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## **ROLE OF FARMLAND AFFORESTATION IN THE DEVELOPMENT OF RURAL AREAS IN POLAND**

### *ROLA ZALESIEŃ GRUNTÓW ROLNYCH W ROZWOJU OBSZARÓW WIEJSKICH W POLSCE*

**Key words: afforestation, agricultural land, rural areas, NWEP**

*Słowa kluczowe: zalesienia, grunty rolne, obszary wiejskie, KPZL*

*JEL codes: Q15, Q23*

**Abstract.** This paper seeks to determine the role of farmland afforestation in the development of rural areas in Poland. An analysis covered the distribution of afforestation conducted in the years 2003-2013 in terms of afforestation needs of rural communes. The assessment relied on the ranking of communes worked out by the Forest Research Institute for the purposes of the National Woodiness Enhancement Programme (NWEP). It was found that, in spite of the NWEP, farmland afforestation did not proceed in a spatially ordered way. The research showed that there is no straightforward relation between the level of afforestation needs of rural communes and spatial differences in farmland afforestation.

### **Introduction**

Farmland afforestation started in Poland at the end of the 19th and the beginning of the 20th centuries [Sobczak 1996, Rutkowski 2001]. It was then conducted on the poorest soils, of least use for agriculture. Afforestation intensified after the Second World War. In the years 1945-1985, a total of 1,137.8 thous. ha of former farmland and wasteland were afforested, i.e. an average of 27.8 thous. ha per year. What determined the scale and spatial distribution of afforestation were not only economic but also socio-demographic factors, a large stock of land not in agricultural use (not infrequently of a good land-capability class), and unstable principles of the state's agricultural policy [Smykała 1990]. Those circumstances "not only facilitated, but in fact enforced afforestation of the land" [Fonder 2002, p. 96]. In the years 1986-1993 afforestation embraced 60.5 thous. ha, which meant a decline in the rate of afforestation work to an average of 7.6 thous. ha annually. The places where it was undertaken – as Bohdan Ważyński [1993] states – were fairly accidental and its significance local. An increase in the afforested area after 1993 was due to advantageous financial conditions and the supply of land on which agricultural production had been given up for a variety of reasons. In the years 1994-2003 a total of 181.1 thous. ha of farmland were afforested, and in the period 2004-2013, half this figure, i.e. 89.5 thous. ha. The reasons for the decline in the afforested area are complex.

Farmland afforestation is an important element of agricultural, environmental and spatial development policies. Proper management of the afforestation process requires the choice of suitable instruments, hence the Forest Research Institute has worked out a National Woodiness Enhancement Programme (NWEP). It was approved by the Council of Ministers' Resolution in 1995. Practice showed that it had to be modified, which was done in 2002. The NWEP is a document describing, among other things, the extent and distribution of afforestation, but it is also an afforestation plan of a European Union member country [*Council Regulation (EC) no. 1257/1999 of 17 May 1999, OJ, L 160, 26.02.1999*].

The goal of this paper is to determine the role of farmland afforestation in the development of rural areas in Poland. To achieve it, the dependence between the level of afforestation needs of

rural communes and the distribution of afforestation was examined. An analysis of afforestation needs allowed determining if the afforestation performed fitted the afforestation needs of a commune, and thus if the distribution of afforestation was an optimal one from the point of view of the landscape structure. Natural assets of rural areas are a significant factor of their development. However, their role is not always noticed and appreciated. The analysis covered the years 2003-2013. The basic research units were rural communes and rural areas of urban-rural communes.

The article was prepared on the basis of Central Statistical Office data concerning the area of farmland afforestation and the area of agricultural land (AL), as well as data of the Forest Research Institute on afforestation needs of communes.

