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## Landscape valuation for planning ecotourism trails – case study

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**Abstract:** *Landscape valuation for planning ecotourism trails – case study.* Ecotourism is a type of tourism strictly connected with natural and cultural landscape values. This kind of idea of “green travel” is perfect option for people who want to relax and sightseeing rural municipalities. It is really important to design eco-tourism trails, which are very usefulness for tourists in this area. The paper is presented natural and cultural values of Piaseczno municipality. It was done landscape valorization, which are included natural and cultural elements of this area. The purpose was to distinguished the areas with the high natural and cultural landscape values for eco-tourism trail design. It was used bonitation points to assessment in scale from 1 point to 5 points. The results were presented on maps, including areas with high, medium, low and very low landscape values. It was distinguished areas with minimum 50% of the maximum number of points were considered attractive for design eco-tourism trails.

**Key words:** ecotourism trails, landscape valorization, Piaseczno municipality

## INTRODUCTION

Ecotourism as a form of eco-friendly travel. “Green tourism” is also popular in Poland. It directly contributes to the protection of the natural and cultural environment of these regions, and its participants are people with high ecological awareness and sensitivity (Aldous 2013, Gibson 2014, Zaręba 2015). Ac-

cording to the International Ecotourism Society, ecotourism is responsible travel to natural areas that preserves and protects the environment and improves the living conditions of local residents (McCombes et al. 2015). The beginnings of ecotourism date back to the 1970s (Jones and Spadafora 2017). Until recently, this form of travel was not known to a wider public. It is a starting point to find that environmentally-friendly travel can contribute to its protection. This thesis is also confirmed by the statements included in the Declaration on Ecotourism 2002 including, among others, the increase in interest in travel in natural areas, ecotourism is actively contributing to the protection of natural resources and the integrity of local communities, as well as to raising awareness all travelers on the preservation of natural and cultural heritage, ecotourism can have a positive economic dimension for the local population, its culture and future generations, and can be the main source of income for protected areas (Fancy 2002). Ecotourism is one of the fastest developing tourist markets in the world and is growing at a rate of 20–34% per annum (Jones and Spadafora 2017). This kind of idea of “green travel” and untouched nature is possible only due to

the appropriate planning and controlling of the ecotourism product (Hawkes and Williams 1993, Zainoren et al. 2016). This management should include: control of tourist traffic in time and space, determination of zones serving different types of tourist penetration, tourism development adapted to the needs of the protected area. Because of unplanned and uncontrolled tourism largely destroys the environment, an eco-route scheme is proposed to protect the natural and cultural environment. The route directs the tourist traffic to the most natural and culturally sensitive areas of the municipality and at the same time protects the area against devastation while fulfilling ecotourism principles. From the above indications for planning eco-trails for landscape protection, it is clear that the activities of municipalities for ecotourism development and related environmental protection should not be limited only to the delineation of trails and management of their infrastructures (McCoy et al. 1995). A huge role in the success of ecotourism and at the same time protecting the landscape plays the development of the infrastructure of “green tourism” including eco-trails. That is why many municipal actions must focus on supporting in a variety of ways – financial, promotional – local communities (IUCN-WCPA 2000, Es-hoo et al. 2018, Lee and Jan 2018).

The authors of the paper assumed the hypothesis that Piaseczno municipality has got high natural and cultural landscape values as potential for eco-tourism trails design. Therefore the aim of this work was to perform the landscape valorization of the Piaseczno municipality for eco-tourism trail design.

## MATERIAL AND METHODS

### Characteristic of Piaseczno municipality

Piaseczno municipality is located in the central part of the Mazowieckie Voivodeship, nearby Warsaw. The surface of municipality is 12,823 ha. Piaseczno municipality is one of the most forested areas in the Warsaw agglomeration.

