

Selected aspects of the forest recreational function in view of its users

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Abstract. The results of a survey conducted in several Promotional Forest Complexes (PFC) in the Śląskie and Podlaskie regions, as well as the urban forests in Łódź and Warsaw, indicate that visitor preferences vary among forest sites. Those forests where visitors prefer to rest should be located in forests designated for recreation, and include elements of recreational infrastructure. Depending on characteristics of the forest in question (seaside, lakeside, or mountains), respondents preferred forest located near to the water's edge, whereas in mountainous areas they selected open places (roads and openings). Urban residents more commonly chose sites deep within the forest, while hikers selected forest edges. The desired recreational infrastructure, included garbage cans and hiking trails as the most important elements among city dwellers, while hikers pointed to rest areas and information boards.

The respondents consistently agreed on the type of recreational activities conducted in forests as well as on type of elements which determine the attractiveness of forests for rest and recreation. Independently of site characteristics and the research location, the most common activities for respondents were hiking and riding bicycle; and attractive elements were silence and calm as well as cleanliness of the forests.

The Contingent Valuation Method (CVM) was used to evaluate respondents' Willingness to Pay (WTP) for intensification of selected public forest functions and forest management, including recreational functions. The number of respondents who declared a hypothetical monetary amount or $WTP > 0$ depended on the place where research was conducted (forest or respondent's home); forest area covered by financing (forests in general or local forests where respondents reside); the type of question used to obtain the information on WTP; as well as the scope of financing (all public forest functions or just a recreational function). The average WTP declared per household per year varied from 41 PLN (Gołos, Janeczko 2002) to 150 PLN (Gołos, Kaliszewski 2006) for selected forest areas. The average overall state statistics for WTP was 52 PLN (non-timber forest functions in municipality) and 41 PLN (recreational management of forests in municipality).

The respondents also underlined that the goods and services provided should be co-financed from both state and local budgets, and that such financing should go directly to the organizations conducting forest management.

Key words: Contingent Valuation Method, Willingness to Pay, preferences, survey

1. Introduction

Growing world population, rapid industrialization and urbanization of human environment together with social and economic changes (better standards of living and shorter working hours) contribute to increasing social pressure on forest areas as a place for recreation

and rest providing the best conditions for realizing our natural need of having contact with nature. Such situation forces forest owners and managers, especially those from forests surrounding large urban areas, to pay special attention to organization of recreational forest management. Adaptation of forest management to the above-mentioned conditions should take into account

social expectations, which could be studied through social survey. Such adaptive management could help to improve not only management of forest areas, which are part of public goods, and protect the most valuable nature elements, but also to reach economic efficiency for implemented activities.

Apprehension of social needs and expectations towards forest environment is essential in contemporary times due to the fact that society of the 21st century more actively participates in shaping the natural environment employing the achievements of democracy, market mechanisms, access to information, knowledge and education, as well as advancement of self-governance. Moreover, the society does not passively accept all the solutions proposed by foresters. It specifies their own desirable solutions, which allows providing variable benefits to larger group of citizens. Bearing in mind that forest users make their decisions on the basis of individual and subjective preferences (Janusz, Piszczek 2008), it would be necessary to undertake measures which shape these preferences and modify existing habits negatively affecting other forest users or bringing losses or additional costs to forest economy.

The way of optimizing recreational forest management should be based on harmonization of social expectations, capacity of forest ecosystems and forest economy. Such optimization should allow for compromising primary function of specific forest with its other functions. It should also minimize in specific cases the conflicts between economic and public activities of forest management, more commonly between timber production and many important and valuable ecological, protective and social functions.

2. Research goal and scope

The goal of the current publication is to present selected unpublished survey results discussing social and economic aspects of public forest functions with the special accent given to recreational function. The research was conducted in 2000–2009 by the Forest Research Institute (IBL). Among the respondents

were the tourists visiting selected promotional forest complexes (PFC), residents of Śląskie (Silesia) and Podlaskie (Podlachia) regions as well as residents of Łódź and Warszawa (Warsaw) cities visiting urban forests. The data was supplemented by the results of two national surveys of the random sample of Polish residents and Warszawa residents. The list of conducted surveys is presented in Table 1.

This publication discusses the opinion of respondents on the topic of:

- forest sites preferred for recreation,
- factors affecting attractiveness of forest areas for recreation,
- major forms of forest recreation,
- crucial for forest recreation elements of infrastructure,
- organizations which should co-finance public forest functions and management,
- mean willingness to pay (WTP)¹ declared by respondents using the contingent valuation method (CVM),
- preferences towards the non-timber forest values.

