

EVALUATION OF SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF THE ENVIRONMENTAL ORDER IN RURAL AREAS

**M. Witkowska – Dąbrowska, A. Napiórkowska – Baryła,
De Jesus Ilisio Manuel**

University of Warmia and Mazury in Olsztyn, Faculty of Economics,
Department of Spatial and Environmental Economics,
Oczapowskiego 4, 10-957 Olsztyn

(Поступила в редакцию 11.06.2015г.)

Summary. *The purpose of this study has been to assess the progress on rural areas with respect to the access to linear infrastructure which contributes to the environment conservation. The study covered rural areas in Poland. The time span was 2002-2012. Indicators and indices were calculated from the gathered data to characterize the sustainability of development with respect to the natural environment. Distinct proportions were noted in the share of population with access to linear infrastructure, especially sewers and gas pipelines, between towns and the countryside. A steady progress in the accessibility to linear infrastructure in rural areas has been noticed, although in many cases the rate of advance decreased in the consecutive years.*

Introduction. The concept of sustainable development has arisen from the notion of eco-development, which – according to common knowledge – originated in 1969, when the report ‘Man and His Environment’ signed by the United Nations Secretary-General U Thant was published. The idea of eco-development, which in the early 1970s was associated with the problems of underdeveloped countries, has grown into the concept of sustainable development, seen as a distinguishing mark of advanced civilizations and high responsibility of whole societies. Thus, the concept of sustainable development can be perceived as a complex outcome of various ideas, including the growth of the Third World, actions undertaken to counteract the depletion of natural resources and attempts to feed the human population. In 1973, a further stimulus was incidentally given by oil exporters from Arabic countries who tried to blackmail the Western states, which drew attention to alternative sources of energy (Gudowski 2009).

In line with the first principle of the Stockholm Declaration of 1972, people are entitled to freedom, equality and life in proper environmental conditions, which will enable them to live in dignity and welfare. This right is granted to present and future generations, which is why national governments are obliged to safeguard the natural environment. In 1975, during the Third Session of the Governing Council of the United Nations Environment Programme, the delegates agreed that a society which pursued the idea of eco-development was

the one which admitted the superiority of certain ecological requirements that should not be violated by the growth of a civilization, culture or economy, which in turn should be able to self-control their development in order to maintain homeostasis and symbiosis with nature; in other words, a sustainable society should promote economical production and consumption as well as waste recycling, and ought to be attentive to the future consequences of its actions, that is of the needs and health of future generations (*Protection...*1984). In 1983, The General Assembly of the United Nations adopted another definition of sustainable development, which was later included in the document titled 'Our Common Future' (1987), and which declared that a sustainable development was 'the development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Gudowski 2009). The current definition of sustainable development was confirmed during the Earth Summit in Rio de Janeiro in 1992. It states that sustainable development is 'a strategy encompassing ecological, social, technical and technological as well as organisational transformations whose aim is to reach a rational and permanent level of social well-being, transferable to future generations and not posing any threat to natural resources and ecosystems'.² The Polish Law states that sustainable development is such a social and economic development which integrates political, economic and social actions while maintaining the environmental balance, for the sake of ensuring that individual communities and citizens of both present and future generations are able to satisfy their demands'.³ The legal definition in Poland clearly stems from the definitions proposed by the UN conferences.

An essential moment in the implementation of the sustainable development concept in Poland was the incorporation of this concept in the Constitution.⁴ The accession of Poland to the European Union in 2004 put an additional obligation on the national legislators to account for the idea of sustainable growth in the Polish legal regulations. Thus, one of the principal aims of the European Union is to achieve the social and economic cohesion of the member countries and to balance the levels of development (convergence). The easternmost regions of the EU are in a very specific situation in that they lie at the crossroads of influences of the western states and Russia. Moreover, they are characterised by a low level of development and poor competitiveness.

