Proceedings of the 2015 International Conference "ECONOMIC SCIENCE FOR RURAL DEVELOPMENT" No38
Jelgava, LLUESAF, 23-24 April 2015, pp. 14-23

NATURA 2000 SITES AND SOCIO-ECONOMIC DEVELOPMENT OF RURAL COMMUNES IN EASTERN POLAND

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Abstract. The paper is an attempt at a static analysis of the relationships between the level of socio-economic development of rural communes in the Eastern Poland and the Natura 2000 sites being established within their territories. In spite of public concerns about the emergence of such sites, the authors demonstrate the lack of strong adverse reaction between these variables. At the same time, they indicate that Natura 2000 is not a stimulant of socio-economic development either. The authors analysed the indicators as selected based on literature studies, which showed the level of development in the social, economic, and environmental aspects, of the year 2013, which in turn allowed the calculation of synthetic quantities on the basis thereof. This allowed the classification of 494 rural communes in one of the poorest regions of the European Union i.e. the Eastern Poland. On that basis, the authors investigated the relationship between the values obtained and the proportion of the area of Natura 2000 sites in the communes concerned. The study results indicated huge discrepancies in particular provinces of the region.

Key words: socio-economic development, rural communes, Natura 2000, economic effects

JELcode: O13, R12, Q56,

Introduction

In Poland, Natura 2000 sites have been being established since 2004 when Poland joined the European Union and became the integral part thereof. Consequently, a new form of environmental protection was established under the law, which has typically been situated in areas with a high forest ratio, small population, and on poorer soils as well as in the areas where both underdeveloped infrastructure and poorly developed entrepreneurship are found (Boltromiuk A., 2012). This is a typical characteristic of poor rural areas which primarily include the provinces of the Eastern Poland. At the time of Poland's accession to the European Union, it is the areas concerned that actually turned out to be the least developed ones on the

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national level. This was a determinant for the establishment of a specific supra-regional programme supporting socio-economic development for five provinces, namely Lubelskie, Podkarpackie, Podlaskie, Swietokrzyskie and Warminsko-Mazurskie – *Operational Programme Development of Eastern Poland (OP DEP).* Based on the Eurostat study of 2002, they were recognised as regions with the lowest GDP per capita in the European Union (Portal …, 2014).

The regions which were included in *OP DEP* are, at the same time, regions with the highest proportion of Natura 2000 sites in Poland. It should be noted, however, that the network concerned is not commonly regarded as an element of the policy of socio-economic development. For most local communities, this is another area covered byenvironmental protection policy, which restricts their free use of space, and is associated with a natural barrier to the development. It is to be noted that this is how the public frequently treats the areas of environmental protectionand that in numerous publications and documents at various levels these forms are thus called.Therefore, Natura 2000 is clearly perceived as a threat, and not as a chance or a challenge (Weber N., Christophersen T., 2002).

The establishment of Natura 2000 sites is most commonly associated with handicaps resulting from (Boltromiuk A., 2012):prolongation of the duration of project implementation, costs associated with an environmental impact assessment of projects, uncertainty over the obtaining of a building permit,the lack of guidelines specifying the permissible type and scope of business activity,restrictions on the performance and development of agricultural production,general misinformation,uncertainty over the existing regulations and specific restrictions associated with the functioning of a particularsite.

The concept of "development" is complex and multidimensional in nature. It is most frequently defined as a process of positive changes, including both the quantitative growth and the qualitative progress taking place in a particulararea, and relating to both the standard of living of the population and the conditions for the functioning of business operators (Parysek J.J., 2001; Potoczek A., 2003; Cieslak I., et al., 2013). Therefore, it can be concluded that the socio-economic development at the local level takes place on four levels: economic, social, political and environmental (Takamori H., Yamashita Sh., 1973; Potoczek A., Stepien J., 2008). All the distinguished levelsare not uniform, and their functioning is closely linked. These relationships contribute to the establishment of new, sustained development potential which is supposed to contribute to the more comprehensive meeting of the local community's needs, and to bring about no adverse effects in the surroundings (Szewczuk A., et al., 2011). An analysis of the level of socio-economic development allows the evolution of the concept and formulation of the strategy of an assessment of sustainable development – also on a global level (Vanags J., et al., 2012).

