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## **MANAGEMENT OF NATURAL RESOURCES WITH AIM SUSTAINABLE RURAL DEVELOPMENT: COMPARATIVE ANALYSIS OF THE CASE OF THE LITHUANIAN ELDERSHIP AND POLISH MUNICIPALITY**

*The article analyzes sustainable rural development as development of rural localities that promotes progressive and effective management of resources, in coordination of their protection and sustainable usage with regard to requirements set in different areas (economics, social development, culture, law and environmental protection). The natural resources' sorts, functions and indicators related to usage of natural resources are described. The strengths and weaknesses of environmental changes, the solution possibilities of the sorest problems and probable threats are named. The essential attention is given to the main components of the environment – air, water, climate, landscape, and problems of biological diversity.*

*The article stresses the sustainable development of natural resources through strategic usage of natural resources that is beneficial to rural localities and residents. The described research was carried out in Zaslai eldership of Kaišiadorys region (Lithuania) and in Siedlce Municipality of Siedlce Poviát (Poland). The condition of its natural resources, management tools and significance for sustainable development of the locality were assessed. The improvement directions of management of natural resources in the eldership were named and substantiated with regard to the components of sustainable development (economic, environmental protection and social-cultural).*

**Keywords:** management of natural resources, management of resources based on community needs, sustainable rural development.

### **Introduction**

The rural development and applicable tools affect the condition and functionality of the resources present in the locality. Besides, their rational usage affects the expansion of other sectors of economic activities (Aleksandravičius, ir kt., 2011). The management of rural natural resources is a complex process that integrates various rural resources in order to create common potential of the locality's development. The integrated resources and their direct and indirect influence of management on other sectors may be regarded as the result of joint activity – synergy. The synergetic effect creates evident input in development of the locality's potential, creation of added value not only in the aspect of development of local production and economic activities, but also with regard to creation of image, increase of attractiveness and attraction of investments (Baležentis, 2011). The

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perception of local potential on the ground of the analysis of resources determines the diversity of possibilities and solution methods of problems. The abundance of available resources, their quality or significance for the locality are not the only factors, which affect rural development; it is also affected by support of authorities, investments to facilities, marketing tools and managerial decisions. The financial support has been and is an important tool used to protect natural resources of each country in the course of development of competitiveness of rural localities through various economic activities. The management of natural resources should be based on the desire of the interested parties to identify the environmental problems and to find their possible solution methods. The object of research is management of natural resources. The purpose of research is to identify and substantiate the improvement directions of management of natural resources. Tasks of research: to analyze the principles of management of natural resources and sustainable development in the theoretical aspect, to carry out assessment of condition of natural resources in the eldership; and to prepare recommendations for management of natural resources in the eldership. Research methods: analysis of scientific literature, analysis of documents, comparative analysis, and structural interview.

### **Theoretical aspects of management of natural resources in pursuit of sustainable rural development**

It should be noted that sustainable management of natural resources is a part of harmonious (economic, environmental and social) rural development, thus only the natural resources, which are used correctly, strategically and optimally could be of benefit for rural localities and their residents. According to the data of scientific research (Benoit; Charles, 2012), sustainable usage of local resources allows protecting natural resources and resources created by humans in various localities, to provide the top-quality products, and to integrate this for behalf of the region. In order to use the local natural resources as effectively as possible, it is necessary to give more attention to planning of local facilities and control of resources' usage. According to Grundey (2012), the management actions, which are properly planned, applied and controlled, can have only positive impact; however, it is necessary to follow the main management principles of natural resources: effectiveness (few disputes and few efforts to maintain organizational order); stability (ability "to accept" programme changes, investments to new technologies); resistance (ability to react properly to surprises and sudden external hindrances); and fairness (transparency of activity). According to Grant (2010), when the external environment is changing continually, the internal resources have to serve as much more stable ground, on the basis of which the development strategy is formed. The analysis of the local resources allows assessing the condition of local resources and their significance on the level of community, eldership and municipality.

According to European Commission guidelines "Europe 2020" strategy on the rational management of resources includes three correlated priorities (Communication From The European Commission Europe 2020. A European strategy for smart, sustainable and inclusive growth COM(2010) 2020, Burchart-Korol, 2016, p.52):

- intelligent development - development of a knowledge-based economy and innovation,

- sustainable development - promoting a resource-efficient, ecological and more competitive economy,
- inclusive growth - supporting an economy of high level of employment, ensuring social and territorial cohesion.

When the strengths and weaknesses of environment quality changes, the solution possibilities of the sorest problems and probable threats were analyzed in the article, the major attention was given to the main environmental components – air, water, climate, landscape, and problems of biological diversity. With regard to the data of the analysis of scientific literature (Herriges; Kling, 2012; Krankalis; Anzelytė, 2013), the natural resources were divided into 7 sorts: sun, ambient air and climate, water, landscape, resources of live nature and minerals.

