

Lewandowski, Piotr; Zydlik, Piotr

## Article

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Economic and Environmental Studies (E&ES)

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*Suggested Citation:* Lewandowski, Piotr; Zydlik, Piotr (2016) : The use of eco-development programs for the assessment of environmental changes and the effectiveness of pro-ecological actions of local government administration at municipal level, Economic and Environmental Studies (E&ES), ISSN 2081-8319, Opole University, Faculty of Economics, Opole, Vol. 16, Iss. 2, pp. 303-317

This Version is available at:

<https://hdl.handle.net/10419/178918>

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# The use of eco-development programs for the assessment of environmental changes and the effectiveness of pro-ecological actions of local government administration at municipal level

**Piotr LEWANDOWSKI and Piotr ZYDLIK**  
**Poznań University of Life Sciences, Poland**

**Abstract:** An analysis of environmental protection in 30 selected municipalities of the Greater Poland Province was performed. Municipal eco-development programmes developed in the years 1998-2013 were used for this purpose. Their analysis made it possible to conclude that the conditions of the environment have improved significantly in the area under analysis. The quality of air and surface waters has been improving, the length of the sewerage networks has been growing and the number of modernized or newly commissioned municipal sewage treatment plants. Among employees of local government administration the role and importance of ecological education has been growing significantly. It is still necessary to undertake greater efforts towards elimination of household coal-fired systems in municipalities and a rational municipal waste management policy. Among pro-ecological purposes to be achieved in eco-development programs, water and sewage management tasks, as well as preparation or updates of planning documents, including environmental inventories and valuation, are quite common.

**Keywords:** sustainable development, municipal local government administration, pro-ecological investments, ecological education

**JEL codes:** Q01, Q56, Q58

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*Correspondence Address:* Piotr Lewandowski, Piotr Zydlik, Department of Land Improvement, Environmental Development and Geodesy, Department of Horticulture and Landscape Architecture, Poznań University of Life Science, ul. Wojska Polskiego 28, 60-637 Poznań, Tel.: (61)848 – 64-95, (61)848-79-09. Fax: (61)848-79-12. E-mail: piotrlw@up.poznan.pl, piotriw@up.poznan.pl.

## 1. Introduction

In Poland, municipal local government units prepare a range of planning documents. These include the sustainable development program (or, in other words, an eco-development program). Despite numerous discussions, no unambiguous definition of this term has been established (Borys, 1999). There are approximately 150 definitions of sustainable development. This is usually defined as a way of conducting business activity, shaping and using the environmental potential and of organizing social life which would ensure dynamic development of qualitatively new manufacturing processes, sustainable use of environmental resources and improvement and retention of high standards of living of current and future generations. Eco-development is sometimes defined as unconventional or alternative development (Borys, 2014). It is also understood as a direction of interdisciplinary scientific research including studies on relations between the society, economy and environment systems (Poskrobko, 1997; Leśniewski, 2013).

The duty of preparing eco-development programs results from the provision of the Global Action Program (Agenda 2) developed in 1992 at the international UN conference “Environment and development” held in Rio de Janeiro (Miklaszewski, 2000). Agenda 21 is a strategic and planning document prepared at the lowest level of local government administration. It contains over 2 thousand guidelines concerning the implementation of eco-development principles (Instytut Ochrony Środowiska, 1993; Kozłowski, 2000; Giordano, 2005).

To meet the expectations of municipal local governments, numerous methodological materials have been devised which are helpful in the preparation of eco-development programs (Kachniarz and Korzeń, 1998; Krukowska-Szopa and Ruszlewicz, 1998; Kistowski et al., 1999; Kronenberg and Bergier, 2010; Leśniewski, 2013). There have been publications containing various models for the implementation of such programs (Ilnicki, 1996; Kozłowski, 1999a, 1999b). The progressing decentralization of the state enhances the rights but also responsibilities of local governments. Therefore, documents such as sustainable development strategies (which are interchangeably called programs) are becoming more and more important for their proper functioning (Giordano, 2005). At present, the preparation of a sustainable development strategy in the Polish legal system is voluntary. However, it is difficult to draw up good legally required developmental programs and plans without it (Poskrobko and Poskrobko, 2012).

