PROBLEMY EKOROZWOJU – PROBLEMS OF SUSTAINABLE DEVELOPMENT
2014, vol. 9, no 1, 119-126

Sustainable development of rural areas

Zrównoważony rozwój obszarów wiejskich

Wiktoria Sobczyk

Department of Environmental Engineering and Mineral Processing,
AGH University of Science & Technology, Al. Mickiewicza 30, 30-059 Kraków, Poland
E-mail: sobczyk@agh.edu.pl

Abstract

Economic development of rural areas guarantees stable employment for the local inhabitants and is prerequisite for implementing investments aimed at environmental protection. This article contains a number of examples of actions taken in compliance with the concept of sustainable development in the fields that represent the pillars of economic, environmental and social governance. In addition, the article presents objectives and conditions for the economic development of rural areas in the European Union and Poland. Attention was devoted to the growth of agritourism – especially in the context of sustainable tourism. The authors described the criteria for human resources development as well as the perception of villages as a place where local communities live and work.
In addition, the possibilities to produce healthy food were discussed, as well as the methods of obtaining energy from alternative sources and environmentally-friendly technologies of waste treatment. The importance of widespread environmental education among rural communities for sustainable development was emphasised.

Key words: sustainable development, rural areas, agriculture, environmental education

Streszczenie

Rozwój ekonomiczny terenów rolniczych gwarantuje stabilizację zawodową mieszkańców wsi oraz warunkuje działalność inwestycyjną w ochronę środowiska. W artykule opisano przykłady działań zgodnych z ideą zrównoważonego rozwoju w dziedzinach reprezentujących filary ładów: ekonomicznego, środowiskowego i społecznego. Scharakteryzowano cele i uwarunkowania rozwoju gospodarczego terenów wiejskich w Unii Europejskiej i w Polsce. Zwrócono uwagę na rozwój agroturystyki, szczególnie w kontekście zrównoważonej turystyki. Przedstawiono kryteria rozwoju kapitału ludzkiego oraz postrzeganie wsi jako miejsca życia i pracy społeczności lokalnych.
Omówiono możliwości produkcji zdrowej żywności, pozyskiwanie energii z alternatywnych źródeł, ekologicznej metody oczyszczania ścieków. Podkreślono rolę powszechnej edukacji ekologicznej społeczeństwa wiejskiego dla zrównoważonego rozwoju.

Słowa kluczowe: rozwój zrównoważony, tereny wiejskie, rolnictwo, edukacja ekologiczna

Upon seeing the beauty of this land, I feel obliged to call for preserving it for future generations. If you truly love your home country, you will not leave my call unanswered
John Paul II

Introduction

In 1987, a report by G. H. Brundtland titled *Our Common Future* was published. The document introduced a new concept of sustainable development that took into consideration the opinions of the representatives of natural, philosophical, economic, social and technical sciences (Pieńkowski, 2012). It was stated, that sustainable development should provide a balance between economic growth and environmental protection so that a high standard of living could be offered to the society (WCED, 1987).
Rural space comprises the area of human settlements and infrastructure, agricultural activity, woods and surface waters. The rural areas in the Member States of the European Union feature considerable diver-

sity: from remote places undergoing depopulation and deterioration to expanding suburban rural areas which are under constant pressure from city centers. As per the definition of OECD based on population density, rural areas amount to 92% of the EU area, while in the case of states such as Poland – as much as 93% (*GUS Obszary…*, 2011).

In this article, Poland was adopted as an example as this country has been traditionally perceived as a rural one. The rural areas analysed in the paper are *rural* in the strict meaning of the word, namely they are agricultural lands that can be cultivated to yield profits, thus being crucial for sustainable development. Agricultural lands comprise over 50% of Poland (*GUS Obszary…*, 2011). There are strong bounds between inhabitants of villages and the surrounding environment; furthermore, cultivating these areas is an important element of the national culture.