The basis for deliberations and analyses is a thesis that the socio-economic development of rural areas depends, *inter alia*, on the rate of occurrence of Natura 2000 sites within those territorial units. This relationship occurs with varying intensity in relation to heterogeneous spheres of the development, and, contrary to the common belief, it is a directly proportional

relationship. This means that the rate of occurrence of Natura 2000 sites may have a stimulating effect on certain spheres of the development of rural communes. This is proven by the fact that since the Poland's accession to the European Union, the problem areas in the East of the country have been developing despite the increase in the proportion of naturally valuable areas,as is the case for the areas not being included in the Natura 2000 network (Getzner M., Jungmeier M., 2002; Pawlewicz A., et al., 2011).Only in certain cases the indicators of socio-economic development are improving,because the local community takes advantages of the opportunities associated with protected areas, e.g. the establishment of environmentally-friendly agriculture such as organic farming being supported from the Rural Development Programme, or tourism.

The aim of the study is to conduct a static analysis of the relationships between the area of Natura 2000 sites and the level of socio-economic development of rural communes in the Eastern Poland. The developed analysis is based on three methods. Firstly, based on the collected date, the area under research was classified into five grades of the rate of proportion of Natura 2000 sites to the total area of a commune. Secondly, the authors determined a synthetic indicator of the level of socio-economic development of the communes. Finally, they specified an interdependence between the coverage of the area under research by the Natura 2000 network and the level of socio-economic development. In the following sections, the authors introduce the methodologies as applied in the drawing up of this study.

The area under research included provinces of the Eastern Poland, which are still perceived as problem areas, and are actually struggling with development problems in the socio-economic sphere. The basic subject of the study was a rural commune, the total number of which was 494. Rural communes, particularly in the Eastern Poland, are much poorer units with a low level of development. Relatively small areas of those units make them significantly more susceptible to either stimuli or obstacles to the development thereof.

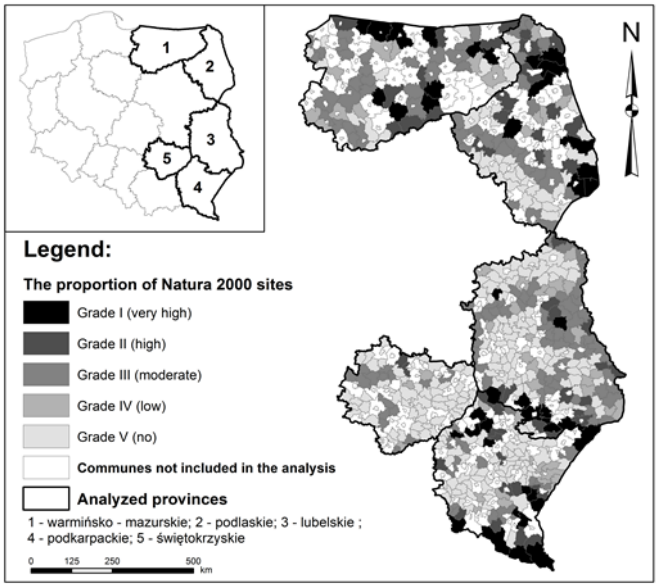
While proving the advanced thesis, the authors employed the basic methods for statistical analyses. These methods allowed the synthetic values representing the level of socio-economic development to be described, classified, and obtained. Moreover,the intensity of correlation of the phenomena being described was determined by the methods concerned.Tasks of the research are detailed in next chapter with results.

Research results and discussion

In order to achieve the set purpose, it was necessary to maintain the previously mentioned procedure. The first step was to determine the rate of coverage of the area of communes accepted for analysis by Natura 2000 sites. The said indicator was obtained while analysing data and using information collected within the framework of the *Partnership System of Economic Change Management within Natura 2000 Sites*. Based on the collected data, the authors classified the area under research, and distinguishedfive grades indicating the intensity of the phenomenon in a given area. The classification was conducted according to the following

principles (Wysocki, F., 2010):grade I – $(S_{Ni} \geq \overline{S_{Ni}} + s_{NS_i})$ –a very high degree of coverage of a commune by Natura 2000 sites;grade II – $(\overline{S_{Ni}} \leq S_{Ni} < \overline{S_{Ni}} + s_{NS_i})$ – a high degree of coverage of the commune by Natura 2000 sites;grade III – $(\overline{S_{Ni}} - s_{NS_i} \leq S_{Ni} < \overline{S_{Ni}})$ – a moderate degree of coverage of the commune by Natura 2000 sites;grade IV –$(S_{Ni} < \overline{S_{Ni}} - s_{NS_i})$– a low degree of coverage of the commune by Natura 2000 sites;grade V - no Natura 2000 sites are situated within the commune,where: S_{Ni}– indicator of coverage of the commune by Natura 2000 sites, $\overline{S_{Ni}}$ – arithmetic average of the coverage indicator S_{Ni}, s_{NS_i}– standard deviation of the coverage indicator S_{Ni}.

