

Polarization of Rural Settlements in the Lubelskie Voivodship as a Result of Population Changes

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Abstract

Rural settlements, as a basic element of space, are dynamic structures subject to changes due to various factors determining the conditions of their development and functional transformations. Certain directions of changes occurring in rural areas are characteristic of each historical period. They are particularly evident in demographic and socio-cultural processes, in rural economies, and living conditions of residents. This article analyses population changes in rural areas of the Lubelskie Voivodship in the years 1950–2011. Strong polarization of settlements was observed. Considering the current trends, the author constructed two forecasts (short- and long-term) of transformations in the structure of rural settlements.

Keywords: Lubelskie Voivodship, population forecast, changes in the rural settlement network

JEL: J11, R15

Introduction

In Poland, rural settlements constitute the basic component of organization of the existing socio-economic space, averaging 1 village per 7,3 km² of the area of the country.¹ Their distribution, however, is uneven, averaging 14 villages per 100 km². Their highest density occurs in central Poland, particularly in the Łódzkie and Mazowieckie voivodships. In the analyzed Lubelskie Voivodship in 2016, more than 3,3 thousand basic localities existed, constituting 7,7% of all villages in Poland. Their density per 100 km² amounted to 13,2.²

A characteristic feature of modern socio-economic processes is variability of space. The primary conditions determining polarization include location in geographic space and human capital, social, economic, and natural resources. The effect of the polarization phenomenon is a change of population structures manifested in ways such as in the progressing process of aging of the rural population in peripheral areas, selective migration towards cities, and changes in the structure of the rural settlement network. Changes in the rural space in Poland have a direction similar to that in the majority of European countries but are characterized by a considerable backwardness in the scope of technical modernization, infrastructure, building development, and particularly functional transformations. Moreover, on land formerly located in the territory of Poland (including in the Lubelskie Voivodship), we inherited a substantial share of dispersed building development and very

1. [In the journal European practice of number notation is followed—for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style).—Ed.]

2. According to data published by Statistical Office of Poland in the year 2016 at BDL web database (<https://bdl.stat.gov.pl/BDL/start>).

fragmented settlement structure. In 1921, small settlements of up to 20 houses constituted 60,7% of the total number of settlements in the contemporary territory of Poland (Deszczka 1931). Later, these areas proved highly problematic for the development of all elements of infrastructure. The appearing modernization processes covered large villages first, and particularly suburban villages. Peripheral areas, with small villages, were omitted. Their situation deteriorated relatively to suburban areas. This encouraged migration of people from these areas.

The objective of this paper is the determination of population changes and presentation of their effects manifested in the polarization of structures of rural settlements. The author hypothesizes that in the period of the coming decades, transformations of the rural settlement system of the Lubelskie Voivodship resulting from current trends will result in strong polarization of space. The population will particularly concentrate in suburban areas. There, villages will increase, and the network of rural settlements in peripheral areas will become scarcer.

1 Literature Review

Rural settlement is subject to evolution processes. It adjusts to certain phenomena and processes occurring in the geographic space. The current state of the settlement network is a result of complex and long-term processes (Dziwowski 1990, 53–71; Liszewski 1991). Classic factors that determined the distribution of settlements mentioned by researchers include: natural environment, geographic location, level of socio-economic development, political decisions, and historical factors (Kielczewska-Zaleska 1972; Szymańska 2009). Many authors emphasize that the most important factor determining the development possibilities of rural areas is currently accessibility — i.e., their location towards growth centers, state borders, and important transport and communication corridors. Poor accessibility of a given unit is considered a barrier to socio-economic development (Heffner 2011; Kamińska 2010; Miszczuk 2010; Rosner 2012). The size of the rural settlement unit is also important, because it determines the development of its function and planning management (Kielczewska-Zaleska 1972). Cloke (2013) points to the city as one of the primary factors currently affecting the structure of rural settlements. According to the author, “given the nature and size of rural settlements, any particular planning action has a significant marginal effect on existing circumstances. What would be considered small-scale development (or non-development) in urban areas constitutes a very important additional factor at rural settlement scale.”

