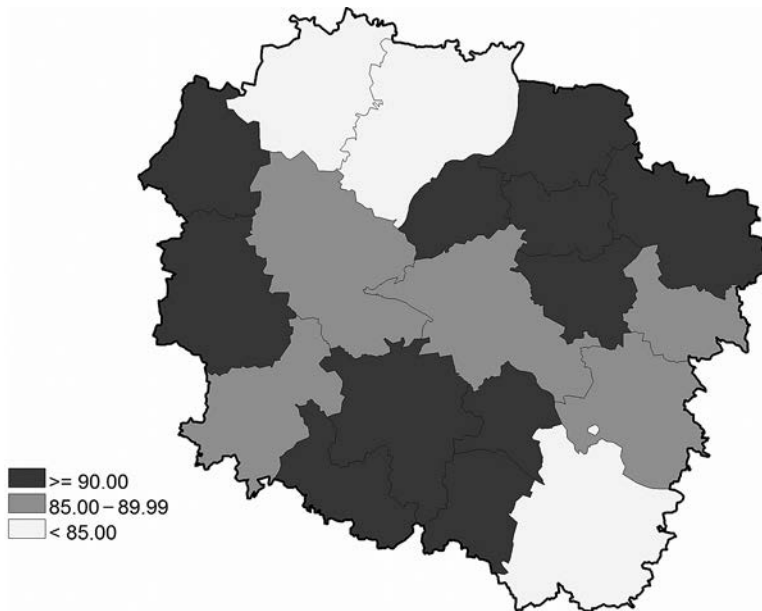


Fig. 3. Agricultural acreage in proportion to the total area of agricultural holdings (as of 2010)

Source: own work on the basis of data by GUS [Central Statistical Office] (PSR 2010 [2010 NAC]).

area by the above-mentioned land use forms) with the figures as of 2010 (which apply exclusively to the lands in good agricultural condition) can be deemed a significant barrier to the analysis of spatial structure of agriculture.

Another fact to be highlighted at that point is that the EU funds can be granted only to those agricultural holdings which are run in compliance with the principles of the Good Agricultural Practice, which means that their management standards abide by the principles governing: the rational management of waste, protection of water and soil, preservation of valuable habitats and species living in agricultural areas, and preservation of the natural beauty of the landscape (*Kodeks.... 2004*).

In general, the agricultural acreage in good agricultural condition comprised 94.2% of the total agricultural acreage in Poland and in Kujavia-Pomerania voivodeship 98.5% in 2010. The proportion varied across the poviats: 96.7% in the Bydgoszcz land poviat, 97% in the Lipno-poviat, and approximately 100% in the Inowrocław-poviat (*cf* Table 2).

On the basis of 2010 NAC, the agricultural acreage in good agricultural condition lies at the foundation of the differentiation and the analysis of particular forms of agricultural land use. The most significant position in the structure was taken by the arable lands (on average 85.6% in the Kujavia-Pomerania voivodeship: from 78.7% in the Rypin-poviat to 94.6% in the Mogilno-poviat). These were predominantly sown areas involving the entirety of the crops which were both sown and planted in the agricultural holding – they constituted 98.5% of all

arable lands in the studied region (from 96.7% in the toruński powiat, to 99.5% in the żniński powiat). Within the arable lands two other land use forms were differentiated, as specified below.

Kitchen gardens – areas usually located around holding headquarters with crops first and foremost dedicated to the self-supply of the household run by the person using the agricultural holding, which are accounted in the NAC under ‘other crops’ and in 2010 NAC are treated separately as a result of the adjustment of GUS agricultural statistics to the EU classification (Eurostat);

Fallow lands – arable lands not used for the purposes of production (including green manure), but maintained in good agricultural condition and in compliance with the environment protection rules; their area comprised 1.4% of arable lands in voivodship and 4.1% of arable lands in the whole country (*cf* Table 2).

What is to be emphasised here is that, according to the data in 2002 NAC, the area of unutilised agricultural lands was by far larger (2.2 mln ha) and its subsequent decrease was related to the Polish accession to the EU and to the implementation of the direct payment scheme (Bański 2007, pp. 150–152).

According to the data presented in 2010 NAC, the agricultural holdings in good agricultural condition were further divided into permanent crops in other words: the total area of planted fruit trees, fruit shrubs, fruit arboreta, ornamental tree and shrub cultivations, forest nurseries for commercial purposes, and other permanent cultivations (e.g. wicker). That form of land use was dominated by orchards, which made up 90% (mean average) of all permanent crops in Kujavia-Pomerania voivodship (from 47.4% in the Toruń land powiat to 100% in the Rypin powiat; *cf* Table 2).

The category of ‘agricultural acreage in good agricultural condition’ used in 2010 NAC also entailed permanent grasslands, i.e. the lands permanently (for at least five years) overgrown with grasses, including the subcategories of lands dedicated for mowing (pastures) and lands not dedicated for mowing (meadows). The green lands constituted 22.5% of all arable lands in Poland, and in the Kujavia-Pomerania voivodship 13.3%. The proportion varied across the poviats: from 5.2% in the Radziejów powiat to approx. 30% in the Inowrocław powiat (32.2%). The green land structure was characterised by a high intraregional diversification: with the domination of meadows in the Inowrocław powiat (96.5%) and with a large share of pastures (49.3%) in the Golub Dobrzyń-powiat (*cf* Table 1).