In Poland, the principles of sustainable development have been legally established both in the Constitution of the Republic of Poland and in legal acts as well as in long-term strategic

documents. The former include the Environmental Protection Law (Ustawa, 27.04.2001) and the latter - the Long-Term Strategy of Sustainable Development - Poland 2025 (Council of Ministers, 2000). Pursuant to Article 5 of the Polish Constitution is the following statement; “The Republic of Poland shall safeguard the national heritage and shall ensure the protection of the natural environment pursuant to the principles of sustainable development.” According to the Environmental Protection Law, sustainable development is social and economic development which involves integration of political, economic and social actions, keeping the natural balance and sustainability of basic natural processes to guarantee the satisfaction of basic needs of individual communities or citizens both from present and future generations (Ustawa, 27.04.2001).

Eco-development programs consist of three basic elements: diagnosis of the current condition of the municipality, SWOT analysis which enables determination of the development vision and defining the most important objectives and tasks to be performed. Next, methods of task implementation are formulated, including identification of their priorities and funding sources and schedules of their execution (Krukowska-Szopa and Ruszlewicz, 1998). A program should end with a description of implementation of pro-ecological tasks, identification of entities responsible for their implementation and the expected methods of assessing the effectiveness of implementation of tasks. It should be emphasized that sustainable development planning may use various models (natural, economic, natural and social ones as well as their variants) (Kozłowski, 2000; Giordano, 2005), while the creation of models does not need to be always based on SWOT analysis. These can also be expert and social methods (Giordano, 2005).

This study was aimed at assessing the dynamics of environmental changes in selected municipalities of the Greater Poland Province on the basis of analysis of municipal eco-development programs.

## **2. Methodological assumptions**

The assessment of environmental changes over a period of over 10 years in thirty municipalities of the Wielkopolska Province (13.3% of the total number in the province) was based on the analysis of municipal eco-development programs prepared by environmental protection students at the University of Life Sciences in Poznań in the years 1998 - 2013. The prepared programs consisted

of three elements: a diagnosis of the current condition of the environment in the municipality, preparation of SWOT analysis and establishment of a vision of its development with the specification of the most important objectives and tasks to be performed in addition to funding sources and schedule for their performance. Sustainable development programs were prepared twice for each municipality analysed in this study in two periods of time from 1998 to 2004 and from 2008 to 2013.

Analysis of environmental changes occurring in the municipalities under analysis included the assessment of the following aspects: air quality, water and sewage management, municipal waste management (including waste sorting), contaminated soil reclamation and changes in environmental protection on the basis of the number and surface area of protected sites. Amongst other things, the analysis took into account the number of plants which are particularly harmful to air, the amount of backyard burning, the number of sewage treatment plants and landfills, progress in the elimination of storage sites and the surface area of contaminated land intended for reclamation and the surface area of reclaimed land. National parks and Natura 2000 sites were not included in the analysis of natural forms occurring in the municipality. The number of the former has not changed for the former since 1990 and recent changes in the boundaries of the Greater Poland National Park were introduced in 1996. Such an analysis would not have been justified for Natura 2000 sites which began to be established in Poland in 2004. Moreover, in accordance with the Environmental Protection Act, the municipal local administration does not have an actual influence on the creation of Natural 2000 sites. Based on eco-development programs, also the numbers and the thematic scope of pro-environmental tasks selected for implementation by municipal local government administration in the nearest future.

### **3. Results and discussion**

The analysis of the prepared eco-development programs indicates that local government administration took various actions for the environment in the municipalities under analysis. Progress has been made, amongst other things, in the improvement of air quality. This was possible thanks to a reduced number of plants constituting environmental nuisance, emitting gaseous pollutants and dust into the air (table 1). The number of such plants has been reduced in every second of the analysed municipalities. Such a tendency towards improvement in air quality in

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Greater Poland communes is similar to the national tendency. In Poland, emissions of dust from particularly burdensome plants were reduced from 1164 thousand tons in 1995 to 52.4 thousand tons in 2013 (Central Statistical Office of Poland, 2014).

