

The Performance of Agricultural Land Management Work in the Context of Needs, Illustrated with an Example of Agricultural Land Consolidations

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Abstract. In the situation where Poland has been a member of the European Union since 2004, agricultural land consolidation has been co-financed with EU funds. This has resulted in an increase in the number of carried out land consolidations throughout Poland. Co-financing of this consolidation work has also introduced the need for a different understanding of the essence of agricultural land consolidation. According to Dacko (see Dacko 2006), the main goal of land consolidation should be to improve the quality of rural life, and not only to increase agricultural production. Land consolidation measures should be initiated to revive the countryside by encouraging continuous economic and political development of the local community, while protecting and rationally managing natural resources. The local community should participate democratically in land consolidation and in defining new forms of land use that make the most of the local potential. Currently in Poland, the choice of a location for the implementation of consolidation work not only depends on the farm land layout and land fragmentation also on the farmers who apply for the implementation of consolidation work in the particular area. Social acceptance is the key prerequisite for successful land consolidation. This fact has resulted in the agricultural land consolidation taking place not only in the areas in which the needs determined on the basis of the farm land layout and land fragmentation are most unfavorable. The paper comparatively analyses the determined needs as regards consolidation work in Poland, and the implementation of this work since 2004. The research employed the following methods: analysis and synthesis of the literature, field inventory, and research from the group of spatial-statistical approaches. The study area covered Poland, and in particular the selected region.

Keywords: land consolidation, rural areas, local community, land fragmentation.

Conference topic: (e.g.) Technologies of geodesy and cadastre. Land management and other Real Estate Cadastre.

Introduction

Many a scientist both in Poland and worldwide has been carrying out work to identify the areas eligible for the implementation of consolidation works (Demetriou *et al.* 2013; Gašiorowski, Bielecka 2014).

The criteria for determining these areas by various scientists vary, and are most often based on parameters describing the spatial structure of rural areas, which are the most important determinants of the profitability of agricultural production.

At present, different indicators of demand for land consolidation measures are applied in Polish regions. There are no global standards that define criteria for evaluating the demand for land consolidation measures. In most cases, the criteria deployed by scientists and practitioners reflect the economic functions and productivity of rural areas.

In Poland, the demand for land consolidation is evaluated by local departments responsible for land management and rural area development. Each department develops unique criteria and individual guidelines for assessing the type of consolidation measures required in a given region. The Lower Silesian Department of Geodesy and Rural Areas in Wrocław defines the demand for land mergers based on the recommendations formulated by the Minister of Agriculture and Food Economy in Instruction No 1 on land consolidation. In line with those provisions, areas characterised by ineffective checkerboard patterns, high-class soils, relatively large average farm area, extensive stretches of checkerboard land between villages and linear infrastructure that leads to fragmentation of agricultural production have priority in consolidation projects. The demand for land consolidation is also assessed based on the initial interest expressed by land owners. However, there are no general guidelines for evaluating that interest. (Dudzinska *et al.* 2015)

Instruction No 1 has been developed in view of the provisions of the Land Consolidation Act of 1982. The Act has been amended several times, but Instruction No 1 has never been modified accordingly and became legally obsolete. At present, consolidation projects are based on the provisions of amended regulations which, however, lack detailed standards for land mergers (Woch, Głazewski 2014).

Akińcza (Akińcza, Maruk 2014) proposed a set of indicators for determining the demand for land consolidation measures in local departments responsible for land management and rural development in Polish regions of Beskidy,

Częstochowa, and Lower Silesia. Most of those indicators were based on production data, including farm fragmentation, shape of land plots, proportions of plot sides, checkerboard patterns, linear infrastructure of supralocal significance, allocation of land plots for infrastructure development, afforestation, land ownership by non-local actors, farmers' interest in expanding their estates, infrastructure upgrades, differences in data found in the real estate cadaster and the land and mortgage register (Table 1). None of the analysed departments have analysed all of the above parameters in the process of estimating the demand for land consolidation measures. The relevant indicators are probably selected individually, depending on the evaluated region (Akińcza, Maruk 2014).