3. Basic methods of the presented research

The differences in research goals and scope of the conducted surveys (Table 1) make it hard to present detailed methodology used as well as characteristics of all the study areas. Considering that, only the most significant methods common for all the surveys are presented. Among them the following should be listed:

- 1) using questionnaires containing multiple-choice questions ('cafeteria-style checklist'),
- 2) conducting direct interviews by trained survey takers,
- 3) implementing research in forests (besides the research implemented by the Centre for Public Opinion Survey (OBOP) on the order of IBL and research conducted in Śląskie and Podlaskie regions),
- 4) following the rule which specifies the use of the simple statements in multiple-choice questions; statements which exclude forestry terms is difficult for respondents' understanding,

¹ Willingness To Pay is an amount declared by respondents within the hypothetical scenario, which is set during survey data collection. It assumes changes in quality and/or quantity of evaluated goods and/or services of natural environment. Value of WTP together with WTA (Willingness To Accept) present the bases for evaluation of the value of non-market goods and/or services within the Contingent Valuation Method (CVM) (Bienabe E., Hearn R. 2006; Loomis J. et al. 2000; Scarpa R. et al. 2000).

Table 1. General characteristics of forests and goals of research conducted in 2000-2009 by the Forest Research Institute on social preferences towards public forest functions

No.	Study area	Sample size and type	Year	Main research goal
1	2	3	4	5
1	Promotional Forest Complex (PFC) Beskid Śląski	65 – residents 125 – tourists	2000	co-financing of non-timber forest functions of nearby forests (municipality)
2	PFC Beskid Śląski	81 – tourists*	2001	improvement of recreational forest management in municipality
3	PFC Oliwsko-Darżlubskie Forests	150 – tourists*	2001	improvement of recreational forest management in municipality
4	PFC Janowskie Forests	113 – tourists*	2001	improvement of recreational forest management in municipality
5	Podlaskie region	595 – residents**	2002	financing of protective and other forest functions besides timber production
6	Śląskie region	908 – residents**	2002	financing of protective and other forest functions besides timber production
7	Communal forests of Łódź city	624 – residents***	2004	financing of management in communal forest
8	Forests of the Regional Directorate of the State Forests in Kraków	300 – tourists****	2006	improvement of quality and quantity of selected public forest functions
9	Forests surrounding Warszawa city	160 – residents***	2007	improvement of recreational forest management in PFC of Warszawa
10	PFC Beskid Śląski	442 – tourists****	2009	improvement of public forest functions and management
11	National survey OBOP (Centre for Public Opinion Survey)	1073	2000	financing of non-timber forest functions in municipality
12	National survey OBOP	1106	2001	improvement of recreational forest management in municipality
13	Representative survey of Warszawa residents	500	2008	opinion of Warszawa residents on non-timber forest functions

*; **; *** research conducted using similar type of questionnaire

**** research conducted using three types of questionnaires with different format of question related to WTP (open question, payment card and dichotomous choice), as well as varying sequence of multiple-choice or cafeteria-style checklist

5) conducting the pilot study allowing evaluation of the correctness of questions and questionnaire structure,

6) using contingent valuation method (CVM)² and willingness to pay (WTP) for estimating the economic value of public forest functions (recreational function) usually in the form of the open ended question, however in selected surveys also using the payment card and dichotomous choice questions,

7) establishing social significance of two non-timber forest values (existence and hereditary values) as well as values of option and desire, which could be included into consumable values,

8) using lists of replies prepared for each question and presented to respondents while reading question text by survey taker,

9) employing pictures for selected questions,

10) applying three schemes of replies in closed ended questions:

- the respondent could select only one category among those listed,

- in case of large number of categories (10 and more), the respondent could indicate maximum three answers, in some cases with the use of ranks allowing evaluation of the significance of mentioned categories,

- the respondent was asked to divide 100 points between proposed categories in a way where established structure would reflect their significance for the respondent.

While discussing the results, the article compares those, where similar questionnaire types were used – in the surveys of tourists in three PFCs, in the surveys conducted in Śląskie and Podlaskie regions as well as in Łódź and Warszawa cities. The results are presented in tables.

4. Research results

Preferred places for forest recreation

The analysis indicates variable preferences which depend on location and the study area, its type (urban

or suburban), and type of respondents (residents/ tourists).

Familiarity with forest site by local residents helps them to feel safe within the forest interior (residents of Śląskie and Podlaskie regions as well as Łódź and Warszawa cities) (Table 2). Forest visitors in PFCs located near to seaside and in lowlands preferred forest areas situated near to water edge (the goal of their visit is to make use of sea or water reservoirs as an important recreational elements). The visitors of mountainous PFCs more often selected open areas (forest opening, trails and forest roads) due to difficult access to forests usually located on hilly terrain, and also because hiking on mountain trails is a dominant type of recreation in mountains.

Residents of the industrial Upper Silesian urban area (Głaz 2002) also prefer to spend time in forests close to water edge and on forest roads and trails going for the bike ride or hiking. Residents of the Podlaskie region (Płotkowski, Zając 2002) often merge their forest visits with berry and mushroom picking³, and therefore they like to choose forest interior. The residents of the agricultural areas often visit forest exterior due to the fact that large part of the population in rural areas of the Podlasie region live near to forests. The residents of Śląskie and Podlaskie regions showed similar preferences towards the recreation in managed areas (2% of respondents) and wild and inaccessible places (preferred by about 15% of respondents) which was an interesting outcome of this research.