**Table 1. Environmental changes in Wielkopolska communities in the years 1998 – 2013**

Environmental elements	Analysed parameters	Number of communities showing:			The parameter was not analysed
		Improve ment	Falling-off	No changes	
Air	Number of environmental nuisance plants	15	7	6	2
	Household coal-fired systems	8	6	10	6
Surface waters	Quality of surface water	12	10	8	0
Water and sewage management	Waterworks networks	15	1	10	4
	Sewerage networks	20	2	5	3
	Sewage treatment plants	18	5	7	0
	Limitation of sewage discharge	6	3	8	13
Quality of soil	Degree of contamination	5	7	16	2
	Reclamation treatment of contaminated soli	12	1	8	9
Municipal waste treatment	Landfills	11	4	15	0
	Management carrion	12	1	5	12
	Municipal waste sorting	17	4	4	5
	Elimination of storage sites	7	1	13	9

Source: Author's own elaboration based on eco-development programs

Less noticeable effects were achieved in the elimination of household coal-fired systems. There were no changes in every third commune in this area and only in eight municipalities there was a decrease in the number of household coal-fired systems. The use of such boilers is a national problem. They are largely responsible for suspended dust (PM 10) and bezo(a)pyrene emissions. In 2012, household coal-fired systems released over 200 thousand tons of dust in Poland, i.e. more than other sources of pollution such as industrial power companies, industrial technologies and mobile sources (Central Statistical Office of Poland, 2014).

The quality of surface waters improved in 12 out of 30 analysed municipalities (approx. 40 of the total number) (table 1). The length of sewerage networks increased gradually (approximately

70% of the municipalities) together with the number of newly built or modernized sewage treatment plants (approx. 60% of municipalities). Similar tendencies are also observed at national level. In 2013, the number of sewage treatment plants in Poland increased by 80 new facilities as compared to the previous year and the amount of untreated sewage released into water over the past several years decreased by 57% (Central Statistical Office of Poland, 2014). The sewerage network in Poland in 2013 was 7 thousand kilometers longer when compared to the one from the previous year (a 6% increase) (Central Statistical Office of Poland, 2014). Water and sewage management plants are priority investment tasks not only in Wielkopolska Province but also in the entire country. In 2014, expenditures on fixed capital formation aimed at improving water conditions and quality constituted 44% of all expenditures, while expenditures on air and climate protection did not exceed 32% (Central Statistical Office of Poland, 2015).

The obligation to improve surface water quality results from the provisions of the National Urban Wastewater Treatment Program (KPOŚK) and its subsequent four updates (Ministry of Environment, 2003). Its development results from the provisions of the so-called Sewage-Sludge Directive (European Union, 1991). KPOŚK imposes an obligation on local government units to take action to improve the quality of surface water by, amongst other things, construction and modernization of urban sewage treatment plants and limitation of sewage discharge into water (Kłos, 2013). Despite considerable outlays on the implementation of tasks from the water and sewage area, there is still a lot to be done. This is illustrated by the fact that the quality of surface water actually deteriorated in 10 out of the 30 municipalities of Wielkopolska under analysis and in 8 of them, no improvement was observed (table 1).

In 2013, over 11 million tons of municipal waste was produced in Poland – 7% less than in the previous year (Central Statistical Office of Poland, 2014). Landfilling is the predominant method of handling such waste in Poland. In 2013, 63% of the total amount of waste collected was neutralized in this way (Central Statistical Office of Poland, 2014). Landfilling prevents waste from being used, it causes potentially large hazards both for air and ground and water environment (Rosik- Dulewska, 2010). To improve waste management, based on the Waste Framework Directive (EU) (European Union, 2008) and national regulations, i.e. initially the Act on Waste (Ustawa, 14.12.2012), and then the Act on Maintaining Cleanliness and Order in Municipalities, which was amended in 2011 (Ustawa, 13.12.1996), further versions of National Waste Management Plans were developed in Poland (Council of Ministers, 2010).

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In the years 1998-2013, new landfills were constructed or the existing landfills were modernized in every third of the analysed Wielkopolska municipalities. No other actions were taken in this area in as many as a half of the analysed municipalities (table 1). Considerable progress was made by the municipal local government administrations in municipal waste sorting. Such actions took place in over 50% of the analysed municipalities (table 1). In the whole country, the amount of selectively collected municipal waste in 2013 increased by around 27% when compared to 2012. This results from implementing strict legal requirements as regards waste management. The EU law and the resulting national law forbids the storage of unsorted municipal waste in landfills.