Selected indicators, including the shape of land plots and farm fragmentation, are included in every analysis, whereas other factors, such as allocation of land plots for infrastructure development or planned investments of supralocal significance, are taken into consideration only when applicable. The department in Częstochowa additionally analyses the demand for land mergers resulting from afforestation projects. It also evaluates the farmers' interest in land consolidation. Most reports do not examine the local community's attitudes to consolidation projects. Local opinions should be one of the most important criteria determining the sequence in which land plots will be merged.

A different approach to the manner of assessing the demand for consolidation works was suggested by Janus (see Janus, Taszakowski 2013). In order to identify areas eligible for the implementation of consolidation works, a new method for analysing rural areas was suggested. This method identified, for the first time, the assessment of the characteristics of the spatial structure of the farms' land, and also determined the probability of achieving satisfactory effects of consolidation works (Janus, Taszakowski 2013). The method took into account partial indices i.e. the average quality of soil, the effect of the area and shape of plots on the incurred costs of cultivation, the presence of areas with no access to a public road, the areal structure of farms, fragmentation of the farms' land, and the assessment of the possibility for developing a new arrangement of plots in the process of land consolidation based on an analysis of aerial photographs. Another noteworthy fact is that the authors approached each of the suggested indicators individually by presenting new manners of their determination depending on the scope and quality of their data (Janus *et al.* 2016).

Analyses of the demand for consolidation works are more and more complex; however, problems with the quality of spatial data, which in Polish information systems are neither regularly updated nor consistently maintained, cannot be ignored in the considerations either (Dawidowicz, Żróbek 2014; Buśko, Meusz 2014; Konieczna, Trystuła 2014; Mika, Len 2016; Buśko, Przewieźlikowska 2016).

Currently in Poland, the choice of a location for the implementation of consolidation works is not only determined by faults in the spatial structure of rural areas but also on other factors, *inter alia* the construction of line investments, or farmers who apply for the implementation of consolidation works in this area. Social acceptance is the key prerequisite for successful land consolidation. In Poland, land consolidation projects are initiated upon the request of more than 50% of land owners or owners who have a legal title of more than 50% of land in a given area. This fact has resulted in the agricultural land consolidation taking place not only in the areas in which the needs determined on the basis of the farm land layout and land fragmentation are most unfavourable. The paper comparatively analyses the determined needs as regards consolidation work in Poland, and the implementation of this work since 2004.

Objectives and methods

The analysis was carried out for the territory of Poland divided into voivodeships (NUTS 2), and for Lubelskie Voivodeship divided into municipalities (NUTS 5) as well as Małopolskie Voivodeship divided into districts.

The study was performed in Lubelskie Voivodeship which runs the highest number of land consolidation projects in Poland. In Małopolskie Voivodeship, most consolidations related to the construction of motorways (infrastructural consolidations) are implemented.

The study was divided into the following stages: at the 1st stage of the study, the scope of implementation of agricultural land consolidation in Poland and in selected voivodeships in the years 2004–2013 was determined. At the 2nd stage of the study, results of an analysis of the degree of urgency of consolidation works in selected research units were presented. Then, an analysis was carried out of the relationships between the implemented consolidations and the determined degree of urgency of implementation of these works in a particular area. The final stage of the study involves drawing conclusions based on the completed research.

The research employed the following methods: analysis and synthesis of the literature, field inventory, and research from the group of spatial-statistical approaches. The study area covered Poland, and in particular the selected region.

Results and discussion

Stage 1: The scope of the implementation of agricultural land consolidations in Poland in the years 2004–2013 and in Lubelskie Voivodeship and in Małopolskie Voivodeship.

Since 2004, agricultural land consolidation has been co-financed by the EU funds, namely the European Agricultural Fund for Rural Development, and the State budget. This has contributed to an increase in the implementation of these measures in Poland.