Several factors related to the characteristics of the urban Łagiewniki forests near to Łódź city were decisive in the selection of recreation ‘deep in the forest’ by the Łódź residents (Gołos, Zaperty 2004). They include the small area of the forest, its location within the city borders, as well as forest appearance, which in many places resembles parks. Besides that, the forest has very well developed road system with good access and parking. The visitors feel secure thanks to the constant presence of the city guards during the summer season.

² The results are presented in the form of mean values for $WTP > 0$ and $WTP \geq 0$. Moreover, the structure of declared amounts was established (using the division of values such as that for payment cards). In case of open ended and dichotomous choice questions, declared amounts were structured by classes. The mean value of WTP/year according to the methods used was presented as a declaration of respondent or the whole family (household) of the respondent. The results also present the share of respondents who declared the $WTP > 0$.

³ The results presenting harvest amounts of berries and mushrooms by the residents of the Śląsk and Podlasie regions can be found in the next part of this publication.

Table 2. Preferred place for rest and recreation in forests indicated by respondents (%)

No.	Study area	Year	Place in the forest							total
			near to water edge	forest opening	forest interior	forest edge	forest roads and trails	other		
1	2	3	4	5	6	7	8	9	10	
1	PFC Beskid Śląski	2001	16	35	17	7	23	2	100	
2	PFC Oliwsko-Darżlubskie Forests	2001	47	14	15	9	14	1	100	
3	PFC Janowskie Forests	2001	42	23	18	11	5	1	100	
4	Podlaskie region	2002	28	25	44	35	31	-	*	
5	Śląskie region	2002	37	29	38	26	38	-	*	
6	Communal forests of Łódź city	2004	-	21	33	12	33	-	100	
7	Forests surrounding Warszawa city	2006	-	24	25	18	33	-	100	
8	PFC Beskid Śląski	2009	10	10	14	16	20	0	100	
9	National survey OBOP	2001	37	23	16	12	11	1	100	
10	Representative survey of Warszawa residents	2008	-	-	43	25	21	5	100	

* the total is more than 100% due to the possibility to choose more than one place in the forest

- these categories did not used in survey

The national survey conducted in respondents' homes indicated that respondents were highly interested in forest recreation in places with water reservoirs, which increases recreational attractiveness of forests (Gołos, Janeczko 2001).

The characteristics of forest areas are important in shaping the preferences of respondents, among them their choice of recreational activity in forests (hiking, biking, swimming, sun bathing, or fishing). Local residents and tourists differ in their selection of sites due to the various levels of security within the forest.

Tourists are often afraid of being lost in the forest and avoid visiting forest interior.

Elements crucial for the attractiveness of forests for rest and recreation

Attractiveness of forest areas for rest and recreation besides natural qualities (location, accessibility, recreational infrastructure) also depends on elements which are not related to forest environment.

Of the 14 elements important for attractiveness of forest area⁴ for rest and recreation (located within the cafeteria-style checklist), two factors were indicated more often: silence and calm, as well as clean environment (Table 3). Largely important to respondents were also water reservoirs (PFC Janowskie and urban forests of Łódź city), in case of the PFC Oliwsko-Darżlubskie i Janowskie. Forests were affecting site attractiveness even in higher degree than forests itself (Gołos, Janeczko 2002). For the residents of Śląskie (Głaz 2002) and Podlaskie (Płotkowski, Zająć 2002) regions, forest appearance was highly significant.

Quality of recreational infrastructure had only small influence on raising the attractiveness of recreational area. History and culture of the given area also had low significance for people recreating in forests. Forest landscape (excluding respondents in mountain areas), presence of protected areas and forest accessibility had only little influence on the attractiveness of recreational forest areas.

Based on the collected data, it would be possible to say that most important elements affecting the attractiveness of forest areas are those, which influence quality of recreation. The survey showed that calm and comfort of recreation in forests are more important to forest visitors than infrastructure, accessibility or additional values.

Dominant forms of forest recreation

Forests allow us to implement many various forms of recreation, the most common of them being hiking. Its popularity results from the lack of special preparation required by visitors. Financial factors also affect the choice of hiking, as hiking does not require additional expenses besides the cost of transportation. Moreover, hiking is possible in any type of forest during any season, and its attractiveness rises during summer and autumn times when the visitors can go for mushroom and berry picking.

Preferences of forest visitors have been studied using several different methods, but the compilation of results

in the form of common table could not be presented here for some reasons. However, the results of our research indicate that:

1. The residents of the studied Podlaskie (Płotkowski, Zająć 2002) and Śląskie (Głaz 2002) regions spend about 30% of their free time relaxing in the forest, while about 18% of respondents spend more than 50% of their recreational time in the forest.

2. Within three PFCs (Gołos, Janeczko 2002) recreational activity depends on the natural qualities of the environment (mountains, sea, water reservoirs) and the degree of forest preparation to particular forms of recreational activity. In the PFC Beskid Śląski, respondents spend almost 23% of their free time on hiking on marked trails, while it is only 5% in other two PFCs (Oliwsko-Darżlubskie and Janowskie Forests). However, in the Oliwsko-Darżlubskie and Janowskie PFCs about 30% of respondents' free time is spent on swimming and sun bathing, while in mountainous forests it equals less than 3%. The time spent on forest hiking is distributed similarly in all three PFCs (about 25% of free time).