Relatively small changes occurred in municipalities as regards storage sites of expired crop protection products. Due to the properties of such products and the usually unsatisfactory technical condition of such storage sites, they are a very big hazard for the ground and water environment (Ignatowicz, 2008; Biziuk, 2009; Wołkowicz, 2010). No actions were taken to eliminate such sites in 13 municipalities. This can result from the fact that this process is organizationally difficult and very expensive; it also results from the existing national achievements in this area. In accordance with the assumptions of the National Waste Management Program (Council of Ministers, 2010), such storage sites should have been eliminated by 2010. This process started in Poland in 1999 and at the end of 2008 there were still around 90 crop protection product storage sites in 11 provinces (Ministry of Environment, 2009). In Wielkopolska Province, the process of eliminating 26 such facilities started in 2002 and it ended in 2009. In 2010, only one crop protection product storage site remained in Wielkopolska Province (Philips Lighting Poland SA in Piła), which was not included in the program due to the type of the stored waste (broken glass with mercury and post-neutralization sediments) situated in the Szydłowo Municipality in the Piła District (Pułyk, 2011). It should be emphasized the Szydłowo Municipality was not included in this study as the eco-development plan was not prepared for it twice.

Contaminated soil requires reclamation treatment which would allow restoration of its productive capacity. In the years 1998-2013, the surface area of reclaimed soils was increased by nearly a half of analysed municipalities (12 out of 30) and a reverse tendency was observed in only one municipality (table 1). This is a significant success, considering that contaminated soils with a

surface area over 25% lower than in 2012 were reclaimed all over the country in 2013 (Central Statistical Office of Poland, 2014).

Environmental protection involves maintaining sustainable use and renewal of resources, formations and components of nature (Ustawa, 16.04.2004). Among forms of protection provided by law, the following forms of protection do not occur in the communes under analysis: landscape parks (14 municipalities), nature reserves (15 municipalities), protected landscape areas (15 municipalities) and ecological utilities (16 municipalities). The greatest dynamics in terms of environmental protection in the municipalities occur in natural monuments. Their number has increased in 21 municipalities (table 2). One of the reasons behind this situation could be the fact that, according to the provisions of the environmental protection act, legislative units of the municipal local administration, i.e. municipal councils, are entitled to establish natural monuments. It can also be assumed that natural monuments are a point-based form of nature conservation which is the easiest to accept at local government level. Changes in the surface areas or numbers of other forms of environmental protection were quite small. The number or surface area of protected landscape areas and ecological utilities grew to its minimum degree (in 3 municipalities in each). It should be added that the establishment of the latter form of a protected area also belongs to the competences of the municipal council.

**Table 2. Nature protection in some Wielkopolska communities in the years 1998-2013**

Form of nature protection	Number of communities showing:			
	Improveme nt	Falling-off	No changes	No forms of protection
Landscape parks	4	0	12	14
Natural monuments	21	5	4	0
Nature reserves	5	0	10	15
Protected landscape areas	3	0	12	15
Landscape-Nature Protected Complex	4	2	11	13
Ecological utilities	3	3	8	16

Source: Author's own elaboration based on eco-development programs

Natural inventory allows for the assessment of biodiversity of an area, to catalogue all protected sites and ones which may deserve protection in the municipality (Giordano, 2005; Pawlaczyk and Jermaczek, 2008). It should deliver ordered information about the nature in the municipality and show it a coherent natural and landscape space and show changes occurring in

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nature (Leśniewski, 2013). Valuation makes it possible to assess the natural value of existing natural resources (Pawlaczyk and Jermaczek, 2008). Apart from describing the existing status, it should include tasks as regards both protection of areas and sites of great natural value, assessment of the potential, capacity and quality of areas which are not under a special form of protection, estimation of changes occurring in eco-systems as well as recommendations concerning directions for business activity and urbanization. Preparation of such documents is a time-consuming and expensive task. This can probably explain the fact that the majority of municipalities did not prepare or update the natural inventory (23 out of 34 municipalities) or valuation (26 out of 34 municipalities) (table 3).