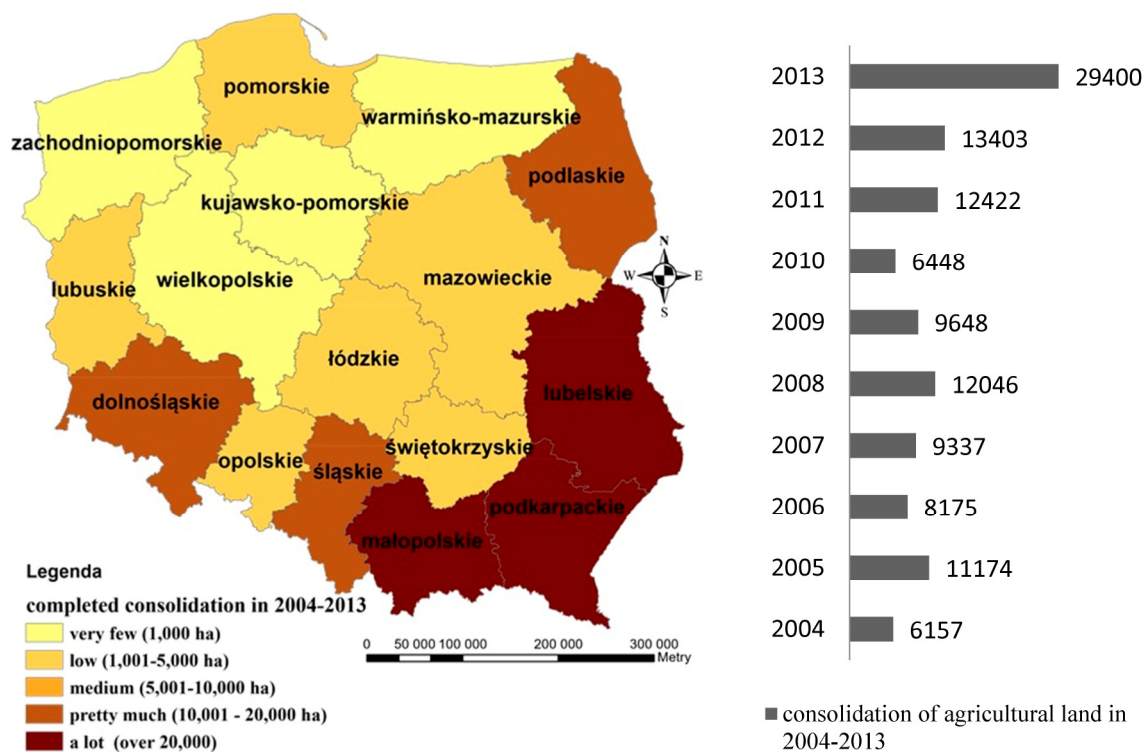


Fig. 1. Implementation of agricultural land consolidation in Poland in the years 2004–2013 (source: own compilation based on information from the Ministry of Agriculture ... (2015))

In Poland, however, the works are implemented with varied intensity (Dudzińska 2015). From 2004 to 2013, agricultural land consolidations were implemented in Poland over an area of 118 thousand hectares. The highest number of them was implemented in 2013 (Ministry of Agriculture... 2015). This probably resulted from the fact that 2013 was the last year of the Rural Development Programme 2007–2013. The highest numbers of consolidations were implemented in Lubelskie, Podkarpackie, and Małopolskie Voivodeships – more than 20,000 ha each. In three other voivodeships, namely Warmińsko-Mazurskie, Zachodniopomorskie, and Kujawsko-Pomorskie, no agricultural land consolidations were implemented (Fig. 1). In spite of the implementation of consolidations over quite a large area, they only constitute 0.6% of agricultural land in Poland. In Małopolskie Voivodeship, the contribution amounts to 2.26% of the area of agricultural land, in Podkarpackie Voivodeship to 2.15%, in Śląskie Voivodeship to 1.62%, and in Lubelskie Voivodeship to 1.56%. In the remaining voivodeships, the contribution is lower than 1% (Dudzińska, Kotlewski 2016).

