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VALUATION OF LAKE ECOSYSTEMS OF CENTRAL POMERANIA BY YOUNG PEOPLE USING THE CONTINGENT VALUATION METHOD

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ABSTRACT: The article presents the results of the survey using the Contingent Valuation Method. The aim of the research was to estimate the value of selected lake ecosystems of Central Pomerania by determining the willingness to pay for recreational use of the beach with the swimming area by people aged from 18 to 21 years. The research shows that 90% of the surveyed group declares their willingness to pay. The highest amounts are offered by young inhabitants of Szczecinek City and Szczecinek County. On the other hand, tourists resting in Central Pomerania value lake ecosystems most often on the basis of aesthetic values, without knowing the ecological condition of the lake. The average ticket price which the respondents are willing to pay is PLN 20.40 per day. The lower the ecological condition of the lake, the lower the willingness to pay, especially among the inhabitants of the region under study. The amounts declared constitute important information for lake managers who are able to compare the costs incurred so far with the potential profits from ticket sales. Moreover, thanks to the use of the Contingent Valuation Method, it is possible to determine which lakes have the highest value for recreationists and to manage them in such a way as to prevent their degradation in the future and, consequently, to prevent the deterioration of the value of ecosystem services.

KEY WORDS: ecosystem services, lakes, recreation, Contingent Valuation Method, Willingness To Pay

Introduction

The concept developed by Hardin (1968) called the tragedy of the common pasture shows that a common good may be destroyed if it is used by too many people. The lake ecosystems subjected to tourist use are a good example of goods affected by this social trap. Degraded ecosystems are losing value and the number and quality of services they provide is declining (Bernaciak, Cichoń, 2012). The problem of inappropriate lake management, especially in lake areas whose development depends on services provided primarily by lake ecosystems, is becoming more and more frequent. The inhabitants of these areas should be aware of this dependence, which should translate into willingness to take up costs. Young people should be particularly interested in the condition of lakes, as they make up 80% of all holidaymakers and, at the same time, will assume responsibility for their administration in a few years' time. It is difficult to determine what the management of lakes by the next generation will look like, because there is no research in this area, but the existing research indicates that young people opt for a consumer-oriented approach. This finding has been corroborated by the research carried out by, among others, Cichoń (2008). In her opinion, young people are guided by economic arguments, and in the hierarchy of values, biotic and abiotic elements of nature occupy the last place.

Therefore, the aim of the present study is to estimate the value of the ecosystems of coastal zones of lakes in Central Pomerania by young people in accordance with the assumptions of the Contingent Valuation Method. The Contingent Valuation Method is one of the commonly used methods of environmental valuation taking into account the degree of willingness to pay. According to Rauba (2016), it is based on surveys conducted among respondents interested in a given good or service. During the survey, respondents were asked how much they would be willing to pay for access to a given good or service (i.e. what is their Willingness To Pay – WTP). In the literature there are numerous publications in which the Contingent Valuation Method has been applied, for example in the works of Żylicz et al. (1995), Ligus (2008), and Wróblewska (2014).

In accordance with the assumptions of the Contingent Valuation Method, each respondent should declare their willingness to pay for one day of recreational use of a selected coastal zone (beach with a swimming area), knowing that the funds obtained from ticket sales would be spent on maintaining or improving the ecological condition of the coastal zone of the lake. In this context Directive 2000/60/EC of the European Parliament and of the Council of

23 October 2000 serves as the reference document defining the parameters of the ecological status of water.

Research area and methods

The survey and interviews were conducted in the years 2006-2017 on a group of over 1000 respondents living and resting in Central Pomerania (figure 1). The selection of respondents was random. The study conducted by the present author analyzed the results of questionnaires from 2014 and 2015 only.

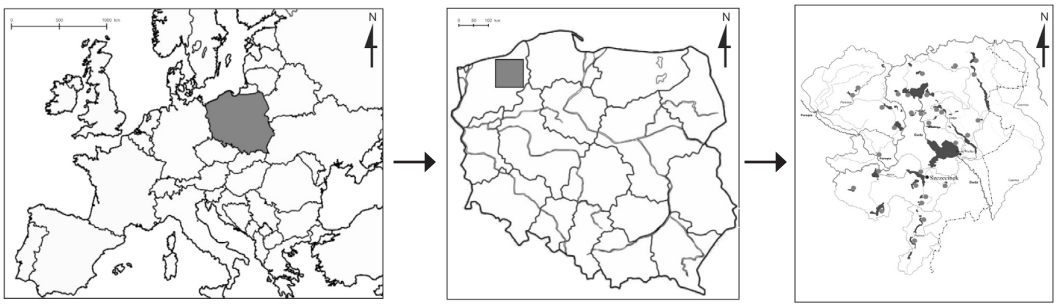

Figure 1. Location of the research area

Source: author's own work.

