Quantification of the economic value of the recreational function of forests in the territory of Městské lesy Hradec Králové a.s.

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Abstract: This article aims at the valuation of the potential and economic significance of the recreational ecosystem services of forests. The research was conducted in the area of Městské lesy Hradec Králové a.s. in 2018. A part of the questionnaire survey assessed by means of statistical analysis was based on the travel cost method and the contingent valuation method, which investigate the respondents' willingness to pay for services resulting from the recreational ecosystem service of forests. The research specifically dealt with the visitors' willingness to pay for the services resulting from the use of forest logging roads, forest clearings, and small structures of forest infrastructure. The questionnaires were created using foreign publications and case studies. The findings of the questionnaire survey indicated that visitors prevailingly believed that the recreational service provided by the area of interest should not be chargeable. The reason for this opinion was mainly the fact that the visitors perceive the forests in the territory of Městské lesy Hradec Králové a.s. as public goods, hence the access to them should be free of charge.

Keywords: economics; forestry; questionnaire survey; statistical analysis; recreational function; case study

This paper aims to apply a statistical analysis to valuate the findings of selected categories of a questionnaire survey carried out in the territory of Městské lesy Hradec Králové a.s. (hereinafter referred to as "Městské lesy Hradec Králové") within the scope of research focused on the economic valuation of the recreational potential of forest ecosystems. It concentrates on determining the visitors' willingness to pay for the use of forest logging roads and bike paths within a part of the territory of the forest enterprise for recreational purposes.

The recreational use of an area is often linked to the notion of tourism.

Tourism, like any other human activity, impacts the community and the place where it is actively performed. Although the term 'impact' often has a negative connotation, the impacts are not always necessarily detrimental. In fact, tourism can have a positive socioeconomic impact on the place of interest and, in some cases, it can even have positive impacts on the environment (Lück 2008).

Despite the opinions on its impacts are still rather conservative, obviously tourism seems to be the major economic driver throughout the world (Weaver 2001).

Forests represent an ideal place for tourist activities of various kinds. Thus, forests fulfil their so-

called recreational function, which belongs to socioeconomic ecosystem services.

Ecosystem services are defined as direct or indirect benefits provided by ecosystems for human well-being (for example see Haines-Joung, Potschin 2010, 2013). Valuating ecosystem services is the first step to document the changes in their nature and availability (Bush et al. 2012). Evaluating changes in ecosystems in connection with the living standard of a population creates the basic conceptual framework of the Millennium Ecosystem Assessment (Alcamo et al. 2005).

The recreational function is one of many services provided by ecosystems. According to the Common International Classification of Ecosystem Services (CICES), the system created by the European Environmental Agency, the recreational function can be classified as a cultural subject category which contains all non-material and usually non-consumer outputs generated by ecosystems that affect the physical and mental condition of people (Haines-Young, Potschin 2013). Bush et al. (2012) suggested that, aside from the valuation of the services provided by ecosystems, economic quantification of these services would be useful as well.

Supporting recreational activities has long been an important issue in regional development policies which are based on parallel developments of the Development Theory and tourism theories after World War II (Telfer 2002).

In the market environment, the need for expressing the value of forest ecosystem services in terms of money, i.e. to valuate them, has been even greater. Forest ecosystem functions are most often valued by means of non-market valuation methods. These methods can be divided into those based on preferences of individuals (Seják, Dejmal et al. 2003; Harris 2006; Šálka et al. 2008; Glover 2010; Soukopová et al. 2011) and those based on expert (non-preferential) approach (see Vyskot et al. 2003; Šišák, Pulkrab 2008; Seják et al. 2010).

The value of recreation is usually determined using the Travel Cost Method (hereinafter referred to as the "TCM") or the Contingent Valuation Method (hereinafter referred to as the "CVM"); most often, the approach focusing on the Willingness to Pay (hereinafter referred to as the "WTP") is used. The TCM belongs to the methods developed in the USA in the 1960's to assess the value of and demand for environmental goods and ser-

vices. Zandersen and Tol (2008) carried out a meta-analysis of the studies in which the TCM had been applied to forest recreation. The methods based on the willingness to pay are extensively utilised in case studies concentrating on the valuation of the recreational value of protected areas (for example see Verbič, Slabe-Erker 2008; Hakim et al. 2011). In the Czech Republic, it was applied for instance by Šišák (1993), who assessed the significance of the social aspects of forest services. Bernath and Roschewitz (2008) used it to valuate the recreational benefits of municipal forests, while Mayor et al. (2007) dealt with the comparison of the TCM and CVM, assessing the economic value of recreational resources based on the example of Irish forests.