### Methods

Landscape valorization is a usefulness method for analysis of landscape values (Żarska 2001, Kil and Kowalczyk 2011, Łukowiak et al. 2017). There are many landscape valorization methods as: Janecki's straight lines method (Janecki 1981), Wojciechowski method (1986), Gacka-Grześkiewicz et al. method (1994), Żarska method (2001), Wolski method (1992). It is necessary to collect many information about natural and cultural elements before the landscape evaluation (Litwin et al. 2009). Landscapes are very diversified, so sometimes is needed to do modification of two, or three valorization methods. After that it is possible to achieved good results with valuable information about values of studded area (Litwin et al. 2009). Most of valorization methods are based on bonitation point consisting in assigning point values to individual elements. However, the most important criterions for choosing a particular method of landscape valorization is the aim of this assessment (Bajerowski 2007, Myga-Piątek 2007, Żarska 2011, Mazurski 2012, Ziembła 2012). After analyzing many valorization methods for tourism, a method developed by Kulczyk and Lewandowski

TABLE 1. Types of spatial-landscape units

Unit number	Type of spatial-landscape unit	Unit number	Name of special-landscape unit
1	build up areas	38	build up areas
2	areas with cultivations, wasteland and railway	39	areas with cultivations
3	build up areas	40	areas with grasses vegetation
4	areas with grasses vegetation and cultivations	41	areas with cultivations
5	areas with grasses vegetation and cultivations	42	build up areas
6	build up areas	43	forest areas
7	forest areas	44	forest areas
8	forest areas	45	forest areas
9	forest areas	46	forest areas
10	forest areas	47	areas with cultivations
11	forest areas	48	forest areas
12	forest areas	49	build up areas with cultivations
13	build up areas	50	forest areas
14	forest areas	51	areas with cultivations
15	areas with grasses vegetation	52	forest areas
16	build up areas with cultivations	53	build up areas with greenery
17	forest areas	54	areas with cultivations
18	forest areas	55	build up areas
19	forest areas	56	build up areas
20	build up areas with grasses vegetation	57	areas with surface waters and plantings
21	forest areas	58	build up areas with cultivations
22	forest areas	59	build up areas
23	surface water	60	forest areas
24	areas with grasses vegetation	61	forest areas
25	build up areas	62	areas with cultivations
26	areas with cultivations and grasses vegetation	63	areas with cultivations and forests
27	areas with grasses vegetation and surface waters	64	build up areas with grasses vegetation
28	build up areas	65	build up areas
29	areas with cultivations	66	areas with cultivations and grasses vegetation
30	areas with cultivations	67	greenery areas
31	build up areas	68	surface waters
32	forest areas	69	build up areas with cultivations
33	build up areas	70	forest areas
34	forest areas	71	build up areas with cultivations
35	forest areas	72	build up areas with cultivations
36	forest areas	73	forest areas
37	forest areas	74	service areas

(2006) was used in Piaseczno municipality valorization. This method is focused more on the attractiveness of nature than on other parameters such as tourist infrastructure. The reason is that the natural environment has the high impact on the quality of ecotourism development. The authors of the chosen method proposed in their work bonitation points for assessment of eight elements as: land use, nature of the sculpture, geological structure, landscape, fauna, forms of nature protection, anthropogenic values and the presence and quality of view-

points. For the needs of the Piaseczno municipality valorization the criteria of assessment were adjusted, giving up the element – geological structure because the area under development does not have a large diversity of geological forms such as rock forms. Criterias as landscape uniqueness and viewpoints were also abandoned, and the following criteria were introduced: vegetation with two sub-criterias – naturalness of plant communities, recreational usefulness of forest communities, surface water and ecotourism infrastructure occurring. Ac-

TABLE 2. Valorization of the Piaseczno municipality for ecotourism with assessment scale

Main criteria and subcriteria		5	3	2	1
Land use	mosaic of land use	–	big	medium	small
Vegetation	naturalness of vegetation	–	forest – natural and semi-natural	non-forest – natural vegetation	–
	usefulness of forest vegetation for recreation	–	large recreational value of forest	medium recreational value of forest	–
Terrain sculpture		–	–	typical forms	single forms
Surface water		natural or semi-natural watercourse or natural reservoir	water stream regulated or artificial water reservoir	–	–
Fauna		–	fauna refuge	large opportunities to meet and fauna observation	opportunities to meet and fauna observation
Forms of nature protection		–	nature reserve, Natura 2000	regional park	areas of protected landscape
Cultural values		–	well preserved high-value historical objects in the region	historical objects of great value in municipality scale	single valuable cultural elements
Ecotourism infrastructure		–	accommodation and food services	trails	–

cording to the authors, the adopted criteria will allow a more complete assessment of the Piaseczno municipality.