It should be noted that all the sorts of natural resources are vital for human life and welfare: the supply functions are used to provide such resources as food, water, wood and fibre, the regulatory functions are used to control climate and amount of precipitation, water (e.g., floods), waste and spread of diseases. The cultural functions cover beauty, inspiration and rest, which contributes to spiritual welfare; the auxiliary functions cover soil's formation process, photosynthesis and cycle of nutritional elements, which serve as a ground for growing and production ((Bukantis, Gedžiūnas ir kt., 2008).

It may be presumed (Dargužas, 2011; Kisieliene, 2012; Skurdeniene; Šeškauskaitė, 2010) that the publicly active residents tend to protect environment more; they take part in the events of environment-cleaning; and that business is also induced (for example, when certain economic branches (tourism, services, high technologies) are developed, the negative impact on environment is smaller than in case of development of traditional industry). As noticed by (Lynam; Norfolk, 2013; Mont; Bleischwitz, 2012), the management of natural resources based on community needs is integral to the strategy of local development; when the tasks of resources' management are set and implemented successfully, the local environment protection processes and satisfaction of the residents are improving; however, it is necessary to identify the performance indexes, which could help to measure the implementation degree of these tasks.

### **Practical aspects of management of natural resources in pursuit of sustainable rural development: comparative analysis and assessment of condition of natural resources**

One of the key factors contributing to sustainable rural development are local governments and decentralized administration system. The importance of localities (municipalities in Poland and elderships in Lithuania) become very evident in the course of planning process, i.e. when long-term strategic plans, which serve as a ground for sustainable development, are prepared. These authorities are within the closest distance to the residents, business, schools, non-governmental organizations, so they can look deeper to current problems, to foresee the results of the projects, and to use the available resources optimally. It is especially important to understand what sustainability means in particular situation at particular time, how much it could be related to pursuing the goals of local development, and how much it is related to the protection of natural resources. When the rural localities are developed, the principles of preserving management of

natural resources would be followed. It should be induced to pollute, to use the local natural resources more effectively, to invest into new technologies, and to create new products or services in observance of ecologic principles.

The research of the article's authors was carried out in Zasłiai eldership in Kaisiadorys region as well as in Siedlce municipality in order to determine the condition of natural resources, management tools and significance for sustainable development of the locality. The following was carried out: analysis of management of natural resources in the eldership and assessment of condition of natural resources; the significant factors of resources' management were identified and their relations with the performance results were determined. The first stage of research, the analysis of documents, allowed making logical conclusions on the ground of essence of the analyzed material (analysis of the document's content was carried out). The second stage of research, comparative analysis, was used to identify the areas of activity in need of improvement and the methods, how to adapt successful experience or examples of success. This method was applied in order to determine the advantages of local natural resources and their usage possibilities in order to identify the management tools of resources and components of sustainable development, which could be used to achieve sustainable rural development. The third stage of research was structured interview. The particular questions and their sequence were determined. The competent specialists with long professional experience, who could provide the most reliable and comprehensive information about local natural resources and their management were interviewed. It was attempted to learn the most relevant problems of management and usage of natural resources.

Analysis of condition of natural resources.

Soil: The soil in the eldership is very versatile. The large part of soil is turfy and podsolc soil. 88,34 percent of soil are of low and very low nitrogen content. The soils of high and very high nitrogen content make 11,66 percent. The land in the territory is much tamed. The landed property of various purposes occupies 68 percent of the eldership's area. Among all the land farmland, the arable takes 56,7 percent, gardens 1 percent, pastures and meadows take 23,8 percent, the roads and protection zones take 5,5 percent of the eldership's territory, and other lands – 13 percent. (Study of Application of Advanced Technologies and Good Practice in Agriculture, 2013). Analysis of Siedlce municipality shows that soil condition seems to be less fertile and varied. Gmina Siedlce is an rural municipality, where the arable land covers 6724 ha, pasture meadows 2497 ha, orchards 154 ha. Light soil, classes IV, V, VI predominate. They determine to a large extent the character of agricultural production dominated by rye, triticale, oat and potatoes. The municipality is a significant resource base in the production of vegetables, fruits and mushrooms. Meadows and pastures create conditions for the production of milk and beef cattle ([www.gminasiedlce.pl](http://www.gminasiedlce.pl)).

Solar energy: It would be the most effective to use the solar energy to heat water. The turnover of the sun's shine is sufficient in order to use effectively the solar collectors of small area. In order to satisfy the needs of warm water for individual house, some 20 m<sup>2</sup> collectors should be installed, while the block of flats would need approximately 60 m<sup>2</sup>. The usage of solar and geothermal energy in the eldership is only 0,6 percent. According to the study of possibilities to supply rural localities with thermal energy, only less than 0,5 percent of individual houses have thermal pumps to heat their housing and prepare ho water, while the solar energy is used only by individual persons.

