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FACTORS MODIFYING WILLINGNESS TO INCUR EXPENSES FOR THE BENEFIT OF THE WIELKOPOLSKI NATIONAL PARK

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CZYNNIKI RÓŻNICUJĄCE SKŁONNOŚĆ RESPONDENTÓW DO PONOSZENIA KOSZTÓW NA RZECZ WIELKOPOLSKIEGO PARKU NARODOWEGO

STRESZCZENIE: Celem niniejszej pracy było określenie inklinacji mieszkańców do ponoszenia opłat za możliwość korzystania z Wielkopolskiego Parku Narodowego. Materiały źródłowe do realizacji postawionego problemu pozyskano podczas badań w formie wywiadu standaryzowanego, przeprowadzonego w latach 2012-2013 wśród mieszkańców miejscowości położonych w obrębie gmin, w których zlokalizowany jest WPN oraz mieszkańców Poznania bezpośrednio sąsiadujących z tymi gminami. W pracy zastosowano model logitowy. Z otrzymanych rezultatów wynika, że na wielkość deklarowanej kwoty za możliwość korzystania z WPN mają wpływ następujące zmienne: wiek respondenta, poparcie wydatków ekologicznych oraz przynależność do organizacji ekologicznych.

SŁOWA KLUCZOWE: wycena dóbr środowiskowych, metoda wyceny warunkowej, metoda logitowa

Introduction

Environmental protection is focused first of all on human needs. Its objective is not to counteract the economic progress of the society, but to prevent and minimise negative effects of this activity. Requirements of protection of environmental value result from many reasons; however, all of them may be included in the sustainable development policy. Due to the fact that it is in the best interest of the society to appropriately utilise environmental resources, it is crucial to ensure sustainability of the environment and its elements. At the same time, as a result of an insufficient awareness of interrelations between economy, the society and the environment the implementation process of sustainable development has been slow. Actions aiming at the protection of nature surrounding us following the principle of sustainable development are multifaceted and one of its forms is to establish surface nature conservation forms such as e.g. national parks.

The reason for the establishment of the National Park of Wielkopolska in 1957 was to protect postglacial landscapes and semi-natural forests located in that area. Ideal conditions for recreation and leisure, as well as the immediate vicinity of a large municipal centre have resulted in an enhanced activity of tourists and individuals interested in settling in the vicinity of the park. Anthropopressure may lead to overexploitation of the natural environment and eventually to its degradation. Threats resulting from the recreation use of protection areas are likely to become more serious as a result of increasing human activity and mobility.

It is believed that environmental resources are priceless; however, since they are limited, it is necessary to instill in the general public the awareness of their great importance for the economy and the extensive effect on the overall quality of life. The best method to present these interdependencies in the most convincing manner is to allocate money value to environmental resources. This process aims not only at enhancing the public awareness, but also at estimating the value assumed for the environment and other public goods, typically not subjected to their market appraisal. Determination of the money value contributes to the promotion of green lifestyles, it facilitates more effective management of expenditure on environmental protection, e.g. as a result of determination of the potential environmental impact of investments on individual elements of the environment as perceived from the human point of view.

However, it still needs to be remembered that a reliable appraisal requires in-depth knowledge and faces significant obstacles, resulting mainly from the general belief that money may not fully reflect the comprehensive value of environmental goods. Moreover, we also need to consider the fact that estimation of environmental value is developed thanks to the creation of new appraisal techniques, including additional socio-economic conditions connected with nature conservations forms.

The first surveys concerning consumer preferences were conducted in the 1940's. They concerned consumer purchases in studies conducted by the US Federal Reserve System¹. The first surveys presenting consumer preferences in relation to environmental goods were carried out by Bowen 1943², and Ciriacy – Wantrup 1947³.

In Poland the first publications focusing on the economic value of the natural environment concerned forested areas⁴. They were studies by employees of the Forest Research Institute in Warsaw, discussing appraisal of non-economic functions of forests. Among authors investigating this problem we need to mention Marszałek⁵, Klocek⁶ and Gołoś⁷.

In turn, the contingent valuation method was applied for the first time in studies concerning protection of the Baltic Sea against excessive discharge of such substances as nitrates and phosphates. Recorded results showed how much Poles would be willing to pay to protect the Baltic and its beaches against negative effects of eutrophication⁸. More recent research using the contingent valuation method has concerned e.g. willingness to pay for cleaner water in rivers and for consumer use or willingness to pay for improved protection of the Białowieża Forest⁹.

The aim of this study was to determine the willingness of inhabitants to pay fees for the use of the National Park of Wielkopolska (NPW).