Two assumptions were made to corroborate the assumptions: the first one – respondents were aged from 18 to 21 years, and the second one – their place of residence was different. The respondents were divided into four groups: residents of the Szczecinek City, residents of the Szczecinek county, residents of the Western Pomeranian Region and respondents representing tourists from all over Poland. Each group was populated with 20 respondents. The detailed analyses included the results of 80 people in total. Due to the size of the sample, the present study is a pilot study, and it should serve as a departure platform for further research. In the research procedure, each of the 80 respondents were first asked to complete a questionnaire, where they determined, among other things, the frequency of rest at a given lake, factors determining the choice of beach and swimming area as a place for rest, beliefs and actions in the field of lake protection. The respondents were additionally asked to select the most beautiful beach and swimming area from among eleven shown to them in the photographs (two beaches and swimming areas, at Lake Wierzchowo and Lake Trzesiecko, were used twice), and subsequently they were asked to determine the amount that would be

willing to pay for one day of recreational use of the beach and swimming area of their choice, knowing that the funds obtained from ticket sales would be spent on maintaining or improving the ecological condition of the shore. Thanks to the metric included in the survey (gender, age, education, net monthly salary, place of residence) it was possible to analyze the results.

Results

Exactly 90% of young respondents declare their willingness to pay for the use of the beach and the swimming area. People living in Szczecinek and in the Szczecinek County are willing to pay PLN 24.90 and PLN 24.70, respectively, for rest on a selected beach, while residents of the region of Western Pomerania are willing to pay PLN 19.20 and tourists from other areas of Poland are willing to pay PLN 19.60.

Table 1. Average ticket price declared by four groups of residents for recreational use of a selected beach [person/day]

Photo	Lake	Residents of Szczecinek	Residents of the Szczecinek County	Residents of the Western Pomeranian Region	Residents of Poland
1	Lake Wierzchowo	15.0	0	0	4.0
2	Lake Czarne	25.0	0	0	0
3	Lake Sarcze	0	80.0	5.0	0
4	Lake Trzesiecko	0	0	0	10.0
5	Lake Białe	12.6	1.0	28.0	0
6	Lake Wielimie	10.0	5.0	3.0	13.8
7	Lake Radacz	0	45.0	0	60.0
8	Lake Wierzchowo	1.0	17.5	2.5	5.0
9	Lake Spore	40.0	0	0	5.0
10	Lake Łobez	26.0	38.8	22.5	21.6
11	Lake Trzesiecko	32.7	9.2	31.7	13.3

Source: author's own work.

In the opinion of almost 30% of the respondents the most beautiful beach is located in Szczecinek on Lake Trzesiecko (figure 2). This group included mainly tourists from various regions of Poland (7/20 persons), the Region of Western Pomerania (6/20 persons) and the Szczecinek county (6/20 per-

sons). The average ticket price is PLN 21.80 (figure 2) and PLN 10.00 (figure 3). The residents of the Region of Western Pomerania were willing to pay the highest price for the ticket to access the beach in Szczecinek shown in Photo 1 – PLN 31.70, whereas the inhabitants of the Szczecinek County were willing to pay the lowest price – PLN 9.20 (table 1). The willingness to pay the lowest price was motivated by the knowledge shared by the residents about the low quality of lake water (table 2) and numerous investments carried out in order to aerate the waters of Lake Trzesiecko (figure 3).

Figure 2. Beach in Szczecinek on Lake Trzesiecko

Source: author's own work.

Figure 3. Contaminated water of Lake Trzesiecko on the beach in Szczecinek

Source: author's own work.

The second beach, which enjoyed great interest, was the developed city beach and swimming area in Biały Bór on Lake Łobez (figure 4). Nearly 19% of the respondents, mainly from the Szczecinek County and the Region of Western Pomerania, voted for this artificial beach. The average price which they would be willing to pay was PLN 26.60 (table 2).

Figure 4. City beach in Biały Bór on Lake Łobez Figure 5. Beach in Spore by Spore Lake

Source: author's own work.

Figure 5. Beach in Spore by Spore Lake

Source: author's own work.

The most varied choices appeared among young residents of Szczecinek (tables 1 and 2). Apart from the two coastal zones mentioned above, they indicated the beach and the swimming area on Spore Lake (figure 5) in Spore (4 out of 20 people), and the average price they were willing to pay was PLN 40. Respondents also liked the beach on Lake Białe; they were willing to pay PLN 13 for its use. On the other hand, young residents of the Szczecinek County (4 out of 20 people) highly valued the beach and swimming area on Lake Wierzchowo (table 2) proposing to pay an average of PLN 17.50 per ticket and PLN 9.60. The beaches and swimming areas on Lake Białe and Lake Wierzchowo were among the most valuable ones according to the choice made by the residents of the Region of Western Pomerania. On the other hand, tourists representing all Poland also picked Lake Wielimie with the beach in Gwda Wielka, but the amount they were willing to pay was among the lowest ones, i.e. PLN 8.90. Taking into account all the values indicated in the case of this beach, they reduced the price of the ticket to PLN 9.60 (table 1). The relatively low value of this beach results from its poor accessibility, despite its very charming location and class II water purity.