MATERIAL AND METHODS

Both qualitative and quantitative research methods were used in our project.

The basic method is the qualitative analysis of documents and publications (Früh 1991).

The primary data were obtained by means of the questionnaire survey method, materialized in the form of a structured interview, which aimed to find out the visitors' willingness to pay for the recreational use of the area and the travel costs linked with their journey to the explored area.

A dialogue or an interview is a technique of field data collection by which the required information is obtained from the examined person. The respondents are asked targeted questions "face-to-face", hence it represents an interpersonal contact (Meuser, Nagel 1991). The term 'structured' means that the questions are exactly formulated and asked in the given order. The advantage of this technique is that it makes it possible to obtain detailed information. Its disadvantages, on the other hand, are the time-consuming nature of obtaining information in this way and the unwillingness of respondents to answer the questions asked.

The questionnaire was created based on the publications and case studies prepared by foreign authors (e.g. Bateman et al. 2002; Bernath, Roschewitz 2008; Verbič, Slabe-Erker 2009) who focused on the willingness to pay. Although the authors agree that there is no universal survey method to explore the respondents' willingness to pay for ecosystem services, they still suggest cer-

tain instructions on how to proceed. For example Bateman et al. (2002) proposed that a questionnaire should contain the following:
– its purpose,
– questions determining the respondent's attitude to general questions related to goods or services,
– questions determining how the respondent uses the goods or to what extent they are informed about them, with the aim to distinguish the respondent from those who do not use these goods,
– a valuation scenario (such as payment methods and amount for payment),
– socioeconomic characteristics.

The questionnaire was created with respect to the above-mentioned items. The head of the questionnaire stated its purpose, i.e. an introduction to the research including its main objectives. Then the gender of the respondent was determined. The main part of the questionnaire contained 22 questions. The first four questions were related to the socioeconomic characteristics of the respondents (determination of the respondent's age, education, job, and place of residence). The next nine questions dealt with the use of the area of interest. The respondents answered questions such as how often they visit the place, how they learnt about it, whether the awareness of the place is sufficient, in what season they visit the place most often, the reasons for their visits, what sports and recreational activities they do there, and whether there are sufficient infrastructures for those activities or whether the infrastructures could be improved. The next questions proceeded from the travel cost method. Four questions asked about the respondents' journey – the distance from their place of residence, the type of transportation they used, the travel expenses, and the time spent at the given place. The next four questions focused on determining the willingness to pay for the entry to the territory and the amount what the visitors would be willing to pay. The last question was a supplementary one, where the respondents could provide their own comments on the questionnaire. The questionnaire was processed using Microsoft Office Excel (Version 2016, 2016, Microsoft).

The questionnaire survey was conducted at four localities from June to October 2018, each time a week in the month, between 9 am to 5 pm from Monday to Friday. The survey took place at the busiest forest logging roads in the area of interest, specifically, at the localities Češik,

Hradečnice, Kemp, and Lávka which are within a radius of 3 km east of the Městské lesy Hradec Králové. During the examined period, the students of the Faculty of Forestry and Wood Technology, Mendel University in Brno, distributed 531 questionnaires.

The statistical assessment of the questionnaires examined the dependence of the level of travel expenditures, the willingness to pay a certain percentage of the travel costs for the entry to the area, and the willingness to allocate a certain percentage of the income tax to improve the recreational function of the area on the following variables: gender of the respondent, their age, their highest educational attainment, their current employment status, and their gross monthly income.

The individual questions offered the following categories of answers see Table 1.

The statistical analysis processed 531 questionnaires. The analysis worked with the answers of the visitors to the area of interest (dependent variables) to the following selected four questions:
– Whether they are willing to pay for the access to the area for recreation (dichotomous variable),
– What the travel costs of their journey to the area intended for recreation were (ordinal variable),
– What percentage of the travel costs they would be willing to pay for the access to the area intended for recreation (ordinal variable),
– What percentage of the income tax they would be willing to allocate to the improvement of the recreational function of the area of interest (ordinal variable).