3. Hiking is a dominant form of forest recreation. According to a survey done on visitors in Beskid Śląski (Silesian Beskids mountains) (Gołos 2010), more than 70% of respondents declared such form of activity with an average time spent being about 3 hours per day.

4. Hiking is often accompanied by berry and mushroom picking. Foraging is a distinctive form of free time activity, especially for the rural residents. This notion is supported by comparing research results in the industrial (Głaz 2002) and agricultural areas (Płotkowski, Zająć 2002).

In the Podlaskie region during the period from June 2001 to July 2002 the respondents collected (Płotkowski, Zająć 2002):

- more than 11 thousand kg of mushrooms (396 people – 66% of respondents) and more than 4 thousand kg of berries (283 people – 47%) for their home use,

- more than 6,3 thousand kg of mushrooms (960 PLN/family/year) and more than 2,7 thousand kg of berries (660 PLN/family/year) for sale.

⁴ The questionnaires presented to respondents in three PFCs included questions about elements crucial for the attractiveness of recreational site, not a forest area. Therefore cafeteria-style checklist included 'forest' as an element increasing recreational attractiveness. The task of the respondents was to divide 100 points between nine elements crucial to recreational attractiveness. The results present only the opinion of respondents who declared for the given elements 41 to 50 points.

Table 3. Elements crucial for the attractiveness of forests for rest and recreation (%)

No.	Study area	Year	Elements																
			clean environment	silence and calm	water reservoirs	landscape	protected areas	infrastructure	culture, history, tradition	forest	accessibility	forest appearance	plants and animals	close location	sea	lakes	other	total	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1	PFC Beskid Śląski (residents)	2000	68	-	61	89	57	41	45	-	-	-	-	-	37	-	3	*	
2	PFC Beskid Śląski (tourists)	2000	58	-	69	81	54	42	38	-	-	-	-	-	44	-	2	*	
3	PFC Beskid Śląski	2001	16	17	10	15	5	7	4	18	-	-	-	-	8	-	-	100	
4	PFC Oliwsko-Darżlubskie Forests	2001	13	16	20	10	4	6	4	16	-	-	-	-	11	-	-	100	
5	PFC Janowskie Forests	2001	17	11	26	9	3	6	4	19	-	-	-	-	5	-	-	100	
6	Podlaskie region	2002	48	65	17	-	15	1	-	-	16	43	39	-	-	-	1	*	
7	Śląskie region	2002	42	70	24	-	13	3	-	-	23	37	31	-	-	-	0	*	
8	Communal forests of Łódź city	2004	-	20	23	13	-	6	6	-	-	12	-	19	-	-	1	100	
9	Forests surrounding Warszawa city	2006	-	27	15	9	-	9	5	-	-	18	-	17	-	-	0	100	
10	PFC Beskid Śląski	2009	19	29	-	-	-	12	-	-	19	18	-	-	-	-	2	100	
11	National survey OBOP	2001	27	25	17	10	8	8	4	-	-	-	-	-	-	-	1	100	
12	Representative survey of Warszawa residents	2008	-	31	11	13	-	9	6	-	-	17	-	15	-	-	0	100	

* the total does not equal to 100% due to the type of question, which allows to select maximum three categories

In the Śląskie region (Głaz 2002) during the similar time period, the respondents collected:

- almost 4 thousand kg of mushrooms (404 people – 44%) and 1,5 thousand kg of berries (274 people – 30%) for their home use,
- only 130 kg of mushrooms and 455 kg of berries for sale.

In the Podlaskie region total value of harvested non-timber forest products was about 222 thousand PLN⁵, or on average about 370 PLN per every surveyed household (Płotkowski, Zajac 2002). In the Śląskie region it was 57 thousand PLN, on average about 62 PLN per each surveyed household (Głaz 2002).

Recreational forest management

The results indicate that a major part of respondents find it attractive to have a possibility of hiking in a clean and managed forest in silence and calm environment. There is also a group of forest visitors, who prefer to spend time on specially prepared forest sites, particularly with good infrastructure. Quantity and quality (diversity and spatial distribution) of recreational infrastructure in forests⁶ should not only provide comfort and attractiveness of recreation, but also safety to visitors. Design of all equipment, especially the one intended for children, older people and currently small but growing group exercising sport in forests, should comply with basics of ergonomics and obtain required user safety certificates (Woźniacka, Janeczko 2011).

The survey asked the respondents to indicate the most important infrastructure elements which should be obligatory in forests visited by tourists, and also those elements which are missing from the studied area. The diversity of choices in cafeteria-style checklist makes it impossible to synthesize the responses in tables. To summarize, the most important elements of forest recreational infrastructure presented by respondents included:

1. Hiking trails were selected as an obligatory recreational element by 80% of respondents (Gołos, Janeczko 2000). Their significance was confirmed by the respondents of Podlaskie (Płotkowski, Zajac 2002) and Śląskie (Głaz 2002) regions, where 44 and

58% of respondents, respectively selected them as an important element. Moreover, the respondents indicated bicycle trails 35 and 49%, tourist trails 36 and 39%, and viewpoints 36 and 32%, respectively.

