Pol. J. Environ. Stud. Vol. 23, No. 3 (2014), 1045-1050

Short Communication

Functions and Dysfunctions of Tourism and Recreation and How They Influence Aquatic Environments

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Received: 11 June 2013
Accepted: 29 January 2014

Abstract

Our paper proposes the evaluation of 5 select water bodies in Kraków (Bagry, Zakrzówek, Przylasek Rusiecki, and Kolna, and in the District of Krakóws water bodies formerly known as Kryspinów, currently "Zalew na Piaskach"). Their recreational values were assessed based on expert evaluation of 8 characteristics with the use of Saaty's method to attribute weight to each characteristic. SWOT analysis was also applied, focussing on the problem of uncontrolled tourism. Kryspinow, Przylasek Rusiecki, and Kolna received the highest and very similar grades in terms of tourist attractiveness (2.475, 2.447, and 2.444, respectively), Bagry was slightly less attractive (2.224), and Zakrzówek received the worst score (0.796) due to its difficult access and lack of facilities.

Keywords: water bodies, evaluation methods, tourist attractiveness, anthropogenic impact

Introduction

At the end of 19th century different forms of physical activities, including the ones related to water, became more and more popular. Since then water areas have adjusted to the needs of recreation. This has provoked changes of the natural environment caused by the developed infrastructure, as well as the very presence of tourists.

In Kraków the first water area used for tourism and recreation was the Vistula River. In 1837 at the bank of the Vistula, Ludwik Bierkowski created "bathing facilities" with dressing rooms for men and women [1]. The scale of the activities was rather small – usually fewer than 20 persons at one time. Thus the environmental impact was not significant. Apart from bathing, rowing was also popular. The first regatta was organized in 1881 [2]. More dynamic development of water-based tourism and recreation took place during the interwar period (1918-39) [3]. The bodies of stagnant water were not very interesting for the people of those times, because the Vistula River was available and very attractive. Most of the now popular water bodies did not even exist. The exception might be small ponds situated in the city parks, which were used for different purposes, including bathing [4].

The use of the bodies of stagnant waters for recreation in Krakow started in the second half of the 20th century. Over the 20th century numerous anthropogenic water bodies

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were made as a result of the exploitation of sand, gravel, or limestone [5-8]. The growing interest in recreation made it necessary to build infrastructure, which was not always well harmonized with the landscape.

The objective of this paper is to assess tourist attractiveness of select water bodies and the impact of tourism on the environment of select water bodies in Krakow and the Kraków district. Four borrow pits or their complexes (three in the city and one in the commune of Liszki) and one complex consisting of the river and oxbow lakes were selected. The selection was based on the popularity of these resorts and, consequently, high pressure on the environment. The attempt of quantitative assessment of the values of one of those water bodies (Zalew na Piaskach, formerly known as Kryspinów) has been made before [9], using eight practical criteria and four criteria related to educational values. This paper on one hand simplifies the criteria (reducing the scale of grades to 0-3, instead of 0-5), on the other hand it makes them more precise by giving weight to each criterion.

Study Area and Procedures

The following objects were selected for study:

I) Situated near the city centre:

1. Bagry – a borrow pit (about 30 ha) between the streets: Batki, Kacza, Kozia, and Kolejowa in Kraków; formed in the 1940s after the exploitation of gravel [4, 8].
2. Zakrzówek– a borrow pit situated in Quarter VIII of Dębniki (Krakow) between the rivers of Wisła and Wilga; formed in the early 1990s, after the exploitation of limestone; about 17 ha of area [4] and 30 m depth [8].