Modern planning of rural settlements in Poland is not an easy task, because it has to consider a number of conditions, including demographic conditions. Rural planning should be different, and particularly include a broad range of conditions and modern human needs. Therefore, many specialists support the need for the development of a new approach to rural planning. Such an attempt was presented by Kamiński (2008), who among numerous conditions affecting spatial development policy in rural areas pointed to social aspects (i.e., population distribution, population structure, and dynamics of social transformations). These aspects contribute to the uneven development of rural settlements in Poland. According to Shi, Xie and Cao (2016), “understanding the relationship between the spatiotemporal expansion of rural settlement land and the variation of rural population is the foundation of rational and specific planning for sustainable development.”

The problem of uneven development of particular links of the settlement network is reflected in numerous theories of regional development. They can be divided into three groups (Gawlikowska-Hueckel 2002; Nowińska-Łaźniewska 2004). The first includes theories identifying causes of economic activity in space. In the second group, research focuses on processes and factors facilitating or inhibiting development (theories of growth poles, agglomeration, and urbanization). The third group of theories covers those originating from the search for the causes of variability of the rate of economic growth (new theories of economic development).

Exogenic theories of development were first to appear in the literature. They originated from the economics of economic development, including the concept of space polarization (Hirschman 1958; Myrdal 1957; Perroux 1955, 1964) that explains the development of regions with different dynamics of development (Czyż 1998; Dyjach 2013; Szlachta 1995). The concept of space polarization by Perroux (1955, 1964) appeared among exogenic theories of development — i.e., by Hirschman (1958) or

Myrdal (1957), popular in Europe in the post-war period, until the 1980s (Grzeszczak 1999). In the cited theories, the attention of researchers was directed at the development of centers (growth poles) and their influence on space (theory center-peripheries, core-peripheries) (Gawlikowska-Hueckel 2002). The effects of the growth pole on the surrounding space depend on the dynamics of the environment, defined as the combination of three growth forces (population, innovation, and institution) occurring in a given territorial system, whereas the effect can be of positive (activation) or negative character (hindrance) in the context of development of a given area (Dyjach 2013).

In reference to the theory of exogenic development, development of regions with various socio-economic dynamics is currently observed in Poland, namely winning regions (growth poles), characterized by an increase in population, and losing regions (problem areas), characterized by population decline (Czyż 1998; Szlachta 1995). In each of the regions, demographic (inflow, outflow of population), social (different kinds of professional activity, entrepreneurship and innovativeness, level of education, various activity in the cultural sphere), or economic processes (monofunctionality of the economy based on traditional agriculture, or multifunctionality related to the development of non-agricultural economy and agriculture itself) are observed, characteristic of the existing villages and their situations.

Moreover, as pointed out by Gorzelak (2007), 19th century patterns of regional development have been preventing the reduction of regional disproportions in Poland right up until today. An evident division is observed into the better developed western part of the country, and the eastern one—associated with delayed development and peripheries. Miszczuk (2013) determined that “socio-economic development does not occur in a spatially even manner. Effects of such unevenness are on the one hand areas developing faster, and on the other hand—areas showing very low dynamics of changes (threatened with depression, underdeveloped, problematic).” This is also confirmed by research concerning the assessment of the level of social-economic development of rural areas in Poland, pointing to so-called biaxial polarization: polarization of development in the region along the center-peripheries continuum, and mutual polarization of regions from east to west (Rosner and Stanny 2014)³.

2 Data and methodology

The research employed methods typical of the structural approach—i.e., statistical, cartographic, and descriptive methods (Runge 2006). In order to avoid averaging of the image of the entire conglomerate of variable situations, the analysis of population processes was performed on the level of the smallest units—statistical localities. It is a different approach. The majority of research analyses the problems at the level of the commune unit. Statistical locality was adopted as the basic spatial study unit. According to the definition of the Central Statistical Office, “the statistical locality is a complex of localities adopting the name of the leading locality. The complex is usually composed of a village and the adjacent smaller localities.” In the year 2011, 41 582 statistical localities with a village status functioned in the territory of Poland. Approximately 8% of them were located in the analyzed Lubelskie Voivodship.

The first stage of the research involved the analysis of statistical materials of the Central Statistical Office of Poland. Due to the specificity of the study based on materials covering all rural statistical localities of the Lubelskie Voivodship, it was necessary to refer to detailed data collected exclusively during Population Censuses. Therefore, the study period covered the period from the first post-war Population Census in 1950 to the last Population Census in 2011. The collected statistical data concerning the number of residents were ordered into so-called dynamic temporal-territorial sequences. The next stage involved the presentation of results of statistical analyses in the graphic form (i.e., preparation of maps). An increase or decrease in population in particular localities was presented by means of a point signature (Ratajski 1989). They also provided the basis for the designation of villages with different characters of demographic changes.