The first stage of valorization was the division of the study area into spatial-landscape units. It was used here two main criteria/factors: landform and land use. It was distinguished 74 spatial-landscape units (Table 1) based on land use of Piaseczno municipality.

It was used criteria of assessment as: naturalness of vegetation, usefulness of forest vegetation for recreation, surface water, terrain sculpture, land use, fauna, forms of nature protection, cultural values, ecotourism infrastructure. The evaluation criteria with the assessment scale from 1 point to 3 points are presented in Table 2. Occurrence of a natural or semi-natural watercourse or natural reservoir achieved extra 5 points, because of their unique values on this area. Each study areas could have a maximum of 28 points.

## RESULTS

### Natural landscape

The variety of forest habitats are about 30% of the whole Piaseczno municipality area. The most forests are located in the south-eastern part of the municipality and belong to the Chojnowski Regional Park. Smaller forest areas are located in the southern and western part of the study area. Mixed moist forest and alder occupy areas along Jeziorka river. These are areas with naturally high retention capabilities, hardly accessible, however, fulfilling important ecological and water protection functions. They are not suitable for recreation, but they are interest-

ing landscape objects. Small areas of forests are located between built-up and open areas, too. They are fragments of small, tree-lined patches suitable for recreation isolated from each other.

Non-forest communities are represented by natural and semi-natural vegetation in the study area. Wet meadows with alder parts are located in Jeziorka river valleys. Smaller wetland areas are typical for agricultural areas in the vicinity of Siedliska, Jastrzębie, Pilawa and Orzeszyn, Chojnów, Pęczer, Bogatka, Złotokłos, Wola Gołkowska, Antoninów. Synantropical plants are mostly connected with settlements, orchards, gardens, roads and cultivated areas. The most diversified fauna occurs in the Chojnowski Regional Park. There are foxes, badgers, martens, weasels, cowards and small animals like raccoon dogs, hedgehogs, moles and shrews. About 100 bird species nest as sparrow hawk, buzzard, tawny owl, eagle owl and long-eared owl are in the Chojnowskie Forests. There are also mute swan, black and white stork, gray heron, crane and harriers on water and wetlands habitats. Numerous pheasants, wild ducks and 20 fish species are in the Jeziorka lake. Among the reptiles and amphibians, are occurring numerous viviparous lizard, lizard and several species of frogs. Protected areas are covered 40% of the Piaseczno municipality area. There are represented by 5 nature reserves, 1 landscape park, 1 protected landscape area, 72 natural monuments, 1 ecological site, 1 nature and landscape complex and Natura 2000 areas (according to Study of conditions of spatial development of Piaseczno municipality and gmin of 2014 and field researches – Fig. 1).