The respondents' answers to those four questions were tested for their dependence on five independent variables, namely on gender (dichotomous variable), education, employment status (nominal variable), age and gross monthly income (ordinal variable).

Since all the variables are categorical in their nature, statistical tests intended for such a type of data were used. The dependence of two ordinal variables (both dependent and independent) was tested using the significance test of Spearman's rank-order correlation coefficient (ρ). Pearson's χ^2 test was used for all the other combinations of various types of independence. All the tests were performed using the STATISTICA (Version 13, 2018, TIBCO) and evaluated at the significance level of $\alpha = 0.05$ (Tibco Software 2018).

The categories of some variables had to be merged in order to reach the sufficient frequency

Table 1. The questionnaire survey – individual questions offered the following categories of answers

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a) dependent variables

Estimate the travel costs of your journey to this place:
☐ up to CZK 50   ☐ CZK 50 – 100   ☐ CZK 100 – 200   ☐ CZK 200 – 500   ☐ more than CZK 500

Are you willing to pay an entrance fee for the access to the area used by you for recreation?
☐ yes   ☐ no

What percentage of your travel costs would you be willing to pay for the access to this area providing entrance fees were introduced?
☐ 0%   ☐ 0 – 10%   ☐ 11 – 30%   ☐ 31 – 50%   ☐ 51 – 75%   ☐ 75 – 100%   ☐ more than 100%

Supposing you could decide on the allocation of your income tax payment, what percentage of this payment would you allocate to ensure an improvement of the recreational function at this locality?
☐ 0%   ☐ 1 – 2%   ☐ 3 – 5%   ☐ 6 – 10%   ☐ more than 10%

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b) independent variables

Gender   ☐ female   ☐ male

Which age group do you belong to?
☐ 0 – 17   ☐ 18 – 25   ☐ 26 – 39   ☐ 40 – 54   ☐ 55 – 64   ☐ 65 or more

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What is your highest educational attainment?
☐ primary   ☐ secondary with apprenticeship certificate
☐ secondary with GCSE (General Certificate of Secondary Education)/leaving exam certificate
☐ higher vocational certification   ☐ university degree   ☐ without education

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What is your employment status?
☐ student   ☐ employed   ☐ self-employed   ☐ unemployed   ☐ stay-at-home man/housewife   ☐ pensioner

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What is your gross monthly income?
☐ CZK 0 – 10,000   ☐ CZK 11,000 – 20,000   ☐ CZK 21,000 – 30,000   ☐ CZK 31,000 – 40,000   ☐ CZK 41,000 – 50,000
☐ more than CZK 51,000

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of answers (necessary for the applied statistical tests) within the individual categories of both dependent and independent variables. In the 'education' category, the categories of University degree and Higher vocational examination were merged into one as well as the categories of Unemployed and Stay-at-home man/Housewife and the two highest incomes in the categories of gross monthly income, which were merged into a single category of more than CZK 41,000. The travel cost categories were merged into only three new categories of CZK 0–50, CZK 51–200, and more than CZK 200. Three categories were also created by merging the categories of answers to the question dealing with the percentage of travel costs what the respondents were willing to pay for the access to the area (0%, 1–10%, and 11% and more) and to the question about the percentage of the income tax what the respondents would be willing to allocate to improving the recreational function of the area (0%, 1–2%, and 3% and more).

RESULTS

This part presents the results of the statistical analysis.

The respondents' willingness to pay for the access to the area intended for recreation

Of the five examined variables, only the Gross monthly income was proved to have a statistically significant effect (Table 2). Regardless of their gender, educational attainment or employment status, the respondents mostly stated that they would not be willing to pay for the access to the area intended for recreation. The same opinion also prevailed in all the categories of Gross monthly income, yet it is apparent that with the increasing income the ratio of respondents who would be willing to pay for the access to the area increases, with the ratios of willingness and un-

Table 2. Effect of sex, age, education, status and gross monthly income on four selected questions dependent variables