In Lubelskie Voivodeship, 13 consolidation measures (7 970 ha) were conducted in the years 2004–2006, and 39 consolidation measures (27 502 ha) in the years 2007–2013. Lubelskie Voivodeship comprises 191 rural municipalities, and land consolidation projects covered 31 municipalities. The highest number of four consolidation measures were carried out in the municipalities of Chełm and Urszulin each. The municipalities of Łuków, Ostrówek and Wojsławice performed three consolidation measures each.

The implemented consolidation objects feature various sizes, from 74 ha in the case of objects Łuszczów and Łuszczów kol. in the municipality of Uchanie to 2 101 ha for object Potok in municipality Potok Górny. The largest area of consolidated land concerned measures implemented in the period 2004–2013 in municipalities of Potok Górny and Urszulin, and amounted to 4 202 and 3 863 ha, respectively (Fig. 2a).

In the years 2004–2013, in Małopolskie Voivodeship consolidations were implemented over an area of 20.8 thousand ha in 15 municipalities. Traditional i.e. structural consolidations covered an area of almost 7 thousand ha (2 consolidation objects were implemented in the years 2004–2006, and 8 objects in the years 2007–2013). The remaining implemented consolidations resulted from the construction of line investments, primarily in relation with the construction of A4 motorway (Fig. 2b).

