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ENVIRONMENTAL CONDITIONS AS A DRIVING FORCE OF REGIONAL DEVELOPMENT IN POLAND

MAREK DEGÓRSKI

Introduction

In the perception of numerous social groups environment has been, and still often is, seen as a little important part of the socio-economic system, whose management is frequently in conflict with regional development, both in spatial and in purely economic terms. The economic benefits resulting from the management of the environment are seen only in the exploitation of natural resources, which are traditionally treated to be the original source of economic growth. Over centuries, exploitation and processing of these resources constituted the foundations for the economic development of nations, for the economic and political strategies, as well as for the theories of economic growth, and this with doubtless success. Obviously, the man-environment relations, based uniquely on the policy of exploitation of natural resources, started to have negative consequences for people. New, unprecedented in geographical space, extreme phenomena and processes emerged, having contributed in the last decades of the 20th century to the deeper reflection of men on their relations with respect to the environment, and, consequently, to the new projections of directions for the development of civilization.

During the 1970s the criticism of the socio-economic development patterns to date started to amplify. Limits to growth became an explicit subject of consideration (*Meadows* et al. 1973), in connection with the "zero growth" or "organic growth" concepts (*Mesarovic–Pestel*, 1977), which ultimately led to the idea of sustainable development (WCED, 1987). In the same period, as well, a new vision was defined of the functioning of people in the environment, referred to as the socio-ecological system (SES), understood to be constituted by the intimately linked and mutually interacting two components: the natural and the human resources (*Holling*, 1973). In this concept, environment is assigned not only the economic functions, but also the social (related to health, recreation, culture, education, etc.) and the ecological ones (buffering, regulation of the matter and energy cycles, etc.). It was noted that when looking at the environment only in the perspective of acquisition of goods, human kind destroys itself, or at least worsens the qualities of its living conditions.

It was noted, at the same time, that implementation of principles of sustainable development and optimization of use of the resources extracted from the natural

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environment may constitute a very important factor of economic development. Such activities lead, in particular, to appearance of new investment projects, frequently supported with external sources, to establishment of new jobs, to development of technical infrastructure, etc. They also produce very significant social effects, since they develop in the societies the awareness of individual responsibility for the common good, constituted by the natural environment.

The purpose of the present paper is to assess the influence exerted by the solutions related to environmental management, which are conforming to the principles of sustainable development, on the system of the socio-economic environment. The analysis of these relations on the example of Poland, and determination how in the years 2000–2005 investments into protection of the most valuable resources of the environment and into the improvement of their quality contributed to economic and social activation of the regions, especially those encompassed by the assistance from the European Union in the frameworks of the Cohesion Fund and the Competitiveness Programme, financed out of the European Regional Development Fund (ERDF). The paper aims also at the determination of the interdependence between the increase of the investment outlays into environmental protection and the improvement of economic attractiveness of the areas encompassed by the pro-ecological activity.

Multi-functionality of the natural environment and the socio-economic system

In contemporary world, with the growing pro-ecological consciousness of the societies of many countries, especially the highly developed ones, the role of the natural environment, as an integral part of the mega-system of geographical environment, which encompasses the socio-economic and the natural systems, being mutually the subject and the surrounding of the respective systems, is being increasingly recognised (*Degórski*, 2005). The multi-functionality of the natural environment, and, in particular, its role in formation of the human quality of life, is noted. Given the fact that the respective functions are not only of generally natural and ecological (non-economic) character, but display also the socio-economic aspect (*Łaguna*, 2004; *Łaguna–Witkowska-Dąbrowska*, 2005), including, in particular, the support from the natural and mineral resources, absorption of pollutant emissions and waste accumulation, or habitat and landscape properties for human relaxation (*Figure 1*), they are increasingly perceived as the elements of development of individual regions, countries, etc.