Ambient air: The cars and special servicing transport are used in the territory of both local units. In total 18920 vehicles were registered in 2016/2017 in Zasliai eldership. The interstate railway is nearby. For the inhabitants of Siedlce municipality the main role is the road system. Through the municipality there are several major communication routes with high traffic intensity. The most important one is the Warsaw-Terespol national road, the A-2 motorway (in near future). These trails affect the deterioration of air and acoustic environment. Overall, the climate and health conditions in the study area can be described as average. The most unfavorable for housing in terms of the climate are the valleys and lower parts of landscape. The priority in the plan to improve quality of ambient air is given to cleaning and irrigation of streets and roadsides, control of construction sites and servicing transport, planting of problematic land areas, execution and control of valid environmental normative documents. As energy resources are getting more and more expensive, the power production of small wind power stations is developed rapidly. It has become accessible to many households. The special plan of layout of wind power stations in the municipal territory provides expansion of the network of wind power stations in the eldership, too. The general plan was created, where it is planned to arrange small wind power stations up to 250 kW in the eldership.

Water: The water ponds and protected territories around them can be distinguished as the most significant natural resources in the eldership. The preservation of these resources and development of sustainable expansion principles could bring economic benefit to the eldership. It may be presumed that the group of resources is quite significant on the local level. The abundance of lakes attracts urban residents; however the underdeveloped sector of public services is not able to attract bigger flows of tourists. The waters in the territory consist of the rivers, streams, lakes, ponds, water reservoirs, channels, trenches, and meres. The waters occupy about 1,9 percent of the total territory. Siedlce municipality is located in the Bug River basin. It is dewatered by Liwiec River and its tributaries: Muchawa and Helenka. These rivers are characterized by significant fluctuations in water levels. These rivers are not well developed in terms of tourism. The largest reservoirs of surface waters are fishponds in Golice and Stara Wieś and the "Muchawka" retention reservoir on the Muchawa river. This reservoir is located within the city of Siedlce, but in the immediate neighbourhood of Siedlce municipality.

Landscape: The eldership is characterized by hilly landscape. The "European forest" has been planted. The ferry over the Neris is reached if you turn to the direction of Ciobiskis from Zasliai – it is almost unique in Lithuania. The area of Siedlce municipality is characterized by a rather monotonous landscape. A flat or undulating (with slopes not exceeding 5%) form covers large areas both in the west and east part of municipality. There are dunes (in the south-west) and sandy fields in the municipality.

Resources of live nature: The animals and plants of taiga and broad-leaved forests are characteristic to the eldership. The broad-leaved forests and spruce woods with the elements of broad-leaved forests are predominant. The forests occupy 18,6 percent. The forestry owns 644,5 ha of the land of forest purpose. The agricultural forests occupy 1074 ha area, and the nurseries of non-forest fund occupy 109 ha. There are 5 reserves of local significance, 1 national landscape reserve and 4 natural monuments of local significance. The protected territories occupy approximately 375 ha. Siedlce

municipality is characterized by low forest cover. Only 9.7% of the total area of the municipality is covered by forests . Due to the distance of up to 10 km from the administrative borders of Siedlce city (over 80 thousand inhabitants) all forests in the municipality are environmentally protected. The total forest area is 1,460, whereas the majority (811 ha) belongs to private owners. Siedlce municipality belongs to areas of high natural values. The 1992 nature inventory of the municipality revealed 16 localities areas of very high natural and landscape values. The Liwiec Valley, including the Siedlce ponds, has been designated as a national park of national importance, and fragments of the Muchawa valley and the Chodow forest as – regional. Some parts of the municipality: 27 431.5 ha are covered by Natura 2000 programme. It is an area of Liwiec Valley (CODE: PLB140002) of special protection for birds (according to Birds Directive).

Minerals: The minerals in the eldership are sand, gravel, clay and peat. The sands and gravels occupy 5,1 ha in the eldership and the quarries – 5,2 ha. Gravel and sand are mainly used to make building materials, while the peat is used to make compost (to improve soil), to make pots for sprout growing, and packing materials. The minerals in Siedlce municipality are gravel and sand. There are 3 documented reserves of mineral resources, two have been already emptied and one – active. (Szuflicki (ed.) Bilans zasobów złóż kopalin, 2016).

In order to present the opportunities for natural resources management in Siedlce Municipality, the SWOT analysis was conducted. Some its results are presented below in table 1.

**Table 1.** SWOT analysis of Siedlce Municipality

<b>SWOT Analysis of Natural Resources of Siedlce Municipality</b>	
<b>Geographic location, area, population</b>	
<b>Strengths</b>	<b>Weaknesses</b>
Favorable location with close distance to Siedlce City National, provincial, district Road Well-developed technical infrastructure The course of the railway line Expanded suburban communications	The aging community of the municipality No crèches The fragmented settlement network The need to change the development plan
<b>Opportunities</b>	<b>Threats</b>
The dynamic development of the neighboring city Migration of the city's inhabitants to the municipality High sense of security	Keeping the trend of low reproduction of the population
<b>The natural environment</b>	
<b>Strengths</b>	<b>Weaknesses</b>
Good condition of the commune forest Good value dining facilities Successive replacement of asbestos roof	Poorly developed tourist infrastructure Poor promotion of natural and