### **Afforestation needs of rural communes**

The ranking of communes in terms of their afforestation needs was made in the Forest Research Institute [Kwiecień, Zając 2002, CILP 2013]. To prepare it, use was made of 12 variables selected out of the 25 employed in the NWEF of 1995 because some of them were thought to overlap, or to be of little significance from the point of view of a commune's afforestation needs. Those examined included: the proportion of the poorest soils in the area of agricultural land, steppisation, the threat of surface water erosion, the stock of land for afforestation according to a survey research carried out in the communes, an increase in woodiness for nature protection reasons, major watersheds, protected catchments, areas of groundwater protection, the quality of agricultural production space, the type of relief, the woodiness rate, and the proportion of meadows and pastures in a commune's area. High values of the first eight partial indices showed a commune's afforestation needs to be great, while high values of the remaining variables meant lesser needs. Weights were assigned to the variables to reflect their effect on the index of afforestation needs of communes, and then a synthetic index was calculated. The communes were ordered on the basis of the results obtained in a so-called environmental variant describing urgent afforestation needs connected with environmental protection and planning.

The synthetic index of afforestation needs of rural communes ranged from 4.0 points in commune Spytkowo (Małopolska) to 57.5 points in commune Dukla (Subcarpathia), with the average for rural areas amounting to 15 points. Nearly half of the rural communes were areas with great afforestation needs. There were a total of 580 rural communes (26.7%) with great afforestation needs (15-20 points) and 343 (15.8%) with particularly great ones (over 20 points). Rural communes with little need of afforestation (under 10 points) made up 17.7% (385) of their total number.

The distribution of rural communes with particularly great afforestation needs showed wide spatial differences. Their smallest proportions could be found in the voivodeships: Opole (1.5%), Lower Silesia (3.0%) and Łódź (3.2%), and the highest, in Wielkopolska (38.6%), Warmia-Mazuria (31.0%) and Kujavia-Pomerania (29.9%). In turn, the lowest proportions of communes with great afforestation needs were noted in Opole (4.4%) and Silesia (7.6%), and the highest, in Wielkopolska (38.6%), Warmia-Mazuria (31.0%) and Kujavia-Pomerania (29.9%). The afforestation needs of more than half of the rural communes in Opole (52.9%) and Silesia (51.7%) were little [cf. Polna 2011, Tab. 1]. The smallest proportion of rural communes with little afforestation needs could be found in Kujavia-Pomerania (3.1%), Wielkopolska (3.4%), and Podlasie (8.6%).

### **The extent, intensity and spatial differences in afforestation**

In the years 2003-2013, as much as 115.9 thous. ha of farmland were afforested in the rural areas of Poland. The greatest increase in new woodland took place in Warmia-Mazuria: 22.6 thous. ha, i.e. 19.5% of the total area afforested over the study period. Next comes West Pomerania with its 11.9 thous. ha of new forest (10.3%). The smallest farmland areas were afforested in Silesia, 1.4 thous. ha (1.2%), and Małopolska, 1.9 thous. ha (1.6%). On average, there were 6.3 ha afforested per 1,000 ha AL. This index displayed wide spatial differences, both regional, from 2.3 ha in Silesia to 17.4 ha in Warmia-Mazuria, and among communes, from 0.01 ha in Radzanowo (Mazovia) to 54 ha in Brzeszcze (Małopolska).