Forms of non-agricultural land use

With the above-described decline in the area of agricultural acreage, the period 2002–2010 saw a pronounced increase (by 64.2 thousand ha) in the area of non-agricultural lands in agricultural holdings, i.e. forests, bodies of water, etc; there were 116.8 thousand ha in 2002 and 181 thousand ha in 2010. With reference to this category of land use, the average value of the indicator of change for Kujavia-Pomerania voivodship was 155 points, it was the second figure calculated after the Lower Silesia voivodship (180 points), *cf* Table 1.

Table 2. Agricultural land use structure (by agricultural acreage in good agricultural condition)

Specification	Agricultural acreage in good agricultural condition [thousand ha]		Including [%]								
			arable lands			permanent crops		permanent grass-land			
	thou- sand ha	% of total area of agricultural acreage (AA)	total	including			total	includ- ing or- chards	total	including	
				sown areas	kitchen gardens	fallow lands*				mead- ows	pas- tures
Kujavia-Pomerania	1059.6	98.5	85.6	98.5	0.2	1.4	1.1	90.0	13.3	82.0	18.0
by poviats											
Aleksandrów Kujawski	35.7	99.1	91.2	98.9	0.2	1.0	1.5	98.5	7.3	89.9	10.1
Brodnica	59.8	97.3	88.4	98.4	0.1	1.5	1.8	97.5	9.8	65.9	34.1
Bydgoszcz*	59.2	96.7	83.8	96.8	0.3	2.9	2.9	91.5	13.4	82.9	17.1
Chełmno	39.3	99.3	90.4	98.9	0.2	0.9	0.6	88.5	9.0	68.8	31.2
Golub-Dobrzyń	41.8	98.5	92.0	98.9	0.1	1.0	0.5	95.8	7.6	50.7	49.3
Grudziądz*	55.3	98.5	90.0	99.1	0.1	0.8	0.8	95.9	9.1	70.2	29.8
Inowrocław	116.1	99.6	66.6	99.4	0.1	0.5	1.1	93.5	32.2	96.5	3.5
Lipno	56.2	97.0	83.7	97.0	0.3	2.7	0.9	92.6	15.4	65.2	34.8
Mogilno	42.0	98.9	94.6	99.4	0.1	0.5	0.4	92.3	5.0	83.9	16.1
Nakło	65.7	99.3	80.5	99.2	0.1	0.7	0.9	99.6	18.6	87.2	12.8
Radziejów	48.9	98.5	94.2	99.3	0.1	0.6	0.6	68.8	5.2	87.3	12.7
Rypin	35.1	97.6	78.7	97.1	0.2	2.7	0.8	100.0	20.5	70.2	29.8
Sępólno	44.4	98.8	87.5	99.1	0.1	0.7	0.4	67.7	12.2	75.1	24.9
Świecie	66.5	98.3	87.3	98.6	0.1	1.3	0.8	93.5	11.9	77.5	22.5
Toruń*	62.0	98.6	88.7	96.7	0.2	3.1	1.2	47.4	10.1	69.0	31.0
Tuchola	38.6	97.4	83.5	98.4	0.2	1.4	0.5	84.7	16.1	84.7	15.3
Wąbrzeźno	39.7	99.5	90.1	99.1	0.1	0.8	0.9	90.9	8.9	73.4	26.6
Włocławek*	89.8	98.1	88.8	97.6	0.1	2.2	2.1	93.7	9.1	85.7	14.3
Żnin	63.3	99.3	91.2	99.5	0.1	0.4	0.4	94.2	8.5	84.5	15.5

Source: own work on the basis of data by GUS [Central Statistical Office] (PSR 2010 [2010 NAC]).

As far as the *poviats* are concerned, on the one end of the scale there were the figures of below 120 points (only in Tuchola-poviat) and, on the other end, there were values exceeding 150 points (Świecie-poviat and Inowrocław-poviat; cf Fig. 4). Generally, the differences were related to the natural conditions (cf Table 1) as the indicator of change for the *poviats* with favourable natural conditions (86 points) and for those with unfavourable natural conditions (above 140 points).

That was a positive phenomenon. When it comes to the historical units, this phenomenon was observed only within the territories of the Polish–Lithuanian Commonwealth acquired by the Russian Empire during the partitions of Poland (which is attributed to a high employment rate in agriculture and a big agrarian fragmentation – the factors restricting the non-agricultural development of lands belonging to agricultural holdings).

In 2010 the non-agricultural acreage comprised (on average) 14.4% of the total area of agricultural holdings in voivodship. The percentages differed across the poviats (with 5.9% in the Mogilno-powiat and 6% in the Inowrocław-powiat and Chełmno-powiat, up to 46.3% in the Świecie-powiat, cf Fig. 5). The analysis of the geographical layout evinced that the natural conditions played an important role here: the share of non-agricultural acreage amounted to 4.3% of the area of *poviats* with favourable natural conditions and to 14.8% of the area of *poviats* with unfavourable natural conditions. The historical factor analysis showed a particularly large share of non-agricultural acreage (affected by natural conditions as well) in the total area of agricultural holdings in the *poviats* lying within the boundaries of the territories of the Polish-Lithuanian Commonwealth acquired by the Russian Empire during the partitions of voivodship.