Dependent variable	Independent variable	χ^2	df	ρ	t	P
Willingness to pay for entry into the territory	sex	0.1919	1			0.6614
	age	8.2248	5			0.1443
	education	4.058	3			0.2553
	status	5.5675	4			0.2339
	gross monthly income	21.2441	4			0.0003*
The amount of travel costs	sex	3.4282	2			0.1801
	age			−0.0715	−1.648	0.0999*
	education	5.2491	6			0.5123
	status	12.6217	8			0.1256
	gross monthly income			0.034	0.7828	0.4341
Willingness to pay certain percentage of travel costs for entry into the territory	sex	1.7388	2			0.4192
	age			0.0079	0.1825	0.8553
	education	4.6199	6			0.5934
	status	13.0041	8			0.1117
	gross monthly income			0.1144	2.6476	0.0084*
Willingness to allocate certain percentage of the income tax to improve the recreational function of the territory	sex	1.2363	2			0.539
	age			−0.1218	2.821	0.005*
	education	15.0405	6			0.0199*
	status	47.1755	8			< 0.0001*
	gross monthly income			0.2085	4.9032	< 0.0001*

χ^2 – value of Pearson´s χ^2 test of independence, df – degrees of freedom, ρ – Spearman´s rank correlation coefficient, t – t value, P – P value, *significant differences at α = 0.05

willingness to pay being almost equal (45 : 55%) in the highest income category (Fig. 1).

The travel costs spent on the journey to the area intended for recreation

As for this question, none of the tested variables was proved to have a statistically significant effect on the distribution of the frequency of the answers (Table 2). The answer indicating the travel costs of
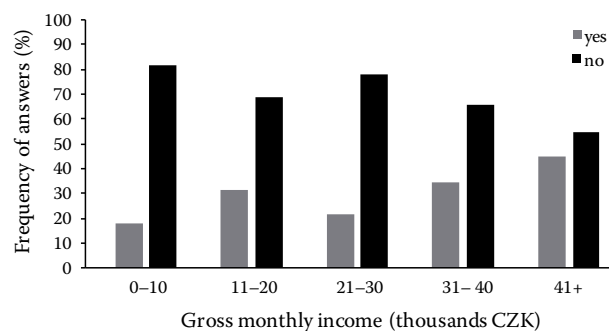

Fig. 1. Answers frequency of willingness to pay for entry into the territory according to gross monthly income categories

CZK 0–50 prevailed with all the examined variables. The other two categories had only minor representations and their ratios were balanced.

The percentage of travel costs the respondents would be willing to pay for the access to the area intended for recreation

Similarly to the question about the willingness to pay for the access to the area, only the gross monthly income was proved to affect the percentage of travel costs what the respondents would be willing to pay for the access to the area (Table 2). The prevailing answer was 0% followed by 1–10% as the second most frequent one. The least frequent answer was 11+%. This trend remained the same regardless of the gender, age, educational attainment or employment status of the respondents.

With the gross monthly income, the same trend was found only in the group of respondents whose income was less than CZK 30,000 (Fig. 2). The ratios of 0% and 1–10% answers were balanced with the respondents ranking in the category of income between CZK 31–40 thousands. The frequency of
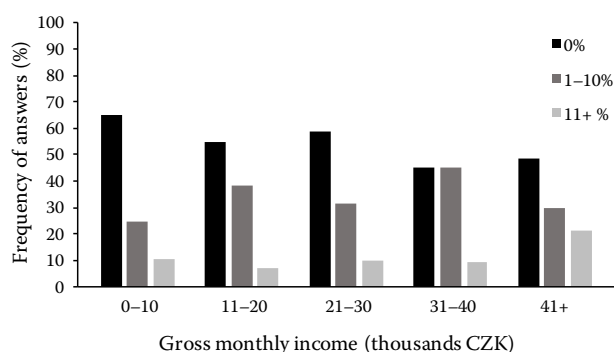
Fig. 2. Answers frequency of willingness to pay certain percentage of travel costs for entry into the territory according to gross monthly income categories

the answer of 11% was roughly the same as in the three categories of lower income. While the answer of 0% prevailed with the persons with the highest incomes again, the frequency of the answer 'more than of 11%' notably increased (21.2 % of answers). Hence it is evident that a part of the respondents with the highest incomes would be willing to pay a relatively higher fee for the access to the area.