This kind of approach causes that the improvement of the living standards of the population is seen no longer only in the perspective of the economic and social

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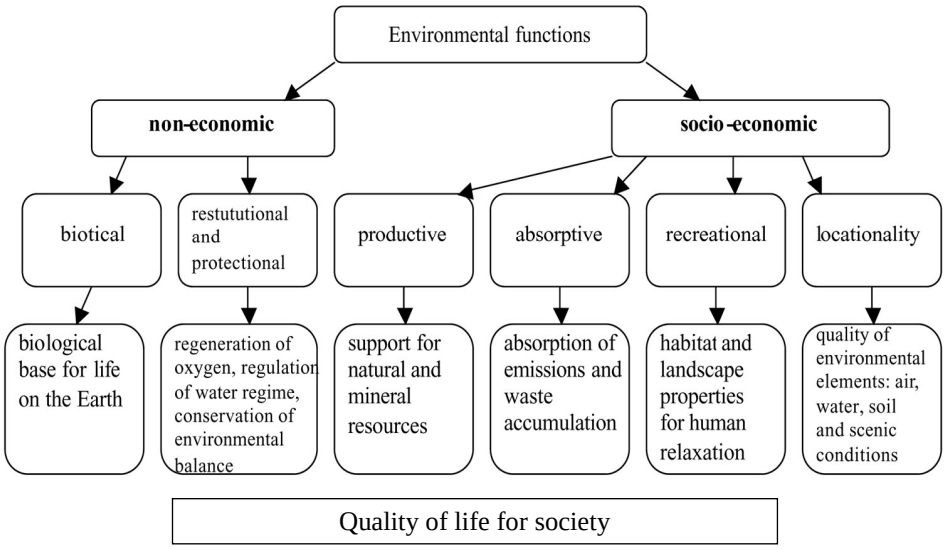
development, but also of the care for the natural environmental resources, as expressed through the optimisation of use and management of their potential. This is implemented with the use of the concept of sustainable development, this implementation requiring a number of logistic and economic activities. These activities are very often, in turn, an activating factor for the economic development of given country, since they require new investment projects, enabling production of the pro-ecological equipment, construction or modernisation of infrastructure associated with sewage and waste-water economy, solid waste management, or application of new solutions in power generation or transport. Hence, these activities constitute the stimuli for such sectors of economy as construction, trade, transport and service.

Figure 1

Environmental functions



Source: Own elaboration.

The need for such activities and their cost intensity is best seen in those countries, where the delay in the introduction of principles of sustainable development is especially serious. A striking example in this sense is provided by the countries of the Central and Eastern Europe, which, prior to accession, had been characterised by a very liberal policy with respect to the care for the quality of the natural environment, particularly with respect to minimisation of the negative effects of the human impact on the functioning of the natural system. It was only the inclusion of

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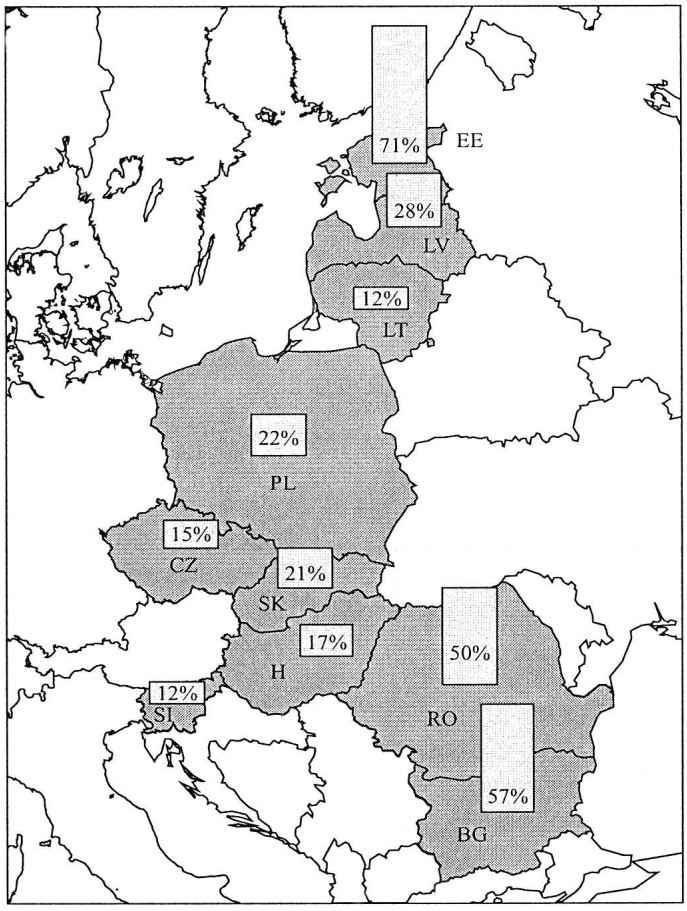
these countries into the European structures that forced upon them the adoption of the regulations valid for the members of the European Union, including the regulations related to environmental protection. Investment funds, judged to be absolutely essential for the implementation of the *environmental acquis*, expressed in the share of the respective GDPs, ranged in 2003 from close to 12% in Lithuania and Slovenia to 71% in Estonia (*Figure 2*).