The obtained results of the classification are presented in the demonstrative map of the area under research (Figure 1).



Source: authors' calculations based on www.natura2000.efort.pl, Access: 20.09.2014

Fig. 1. **The proportion of Natura 2000 sites to the total area of rural communes in the Eastern Poland**

The next phase of the analysis was the determination of a synthetic indicator of the level of socio-economic development of communes based on the Central Statistical Office of Poland data. Complex phenomena, such as the socio-economic development, cannot be expressed using a single characteristic, or measured directly. They need to be characterised using a variety of variables (Caschili S. et al., 2014).

Examples of indicators which need to be indicated as those showing the situation in such spheres as environmental protection, health, and social income are cited in numerous publications and reports. However, the indication of a universal set of such indicators is not possible due to both the multitude thereof and the diversity of the purposes of the analyses being undertaken (Rutz D., Janssen R., 2014). The construction of a certain standard of the variables being applied may have a significant effect on the level of monitoring and formulation of a decision-making policy as part of the construction of, e.g. sustainable development. It has

also been emphasised by the European Commission which requires the Community institutions to draw up a list of such indicators (Pallemaerts M., Adelle C., 2009).

For the proper diagnosis of data, it is, thus, therefore necessary do develop synthetic indicators – especially, where the cited quantities are supposed to provide the image of the level of socio-economic development. Such an approach allows the replacement of the set of multiple explanatory variables with one synthetic variable, which allows the reduction in the number of variables, facilitates estimation, and, in certain cases, eliminates the possibility for obtaining the values of the assessment of parameters being incompatible with the direction of the impact of single explanatory variables on the response variable (Cieslak M., 2001).

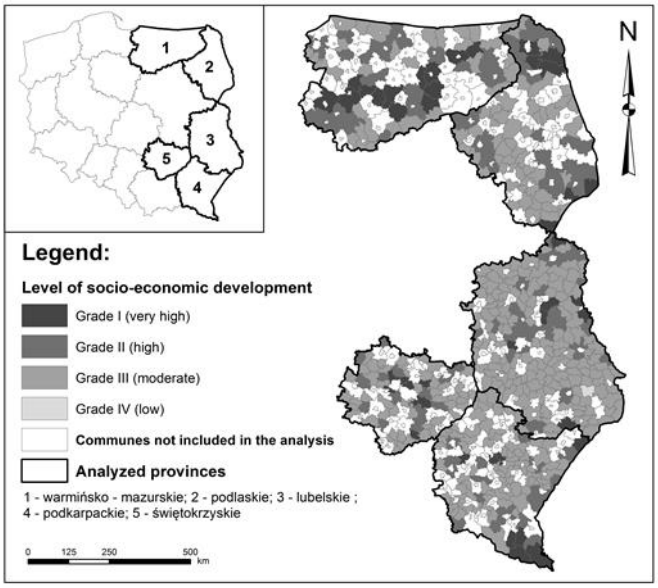
Among many different methods for the development of synthetic variables, which use the appropriately selected, the so-called diagnostic variables, one of the oldest and most frequently employed one is a method developed by professorHellwigZ. (1968), which was employed in this case.

Diagnostic variables are selected from a set of potential variables which characterise the phenomenon under research. In this case, diagnostic variables were the indicators characterising the socio-economic development of rural communes in the Eastern Poland. A substantive analysis of the available literature on the subject (Bossel H., 1999; Borys T., 2005; Korol J., 2007; Brodzinski Z., 2011) allowed the identification of a group of indicators belonging to spheres relating to demography, social welfare, habitation, activity in the labour market, environmental protection, communal finances, and tourism. Ultimately, 14 indicators were identified, which showed the level of socio-economic development of the communes under analysis: x_1– population density; x_2 – migration balance; x_3 – total expenditure on social security per capita; x_4– the usable floor space in new residential buildings; x_5 – the proportion of registered unemployed people to the population of working age; x_6 – the number of economic operators per 1000 inhabitants of working age; x_7– mixed waste collected during one year; x_8 – the proportion of population using the water supply system per the total number of inhabitants; x_9 – self-generated revenues of the local government per inhabitant; x_{10} – municipal investments per resident per 1 inhabitant; x_{11}– the number of collective accommodation facilities; x_{12}– tourism infrastructure saturation index (beds for tourists / km^2); x_{13}– indicator of the tourism function of a particularplace (beds for tourists / actual inhabitants); andx_{14} – indicator of the tourism intensity (number of tourists / actual inhabitants).