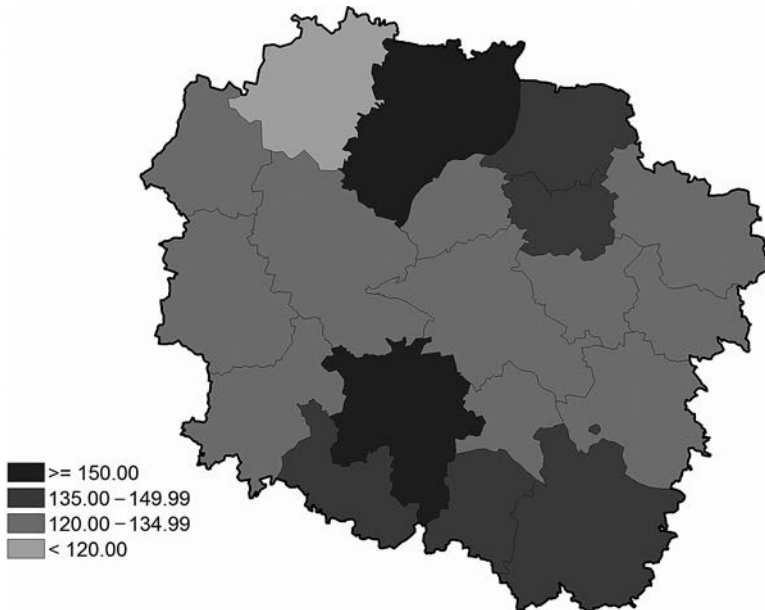


Fig. 4. Changes in non-agricultural acreage of agricultural holdings in period 2002–2010 (benchmark: 2002 = 100 points)

Source: as in Fig. 2.

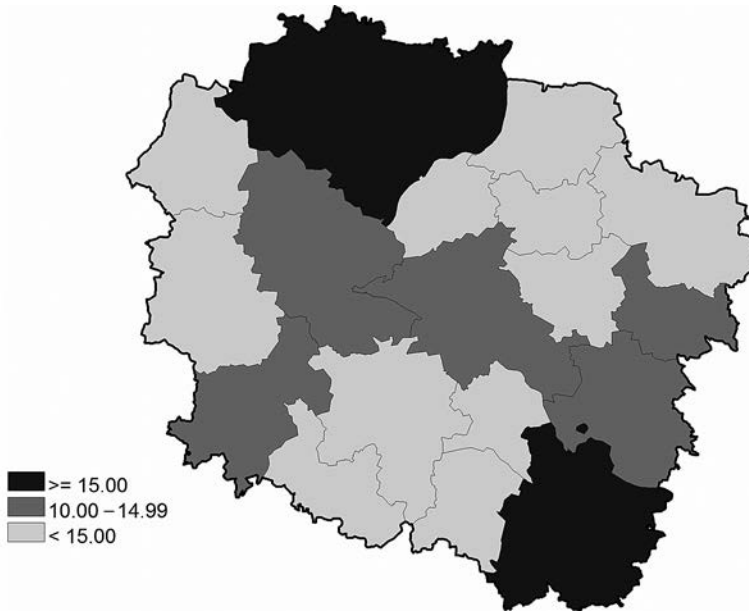


Fig. 5. Proportion of non-agricultural acreage in the total area of agricultural holdings (as of 2010)

Source: as in Fig. 3.

Forms of non-agricultural land use in agricultural holdings

When the sustainable agriculture is developing and when the production is no longer a dominating function in agriculture, the variety of non-agricultural land use forms is gaining in significance. Therefore, the analysis involved two forms of land use: forests and forestlands (treated as one group); and other lands (*cf* Table 3).

Forests and forestlands

The category of ‘Forests and forestlands’ involves the areas covered with forest plants (afforested) or partly devoid of them (not afforested), as well as the lands related to the forestry. It encompasses the forest nurseries established in forestlands and used for the self-supply of an agricultural holding (i.e. not for commercial purposes) and the cultivations of fast-growing trees and shrubs within agricultural acreage.

The comparative analysis of the National Agricultural Censuses of 2002 and 2010 evinced that the period at issue was characterised by a nationwide tendency for the areas of forests within agricultural holdings to grow; there were 32.1 thousand ha more forests. The phenomenon was observed in the majority of poviats. The biggest rise was noted in the poviats: Świecie and Inowrocław. There

Table 3. Selected elements for the assessment of changes in non-agricultural acreage of agricultural holdings and in its structure in Kujavia-Pomerania voivodship in period 2002–2010 (by holding headquarters).