The percentage of the income tax what the respondents would be willing to allocate to improve the recreational function of the area of interest

Statistically significant differences in the frequency of answers to this question were found in all the examined variables with the exception of gender (Table 2). Both men and women answered accordingly and the most frequent answer was that they were not willing to allocate any percentages of the income tax.

Based on the respondents' age, the answers were divided into two different groups. The first group included the respondents aged 18–54, who prevailingly answered that they would be willing to allocate 1–2%, while the other two categories of answers were balanced. The other group presented the respondents aged or younger than 17 and 55 or more. The unwillingness to allocate a percentage of the income tax (0%) prevailed in this group unanimously and the frequency of answers decreased with the increasing percentage. The obtained results allow for stating that working-age people are willing to allocate a percentage of the income tax

while people outside this age group or on its verge dismiss such allocation.

The distribution of the frequency of the respondents' answers with respect to their highest educational attainment also led to the formation of two different groups. One of the groups included people with primary and secondary education (both leaving/GCSC exams and apprentice certificates), who were prevailingly unwilling to allocate a percentage of the income tax. Again, the frequency of this answer decreased with the increasing percentage of the income tax. The other group contained the respondents with higher or university education, who were predominantly willing to allocate 1–2% of the income tax. The other two categories were quite balanced.

Regarding the allocation of percentages of the income tax to improve the recreational function, the groups created on the basis of the respondents' employment statuses also belonged to two bodies of opinion. While pensioners, students, unemployed, and stay-at-home persons were not willing to allocate any percentage of the income tax, the employed and self-employed persons most often answered that they would allocate 1–2% of the income tax.

There were also provable differences represented by creating two groups of respondents in the case of the dependence of the gross monthly income on the percentage of the income tax allocation (dependence of the percentage of the income tax allocation on the gross monthly income). Persons with their gross monthly income up to CZK 20,000 were not willing to allocate any income tax percentage and the frequency of answers given by these persons decreased with the increasing income tax per-
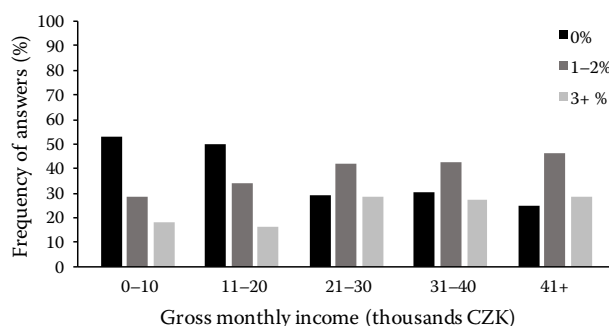

Fig. 3. Answers frequency of willingness to allocate certain percentage of the income tax to improve the recreational function of the territory according to gross monthly income categories

centage what they would be willing to allocate. On the contrary, the answer of 1–2% dominated with the persons whose income was higher than CZK 20,000. The ratio of answers in the remaining two categories (0, 3+) was more or less balanced (Fig. 3).

DISCUSSION

The materialization of the tourist activities is reflected in the economic benefits for the visited area in the form of transfer of wealth and investments from the richer and more developed areas to the poorer and less developed ones (Sharpley 2002). The expenditures of the visitors in the target area and the investments into the tourist infrastructure made by enterprises from the areas which generate the tourists should be the main carriers of this transfer, including all the positive and negative impacts (Williams 2000). The idea of supporting such tourism activities that are environmentally friendly has got on quite quickly, in the area of the physical impacts of tourism on the environment in particular (Hall, Frost 2009).

Nevertheless, tourism activities have been long affecting its surroundings with a wide variety of very intensive impacts, which publications usually sort into three categories: economic impacts (for instance see Gökovali, Bahar 2006; Katircioglu 2009; Lew 2011; Ivanov, Webster 2013; Tang, Abosedra 2014), environmental impacts (e.g. in Marzano, Dandy 2012; Barros et al. 2013; Oian 2013; Newsome 2014), and socio-cultural impacts (for examples see Daldeniz, Hampton 2013; Thomas et al. 2013). Not only they often lead to the degradation of the environment and of the local culture but also they destroy local resources, both directly and indirectly (Williams 2000). This goes hand in hand with the degradation of the resources of tourism. If no correction occurs, this development can reach the point when tourists would leave for other places followed by tourism enterprises, leaving behind a place and local inhabitants deprived of resources for their growth (Butler 1980; Williams 2000). This development is traditionally connected with the tragedy of the commons (Hardin 1968). Fortunately, some groups realized as early as in the 1960's that, in the long-term view, the boisterous development of tourism brings along more losses than profits (not only economic but mainly environmental and cul-

tural ones). Public institutions followed by enterprises have therefore adopted measures mitigating the negative impacts of visitor arrivals at the target areas (Hall, Frost 2009).

