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Social perception of the need for forest management in Poland – assessment of the current status and occurring changes

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ABSTRACT

The purpose of the study was to obtain knowledge on the current level of public acceptance for the need for forest management in Poland, and to learn about changes that occurred in that respect over a period of 15 years. In the course of the study individual questionnaire interviews were conducted. The 2020-2021 survey covered 476 respondents, and the 2005-2006 – 947. The respondents were adults, without any ties to the management of forest resources in Poland, either through their occupation or education. The average rating of the importance of forest management amounted to 6.08 points during the earlier survey, while currently it dropped to 5.40 points (for a total of 7 points possible). The obtained results on one hand prove that the society understands the role of forests and forestry. On the other hand, the decline in the level of acceptance raises the need to consider the reason for these changes. Detailed analysis of answers suggests that one of the most probable causes can be the fact that some respondents base their opinions on the informal questionable content, transmitted over the widely accessible Internet, rather than on official data compiled on the basis of detailed forest inventory. Simultaneously, results of the study demonstrate the positive influence of one's own, direct observations of the forests and their management on the proper assessment of the importance of the role of forests and forestry. The suggested actions, described in the Conclusions section, include the need to offer the society an appropriate scope of knowledge – not only on the environmental and nature-related aspects, but also on the principles and rules for use of the forests as a source of raw material.

KEY WORDS

forest multifunctionality, forestry principles, forestry works, individual questionnaire interview, social awareness

Introduction

Sustainable forest management is the essence of the multifunctional model of Polish forestry. Its importance has been stressed both in the Act on Forests (Ustawa, 1991) and in the State Forest Policy (Polityka, 1997), pursuant to which, quote, 'The forests have become an inseparable element of modern and future civilization, thanks to the work of man using forces of nature for the needs

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of the society.’ This phrase fully reflects the importance of forest management, which is carried out in Poland according to the following principles (Ustawa, 1991):

- 1) universal protection of forests;
- 2) sustainability of forest maintenance;
- 3) continuity and sustainable use of all forest functions;
- 4) expanding forest resources.

These principles, which are being implemented in practice, show that forest management involves both the use and protection of forests. When discussing the aspect of use of forest areas, it is necessary to underscore that it is multi-directional, as it refers to all functions fulfilled by the forests. These functions include: environmental (protective), which ensures, among other things, the purification of the air; production (economic), including maintenance of the sustainability of timber harvesting; social, serving, among others, the formation of conditions for leisure and recreation (Ustawa, 1997; Polityka, 1997). Focusing on the production functions, it is necessary to stress that the forestry and timber sector is an important part of the economy of Poland, which has over 38 million of inhabitants (Statistics Poland, 2019). Currently, this sector employs 460 000 persons, of which 54 000 work in forestry (Statistics Poland, 2020b). In 10 years, the number of persons working in this sector grew by 18% (Statistics Poland, 2020b).

Forest land in Poland, as of 2019, covers an area of 9.46 million hectares, or 30.9% of the country’s land area (Statistics Poland, 2020b). The majority (80.7%) of forests constitute public property. The State Forests National Forest Holding manages 95% of the public forests. The Holding comprises 429 forest districts. Forest management, performed in each of the forest districts, is based on forest management plans, designed for a 10-year period and approved by the minister responsible for the environment (Ustawa, 1991). Pursuant to the Polish law, the process of development of forest management plans includes public consultations (Ustawa, 2008; IUL, 2012). For this reason, it is necessary to provide the public with adequate knowledge, influencing public awareness of the importance of forestry, as well as the basis and principles of its management and ongoing changes in forest resources.

Public acceptability for the management of natural resources is not a new concept in the global perspective – it has been broached for the first time as early as in 1960, by Firey (1960). In the later years, the issue of public attitude towards forest management was analyzed by: Clawson (1975), Stankey *et al.* (1985), Obua *et al.* (1998), de Camino (1999), Ferroukhi and Aguilar Schramm (2003), Shindler *et al.* (2004), Nordlund and Westin (2011), Šišák (2011), Kikulski (2014), Yang *et al.* (2015), Ford and Williams (2016), Krokowska-Paluszak *et al.* (2017), Floress *et al.* (2019), Ofoegbu and Chirwa (2019). This list proves that such studies were conducted in various locations all over the world, and increasingly frequently with the passing time.

Research whose goal is to learn about public opinion on forest management is important, as its results can be used to evaluate whether the communication with the society – not only on the part of managers of forest areas – is proper. This is particularly important as the meaning and value of forests changes over time and space (Clausen and Schroeder, 2004).

The purpose of the study was to obtain knowledge on the current level of public acceptability for the need for forest management in Poland, and to learn about changes that occurred in that respect over a period of 15 years (2005-2006 – 2020-2021). Simultaneously, it was analyzed whether there were statistically significant differences in the answers given by respondents depending on: their social characteristics; the time spent for leisure and recreation in the forest; the frequency of encountering forestry works, no entry signs due to felling, deep ruts caused by

timber-carrying vehicles; and whether or not they perceived forestry works as a factor disturbing their recreation.