coverings co-financed by environmental funds Placing in the area of the community valuable natural areas - such as nature reserves High rate of waste segregation	landscape values Undeveloped water reservoirs (rivers) The lack of a developed network of agritourism services High energy consumption of public buildings
<b>Opportunities</b>	<b>Threats</b>
Increasing interest of the inhabitants of the city settle in the municipality Opportunity to develop agritourism, rural tourism and recreation (bicycle paths) Possibility of obtaining EU subsidies for environmental and waste management projects Increasing demand for leisure and entertainment services Fashion for healthy food and healthy lifestyle Increased interest in renewable energy sources Demand for agriculture products	Low ecological awareness Rapidly growing production costs in agriculture
<b>Social sphere</b>	
<b>Strengths</b>	<b>Weaknesses</b>
Good location of social infrastructure (schools, day centers, village clubs) Well-functioning non-governmental organizations Cyclical organization of cultural and sport events (harvest fest, festivals, contests, competitions, integration events)	Insufficient number of kindergartens and crèches, and too few schools in relation to the number of students Poor integration of residents Unused potential of rural daycare centers as meeting places and integration of residents Educational staff living out of Municipality with less contact with municipal citizens Lack of local cultural leaders Limited access to specialized medical services
<b>Opportunities</b>	<b>Threats</b>
Possibility of using EU funds for the development of the social sphere Adopting cultural, educational and educational facilities, conferences, opportunities for greater integration and awareness of the inhabitants Streamlining the cooperation between the administration and non-governmental organizations and promoting bottom-up	Poor cultivating of subregion traditions Inadequate budgetary resources for cultural and sport activities Failure of national identity High cost of education Complicated procedures for acquiring and settling funds for the

initiatives.	development of culture activities
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Source: Strategy of Siedlce Municipality Development

Based on the information presented in the table, it is possible to present the directions of changes and improvements in the management of the development and natural resources of the municipality.

It is possible to state that upon identification of competitive advantages of the locality and assessment of the available resources, it is possible to determine the tools, how to reinforce the locality's competitiveness without prejudice to the principles of sustainable rural development.

### Improvement of management of natural resources in the eldership

Following the data of theoretical analysis and practical researches, the directions of improvement of management of natural resources in the eldership were identified and substantiated in accordance with the components of sustainable development (economic, environmental protection and social-cultural), and the practical recommendations for actors of local development were prepared (Table 2).

**Table 2.** Directions of improvement of management of natural resources in the eldership in accordance with the components of sustainable development

Improvement direction	Planned results in accordance with component of sustainable development			Actors of local development
	Economic	Environmental protection	Social-cultural	
Improvement of quality of soil and bioproduction on farm	Planting of infertile territories or territories less favourable for farming with forest			Private investors or farmers, Zasliai eldership, Zasliai forestry
	The owners of private land could plant infertile territories or territories less favourable for farming with forest. It is recommended to acquire trees from Zasliai forestry that manages forest resources in the eldership	The growing forest areas would change the eldership's landscape, improve ecologic conditions and would contribute to reduction of climate changes	The work places would be created for persons receiving municipal allowances, and the activities of rural residents would become more versatile	
	Observation of soil's condition			Kaisiadorys

	To establish association of farmers of Zasliai eldership. In cooperation with Kaisiadorys regional municipality it would be possible to initiate the examination of soil's condition in Zasliai eldership. The ordered examination could lead to improved quality of grown production, while the association could allow selling production for higher price	The condition of soil resources would be evaluated more effectively, the preserving usage of soil in agriculture could be induced and better conditions for biological balance of the soil could be created	The cooperation would allow carrying out agrochemical tests of the soil for minor farmers, as well; besides good experience and insights could be exchanged	regional municipality, farmers in Zasliai eldership
Usage of solar energy resources to generate alternative energy	Priority of activity of Zasliai Centre of Traditional Crafts – programme of usage of solar energy resources			Zasliai Centre of Culture and Crafts, Zasliai community, Kaisiadorys local activity group
	To prepare the project and to organize seminars and visits to examples of good practice, according to the practice of German institute "Passivhaus Institut". Total	Such an initiative would have positive impact on landscape, would improve ecological conditions (quality of ambient air).	The educational activity would be performed through organization of creative workshops by Zasliai Craft Centre, the examples of	

	value of the project - 12 000 euros; the resources of the EU structural funds and private companies (which could promote their production) could be used to finance the project.	This would introduce residents of Zasliai eldership to advantages of usage of solar energy and would help to safeguard energy safety and to prevent conflicts	good practice would be made public, and seminars and courses about usage of alternative resources would be conducted		
Improvement of condition of ambient air resources	Arrangement of wind power stations around the village "Zuvys"	To develop power production by small wind power stations in Zasliai eldership, around the village "Zuvys". The majority of manufacturing companies located in Zasliai eldership are in this territory. They may reduce usage of electric energy. Following the example of good practice of Smalininkai community, the arrangement expenses of 1 wind power station are equal to 11050 euros.	The effective usage of wind energy would reduce air pollution while generating alternative energy.	The increased amount of information known to society about meaning of wind power stations for climatic changes and about means to reduce these changes; creation of new work places	Kaisiadorys municipality, owners of private enterprises, Kaisiadorys local activity group

