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THE SPATIAL DIFFERENTIATION OF THE INTERVENTION OF THE REGIONAL POLICY OF THE EU SUPPORTING PRO-ENVIRONMENTAL ECONOMIC CHANGES IN POLAND

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ABSTRACT: The goal of this article is to identify the environmental economic changes supported as part of the intervention of the regional policy of the EU and to identify the regional differentiation of employing the relevant funds. In the research, relative data was used from the System of Monitoring and Financial Control of Structural Funds and Cohesion Funds SIMIK 07-13. The research results indicate a wide range of the regional policy's impact on the environment-oriented economic changes including increase in energy effectiveness, the development of renewable sources of energy, the development of rail and water transport as well as local public transport and bicycle traffic, a more rational use of water resources, enhanced protection from adverse effects of the element of water, the development of recycling, restoration of degraded land and improvement of biodiversity protection. The regional differences in the value of the related support resulted from two types of conditions: the level of anthropogenic impact and the specific environmental conditions.

KEY WORDS: sustainable development, EU regional policy, environmental intervention

Introduction

The major goal of the regional policy of the EU is to stimulate social, economic and territorial cohesion in all of Europe's regions. This is reflected in the way of allocating structural funds: a majority of them is channelled to relatively least developed regions which included Polish provinces. Since 2004, the financial support from the regional policy of the EU has affected investments in Poland, offering more opportunities to satisfy the domestic and regional environmental needs also related to the development of rural areas in line with the concept of the integrated development of agriculture and the country (Kozak, 2014; Kutkowska and Pilawka, 2016; Kołodziejczak 2017). The regional policy is among the fundamental EU investment policies. It represents approximately 30% of the EU budget and as such, it can be viewed as an important financial instrument supporting positive social and economic changes. They are also related to implementing the concept of sustainable development according to which the spatial diversity of the intervention of the regional policy of the EU should be conditioned by the scale and type of regional and local developmental needs¹.

The content-related focus of the regional policy of the EU is stipulated in the Community's strategic documents referring to the requirement of laying the foundations for sustainable development. At present, it is among the developmental priorities for the entire European Union, strongly emphasized in the Europe 2020 Strategy (2010). There, sustainable development is identified with supporting an economy that draws on the resources more effectively, is more environmentally-friendly and more competitive. The postulated related activities include environmental changes to areas of economic activities which are of key importance to the natural environment and include energetics, transport, water management, waste management and environmental protection (Minorski, 1977; Clini et al., 2008; Trzepak, 2012; Revell, 2013; Ryszawska, 2013).

The goal of this article is to identify the environmental-oriented economic changes supported as part of intervention of the regional policy of the EU and to identify the diversity in employing the related funds. What is more, in the article, an attempt has been made to determine the conditioning behind the spatial differentiation of employing environmental intervention within the regional policy of the EU. Is it related to the specific environmental conditioning in a region or perhaps the level of anthropogenic impact?

¹ In accordance with the resolution adopted by the United Nations General Assembly on 25.09.2015 "Transforming our world: the 2030 agenda for sustainable development" (A/RES/70/1).

Areas of economic activity of key importance to the natural environment and changes thereof

The environmental intervention of the regional policy of the EU is based on the assumptions of sustainable development which highlights the importance of desirable relations between the economy and the natural environment in a way ensuring lasting social and economic development (Constanza et al., 1991; Rogall 2009; Górka, Łuszczuk, 2014). A question arises what *desirable* relations means. In order to answer this question, we should identify the nature of the economy's impact on the natural environment. Since the beginning of human development, man has drawn on natural resources to satisfy his needs. As the population grew and civilization spread, this process intensified until it assumed a form of over-exploitation, destroying animals, microorganisms and plants (Janik, Krawczyk, 1982). When human activity was too much of an encumbrance to the natural environment, eco-systemic functions were disturbed, resulting in environmental problems (Mizgajski, 2010; Herodowicz, 2016). Therefore, *desirable* relations between the economy and the natural environment should indicate necessary changes to economic activity in order to limit environmental problems.

Table 1. Areas of economic activity of key importance to the natural environment and its environment-related changes

Area	Environment-oriented changes
Energetics	increase in energy effectiveness
	development of renewable sources of energy
Transport	development of rail transport
	development of water transport
	development of local public transport and bicycle traffic
Water management	more rational use of water resources
	enhanced protection from adverse effects of the element of water
Waste management	development of recycling
	restoration of degraded land
Environmental protection	improvement of biodiversity protection

Source: author's own work.