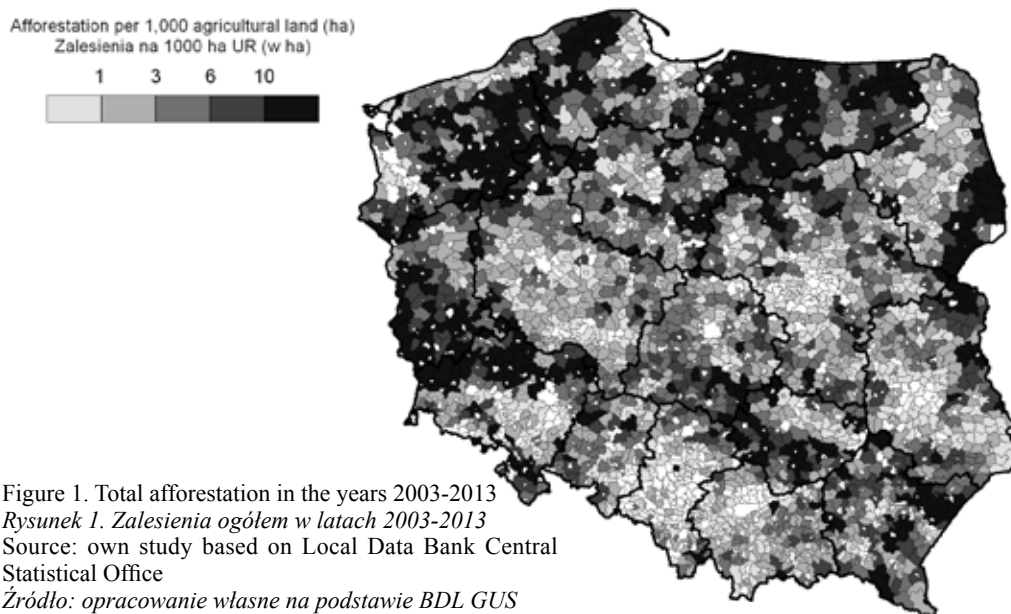


Figure 1. Total afforestation in the years 2003-2013

*Rysunek 1. Zalesienia ogółem w latach 2003-2013*

Source: own study based on Local Data Bank Central Statistical Office

*Źródło: opracowanie własne na podstawie BDL GUS*

Over the study period, in almost half of the rural communes (49.2%) farmland afforestation intensity did not exceed 3 ha /1,000 ha AL, this index being lower than 1 ha in about 1/4 of them. Rural communes with afforestation intensity of over 10 ha /1,000 ha AL made up 17% of the total number. The highest proportion of communes (25.4%) showed afforestation intensity between 3 and 6 ha /1,000 ha AL, their number decreasing as the interval grew. Individual voivodeships differed in terms of the structure of rural communes by farmland afforestation intensity.

The intensity of farmland afforestation varied over the country. It was high – over 10 ha /1,000 ha AL – in 368 rural communes, mostly those of Warmia-Mazuria, Lower Silesia and West Pomerania, where they formed several concentrations. Smaller clusters of communes could also be found in Subcarpathia, Lubuska Land, Pomerania, Świętokrzyska Land and Podlasie. In the remaining area communes of this type occurred only sporadically (Fig. 1).

The index was found to be low – under 1 ha /1,000 ha AL – in 358 rural communes. They were scattered all over the country, the greatest number being located in Mazovia, Lublin, Wielkopolska and Małopolska, those regions accounting for more than a half (54.2%) of communes of this type. In 160 communes (7.4%) no farmland afforestation took place. They could mostly be found in Silesia, Małopolska and Mazovia, which accounted for over 44% of their total number.

### Farmland afforestation and NWEF assumptions

An analysis of the index of farmland afforestation intensity (afforested area per 1,000 ha AL) showed that the rural communes where the intensity was high did not coincide with those where afforestation needs were great and particularly great, although afforestation occurred in 95.6% of the latter. This dependence was found in only 17% (153) of the rural communes with great needs (Tab. 1). More than half of them (56.2%) lie in five voivodeships: Warmia-Mazuria (28 communes), Kujavia-Pomerania (16), Subcarpathia (15), Mazovia (15), and West Pomerania (12). In none of the four rural communes in Opole with great afforestation needs was it actually conducted. In turn, in Łódź voivodeship afforestation intensity was high in only two rural communes: Łanięty and Ujazd, and in each of Małopolska and Silesia, only one of all those in need of afforestation: Szczawnica (Małopolska) and Jeleśnia (Silesia). In over 1/4 (27.1%) of communes with great afforestation needs its intensity was in the interval of 1-3 ha /1,000 ha AL, their number decreasing with its growth.