Figure 2

Investment found absolutely essential for the implementation of environmental acquis in GDP 2003



Source: According to Łaguna, 2004, modified by the author.

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In addition, these activities require constant monitoring, which, on the one hand, includes the controlling functions with respect to the principles of realisation of the obligations, adopted by the state, resulting from the environmental acquis, while, on the other hand, is subject itself to the audit, including the module of the evaluation indicators used (*Borys*, 2005). The correctly and properly conducted monitoring activities, yielding an increasingly good recognition of the processes and phenomena, taking place in the system of geographical environment, aid also in the development of the environmental-social concepts, and, in particular, in construction of the economic-ecological models.

Economic-ecological models

The concept of the socio-ecological system is still undergoing verification, and continuing studies are carried out on the flexibility of the system with respect to external factors (*Carpenter* et al., 2005) and determination of the directions of action, meant to optimise the use and protection of natural environmental resources (Barrenda and Georgantzis, 2000), as well as generation of development of the multifunctional landscape (*Degórski,* 2003). Socio-ecological models are being developed (*Nijkamp,* 1987; *Domański,* 2004), linking technical and procedural solutions having been applied for years in the single-discipline models (ecological and economic), internalizing the mutual relations between the economic and natural processes, taking place in the environment.

The primary method of model integration is selection and linkage of the single-discipline models for the purpose of construction of multiple-discipline models. Another approach to the development of the integrated models consists in holistic modelling. Instead of linking the detailed models into the increasingly complex formulas, in the holistic models efforts are made to construct one model, encompassing the respective whole. The ecological-economic constructs are becoming more and more numerous and spread out, forming an important branch of modelling, to which, in particular, application-oriented implementation of the sustainable development concept essentially contributed. Among the most frequently applied models one should mention input-output, extended, environmental quality and energy policy models.

Input-output models

Input-output models, being effective tools for describing regions and regional systems, used before for determining flows between branches, nowadays account for the input-output coefficients expressing the flows of goods between the economy and the natural environment, that is – between the economic system and the ecological system. One of the basic objectives of application of these models is to

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determine the optimum solutions in the raw material economy. This concerns both the models of material intensity of the economy, representing the interrelations between the increase of the GDP and the TMR (total material requirement), and the ones showing the load on the particular environmental resources related to production of definite income.

Yet at the end of the last century in the world economy the growth of the GDP of numerous countries was slower than the increase of volume of raw materials used to generate it. In the countries of the European Union such a state of affairs lasted until the middle of 1980s. It is only since then that a clear slowdown took place of demand for mineral resources, while the GDP of the EU member states has continued to grow (*Bringezu–Schütz*, 2001).

Side by side with the TMR indicator, applied in the input-output models, a very important measure, used in optimization of the relation of costs to benefits, in terms of the flow of goods between the economy and the natural environment, that is – between the economic system and the ecological system, is the volume of the particular goods of nature necessary to produce a definite level of the GDP. Such a yardstick is constituted, for instance, by the water capacity used to generate 1,000 USD of GDP. It can be used to determine the differentiation of the volume of water resources, needed to produce the value of 1,000 USD of the GDP in various regions or countries. Thus, for instance, in the countries of the EU the range of values of this indicator is of one order of magnitude. The lowest value is observed in The Netherlands, while the highest – in Spain. In Poland this value is at about 18 cubic meters (*Figure 3*).