**Table 3. Natural inventory and valuation in some Wielkopolska communities in the years 1998-2013**

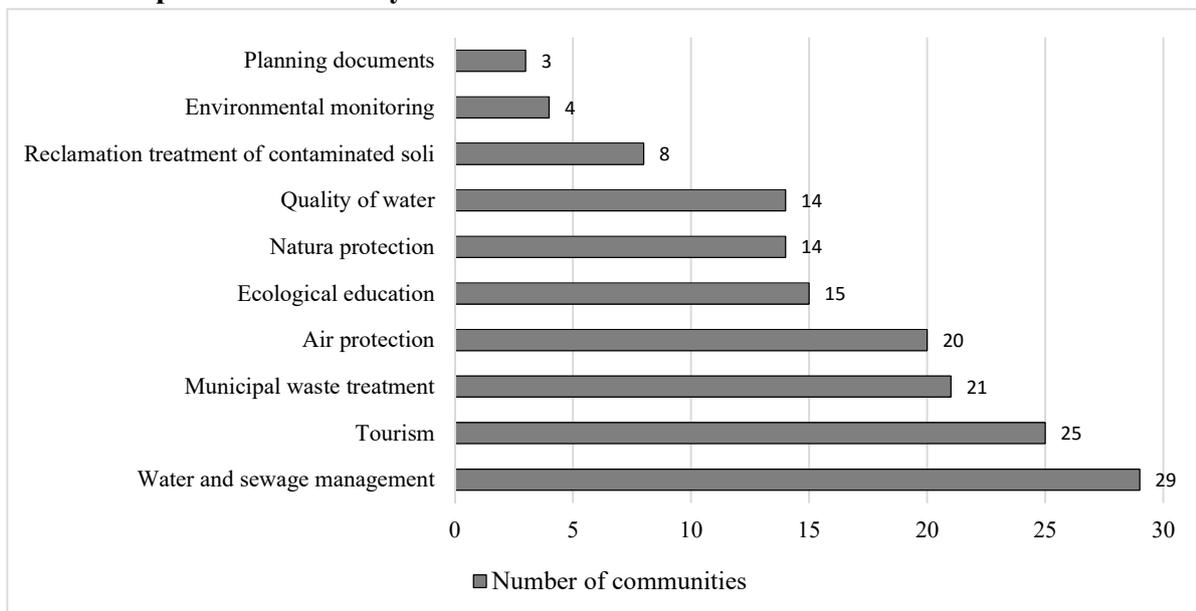
Kind of documents	Number of communities showing:			
	Improvement	Falling-off	No changes	The parameter was not analysed
Natural inventory	6	23	0	1
Natural valuation	3	26	0	1

Source: Author`s own elaboration based on eco-development programs

The basic element of an eco-development program is the selection of tasks to be performed by local government administration with specification of the timeliness of their performance (priorities) and potential sources of their funding. Figures 1 and 2 present a summary of pro-environmental tasks included in eco-development programs selected for implementation by the municipal local government administration. On this basis, analysis of the changes in such tasks was performed between the first stage of the study (the years of 1998-2004) and after several years. In both periods, the most important tasks to be performed mostly involved water and sewage management. For nearly 100% of the analysed municipalities (29 out of 30 communes), the construction of new water and sewage networks or sewage treatment plants or modernization of existing ones was a priority task to be performed. It is a consequence of the neglected status of water and sewage management in Poland which results from the lack of investment in this area during previous decades. A considerable increase in the interest in ecological education should be considered a positive trend. In the first analysed period, it was listed among priority tasks to be