The Strategy of Sustainable Development of Rural Areas, Agriculture and Fishery in 2011-2020, developed by the Polish Ministry of Agriculture and Rural Development, assumes that *in 2020 rural areas will be an attractive place to work, live, rest and undertake farming activity, which will contribute to economic growth. These areas will generate public and commercial goods, but at the same time they will help preserve unique natural, landscape and cultural assets for future generations. Rural areas will retain their unique character due to sustainable development of competitive agriculture* (*Strategia…*, 2011). The document facilitates proper financing of investments with the use of domestic and EC funds. The main objective of the Polish strategy is to improve the quality of life in rural areas and to efficiently use the resources and the potential to stimulate sustainable development of the country. Such aspirations are supported by the *National Environmental Policy* which favours economic development of the regions and popularisation of regional produce on an international level (*Polityka Ekologiczna…*, 2008). The proper development benefits from exchanging experiences, establishing a network of offers and providing mutual support for rural areas.

When planning the development of rural areas in Poland, one should bear in mind that it needs to be adapted to development tendencies prevalent in the Member States. Significant help can be obtained in this case from the European Agricultural Fund for Rural Development. The Fund offers resources for stimulating economic development, employment and sustainable development of rural areas. This approach is in line with the *Declaration on the Guiding Principles for Sustainable Development* and the *Renewed Lisbon Strategy*, the aim of which is to provide funding for making the EU *the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs, greater social cohesion, and respect for the environment* (*Renewed Strategy…*, 2007). Financial assistance is primarily earmarked for investments and job creation in rural areas.

Sustainable development of rural areas

Introduction of sustainable farming opens a window of opportunity for villages and rural areas. The term denotes farming practices that combine three kinds of balances: economic, social and environmental. In this case, the aims include reduction of differences between rural and urban areas when it comes to the quality of life and improvement of the country's cohesion by equalizing differences between particular rural regions, with attention paid to preserving cultural and social identity of rural areas, which is an important niche of development (Hałasiewicz, 2011).

Economic stimulation of rural areas requires the development of appropriate institutional infrastructure (specialized government agencies, NGOs, advisory services supporting the local administration) and technological infrastructure (road systems, water supply systems, sewage systems). Multi-functional development needs to be ensured. Among the various non-farming functions of rural areas in Poland, the following are currently experiencing growth: tourism, services, trade, forestry, and small-scale production.

Economic sustainability

Poland should – in line with EU guidelines – put great weight on the formation of a competitive economic system which would be capable of acquiring and building knowledge. One of the elements of development of such an economic model is increasing competitiveness of regions understood as a capacity to adapt to ever-changing conditions. Competitiveness is perceived as the most important indicator of success in the economic policy of rural areas. Competitiveness factors in rural areas comprise supporting of small and medium enterprises which play a crucial role in job creation and counteracting unemployment. Other indispensable factors include: upskilling the workforce, professional activity, innovation, expanding sales markets, improved access to energy sources. Stimulation in these areas will bring about favourable effects for the society: improvement of living conditions, improving health and social care (Kryk, 2010). Economic growth of the region depends on the value of the capital held, demand for produced goods, skills of workers and possibilities of employment. As it can be observed, the aspects of economic development are strictly related to the social pillar.

GDP *per capita* in rural areas is slightly lower than in cities – i.e. 80% of national average, namely PLN 32,000 *per capita* (EUR 7,769). The case is similar as far as investment and development outlays are concerned.

The primary aim of farming is to guarantee food supplies at affordable prices. A measure of food safety is self-sufficiency, which is understood as the ability to produce domestically all or most of the food needed. In the conditions of open economy, a country's food self-sufficiency stands for economic and physical availability of food in the internal market, irrespective of the place of its origin, while a measure of a country's food self-sufficiency is the balance of trade in agri-foods. Poland has favourable natural conditions for agricultural production (*GUS Obszary*…, 2011).