3. See also English version of the document: Socio-economic development of rural areas in Poland, available at http://admin.www.irwirpan.waw.pl/dir_upload/site/files/Lukasz/MROW_en_2017.pdf.

Then, the author developed a forecast of transformations of the rural settlement network. She applied the method of spatial-temporal analogy, involving shifting the observed phenomena and patterns in time. The starting point was the state of population in 1950 in rural municipalities (after consideration of administrative transformations) and 2011. The analysis of temporal sequences employed a very simple method, the so-called naive method, assuming that the value from the previous period is ascribed to the following period as the forecasted value.

Based on the comparison of the state of the population of statistical localities in 1950 and 2011, the author calculated the transformation index, and then prepared a forecast of changes in the rural settlement network. She presented a short-term (by 2030) and long-term forecast (by 2050). Formulating the assumptions of the forecast involved the application of the analogy method. It was assumed that the rate of the decrease or increase in population observed in the years 1950–2011 will be analogical to that determined in the analyzed period in the future. The undoubted disadvantage of the applied method is its assumption of a constant level of the observed phenomenon and lack of consideration of potential incidental fluctuations, which can directly translate into the quality of the forecast.

Considering the simplified model structure, two variants were assumed, maximum and minimum. In the case of the long-term forecast, it was assumed that the rate of the actual decrease in population would be identical to the period 1950–2011 in the case of the maximum variant, and the minimum variant assumed half the intensity of the rate of decrease observed in the analyzed years. The procedure was similar in the case of the short-term forecast, whereas it referred to the rate of the actual decrease in the population for the years 1988–2011. The final presented forecast of population changes in statistical municipalities was based on the following calculations:

- calculation of the rate of a decrease/increase in population for each locality for the years 1950–2011, next used for the construction of a long-term forecast
- calculation of the rate of a decrease/increase in population for each locality for the years 1988–2011, next used for the construction of a short-term forecast
- multiplication of the obtained results by forecast assumptions. Two forecast variants were performed for each of the discussed periods: minimum and maximum

The application of this simple research forecast provided the basis for the identification of future population changes in statistical localities in different variants. This provided the basis for the determination of potential directions of transformations of the structure of rural settlements resulting from the phenomenon of space polarization.

3 Presentation and Discussion of Findings

3.1 Change in the size of population

Changes in rural areas observed in recent years suggest high sensitivity of human capital. According to Eberhard (1989), demographic and spatial development of urban agglomerations occurs, and on the other hand areas with characteristics of depression and demographic regress expand. This contributes to magnifying disproportions in the spatial management of the country. This type of transformation is in accordance with global processes of polarization and concentration of socio-economic phenomena. Primary causes of depopulation include: geographic location, population age structure, size of the village and its role in the local settlement system, etc. The occurrence of unfavorable socio-economic conditions (problems in the local labor markets, low standard of living, weak availability of services) resulted in the polarization of human capital also in the rural areas of the Lubelskie Voivodship. Modern irregularities in the spatial distribution of human resources are directly proportionate to the distance from centers of metropolitan areas, and the basic variable modifying the geographic distribution of polarization is spatial accessibility (geodesic, temporal, or economic) (Śleszyński 2012). Accessibility determined the local prevalence of a given location in comparison to others (Spiekermann and Neubauer 2002).

In the analyzed Lubelskie Voivodship in the period 1950–2011, 80% of villages recorded a decrease in population. Approximately 15% of villages were characterized by a very high population