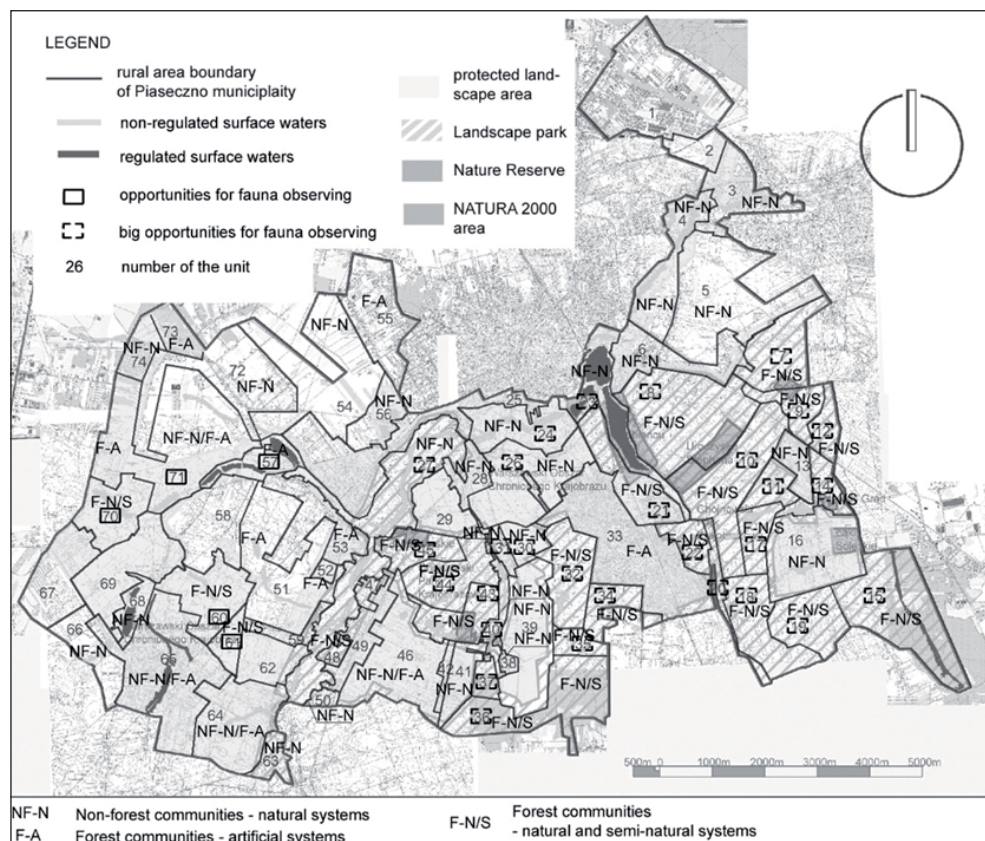


FIGURE 1. Natural landscape (own research)

## Cultural landscape

There are memorial sites, archaeological sites, cemeteries and manor parks. It was located only five accommodation and catering facilities for ecotourism purposes in Piaseczno municipality. There are also hiking trails here, among others Chojnowski trail of natural

monuments, the main trail of the Chojnowskie Forests, the South Route and the Magdalenka Trail–Zalesie Górne, bicycle routes and educational paths<sup>1</sup>. There are also equestrian centers and recreational shelters as well as another cultural objects (e.g. memorial places, historical churches, old buildings) showing the history of the site (Fig. 2).

<sup>1</sup> <http://www.krainajeziorki.pl/index.php/szlaki> [accessed: 14.03.2018], <http://piaseczno.eu/index.php?mnu=29> [accessed: 16.03.2018].