Specification	Forests and forestlands in agricultural holdings [thousand ha] as of 2010	Including			Other lands in agricultural holdings [thousand ha] as of 2010	Including		
		[%] of total area of agricultural holdings (2010)	[%] of unutilised agricultural lands (2010)	changes in acreage in period 2002–2010 (2002=100 points)		[%]of total area of agricultural holdings (2010)	[%]of unutilised agricultural lands (2010)	changes in period 2002–2010 (2002=100 points)
Kujavia-Pomerania	65194	5.2	36.0	197	115.8	9.2	64.0	139
		by poviats						
Aleksandrów Kujawski	678	1.8	29.3	108	1.6	4.3	70.7	102
Brodnica	2207	3.3	38.3	108	3.6	5.3	61.7	29
Bydgoszcz*	2353	3.4	31.7	115	5.1	7.4	68.3	122
Chelmno	558	1.3	22.0	103	2.0	4.7	78.0	93
Golub-Dobrzyń	1184	2.6	30.5	112	2.7	5.8	69.5	116
Grudziądz*	1380	2.3	31.1	130	3.1	5.1	68.9	110
Inowrocław	1774	1.4	30.7	201	4.0	3.3	69.3	49
Lipno	4312	6.4	44.8	110	5.3	7.9	55.2	132
Mogilno	846	1.9	31.7	152	1.8	4.0	68.3	93
Nakło	1888	2.6	27.3	114	5.0	6.9	72.7	95
Radziejów	722	1.4	20.6	142	2.8	5.2	79.4	107
Rypin	2456	5.9	41.8	127	3.4	8.2	58.2	170
Sępólno	1710	3.4	35.8	120	3.1	6.2	64.2	116
Świecie	31554	25.0	54.0	1058	26.9	21.3	46.0	628
Toruń*	2304	3.2	28.7	115	5.7	8.1	71.3	172
Tuchola	4858	10.4	67.4	95	2.4	5.0	32.6	92
Wąbrzeźno	892	2.1	27.7	147	2.3	5.4	72.3	110
Włocławek*	2295	1.9	7.9	135	26.8	22.2	92.1	274
Żnin	1224	1.7	12.9	75	8.3	11.3	87.1	87

Source: sources and legend as in Table 1.

were only two poviats where the area of forests and forestlands dwindled, i.e. poviats: Żnin and Tuchola.

The indicator of change in the forest area of agricultural holdings for the period of 2002–2010 was at the average level of 108 points for Poland (benchmark: 2002 = 100 points), and in Kujavia-Pomerania voivodship 197 points, (cf Table 3).

The changes in the area of forests within agricultural holdings were also related to the historical factors. It was reflected, in a small increase in the forest

area within the territories of the Polish-Lithuanian Commonwealth acquired by the Russian Empire during the partitions of voivodship (115 points) and, on the other hand, in the increase in the said area within the territories of the Polish-Lithuanian Commonwealth acquired by the Kingdom of Prussia during the partitions of Poland, which applies both to the territories remaining within the Polish borders in the interwar period (236 points) (cf Table 1, Fig. 6).

In 2010 the area of forests and forestlands made the average of 5.2% of the total area of agricultural holdings. The share varied largely across the poviats (from 1.4% in the Inowrocław-powiat and Radziejów-powiat, to 25% in the Świecie-powiat; cf Table 1). A high figure of the marker (i.e. low *WjRpp*) was calculated for the Lake District of Kaszuby (belonging to the territories of the Polish-Lithuanian Commonwealth acquired by the Kingdom of Prussia during the partitions of Poland), which points that the above-mentioned territorial characteristics were affected by the natural conditions as well. Such a relation was also supported by different proportions of forest areas to the area of the agricultural holdings in the *poviats* with unfavourable (5.3%), moderate (8.6%) and favourable natural conditions (1.4%); cf Table 1, Fig. 7).

The analysis of data published in 2010 NAC demonstrated that forests and forestlands were important features of the agricultural holdings in Poland, by reason of both their natural impacts (improvement of biodiversity in ecosystems) and their economic significance (income of agricultural holdings derived from silviculture and afforestation within the Common Agricultural Policy – CAP). As far

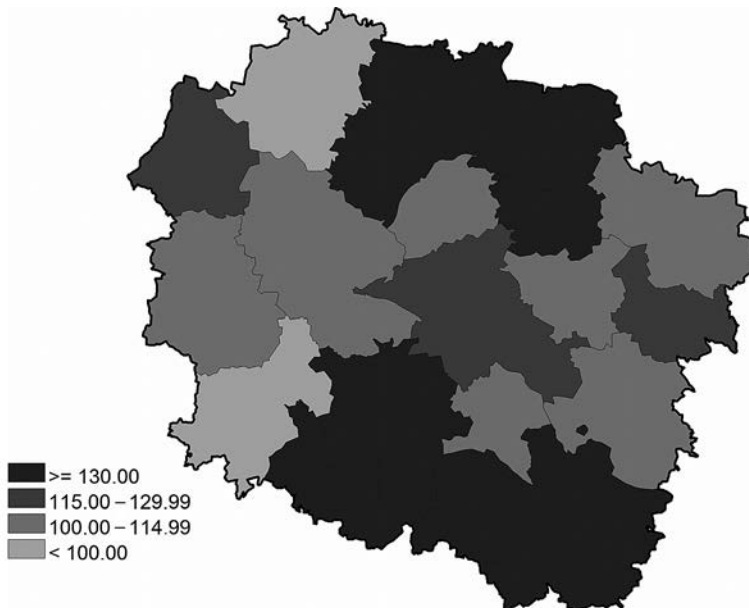


Fig. 6. Changes in forest area and forestland area of agricultural holdings in period 2002–2010 (benchmark: 2002 = 100 points)

Source: as in Fig. 2.

as the natural importance of forestlands for agricultural holdings is concerned, it suffices to look at their share in the total area of forests. The Polish average was 13.9% and in Kujavia-Pomerania voivodship 15.2 %.

While the economic significance of forests and forestlands becomes clear upon the study of the number of the agricultural holdings where these lands were in use (19.1 thousand holdings, with the largest sum of 2.5 thousand in the Lipno-powiat). What emerged due to 2010 NAC was that as many as 21.5% of all agricultural holdings of Kujavia-Pomerania voivodship used forests and forestlands. The proportions differed across the powiats: with about 9% in the Inowrocław-powiat and Mogilno-powiat, to above 35% in Lipno-powiat and Tuchola-powiat; cf Table 4).

