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Economic evaluation of the recreational use of forests: A case study of the Training Forest Enterprise Masaryk Forest Křtiny

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ABSTRACT: The objective of the article is to evaluate the results of a questionnaire survey carried out in forest districts of the Training Forest Enterprise Masaryk Forest Křtiny (TFE Křtiny) within research focused on economic evaluation of the recreational potential of the TFE Křtiny. The article is aimed at surveying the willingness of visitors to the area to pay for the use of the recreational function of forests and evaluation of the used method. The evaluated part of the questionnaire survey was based on the contingent valuation method examining the willingness of respondents to pay for recreational function. It was found by the results of the questionnaire survey that visitors are not very willing to pay for recreational function and it is so especially because forests in the area of the TFE Křtiny are perceived as public assets and thus access to them should be free. Furthermore, there were some problems with the method used. Thus it is necessary to find a new way of evaluating the recreational potential of the area.

Keywords: economics; forestry; questionnaire survey; recreational function; methods of valuation; willingness to pay

The recreational use of an area is often related to the term tourism. Tourism, as well as any other human activity, has an impact on a community and a place where it actively operates. Although the term impact is often negatively interpreted, it does not always have to be harmful. In reality, tourism can have a positive socio-economic impact on a destination, and in some cases even a positive impact on the environment (Lück 2008).

Although opinions about the impact of tourism are still rather controversial, it is clear that tourism is the main economic force in the whole world (Weaver 2001).

Forests are an ideal place for all kinds of tourist activities. Thus, a forest fulfils the so-called recreational function, which belongs to socio-economic ecosystem services. Ecosystem services are defined as the direct and indirect benefits provided by ecosystems for human well-being (e.g. TEEB 2011; Haines-Young, Potschin 2013; Nunes et al. 2014).

According to the Common International Classification of Ecosystem Goods and Services (CICES), the recreational function can be classified as a cultural thematic category which includes all the non-material, and normally non-consumptive, outputs of ecosystem that affect physical and mental states of people (Haines-Young, Potschin 2013).

The valuation of ecosystem services is the first step towards documenting changes in their nature and availability. In addition to the assessment of ecosystem services it is useful to be able to provide an economic quantification of these services (Busch et al. 2012).

For a long time, support of recreational activities has belonged to important features within regional development policies based on the parallel evolu-

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tion of development theories and tourism theories after the Second World War (Telfer 2002).

In the market environment there is an increasing urgency of the need to express the values of forest ecosystem functions in a monetary form, thus to evaluate them. For evaluation of forest ecosystem functions the nonmarket evaluation methods are used the most frequently. These methods can be divided into methods based on preferences of individuals (e.g. Harris 2006; Šálka et al. 2008; Glover 2010; Soukopová et al. 2011) and methods based on the expert (nonpreferential) approach. According to Kupec (2014) there are three methods based on an expert approach used in the Czech professional forest practice – the method of quantification and evaluation of forest functions (Vyskot et al. 2003), the method of biotope appraisal (Seják, Dejmal 2003) and the method of appraisal of the socio-economic importance of basic non-wood production forest functions (Šišák et al. 2002). The difference between the results coming from these methods is relatively high (Kupec 2014).

This paper evaluates partial results of a survey carried out in the Vranov forest district, Habrůvka forest district and Bílovice nad Svitavou forest district, as part of a research project focused on the economic valuation of the recreational potential of the Training Forest Enterprise Masaryk Forest Křtiny (TFE Křtiny). A part of the research was focused on the willingness of visitors to pay for the recreational use of forest roads and cycle trails located within a portion of the forest enterprise and an evaluation of the method used.

The aim of the paper is to present partial results obtained by a survey which took place in 2015. The selected result focused on the willingness to pay an entrance fee to the TFE Křtiny which was based on the contingent valuation method and the travel cost method. The contingent valuation method has been the focus of intense study for several decades, resulting in a number of works describing the theory and methods in relation to the valuation of natural resources, environmental amenities, and public goods (e.g. Bateman, Willis 2001; Champ et al. 2003; Pearce et al. 2006; Mayor et al. 2007; Garcia et al. 2009). Travel cost method is based on quantifying the environmental benefits of public goods or damage associated with the loss of these benefits that are derived from travel cost (e.g. Clawson 1959; Fleming, Cook 2008; Willis, Garrod 2008; Brezovská, Holécy 2009).