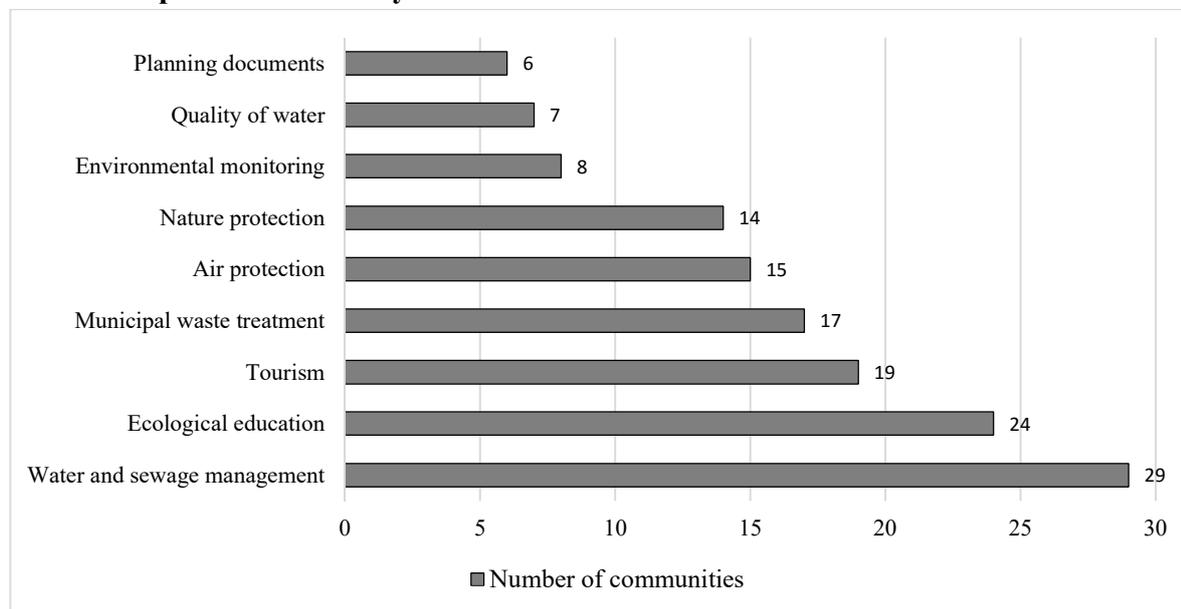
performed in every second municipality and in the second period the number of such municipalities increased to 24 (figures 1 and 2). The importance of ecological education could increase as a result of expenditures on pre-environmental actions which were incurred by the municipalities and the willingness to further keep positive results of such actions. This can also be influenced by the obligation to implement new legal requirements regarding environmental protection. For example, regulations concerning waste management require the continuous education of society in terms of waste pre-selection. An increase in knowledge and the so-called ecological awareness among municipality heads is also important.

**Figure 1. Number of Wielkopolska communities with specification of pro-environmental tasks to be performed in the years 1998-2004**



Source: Author's own elaboration based on eco-development programs

**Figure 2. Number of Wielkopolska communities with specification of pro-environmental tasks to be performed in the years 2008-2013**



Source: Author's own elaboration based on eco-development programs

Efforts made by the municipal local government administration towards rational waste management brought measurable results. In the years 2008-2013, as compared to the previous period, the number of municipalities for which waste management was listed among priority tasks to be performed decreased from 21 to 17. A similar decreasing trend also occurs in air protection (figures 1 and 2). Local government authorities in municipalities paid more attention to the need for proper preparation or updating of planning documents (environmental protection programs, ecophysiological studies, local area development plans) and for organizing a denser network of control and measurement points of the National Environmental Monitoring. The number of municipalities for which these issues were listed among priority tasks to be performed in the second research period doubled as compared to the first period.

The presented results of actions of the municipal local government administration for the environment can be compared with the results of other similar studies. These include, amongst other things, surveys of municipalities administered in 1999 (Giordano, 2005). The degree of municipality involvement for the planning and implementation of sustainable development in their areas was analysed. The questions concerned, amongst other things, the preparation of natural

inventories, the study of conditions and directions of spatial development of the municipality, plans, programs and strategies regarding environmental protection, the number of municipal employees with education in natural sciences and the amount of funds for pro-ecological enterprises from in the budget of the municipality (the Municipal Environmental Protection and Water Management Fund existing at that time). On the basis of the results of the surveys, points were awarded to municipalities for their activity. Eight communes achieved were good results. As compared to other municipalities, this is an average number. The largest number of municipalities with very good results were found in the Sub-Carpathian Province (14) and this number was the lowest in the Warmian-Masurian Province (2 municipalities) (Giordano, 2005).

As shown by the results from other surveys conducted in all municipalities of the Świętokrzyskie Region (Leśniewski, 2010), the implementation of eco-development by municipal local government administration in this area takes place by increasing environmental awareness (15% of municipalities), waste sorting (15% of municipalities), pro-environmental investments (9% of municipalities), construction of sewage treatment plants (4% of municipalities) and promotion of ecological food and modern technologies (3% of municipalities). The development of agro-tourism (2% of municipalities) or development of environmental protection programs (2% of municipalities) were less popular. Research by Leśniewski (2010) shows mechanisms of effective implementation of eco-development principles. According to respondents from the Świętokrzyskie Province, these include: modification of the legal system to include eco-development (4% of responses), reduction of taxes (31% of responses) and subsidizing training related to eco-development.