To a large extent, the increase in the forest area of agricultural holdings was an effect of the CAP instrument operating within the Rural Development Programme (RDP) which was dedicated for supporting the afforestation of agricultural holdings. In that light, the afforestation comes as an important factor in the processes of improving the natural conditions of agricultural acreage (i.e. increasing the forest area through the afforestation of lands used within agricultural holdings) within the RDP for 2004–2006 (which applies mostly to the low-soil-quality lands) and of other lands within the RDP for 2007–2013 (i.e. afforestation of abandoned agricultural lands or other types of set-asides). The measure is particularly significant for the Polish agriculture which is characterised by an excessive use of lands with low agricultural usefulness and lands exposed to such risks

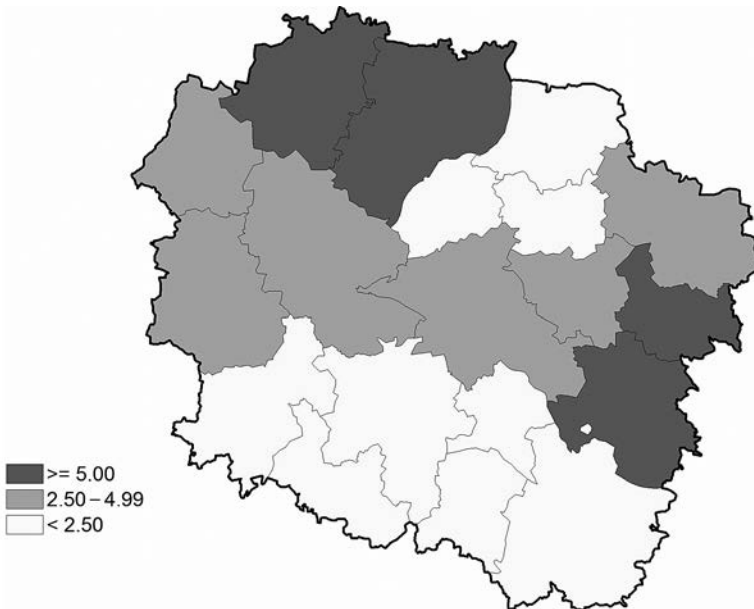


Fig. 7. The proportion of forest area and forestland area in the total area of agricultural holdings (as of 2010)

Source: as in Fig. 3.

Table 4. Forests and forestlands in agricultural holdings and afforestation within the RDP – selected elements

Specification	Forests and forestlands in agricultural holdings (2010)				Afforestation within RDP (2004–2010)			
	area		number of holdings		afforestation area		number of applications	
	thousand ha	[%] of total area of forests	thousand	[%] of total agricultural holdings	thousand ha	[%] of forests within agricultural holdings	thousand	[%] of agricultural holdings with forests
Kujavia-Pomerania	65194	15.2	19069	21.5	2933.70	4.5	3454	18.1
	by poviats							
Aleksandrów Kujawski	678	19.3	583	15.7	35.19	5.19	52	8.92
Brodnica	2207	9.6	1414	28.0	60.02	2.72	118	8.35
Bydgoszcz*	2353	3.7	1012	14.0	63.10	2.68	77	7.61
Chełmno	558	15.3	396	13.7	41.83	7.49	25	6.31
Golub-Dobrzyń	1184	9.5	869	21.7	42.05	3.55	134	15.42
Grudziądz*	1380	11.6	830	20.2	56.11	4.07	213	25.66
Inowrocław	1774	13.9	480	9.2	85.06	4.79	99	20.63
Lipno	4312	18.8	2514	36.4	53.81	1.25	561	22.32
Mogilno	846	7.6	412	9.9	43.30	5.12	152	36.89
Nakło	1888	7.2	779	23.3	63.86	3.38	222	28.50
Radziejów	722	24.8	606	13.2	48.76	6.75	149	24.59
Rypin	2456	20.7	1416	31.0	34.04	1.39	220	15.54
Sępólno	1710	8.7	873	34.7	44.27	2.59	157	17.98
Świecie	31554	58.6	1322	24.2	64.64	0.20	101	7.64
Toruń*	2304	5.0	1180	19.5	62.33	2.70	190	16.10
Tuchola	4858	9.1	1428	39.5	40.11	0.83	111	7.77
Wąbrzeźno	892	21.2	515	20.9	38.43	4.31	221	42.91
Włocławek*	2295	7.7	1790	19.4	91.08	3.97	510	28.49
Żnin	1224	7.2	650	18.2	62.89	5.14	142	21.85

Source: own work on the basis of *BDL GUS* [Local Data Bank by Central Statistical Office] and data published by *ARiMR* [Agency for Restructuring and Modernisation of Agriculture].

as erosion or water contamination. When undertaken in these conditions, the afforestation has positive influence on the sustainable growth of agriculture and rural areas. It applies both to the natural environment (larger forest cover leads to the creation of conditions favourable for ecosystems and biological diversity) and to the socio-economic growth of the rural areas (through the provision of additional workplaces and sources of income; Polna 2006, Rudnicki 2010).