The indicator of economic governance is the activity of certified organic farms. Organic farming is a system of management of sustainable crop and livestock production on a farm. It relies on biological and mineral resources that have not been technologically processed. The basic rule of organic farming is abstaining from the use of farming, veterinary and food chemicals in the process of food production.

Organic farming plays an important economic role in the European Union. As part of the common agricultural policy, organic farming is supported with subsidies, strategies and regulations the aim of which is to increase consumers' trust and to create conditions advantageous for fair competition between organic farmers in particular EU Member States.

The criteria for organic farming adopted in Poland are in line with the requirements of the European Union and the *International Federation of Organic Agriculture Movement*. Programmes aimed at making agriculture more environmentally-friendly are being implemented in cooperation with the directors of national and landscape parks.

The number of organic farms in Poland keeps increasing. At the end of December 2011, there were more than 23,000 organic farms utilising 3% of arable lands. To compare – in the European Union 5% of arable lands have been dedicated to organic farming (*Raport*, 2011). It seems that this level can be attained in Poland as well, however the process may take several years. The high prices of produce in this sector and insufficient number of shops that offer organic food are a barrier to the development of *green* agriculture in Poland.

Application of environmentally-friendly methods is a good solution for areas featuring high quality environment. A key to the success of sustainable agriculture is cooperation of farms and food industry that operate in the same area. This enhances the pro-environmental image of a region and eliminates the need to transport fruit and vegetable over long distances (Sobczyk, 2013).

The success of an undertaking comprising production of regional produce depends on the popularity of the region and its specificity. Areas exist which for long have been renowned for, e.g., growing hop or fruit-farming (Photo 1).

Photo 1. Apricot orchards in Strochocice near Sandomierz (photo: Z. Rosowicz).

Concentrating on regional production is conducive to conquering the market for a certain type of produce in the whole of Poland and abroad. A case in point is sheep cheese (oscypki) from Małopolska (Photo 2). Unfortunately, high transport costs increase produce prices significantly. An important factor that needs to be considered when developing a strategy for this type of production is using the ecological labelling, referring to the concept of *biological quality mark.* A special role is played by the *eco-farming* certificate which boosts the sales level.

Photo 2. Sheep cheese – produce of the mountain region (photo: W. Sobczyk).

However, food production is not the only task to be performed by ecological farming.

A multi-functional development of rural areas consists in the development of their other functions (in addition to agricultural production). A field which gives hope that the current functions of agriculture will expand is production of energy from alternative sources. The subject is described in the section on the ecological pillar.

One of the solutions, in the context of sustainable development of rural areas, can be the production of renewable raw materials as well – they can substitute synthetic masses generated through processing of crude oil and natural gas (Otoliński, Wielicki, 2003).

These products are used in our daily lives. From agricultural produce substitutes for plastics can be derived, such as starch polystyrene, lacquers and paints from vegetable oils, objects from bioplastics, bottles and packages from cellulose and protein bilayers. Substituting synthetics with natural products may create a large sales market for agricultural commodities. As we can see, the range of possibilities for agriculture (and the resultant opportunities for its multi-functionality) is very wide (Table 1).

Table 1. Functions of traditional and sustainable agriculture.

Functions of traditional agriculture	Functions of sustainable agriculture
food production	production of safe food, identity of rural areas, generation of renewable materials for the production of bioplastics
production of raw materials for the farming industry	production of energy from biomass (biogas, bio-alcohols, biodiesel)
production of raw materials for the food industry	production of energy from the Sun, wind, force of falling water and geothermal
production of raw material for the food processing industry	