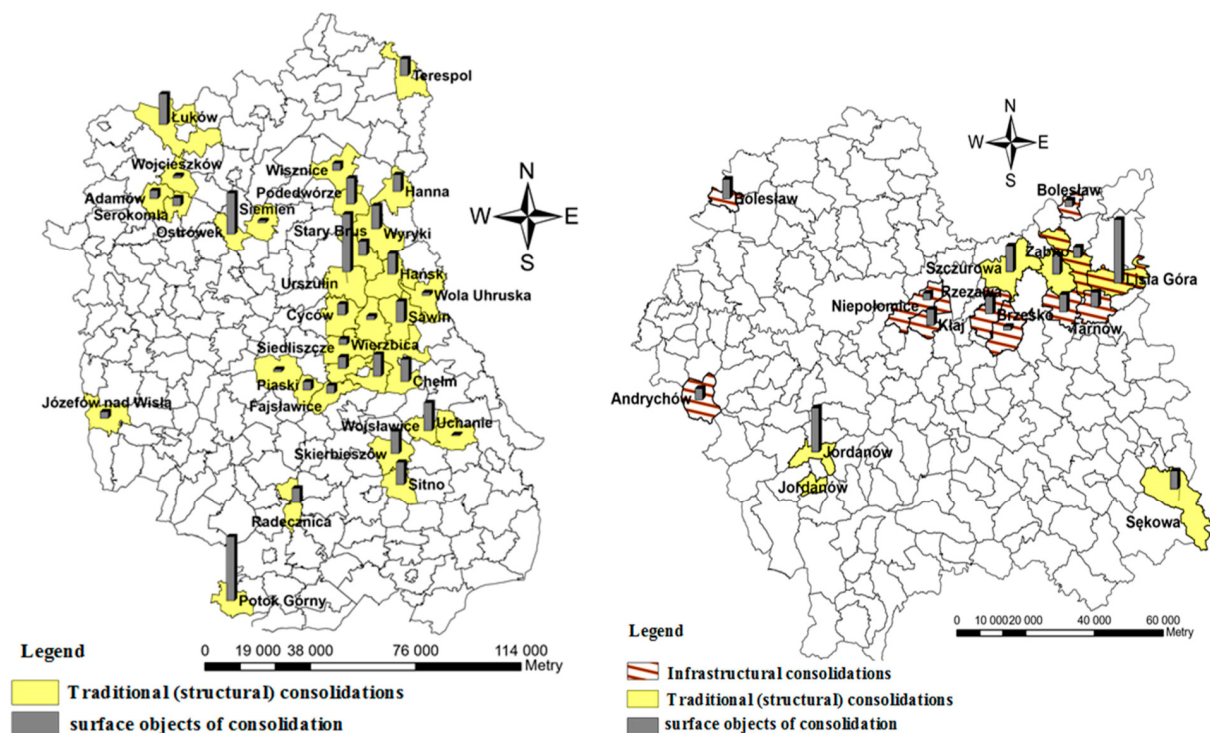


Fig. 2. Implemented consolidations in the municipalities of Lubelskie Voivodeship (2a) and Małopolskie Voivodeship (2b)

Stage 2: Determination of the degree of urgency of consolidation works in selected research units. Analysis of the relationships between the implemented consolidations and the determined degree of urgency of implementation of these works in a particular area.

Poland, by voivodeships (NUTS 2)

The latest research determining the demand for consolidation works in Poland was implemented by Jędrejek *et al.* (see Jędrejek *et al.* 2014a, 2014b). It involved the assessment of fragmentation of land of family-owned farms in Poland, and the need for its reduction based on the current data (2013) of the Agency for Restructuring and Modernisation of Agriculture (ARiMR – payer of direct subsidies for agriculture). The authors identified municipalities and voivodeships where consolidation works should be performed (Table 1). The assessment of the needs for land consolidation was based on data concerning the assessment of fragmentation of agricultural farms, and regional criteria, i.e. the area of a plot, number of plots in a farm, distance of the land from households, as well as supplementary criteria e.g. contribution of plots with no access to roads, possibility of increasing farms from land of ANR. The research permitted the determination of areas in the voivodeships where due to the analysed conditions, consolidation works are necessary, as well as areas where consolidation works are advisable.

“Necessary” consolidations were suggested in villages where farmers (due to the unfavourable areal structure) lose at least 20% of income, and “advisable” consolidations were suggested where they lose 15–20% of income (Jędrejek *et al.* 2014a, 2014b).

Jędrejek *et al.* (2014a, 2014b) determined the need for necessary consolidation works at a level of 1.4 million ha, and for advisable works at a level of approximately 5.7 million ha. This constitutes 13.7% and 55.4% of the area of arable land in Poland, respectively (Table 1). According to the study, needs for consolidation works exist in every voivodeship, to the greatest extent in southern Poland, and to the smallest extent in northern Poland (Table 1). Nonetheless, consolidation works should be implemented throughout Poland. Necessary consolidations should be implemented over areas from 1.2% of arable land in Kujawsko-Pomorskie Voivodeship to 13.9% in Opolskie Voivodeship (Fig. 3).

Jędrejek *et al.* (2014 a, 2014b) determined the total need for necessary and advisable consolidation works at a level of approximately 7.1 million ha. This is equivalent to 69.14% of the area of arable land in Poland.

Research concerning the demand for consolidation works was also conducted by IUNG in Puławy in 2010. The demand was determined at a level of 4 million ha (Woch 2010).

Table 1. The assessment of the needs for land consolidation in Poland, ranked by voivodeships (source: own compilation based on information from Jędrejek *et al.* 2014a)

lp.	Voivodeship	The assessment of the needs of land consolidation			
		necessary		recommended	
		ha	%	ha	%
1	zachodniopomorskie	49.429	4.41%	290.26	57.5%
2	wielkopolskie	86.861	4.50%	640.684	56.2%
3	warmińsko-mazurskie	53.41	4.08%	468.987	65.9%
4	świętokrzyskie	63.123	8.42%	243.191	59.4%
5	śląskie	68.972	11.0%	112.342	54.8%
6	pomorskie	20.931	2.3%	294.072	59.9%
7	podlaskie	137.121	11.3%	470.909	59.9%
8	podkarpackie	48.455	5.2%	290.075	69.1%
9	opolskie	83.519	13.9%	171.186	59.6%
10	mazowieckie	279.248	11.6%	677.745	45.9%
11	małopolskie	69.595	7.5%	173.588	43.4%
12	łódzkie	147.276	11.4%	381.599	49.1%
13	lubuskie	26.011	4.6%	180.634	67.7%
14	lubelskie	215.987	12.3%	580.256	53.9%
15	kujawsko-pomorskie	14.041	1.2%	288.784	38.4%
16	dolnośląskie	42.659	3.6%	406.617	73.4%
Total in the country		1.406.641		5.670.930	