The afforestation within the RDP was in compliance with the *Krajowy Program Zwiększenia Lesistości (KPZL)* [National Afforestation Programme] and was undertaken on the lands which did not belong to the Treasury but which were farmers' private property, whereby the minimum afforestation area amounted to 0.3 ha (RDP, 2004–2006) and 0.5 ha (RDP, 2007–2013) and the minimum width of wood cover was to equal 20 m (with exception of the plots adjacent to the forest). Only the indigenous species of trees and shrubs (following the subcategorization of the major species, minor species and biocoenotic species) may be used for afforestation; what is more, the saplings must be traceable to a licensed seed bank. In the process of choosing the species for planting the following was taken into consideration: classification of agricultural lands and the physiography, according to the Regulation of the Council of Ministers on detailed conditions of and procedures for granting financial aid for the afforestation of agricultural lands within the Rural Development Programme (The Journal of Laws of 2004, No. 187, item 1929).

1. The financial aid for farmers undertaking the afforestation of their lands within the RDP stemmed from the EU funds in 80% (from the state funds in 20%) and involved three stages: 1. The support for afforestation, whereby the amount of support depended on the structure of tree stands (i.e. the share of deciduous and coniferous species), the use of fencing to protect the cultivation against animals, the landform (the slopes of a gradient higher than 12° raise the afforestation costs by 40% in relation to the afforestation costs incurred through activities on lands with a favourable landform configuration). The payments were in the form of lump sums and covered 80% of costs related to afforestation and protection against animals (beneficiary's own contribution was 20%). The one-off payments were calculated for each hectare of lands under afforestation and were available for farmers upon the start of cultivation. At present (PDR, 2007–2013) the financial aid for afforestation of agricultural acreage starts with EUR 1,065.6 per hectare (cultivation of deciduous trees in the areas with a favourable landform configuration where the miccorhized seedlings with a covered root system are used) and reaches EUR 1,603.6 per hectare (cultivation of coniferous trees on slopes with a gradient higher than 12° where the miccorhized seedlings with a covered root system are used).
2. The annual allowance to cover maintenance costs paid in the first five years of cultivation. It is to compensate for the costs of maintenance involving, apart from fighting the pathogens and weeds hampering the growth of seedlings, first and foremost the so-called preliminary thinning, i.e. practices of removing some of the seedlings from the silviculture with a view to forming a desirable species structure and to facilitating their growth. The amounts of the allowance do not depend on the tree stand species; what matters is the use of tree protection measures against animals, such as repellents (RDP, 2007–2013: EUR 48.7 per hectare), pickets (RDP, 2007–2013: EUR 179.3 per hectare) and sheep wool (RDP, 2007–2013: EUR 71.7 per hectare) as well as whether the afforestation is undertaken on lands with a favourable or unfavourable landform configuration, whereby the cultivations on lands with unfavourable

vourable conditions (reclaimed lands) and grown in the system of natural rotation are treated separately (the differences in payments for the afforestation of agricultural lands amounted to: at least EUR 248.5 per hectare of land with unfavourable configuration or up to EUR 348.4 per hectare of land on the slopes with the gradient higher than 12°).

3. The annual premium per hectare to cover loss of income resulting from afforestation (RDP, 2007–2013) paid for the period of fifteen years counting from the first year of cultivation (RDP, 2004–2006: paid for the period of twenty years). The amount of the premium, under the RDP for 2004–2006, depended on the proportion of income from agricultural activities in the total income of a particular agricultural holding: when below 20%, the premium amounted to PLN 360 per hectare in 2004; and when above 20%, the premium reached PLN 1,400 per hectare in 2004. Whereas under the RDP for 2007–2013 the premium was granted to the farmers whose income from agricultural activities did not surpass 25% of their income in total: PLN 1,580 (EUR 404.7) per hectare annually (*cf* Kołodziejczak, Rudnicki 2012).

In general, the analysed measure covering the period of 2004–2010 allocated PLN 734 mln for afforestation, which was tantamount to 3.5 thousand applications being processed (with 25 in the chełmiński powiat and with 561 in the lipnowski powiat) and to 2.9 thousand ha being afforested (from 34 ha in the powiats: rypiński and aleksandrowski to 91 ha in the włocławski powiat; *cf* Table 4).

The importance of the financial aid from the EU funds is demonstrated by the fact that the afforestation undertaken within the RDP made as many as 60% of the increment of forests and forestland areas in agricultural holdings in the period of 2002–2010. Although this CAP instrument has been effective for a relatively short time, as early as in 2010 the area under afforestation within the RDP comprised 4.5% of the total area of forests and forestlands in agricultural holdings in Kujavia-Pomerania voivodeship. The share varied in the following manner: from 0.2% in the Świecie-powiat, through 6% in the Radziejów-powiat and up to 7.5% in the Chełmno-powiat. Therefore, it can be acknowledged that the RDP measure under analysis was highly popular with farmers, particularly in those powiats where the number of processed afforestation-related applications exceeded 20% of all agricultural holdings utilizing forests and forestlands, i.e. in the Wąbrzeźno-powiat (42.9%), the Mogilno-powiat (36.9%, and the Nakło-powiat and Włocławek land powiat (28%); *cf* Table 4).