Table 1. Structure of rural communes in terms of afforestation needs and intensity  
 Tabela 1. Struktura gmin wiejskich pod względem poziomu preferencji i natężenia zalesień

Number of points/ Liczba punktów	Structure of rural communes/Struktura gmin wiejskich									
	< 1 ha		1-3 ha		3-6 ha		6-10 ha		> 10 ha	
	per 1,000 ha AL/na 1000 ha UR									
	number/ liczba	%	number/ liczba	%	number/ liczba	%	number/ liczba	%	number/ liczba	%
< 10	96	24,9	88	22,9	74	19,3	54	14,0	73	19,0
10-15	242	28,1	211	24,5	162	18,8	105	12,2	142	16,5
15-20	135	23,3	155	26,7	132	22,8	76	13,1	82	14,1
> 20	44	12,8	96	28,0	66	19,2	66	19,2	71	20,7
Total/Razem	517	23,8	550	25,3	434	20,0	301	13,9	368	17,0

Source: own study based on Local Data Bank Central Statistical Office and NWP [MŚ 2003] data  
 Źródło: opracowanie własne na podstawie BDL GUS, KPZL [MŚ 2003]

Afforestation intensity was high in 73 (19%) rural communes with little afforestation needs. Nearly 1/5 of them lie in Warmia-Mazuria and about 1/7 in each, Lower Silesia and West Pomerania. The fewest communes of this type can be found in Kujavia-Pomerania, Łódź, Podlasie, Silesia, Świętokrzyska Land, and Wielkopolska (one in each, Tab. 2). As much as 96 rural communes where afforestation intensity was low or absent were those with little need of afforestation (up to 10 points). They can mostly be found in Silesia (30.2%, or 29 communes), Mazovia (13.5%, or 13

Table 2. Structure of communes in terms of afforestation intensity and afforestation needs by voivodeship  
 Tabela 2. Struktura gmin pod względem natężenia zalesień i potrzeb zalesieniowych w układzie województw

Province/ Województwo	Structure of rural communes/Struktura gmin wiejskich							
	under 1 ha/1,000 ha AL poniżej 1 ha/1000 ha UR				over 10 ha/1,000 ha AL powyżej 10 ha/1000 ha UR			
	< 10 points/pkt		> 15 points/pkt		< 10 points/pkt		> 15 points/pkt	
	number/ liczba	%	number/ liczba	%	number/ liczba	%	number/ liczba	%
Dolnośląskie	7	7.3	2	1.1	10	13.7	11	7.2
Kujawsko-pomorskie	0	0.0	13	7.3	1	1.4	16	10.5
Lubelskie	3	3.1	39	21.8	5	6.8	3	2.0
Lubuskie	0	0.0	1	0.6	7	9.6	11	7.2
Łódzkie	3	3.1	9	5.0	1	1.4	2	1.3
Małopolskie	10	10.4	19	10.6	3	4.1	1	0.7
Mazowieckie	13	13.5	25	14.0	4	5.5	15	9.8
Opolskie	8	8.3	1	0.6	4	5.5	0	0.0
Podkarpackie	2	2.1	8	4.5	7	9.6	15	9.8
Podlaskie	2	2.1	8	4.5	1	1.4	10	6.5
Pomorskie	4	4.2	3	1.7	3	4.1	11	7.2
Śląskie	29	30.2	2	1.1	1	1.4	1	0.7
Świętokrzyskie	2	2.1	13	7.3	1	1.4	9	5.9
Warmińsko-mazurskie	0	0.0	1	0.6	14	19.2	28	18.3
Zachodniopomorskie	1	1.0	34	19.0	1	1.4	8	5.2
Wielkopolskie	12	12.5	1	0.6	10	13.7	12	7.8
Poland/Polska	96	100.0	179	100.0	73	100.0	153	100.0

Source: see tab. 1.

Źródło: jak w tab. 1.