In order to find out willingness to pay, a structured interview was used as the main method in the area of the TFE Křtiny. Obtained results were further evaluated by basic statistical methods.

MATERIAL AND METHODS

Three forest districts of the TFE Křtiny were chosen for research. TFE Křtiny is an organisational unit of Mendel University in Brno and a special-purpose facility of its Faculty of Forestry and Wood Technology. The enterprise was founded in 1923. The total area is 10,495 ha. The forest cover is approximately 98% (http://www.slpkrtiny.cz/). This area is located near Brno, which is the second largest town in the Czech Republic. Forests are suburban forests and the forest ecosystem mainly fulfils a recreational function.

Qualitative and quantitative research methods were applied during the project solution. Required material for formulating relevant outputs was obtained from a secondary research, on the basis of an analysis of available scientific literature dealing with the valuation method of ecosystem services and questionnaire survey. The qualitative analysis of documents and publications is a basic methodical procedure (e.g. Früh 1991).

Furthermore, information from already published results of previous research carried out by the research team from the Faculty of Forestry and Wood Technology of Mendel University in Brno was used (e.g. Hlaváčková, Březina 2015).

The questionnaire survey method in the form of a structured interview was used in order to obtain primary data, by which willingness of visitors to pay for recreational use of the area and travel costs related to travelling into the researched area were surveyed.

An interview is a technique of collecting information in th efield, during which necessary information is obtained from surveyed people via targeted questions that are asked face-to-face. Thus, it includes the interpersonal contact (e.g. Meuser, Nagel 1991; Wengraf 2001).

Denomination such as "structured" expresses the fact that questions are specifically formulated and they are asked in a certain order. The advantage is a possibility to obtain detailed information. The weakness of this research is duration of obtaining information and unwillingness of respondents to answer questions.

To prepare the questionnaire, publications and case studies by foreign researchers were used, for example Bateman et al. (2002), Peyron et al. (2002), Carson and Hanemann (2005), and Verbič and Slabe-Erker (2009). These sources agree that there exists no universal research methodology to determine the willingness of respondents to pay for ecosystem services. Based on the literature and methodological instructions of the Organisation for Economic Co-oper-

ation and Development (OECD 2005) a questionnaire was drawn up which was used in the interview.

The questionnaire survey comprised 22 questions. The questionnaire was the same as that used in the research in 2013 and 2014. The introduction of the project and description of the main goal of the project are at the top of the first page. Gender specification follows. The first four questions are about socio-economic characteristics of respondents. Other nine questions deal with the use of the area of interest. The next questions are based on the travel cost method. Four of these questions ask about respondents' journey:

(1) How far is this place from your place of residence (in km)?

(*i*) up to 1
(*ii*) 1–10
(*iii*) 11–50
(*iv*) 51–100
(*v*) 101–200
(*vi*) over 200

(2) How did you travel to this place? If you used several ways of travelling, select multiple options.

(*i*) on foot
(*ii*) cycling
(*iii*) public transport
(*iv*) motor vehicle
(*v*) train
(*vi*) bus

(3) Estimate the travel cost of your journey to this place (in CZK):

(*i*) up to 50
(*ii*) 50–100
(*iii*) 100–200
(*iv*) 200–500
(*v*) above 500

(4) Estimate the amount of actually incurred (paid) travel expenses to stay at this place (fare, spending diet, food, accommodation, etc.).

The next four questions are focused on the willingness to pay a fee to enter the area and how much they are willing to pay:

(1) Are you willing to pay a fee to enter the area you used for recreation?

(*i*) yes
(*ii*) no

(2) What percentage of the travel cost would you be willing to pay to enter into this area, if the user fees were introduced?

(*i*) 0
(*ii*) 0–10
(*iii*) 11–30
(*iv*) 31–50
(*v*) 51–75
(*vi*) 75–100
(*vii*) more than 100

(3) What is your gross monthly income (in CZK)?

(*i*) 0–10,000
(*ii*) 11,000–20,000
(*iii*) 21,000–30,000
(*iv*) 31,000–40,000
(*v*) 41,000–50,000
(*vi*) above 51,000

(4) If you could decide to allocate your payment of income tax, what percentage of the payment will you allocate to improve recreational functions in this area?