¹ Final documents of the UN Conference 'The Environment and development' in Rio de Janeiro, Instytut Ochrony Środowiska, Warszawa 1993

² Act of 27 April 2001, the Law on the Environment Protection (Dz.U. 2001 no 62, item 627)

³ Constitution of the Polish Republic of 2 April 1997 (Dz.U. 1997 no 78 item 483)

These are the characteristics typical of peripheral regions. It has been documented empirically that the eastern borderlands of the EU experience two concurrent processes: convergence and divergence. The former process occurs within the whole European Community, as a result of which the economic lag of the countries situated in the EU eastern outskirts is decreasing. The rate of change, however, varies from country to country. At the same time, inter-regional differences within individual countries grow larger (Kosiedowski 2009). Such differences occur not only between administrative districts but also between urbanised and non-urbanised areas or between the countryside and towns. Considerable changes in the rural areas in Poland are a function of numerous economic, social, political and cultural processes. They are also related to environmental conditions and increasingly stringent environmental regulations. A certain role is also played by the location-specific characteristics of each village against a broader regional, national or even transnational backdrop. Such versatile effects influencing the countryside result in substantial differences in the level of development between individual villages. The sustainable development of rural areas has long been restricted to the question of urbanisation. Today, three basic directions in the development are mentioned: betterment of the living standard of rural populations, including their access to infrastructure, creating jobs outside farming in villages, and stimulating the activity of rural populations (Hefner 2009). The tenth anniversary of Poland's presence in the European Community seems to be a good moment for the first assessments of its sustainable development. The basic instruments for such assessments are indices and one of the basic methods is to apply them to measure development in three orders: environmental, economic and social ones (Witkowska-Dąbrowska, Napiórkowska-Baryła 2014).

Research methods. The research objective was to make an assessment of the sustainable development of rural areas in the context of environmental order. The study covered rural areas in different parts of Poland, which – according to the Polish taxonomy – are all areas outside administrative borders of towns. To improve our assessment, the results were compared with analogous data achieved for towns. The time span was 2002-2012. The source of data was the Local Data bank of the Main Statistical Office (GUS) in Poland. The indices listed underneath were selected for our analysis. They identify the sustainable development and characterise environmental order, including the aspect of linear infrastructure which helps to protect the natural environment.

- share of the population with access to the linear infrastructure protecting the natural environment: sewers, waterworks and gas pipelines (%),
- ratio of waterworks per 100 km² to the total length of sewers per 100 km² (km),

- the rate of change in the length of waterworks over 100 km² to the length of seweres over 100 km²(km),
- dynamics of change (%) in the development linear infrastructure protecting the natural environment available to rural populations (a chain base index).

The results were presented in the graphic (tables and figures) and descriptive forms.

Results. Until the 1990s, Poland had been among the most severely polluted European countries. Industrialisation and urbanisation of the country had been implemented with little respect to the environment protection and conservation. Social or economic considerations had taken precedence over ecology. A prospect of Poland joining the European Union gave an impulse to a more sustainable development. The provisions of the Accession Treaty imposed some serious obligations on Poland, with the general aim of the Republic of Poland abiding all environmental standards in the EU member states after 2015. This difficult task was financially supported by the EU funds, first under the ISPA programme, and later by the Cohesion Fund, under the Strategy for the Cohesion Fund Use in 2004-2006, and by the European Regional Development Fund under the Integrated Programme of the Regional Development Operational Programme and the Sectoral Operational Programme ‘Competitiveness and Entrepreneurship’, as well as the European Orientation and Agricultural Guarantee Fund under the Plan for the Development of Rural Areas in 2004-2006, and the Sectoral Operational Programme ‘Restructuring and Modernisation of the Food Sector and Rural Development in 2004-2006’. Since 2004, environmental projects have also been co-financed from the Financial Mechanism of the European Economic Area and the Norwegian Financial Mechanism. In the 2007-2013 period, investments serving environmental protection were most often supported by the Operational Programme ‘Infrastructure and Environment’. Under that programme, 4.84 million euro from the Cohesion Fund and from the European Regional Development Fund were allocated to environmental projects. An additional source of co-funding was the financial means from the European Regional Development Fund under the framework of 16 Regional Operational Programmes. Large sums of money were also expended from the Programme of the Development of Rural Areas in 2007-2013 and from the Operational Programme ‘Sustainable Development of Fisheries and Coastal Areas’ (The state’s 2006). Many of the above funds were dedicated to the co-financing of eco-friendly infrastructure in the countryside. Whereas differences in the quantity and quality of infrastructure between rural (non-urbanised) areas and urban (urbanised) areas were understandable, having resolved to meet the EU requirements, it was necessary to develop environment protecting infrastructure mainly in rural areas, where the needs were the greatest. The gravest problems