Table 2. Willingness to pay for the use of the beach, average amount in PLN [person/day] taking into account the ecological condition of the lakes (Directive 2000/60/EC, 2000): I – very good, II – good, III – moderate, IV – poor, V – bad

Photo	Lake	Ecological condition of lake waters	Percentage of respondents interested in the coastal zone	Minimum ticket price	Maximum ticket price	Average ticket price
1	Lake Wierzchowo	II	3.8%	4	20	17.50
2	Lake Czarne	II	2.5%	20	30	25.00
3	Lake Sarcze	II	3.8%	0	80	30.00
4	Lake Trzesiecko	IV	1.2%	10	10	10.00
5	Lake Białe	II	8.8%	1	50	17.60
6	Lake Wielimie	V	10.0%	1	20	8.90
7	Lake Radacz	III	3.8%	40	60	30.00
8	Lake Wierzchowo	II	11.3%	0	50	9.60
9	Lake Spore	II	8%	0	100	27.50
10	Lake Łobez	II	18.8%	4	80	26.60
11	Lake Trzesiecko	IV	28.8%	0	100	21.80

Source: author's own work.

The above results confirm the practical approach of young respondents to choosing the beach as a place of rest. The better developed the beach, the greater the willingness to pay for the use of recreational services. The results confirm earlier studies that the individual assessment of the resting person is determined by the ability of the place to meet specific needs. If we take into account the needs of contemporary youth, including the availability of beaches and recreational infrastructure, urban beaches meet their expectations. However, if we compare the average ticket prices presented in this study (tables 1 and 2) to the average ticket prices declared by respondents from Central Pomerania aged 15 to 80 in 2011 (Bernaciak, Cichoń, 2013), we will notice that young people begin to appreciate the cleanliness of the beach and swimming area. For example, in 2011 the average ticket price for using the coastal zone of Lake Wierzchowo in one day was PLN 13.50, and in 2014-2015 – PLN 17.50 (table 2). Another example concerns Lake Spore – in 2011 the average ticket price was PLN 18.90, while in 2014-2015 – PLN 27.50 (table 2).

Table 3. Valuation of ecosystems in selected coastal zones of lakes (beaches and swimming areas) and the potential amount possible to obtain from ticket sales in the summer season

Photo	Lake	Average ticket price [PLN]	Average number of people per day	Average number of rest days	Revenue from ticket sales [PLN]
1	Lake Wierzchowo	17.50	55	40 days	38 500
2	Lake Czarne	25.00	15	20 days	7 500
3	Lake Sarcze	30.00	40	35 days	42 000
4	Lake Trzesiecko	10.00	30	10 days	3 000
5	Lake Białe	17.60	5	15 days	1 320
6	Lake Wielimie	8.90	75	50 days	33 375
7	Lake Radacz	30.00	20	30 days	18 000
8	Lake Wierzchowo	9.60	15	15 days	2 160
9	Lake Spore	27.50	30	35 days	28 875
10	Lake Łobez	26.60	65	40 days	69 160
11	Lake Trzesiecko	21.80	70	40 days	61 040
		20.40			304 930

Source: author's own work.

These examples show that despite difficulties in accessing the two lakes and travel costs incurred (about 15 km), young people choose to rest at a clean lake, often at the expense of infrastructure. According to Bernaciak and Cichoń (2013) lakes with a low level of pressure are perceived as worthy of higher expenditure.

To sum up, the willingness to pay for the use of a selected beach per day amounted on average to PLN 20.40 for all respondents. Assuming that mainly young people (80% of holidaymakers) will want to use paid beaches, lake shore zone managers will receive over PLN 300,000 in season tickets (table 3). For comparison, the cost of aeration and restocking Lake Trzesiecko is PLN 400,000 per year.

Conclusions

Studies on the valuation of lake ecosystems on the basis of photographs conducted among four groups of young people indicate differences in the valuation of ecosystem services. Young people, who do not live in Central Pomerania but only rest there, assessed the lakes from the aesthetic point of view, while the inhabitants of the region assessed them with regard to ecological condition and accessibility. Hence the differences in the declared ticket prices between the inhabitants of Szczecinek City and Szczecinek County and tourists from Poland and the region. It is difficult to determine the reliability of the declarations made by the surveyed youth, especially as the increase in willingness to pay does not correlate with age or income, but rather with the presence of tourist infrastructure and attachment to the place of residence. Nevertheless, the average ticket price of PLN 20.40 per day seems to indicate a high level of willingness to pay for the use of the beach and the swimming area. Comparing the amount of PLN 300,000 with the costs of maintaining the ecological condition of one lake, the value of selected lake ecosystems seems relatively low. For comparison, the total willingness to pay of the local population in Finland at Lake Pielinen amounts to about EUR 240,000 – 440,000 per year (Lehtoranta et al., 2013).

The results show that lakes, especially Lake Trzesiecko and Lake Łobez, are treated by young people as a common good that can be used for recreational purposes. Young people are aware of which economic operators are polluting the lakes, so when lakes are being degraded, they are more likely to spend money on travel and change their place of rest than to rehabilitate a reservoir. The solution, however, is not to look for another place to develop a new beach and a new swimming area, but to ensure that the recreational use of the lakes is evenly distributed. Thanks to appropriate environmental edu-

cation and social participation, young people should understand that lakes, together with resource, regulatory, supporting and cultural services, constitute a "natural capital" for the next generations of Central Pomerania.

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