Usage of water and landscape resources for tourism and recreation	Arrangement of campsite in the north eastern part of the eldership, by the road Zasliai – Beiciunai			Zasliai community, Kaisiadorys regional local activity group, private enterprises, Zasliai Craft Centre, local residents
	Zasliai village community could write a project to acquire arbour with outdoors furniture and outdoors fireplace. UAB “Elpura” located in Zasliai eldership could make the arbour with outdoors furniture for 3500 euros. The outdoors fireplace would be the responsibility of members of Zasliai Craft Centre. Zasliai eldership could organize cleaning of environment	Tidied entry to tourist campsite, liquidated damage to landscape; induced wish of campers to maintain clean environment	The conditions are created for rest, educational ecological tourism, and full-rate rest in nature. The campsite would be easy to find for travellers, it would be close to the village centre, where the services necessary for traveller would be available	
	Formation of educational walking path on the coast of Zasliai lake during the workshop of woodsmen			Zasliai municipality, Zasliai community, folk artists, owners of private forests, local farmers, residents
	The workshop of woodsmen could be organized by Zasliai eldership. The necessary wood could be given by owners of private forests. The local formers would	When the educational walking paths are formed, the society would be able to get familiar with native country, rare sorts of plants and	This could allow adjusting the objects of cultural heritage, community initiatives and natural resources of local landscape for the needs	

	take care about transportation works, while the volunteering residents would take part in working bee on the set day. As the network of sightseeing objects is expanded in the eldership, the competitiveness of suggested tourism services would increase.	animals	of educational tourism.	
Protection of resources of live nature	Creation of information system of natural objects in Zasliai, which are interesting with regard to tourism			Kaisiadorys local activity group,
	To announce the competition of smart programmes for creation of educational routes through protected natural objects, which are interesting with regard to tourism. The possibility would be created to attract new tourist flows and to promote the regional traditions	The mobile application meant for residents and guests of Zasliai eldership would help to get familiar with the protected objects of live nature in the village	The local youth are encouraged to take interest in potential of local natural resources	Kaisiadorys Centre of Tourism and Business, companies providing accommodation and tourism services
	Protection of Zasliai herpetological reserve			Community of

	The rescue events of European spadefoot toads are organized by erecting 1000 meters fence on the road Zasliai-Zuvys. The necessary materials could be donated by Zasliai forestry, while the members of community would take care about necessary tools.	The events of natural protection would allow learning more about nature and preserving the vanishing species of amphibians	Promoted ideas of environmental protection, trained volunteering principle, young people induced to get involved into community activities	Zasliai eldership, Kaisiadorys regional agency of environmental protection, Zasliai secondary school
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As it has been already mentioned, the landed property of various purposes occupies 68 percent of the eldership's area. Among all the land farmland, the arable takes 56,7 percent, gardens 1 percent, pastures and meadows take 23,8 percent, the roads and protection zones take 5,5 percent of the eldership's territory, and other lands – 13 percent. The majority of territories suitable for farming are improved in order to create more favourable conditions for agricultural activities. The changes of land usage planned in general plan of the eldership are based on current tendencies of development of agricultural and residential territories. Part of infertile soil or territories less favourable for farming will be planted with forest. When needed, it is planned to give land for exploitation of minerals or expansion of residential territories. This could have negative impact not only on soil, but also on water regime. Part of soil will be destroyed during constructions or exploitation of minerals in the territory of the eldership. The reduction of the area of landed property will not have significant influence on agriculture or its development. The conditions for intensive farming activity would be better in the remaining areas if necessary protection means of soil are safeguarded together with balanced fertilization by organic and mineral fertilizers.

The solar energy may be used in 2 ways: to produce electric energy or heat (water heating by collectors, direct heating of buildings' partitions, etc.). The solar collectors in the eldership would be suitable to prepare hot water, i.e. the area of collectors is selected with regard to the needs of hot water. The solar collectors would allow saving expenses spent on preparation of hot water. The solar collectors would allow saving up to 70 percent of annual preparation expenses of hot water. Moreover, the solar collectors would become very topical for people, who have outdoors or indoors swimming pools. According to the data of companies, which sell systems of solar collectors (UAB "Ekoplus", 2016) the purchase of solar collector for the family of 2-4 persons costs 1500-7000 euros. 2 most popular and wide-spread systems of flat solar collectors (with

installation) cost approx. 2300 euros. However, it is quite a big investment for the owners of private houses.