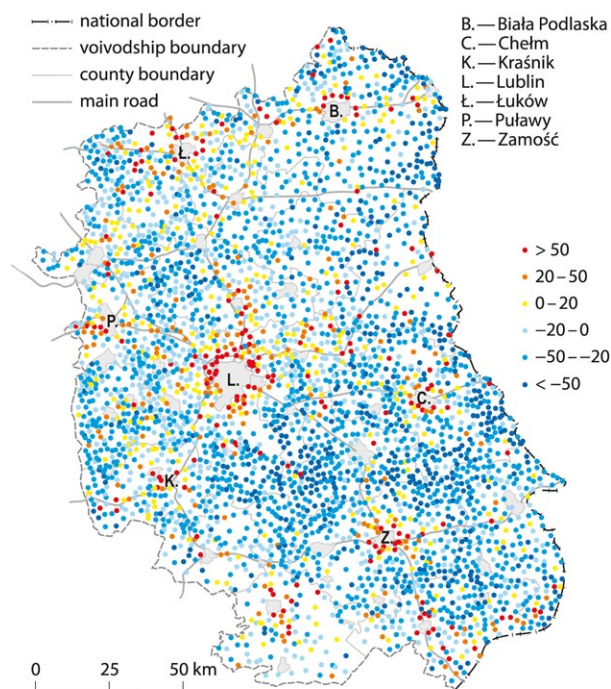


Fig. 1. Change in the size of population in villages of the Lubelskie Voivodship in the years 1950–2011 (in %)

Source: Own elaboration based on data published by Central Statistical Office of Poland

decrease exceeding 50%. Such villages were located in the Krasnystaw-Hrubieszów region and in the near-border belt. An increase in population was observed in suburban zones of large and medium-sized cities, particularly Lublin, Zamość, Chełm, Biała Podlaska, and along some transport routes (fig. 1). The observations of population changes in the rural areas of the Lubelskie Voivodship are confirmed by research by other authors, among others Celińska-Janowicz et al. (2010) or Rosner (2012). Areas active in terms of population and depopulation areas are evidently distinguished. This particularly concerns peripheral areas, both in spatial and socio-economic terms.

Villages of the Lubelskie Voivodship also show spatial polarization of the population age structure which is one of the causes of spatial segregation. This undoubtedly has no positive effect on the quality of human capital. The literature presents attempts of explanation of the degradation of the structures, and points to consequences of such transformations. Such areas are characterized by a mechanism of intensification of the process. A tendency for an increase in the share of the elderly population is observed (Rosner 2012). Aging of the population and a decrease in the share of young people as a result of selective migrations contribute to their further depopulation. As a consequence, this may lead to the appearance of declining localities (Glasgow and Brown 2012; Heffner 2015; Potrykowska 2007; Rogers and Willekens 1986; Rosner 2012; Taylor 2001; Weiss 2002; Wesołowska 2012, 2013).

As a result of aging of rural areas in the Lubelskie Voivodship in the years 1960–2011, the share of population at post-productive age increased from 11,2% to 20,4%. Aging contributed to a further decrease in the population of rural settlements (so-called closed cycle of depopulation). The Rogers-Castro model explains the process of degradation of age structures in rural areas (Rogers and Willekens 1986). According to the research, in more than 2/3 of cases, migration concerns young people from the age range of 20–34. This leads to spatial polarization of population age structures. Based on the demographic population forecast by 2050 (Waligórska et al. 2014), further aging of population is expected, as well as a decrease in the share of young people (migrations), and particularly women, in depopulation areas. This will contribute to further depopulation of many villages, particularly located in east and central Poland (Potrykowska 2007; Rosner 2012). Similar processes are observed in other countries — e.g., in the United States, where according to forecasts, in 2030 the population older than 65 years of age will constitute more than 20% of the population residing in rural areas outside of the core of urban agglomerations (Glasgow and Brown 2012).

3.2 Construction traffic as a manifestation of space polarization

The study shows that demographic as well as economic phenomena are reflected in the rural landscape, and the component which considerably responds to such changes is building development. Its parameters reflect financial possibilities, manner of management, system of values, and lifestyle of residents specified at a given moment (Lipińska 2003). The dwelling is a function of the economic possibilities of a given group of people, a specific function of wealth (Ilnicki 1999, 2003; Markowski 1998; Marszał 1999). This results in spatial disproportions both in the standard of housing and construction traffic.

In the years 2008–2013 in the rural areas of the Lubelskie Voivodship, somewhat more than 16,4 thousand apartments were commissioned, corresponding to a value of 14,2 apartments per 1 000 residents. The value is approximate to the average number of apartments commissioned in rural areas in Poland (12,3). The number of apartments commissioned in the analyzed voivodship, however, is not distributed evenly. It also changes with the size of villages (fig. 2). The highest construction activity occurs in large and very large villages, whereas small villages (below 200 residents) hardly participate in construction traffic. Such distribution of construction traffic confirms the initial hypothesis on the polarization of settlement structures. In suburban villages, a classic suburbanization process occurs, manifested in such ways as in the scale of construction of new houses in the localities. Should such a tendency be maintained, the largest villages will soon strengthen their position in the local settlement network. Villages with peripheral location and regressive character of population changes often do not participate in construction traffic. In 1 205 villages, no apartments were commissioned. They are localities located in the southern part of the voivodship, in the Krasnostawski, Hrubieszowski, Zamojski, and Tomaszowski counties (fig. 2).