The objective of the complex monitoring of tourism and of visitor arrivals in general is to provide basic information about the numbers of visitors and the time variability (within a day, a week, months of the year, and seasons) and the spatial distribution of their arrivals in the target area (Zahradník et al. 2012). The standard outputs also include information about the structure of visitors' opinions. Lately, the monitoring of visitor arrivals has represented one of the main activities performed by managements of large protected areas in the field of tourism (Bláha 2010; Kala, Salov 2010; Kos 2010) but it is appropriate wherever a conflict of interests arises or the use of the area is influenced by interest groups.

Consequently, the need for expressing the value of non-productive forest services in terms of money, i.e. to valuate them, has been increasing in the market environment over the last decades, the need being raised by conflicts of private and public interests over the optimum extent and the way of using the environmental resources in landscapes, among which forests are of crucial importance (Hlaváčková, Šafařík 2013).

The value of recreation is usually determined using the travel cost method or the contingent valuation method, the approaches focusing on the willingness to pay in particular.

Tutka, Kovalčík (2008) dealt with the potential to valuate the recreational function of forests in the Slovak Republic using both methods. However, they calculated the value per single visit.

The research generally shows that visitors to the area of interest are not willing to pay for using the recreational function of the forest ecosystem. The same results were also obtained by authors of foreign studies focused on the valuation of economic benefits of ecosystem functions (for example see Mayor et al. 2007; Bernath, Roschewitz 2008).

CONCLUSION

This paper has presented the results of research carried out in the territory of Městské lesy Hradec Králové by the Department of Forest and Wood Product Economics and Policy, Faculty of Forestry

and Wood Technology, Mendel University in Brno, in cooperation with the Department of Landscape Management, Faculty of Forestry and Wood Technology, Mendel University in Brno, within the scope of the project conducted by the Internal Grant Agency of the Faculty of Forestry and Wood Technology of Mendel University in Brno in 2018.

The paper is aimed at research in travel costs of the visitors to the area of interest and their willingness to pay for the recreational function provided by a part of the territory of Městské lesy Hradec Králové. The method has been based on the combination of the contingent method and the travel cost method. Secondary research analysed the available materials, both domestic and foreign ones. Primary research mainly employed the method of a structured interview. The interviews were carried out by students of the Faculty of Forestry and Wood Technology at four localities in the territory of Městské lesy Hradec Králové, each time a week in a month from July to October. The respondents filled in the total of 531 questionnaires.

Based on the obtained results, it can be concluded that the respondents were prevailingly unwilling to pay for the access to the area intended for recreation, although this unwillingness decreased in the respondents with higher incomes. It is also evident from the results that the visitors most often spent CZK 0–50 on transportation to the recreation area. The willingness to pay a certain percentage of the travel costs for the access to the area intended for recreation was basically negative but this opinion changed in the respondents whose incomes were higher than CZK 30,000 and the willingness to pay even a higher percentage increased. The unwillingness to allocate a certain percentage of the income tax to the improvement of the recreational function of the given area prevailed with the non-working-age visitors with primary or secondary education who did not have a permanent income from employment or business activities and whose incomes did not exceed CZK 20,000. By contrast, the working-age respondents with higher or university education and with permanent income (from employment or business activities) higher than CZK 20,000 were most often willing to allocate 1–2% of the income tax. The results of the research clearly indicate that the amount of the gross monthly income has the biggest impact on the answers to the questions asked since it provably affected the answers to three of the four questions.

This article contributes to research in the area of valuation of forest services and, above all, it creates a basis for economic assessment of actual cash flows resulting from the recreational use of the area of interest.

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