2. While viewing 12 presented pictures (Table 4) and evaluating elements of recreational forest management, the respondents from three PFCs placed at the top of the list; forest toilets. Subsequently, the respondents in PFCs of Oliwsko-Darżlubskie and Beskid Śląski forests placed information tables with plans of tourist routes, while the respondents of Janowskie forests selected shade structures with places for campfires (Gołos, Janeczko 2002). However, the respondents in urban forests of Łódź (Gołos, Zaperty 2004) and Warszawa (Zajac, Gołos 2007) cities more frequently selected the category ‘rest facility’ – 17 and 19%, shade structures – 12 and 10%, and sanitary structures – 11 and 10%, respectively.

3. The respondents in urban forests of the Łódź city (Gołos, Zaperty 2004) similarly to respondents in forests surrounding Warszawa (Zajac, Gołos 2007) enclosed the list of most important recreational elements needed, i.e. garbage cans (22 and 25%, respectively), sanitary structures and information tables (15 and 18%). The third selected element was places for sitting and tables – 14% of respondents. It should be mentioned that only about 33% of respondents in urban forests of Łódź city selected forests managed for recreation as a place for spending free time, while most of the respondents (65%) prefer forests unmanaged for recreation.

4. The respondents of the representative survey OBOP of Warszawa residents more often (46% of respondents) indicated the lack of rest facilities (for example benches, tables, shade structures) (Zajac, Gołos 2007). They also noted the absence of linear recreational objects such as bike trails (38% of respondents) and hiking trails (30% of respondents). The respondents were also bothered by the lack of special trails, such as health or sport trails (20% of respondents) as well as nature educational trails (19%). It was interesting to discover that not many people pointed to the lack of parking places (only 10%) and places for games with children (playgrounds – 9% of respondents).

⁵ The average purchase price in 2000 for mushrooms was 10 PLN/kg, and for berries 7.5 PLN/kg (*Leśnictwo* 2000).

⁶ Forest recreational infrastructure includes objects and constructions located on forest areas, which are integral part of forest management, and which enhance comfort and safety of forest visits (such as shade structures, maps, water sources, bridges, foot-bridges, camp-fire sites, tables, and others).

Table 4. Elements of infrastructure selected by respondents on pictures (%)

No.	Study area	Elements of infrastructure											
		toilets in the forest	rest facility	fire control tower	information board	observation tower	map	shade structure with campfire place	sculpture	bird clock	information and educational board	shade structure with barbecue place	information signs
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	PFC Beskid Śląski	20	14	2	4	8	15	18	0	4	5	3	6
2	PFC Oliwsko-Darżlubskie Forests	22	20	2	2	13	20	9	1	2	3	2	3
3	PFC Janowskie Forests	27	19	7	1	4	9	13	4	0	11	4	2
4	Communal forests of Łódź city	11	17	8	3	13	8	12	6	5	6	4	3
5	Forests surrounding Warszawa city	10	19	6	5	9	9	10	6	4	6	10	5

5. The respondents in the PFC Beskid Śląski (Gołos 2010) among 10 proposed elements more commonly selected garbage cans (more than 20% of respondents) and sanitary facilities (almost 19% of respondents).

Generally the reasoning for such selection could be found by means of spending the majority of time in forests while doing hiking. The results also confirm that forest visitors give a great meaning to the elements which allow them to freely move and find the way through the landscape, such as all types of markings (road indicators and information tables). If we assume that replies reflect the feelings related to the lack of recreational forest management, than the absence of forest sanitary facilities, information tables and shade structures would be especially significant.

Economic aspects of forest recreation

Who should finance public forest functions?

Cafeteria-style checklist included five categories with the possibility to select ‘other option’ besides those

presented. Two categories (managing organizations and national budget) were present in all the questions (Table 5).

National budget was at the top of the list when the questions contained the term ‘public forest functions’. When questioned about the financing of the recreational forest functions, the respondents pointed out to the nature protection funds or to self-governance authorities. The selection of self-governance funds was more common for the local residents than for forest visitors.

There was large discrepancy in replies of respondents related to the same problems when comparing the results belonging to the respondents who selected the WTP higher than zero. Their readiness to finance public forest functions varied from 4% in urban forests of Łódź (Gołos, Zaperty 2004) to 19% in the PFC Janowskie Forests (Gołos, Janeczko 2002).

The percentage share of respondents declaring WTP>0 varied from 27% in the Podlaskie region (Płotkowski, Zajac 2002) to 96% in the regional forests of Kraków (open type questions) (Gołos 2006) (Table 6).