II) Situated out of the city centre (more than 10 km from the city centre:

3. Przylasek Rusiecki – a complex of borrow pits situated in Quarter XVIII of Nowa Huta (Kraków); between the streets of Tatarakowa, Rzepakowa, and Kąkolowa; the total area of the water bodies is 82.19 ha, the pond used as a bathing place is 18.57 ha.
4. Kolna (the Kolna street) – the complex situated near Tyniec (western part of Kraków, the right bank of the Vistula river. It includes the river, the oxbow lake, and some smaller water bodies. A canoeing track is there.
5. Two borrow pits between the villages of Cholerzyn and Budzyń (the commune of Liszki, Kraków District), formerly known as Kryspinów, since 1 January 2012 called "Zalew na Piaskach" and "Budzyń" [10]. In this paper the old name "Kryspinów" will be used. The area of the water bodies is: Zalew na Piaskach, 24.5 ha; and Budzyń, 20.3 ha (calculated by Wagner with the Quantum program based on a 2005 map from the Central Geodetic and Cartographic Resource), Pietrzyk-Sokulska gives 35.4ha [8] for the bigger pond. The bigger pond is shallower than the smaller one (9 and 20 m, respectively [8]).

The evaluation was based on the following criteria:

1. *Access*

How easy is to get to the area? The possibilities to get by public transport from the centre of Kraków (understood as the area of 4 km from the Main Square) as well as parking facilities were taken into account. The following grading was proposed:

3 – Direct access by public transport at least every 20 minutes and/or big car park. The admission and car-park free. This criterion was met by Bagry and Kolna.

2 – Public transport is more difficult, the price of the parking and/or admission does not exceed 10 zlotys. This criterion was met by Przylasek Rusiecki.

1 – Public transport more difficult, the price of the parking and/or admission exceeds 10 zlotys. This grade was attributed to "Kryspinów" where the prices are: 12 zlotys (regular), 6 zlotys (for children between 7 and 15), and 20 zlotys (family ticket). The car park costs 10 zlotys [11]. There are also some difficulties in getting by public transport (Table 3). Zakrzówek, with easy access by public transport, also falls into this category due to the relatively high admission fee (30 zlotys for the diver and diving instructor) and the limitation of admission [12].

0 – Practically no admission – none of the water bodies falls into this category.

2. *Sanitary facilities*

3 – Adequate number of fixed toilets, washing facilities. Requirement met by "Kryspinów" and Kolna

2 – Adequate number of portable toilets (toi-toi type) in a good shape – none

1 – Few facilities, as in Bagry – only in the restaurant "Tawerna na Hornie" or facilities in poor shape, as in Przylasek Rusiecki,

0 – No sanitary facilities for the public, as in Zakrzówek

3. *Food facilities*

3 – Many food-selling points, working for at least most of the season: "Kryspinów" and Kolna

2 – Few food-selling points, working for at least most of the season – one restaurant "Tawerna na Hornie" in Bagry working year-round

1 – Food-selling points working irregularly – Przylasek Rusiecki

0 – No food facilities – Zakrzówek

4. *Possibilities of swimming (bathing)*

3 – Organized bathing area, lifeguards most of the time, sand beach, buoys – "Kryspinów," Bagry, and Przylasek Rusiecki

2 – No swimming in the water body, but swimming pool available after paying the admission fee – Kolna

1 – Swimming allowed at one's own risk – none

0 – Swimming forbidden, apart from diving with the instructor – Zakrzówek

5. *Other forms of sport and recreation,* e.g. sailing, canoeing, diving, playing grounds, paintball, table tennis, high ropes park

Table 1. Weights matrix of attractiveness factors in assessing the water bodies in the Kraków District

		1.	2.	3.	4.	5.	6.	7.	8.
		Access	Sanitary Facilities	Food Facilities	Swimming	Other Recreation	Angling	Flora and Fauna	Landscape
1.	Access	1							
2.	Sanitary Facilities	1/3	1						
3.	Food Facilities	1/5	1	1					
4.	Swimming	5	7	1	1				
5.	Other Recreation	3	3	1/3	5	1			
6.	Angling	3	1	3	1/3	1/5	1		
7.	Flora and Fauna	1	1	3	1	1/3	3	1	
8.	Landscape	3	3	3	1	1/3	1	1	1

Table 2. The assessment of tourist attractiveness of five water bodies of the Kraków District.