Figure 2. Types of rural communes by the level of afforestation needs and afforestation intensity

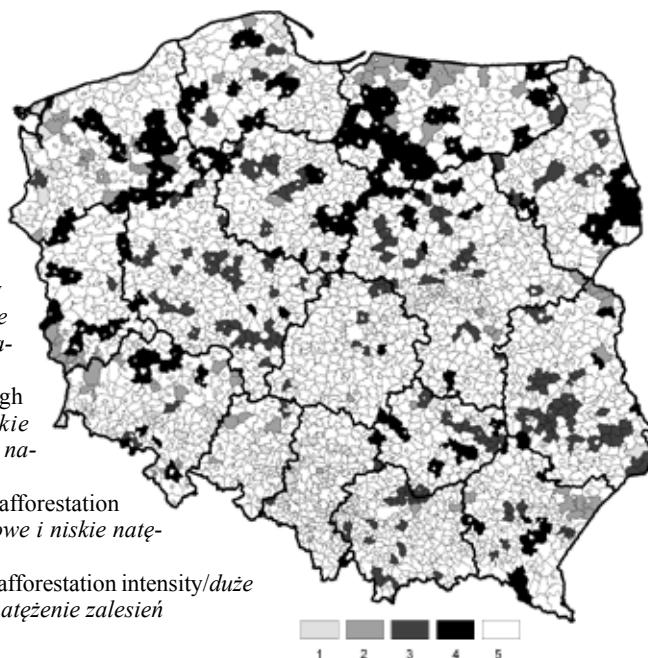
*Rysunek 2. Typy gmin ze względu na poziom preferencji zalesieniowych i natężenia zalesień*

Source: see tab. 1.

*Źródło: jak w tab. 1.*

Types communes/*Typy gmin wiejskich*

- 1) little afforestation needs and low afforestation intensity/*niewielkie potrzeby zalesieniowe i niskie natężenie zalesień*
- 2) little afforestation needs and high afforestation intensity/*niewielkie potrzeby zalesieniowe i wysokie natężenie zalesień*
- 3) great afforestation needs and low afforestation intensity/*duże potrzeby zalesieniowe i niskie natężenie zalesień*
- 4) great afforestation needs and high afforestation intensity/*duże potrzeby zalesieniowe i wysokie natężenie zalesień*
- 5) other (total)/*pozostałe razem*



communes), West Pomerania (12.5%, or 12 communes) and Małopolska (10.4%, or 10 communes). There was no low-intensity afforestation, i.e. under 1 ha/1,000 ha AL, in any of the rural communes of Kujavia-Pomerania, Lubuska Land and Warmia-Mazuria with little need of afforestation (Fig. 2)<sup>1</sup>. The proportion of such communes showed a downward tendency in an interval of 0.1 to 10 ha, while with afforestation intensity in excess of 10 ha their number can be observed to grow.

## Conclusions

The research showed that the effect of farmland afforestation performed in the years 2003-2013 on the development of rural areas differed in spatial terms. Rural communes with great and particularly great afforestation needs did not always use this potential to change their management. This process should be facilitated by the absorption of European Union means intended to support rural development in the next budgetary period (2014-2020). At the same time intensive afforestation was carried out in areas with little afforestation needs. Communes of this type are located primarily in the northern and south-western parts of the country.

The National Woodiness Enhancement Programme notwithstanding, farmland afforestation does not proceed in a spatially ordered way. The research revealed there to be no straightforward relation between the level of afforestation needs of rural communes and spatial differences in the afforestation undertaken. Establishing the reasons for the disproportions require an additional study. It should cover a broad range of factors, like the introduction of direct payments, formal requirements of allotting private farmland for afforestation in the framework of the Rural Development Programme, or the stock of land given by the Agricultural Real Estate Agency to the State Forests National Forest Holding for afforestation.

<sup>1</sup> For the sake of readability, Figure 2 presents only selected types of rural communes.

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### Streszczenie

*Celem artykułu jest określenie roli zalesień gruntów rolnych w rozwoju obszarów wiejskich w Polsce. Przeanalizowano rozmieszczenie zalesień wykonanych w latach 2003-2013 pod kątem potrzeb zalesieniowych gmin wiejskich. Oceny dokonano uwzględniając ranking gmin opracowany w IBL na potrzeby Krajowego Programu Zwiększania Lesistości. Wykazano, że mimo istnienia KPZL zalesianie gruntów rolnych nie odbywa się w sposób przestrzennie uporządkowany. Badania uwiarydowiły brak jednoznacznego związku między poziomem preferencji zalesieniowych gmin wiejskich a zróżnicowaniem przestrzennym zalesień.*

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