Table 5. Organizations which should co-finance public forest functions and management (%)

No.	Study area	Year	Co-financing organizations							
			users	managing organization	national budget	funds	other	self-governance	no-one	total
1	2	3	4	5	6	7	8	9	10	11
1	PFC Beskid Śląski (tourists) ¹	2000	10	23	38	-	2	27	-	100
2	PFC Beskid Śląski (residents)	2000	10	34	19	-	0	37	-	100
3	PFC Beskid Śląski ²	2001	15	26	24	-	-	35	-	100
4	PFC Oliwsko-Darżlubskie Forests	2001	11	28	26	-	-	35	-	100
5	PFC Janowskie Forests	2001	19	24	21	-	-	36	-	100
6	Podlaskie region ³	2002	-	8	57	-	10	25	0	100
7	Śląskie region	2002	-	10	52	-	8	28	2	100
8	Communal forests of Łódź city ⁴	2004	4	14	36	38	7	-	1	100
9	Forests surrounding Warszawa city ⁵	2006	9	10	53	25	1	-	1	100
10	National survey OBOP ⁶	2000	11	25	45	-	1	17	1	100
11	National survey OBOP ⁷	2001	13	15	28	-	2	42	-	100

The question related to:

¹ co-financing of non-timber forest functions of nearby forests (municipality)

² improvement of recreational forest management in municipality (also refers to research conducted in the PFC Oliwsko-Darżlubskie and PFC Janowskie Forests)

³ co-financing of non-timber forest functions (also refers to Śląskie region)

⁴ co-financing of recreational forest management in communal forests of Łódź city

⁶ co-financing of public functions

⁷ co-financing of recreational forest management

Table 6. Estimation of economic value of public forest functions and management using Contingent Valuation Method

No.	Study area	Question type	Year	Share (%) of respondents declaring specific amount (PLN)								% respondents declaring WTP>0	WTP>0/family/year (PLN)	WTP>0/person/year (PLN)	WTP≥0/family/year (PLN)	WTP≥0/person/year (PLN)
				10	20	50	100	200	500	other	total					
1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	PFC Beskid Śląski	Po	2001	10	21	30	26	5	7	2	100	52	99	-	74	-
2	PFC Oliwsko-Darżlubskie Forests	Po	2001	17	14	35	27	4	3	1	100	74	70	-	51	-
3	PFC Janowskie Forests	Po	2001	15	15	34	23	5	3	4	100	77	93	-	76	-
4	Podlaskie region	Po	2002	49	24	16	7	1	2	1	100	27	109	41	35	11
5	Śląskie region	Po	2002	42	15	28	9	1	3	2	100	40	109	52	29	21
6	Communal forests of Łódź city	Po	2004	16	0	66	14	2	2	0	100	81	55	-	45	-
7	Forests surrounding Warszawa city	Po	2006	44	16	27	9	3	1	0	100	-	107	-	49	-
8	Regional Directorate of the State Forests in Kraków	Po	2006	4	11	24	32	14	10	4	100	90	150	-	135	-
9		Pzk	2006	18	18	31	24	9	0	0	100	96	75	-	72	-
10		Pof	2006	4	34	49	13	0	0	0	100	94	92	-	86	-
11	PFC Beskid Śląski	Po	2009	7	17	36	28	6	5	1	100	93	94	-	84	-
12		Pzk	2009	25	20	28	22	3	3	0	100	87	58	-	51	-
13		Pof	2009	35	4	35	15	7	5	0	100	80	68	-	55	-
14	National survey OBOP	Po	2000	28	21	26	17	4	2	2	100	49	52	-	24	-
15	National survey OBOP	Po	2001	34	24	23	14	2	1	2	100	45	41	-	17	-
16	Representative survey of Warszawa residents	Po	2008	41	21	19	14	1	1	3	100	53	53	-	27	-

Po – open question

Pzk – question with payment card

Pof – question with dichotomous choice

Value of public forest goods and services and forest economy

All the surveys contained the question which was intended to evaluate social value of the most important

public forest functions or only recreational function (Table 6).

Depending on the scope of the valuation (selected functions or only recreational function), the context of valuation (all forests or only nearby forests of the

Table 7. Methods of transferring fees for co-financing of public forest functions preferred by the respondents (%)

No.	Study area	Year	Transferring						
			directly	via			other	no answer	total
				budget	funds	self-governance			
1	2	3	4	5	6	7	8	9	10
1	PFC Beskid Śląski – tourists	2000	45	23	21	8	3	0	100
2	PFC Beskid Śląski – tourists	2000	46	17	24	13	0	0	100
3	Podlaskie region	2002	25	9	11	7	1	48	100
4	Śląskie region	2002	40	3	12	5	0	41	100
5	National survey OBOP	2000	47	10	26	16	1	0	100

Table 8. Significance of selected non-timber forest values as indicated by respondents