An important element in the economic development and stimulation of Polish rural areas is agritourism, i.e. accommodation offered at active farmsteads whose owners render tourist services. Agritourism allows farmers to expand their non-agricultural activity; it is also a source of additional income, constituting a specific type of rural tourism (Winnicki, 2006). Involvement of the entire family in the agritourism activity improves the chances for the undertaking to be successful. When launching tourism-related activity, farmers invest their own financial means (it is estimated that 80% of agritourist farms support their operations with their own funds). Self-financing builds strong ties between the farm and the planned investment as a new quality is achieved. Agritourist business – when treated as a long-term activity – becomes a stable business provided that proper promotion means are applied (web portal, local agritourist association, etc). In addition, such promotion builds greater trust among tourists who use the services (Sobczyk, 2013). To yield larger profits new offers are created: healthy organic food, regional cuisine, direct contact with hosts and experiencing different life styles, new forms of leisure, such as scenic tours, horse riding, angling, mushroom picking, sport tournaments for holidaymakers and their children, barbecuing, etc. In addition to appreciating a close contact with nature, tourists are welcome to sightsee e.g. regional attractions, monuments of nature and culture and so on. This facilitates discovering the tradition, customs and regional culture. The development of agritourism as a form of entrepreneurship is a great chance for sustainable development of rural areas; it increases farmers' income and contributes to the development of related areas, such as trade, catering businesses, craft.

Ecological sustainability

The ecological factor is represented by the resources of natural environment: air, water, soil, fauna, flora, but also by forms of inanimate nature as well as landscape aesthetics. Humans – through their economic activity – deteriorate the quality of the environment. Reasonable and rational management can slow down these processes or even eliminate them. A measure of sustainable development as regards this pillar is widespread availability in a region of modern methods and technologies of environmental protection with respect to water treatment, waste management, reduction of emissions into the air. Environmental governance in rural areas is expressed in preserving the elements of the natural environment.

In terms of water conservation, one can build domestic hydrobotanical sewage treatment plants. These facilities utilise the filtration properties of such waterphilic plants as: common reed (*Phragmites australis*), sweet flag (*Acorus calamus*), mannagrass (*Glyceria aquatica*), common bulrush (*Typha latifolia*) and duckweed (*Lemna minor*) (Gajewska, Obarska-Pempkowiak, 2009). Being affected by interrelated biochemical processes, the substances present in wastewater are subjected to natural processing as a result of which they decompose into compounds easily absorbed by both microorganisms and plants. Microorganisms can utilize a significant proportion (up to 85%) of the resulting components in their biological processes. A small part of the components (10-15%) is assimilated by green plants (Kuczewski, Pawęska, 2005; Przybyła et al., 2009; Sadecka, 2005). Currently, there are many different domestic sewage treatment plants on the market. Systems capable of disposing of small amounts of wastewater are increasingly popular in rural areas (constructed wetland systems, hydrobotanical systems, soil and plant systems, Bugajski, 2006; Jóźwiakowski, 2003).

The use of alternative energy sources is beneficial for the protection of air. Growing energy crops, however, causes controversy in some circles. D. Piementel emphasises that ethanol production from corn is highly unecological and it pollutes the environment to a significant degree. The analysis by D. Pimentel goes against the opinion that biomass-based liquid fuels are an alternative to crude oil-based fuels. In the opinion of that scientist, the introduction of biomass-based liquid fuels is contrary to the idea of sustainable development

(Piementel, Patzek, 2008). Therefore the use of biomass calls for special attention.
On arable lands the energetic willow can be grown (Photo 3), so later its biomass can be used for heating purposes (Sobczyk, 2011; Styszko et al., 2010). In Poland, this type of willow is grown on 2,000 hectares (in Europe the biggest cultivation area is in Sweden – 17,000 ha). The balance of carbon dioxide is close to zero: during combustion CO_2 is released into the atmosphere, but the growing plants absorb it. The willow grows 14 times faster on idle agricultural land than forest trees. It is resistant to the vagaries of weather: it grows well both in cold weather, as well as in times of drought. However, forest animals do not feed on it, because it contains salicylates.

Photo 3. Experimental plantation of the energetic willow in Brodła Forest District, Śląskie Province (photo: W. Sobczyk).