Energy policy models

These models are applied mainly for optimising or simulating the functioning of the entire power system of a region, from extraction of energy resources or use of energy sources, through the technological process of energy production and distribution, down to the economic

Consequences for the development of supply and demand, and the impact of the processes of energy production on the environment. As noted by R. Domański (2006), embodied energy may constitute a common denominator for the ecological and economic formulas.

Similarly as in the input-output models, in the energy policy models, energy consumption is considered, often in relation to cost intensity of its production, and in comparisons with the increase of the GDP. Attention started to be particularly paid to the consumption of energy after the energy crisis of the 1970s, when, on the one hand, the problem of exhaustion of the non-renewable energy resources, coupled with the unlimited increase of prices, became realistic, and on the other hand – the negative impact of burning the energy carriers on the quality of natural environment was defined and scientifically demonstrated. Hence, the use of energy

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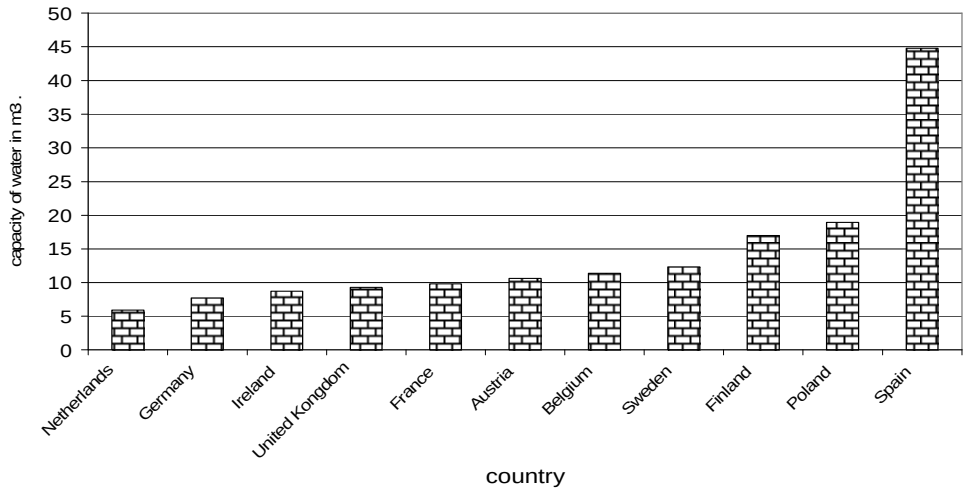
resources started to be optimised, and the rate of increase of energy consumption in relation to the increase of the GDP started to be decreased. Thus, for instance, in the EU 15 countries in the years 1995–2001 the GDP increased by roughly 17%, and at the same time energy consumption increased by 5%, while in the years preceding this period the growth of energy consumption was higher than that of the GDP (Environmental Signals, 2004). Yet, the energy intensity of the economies of the new EU members differs from that of the old EU members. The lowest energy intensity indicator, expressed as TOE/GDP, is noted for Denmark (at around 100). It should be emphasised that the average value of this indicator for the old EU countries is around 200. In comparison – for Poland it equals 460, and for all the ten new member countries the average is higher than 700 (European Energy, 2004).

Figure 3

Water capacity used for the generate of 1000 USD GDP



Source: Own elaboration.

Environmental quality management models

Environmental quality management models are containing, side by side with the ecological and economic components, also the modules of the objective functions, made use of mainly in the situation of multiplicity of goals that are formulated within the concepts of development of an area. These models are also used for purposes of valuation of space with respect to the location attractiveness, especially for housing construction and the development of the residential areas (*Łaguna–Witkowska-Dąbrowska,* 2005). Valuation, expressed through the value of the ecological value of fixed property (V_{EFP}):

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$$V_{EFP} = \frac{P_1m_1 + P_2m_2 + \ldots..}{\sum P}$$

Is performed on the basis of the point scores corresponding to the land use forms (m), determined for the area of land (P). For example, the following point scores are used for the particular categories of land cover: old forest – 10 points, pasture – 4 points, arable land – 1 point. Then, on the basis of adopted intervals for the value of sum of scores, the degree of ecological value is determined, related to the characteristics of the land use forms (very small, small, medium, good, etc.).