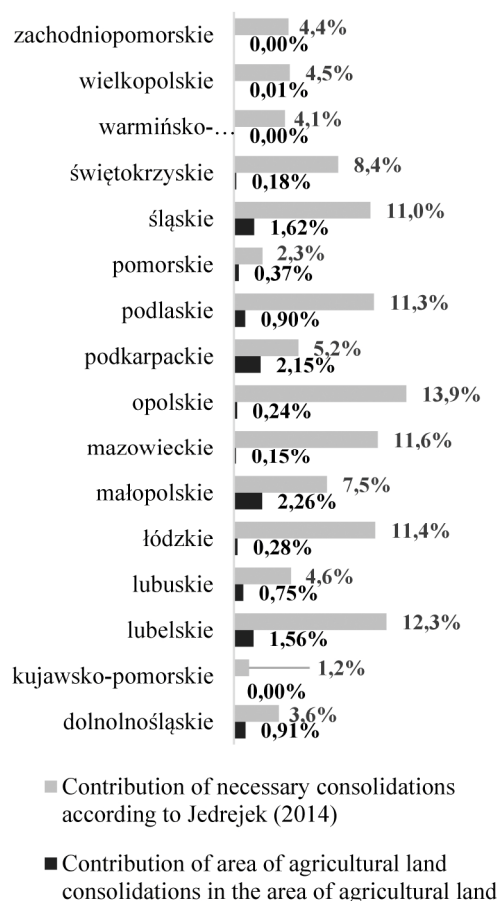


Fig. 3. The share of realised consolidations in the area of agricultural land, by voivodeships. Implementation of “necessary consolidations”. Source: own compilation based on information from the Ministry of Agriculture... (2015) and Jędrejek *et al.* (2014 a, 2014b)

Lubelskie Voivodeship divided into municipalities (NUTS 5)

Jędrejek *et al.* (2014 a, 2014b) also determined the need for consolidation works for municipalities of Lubelskie Voivodeship (Fig. 4). In 13% of these municipalities, the level of “necessary” consolidation works covers a large area of municipalities (larger than 50%), in 20% of the municipalities an average area (20–50%), and in 67% of the municipalities, a small area (smaller than 25%) (Fig. 4).