Diagnostic variables may bear different names, and that prevents them from being directly compared. It is therefore necessary to perform standardisation (elimination of the impact of measurement units), which will provide them with the name allowing comparability. In this case, the unification of variables was performed using the standardisation of variables according to the formula:

$$z_{ij} = \frac{(x_{ij} - \bar{x}_j)}{s_j},\ j = 1, 2, \dots, m), \qquad \text{where:} \quad \bar{x}_j = \frac{1}{n}\sum_{i=1}^{n} x_{ij,}\, s_j = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(x_{ij} - \bar{x}_j\right)^2},$$

The performed conversions resulted in obtaining a matrix of standardised values of characteristics, which was used to determine the so-called "development pattern". "Development pattern" is an abstract object P_0 (a rural commune) with the coordinates: $P_0 = [z_{01}, z_{02}, \dots, z_{0j}]$, where: z_{0j}= max$\{z_{ij}\}$, when $Z_j$is a stimulant, and z_{0j}= min$\{z_{ij}\}$, when $Z_j$is a destimulant.



Source: authors' calculations based on the Central Statistical Office of Poland, 2014

Fig. 2. **The classification of rural communes in the Eastern Poland according to the synthetic indicator of the level of socio-economic development**

It follows from the foregoing considerations that the "development pattern" is a hypothetical commune with the most favourable variable values. Then the authors calculated the Euclidean distances separatingeach object P_i under assessment (in this case, a rural commune) from the determined "development pattern":

$$q_i = \sqrt{\sum_{j=1}^{m} \left(z_{ij} - z_{0j}\right)^2}.$$

The obtained values q_i were used for the calculation of the value of Hellwig's synthetic measure of development, based on which the authors assessed the communes under research. The value of the indicator takes the following form:

$$S_i = 1 - \frac{q_i}{q_0} (i = 1, 2, \dots, n), \quad \text{where:} \quad q_0 = \bar{q}_0 + 2s_0, \qquad \bar{q}_0 = \frac{1}{n}\sum_{i=1}^{n} q_i, \qquad s_0 = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(q_i - \bar{q}_0)^2}.$$

Hellwig's synthetic measure of development S_i typically takes values from the range of (0.1). The closer the values of the measureare to 1, the higher is the level of development of the object under research. The closer a commune is to the "development pattern", the higher is the level of socio-economic development of the commune.

In the next step, the communes were classified in terms of the value of the measure calculated. The classification was performed while maintaining a principle being analogous to

the classification of the proportion of Natura 2000 sites to the total area of the communes under research. The analysis results are illustrated in Figure 2.

The final phase of the statistical analysis was the determination of the correlation between the independent value, i.e. the rate of coverage of the area under research by Natura 2000 network, and the dependent value, i.e. the level of socio-economic development, which was performed using*STATISTICA 10* software.

Conclusions, proposals, recommendations

Natura 2000 sites are situated within more than 50% of rural communes in the Eastern Poland. The rate of coverage of the units by the sites is significantly diversified, and ranges from 0 to as much as 100% of the coverage of the commune area. The division into grades is provided in Table 1.

Table 1

Rural communes in the Eastern Poland. The areas divided into grades of the rate of coverage of a commune by Natura 2000 network site

Specification	Grade I	Grade II	Grade III	Grade IV	Grade V	Total
	very high degree of coverage of a commune by Natura 2000 sites	high degree of coverage of the commune by Natura 2000 sites	moderate degree of coverage of the commune by Natura 2000 sites	low degree of coverage of the commune by Natura 2000 sites	no Natura 2000 sites are situated within the commune	
	% of coverage of a commune by Natura 2000 network site					
	100%-54%	53%-29%	28%-3%	below 3%	lack	
Rural communes in Eastern Poland	45 (9.2%)	50 (10.1%)	134 (27.1%)	48 (9.7%)	217 (43.9%)	494 (100%)

Source: authors' calculations based on www.natura2000.efort.pl, Access: 20.09.2014

When applying the Hellwig's synthetic measure of development, rural communes in the Eastern Poland were ranked in accordance with the level of socio-economic development, and divided into grades in accordance with the adopted procedure. The division into grades is provided in Table 2.