regarding the natural environment protection occur in the field of sewage management and control of the impact of wastewater and sewage on surface and groundwaters; another difficult area is the air pollution with the so-called low emission. Poland will also find it difficult to achieve the resolutions contained in the Accession Treaty concerning the protection of surface waters. Although our country has made a large progress in this subject over the past twenty years, the the European Union standards are high and require an output of nearly 60 billion Polish zloty until 2015. To this year, all larger localities are to have modern and highly efficient wastewater treatment plants, connected to broadly developed systems of sewers. The accomplishment of this task will largely contribute to the achievement of the goals set in the mentioned Baltic Action Plan, under the Convention done in Helsinki on 9 April 1992, on the protection of the marine habitats in the Baltic Sea (Journal of Law of 2000, No 28, item 346) (HELCOM Convention). This is definitely a major task, both because of its scale and the costs, compared to other priorities in the environmental protection policy until 2016 (The state's...2006). The ongoing National Programme of Municipal Sewage Treatment, started in late 2003, is mostly concerned with the construction of wastewater treatment plants in selected agglomerations whose size is over 2000 population equivalent (PE (RLM))⁴⁵ and in areas with unique natural values. The planned development of wastewater treatment infrastructure in rural areas, with greatly scattered farmsteads and houses, as well as in recreational areas will require specially designed solutions providing comparable levels of wastewater treatment and separate action plans with supporting funds. Therefore, it is essential to develop networks of sewers not only in centres but also around them, that is in rural areas. Wherever building a network is not feasible because of the dispersed pattern of location of farmsteads, home sewage treatment plants should be installed.

For the natural environment, it is important to control air pollution. Over the past thirty years, Poland has made a huge progress reducing the emission of dusts and gases to the atmosphere, but compared to the whole European Community it is still responsible for substantial air contamination. The main reason is that coal combustion provides 95% of electricity and 80% of heat in Poland. Under the Accession Treaty as well as the Directive 2001/81/EC of the Europe-

⁴ RLM – population equivalent – a parameter serving to identify the capacity of an installation for sewage and wastewater treatment. It allows one to determine the ratio of sewage and wastewater discharged from service and industrial facilities to the oxygen demand of microorganisms in the treatment process of wastewater generated daily in a typical, one-man household.

an Parliament and Council, of 23 October 2001, on emission of some airborne pollutants, Poland is obliged to reduce substantially the emission of SO₂, NO_x, NH₃ and volatile organic compounds (The state's...2006).

Moreover, changes in the functions played by adjacent rural areas due to the intensive growth of towns, development of transport and communal infrastructure as well as some intensive agricultural production technologies aggravate conflicts between sustaining the space's ecological cohesion versus the social and economic development (The Concept...2011).

The environmental order is one of the three orders of sustainable development distinguished in literature (*Indices...*2005), the other two being economic and social orders. The environmental order encompasses problems of environment protection related to the use of natural resources, emission of pollutants and nature conservation. Today, the environmental order is mentioned among the prerequisites to attaining an adequate quality of life by present and future generations, resulting from sustainable development.

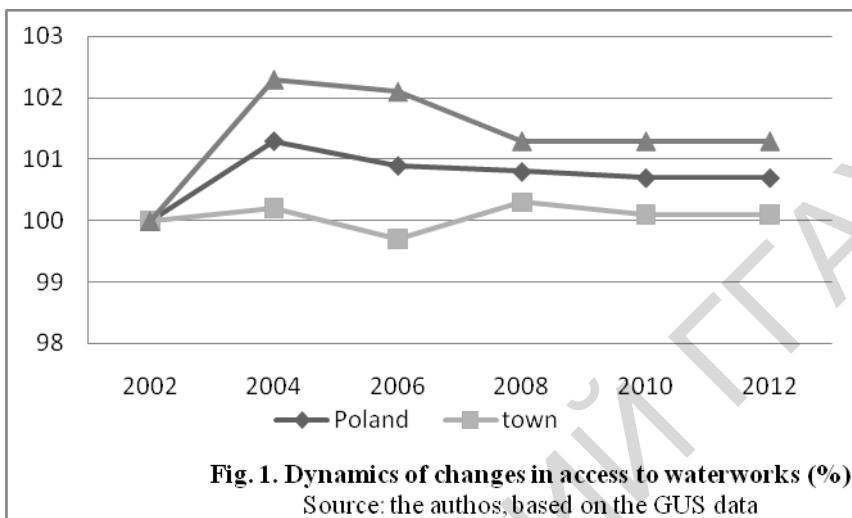
During the ten years covered by our study, the percentage of populations having access to the water supply network increased in all the analysed areas. The difference between towns and villages reached about 20%, being nearly invariable in the consecutive years (tab. 1).