The implementation of the project “Creation of the Centre of Traditional Crafts” is coming to the end in the eldership. The centre of traditional crafts as the unit of Zasliai cultural centre is established in the premises of Zasliai cultural centre. It will provide services of preservation, teaching, consultation, etc. the programme of renewable power could also be included into the activities of the craft centre. The craft centre could contribute to the usage of potential of solar energy through organization of seminars and creative workshops. The solutions of engineering facilities would have significant positive impact on air, water and soil. When the centralized thermal supply is expanded and less pollutant fuel sorts are selected, the air quality would improve. If more users were connected to centralized water supply and wastewater networks, the quality of surface water ponds would improve.

In order to attract more tourists, it is recommended to arrange campsite in the north eastern part of the territory, by the road Zasliai-Beiciunai. The easy-to-find campsite would be close to the village centre, where the services necessary for traveller would be available. Two lakes of the village would be used for the rest by water – northern part of Statkuniskis Lake would be used for beaches and Zasliai Lake would be used as the main recreation place of rest and festivals used by the residents and guests. It is recommended to arrange the recreation area with stadium and other sport courts in the northern part of Zasliai Lake, in the green area of the village. It is a territory that would be dedicated for active rest and water entertainments with the possibility to get a swim. It is suggested to arrange the place for festivals and events with the servicing structure in the cape in the western part of Zasliai Lake. The boat pier could be also arranged here. One of the biggest values is the exclusive landscape. One of the important advantages of landscape panorama is the absence of large industrial or stock-breeding buildings, silos, etc., which could cause negative impact on the environment. In order to arrange, use and protect natural framework of the territories, it is suggested to apply the following directions, which express the protection and formation types of natural landscape: the present natural character of the landscape is preserved and protected; the naturalness of landscape is maintained and increased; the elements restoring naturalness of landscape are beautified and plentiful. These directions are expanded through expansion of plant arrays and belts in the valleys of streams, arrangement of recreational undeveloped areas by for rest and fun by the lakes, and through making the amount of plants bigger.

One of the possibilities to use the landscape could be formation of educational walking path on the Coast of Zasliai Lake during the workshop of woodsmen. This would not simply provide entertainment to local residents, but would also introduce the visitors with ethnographic culture of Zasliai, folk art and traditions. It is important to include natural resources present in the eldership when the idea is formed. The raw materials necessary for artistic activities would be received through cooperation with Zasliai forestry and owners of private forests. The representatives of private business, who use the quarry on the south eastern part of the lake, could contribute with machinery meant for digging and levelling. Such a creative partnership project would gather the professionals from the educational and social areas in order to improve landscape and to integrate the local natural resources. The cultural impact would be manifested through

promotion of health and community welfare, provision of equal possibilities to create art, and participation in cultural activities.

It is important to include cultural tools used to induce health and welfare into the plan of the eldership's development. The community organizations and eldership are responsible for the project's preparation. With regard to financing, the cultural and artistic projects promoting health and welfare could be sponsored by the Ministry of Education and Culture. The cooperation with municipality, local activity groups, etc. is also important. The community's initiative could reduce the financing expenses by organizing the workshops of woodsmen.

Considering Siedlce Municipality it is worth mentioning, that the main idea for local authorities is to improve the life conditions for citizens. Thus, their interest of natural resource management become as important as the other facilities for society. Within each of the social development sphere, the natural resource management occurs.

The proposals of natural resources management improvements appear within four main activity goals:

1. Improvement of the environment quality:
  - Systematic removal of asbestos from roofs,
  - Protecting the environment and improving ecological security,
  - Improving the state of the environment by introducing and enforcement of rational waste management and selective waste collection,
  - Supporting measures to reduce pollutant emissions to atmosphere by households and business entities,
  - Reduce the impact of traffic pollution,
  - Reclamation of degraded land,
  - An efficient and effective waste management system (including disposal and recycling),
  - Development and modernization of integrated waste management through support
  - Segregation, recycling and disposal systems, tightening of landfill and waste management controls, and the safeguarding of hazardous waste.
  - Development of water retention flood retention system.
  - Cooperation with the Recycling Waste Company in the field of ecological promotion.
2. The use of ecology for the development of the municipality:
  - Increased use of renewable energy,
  - Modernization of the citizens' boiler rooms in the scope of exchange of heating sources to modern and ecological.
  - Promoting renewable energy sources (biogas, solar cells, wind farms, growing energy crops) as a source of income for agricultural holdings,
  - Replacement of district heating networks with heat loss,
  - Construction of new heating systems,
  - Support for the use of renewable energy sources (including photovoltaics and sun collectors),
  - Preparation and provision of forest areas for tourist and recreational purposes,
  - Supporting forest management by shaping the ecological forest, multifunctional, providing a positive impact of the forest on the environment,

- Thermomodernization of public buildings and collective residential buildings .
3. Modernization of local agriculture to market economy requirements:
- Supporting entrepreneurs and owners of farms in acquiring external partners (including foreign), and marketing of local products and manufacturers,
  - Strengthening the institutional environment of the agricultural sector through the development of the system market information, specialist advice and training,
  - Encourage the diversification of farm activities towards business non-agricultural by supporting the development of tourism, including agritourism and ecotourism,
  - Improving the efficiency of farm businesses through support modernization of equipment and buildings, improvement of agrarian structure, improvement of production quality and diversification of directions of agricultural production (biofuels, renewable energy, etc.),
  - Development of the offer and improvement of the availability of support instruments for ecological development agriculture and food processing and marketing of high quality food products,
  - To initiate the formation, support and promotion of various organizations of association farmers,
  - Support and promotion of the creation of agritourism farms and production of healthy food,
  - Help with the organization of local product sales locations,
  - Encourage farmers to acquire specialized knowledge about modern methods of agricultural production and requirements in force in the European Union.