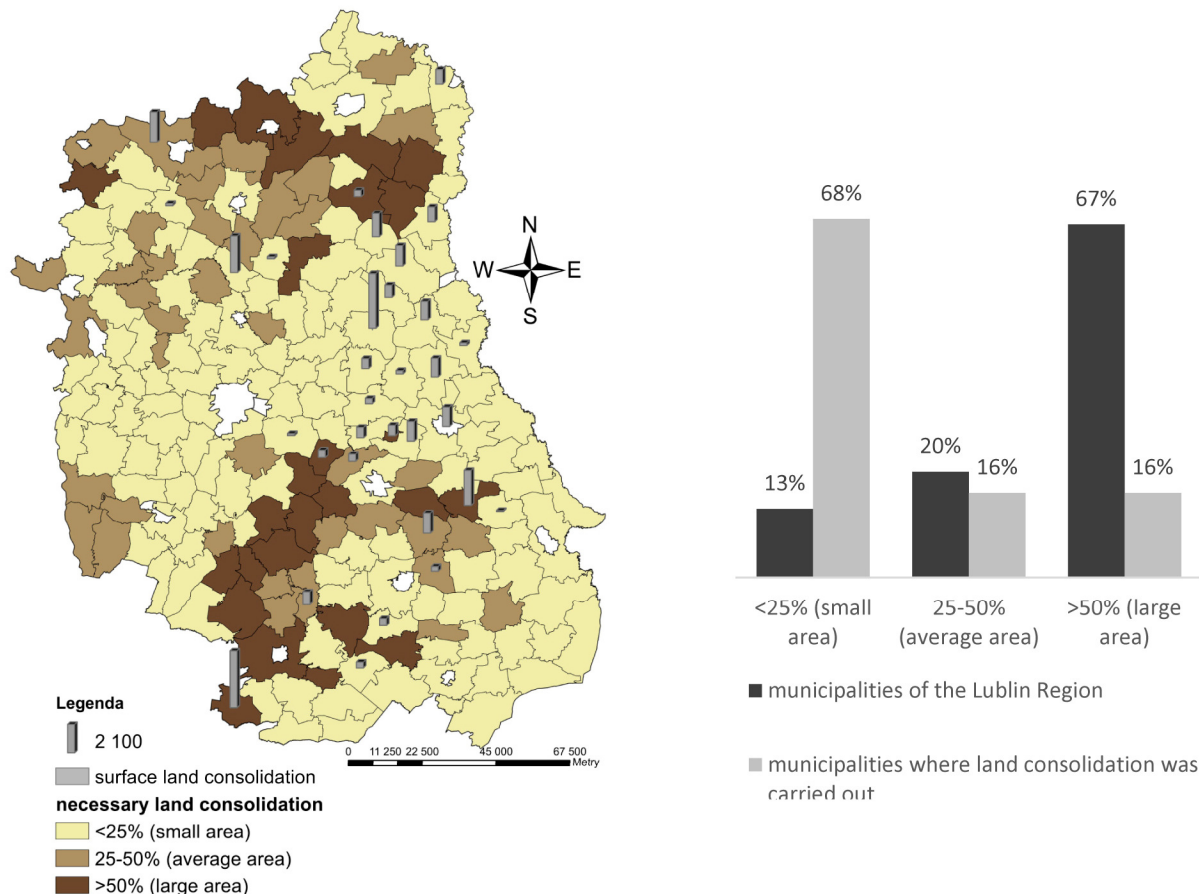


Fig. 4. The needs for land consolidation procedures of Lubelskie Voivodeship, ranked by municipalities – necessary land consolidation

Land consolidation was implemented in 31 municipalities (Fig. 4). Most consolidations are implemented in municipalities in which the needs for “necessary” consolidation works are at a low level (68% municipalities – Diagram, Fig. 4). In 5 municipalities (16%), the level of the needs for “necessary” consolidation works is at an average level, while in next 5 municipalities (16%) it is at a high level (Fig. 4 – Diagram).

Małopolskie Voivodeship divided into districts

Janus (see Janus, Taszakowski 2013) determined the needs for consolidation works for Małopolskie Voivodeship based on the total of six partial indices (introduction). This analysis resulted in 40% of the districts being described as areas with relatively adverse conditions for carrying out consolidation works. 33% of the districts are characterised by relatively favourable indices of land fragmentation (Fig. 5). Only 2% of the land are present in the areas with serious indications for the implementation of consolidation works (Fig. 5).

The implementation of consolidations in Małopolskie Voivodeship included districts with extremely adverse conditions for the implementation of consolidation works (40% of districts under consolidation), with relatively favourable indices of agricultural land fragmentation (22% of districts), and with significant and limited indications for the implementation of consolidation works (22% and 17% of districts under consolidation, respectively). Consolidations were not implemented in the areas with serious indications for the implementation of consolidations works (Fig. 5).