Extended models

The so-called extended models, that is, the economic ones with an ecological component, are constructed for the purpose of assessing the economic consequences of the environmental policies, and in particular – the effects of reduction of environmental pollution. In their theoretical prerequisites these models refer to the state of general spatial equilibrium, which results from the equilibrium between the subjects such as producers and consumers, having at their disposal, in particular, the environmental resources, production means, etc. Based on the concepts of Walrus and Pareto (*McClure,* 2001), they are being still developed (*Hicks,* 1975, 1979), with one of examples constituted by the models of optimization of air protection costs (*Łaguna,* 2004). Such models, based, for instance, on the relations between the maximum acceptable cost of pollution reduction (MAC) and the maximum acceptable social cost (MSC) allow for the determination and then implementation of the technical solutions, meant to both reduce pollution and to decrease the related social costs.

Investment outlays associated with the improvement of human life quality, through the improvement of the sanitary state of the environment, represent nowadays one of the most rapidly developing segments of the economy, especially so in the countries, where highly significant delays in this domain still exist. This applies also to Poland, where ample potential room for investments remains in existence in this domain. One of the segments in question is sewage and wastewater economy, and, in particular, the investment projects linked with the construction and expansion of the sewage systems and water treatment plants. Despite an important progress in this field, the value of the potentially needed investment projects is estimated at the level of tens of billions of Euro.

The investment projects to date, linked with construction of sewage systems and water treatment plants, have been realised primarily in towns. The number of water treatment plants, serving towns, increased in the years 1990–2003 from 566 to 955. During this period 344 wastewater treatment (WWT) plants were built featuring enhanced effectiveness of water purification, that is – with improved removal of biogens. The situation regarding the development of the sewage systems and con-

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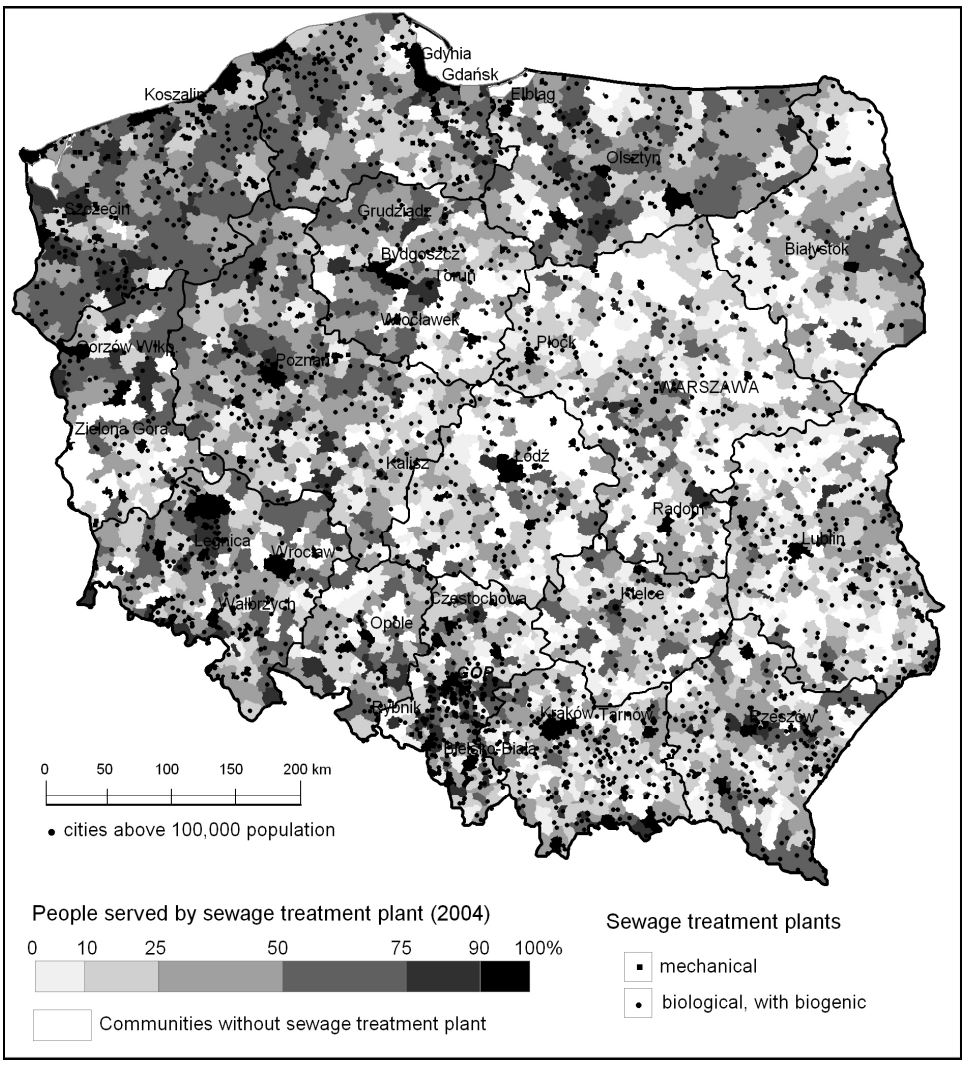
struction of the WWT plants is much worse within the rural areas, where only 16.5% of the inhabitants are served by the WWT plants (compared to 84.2% for towns). The lowest shares of the inhabitants, serviced by the WWT plants occur in the central and eastern parts of the country (*Figure 4*).