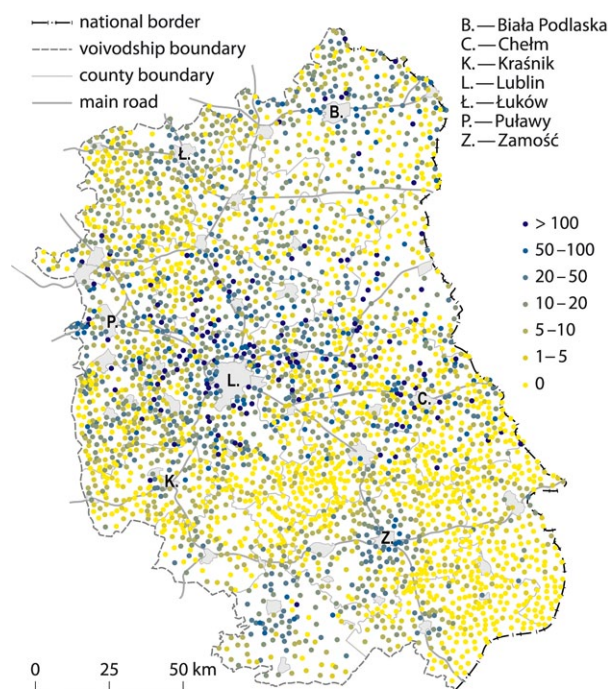


Fig. 2. Apartments commissioned in the years 2008–2013

Source: Own elaboration based on data published by Central Statistical Office of Poland

3.3 Forecast of population changes and structure of the rural settlement network

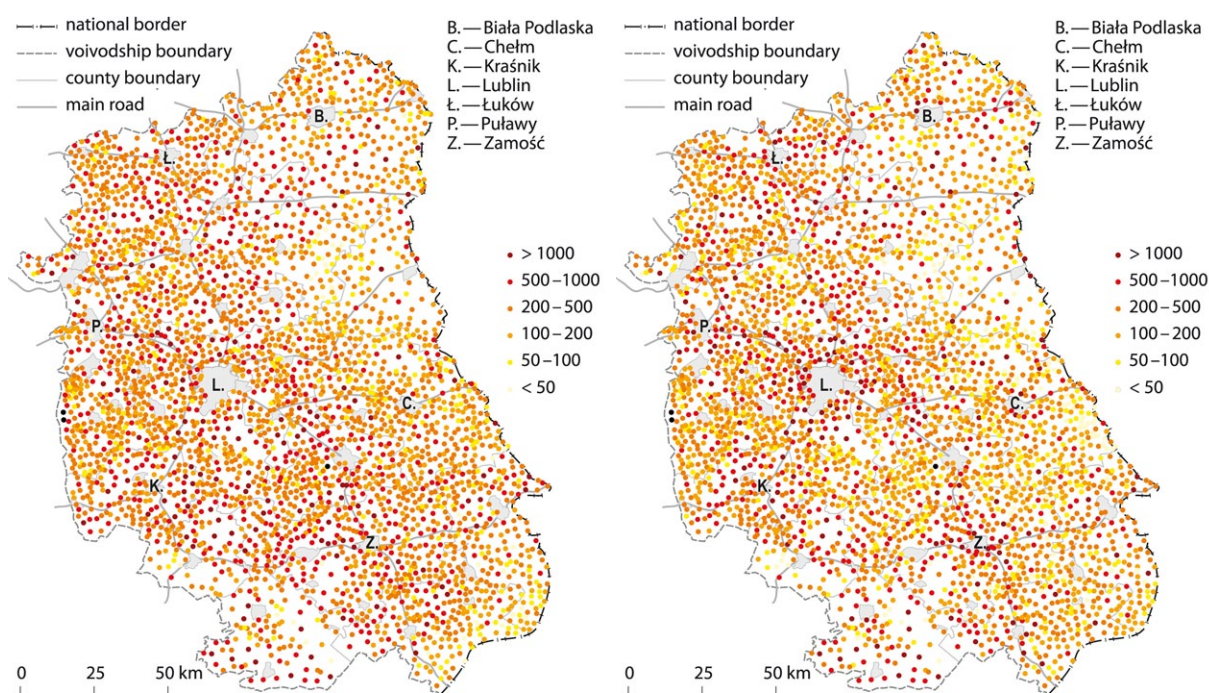
The rural settlement network of the Lubelskie Voivodship is characterized by high variability of sizes of villages. In 1950, it was dominated (46,9%) by medium-sized villages (200–500 persons), and very large villages (> 1 000) constituted only 4,1% (tab. 1). They concentrated in the central and southern part of the voivodship (fig. 2). Over the next six decades, the share of very large villages increased to 4,6%, but the share of small villages also increased (< 100) from 8,2% to