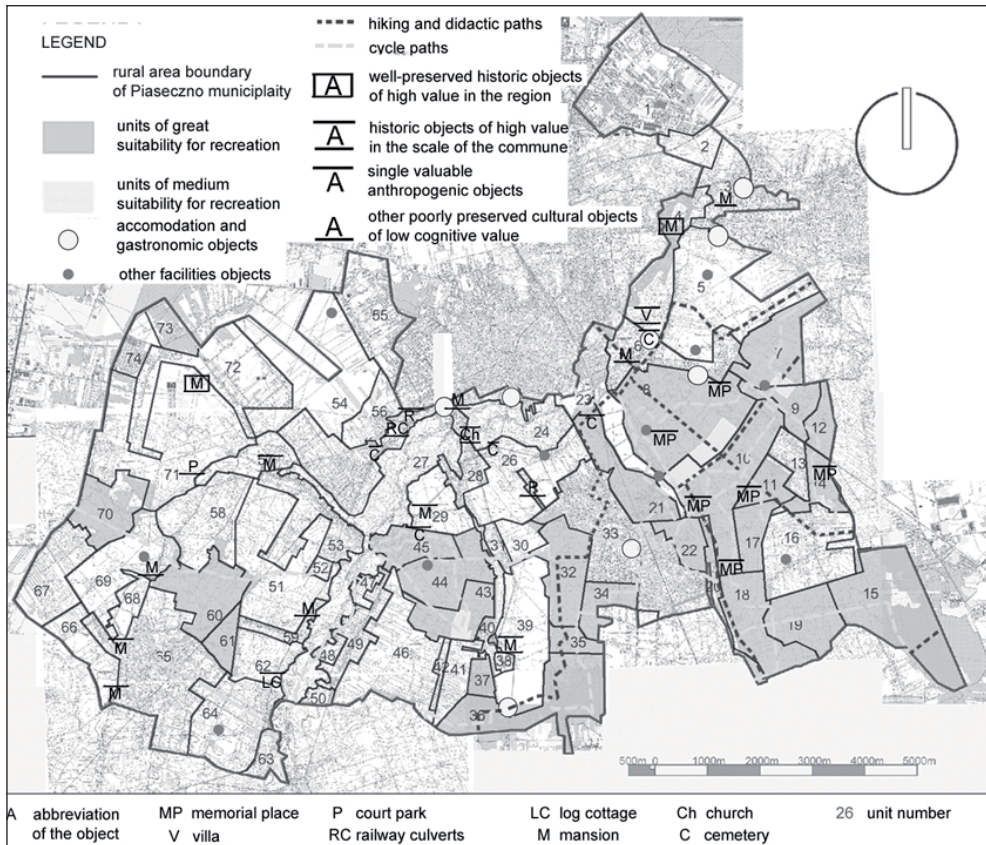


FIGURE 2. Cultural landscape (own study)

### Landscape valorization

It was done valorization using nine criteria to assessment of Piaseczno municipality landscape. Piaseczno municipality landscape is very diversified. It was distinguished four types of areas (Table 3):

- areas with high landscape values (from 15 to 22 points) – 33 units;
- areas with medium landscape values (from 10 to 14 points) – 22 units;

- areas with low landscape values (from 5 to 9 points) – 13 units;
- areas with very low landscape values (from 0 point to 4 points) – 5 units.

The spatial-landscape units with minimum 50% of the maximum number of points (min. 15 points), were considered attractive for ecotourism aspect. The results of the valorization and distribution of the spatial landscape units with high landscape values (from 15 to 22 points) are presented in Figure 3.

TABLE 3. Landscape valorization results

Number of spatial landscape units	Landscape valorization								Ecotourism infrastructure	Sum of bonitation points
	Vegetation		Land use	Terrain sculpture	Surface waters	Fauna	Forms of nature protection	Cultural values		
	Naturalness of vegetation	Usefulness of forest vegetation for recreation								
1			2		5					7
2			2				1			3
3	2		2		5		1		3	13
4	3	3	2		5		1	3		17
5	2		2				1		2	7
6	2		2		5		1	1	3	14
7	3	3				3	3		2	14
8	3	3		3	3	3	3	1	3	22
9	3	3				3	3		2	14
10	3	3		3		3	3	1	2	18
11	3	3		3	5	2	2	1	2	21
12	3	3				2	2		2	12
13	2						1			3
14	3	3			5	2	3	1	2	19
15	3	3			3	2	2		2	15
16	2		2		5	3	3		2	17
17	3	3			5	2	2		2	17
18	3	3		2		2	2		2	14
19	3	3				2	2		2	12
20	3	3	2	2	5	2	2		2	21
21	3	3	2	3		3	3		2	19
22	3	3		2		2	2		2	14
23	3	3	1		5	3	3	1	2	21
24	2		2	2	5	2	1	2		16
25	2		2	2	5		2	3	3	19
26	2		2	2	5	2	1	1	2	17
27	2		2	2	5	2	2	3	2	20
28	2		2	2	5		1			12
29	2		2			2	2	1		9
30	2					2	2		2	8



TABLE 3, cont.