Study area and year	Like to be in the forest – value of desire		Forest is a common good having significance for us, our children and grandchildren – hereditary value		Existence of forest is itself important, its absence or threat to forests would be disturbing to respondent – value of existence		Forest exists and visits to forests are possible at any time – value of option		Other values
	L*	%	L	%	L	%	L	%	
1	2	3	4	5	6	7	8	9	10
PFC Beskid Śląski	1	28,78	2	30,37	3	18,81	4	21,19	0,85
	3	24,33	4	33,99	1	29,33	2	12,02	0,34
	4	29,68	2	26,88	3	21,96	1	21,08	0,40
mean	x	27,23	x	30,84	x	23,98	x	17,43	0,51
Regional Directorate of the State Forests in Kraków	4	19,74	2	31,33	1	30,36	3	14,62	3,95
	1	25,40	3	29,85	4	24,45	2	15,65	4,65
	1	32,8	2	31,90	3	21,70	4	9,90	3,65
mean	x	25,98	x	31,03	x	25,50	x	13,39	4,08

* order of question in cafeteria-style checklist

municipality), WTP question type (open question, with the payment card and dichotomous choice), the average amounts for the $WTP > 0$ /household/year varied from 41 PLN (Gołos, Janeczko 2002) to 150 PLN (Gołos 2006), whereas $WTP \geq 0$ /household/year varied from 17 to 135 PLN.

The share of respondents declaring $WTP > 0$ was generally above 50%. Among the presented results, this value was below 50% only in four cases (Podlaskie and Śląskie regions, and two national surveys), while the lowest value was observed in the Podlaskie region at the level of 27% (Płotkowski, Zajac 2002).

Five surveys contained the question on the methods of transferring declared monetary amounts. The respondents were more willing to make transfers directly to the account of the organization managing forests. Such declaration was made by 40–47% of respondents in four study areas (Table 7). Only the respondents in the Podlaskie region were unclear in their answer – 48% of respondents did not answer to that question.

Preferences of respondents related to the non-timber forest functions

Among the presented studies, two of them had a question which allowed to us research the preferences of respondents towards the non-timber forest values⁷ (existence and hereditary values) and values, which are considered as utilitarian – value of option and desire.

The received results are interesting due to the fact that the above question was located within questionnaires which were also intended for answering the question on the importance of the order of multiple-choice answers for the average values of responses. The results indicate the following relationships (Table 8):

1. Four samples showed the most important value to be the hereditary value ('forest is a common good having significance for us, our children and grandchildren'). Its share was from 30 to 34%.

2. In two among six samples (in regional forests of Kraków (Cracow) and PFC Beskid Śląski), the

respondents determined the desire value to be the most important ('liking to be in the forest'), which received 33 and 30% accordingly.

3. The desire value was second when the means were calculated (for all the questionnaires without the division on the types of WTP questions). It received on average more than 27% in PFC Beskid Śląski and almost 26% in regional forests of Kraków.

4. In five cases, the values declared by respondents for categories located higher on the list of multiple-choice questions were indeed given higher means.

5. In three cases, the situation was the opposite and the values, which were located lower on the list of multiple-choice cafeteria-style checklist received significantly higher means than those located at the top of the list.

5. Discussion

For a better comparison of presented results, the discussion will deal only with the research conducted in Poland⁸.

Forest visitors clearly prefer to rest in forests having natural or even primary appearance. Research conducted by Janusz and Piszczek (2008) also confirms this notion. According to the results received by Kikulski (2008), 34% of people recreating in forests choose forests unmanaged for recreation. However in case of research by Woźniacka and Janeczko (2009), the majority of respondents (26% of those surveyed) relax in places which are managed for recreation, and only 6% of respondents prefer to spend time in places lacking recreational infrastructure.

Similarly to the presented research, the respondents of the survey conducted in December 2009 by the Computer Assisted Personal Interviewing (CAPI) noted high significance of cleanliness and neatness of forests. On the scale from 0 to 10, clean forest received the score of 8,8; garbage cans – 8,7; and safety feeling – 8,4 (Hyży 2011). The research by Bagińska (2009) indicates that among recreational elements,

⁷ Non-timber forest values are integral part of total economic value (TEV). Among them the hereditary and existence values are mentioned more often (Walsh R.G. et al. 1984; Merlo, Brailes 2000). Besides those values, Our study also researched values of option and desire, which are considered to be utilitarian values. The description of values could be found in Table 8.

⁸ The outcome of social research and economic analysis (value estimation) in large degree depends on existing social and economic conditions (level of development), cultural situation (significance of forests and forest economy), and historical knowledge.

which are most significant for tourists, besides silence and calm (26% of respondents), are nature and clean air (54% of respondents). Natural conditions, quality of natural environment and safety were evaluated by the respondents as most important for the quality of recreation in the research mentioned above.

On the 5-point scale, all the above elements were given the score of 4.4. Such results confirm the outcome of the POLFOREX project. The survey showed that while making a decision on carrying the additional costs on the improvement of forest quality in Poland, the respondents pay a lot of attention to garbage in forests (70% of respondents evaluated this problem as highly important) (Polforex 2011). According to the research conducted by the Public Opinion Research Center (CBOS) at the request of the Institute for Sustainable Development (InE), 63% of respondents selected specific place for recreation due to its beautiful nature and natural qualities, while half of the respondents were driven by silence and calm of the area (Stanaszek, Tędziągolska 2011). In the survey of Rogów residents, the respondents declared their selection of forest as a place for recreation because they value contact with nature as well as silence and calm (60%). Highly important quality of forest area was also healthy air (53% of replies) (Stawski, Stawska 2009). Factors disturbing recreation in urban forests of Warszawa city included litter (31% of respondents), destroyed objects important for recreation, such as broken benches, upturned garbage cans, etc. (19%), noise (17%), high number of people (15%), insufficient number of recreational equipment (10%), inaccurate or unreadable marking of recreational trails (5%), and discomfort resulting from various restrictions and rules (4%) (Woźniacka, Janeczko 2009).