(*i*) 0
(*ii*) 1–2
(*iii*) 3–5
(*iv*) 6–10
(*v*) more than 10

Table 1. Terms of questionnaire distribution

Month	Terms
July	13.7.–19.7.2015
August	10.8.–16.8.2015
September	14.9.–20.9.2015
October	12.10.–18.10.2015

The structured interview with visitors was conducted by students of the Faculty of Forestry and Wood Technology at Mendel University in Brno. The survey took place at 5 locations, one week from Monday to Sunday, from 9 am to 5 pm, from July to October 2015. The busiest roads in the forest road network and cycle trails were chosen. Table 1 shows the survey dates.

Basic statistical methods were used to evaluate the data obtained from primary research, especially the correlation method.

RESULTS

The outputs of the research contain summary and discussion of chosen research results focused especially on willingness of visitors to pay for the recreational use of the forest districts Vranov, Habrůvka and Bílovice nad Svitavou. The results are accompanied by the graphical representation.

In total 1,843 questionnaires were distributed in 5 localities during the periods mentioned in the Material and Methods chapter (Table 1). Respondents did not always answer all questions in the questionnaire. According to the gender there were 54% of male and 46% of female visitors. The largest category consisted of people at the age of 26–39 years, who accounted for approximately 30% of all respondents. Fig. 1 documents the numbers of distributed questionnaires in individual months.

The weather and the summer vacations in July and August had a demonstrable impact on the number of filled questionnaires in the individual months.

Another important factor is that the forests in the observed area fall into the category of suburban forests and thus they are frequently visited especially by local inhabitants. This statement is confirmed by Fig. 2, which shows the distance of respondents' place of residence.

It is apparent from Fig. 2 that for approximately 49% of visitors the observed areas are located within 10 km from their residence. This statement was also confirmed by the circle method that investigated the distribution of visitors from their place of residence. According to this method it was found

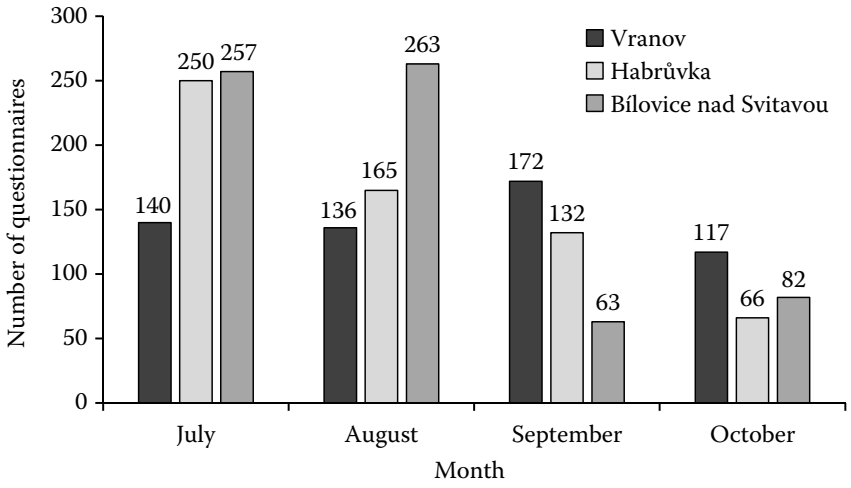

Fig. 1. The number of questionnaires distributed in the forest districts Vranov, Habrůvka and Bílovice nad Svitavou

that for approximately 86% of visitors the area is located within 50 km from their place residence.

Fig. 3 implies that there is a strong direct relation of visitor number to transport distance from the areas of the Vranov forest district. The coefficient of determination is $R^2 = 0.7875$ and the correlation coefficient is $R = 0.8874$. The Bílovice nad Svitavou forest district shows a medium strong relation of visitor number to transport distance from the area. The coefficient of determination is $R^2 = 0.3657$ and the correlation coefficient is $R = 0.6047$. The relation of visitor number to transport distance from the area can also be observed in the Habrůvka forest district. The coefficient of determination is $R^2 = 0.1521$ and the correlation coefficient is $R = 0.3900$. We can state that the most attractive distance for visitors is within 50 km from their place of residence.

In the majority of cases, the amount of travel costs spent by visitors to get to the observed locality is dependent on distance from their place of residence. The surveyed cost amounts were divided into categories. Fig. 4 shows the categories of visitor's travel costs.