Figure 4

People served by sewage treatment plant in Poland



Source: According to Węcławowicz et al. 2006.

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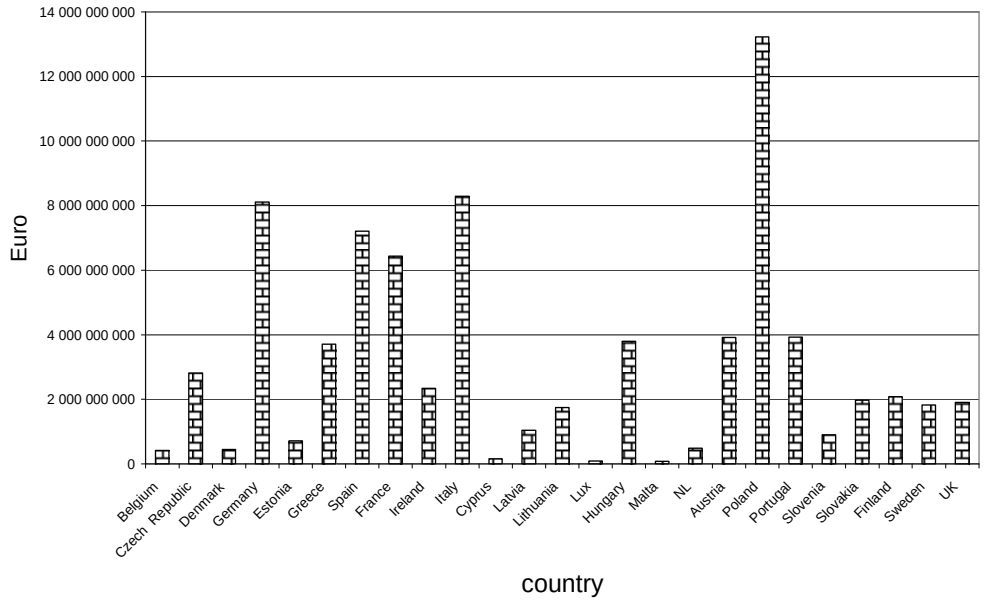
An instrument, which can be made use of for the purposes of improving quality of life on the rural areas through realisation of pro-ecological investment projects or programs of protection of the most valuable fragments of the environment, is constituted by the Agricultural Funds, especially on the areas characterised by an intensive farming economy (*Meyer*, 2005). European Commission planned the funding of such programs for rural areas in 2007–2013 at the level of 77.66 billion €, with additional 10.23 billion € meant for Bulgaria and Romania.