Tab. 1. Structure of the rural settlement network of the Lubelskie Voivodship in 1950 and 2011, and in 2030 and 2050 based on the adopted forecast variants

Village size	1950		2011		Short-term forecast (2030)				Long-term forecast (2050)			
					Minimum		Maximum		Minimum		Maximum	
	Vill.	Pop.	Vill.	Pop.	Vill.	Pop.	Vill.	Pop.	Vill.	Pop.	Vill.	Pop.
< 100	288	20 690	608	38 412	688	41 496	828	48 722	777	45 596	1 042	55 384
100–200	831	123 472	961	141 297	982	143 857	934	137 326	945	137 574	846	123 341
200–500	1 646	523 724	1 314	414 836	1 232	390 294	1 163	368 723	1 152	366 613	966	304 666
500–1000	601	405 320	466	316 715	433	297 074	387	264 649	412	287 081	383	266 459
> 1000	144	199 702	161	248 185	175	294 470	198	355 516	224	450 624	273	665 680

Source: Own elaboration based on data published by Central Statistical Office of Poland

Note: Vill. — number of villages; Pop. — population

**Fig. 3.** Size of villages in 1950 (left map) and 2011 (right map)

Source: Own elaboration based on data published by Central Statistical Office of Poland

17,3% . Large villages appeared in the vicinity of cities, particularly Lublin, and the share of small villages increased in the east, in the near-border belt, and in the Opole–Krasystaw–Hrubieszów belt. The analysis of population trends resulted in the forecast of changes in the rural settlement network of the Lubelskie Voivodship for 2030 and 2050 presented below. In the short-term variant, the population of the analyzed villages will increase by 0,7% (variant min.) to 1,3% (variant max.). In the case of the long-term variant, analogically by 11% and 22,1%.

Depending on the variant of forecast, further changes will cover the structure of villages. In 2030, according to the maximum forecast, as many as half of the villages will be small villages (up to 200 persons). In 2050, their share will increase to 54% (tab. 1, fig. 3). In 2050, very small villages with up to 100 residents will have a large share. They will constitute 30% of villages. The share of large (500–1 000) and very large villages (> 1 000 residents) will also increase. According to the short-term variant, such villages can constitute approximately 17% of villages in the voivodship. The long-term forecast assumes an increase in their share to 18,7% (fig. 4). Those considerable changes in the extreme size groups of villages suggest intensifying processes of polarization of settlement structures.

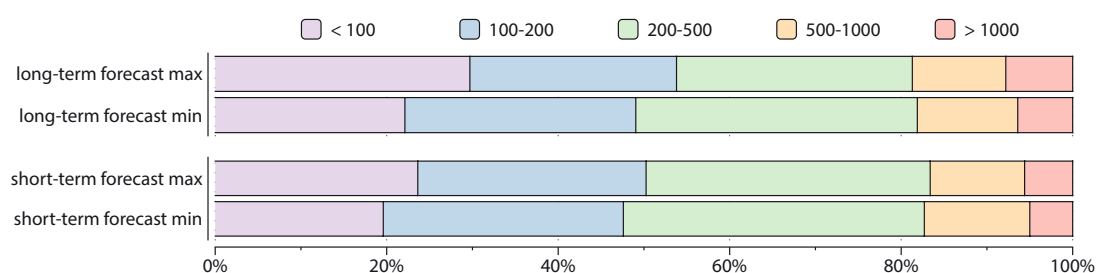


Fig. 4. Structure of the rural settlement network of the Lubelskie Voivodship (by village size) according to the adopted variant of forecast

Source: Own elaboration based on data published by Central Statistical Office of Poland