Fig. 4 illustrates that approximately 73% of visitors estimated the amount of their travel costs connected with travelling to the given locality to be less than 50 CZK.

It follows from Fig. 5 that there is a strong direct relation of visitor number to the amount of travel costs for individual locations in the Vranov forest dis-

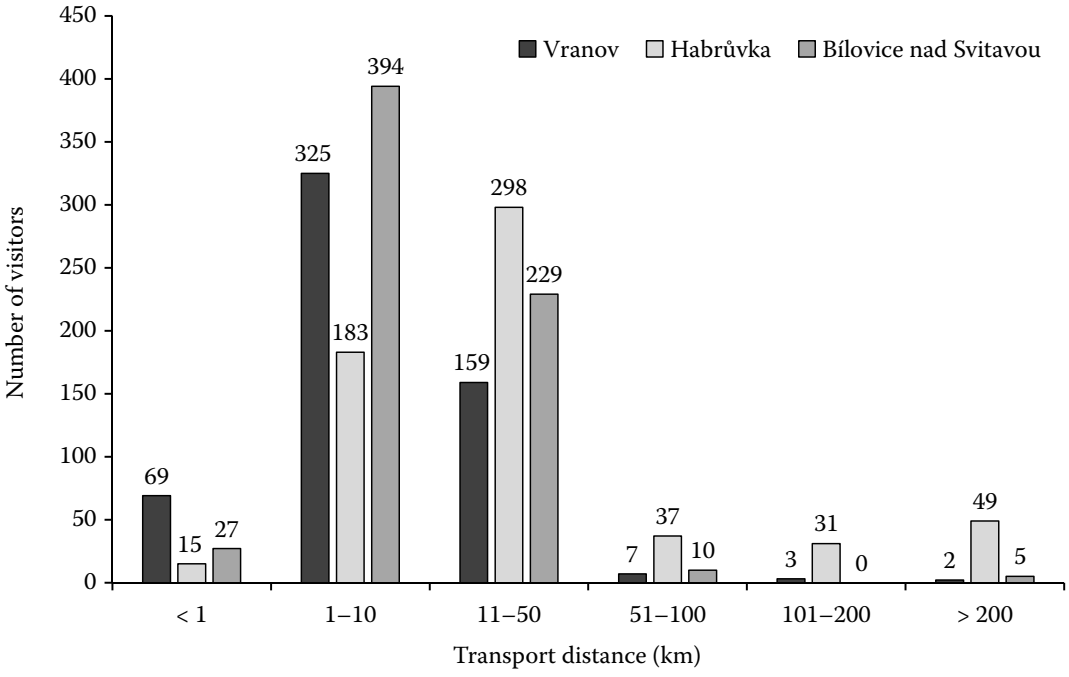

Fig. 2. The distance from the place of visitor's residence

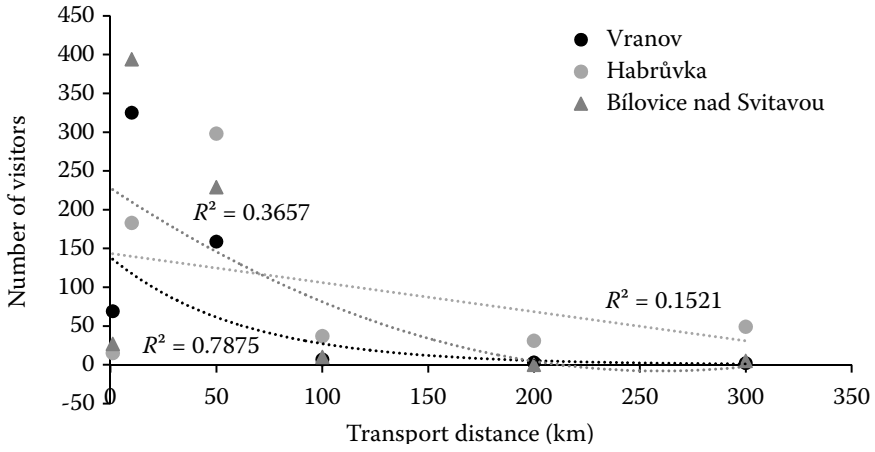

Fig. 3. The relation of visitor number to transport distance

trict. The coefficient of determination is R^2 = 0.8181 and the correlation coefficient is R = 0.9045. A strong direct relation to travel distance to the locality is shown also by the Bílovice nad Svitavou forest district. The determination coefficient is R^2 = 0.9910 and the correlation coefficient is R = 0.9955. A strong direct relation of visitor number to travel distance to the locality can also be observed in the Habrůvka forest district. The coefficient of determination is R^2 = 0.9482 and correlation coefficient is R = 0.9738. It is apparent that the amount of travel costs of 1,572 visitors did not exceed 100 CZK.