In the Polish agriculture, the most important source of alternative energy is biomass (mainly forest biomass). The total use of biomass in Poland in 2009 amounted to 217 PJ, while the energy consumption of biomass in agriculture – 78 PJ. Biomass is used directly in agriculture (irrigation, drying, greenhouse crops, livestock, fuel for machines) and for domestic purposes (heating of rooms, preparation of domestic hot water).
In addition to biomass for energy production, farms also employ solar installations (Photo 4), but solar panels are not widespread in Polish agriculture. They are usually installed on single-family houses, in housing cooperatives and – more and more frequently – in small and medium-sized service companies. Of the total cumulative area of over 656,000 m^2 of solar panels installed in our country, only approx. 10% were located on farms (*Fundacja…*, 2011).
At breeding farms, energy can also be obtained as a result of manure combustion, but a precondition to the profitability of such a venture is its large scale. Dried poultry manure can be used to produce biogas and compost. However, biogas production requires a large expenditure (Banaś, 2006). Although there are many various technologies available, non-conventional energy sources in Polish rural areas have been used so far only to a small extent.

Photo 4. Utilisation of alternative energy sources. Photovoltaic panels in Kalinowo near Piotrków Trybunalski (photo: W. Sobczyk).

Sustainable rural development in the field of environmental protection goes beyond energy issues. It is also conditioned by restoration and permanent protection of biodiversity, elimination of dangerous chemicals from farming processes, keeping the limits of environmental impact imposed by the assimilative capacity of the environment (Sobczyk, 2013). One should also make an effort to preserve the natural and landscape values of rural areas (Photo 5).

Photo 5. Rural areas of unique natural values. Farming landscape. Żegocina near Limanowa (photo: W. Walat).

Social sustainability

The social pillar, which refers to humans and their living conditions, plays an important role in efficient implementation of sustainable rural development (Hull, 2008). It is represented by such indicators as: unemployment rate, education level, access to the Internet. The leaders of local communities manage regional development, using the most important assets in rural areas. The proposed directions of economic development should satisfy the inhabitants of the region. Activity, entrepreneurial spirit and ingenuity in solving economic, social and environmental issues

guarantee the success of interesting projects. This improves the quality of life of rural communities, increases the sense of satisfaction, a belief in the possibility to realise one's ideas and goals, and the feeling of safety (Korol, 2007).

Persistent financial and communication barriers make it harder for the inhabitants of Polish rural areas to gain access to education on all levels. This applies to both formal and informal education. The records show a low quality of education of children and youth from rural areas, as well as inadequate education of adults. This also applies to pre-schools, which are a very important instrument of the policies advocating education, integration and equal development opportunities (Hałasiewicz, 2011). Even in the early 21st century (2002), among the people working exclusively or primarily on their farms only just a few percent of them had higher education: 4.3% (Sobczyk et al., 2008). In recent years, however, the situation has improved, access to knowledge has become open to all social groups. Thanks to this, the percentage of well-educated and highly-qualified people increased dynamically: from 5.3% in 2007 to 9.8% in 2011 (GUS, 2012). In addition, with the development of new technologies (including information solutions), entrepreneurship and innovation have begun to develop. A great chance has opened up for rural youth, full of new ideas and better educated. Measures aimed at improving the level of general and vocational education are an attempt to meet the basic condition for equal opportunities for inhabitants of rural areas in terms of their professional activity. Farmers have understood that professional qualifications are the right way to achieve a sense of stability, improve their families' living conditions, satisfy their aspirations in life. Unfortunately, there are times, when the traditionalist attitudes of many people in rural areas, frequently resulting from the lack of self-confidence and fear of the consequences of risk, lead to stagnation and resignation. In such cases, unemployment and crime rates are on the rise. The percentage of unemployed in the country exceeds the value of this indicator in urban areas (in cities – 12.3%, in rural areas – 13.8%, GUS, 2012).

Despite the huge economic potential of rural areas, a massive migration of young people from rural areas to cities can still be observed. Similar trends are noticeable in many countries of the European Union. The consequence of this phenomenon is not only the loss of labour force, but also cultural impoverishment and loss of agricultural and folk traditions. In view of the danger of depopulated villages, it is necessary to change the mentality of the young generation: encourage young people to pursue the best possible education, strengthen their respect for every job and adherence to the tradition.