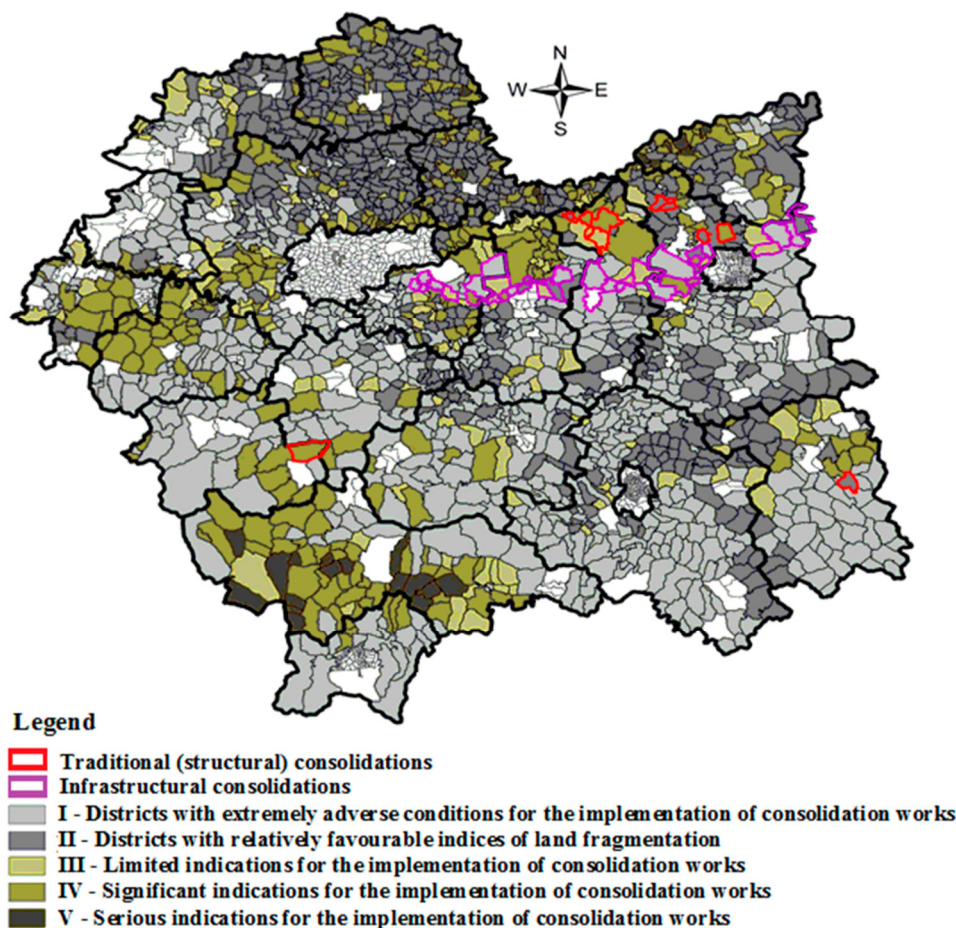


Fig. 5. Spatial diversity of the Małopolska region with regard to advisability of the implementation of consolidation works.
Source: own compilation based on Janus, Tazsakowski 2013

In Małopolskie Voivodeship, traditional (structural) consolidations were implemented in the districts with relatively favourable index of fragmentation (45%), significant indications for the implementation of consolidations (36%), and limited indications for the implementation of consolidations works (18%).

Conclusions

1. The areas of implemented consolidations are inconsiderable in comparison to the determined needs.
2. In Poland, the actually implemented consolidations do not correspond with the level of necessary consolidation measures (coefficient of correlation 0.194).
3. The degree of urgency of the implementation of consolidation works was at the highest level in only 16% of municipalities of Lubelskie Voivodeship in which consolidations were implemented.
4. In Małopolskie Voivodeship, no consolidations were implemented in the areas with the highest (serious) indications for the implementation of these works due to the areal structure of farms, and the assessment of possibilities for developing a new arrangement of plots in the process of consolidation.
5. The above study confirms the thesis according to which the location of the implementation of consolidation works is not only determined by the high volume of negative characteristics of the spatial structure of the land and farms but also by other determinants, *inter alia* the construction of line infrastructural projects e.g. motorways, or the human factor which co-determines the location of the implementation of the project.

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