Forests constitute a significant form of non-agricultural land use in agricultural holdings. On average, their share in the total non-agricultural acreage in Poland amounted to 36% (2010). The proportions varied across the powiats: with 7.9% in the Włocławek land powiat and 12.9% in the Żnin-powiat to 54% in the Świecie-powiat and 67% in the Tuchola-powiat (*cf* Fig. 8). Upon the analysis of these figures in relation to geographical layout, it has become evident that the historical factors were very strong. On the one hand, forests and forestlands had a non-negligible share in the total non-agricultural acreage of agricultural holdings situated in the powiats in the Polish-Lithuanian Commonwealth acquired by the Kingdom of Prussia: 42.7% mostly the territories of the Polish-Lithuanian

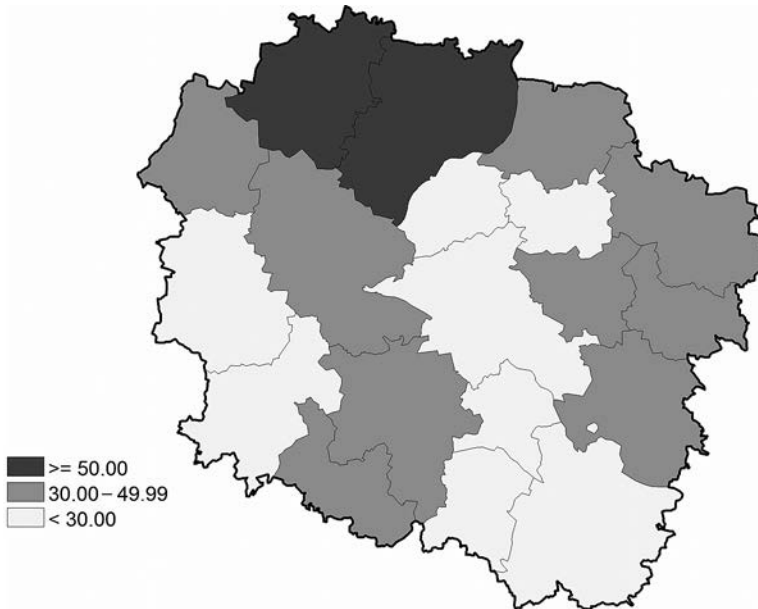


Fig. 8. Proportion of forests and forestlands in the non-agricultural acreage of agricultural holdings (as of 2010)

Source: as in Fig. 3.

Commonwealth acquired by the Russian Empire during the partitions of voivodship (21.6%).

To a large extent, the territorial differences, as described above, resulted from the agrarian reform executed by virtue of the Decree of *Polski Komitet Wyzwolenia Narodowego* [Polish Committee of National Liberation] dated 6 September 1944. The aim of the reform was to assign some lands to individual agricultural holdings; however, in the north and west of Poland (the so-called Regained Territories) these lands comprised first and foremost non-agricultural acreage; whereas the forests and forestlands were usually taken over by the State to enrich the resources of the just-created body of State Forests. The lands which were not in the focus of the said reform maintained a high, historically-determined share of forests in the total area of agricultural holdings.

Other lands

The analysis of changes in the land use structure of agricultural holdings in Poland also involved the category of 'other lands'. It includes the lands occupied by building structures, yards, decorative squares and gardens, parks, areas of landlocked bodies of water, field drains, areas overgrown with natural wicker, swamps, other uncategorized areas (e.g. peat-bogs, gravel pits), wastelands and areas dedicated for sports and recreation (e.g. golf courses). Moreover, this category encompasses the area of unutilised agricultural lands if these are not to

become part of agricultural acreage again (e.g. agricultural lands dedicated for road or supermarket construction).

In general, the period of 2002–2004 saw an increase in the share of the above-mentioned lands in the agricultural holdings in Kujavia-Pomerania voivodeship by nearly 32 thousand ha (from 83.3 thousand ha in 2002 to 115.8 thousand ha in 2010). However, the intraregional analysis of changes in the area of the ‘other lands’ evinced that, national average was 104 points and 139 points in voivodeship. A decrease was in seven poviats: (e.g. Brodnica-powiat 29 points, Inowrocław-powiat 49 points) and increase in 12 poviats; the highest increase was observed in Świecie powiat (628 points) and in Włocławek land powiat (274 points; cf Fig. 9).

As far as the contributing factors are concerned, the highest rate of growth in the area of the ‘other lands’ was in the *poviats* characterised by moderate and unfavourable natural conditions, which is a positive phenomenon. When it comes to the historical determinants, a decline in the area of the ‘other lands’ was noted only in the territories which were added to Poland after World War II. Being part of the mechanisms operating in the previous political and economic system, they were dominated by the state agriculture. During the transformation period these lands were only partially used for agricultural purposes (there were large areas of fallow lands and set-asides). That negative trend was reversed upon the Polish accession to the EU and the implementation of direct subsidies.