The scope of study and methods

The scope of this study included an analysis of the material collected from 1400 respondents during standardised interviews and mail questionnaires.

The questionnaire consisted of three parts. In the first part questions concerned general information on NPW (the knowledge, frequency of visits, the im-

¹ F.T. Juster, *Consumer buying intentions and purchase probability: an experiment in survey design*, "Journal of the American Statistical Association" 1966 no. 61, p. 658-696.

² H.R. Bowen, *The interpretation of voting In the allocation of economic resources*, "Quarterly Journal of Economics" 1943 no. 58, p. 27-48.

³ S.V. Ciriacy-Wantrup, *Capital returns from soil-conservation practice*, "A Journal of Farm Economics" 1947 no. 29, p. 1181-1196.

⁴ A. Zydroń, K. Szoszkiewicz, *Wartość środowiska a gotowość społeczeństwa do zapłacenia za to dobro*, "Annual Set The Environment Protection" 2013 no. 15, p. 2874-2886.

⁵ T. Marszałek, *Szacowanie pozagospodarczej wartości lasów, parków narodowych i rezerwatów przyrody*, „Sylwan” 1976 no. 3, p. 33-45.

⁶ A. Klocek, *Pozaprodukcyjne funkcje lasu – dobra publiczne gospodarki leśnej*, „Sylwan” 1999 no. 11, p. 5-20.

⁷ P. Gołoś, *Wycena wartości ekonomicznej rekreacyjnej funkcji lasu na przykładzie Leśnego Kompleksu Promocyjnego Gostynińsko-Włocławskiego*, rozprawa doktorska, Warszawa 1998.

⁸ F.T. Juster, *Consumer buying intentions and purchase probability: an experiment in survey design*, "Journal of the American Statistical Association" 1966 no. 61, p. 658-696.

⁹ M. Czajkowski, *Nośniki wartości dóbr środowiskowych*, rozprawa doktorska, Warszawa 2008, p. 302.

portance of NPW for visitors, preferred forest type), while the second part comprised questions related to the willingness of respondents to incur costs for the sake of the environment (voluntary allocation of funds for the possibility to use the NPW value or possible compensation for a lack of such a possibility, alternatively if the respondents declared no amount they would pay, whether they would provide volunteer work for NPW). In turn, the third part included socio-economic characteristics of respondents (their sex, age, profession, net income per family member, education, place of residence). Results were verified and in this way questionnaires containing no answers to key questions were eliminated. Finally an ordered, verified matrix was prepared with answers of the respondents, comprising results of 577 interviews. Based on the answers of the respondents the following variables were identified, as described in Table 1.

Table 1
Dependent variables which explain the declared amount of money for the use of NPW

Explanatory variable	Unit	Symbol	Theoretical assumption
Frequency of visits in the National Park of Wielkopolska	0 – never, 1 – once a year, 2 – several times a year, 3 – once a month, 4 – once a week, 5 – more frequently	x_1	+
Knowledge on the National Park of Wielkopolska	0 – practically almost none, 1 – poor, 2 – moderate, 3 – good, 4 – very good	x_2	+
Willingness to work for the sake of the National Park of Wielkopolska	1 – 1 day, 2 – 2 days, 3 – 5 days, 4 – 7 days, 5 – more days	x_3	+
Age	1 – below 18 years, 2 – 18-25 years, 3 – 26-40 years, 4 – 41-60 years, 5 – over 60 years	x_4	+
Residence in terms of population size	1 – village, 2 – town up to 20 thousand inhabitants, 3 – town – from 21 thousand to 100 thousand, 4 – city over 100 thousand	x_5	+-
Mean net income per person	1 – up to 100 PLN 2 – 100-200 PLN 3 – 200-500 PLN 4 – 500 PLN – 1000 PLN 5 – 1000-2500 PLN 6 – over 2500 PLN	x_6	+-
Education	1 – elementary, 2 – vocational, 3 – secondary, 4 – higher	x_7	+-
Opinion on financial requirements of environmental protection	1 – moderate, 2 – I am for it, 3 – I am all for it, -1 – I am against, -2 – I am strongly against it	x_8	+
Affiliation to environmental organisations	1 – I am not a member, 2 – I used to be a member, 3 – I am a passive member of environmental organisations, 4 – I am an active member of environmental organisations	x_9	+
Distance from NPW	[km]	x_{10}	-

(-) – negative effect on the the declared amount of money

(+) – positive effect on the the declared amount of money

Source: own elaboration.