The largest beneficiary of the means, directed by the European Commission for the development of rural areas (77,66 billion euro), will be Poland, whose share will amount to more than 13 billion € (*Figure 5*), which constitutes more than 17% of all the EU means devoted to the development of rural areas (*Figure 6*). A part of these means will be directed to realization of the so-called agricultural-environmental programs, whose task it is to optimise the functioning of the natural environment on rural areas. The more particular examples include, inter alias, the implementation of the Ramsar Convention on Wetlands (United Kingdom), development of wind energy (Scotland), development of agro-environmental schemes (Austria), or NATURA 2000 wildlife habitat protection programme (Germany, Poland).

Figure 5

Rural funding shares conform by European Commission for 2007–2013



Source: Own elaboration.

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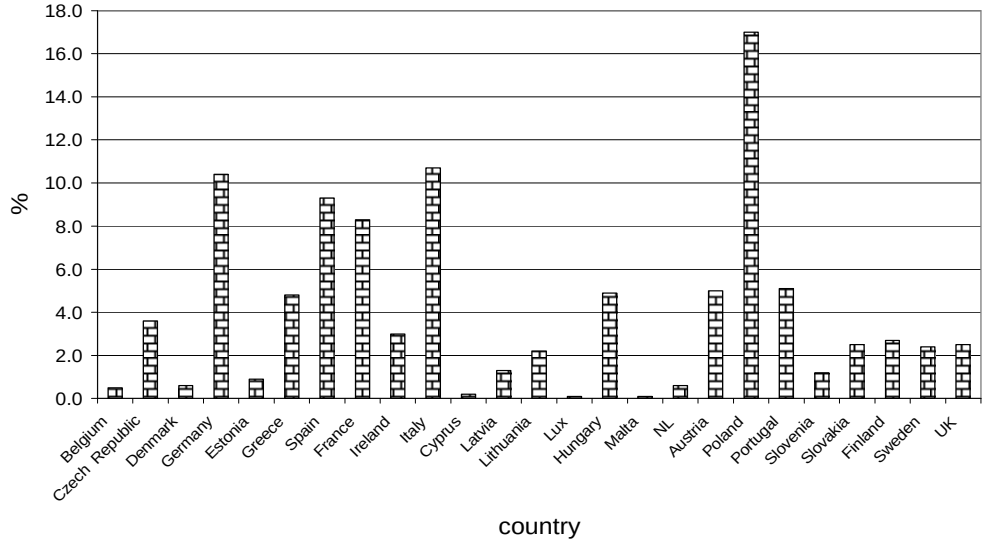
Figure 6

The percentage participation of each states in EU rural funding for 2007–2013



Source: Own elaboration.

Cohesion through competitiveness

One of the instruments, enabling verification and application of ecological-economic models, is constituted by the operational actions, implementing the multiple option results from the ecological-economic models. The cost of optimisation of the social development with the use of natural resources and the economic basis is covered most often from own means of a given country, although it is increasingly often supported from the international funds, which results from the increase of awareness of many societies that the openness of the system of natural environment precludes any boundaries, and that it is the common good shared by all the citizens of the globe. In case of the new EU member countries such a role is played by the Cohesion Fund and the Competitiveness Programs, financed from the European Regional Development Fund (ERDF). It is owing to the support from these sources that the investments made into protection of the most valuable environmental resources and improvement of their quality, contributed to economic and social activation of the respective regions. Oftentimes, regions, according to the principles of competitiveness, try to achieve increasingly good effects of implementation of the