The role of environmental education in sustainable rural development

Implementation of the assumptions of sustainable rural development should proceed in parallel with effective environmental education of the society, which builds a sense of community with nature. Poland, as one of the EU Member States, has a policy of co-financing vocational training and consulting services for farmers (*Strategia…*, 2011). The development of a consultancy system is conditioned by the scale of organic production. Farmers improve their professional skills during short courses and holiday practices. The most common forms are meetings of regional groups of farmers, associated in consumer organisations, but the lack of experienced advisory personnel and IT facilities (online databases) is noticeable.

The basic element of farmers' environmental education is the knowledge of the *Code of Good Agricultural Practice*. This document contains a collection of environmentally-friendly agricultural practices, the use of which will ensure sustainable development in the sphere of agricultural production. The purpose of the Code is to raise the level of knowledge of the protection of air, water and soil, as well as enhancing the landscape assets of the countryside. The farmer is also required to comply with the *Code of Practice for Plant Conservation* (Pruszyński, Wolny, 2009). It is a legal act but also a source of information necessary for the proper and safe use of plant protection products. It explains the rules of selecting crop protection techniques, as well as the rules of preparation for work and operation of appropriate equipment, and the impact of pesticides on the population dynamics of the perpetrators of diseases, pests and weeds (Sobczyk, 2004, 2013).

Environmental education is also promoted by the *Agri-Environmental Programme*, implemented in all Member States of the European Union. The Programme was established on the basis of Council Regulation (EC) 1257/1999 and EC Regulation 445/2002. The *Polish National Agri-Environmental Programme* has been adapted to the specificity of Polish agriculture and environmental conditions. The Project is targeted directly at farms (*Rozporządzenie…*, 2008) and aims to involve agricultural producers in improving the quality of the environment and conservation of natural values of rural areas. The Programme comprises the so-called agri-environment packages: organic farming, sustainable agriculture, maintaining extensive meadows and pastures, soil and water protection, buffer zones, protection of indigenous livestock breeds. An organic farm should be harmoniously integrated with a properly shaped area; it should also take up an optimal area in economic and technological terms. From the point of view of environmental protection policy, an Eco-audit is highly recommended for the agricultural sector. Its objective would be to determine the

methods of minimizing negative impacts on the environment.
An equally important issue, having a significant educational value, is the improvement of the aesthetic image of the farms and villages. It is a subject of workshops, demonstrations, competitions and seminars. Classes in growing ornamental plants, arranging kitchen gardens, leisure areas and playgrounds are highly popular.
Measures to improve the level of environmental awareness among rural residents, according to European Union standards, take a variety of forms, ranging from educational activities (seminars and regular trainings), through the promotion of the rules governing the protection of the environment, emphasizing the role of agriculture in development of the rural natural landscape, cooperation with *green* organizations and foundations, etc.
These, so far, have brought only limited results. The barrier in this case is very modest tradition of environmental education and a low income bracket of many rural families. But in fact, control systems and farmers' sense of responsibility for the social, environmental and economic aspects of environmental protection are a guarantee of safety for this generation and for generations to come.