Logit model

When selecting explanatory variables the theoretical assumptions were as follows: the amount of the declared fee for the possibility to use NPW will be positively affected by: frequency of visits to the National Park of Wielkopolska, knowledge on the National Park of Wielkopolska, willingness to offer days of volunteer work for the National Park of Wielkopolska, age, financial requirements of environmental protection and affiliation to environmental organisations. In turn, a negative effect on the explanatory variable was expected in the case of distance from NPW. Additionally it was stated that the population size of the place of residence, education and mean net income per person should not influence the declared amount for the possibility to use NPW.

The outlined objective was analysed using the logit method¹⁰, which makes it possible to describe dependencies between frequencies of individual variants of the explained variable and selected explanatory variables. For the purpose of analysis of the amount declared for the possibility to use NPW a model was constructed, in which values of the explained variable (y) were presented in the nominal scale, i.e. 0 denotes the answer of 0 PLN, 1/7 – 10 PLN, 2/7 – 25 PLN, 3/7 – 50 PLN, 4/7 – 100 PLN, 5/7 – 200 PLN, 6/7 – 300 PLN and 7/7 – 400 PLN. It was assumed that variation in the declared amounts for the possibility to use NPW may be expressed by the equation:

$$y = \frac{\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_{10} x_{10})}{1 + \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_{10} x_{10})} \quad (1)$$

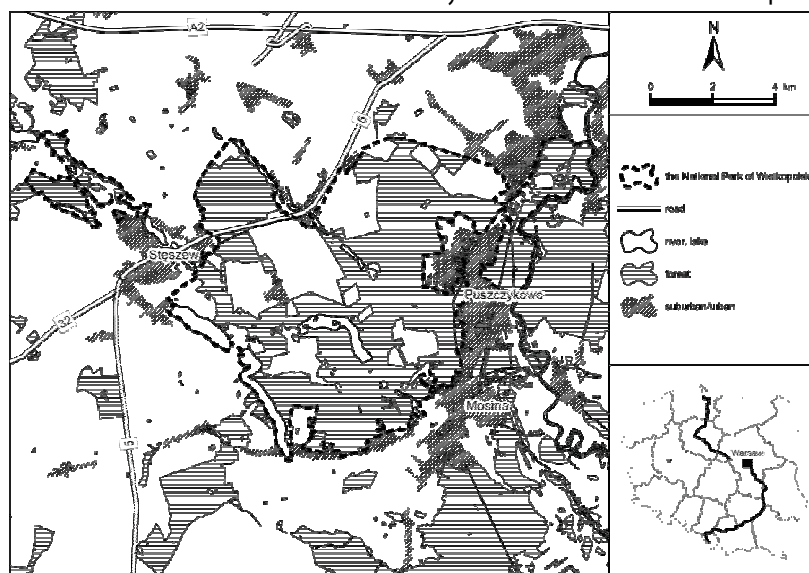
where: $\beta_0, \beta_1, \dots, \beta_{10}$ are unknown regression coefficients, which were determined using the maximum likelihood method. In this analysis the calculations were performed using the *Statistica* 10.0 programme.

Characteristic of the study area

Source materials for the realisation of the presented problem were collected in the course of standardised interviews performed in the years 2012-2013 with inhabitants of towns located in communes, within which NPW is situated and with the inhabitants of Poznań, neighbouring these communes. The Park is located at a distance of approx. 15 km south from the centre of Poznań (Figure 1). NPW was established in 1957 in order to protect various forms of post-glacial landscape and the most natural plant communities, as well as associated animal species. At present the area of NPW is 7 584 ha, while including the protection zone it is 14 840 ha. It is estimated that over 1 million tourists visit the National Park of Wielkopolska annually. The Park comprises approximately 85 km hiking trails, 100 km cycling paths and 30 km horse-riding trails.

¹⁰ A. Markowska, T. Żylicz, *Costing an international public good: The case of the Baltic sea*, "Economic Economics" 1999 no. 30, p. 301-316.

Figure 1
Location of the study area – the National Park of Wielkopolska



Source: own elaboration.

Results and discussion

A logit model was constructed in order to predict the declared amount of money to be paid for the use of NPW and to indicate which of the analysed factors will have a significant effect on this variable. Table 2 presents results of this modelling.

Analyses showed that the declared amount of money for the use of NPW depends on the following variables: age of respondents, their opinion on financial requirements of environmental protection and affiliation to environmental organisations. A positive effect on the investigated phenomenon was connected with the age of respondents (older individuals declared higher amounts), while a negative effect was found for the other two factors. In the case of respondents acknowledging the necessity to allocate large amounts of money for environmental protection, the personally declared amount of money for the use of the Park was very low. They acknowledged that environmental protection requires high outlays, but it is not the local community using the NPW services that should be burdened with additional costs. This may result from the fact that local communities on the one hand believe that they are interested in ecology and that nature is a value by itself, while on the other hand they do not suffer consequences of their actions and at the same time they feel excused from responsibility for a given problem¹¹.