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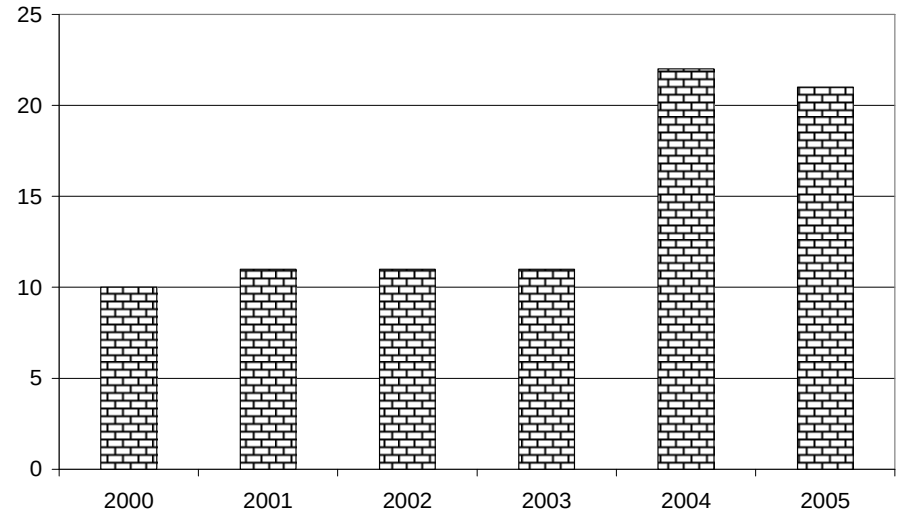
sustainable development precepts and to attain better environmental conditions for social development.

Poland, being a country having taken advantage of the EU assistance funds already during preparation for accession, gained an even broader access to the EU means after having joined the European structures. The number of projects increased (*Figure 7*), along with the outlays into their realisation, including the proportion of the contribution from the regional development funds (*Figure 8*). In the years 2000–2005 altogether 86 projects were implemented in Poland, with joint outlays on them equal 4.49 billion €. Poland obtained from the means of the so-called Cohesion Fund of the EU 2.83 billion €. Unit value of individual projects was significantly differentiated. The project with the highest value of means directed to its realisation was the third stage of water supply and treatment system in Warsaw – 405.54 million €, funded by the Cohesion Fund of the EU in 248.06 million EU.

Figure 7

Number of project supported by Cohesion Fund of the EU



Source: Own elaboration.

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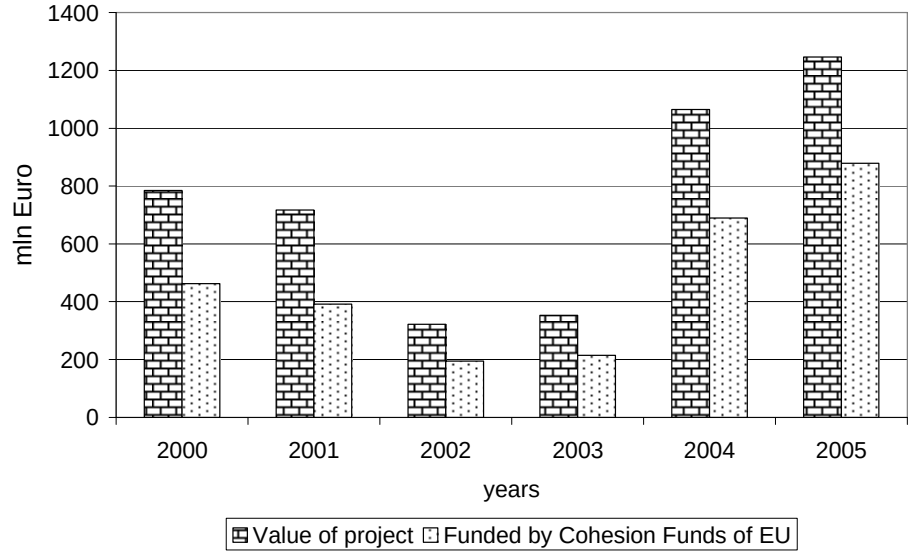
Figure 8

Total value of the regional development projects realized in Poland, including the proportion of the contribution from the Cohesion Funds of EU



Source: Own elaboration.

Conclusion

In the contemporary world natural environment constitutes a very important element of the entire geographical mega-system, and its qualities and resources are an economically measurable element of the economy, which is often the driving force of regional development. Hence, using the assets of nature in the policies of regional development is highly promising for the future, in view of the directions of development of the economies of numerous countries, referring to the concept of sustainable development.

On the basis of the results presented it can therefore be stated that:

- environment is playing a very important role in socio-economic development
- the economic-ecological models are very useful for estimation of sustainable development on local and regional levels
- cohesion through competitiveness is a very important instrument in regional development.

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