Among the recreational objects the ones desired most by the respondents in the research by Kikulski (2009) were biking trails (19,9%), hiking trails (10,4%), beaches and swimming places (10,1% each), as well as parking areas (8,9%). The most required recreational equipment included garbage cans (44,0%), seating places (21,2%) and sanitary facilities (19,3%). Hiking and biking trails, health trails, playgrounds and rest facilities were among the most preferred elements of the recreational program in urban forests. Forest users underlined the need to supplement the existing recreational infrastructure, to increase first of all the number of benches, garbage cans, toilets and shade structures. The results of the presented research demonstrate that existing recreational forest management in urban forests is commonly evaluated as insufficient (Janeczko, Woźniacka 2009). In the research

conducted by Stawski and Stawska (2009), 45% of the respondents expect to have marked biking and hiking trails, and also rest facilities such as shade structures with benches (42% of respondents). Moreover, some people would be interested in visiting educational trails (19%). More than one-fifth of people would like to have parking areas. From the other side, quite large part of respondents (21%) would prefer to have forest without recreational infrastructure.

The favourite forms of recreation for people in forests of the Iława and Dąbrowa forest districts are mushroom picking (70,8%) and hiking (66,8%). Less popular is berry picking (32,1%), biking (30,1%), swimming (24,9%) and nature observation (22,6%) (Kikulski 2008). The research studying recreational preferences of forest users in urban forests showed that the most favoured forms of recreation are hiking and biking (Górecka 2009).

Similarly, in urban forests of Warszawa, hiking was fancied by 40.9% of respondents, including walks with a dog – 8%, and biking – 22% of respondents (Janeczko, Woźniacka 2009). The residents of the Rogów municipality often visit forest for hiking or trip with children (52 and 39% of replies). Less popular forms of forest recreation are sports, such as running or biking, which was declared by only 18% of respondents (Stawski, Stawska 2009).

Value estimation of public forest functions has been done only in several studies other than in Forest Research Institute (IBL). Such examples include the study related to the value of non-timber forest functions in the Białowiecki National Park (BPN) (Buszko-Briggs 2008), or estimation of recreational values with the use of Travel Cost Method (TCM) in BPN (Giergiczny 2009). Those studies are concerned with the unique forest area, and therefore their results could not be compared to the research presented in current publication. A possible comparison could be done with the results of the study estimating recreational forest value conducted in 2005 on the sample at the national level (Bartczak et al. 2008). The values received varied from 2,54 to 27,51 PLN/person/visit depending on the used estimation method.

6. Summary and conclusions

Comparison of presented research results conducted in different forest locations, throughout different time periods and with participation of various groups of people allowed us to describe social preferences and

expectations towards selected elements of recreational forest management, to define characteristics of recreational activity and to study certain economic aspects related to the demand on services provided by forest economy. Acquired data, their analysis, compilation and comparison let us formulate the following general conclusions:

1. Prior to initiation of projects related to recreational management of the selected forest area, it should be specifically established, which user group (regarding their origin - local residents or tourists) will benefit from the prepared actions. In the case, when forest will be visited mainly by local residents, which is true in forests located within cities and in their surroundings, the plan should also include management of forest interior. However, management of forest areas located along major transportation routes and near to towns of high recreational significance, should consider large visitation frequency of visitors and tourists. In such cases, the dominant concept should concentrate on the management of forest edges, noting importance of maps and road signs, which facilitate navigation in unknown terrain.

2. Ensuring silence and calm, clean terrain (no garbage) and safety to forest visitors is an important condition for the successful recreational forest visit. Its implementation is possible only with the co-operation of special services, such as police and city guards. To some degree, forest guard should also be involved in this process. Safeguarding of cleanness in forests largely depends on shaping social consciousness, enforcement of fees for littering, further development of monitoring in selected places, as well as economic conditions related to cleaning of forests.

3. The research clearly indicates that hiking is a dominant form of recreation in forests. It is often connected with berry and mushroom picking. In urban and suburban forests biking is also popular. From the point of view of supply and demand of recreational forest functions, it should be noted that those are the activities, which provide great satisfaction to forest users and at the same time do not require high cost input.

4. While planning recreational forest management, it is important to remember that there are two large groups of forest users. The first one prefers well-managed forest areas with well-developed recreational infrastructure. The second group expects to spend time in forests accessible for recreation and providing close-to-natural environment without the signs of human impact.

5. The presented results confirm the existence of social agreement on co-financing of public forest functions (in the form of hypothetical declaration), including the recreational forest function. Majority of the respondents declared the amount of WTP>0, which they would prefer to transfer directly to organizations managing forests.

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