The instrument intended to support these changes is the regional policy of the EU whose focus is stipulated in the related documents² and which includes certain changes to areas of economic activity of key importance to the natural environment (table 1).

The first environment-oriented change to energetics: **increase in energy effectiveness**, indicates increased effectiveness in producing, transferring and using energy. To this end, ventures have been initiated including (Karaczun et al., 2008), among other things, construction/reconstruction of entities producing simultaneously energy and heat (the so-called cogeneration), construction/reconstruction of the distribution networks of power and heat, thermal upgrading of buildings and conversion from fuel combustion installations to environmentally friendly solutions. The other change identified in energetics is **development of renewable sources of energy**. In this respect, investments should include new entities producing renewable energy, producing biofuels or construction of technological lines to manufacture devices used in renewable energetics.

As for transport, an important source of air pollution (Costabile, Allegrini, 2008), environmental changes include support for forms of transport alternative to road transport. One of them is **rail transport** where the efforts are focused on constructing and upgrading railroads and railway stations coupled with purchases and overhaul of the rolling stock. Another, relatively environmentally friendly form of transport is **water transport**, the development of which is supported by enhancing access to sea ports and improving the quality of the port infrastructure as well as upgrading inland waterways and inland navigation equipment. The last reviewed change to transport is **development of local public transport and bicycle traffic** which should comprise creation of new transport connections, more intense transport of passengers as well as investment in municipal transport vehicles.

Environmentally friendly changes to water management are primarily related to **a more rational use of water resources**. This notion includes on one hand efforts aimed at limiting discharges of compounds of nitrogen and phosphorus, predominantly from industrial and municipal wastewater (Mikulski, 1998) and on the other hand sparing water resources by entrepreneurs and households. The related investments should focus on developing systems of sanitary sewage and upgrading sewage treatments. Another change identified as part of water management is **enhanced protection from adverse effects of the element of water** interpreted as protection from the threat of flood (investment in protective infrastructure) combined

² Community Support Framework (2003), Community Strategic Guidelines (2006), Common Strategic Framework (2012).

with preventing negative effects of droughts (enhanced retention of water resources).

As part of waste management, two environmental changes have been identified: **developing recycling** which is the basis for reorienting waste management as postulated by H. Rogall (2009) consisting in prevention of waste production and in reuse of waste rather than simple neutralisation and elimination of excessive waste. Another identified environmental change to waste management is **restoration of degraded land** including restoration of the use value and natural values to dormant landfills.

Environmental protection is the only considered areas of economic activity which in itself does not pose environmental problems. Its role is to prevent and limit decreases in biodiversity resulting from another type of human activity. **Improvement of biodiversity protection** is to demonstrate itself in maintaining biological diversity owing to protection of all wild plants, animals and fungi as well as all natural habitats (Symonides, 2014).

Research methods

The analysis covers the years of 2004 to 2015 while the spatial range includes 16 Polish provinces. The research was divided into two major stages: the first one was based on an analysis of literature on the subject and the strategic and programme-related documents pertaining to the environmental intervention of the regional policy of the EU. The major effect of this stage was systemization and identification of the major environmental changes to economic activities of key importance to the natural environment. Stage two, an empirical one, resulted in identifying the regional differentiation of the intervention of the regional policy of the EU. To this end, on the basis of data published by the Ministry of Economic Development and obtained from the System of Monitoring and Financial Control of Structural Funds and Cohesion Funds SIMIK 07-13, the value was established of the regional policy of the EU funds employed in the process of stimulating environmental economic changes in Poland. The identification of the regional conditioning of the environmental intervention of the regional policy of the EU was based on an analysis of the intensity indicators reflecting the value of the per capita funds allocated to a specific region. What is more, a typology has also been developed for the provinces with respect to the intensity of using the EU support. To this end, the researched units were allocated weighting which reflects the ranges of the value of intervention as part of each environmental transformation. The sum of the weighting allowed to indicate regions with high, average and low intensity of using the environmental intervention of the regional policy of the EU.

The regional diversity of environmental intervention of the EU regional policy

The characteristics of the regional diversity of the environmental intervention of the regional policy of the EU were identified as part of a system of environmental changes to economic activity. At this stage, the obtained EU funds were used as part of specific change against the number of a region's inhabitants.