Furthermore, willingness of visitors to pay for entry into the observed area or willingness to pay for the recreational function offered by forest ecosystems in the observed area was surveyed. This part of questionnaire contained 4 questions. In the first of them interviewees expressed if they are ever willing to pay the fee for entry into the area used for recreation. Answers to the three remaining questions follow from this question. Willingness to pay for entry into the area used for recreation was expressed by 41% of respondents.

The willingness to pay is related to the amount of income, therefore respondents were asked about their gross monthly income. The answers indicate that 51% of visitors do not have the gross monthly income higher than 20,000 CZK.

Two further questions were related to the fee for the area use. Fig. 6 documents the results of answers to the first question asking what percentage of travel costs respondents would be willing to pay for entry to the given area if user fees were introduced.

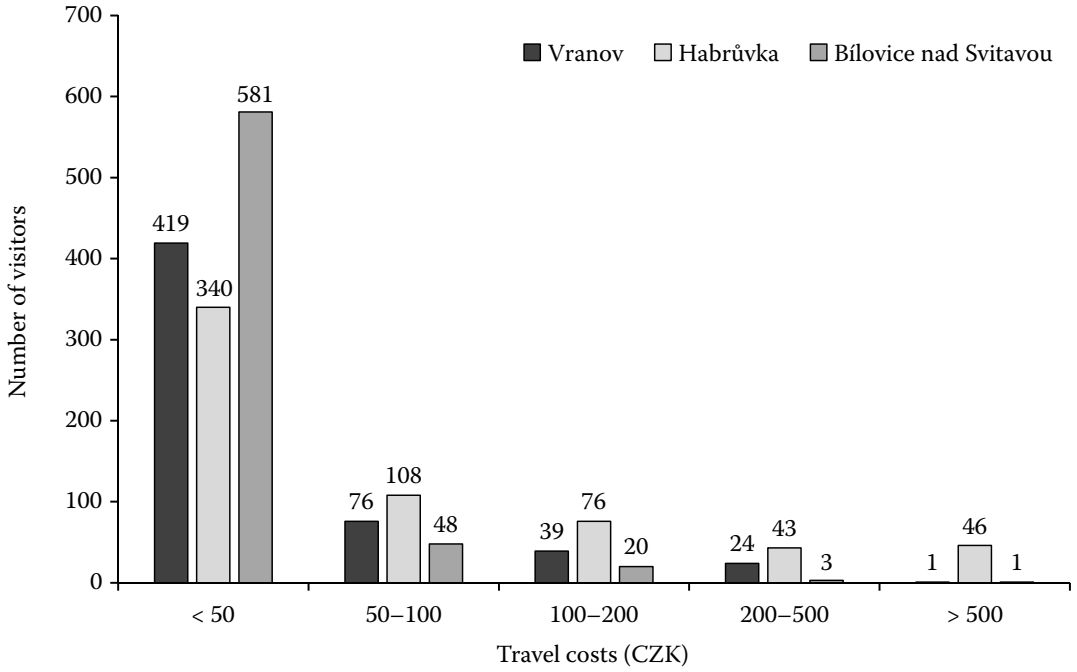

Fig. 4. Travel costs of visitors

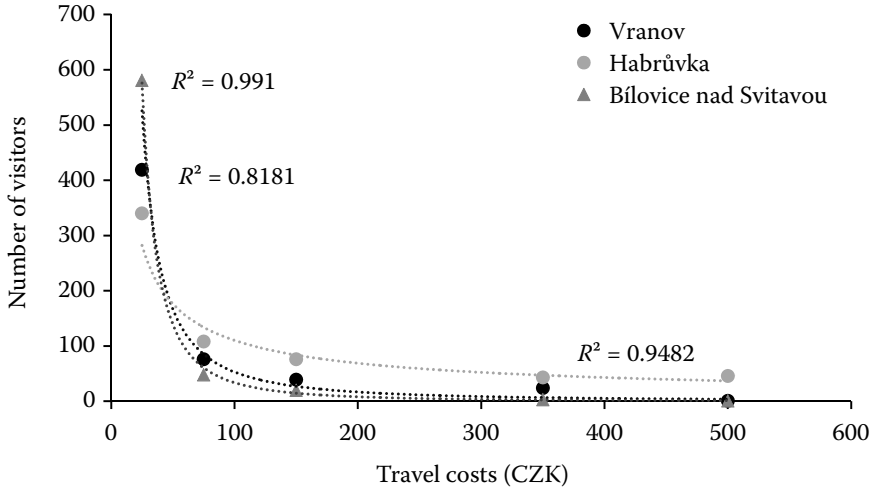

Fig. 5. The relation of visitor number to travel costs