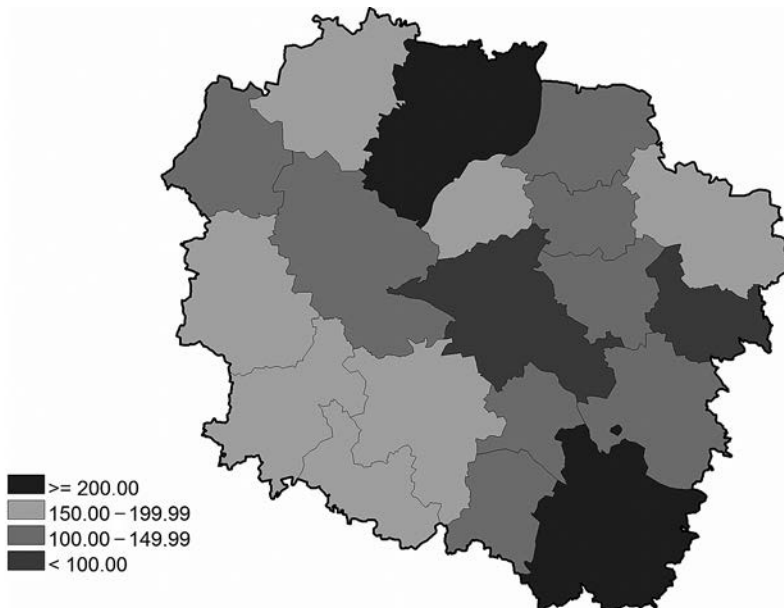


Fig. 9. Changes in the area of the ‘other lands’ in agricultural holdings in period 2002–2010 (benchmark: 2002 = 100 points)

Source: as in Fig. 2.

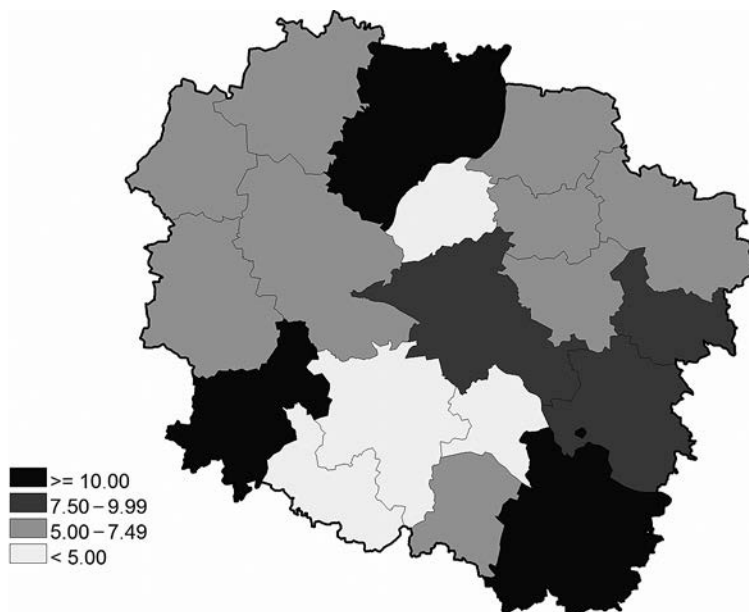


Fig. 10. Proportion of area occupied by bodies of water and 'other lands' in the total area of agricultural holdings (as of 2010)

Source: as in Fig. 3.

According to the data published in 2010 NAC, the 'other lands' comprised 9.2% of the total area of agricultural holdings in Kujavia-Pomerania voivodeship. The values differed in particular voivodships: starting with 3.3% in the Inowrocław-poviat and 4.3% in the Aleksandrów Kujawski-poviat; reaching the record of above 20% in the Świecie-poviat and Włocławek land poviat (*cf* Table 3; *cf* Fig. 10).

The analysis of the above-mentioned indicator demonstrated a significant role of the historical ones (high results in the territories of the Polish-Lithuanian Commonwealth acquired by the Russian Empire during the partitions of Poland, i.e. 12%, which is also a feature of agricultural holdings situated in the mountains; and in the so-called Regained Territories, i.e. 8%, which is characteristic of agricultural holdings located in lake districts).

Summary

The analysis demonstrated that the period of 2004–2010, mostly related to the first years of the Polish membership in the EU and to the inclusion of the Polish agricultural holdings into the Common Agricultural Policy, saw substantial changes in the land use structure, which applied to both their rates and their directions. The period was characterised by a considerable increase in the area of agricultural acreage only in Kujavia-Pomerania and Lower Silesia voivodships. It has also transpired that the area of unutilised agricultural lands was on the rise,

which applied particularly to forests and forestlands. That phenomenon, on the other hand, can be considered positive, as it contributes to the biological diversity of rural areas.

The changes in the land use structure of the agricultural holdings varied immensely across the regions, which was related to the impacts of natural and historical factors as well as to the mechanisms of the Common Agricultural Policy.

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Zmiany struktury użytkowania ziemi w gospodarstwach rolnych województwa kujawsko-pomorskiego w świetle wyników spisów powszechnych rolnictwa z lat 2002 i 2010

Zarys treści: Artykuł dotyczy wyników analizy przestrzennej stanu (2010 r.) oraz zmian (lata 2002–2010) ogólnej powierzchni gospodarstw rolnych, z wydzieleniem użytków rolnych (w tym: grunty orne, uprawy trwałe, trwałe użytki zielone) i gruntów nie użytkowanych rolniczo (w tym: lasy i grunty leśne oraz grunty pozostałe). Wykazano, że tylko w województwie kujawsko-pomorskim na tle

kraju zwiększyła się ogólna powierzchnia gospodarstw rolnych; nieznacznie zmalała powierzchnia gruntów ornych (ubyło 21 tys. ha); równocześnie odnotowano wzrost areалу gruntów nie użytkowanych rolniczo, w tym głównie lasów (przybyło 65,4 tys. ha lasów). Przemiany te były silnie zróżnicowane przestrzennie, uwarunkowane przyrodniczo, historycznie, a także są efektem oddziaływania instrumentów Wspólnej Polityki Rolnej.

Słowa kluczowe: użytkowanie ziemi, gospodarstwa rolne, województwo kujawsko-pomorskie