Tabela 1 – Share of population with access to waterworks (%)

Area	Years					
	2002	2004	2006	2008	2010	2012
Town	94.2	94.4	94.9	95.2	95.3	95.4
Village	69.7	71.3	72.8	74.2	75.2	76.2
Total	82.0	81.4	83.9	84.7	85.3	85.8

Source: the authors, based on data from the Main Statistical Office (in Polish, GUS)

Although the share of people with access to tap water increased, the dynamics of this change tended to slow down year after year. This decrease was halted in 2008, after which changes were slightly above 100% compared to the preceding year. The highest dynamics was observed in rural areas, which indicates that changes were the most intensive in villages (fig. 1).



The share of population with access to a sewage system, similar to the above case of waterworks, increased in all areas during the examined period of time. However, there were evident disproportions between villages and towns, reaching about 60%, which was significantly more than in the case of waterworks (tab. 2).

Tabela 2 – Share of populations with access to a sewage system (%)

Area	Years					
	2002	2004	2006	2008	2010	2012
Town	83.1	84.0	84.8	85.0	86.1	87.0
Village	14.2	17.3	20.2	22.5	24.8	29.4
Total	48.6	50.7	52.5	53.8	55.5	58.2

Source: the authors, based on data from the Main Statistical Office (in Polish, GUS)

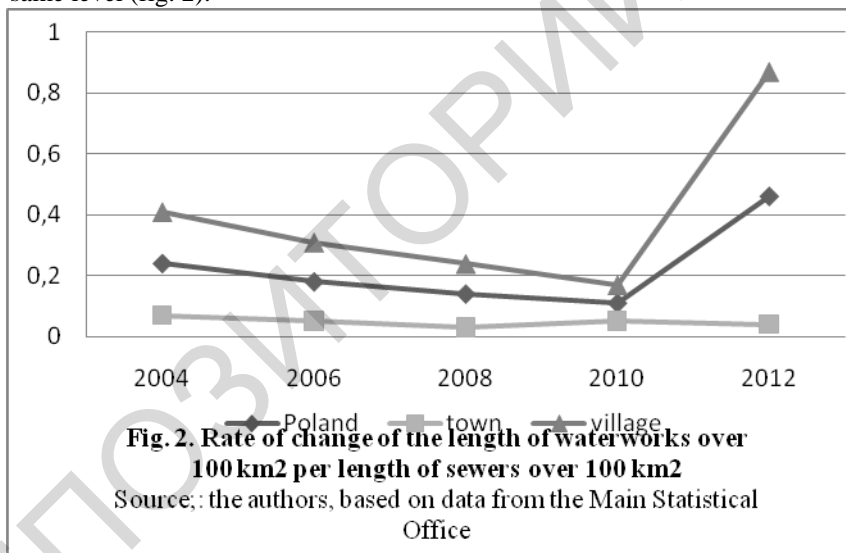
For the protection of nature, it is important to know the ratio of the length of waterworks and sewage systems. With practically all households provided tap water, the amount of generated wastewater and sewage increases. An inadequate access to a sewage system means a limited access to wastewater treatment plants. The length of water distribution pipelines over 100 km² to the length of sewers over 100 km² (km) implicates a shortage. Nevertheless, the ratio of the length of waterworks to sewage systems was observed to have decreased during the ten years submitted to analysis. However, it remained several-fold larger in villages than in towns (tab. 3).

Table 3 Length of waterworks over 100 km² per length of sewers over 100 km² (km)

Area	Years					
	2002	2004	2006	2008	2010	2012
Town	1.37	1.30	1.25	1.22	1.17	1.13
Village	7.52	5.72	4.86	4.35	3.81	3.15
Total	4.45	3.51	3.06	2.79	2.49	2.14

Source: the authors, based on data from the Main Statistical Office (in Polish, GUS)

The rate of change with respect to the ratio of waterworks versus sewers was assessed by a range test, i.e. the difference in the lengths between the consecutive years. The initially rapid rate of change decreased year after year, with a slow decrease persisting until 2010. Afterwards, the rate of change in vilages reached an unprecedented value. At the same time, in towns it remained on the same level (fig. 2).