Although the number of answers in the first category, where visitors are not willing to pay any share of travel costs for entry into the area, does not fully correspond with the number of answers to the question whether visitors are willing to pay for entry to the area (the difference is approximately 119 respondents), low willingness to pay for entry into the area can be seen from in Fig. 6.

The last question from the series focused on willingness to pay for the recreational function offered by the area of the TFE Křtiny was what percentage of income tax visitors would be willing to allocate to improvement of the recreational function in the given locality. The question results are shown in Fig. 7.

Fig. 7 shows that although given a chance to decide how the income (profit) tax they pay into the public budget out of their salaries is used, still about 31% of respondents were unwilling to allocate even 1% of the tax amount for these recreational functions. In general, however, it may be stated that respondents would be willing to allocate a portion of their statutory levies to a specific area, in this case to improve the recreational opportunities in the TFE Křtiny.

DISCUSSION

The recreational function of forests is one of the most commonly required forest functions at present. Due to progressive development of the human society and changing socio-demographic condi-

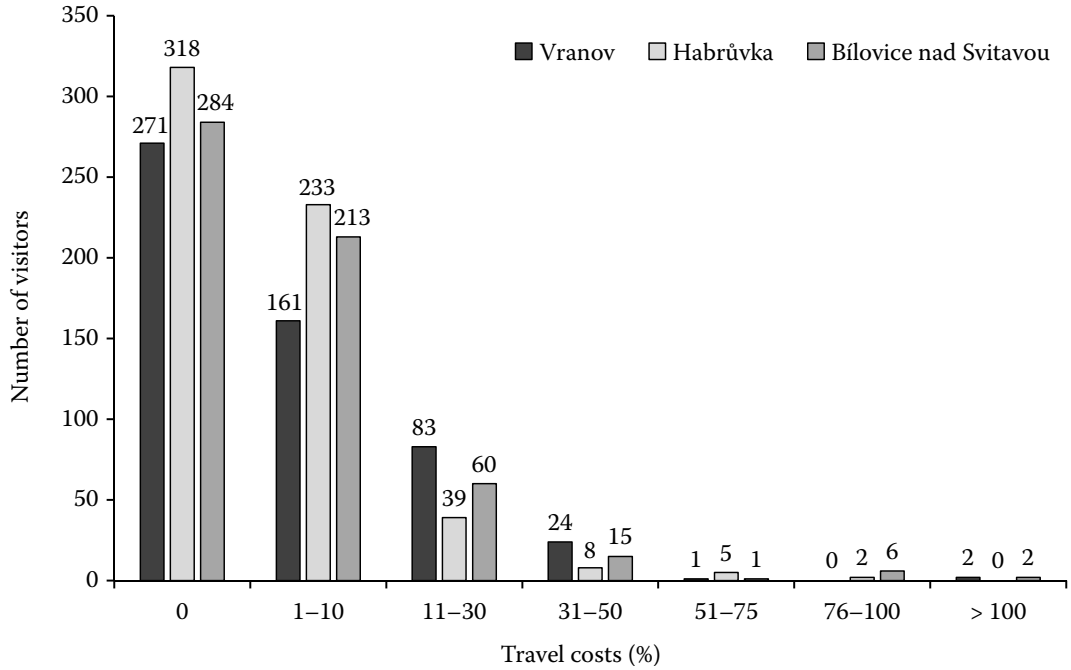

Fig. 6. The percentage of travel costs visitors are willing to pay for entry into the area used for recreation