To summarize, it is possible to note that the suggestions, how to improve resources' management and how to include them into the local government activities , could look to development priorities and projects under preparation more rationally and in more complex way. They should be organized in attempt to achieve sustainable rural and social development through management of natural resources. It is relevant that the suggested practical recommendations are actually possible to implement if the facilities useful for social needs are created and the natural resources present in the eldership are used.

## **Conclusions**

1. The analysis of natural resources allowed determining the following: the lands in the eldership are tamed, which has negative impact on soil resources; the solar energy resources are used little or ineffectively; private transport worsens quality of ambient air; water quality of the lakes is good, but there is lack of localities adjusted for recreation and tourism, which would attract more tourists; and protection of live nature is safeguarded.
2. Planting of less fertile soils with forest and observation of the soil's condition would contribute to improvement of quality of ambient air, would have positive impact on the local landscape, and would improve ecologic conditions.
3. The sustainable development of the eldership based on the usage of renewable energy sources could serve as effective means to create complex usage of wind and sun

resources available in the locality, which would cover not only production of energy, but also its supply and usage.

4. The purposeful usage of water and landscape resources would contribute to sustainable expansion of approaches to Zaslai Lake by adjusting them for recreation and rest. The territory's adjustment for sport needs would help to attract bigger flows of local society and visitors, who would also use other services provided by Zaslai Lake (accommodation, feeding, etc.).

5. The natural resource management in Siedlce Municipality is a part of the Strategy of Development, which stresses the role of social development. Within the aims to fulfil, the natural resources management are reduced to saving the natural environment, protecting it and to introduce the ecology to citizens.