31	2		1		5	2	2		2	14
32	3	3			5	2	2			15
33			1		5		2		3	11
34	3	3			5	2	2		2	17
35	3	3				2	2		2	12
36	3	3			5	2	2		2	17
37		3	1		5	2	2			16
38	2		1		5		1	2		11
39	3						2			5
40	2	3	1	2	5	2	2			17
41	2						2		2	6
42	2	3	1				2		2	10
43	3	3			5	2	3		2	18
44	3	3			5	2	2		2	17
45	3	3		2	5	2	3	1	2	21
46			2		5		1			8
47	2			2	5	2	2		2	15
48				2	5		2		2	11
49	2		1				2		2	7
50	2	3			5		2			12
51	2		2		5		1	3	2	15
52							1		2	3
53	2	3	2	2	5	2	1	3	2	22
54	2		1		5	1	1		2	12
55			2							2
56	2	3	2				1			8
57	2	3	2	2	5	1	1	1		17
58	3		2	2	5	1	1			14
59	2		2	2	5	2	2			15
60	3	3		2	5	1	1	3	2	20
61	3	3				1	1	3		11
62	2		1			2	2			7
63	2		2	2			2		2	10
64	2		2		5		2	1	2	14
65	2	3	2		3	1	1	3	2	17
66	2		1		5		0			8
67			1				1			2
68	2		2		5		1		2	12
69	2		2	2	5	1	1		2	15
70	3	3	2	2	5	1	1		2	19
71	2	3	2	2	5	1	1	3		19
72	2		2			1	1			6
73			2				1			3
74	2		2				1			5



FIGURE 3. Spatial-landscape units with high landscape values for ecotourism aspect (own elaboration based on Kulczyk and Lewandowski (2006) method (own research))

## CONCLUSIONS

The presented valorization method was used to indicate the areas of natural and cultural values of the Piaseczno municipality for the purpose of designing the ecotourism path. The application of this method may be the basis for determining the valuable natural resources of the other municipalities, e.g. agglomerations of big cities like Łódź, Poznań, Kraków. Application of this valorization method may be helpful in defining future directions of development ecosystem services of urban-rural municipalities, as well as being a determinant of a new trend in spatial landscape planning.

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**Streszczenie:** *Ocena krajobrazu w celu zaprojektowania szlaków ekoturystycznych – studium przypadku.* Ekoturystyka jest rodzajem turystyki ściśle związanej z walorami przyrodniczymi i kulturowymi danego regionu. Ten rodzaj turystyki jest idealną opcją dla osób, które chcą się zrelaksować i zwiedzić obszary pozamiejskie o wysokich walorach krajobrazowych. Bardzo ważne

jest projektowanie szlaków ekoturystycznych, które są przydatne dla celów rozwoju ekoturystyki. W artykule przedstawiono wartości przyrodnicze i kulturowe gminy Piaseczno oraz wykonano waloryzację krajobrazu w celu zwartościowania elementów środowiska naturalnego i kulturowego tego regionu. Teren opracowania podzielono na jednostki krajobrazowo-przestrzenne, a następnie sformułowano kryteria ich oceny. W ocenie zastosowano bonitację punktową w skali od 1 punktu do 5 punktów. Na podstawie otrzymanej waloryzacji wyróżniono obszary w czterech kategoriach: jednostki (obszary) o wysokich, średnich, niskich i bardzo niskich walorach krajobrazowych. Wyniki te umożliwiły wyznaczenie cennych obszarów gminy Piaseczno dla potrzeb zaprojektowania ścieżek ekoturystycznych. Badania dotyczące oceny krajobrazu są bardzo ważne dla planowania przestrzennego gmin w kontekście rozwoju m.in. ekoturystyki.

*Słowa kluczowe:* szlaki ekoturystyczne, waloryzacja krajobrazu, gmina Piaseczno

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