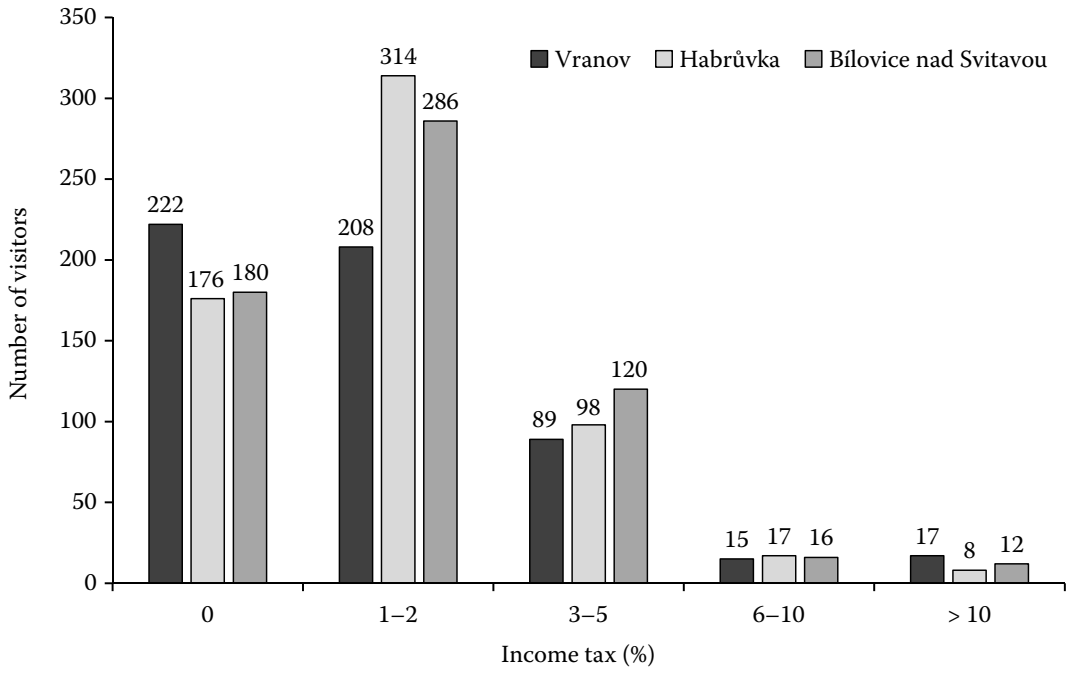

Fig. 7. The percentage of the income tax the visitors are willing to allocate to improve the recreational function of the area of interest

tions people have more leisure time on the one hand but they are exposed to more negative stress factors on the other hand (Kupec 2014). Forests in the area of the TFE Křtiny have been fulfilling this unique function since its establishment in 1923.

Efforts to place quantitative measures on recreation values have been common since this function was recognized as a public responsibility. None of these attempts, however, has completely satisfied their proponents or fully met the objections of affected interests and agencies (Trice, Wood 1986).

Total recreation benefits are defined as the sum of the maximum amount individuals are willing to pay to engage in a recreational activity, rather than forego it (Walsh 1986). Benefits from recreation in forest are not transacted in competitive markets and they are typically estimated using non-market valuation methods. Several methods can be used to estimate the willingness to pay, or the benefits to user (Anonymous 1995).

This article uses the method based on contingent valuation and travel costs to measure the benefits of the area of interest. Contingent valuation requires data collection using survey methods that directly elicit people's valuation of public good and services by determining what they would be willing to pay, or accept in compensation, for specified changes in the quality or quantity of a public good (Mitchell, Carson 1989). Responses are used as data in econometric models to estimate individual benefits which can then be aggregated over the relevant population of recreational users in a given year to calculate annual benefits, or welfare measures (Rollins, Dumitras 2005).

The travel cost method is commonly used to estimate the consumer surplus associated with travelling to the recreational localities (Clawson 1959). The total visitor costs associated with recreation include recreation fees in the territory, transport costs which depend on the type of vehicle and transport distance from the place of residence, the time spent by travelling, the length and frequency of visits.

In the Slovak Republic, Tutka and Kovalčík (2008, 2010) dealt with possibilities of valuation of recreational forest functions. They discussed both valuation methods and tried to find the value of one visit.