Conclusions

Rural areas in the EU Member States are facing particular challenges in terms of sustainable development. They can be a place of both agricultural production and other sectors: trade in agri-food, recreation, tourism and forestry.
The countryside is an attractive place to live and work and a reservoir of natural resources and unique landscapes.
In Poland, demographic processes (including the aging of the population), territorial displacement between urban and rural areas and the restructuring of Polish agriculture after the accession to the European Union are of great importance for the development of rural areas. Since Poland's accession to the EU, one can observe a multifunctional development of rural areas, indicating the economic strengthening of farms, as well as an increase in the competitiveness of the agri-food sector. Also growing is the importance of the countryside being a place of residence of the people working in cities. Members of the rural population can also make their living themselves by rendering (very popular) rural tourism services. Non-agricultural activity is supported with public funds under the programs co-financed by the European Union.
The situation may be improved by the consistent implementation of sustainable development. It should, in conjunction with environmental protection, become trendy, popular and understandable to everyone. Indeed, it is not only an abstract idea, but also a pragmatic code of conduct that is advantageous from the economic point of view. In order to make the respect for the environment a commonplace, the renewal must begin in each of us with the rediscovery of our attachment to nature and animals. The ethical stance of the man towards animals should be based on the defence of their specific interest. *Shame on a civilization that cares only about people, but cares not about animals* – said Schopenhauer.
The strategy of rural sustainable development calls for taking into consideration of the tasks related to comprehensively conducted environmental education of the rural population: organization of trainings and mobilization of young people have a significant impact on the life of the region; what is more, they provide an inspiration for solving environmental problems in one's immediate surroundings. Development of the education offer and adapting curricula to the needs of local farmers will create the right attitude to nature among them.
The concept of sustainable development of agriculture must take root in the public consciousness. To make it happen, a multi-prong, comprehensive, systemic action is needed, aimed at *improving the quality of life in rural areas and the efficient use of agricultural resources and potential (...) for the sustainable development of the country* (*Strategia…*, 2011).
The economic development of a region in the spirit of respect for the environment requires full acceptance of the local population.
Thus, we have two alternatives: agricultural intensification and the resultant environmental degradation or sustainable agriculture. The choice is up to us.

The paper has been prepared within the AGH University of Science and Technology – statutory research work No 11.11.100.482

References

1. BANAŚ K., Uwarunkowania produkcji drobiarskiej w aspekcie zrównoważonego rozwoju obszarów wiejskich, in: *Zrównoważony i trwały rozwój wsi i rolnictwa*, ed. Adamowicz M., SGGW, Warszawa 2006, p. 265-274.
2. BUGAJSKI P., 2006, Hydrobotaniczne (hydrofitowe) oczyszczalnie ścieków. II Konferencja Naukowo-Techniczna Błękitny San, Dubiecko 2006.
3. FUNDACJA Instytut na rzecz Ekorozwoju, *Energia w gospodarstwie rolnym*, Warszawa 2011.
4. GAJEWSKA M., OBARSKA-PEMPKOWIAK H., 2009, 20 lat doświadczeń z eksploatacji oczyszczalni hydrofitowych w Polsce, in: *Annual Set The Environment Protection/Rocznik Ochrony Środowiska*, vol. 11, p. 875-888.
5. GUS, Główny Urząd Statystyczny, *Obszary wiejskie w Polsce*, Zakład Wydawnictw Statystycznych, Warszawa, Olsztyn 2011.