#### **4. Conclusion**

The concept of sustainable development is certainly a target idea for Poland. It makes it necessary, however, to strive after achieving possibly the greatest balance between the needs and expectations of the local community for the sake of the present and future generations. The more a local government unit is successful in implementing such principles, the more sustainable the municipality will become in ecological as well as social and economic terms, thus becoming more resistant to various crises (Kozłowski, 1993).

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On the basis of the analysis of various eco-development programs prepared for thirty municipalities in the Greater Poland Province between the years 1998-2004 and 2008-2013, it can be concluded that there was a noticeable improvement in the quality of the environment. In every second municipality, the number of particularly burdensome plants emitting gaseous pollutants and dust was reduced. The length of the sewerage network increased in many municipalities as did the number of modernized or newly commissioned sewage treatment plants. Also, in a majority of municipalities (70% of the analysed ones), effective actions were taken to sort municipal waste and to increase the surface area of reclaimed land.

The municipal local government administration still needs to solve the problem of eliminating household coal-fired systems which is responsible for the so-called low emissions. Also, no actions were taken to modernize or build municipal landfills in nearly every second municipality.

Among forms of environmental protection, especially ones formed at the level of municipal local government administration, natural monuments enjoyed the greatest interest. Their number increased in over 70% of municipalities. For comparison, the surface area or the number of protected landscape areas increased by 7% in the analysed municipalities and the surface area or number of ecological utilities - by 8%. Natural inventory and valuation plays a significant role in proper management of natural resources. Local authorities in 25 out of 30 analysed communes did not pay sufficient attention to the preparation or updating such documents.

Water and sewage management predominated among pre-environmental tasks selected for implementation by the municipal local government administration (29 out of 30 municipalities). This trend is similar to the national one and it can indicate priorities in the funding of pro-environmental investments in the future. Municipal authorities have become much more interested in ecological education. Considering the principles of introducing eco-development principles, this direction should be regarded as very positive. Local authorities were not particularly interested in tasks involving preparing or updating planning documents. As results from eco-development programs show, the number of municipalities where the preparation of such documents was included in pre-environmental tasks doubled when compared to the previous year.

The results obtained make it possible to specify several recommendations: In the light of civil society development - i.e. society which feels responsible for its closest social and natural

surroundings in the context of economic development, it is important to inform the local community about progress in implementing the principles of eco-development at the municipality level. One of available methods includes organizing and providing pro-environmental training which increases the awareness of inhabitants. Further research should be conducted which would allow monitoring of the implementation of eco-development principles not only in Greater Poland municipalities but also in other regions of Poland

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THE USE OF ECO-DEVELOPMENT PROGRAMS FOR THE ASSESSMENT OF ENVIRONMENTAL CHANGES  
AND THE EFFECTIVENESS OF PRO-ECOLOGICAL ACTIONS  
OF LOCAL GOVERNMENT ADMINISTRATION AT MUNICIPAL LEVEL

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***Wykorzystanie programów ekorozwoju do oceny zmian środowiskowych oraz efektywności działań proekologicznych gminnej administracji samorządowej***

***Streszczenie***

Dokonano analizy zmian w zakresie ochrony środowiska naturalnego zachodzące na terenie trzydziestu wybranych gmin województwa wielkopolskiego. W tym celu wykorzystano opracowane w latach 1998-2013 gminne programy ekorozwoju. Ich analiza pozwoliła na stwierdzenie, iż na obszarze poddanym analizie występuje zauważalna poprawa stanu środowiska naturalnego. Polepsza się jakość powietrza atmosferycznego i wód powierzchniowych, zwiększa się długość sieci kanalizacyjnych oraz liczba modernizowanych lub nowo oddanych oczyszczalni ścieków komunalnych. Wśród pracowników administracji samorządowej wyraźnie wzrasta rola i znaczenie edukacji ekologicznej. Niezbędne jest natomiast, podjęcie większego wysiłku w kierunku likwidacji przydomowych palenisk w gminach oraz prowadzenie racjonalnej gospodarki odpadami komunalnymi. Wśród proekologicznych celów wskazanych do osiągnięcia w programach ekorozwoju często występują zadania z zakresu gospodarki wodno-ściekowej oraz przygotowania lub aktualizacji dokumentów planistycznych, w tym inwentaryzacji i waloryzacji przyrodniczych.

***Słowa kluczowe:*** rozwój zrównoważony, gminna administracja samorządowa, inwestycje proekologiczne, edukacja ekologiczna