## References

- ALEKSANDRAVIČIUS, A.; ŽUKOVSKIS, J. 2011. Kaimo bendruomenių raida ir jų veiklos tikslai: siekiant darnumo visuomenėje [interaktyvus], [žiūrėta 2016 m. gegužės 05 d.]. Prieiga per internetą: <<http://etalpykla.lituanistikadb.lt/fedora/objects/LT-LDB-0001:J.04~2011~1367168789998/datastreams/DS.002.0.01.ARTIC/content>>;
- BALEŽENTIS, A. 2011. Kaimo vietovių raida ir modeliai: darnaus vystymo požiūris [interaktyvus], [žiūrėta 2016 m. kovo 19 d.]. Prieiga per internetą: <<http://vadyba.asu.lt/26/31.pdf>>;
- BENOIT, R.; CHARLES, C. 2012. Configurational Comparative Methods Qualitative Analysis [interaktyvus], [žiūrėta 2016 m. gegužės 10 d.]. Prieiga per internetą: <<http://goo.gl/6gY9Qg>>;
- BUKANTIS, A.; GEDŽIŪNAS, P. IR KT. 2008. Lietuvos gamtinė aplinka, būklė, procesai ir raida [interaktyvus], [žiūrėta 2016 m. balandžio 24 d.]. Prieiga per internetą: <[http://193.219.133.6/aaa/pranesimai/Lietuvos\\_gamtine\\_aplinka\\_bukle\\_procesai\\_ir\\_raid.pdf](http://193.219.133.6/aaa/pranesimai/Lietuvos_gamtine_aplinka_bukle_procesai_ir_raid.pdf)>;
- Burchart-Korol D., zrównoważone zarządzanie zasobami naturalnymi bazując na gospodarce cyrkulacyjnej, Zeszyty Naukowe Politechniki Śląskiej, Seria: Organizacja i Zarządzanie, Z.87, 2016
- DARGUŽAS, A. 2011. Interesų konfliktas sprendžiant klimato kaitos problemą, jų mažinimas. [interaktyvus], [žiūrėta 2016 m. balandžio 14 d.]. Prieiga per internetą: [http://vddb.library.lt/fedora/get/LT-eLABa-0001:E.02~2011~D\\_20110705\\_131620-62024/DS.005.0.01.ETD](http://vddb.library.lt/fedora/get/LT-eLABa-0001:E.02~2011~D_20110705_131620-62024/DS.005.0.01.ETD)
- GRANT, M. 2010. Contemporary Strategy Analysis and Cases [interaktyvus], [žiūrėta 2016 m. gegužės 5 d.]. Prieiga per internetą: [http://books.google.lt/books?hl=lt&lr=&id=dXw6MkTCbeoC&oi=fnd&pg=PA209&dq=grant+rm+.+2010+contemporary+strategy+analysis&ots=8gnBFECEZ\\_&sig=grfVztP9Kd6T2w8Cx8RObzsJCTY&redir\\_esc=y#v=onepage&q=grant%20rm%20.%202010%20contemporary%20strategy%20analysis&f=false](http://books.google.lt/books?hl=lt&lr=&id=dXw6MkTCbeoC&oi=fnd&pg=PA209&dq=grant+rm+.+2010+contemporary+strategy+analysis&ots=8gnBFECEZ_&sig=grfVztP9Kd6T2w8Cx8RObzsJCTY&redir_esc=y#v=onepage&q=grant%20rm%20.%202010%20contemporary%20strategy%20analysis&f=false).
- GRUNDEY, D. 2012. Managing sustainable tourism in Lithuania: Dream or reality? [interaktyvus], [žiūrėta 2016 m. balandžio 17 d.]. Prieiga per internetą: <<http://www.tandfonline.com/doi/pdf/10.3846/1392-8619.2008.14.118-129>>
- HERRIGES, JA.; KLING, CL. 2012. The Measurement of Environmental and Resource Values – Theory and Methods [interaktyvus], [žiūrėta 2016 m. gegužės 3 d.]. Prieiga per internetą: <<http://www.routledge.com/books/details/9780415501583/>>.
- KISIELIENĖ, G. 2012. Gamtinių išteklių, kraštovaizdžio ir bioįvairovės apsauga. Kaunas: Technologija.
- KRANKALIS, R.; ANZELYTĖ, R. 2013. Darnaus vystymosi nuostatų įgyvendinimas kaimiškiosiose savivaldybėse. [interaktyvus], [žiūrėta 2016 m. balandžio 24 d.]. Prieiga per internetą: <[http://vddb.library.lt/fedora/get/LT-eLABa-0001:J.04~2013~ISSN\\_2029-8846.N\\_1\\_5.PG\\_40-52/DS.002.0.01.ARTIC](http://vddb.library.lt/fedora/get/LT-eLABa-0001:J.04~2013~ISSN_2029-8846.N_1_5.PG_40-52/DS.002.0.01.ARTIC)>
- Lietuvos Respublikos aplinkos ministerija. 2001. Rio deklaracija: apie aplinką ir plėtrą [interaktyvus], [žiūrėta 2016 m. gegužės 12 d.]. Prieiga per internetą: <<http://www.am.lt/LSP/files/Agenda21.pdf>>;
- Lietuvos Respublikos teritorijos bendrasis planas. [interaktyvus], [žiūrėta 2016 m. balandžio 20 d.]. Prieiga per internetą: [http://www3.lrs.lt/pls/inter2/dokpaieska.showdoc\\_l?p\\_id=284909](http://www3.lrs.lt/pls/inter2/dokpaieska.showdoc_l?p_id=284909) >;
- Lietuvos Respublikos regioninės plėtros įstatymas [interaktyvus], [žiūrėta 2015 m. balandžio 20 d.]. Prieiga per internetą: [http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc\\_l?p\\_id=298580](http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=298580)

LYNAM, T.; NORFOLK, S. 2013. Review of Tools for Incorporating Community Knowledge, Preferences, and Values into Decision Making in Natural Resources Management [interaktyvus], [žiūrėta 2015 m. gegužės 11 d.]. Prieiga per internetą: <<http://www.mtnforum.org/sites/default/files/publication/files/1730.pdf>>;

MONT, O; BLEISCHWITZ, R. 2012. Sustainable Consumption and Resource Management in the Light of Life Cycle Thinking [interaktyvus], [žiūrėta 2016 m. balandžio 23 d.]. Prieiga per internetą: <[http://www.researchgate.net/profile/Raimund\\_Bleischwitz/publication/229588688\\_Sustainable\\_consumption\\_and\\_resource\\_management\\_in\\_the\\_light\\_of\\_life\\_cycle\\_thinking/links/54045e2f0cf23d9765a62369.pdf](http://www.researchgate.net/profile/Raimund_Bleischwitz/publication/229588688_Sustainable_consumption_and_resource_management_in_the_light_of_life_cycle_thinking/links/54045e2f0cf23d9765a62369.pdf)>.

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SKURDENIENĖ, I.; ŠEŠKAUSKAITĖ, D. 2010. Lyderių vaidmuo Lietuvos kaime: ekonominio išsivystymo ir lyčių lygybės aspektai [interaktyvus], [žiūrėta 2016 m. gegužės 4 d.]. Prieiga per internetą: <[http://vddb.library.lt/fedora/get/LT-eLABa-0001:J.04~2010~ISSN\\_1648-9098.N\\_3\\_2\\_19.PG\\_39-48/DS.002.0.01.ARTIC](http://vddb.library.lt/fedora/get/LT-eLABa-0001:J.04~2010~ISSN_1648-9098.N_3_2_19.PG_39-48/DS.002.0.01.ARTIC)>.

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