More than 160 billion Polish zlotys i.e. approximately 30% of all the funds allocated to Poland in 2004-2015, were earmarked for projects implemented as part of the environmental intervention of the regional policy of the EU. This amounts to more than PLN 4,200 per capita of total project value and almost PLN 2,300 per capita of UE funding. The funds allocated directly from the EU budget represented on average 54% of the total project value. The biggest EU funds exceeding PLN 2,000 per capita were enjoyed in five provinces: Lower Silesian, Łódź, Masovian, Pomeranian and West Pomeranian (figure 1).

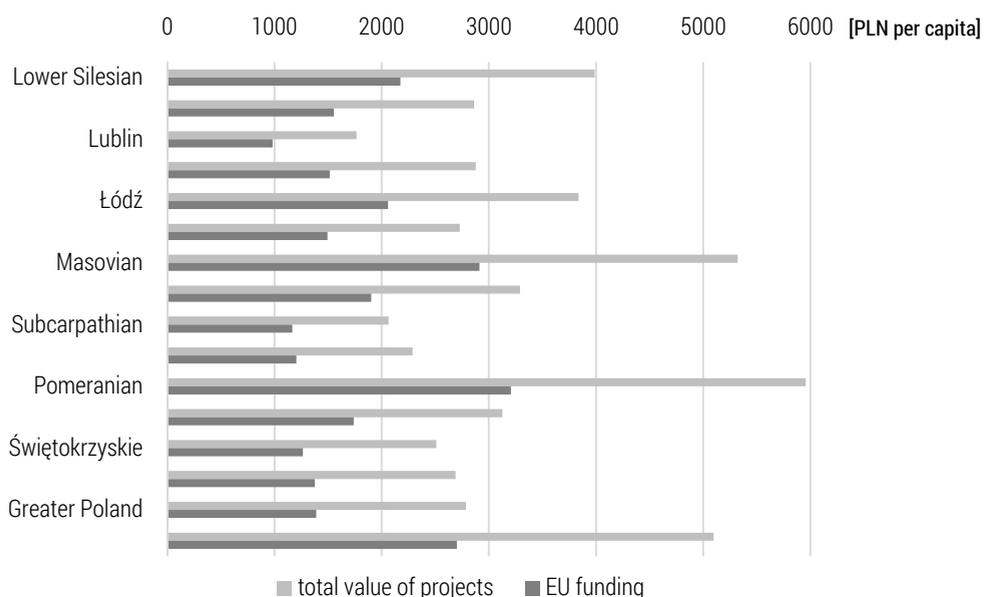


Figure 1. Per capita value of the environmental intervention of the regional policy of the EU in Polish provinces in 2004-2015

Source: author's own work based on data from the System of Monitoring and Financial Control of Structural Funds and Cohesion Funds SIMIK 07-13.

Pomeranian and Masovian provinces were special cases where exceptionally large per capita funds were allocated for environmental intervention. It resulted from stepping up huge investments related to the enhancement of accessibility to the Gdańsk sea port (PLN 1.4 billion) and the development of the Pomeranian Metropolitan Railway (PLN 1.1 billion) in Pomeranian province. On the other hand, in Masovia PLN 6 billion were allocated to the country's biggest self-governed project, namely construction of line 2 of the Warsaw metro. In the other provinces, the per capita value of EU funds exceeded PLN 1,000 with the exception of Lublin province where the value was slightly lower (figure 1).

On the one hand, an analysis of the regional diversity of the environmental intervention of the regional policy of the EU in a system of identified environmental changes to economic activity indicates transformations accompanied by relatively high dispersion (e.g. the development of local public transport or a more rational use of water resources). On the other hand, there are changes indicating trends for a relatively strong concentration (e.g. the development of water transport or enhanced protection from adverse effects of the element of water (figure 2)). This situation seemed to result from two types of conditions: in the case of fairly dispersed changes, the value of environmental intervention was conditioned by population density and the intensity of economic activity. However, the intervention as part of changes relatively strongly concentrated in selected provinces was conditioned by specific features of the natural environment, e.g. access to the seashore or a province's hydrological conditions.