The above is supported by the results on the dynamics of changes in the access to sewers. Based on the available data, chain indices were calculated, with consecutive years taken as the base. Although the percentage of a population with access to sewage systems increased over the years, the dynamics of change decreased until 2010, after which it started to rise. The highest dynamics was noted in rural areas (fig. 3).

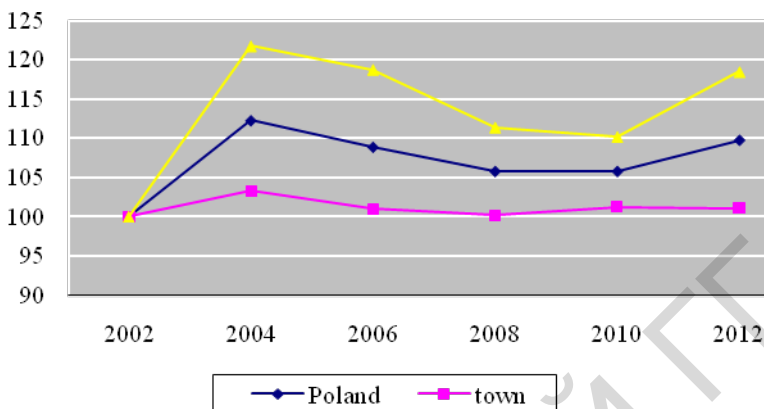


Fig. 3. Dynamics of access to the sewage system (%)

Source: the authors, based on data from the main Statistical Office

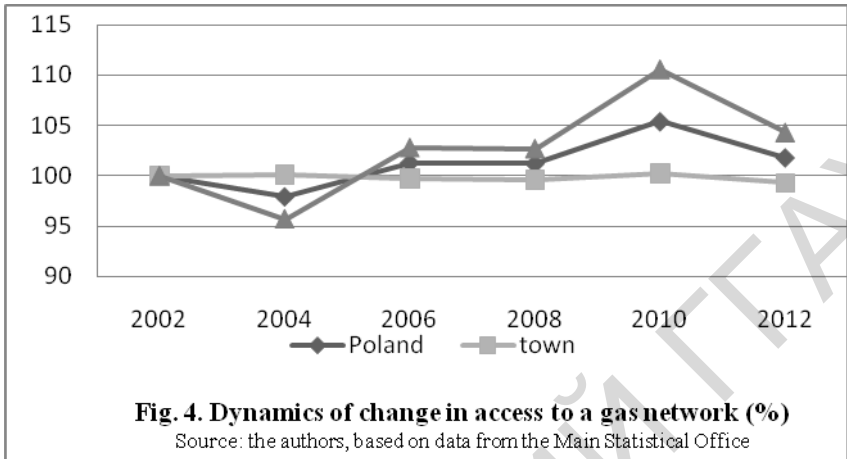
The lowest percentage of the population with access to linear infrastructure was determined in the case of gas pipelines. The tendency was unstable in towns. In contrast, the said percentage grew steadily in villages. The difference in the accessibility to gas pipelines between towns and villages was significant, reaching about 50% in whole Poland. In general, the percentage of households with access to a gas supply system did not exceed 50% (tab. 4).

Table 4 – share of population with access to a gas network (%)