Based on the presented forecast, irrespective of the adopted variant, it can be concluded that the rural settlement network will become scarcer in the south-western part of the region (Opolski County) and in the Krasnystaw–Hrubieszów region which was subject to a strong depopulation process throughout the post-war period. This results from the predominance of small villages (up to 100 residents) in the structure. These type of villages, with a high rate of depopulation, show the most rapid degradation of the settlement network. The largest rural settlements will be characteristic of suburban zones (particularly of Lublin and Zamość), which is related to the suburbanization process, and of the southern part of the voivodship (Bigorajski and Tomaszowski counties)—in Roztocze, where the concentration of population results from the physiographic conditions (land relief) (fig. 5 and 6). The analysis of the spatial distribution of population of rural areas of the Lubelskie Voivodship also suggests an increase in the population of the largest villages at the cost of small ones in areas of decreasing population. This particularly concerns commune villages. Similar findings are presented by Rosner (2012). The described phenomenon of concentration of rural population is frequently combined with functional changes of the villages. A process of intensified urbanization occurs there, manifested in the concentration of specialized services, large-area commerce, and housing development of the non-agricultural population, with an increased standard (Górz and Uliszak 2006).

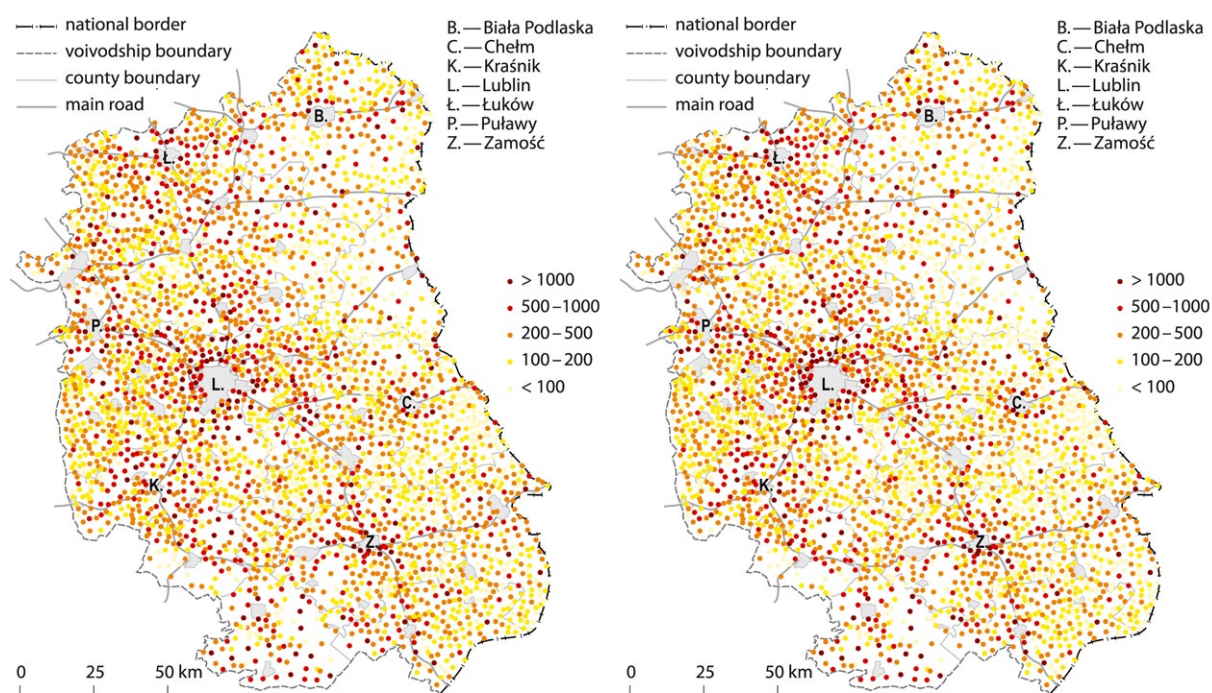


Fig. 5. Short-term forecast of changes in the settlement network of the Lubelskie Voivodship (2030)

Source: Own elaboration based on data published by Central Statistical Office of Poland