Increase in energy effectiveness can be identified as a dispersive change conditioned by the level of anthropogenic impact. The most intensive EU intervention exceeding PLN 125.00 per capita was enjoyed in densely populated provinces and ones hosting large power distribution plants, e.g. Silesian, Opole and West Pomeranian. The relatively generous funds earmarked for every inhabitant of Lubusz province stemmed from carrying out a relatively large-scale project of updating the heating system in Zielona Góra and a number of energy efficiency projects. Coupled with a small number of the province's inhabitants, it resulted in a high value of the analysed indicator (figure 2).

In the case of the **development of renewable energetics**, the type of change indicates tendencies to focus intervention on a specific area in the country, resulting from specific environmental conditions. The amplest EU funds (over PLN 150.00 per capita) were allocated to the north of Poland, especially West Pomeranian and Podlaskie (figure 2). They are also provinces with the best wind conditions for the development of wind energy (Wiśniewski et al., 2012) which was the major direction of the development of renewable energetics in Poland.

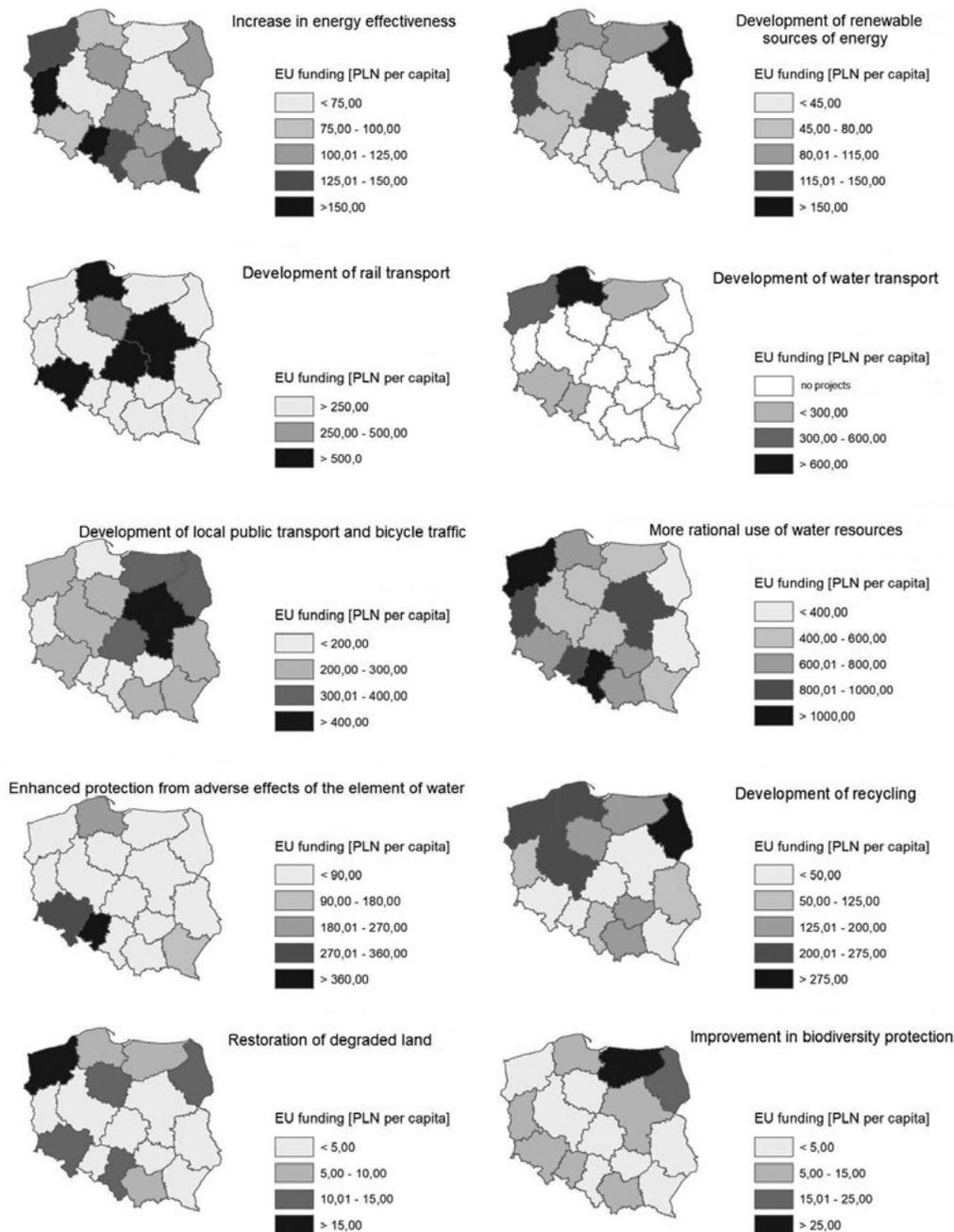


Figure 2. The diversity of the environmental intervention of the regional policy of the EU in the system of environmental changes to economic activity in Poland in 2004-2015

Source: author's own work based on data from the System of Monitoring and Financial Control of Structural Funds and Cohesion Funds SIMIK 07-13.