6. GUS, Główny Urząd Statystyczny, *Wyniki Narodowego Spisu Powszechnego Ludności i Mieszkań 2011,* Zakład Wydawnictw Statystycznych Warszawa 2012.
7. HULL Z., 2008, Sustainable Development: Promises, Understanding and Prospects, in: *Sustainable Development* vol. 16 no 2, p. 73-80.
8. JÓŹWIAKOWSKI K., 2003, Zmiany skuteczności usuwania zanieczyszczeń w gruntowo-roślinnej oczyszczalni ścieków w latach 1995-2000, in: *Inżynieria Rolnicza* 3(45), p. 93-107.
9. KOROL J., *Wskaźniki zrównoważonego rozwoju w modelowaniu procesów regionalnych,* Wydawnictwo Adam Marszałek, Warszawa 2007.
10. KRYK B., 2010, *Zrównoważony rozwój obszarów wiejskich, Wybrane aspekty społeczne*. Economicus, Szczecin 2010.
11. KUCZEWSKI K., PAWĘSKA K., 2005, Oczyszczalnie roślinno-glebowe jako alternatywne rozwiązanie problemów oczyszczania ścieków na terenach wiejskich, in: *Gaz, Woda i Technika Sanitarna*, no 9.
12. ODNOWIONA STRATEGIA LIZBOŃSKA, Serwis Ministerstwa Rozwoju Regionalnego. Polityka Rozwoju, Warszawa 2007.
13. OTOLIŃSKI E., WIELICKI W., 2003, Kierunki rozwoju wsi i gospodarstw rolnych, in: *Rocznik AR Pozn*. CCCLVIII, Ekon. 2, p. 103-119.
14. PIEMENTEL D. and PATZEK T., Ethanol production: energy and economic issues related to U.S. and Brazilian sugarcane, in: *Biofuels, Solar and Wind as Renewable Energy Systems: Benefits and Risk*, ed. Piementel D., Springer, Dordrecht, The Netherlands 2008, 2008, p. 357-371.
15. *Przewodnik dla gmin. Roślinne oczyszczalnie ścieków*, Natural Systems, Kraków 2004.
16. *POLITYKA EKOLOGICZNA PAŃSTWA* w latach 2009-2012 z perspektywą do roku 2016, Ministerstwo Środowiska, Warszawa, 2008, http:// www.mos.gov.pl/kategoria/328 (13.06.2013).
17. PRUSZYŃSKI S., WOLNY S., *Przewodnik Dobrej Praktyki Ochrony Roślin,* Instytut Ochrony Roślin, Państwowy Instytut Badawczy, Poznań 2009.
18. PRZYBYŁA C., BYKOWSKI J., FILIPIAK J., 2009, Efektywność funkcjonowania gminnych oczyszczalni ścieków, in: *Annual Set The Environment Protection/Rocznik Ochrona Środowiska*, vol.11, p. 231-239.
19. *RAPORT Inspekcji Jakości Handlowej Artykułów Rolno-Spożywczych*, 31 grudnia 2011.
20. *ROZPORZĄDZENIE Ministra Rolnictwa i Rozwoju Wsi z dnia 28 lutego 2008 r. w sprawie szczegółowych warunków i trybu przyznawania pomocy finansowej w ramach działania Program rolno-środowiskowy objętego Programem Rozwoju Obszarów Wiejskich na lata 2007-2013 (Dz. U. Nr 34, poz. 200).*
21. SADECKA Z., 2005, Zalety i wady oczyszczalni hydrobotanicznych, in: *EkoTechnika*, no 4.
22. SOBCZYK W., 2004, Typical program for rural society ecological education, in: *Agroekologia* nr 2, p. 80-84.
23. SOBCZYK W., 2011, Evaluation of harvest of energetic basket willow, in: *TEKA Komisji Motoryzacji i Energetyki Rolnictwa PAN*, vol. XI, p. 343-352.
24. SOBCZYK W., *Rolnictwo i środowisko,* Wydawnictwa Naukowe AGH, Kraków 2013.
25. SOBCZYK W., NAGORNIUK O.N., BIEDRAWA A., 2008, Możliwości rozwoju agroturystyki w Małopolsce, in*: Zeszyty Naukowe Uniwersytetu Opolskiego. Nauki Techniczne* 25, p. 105-111.
26. *STRATEGIA zrównoważonego rozwoju wsi, rolnictwa i rybactwa*, projekt z 14 grudnia 2010 r., MRiRW 2011.
27. STYSZKO L., FIJAŁKOWSKA D., SZTYMA M., 2010, Wpływ warunków pozyskania biomasy na odrastanie pędów wierzby energetycznej w czteroletnim cyklu, in: *Annual Set The Environment Protection/Rocznik Ochrona Środowiska*, vol. 12, s. 339-350.
28. WCED, *Our Common Future*, Oxford University Press, New York 1987.
29. WINNICKI T., 2006, Ekoagroturystyka i perspektywy jej rozwoju w województwie warmińsko-mazurskim, in: *Zrównoważony i trwały rozwój wsi i rolnictwa*, ed. Adamowicz M., SGGW, Warszawa 2006.