Criterion	Weight	Bagry		Zakrzówek		Przylasek Rusiecki		Kolna		Kryspinow	
		Value	Weighted Value	Value	Weighted Value	Value	Weighted Value	Value	Weighted Value	Value	Weighted Value
Access	0.085	3	0.255	1	0.085	2	0.170	3	0.255	1	0.085
Sanitary Facilities	0.057	1	0.057	0	0	1	0.057	3	0.171	3	0.171
Food Facilities	0.034	2	0.068	0	0	1	0.034	3	0.102	3	0.102
Swimming	0.295	3	0.885	0	0	3	0.885	2	0.590	3	0.885
Other Sports and Recreation	0.174	2	0.348	1	0.174	2	0.348	3	0.522	3	0.522
Angling	0.118	2	0.236	0	0	3	0.354	3	0.354	2	0.236
Flora and Fauna	0.125	3	0.375	3	0.375	3	0.375	2	0.250	2	0.250
Landscape	0.112	1	0.112	3	0.336	2	0.224	1	0.112	2	0.224
Sum and rank (considering the weights)		2.224 4		0.796 5		2.447 2		2.444 3		2.4725 1	

3 – More than five kinds of activities offered – "Kryspinów" and Kolna
2 – 2-5 offers – Przylasek Rusiecki, Bagry
1 – Only one offer – Zakrzówek (diving)
0 – No offers – none

6. *Angling* – measured based on the number of anglers visiting as recorded in the reports by the Polish Angling Assocciation (R. Mazur, J. Mazur, A. Wagner – unpuplished) and an interview with Łukasz Sroka, secretary of the Kraków Angling District.

3 – Very good conditions – Przylasek Rusiecki and Kolna
2 – Moderate conditions – "Kryspinów"
1 – Tolerable conditions – Bagry
0 – Angling forbidden – Zakrzówek

7. *Flora and fauna*

3 – the presence of species included in EU Directives: Bird Directive or Habitat Directive Przylasek – presence of the white stork (*Ciconia ciconia*) – observation by Orlewicz-Musiał, Bagry – presence of the common tern (*Sterna hirundo*) – observation by Wagner, Zakrzówek – presence of the butterfly *Phengaris teleius* and the fire-bellied toad (*Bombina bombina*) [12]
2 – The presence of at least 5 species protected by Polish law, Kolna – possible presence of the species in the Habitat Directive – fire-bellied toad (*Bombina bombina*) and yellow-bellied toad (*B. variegata*) reported in Tyniec [14], but not seen in Kolna in recent years; Kryspinów falls into the same category.

Table 3. SWOT analysis of the water bodies of the Kraków District.

Area	Strengths	Weaknesses	Opportunities	Threats
Bagry	Easy access, bathing resort, rich nature	Landscape spoilted by anthropogenic influence, not very good facilities	Improvement of facilities	Rubbish deposition, noise from the railway
Zakrzówek	Landscape and nature, easy access by public transport	Very expensive admission, no offer of swimming, only diving allowed	Providing facilities	Rubbish deposition, illegal entrance, plans of building
Przylasek Rusiecki	Bathing resort, nature	Poor facilities	Improvement of facilities	Rubbish deposition
Kolna	Canoeing and other sports activities, good facilities, clean area	Landscape spoilted by anthropogenic influence, swimming only in a covered swimming pool	Further development of water sports	Possible threat to amphibian populations
"Kryspinów"	Bathing resort, various activities, good facilities,	High price for entrance, noise of motor sports, public transport from the centre of Krakow is limited (one bus line from the centre, only in morning and afternoon, other lines from the suburbs), motor sports – danger for nature and nuisance for people wanting to rest.	Separate motor sports from breeding places of birds and amphibians, develop the opportunities of reducing entrance fee for specific time of the day – e.g. late afternoon and specific customers (e. g. students, pensioners).	Uncontrolled development of motor sports (e.g. quads, motorcycles), noise from the neighbouring Balice airport.

No ponds with less than 5 species protected by the Polish law were observed (grade 1 or 0).