The environmental intervention of the regional policy of the EU in the realm of **rail transport** tended to differ from one province to another with respect to the financial support. The development of rail transport prevailed in four provinces: Masovian, Łódź, Pomeranian and Lower Silesian where more than 65% of total EU funds were allocated, obtained as part of the analysed change. Another outstanding province is Kuyavian-Pomeranian where the value of EU funds reached an unprecedented level of almost PLN 300.00per capita (figure 2). Even if in rail transport there is a clear trend for concentrating EU funds, there is no evidence of the influence of environmental conditions. The situation in question resulted from the fact that many railway projects in Poland could not be included in the analysis as their scope went beyond one province and therefore it was impossible to clearly identify their regional locations. For this reason, in the lead were provinces whose capitals were among the biggest cities in the country and as such attracted large-scale projects related to the development of agglomeration railways or restoration of traffic in railway nodes aimed at solving the problem of traffic congestion.

The environmental intervention in **water transport** was implemented only in five provinces: three seaside provinces and two located in the Oder basin (figure 2). To a large extent, it resulted from the environmental conditioning i.e. access to the sea, affecting the location of port infrastructure and access to navigable waterways, the basis of inland water transport. The non-existence of such projects in the remaining provinces can be attributed to the hydrological conditions which in a large part of the country “do not allow to enjoy the desired navigation parameters, even with huge investments involved” (Jarzębińska, 2008, p. 15).

The environmental intervention of the regional policy of the EU pertaining to the development of **local public transport and bicycle traffic** was different. The projects were carried out all over the country, with Masovian province standing out for the very high value of funds allocated to a single project i.e. construction of line 2 of the Warsaw metro. In general, the value of funds earmarked for local transport was largely related to the anthropogenic impact resulting from population density in cities. The relatively high per capita funds allocated to, among others, Podlaskie and Warmian-Masurian provinces, are related to the smaller general number of inhabitants in these provinces (figure 2).

The diversity of environmental intervention as part of **more rational use of water resources** also seemed to be more related to the level of the anthropogenic impact than to the specific environmental conditions in a specific province. The considerable per capita EU funds earmarked for Silesian

or Masovian provinces and the modest funds for Podlaskie and Lublin provinces can be attributed to population density in these provinces (figure 2).

The situation was different with respect to **enhanced protection from adverse effects of the element of water**; this is a change caused by the specific environmental conditions. In Poland, the provinces most vulnerable to flooding are located in the Oder basin and the Vistula basin as well as the depression area in Żuławy (Mioduszewski, 2012). This provided an explanation of the relatively ample funds for intervention focused on protection from adverse effects of the element of water earmarked for Lower Silesian, Opole and Pomeranian provinces (figure 2).

The development of recycling can be defined as a dispersive change which does not tend to concentrate and is theoretically conditioned by the level of anthropogenic impact related to waste production. This statement is justified for provinces like Greater Poland, West Pomerania and Pomerania which enjoyed relatively generous EU funds for development of recycling. At the same time, these provinces produce most waste per capita (Infrastruktura Komunalna..., 2013). A question arises why relatively generous intervention funds were allocated also to Podlasie province where the waste production output is rather low? On the other hand, why were limited EU funds allocated to Lower Silesian and Masovian provinces where lots of waste is produced? Perhaps the level of waste management in these provinces was high enough not to require more intervention? Or perhaps the intervention of the regional policy of the EU was accompanied by errors in spatial distribution? In order to provide answers to these questions, continued in-depth research is required.

The scale of intervention targeted at **restoration of degraded land** should also reflect the level of anthropogenic impact in the specific provinces. Projects carried out as part of the regional policy of the EU focused chiefly on restoration of dormant landfills. Relatively large EU funds were administered to the provinces in Northern and Southern Poland. A case in point is the very well channelled, restoration-related intervention in Lower Silesia and Silesia (figure 2) where the allocated funds were relatively ample and in proportion to the scale of environmental problems. Before accession to the EU, these provinces represented the largest share of total devastated land and degraded areas.