In order to find out the preferences of respondents the structured interview was used. The problem with such a survey is that there exists no universal research methodology to determine the willingness of respondents to pay for ecosystem services as illustrated e.g. by Bateman et al. (2002), Peyron et al. (2002), Carson and Hanemann (2005), Verbič and Slabe-Erker (2009) and López-Mosquera and Sánchez (2013).

The design of the questionnaire was done according to the methodological instruction of OECD (2005) so that the questions are as clear as possible with the selection of alternative answers (Burgess 2001). Since respondents conducted a standardized interview in the time of their recreational activi-

ties, it was not desirable to interview the respondents very long and exceed their available time. The questionnaire was therefore designed with the time possibility of respondents to interview them in a period not exceeding 30 min. Questions were formulated so that the number needed to cover those topics was as small as possible, as is recommended by the OECD methodology. For comparison the approaches to the questionnaire designed see e.g. Armbrecht (2014).

Similar research was conducted in the area of the TFE Křtiny in 2013 and 2014, however, specifically in different localities. 1,581 structured interviews were carried out in 2013 and in 2014 it was 1,588 interviews. The research was carried out in 4 localities. Results in the individual years report similar characteristics. Approximately one third of the respondents were visitors at the age of 26–39 years. The majority of visitors consisted of local inhabitants who had the localities within 10 km from their places of residence. It is connected with the amount of travel costs that did not exceed 50 CZK in the majority of cases. The most problematic questions in previous research were also related to the willingness of respondents to pay for ecosystem services. The results of researches showed that visitors are not willing to pay for recreational opportunities provided to them by these areas.

Researchers abroad focusing on the evaluation of ecosystem functions via the contingent method have reached the same conclusion (e.g. Mayor et al. 2007). The main reason for this lies in the fact that the recreational function of forest ecosystems represents public assets. Mayor et al. (2007) and Carson and Hanemann (2005) also drew the same conclusion. In accordance with Forest Act No. 289/1995 and Amendments to some Acts, everyone has the right to access forests and forest owners have no right to permanently prohibit access. For the reasons indicated above, the introduction of user fees for entry to the TFE Křtiny would not be possible and would surely face resistance on the part of forest visitors and impact the area's use in a negative manner.

At this point it should also be noted that the overall research is not aimed at determining the willingness to pay. The contribution of research is an alternative approach to the assessment of forest enterprises for regional development. Nevertheless, this part of research has also the practical use. According Bateman et al. (2002) the results of the valuation based on willingness to pay can be used for example for demonstrating the economic value of environmental and cultural assets, cost-benefit analysis, setting priorities for environmental policy, design of economic instruments, green national accounting, and resource damage assessment. As Mayor et al. (2007) indicated, the determination of visitor willingness to pay for the use of forests could contribute to measuring the attractiveness, quality and facilities offered in forests and could represent an argument for obtaining contributions to forest management for forests primarily used for recreational purposes.

CONCLUSIONS

The article brings results from the research carried out in the area of the TFE Křtiny in 2015. The quantification of potential and economic significance of the recreational forest ecosystem service was one of the primary objectives of research.

The article focuses on the research survey about travel costs of visitors in the area and willingness to pay for the recreational function offered by the part of the area of the TFE Křtiny. The methodical approach is based on the combination of contingency method and travel cost method. By the secondary research domestic and foreign resources were analysed. The main method of the primary research was a structured interview. The interview was conducted by students of the Faculty of Forestry and Wood Technology in 5 localities of the TFE Křtiny, always for 1 week in a month from June to October. In total 1,843 questionnaires were filled by respondents. More than a half of respondents were men. The prevailing age category consisted of visitors at the age of 26–39 years. The majority of respondents had their place of residence within 50 km from the locality. Approximately 85% of visitors do not spend more than 100 CZK per one travel. It was found by the results of the questionnaire survey that visitors are not very willing to pay for the recreational function, which is provided by the area of interest and it is so especially because the forests in the area of the TFE Křtiny are perceived as public assets and thus access to them should be free. Furthermore, there were problems with the method used, especially in expressing the real willingness to pay and obtaining relevant numbers from respondents. Thus the necessity to find a new way of evaluating the recreational potential of the area based on relevant economic data was confirmed.

This case study is a contribution to research in the area of evaluation of forest functions and especially a basis for economic evaluation of real cash flow coming from the recreational use of the area

of interest. The research methodology will be used for research in further areas. Although the research was conducted at the local level, its outputs can also be used at the national and global level.

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