8. *Landscape*

3 – All the elements (relief, vegetation forms) strongly differentiated, no or little disturbance – Zakrzówek

2 – Elements of landscape moderately differentiated and/or moderate anthropogenic disturbance – Przylasek and Kryspinów

1 – Moderate diversity of landscape, significant anthropogenic disturbance – Bagry and Kolna

0 – degraded landscape – none

Then the Saaty method of hierarchic analysis [15] was applied to attribute each characteristic with a certain weight. The characteristics were compared in pairs and for each pair a more important characteristic was decided (based on the questionnaires and interviews with people visiting the object [16] and authors' observations. The following intensities of importance were considered: 1 – equal importance, 3 – moderate importance, 5 – importance, 7 – very strong importance, 9 – extreme importance. Less important characteristics of each pair take values: 1/3, 1/5, 1/7, 1/9, respectively. The proposed values are presented in Table 1.

The program by Klaus D. Goepel (http://bpmsg.com/) was applied to calculate the consistency of the attributed weights. The ratio of consistency was 0.37 (consistency acceptance α=0.1). The weights of the following characteristics were the following: the possibility of swimming – 0.295, other sports and recreation – 0.174, flora and fauna – 0.125, angling – 0.118, landscape – 0.112, access – 0.085, sanitary facilities – 0.057, and food facilities – 0.034. Then formula (1) was applied to provide the summary evaluation of the place:

$$S = \sum_{i=1}^{n} w_i \cdot x_i \quad (1)$$

...where: S – summary value, considering the ranks, w_i – weight of each characteristic, x_i – value, regarding the criterion.

Apart from quantitative methods, a SWOT analysis was applied. Based on observations, interviews, and previous studies [16-18] the attractiveness of each area and the possible threat to the environment were examined.

Results

The results of the quantitative assessment are presented in Table 2. The water bodies of "Kryspinow," Przylasek Rusiecki, and Kolna received the highest and very similar grades in terms of tourist attractiveness (2.475, 2.447, and 2.444, respectively). Bagry was slightly less attractive (2.224) and Zakrzówek received the worst score (0.796) due to the difficult access and the lack of facilities. The results of the SWOT analysis are presented in Table 3.

Discussion of Results

The selection of the criteria resulted in the highest grades for the water bodies under relatively high anthropogenic pressure. Organizing facilities of different types increases the attractiveness of the area. It also forces the managers of the area to keep it clean.

Care for the environment is particularly seen in Kolna, where rubbish is collected in separate containers for recycling and solar energy is used to maintain the facilities. On the other hand, mass tourism in many areas (Bagry, Przylasek, "Kryspinów") may cause uncontrolled rubbish deposition and possible water pollution [18]. The vicinity of roads and car parks causes air pollution, but due to the dust, also water and soil pollution. Particularly acute is the problem of the development of motorized sports in "Kryspinów" [17].

The authors propose more organized activities in places like Przylasek Rusiecki and Zakrzówek to keep the visitors out of uncontrolled penetration of the areas valuable from the point of view of the environment (e.g. resulting in threatening of animals, destroying plants, and depositing rubbish). Information tables about the wildlife are necessary in all the places to raise environmental awareness. The way to do so is planning didactic routes in the area of Kraków, including natural and cultural values [19, 20]. A comprehensive approach is recommended in the process of revitalization of the Podgórze district, where Bagry, together with another borrow pit (Staw Płaszowski) is an important element of ecological values as well as a place of recreation [21]. Better management of the areas all the year round can be achieved by the stimulation of human activities related to qualified tourism, e.g. sports like diving [22] and ice swimming (M. Orlewicz – personal experience and observation).

International co-operation can also contribute to revitalization of areas situated near waters. The example can be European projects with the co-operation within the Union des Terres de Rivieres.

Acknowledgements

This paper was financed by the Prace Statutowe grant No. AGH 11.11.150.949. The authors wish to thank Dr. Wojciech Drzewiecki for his advice referring to the quantitative analysis and to Mr. Łukasz Sroka for information about angling in the Kraków District.

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