The last analysed change to economic activity was **improvement of biodiversity protection**. It is a change with a degree of concentration which may stem from a province's natural assets. The value of the intervention reached its peak in Warmian-Masurian and Podlaskie provinces, the "green lungs" of Poland. Similarly, in Lubusz province the relatively large funds allocated to the local projects can be attributed to the natural values of the prov-

ince which enjoys the highest forestation rate in the country, coupled with considerable natural assets. The country's southern provinces also stood out with their valuable mountain ecosystems.

Conclusions

In 2004-2015, the regional policy of the EU was an instrument financing activities conducive to environmental changes to economic activity in Poland, identified in this article. The major goal was to limit the negative human impact on the natural environment and, on the other hand, to protect valuable natural assets. Due to the spatial diversity of the environmental intervention of the regional policy of the EU, two major types of this intervention can be identified:

1. **Dispersive intervention**, without tendencies to concentrate in specific provinces whose value most typically resulted from the level of anthropogenic impact. This type of intervention included the following environmental changes to economic activity: increase in energy effectiveness, development of the local public transport and bicycle traffic, a more rational use of water resources, development of recycling and restoration of degraded land.

2. **Focused intervention**, indicating concentration in specific provinces which stemmed from a very strong concentration of people and economic activity as was the case of the development of rail transport. On the other hand, it resulted from specific environmental conditions which affected the scale of the intervention as part of the development of renewable energetics, development of water transport, enhanced protection from adverse effects of the element of water and improvement of biodiversity protection.

In order to synthesize the regional diversity of the environmental intervention of the regional policy of the EU in Poland, the provinces were divided into types with respect to the intensity of using EU's funds (table 2).

Therefore, provinces with high intensity of using the EU funds as part of the environmental intervention of the regional policy of the EU included Podlaskie, Pomeranian and West-Pomeranian provinces. An average intensity was recorded in Lower Silesian, Lubusz, Opole and Warmian-Masurian provinces. As for provinces with a relatively low intensity of using the EU funds, these included Kuyavian-Pomeranian, Lublin, Łódź, Lesser Poland, Masovian, Subcarpathian, Silesian, Świętokrzyskie and Greater Poland provinces. It is worth noting that the typology does not take into account the intervention on a supra-regional level as it was impossible to attribute it correctly to specific provinces. This certainly affected the intensity of using the funds allocated as part of the regional policy of the EU.

Table 2. Types of Polish provinces with respect to the intensity of using the environmental intervention of the regional policy of the EU

change province	Increase in energy effectiveness	Development of renewable sources of energy	Development of rail transport	Development of water transport	Development of local public transport and bicycle traffic	More rational use of water resources	Enhanced protection from adverse effects of the element of water	Development of recycling	Restoration of degraded land	Improvement in biodiversity protection	total
Lower Silesian	2	2	3	2	2	3	4	1	3	2	24
Kuyavian-Pomeranian	3	2	2	1	2	2	1	3	3	1	20
Lublin	1	4	1	1	2	1	1	2	1	1	15
Lubusz	5	4	1	1	1	4	1	2	1	2	22
Łódź	3	4	3	1	3	2	1	1	1	1	20
Lesser Poland	3	1	1	1	2	3	1	3	2	2	19
Masovian	1	1	3	1	4	4	1	1	1	2	19
Opole	5	1	1	2	1	4	5	1	1	2	23
Subcarpathian	4	2	1	1	2	2	2	1	1	1	17
Podlaskie	3	5	1	1	3	1	1	5	3	3	26
Pomeranian	2	3	3	4	1	3	3	4	2	2	27
Silesian	4	1	1	1	1	5	1	2	3	1	20
Świętokrzyskie	3	1	1	1	1	3	1	3	1	1	16
Warmian-Masurian	1	3	1	2	3	2	1	3	2	4	22
Greater Poland	1	2	1	1	2	2	1	4	1	1	16
West Pomeranian	4	5	1	3	2	5	1	4	4	1	30

- high intensity (26-30 p.)
 - average intensity (21-25 p.)
 - low intensity (16-20 p.)

Source: author's own work.

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