Table 2

Rural communes in the Eastern Poland. The areas divided into grades of the level of socio-economic development in accordance with the Hellwig's synthetic measure of development

Specification	Grade I	Grade II	Grade III	Grade IV	Total
	high level of socio-economic development	average level of socio-economic development	low level of socio-economic development	very low level of socio-economic development	
	(max-0.123>	(0.123-0.008>	(0.008-0.004>	(0.004-min)	
Rural communes in Eastern Poland	41 (8.3%)	109 (22.1%)	344 (69.6%)	0	494 (100%)

Source: authors' calculations based on the Central Statistical Office of Poland, 2014

The degree of development for communes in the Eastern Poland is quite homogeneous, and is at a low level. Based on the analysis conducted, it may be noticed that only over 8% of the communes under analysis are units with a high level of socio-economic development

(Grade I). In Warminsko-Mazurskie province, there are 13 of them, in Podkarpackie province 8, in Podlaskie and Swietokrzyskie provinces 7, and in Lubelskie province there are 6. The communes concerned stand out in comparison to other communes in the Eastern Poland with high indicators showing the tourism character of the area i.e. the rate of tourism intensity, tourism function of a place, and the saturation of tourism infrastructure as well as the large number of business operators functioning within a commune. It is also worth noting that out of 41 Grade I communes, only 7 do not have Natura 2000 sites in their resources. Approx. 22% of them are communes with a moderate development level (Grade II), and nearly 70% of the units under analysis are communes with a low development level (Grade III). Most communes with a low development level are situated in Lubelskie province (80% out of the total number of communes in the province). None of the communes under analysis was classified as a unit with a very low development level.

The major problems of communes with a low level of socio-economic development include low own revenues and investment expenditure, which were below the average as well as the occurrence of few business operators and a high migration index as well as deficiencies in the water supply networks. Most of the analysed Grade III communes were also characterised by low indicators showingthe tourism natureof the area. Here, the rate of coverage of a commune by Natura 2000 was very diversified as well, and ranged from 0 to as much as 100% of the coverage rate.

Having analyzed the relationship between variables, where the independent one was "*the proportion of Natura 2000 sites to the total area of the commune*", it may be concluded that the relationship is not strong. Generally, the correlation indicator in the Eastern Poland amounts to 0.28, with the significance level $p<0.5$ (Table 3). The presence and size of the surface of Natura 2000 site has an impact on the level of socio-economic development of those communes, although the impact is non-determining.

Table 3

The correlation coefficient for the proportion of Natura 2000 sites, and the synthetic indicator of socio-economic development for rural communes in the Eastern Poland

Arealscope	Eastern Poland	Province				
		Lubelskie	Podkarpackie	Podlaskie	Swietokrzyskie	Warminsko-Mazurskie
Number of cases	494	171	107	78	71	67
Significancelevel	$p < 0.05$					
Pearson product-moment correlation coefficient	0.28	0.16	0.24	0.47	0.05	0.25

Source: the authors' own work

Where, however, the coefficient is determined for each province individually, it will turn out that this relationship increases significantly for some of them. For Podlaskie province, it amounted to as much as 0.47. In these provinces, communes of grades of a very high proportion of Natura 2000 sites are also situated as well as these for which the authors demonstrated high indicators of tourism functions. These coefficients in provinces such as Podlaskie or Warminsko-Mazurskie are correlated with Natura 2000 sites. Having analysed

those results, the significance of these areas may only be determined in the areas with high quality of the natural environment, e.g. in a form of naturally valuable areas, or as part of tourism activities.

In conclusion, the rate of occurrence of Natura 2000 sites within the territorial units concerned does not currently have a significant impact on the socio-economic development of rural communes situated in the Eastern Poland. On the one hand, this is a conclusion which may mitigate social conflicts arising frequently due to the establishment of new areas being included in the network, and debunking the myth of development barrier as generated by the areas in question. On the other hand, this is a signal for the institution managing the network, which indicates the non-effective pro-environmental policy promoting the establishment of Natura 2000 sites, which do not actually translate into the development of areas within which the areas concerned are being established, and a sort of an incentive generating the favour of the local community with the protection of naturally valuable areas.

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