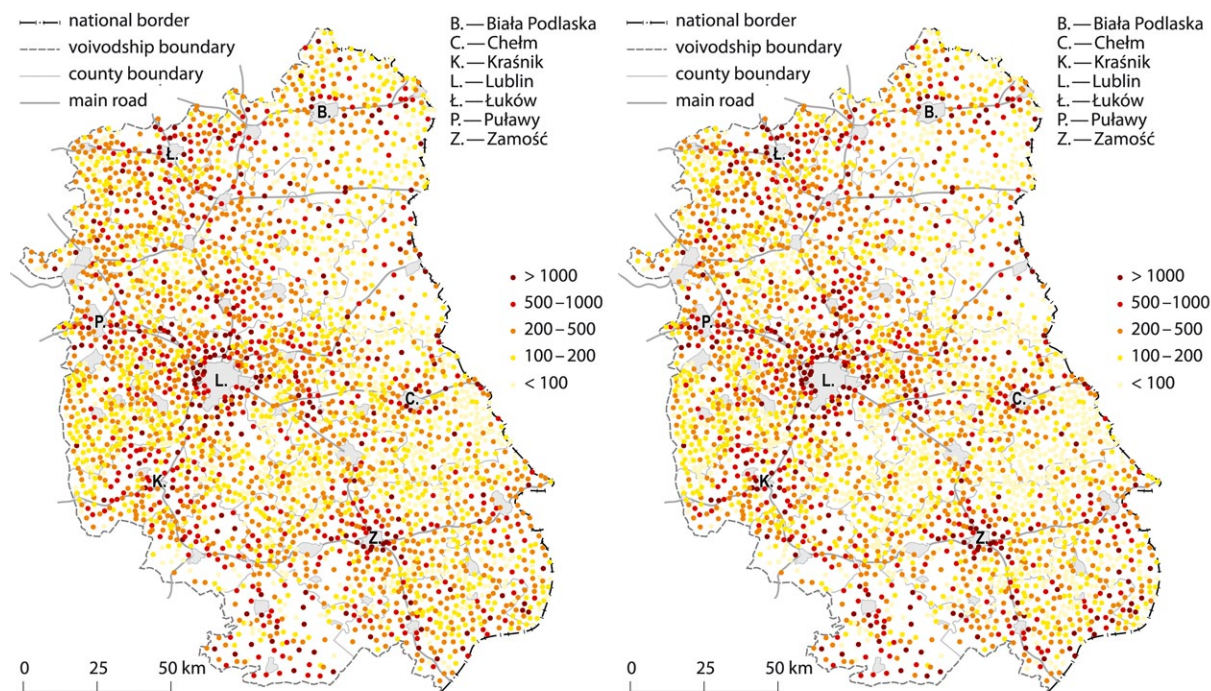


Fig. 6. Long-term forecast of changes in the settlement network of the Lubelskie Voivodship (2050)

Source: Own elaboration based on data published by Central Statistical Office of Poland

Conclusions

The analyses suggest the modern occurrence of the phenomenon of concentration of rural population and polarization of rural settlements in the Lubelskie Voivodship, resulting in the concentration of services, commerce, and housing development. This is confirmed by research on other areas of Poland (Celińska-Janowicz et al. 2010; Górz and Uliszak 2006; Rosner 2012). Technical-spatial adjustments are performed, resulting in the occurrence of two types of settlements: developmental and regressive. According to the author's research, confirmed by other authors, peripheries will be further subject to the intensification of their peripheral character in relation to urban centers. Łuczyszyn and Chołodecka (2014) called the process "double polarization" (social and economic). It intensifies disproportions in the region and prevents mutual influence of endo and exogenic factors.

Considerable spatial differences are observed in the Lubelskie Voivodship in the number of commissioned apartments. Areas of concentration of new housing development are formed with simultaneous occurrence of areas in which housing development declines. The scale of the differences is determined by factors particularly related to non-agricultural income-generating activities of the population, having a considerable effect on shaping the capital resources of the rural population and on investments implemented within homesteads. As a result of this irreversible process, disproportions between regions increase. Localities located nearer cities or in areas with particularly attractive environmental values develop considerably faster than areas located far from the most important transport routes and larger urban centers. The determined differences in housing development in the Lubelskie Voivodship reflect broader socio-economic processes involving transfer of some types of business activity from large cities to the adjacent rural areas, as well as the development of new housing development by the population of such cities in suburban areas. The scale of the phenomena can be expected to intensify with time.

The performed forecasts of changes in the rural settlement part of the Lubelskie Voivodship point to a considerable growth of small villages, and dilution of the network in the southern part of the voivodship, and particularly in the following counties: Opolski, Krasnostawski, Hrubieszowski, and Zamojski. Suburban villages will gain population as a result of the suburbanization process.

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