¹¹ J. Herink, *Odpowiedzialność ekologiczna a komunikacja marketingowa*, "Annual Set The Environment Protection" 2013 no. 15, p. 2799-2810.

Table 2
Regression coefficients in the model describing the declared amount of money for the use of NPW

Explanatory variable	Symbol	Assessed regression coefficient	Empirical level of significance
Constant	-	0.686	0.241
Frequency of visits in the National Park of Wielkopolska	x_1	-0.099	0.198
Knowledge on the National Park of Wielkopolska	x_2	-0.146	0.188
Willingness to work for the sake of the National Park of Wielkopolska	x_3	-0.023	0.723
Age	x_4	0.418	< 0.001
Residence in terms of population size	x_5	-0.112	0.149
Mean net income per person	x_6	-0.108	0.069
Education	x_7	0.157	0.132
Opinion on financial requirements of environmental protection	x_8	-0.449	< 0.001
Affiliation to environmental organisations	x_9	-0.394	0.023
Distance from NPW	x_{10}	-0.393	0.063

Source: own elaboration.

Studies conducted by Mitchell, Carson¹² and Nowacki¹³ showed that the amount declared for the use of the environment value depend on income, education, profession, the composition of the group of visitors, demographic and psychographic factors. Moreover, this amount to a considerable extent is dependent on the features of the attraction itself, such as quality of services and infrastructure.

When analysing the assessed regression coefficients it was stated that similar opinions were expressed by members of environmental organisations. They also declared low amounts of money to be paid for the use of NPW. A similar problem was investigated in their study by Królikowska, Królikowski¹⁴, who examined the introduction of fees for discharge of precipitation and snowmelt water. It was not a simple problem, as evidenced by the fact that very few municipal sewage and utility companies decided to introduce fees for precipitation water discharge.

¹² R.C. Mitchell, R.R. Carson, *Using surveys to value public goods: the contingent valuation method resources for the future*, Washington DC 1989; N.A. Powe, K.G. Willis, op. cit.; K. Kawagoe, N. Fukunaga, op. cit.

¹³ M. Nowacki, *Skłonność do zapłaty a cena wstępu do atrakcji turystycznej*, „Zeszyty Naukowe Uniwersytetu Szczecińskiego” 1999 no. 568, „Ekonomiczne Problemy Turystyki” no. 13.

¹⁴ J. Królikowska, A. Królikowski, *Opłaty za odprowadzanie wód opadowych – potrzeby i możliwości*, „Annual Set The Environment Protection” 2013 t. 15, p. 1143-1152.

When analysing values of empirical significance levels presented in Table 2 for the mean net income per family member and the distance from NPW a trend may be observed for the negative effect on the investigated explanatory variable. It is highly likely that willingness to support NPW decreases with an increase in income in the general public. Similarly, we have concluded that with an increase in the distance of the place of residence from NPW the willingness to pay for the benefit of NPW decreases. Such conclusions were also reached as a result of other mathematical analyses, i.e. canonical analysis of correspondence¹⁵.

In the case of other investigated sociological characteristics, such as the frequency of visits to NPW, knowledge on the National Park of Wielkopolska, willingness to offer volunteer work for NPW and education, no interdependencies were found with the declared amount to be paid for the use of the National Park of Wielkopolska.

Following the opinion of Czajkowski¹⁶ it may be stated that the contingent valuation method based on responses of the interviewees, who declared their action in a hypothetical situation, facilitates considerable flexibility and valuation of goods, for which there is no market and which may not be appraised otherwise. This method makes it possible to assess the significance of individual characteristics of protected areas and verify willingness to pay for them.

Conclusions

1. The declared amount of money for the use of NPW depends positively on the age of the respondents, while it is negatively dependent on their opinion on the financial requirements of environmental protection and affiliation to environmental organisations.
2. Mean net income per family member and the distance from NPW show a trend towards a negative effect on the amount of money declared for the use of NPW.
3. No interdependence was found between the amount of money declared for the use of NPW and the frequency of visits to NPW by the respondents, their education, knowledge on the National Park of Wielkopolska and their willingness to provide volunteer work for the Park.

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¹⁵ A. Zydroń, K. Szoszkiewicz, *Wartość środowiska a gotowość społeczeństwa do zapłacenia za to dobro*, "Annual Set The Environment Protection" 2013 no. 15, p. 2874-2886.

¹⁶ M. Czajkowski, *Nośniki wartości dóbr środowiskowych*, rozprawa doktorska, Warszawa 2008.