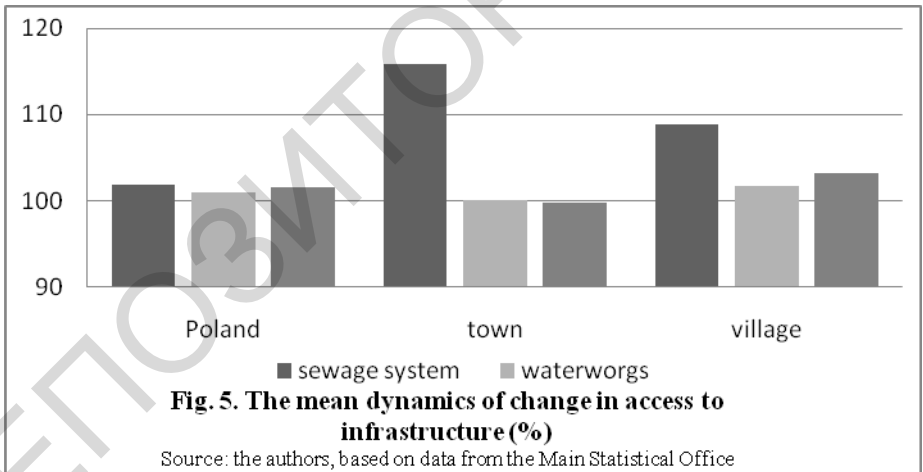
Area	Years					
	2002	2004	2006	2008	2010	2012
Town	73.1	73.2	73.0	72.7	72.9	72.4
Village	18.6	17.8	18.3	18.8	20.8	21.7
Total	45.9	45.5	45.7	45.8	46.9	47.1

Source: the authors, based on data from the Main Statistical Office (in Polish, GUS)

This instability of this process is confirmed by our analysis of the dynamics of change. While the development of waterworks and sewers seems to be a stabilized process, the construction of gas pipelines shows highly varied dynamics. In towns, the change oscillates around 100% versus the preceding year, and remains on a stable level. In villages, however, the percentage of a population with access to gas pipelines fell by 5% in 2004 relative to the year 2002. However, in the subsequent years, a successive growth was observed, up to 2010. Between 2010 and 2012, the dynamics fell by about 7% (fig. 4).



The mean dynamics of change in the percentage of populations using the environment protecting infrastructure was the highest in the case of sewage systems. However, the highest mean dynamics of change was achieved in towns (fig. 5).



The dynamics of change in the share of people using waterworks remained on a similar level in all the analysed areas, thus indicating that it was the most stabilized one.

During the analysed years, the percentage of people with access to all the three types of linear infrastructure in the analysed areas of Poland increased.

However, disproportions in the shares of populations using linear infrastructure facilities in villages and in towns remain quite large. Noteworthy is the fact that the most stable is the accessibility to waterworks. In vilages, the percentage of residents dwelling in households connected to waterworks is about 80%, being close to that recorded in towns. The most distinctly felt was the gap in the access to gas networks in towns and vilages. However, this parameter was characterized by the highest dynamics of change. The biggest increase in the share of rural populations with access to the environment protecting linear infrastructure was noted with respect to sewage systems. However, a mere 30% of rural populations live in houses connected to sewers, in contrast to 90% of town residents. This means that the ratio of the lengths of waterworks to sewers continues to be poor, despite a steady improvement year after year.

REFERENCES

1. Gudowski J. 2009. Ignacy Sachs as a precursor of the concept of sustainable development. (In:) Ed. Kielczewski D., From the Concept of Ecodevelopment to Economy of Sustianable Development. WSE Publishing House in Białystok, s.12-19 (in polish).
2. Hefner K. 2009. Evolution of the differentiation in the social and economic development. (In:) Ed. Michałowski K., Influence of the Concept of Sustainable Development on the Policy of a State and Regions. Vol. 2. Regional and Local Problems. WSE in Białystok, s. 99-107 (in polish).
3. Kosiedowski. W. 2009. Disproportions in the development in the eastern borderland of the European Union. (In:) Ed. Poskrobko B., Influence of the Concept of Sustainable Development on the Policy of a State and Regions. Vol. 1. State and Sectoral Problems. WSE in Białystok s. 64-75 (in polish).
4. The Concept of the State's Spatial Management 2030.2011. Committe for the Spatial Management of the State. The Polish Ministry of Infrastructure and Development s. 24-39(in polish).
5. Protection of the man's environment – a humanistic view of the world.1984.(In:) Prace Naukowe Polskiego Klubu Ekologicznego,t1,Kraków (in polish).
6. The state's ecological policy in 2009-2012 with an outlook until 2016.The Polish Ministry of the Environment. Warszawa 2006,s.4-25 (in polish).
7. Witkowska-Dąbrowska M., Napiórkowska-Baryła A. 2014. Protection of the environment versus innovations. Wyd. Expol. Włocławek, s. 38-48 (in polish).
8. Indices of sustainable development. 2005. Ed. T. Borys. Wyd. Ekonomia i Środowisko. Warszawa – Białystok, s. 247-335 (in polish).