Materials and methods

The public perception of the need for forest management in Poland was established on the basis of answers given by 476 adult respondents to the following question: ‘What is your opinion on the need for forest management in Poland (timber harvesting, planting new forests on harvested areas, forest care, protection of forest against hazards)?’ The respondents indicated a point on a horizontal, 7-degree analog scale, corresponding to their opinion – in the range from (left edge of the scale) ‘strong supporter of forest management’ to ‘strong opponent of forest management’. The scale did not state numerical values, in order to prevent influencing the answers of an undecided respondent with the numbers. At the stage of compilation of the study results, the individual items of the scale were assigned values from 1 (strong opponent) to 7 (strong supporter). The particulars section contained questions on the following social characteristics: gender, age, place of residence, level of education, field of education (this applied to persons with secondary or university education) and occupation. The questions regarding time dedicated for leisure and recreation in the forest, as well as the other aspects listed at the end of the Introduction, as well as questions regarding the usual location (forest district) for the respondent’s recreation, covered the past 5 years (preceding the study). This period is relatively long, and at the same time takes into account the limited capacity to remember (Babbie, 1995; Ossowski, 2014).

Individual questionnaire interviews were conducted in 2020 and 2021, as a part of scientific research carried out in specialization classes on forest use – by 84 students of the Faculty of Forestry of the Warsaw University of Life Sciences (453 interviews) and by the author of this paper (23 interviews). The survey was conducted by: telephone (65%), video call (29%), direct conversation (6%). Persons interviewed by telephone or video call received the questionnaire by e-mail. The respondents included members of extended families and friends of the persons conducting the research, as well as people unknown to them (Kikulski, 2021b). The selection of respondents took into account the proportions of gender, age and place of residence of adult Poles presented in statistical data (Statistics Poland, 2019), which was largely fulfilled (Table 1).

The share of respondents by education level was as follow: primary or vocational education – 16.0%, secondary – 37.1%, university education – 46.9%. Respondents with secondary or university education declared that they graduated from schools or universities with the following profiles:

Table 1.

Social characteristics of the respondents (R [%]) on the background of the demographics of the whole adult Polish population (PP [%])

Social groups	R [%]	PP [%]
Gender	women	48.9
	men	51.1
Age [years]	18-25	14.5
	26-35	22.1
	36-45	22.5
	46-55	18.1
	>55	22.9
Place of residence	village	41.2
	city ≤50 thous. inhabitants	27.3
	city 50.001-100 thous. inhabitants	7.8
	city >100 thous. inhabitants	23.7

life sciences – 13.8%, liberal arts – 18.6%, general – 18.1%, economics – 15.3%, technical studies – 34.2%. In terms of occupation, the distribution of respondents was: farmers – 12.6%, blue-collar workers – 28.3%, white-collar workers – 49.1%, students of schools and universities – 10.0%. The majority of respondents (82%) stated that they usually visit a single forest district for recreational purposes. The respondents named in total 175 forest districts (out of the total 429 in Poland) in all 17 Regional Directorates of the State Forests (Kikulski, 2021b).

The 2005-2006 study was conducted in the Dąbrowa Forest District (the Warlubie Forest Subdistrict) and in the Iława Forest District (the Drwęca Forest Subdistrict). These areas are an example of typical managed timberland – the average annual volume of logging (large and small timber) in these forests circles amounted to 4.18 m³/ha in the years 2001-2005 (Kikulski, 2011). This value was very close to that calculated for all forests managed by the State Forests (4.21 m³/ha) (Statistics Poland, 2007). At the same time, the study sites were selected because they also have a largely social function (tourism and recreation) – both forest districts are situated in the lakelands (in the northern part of Poland) where people from all over Poland rest (Kikulski, 2011). The individual questionnaire interviews were conducted, during the summers, with a randomly selected group of 947 adult Poles; 621 interviews were conducted by the author of the paper, and 326 by 3 appropriately trained persons. The respondents included persons living in rural areas and vacationing at resorts, on private recreational plots, as well as stopping at forest parking lots for tourism and recreation. The random route method was used for selection of respondents (Sawiński *et al.*, 2000). This method involves interviewing a person in every *n*th facility – a rural farm, an apartment, a cottage in a resort, a private recreational plot, a person from every *n*th car in a parking lot. At the further stage of drawing, the Kish method was selected – in the given facility, a person who recently celebrated their birthday was selected for the interview (Sawiński *et al.*, 2000).

The distribution of respondents based on their social characteristics were as follows: gender: women – 52.9%, men – 47.1%; age: 18-25 years – 25.0%, 26-35 years – 19.5%, 36-45 years – 17.2%, 46-55 years – 19.4%, >55 years – 18.8%; place of residence: village – 49.3%, city ≤50 thousand inhabitants – 14.9%, city 50.001-100 thous. inhab. – 14.8%, city >100 thous. inhab. – 21.0%; level of education: primary or vocational – 39.8%, secondary – 42.0%, university – 18.2%; profile of education: life sciences – 14.2%, liberal arts – 14.5%, general – 21.1%, economics – 18.9%, technical studies – 31.3%; occupation: farmers – 9.6%, blue-collar workers – 40.3%, white-collar workers – 34.2%, students of schools and universities – 15.9%.

The respondents, both in the 2020-2021 and in 2005-2006 surveys, included persons who did not have any ties to the management of forest resources in Poland through their occupation or education. The questionnaire and the method for conducting the study were consulted with a sociologist.

The distribution of responses to the questions differed from the normal distribution (determined with the Shapiro-Wilk test). Due to this, statistical analyses were performed with the use of nonparametric tests – the Mann-Whitney U test and the Kruskal-Wallis ANOVA. Differences were classified as significant when $p < 0.05$.

The mean percentage error, depending on the variants of the distribution of the bivariate variable, amounted to 4.5% from the sample of 476 interviews, and to 3.3% from the sample of 947 interviews (at the 95% confidence level) (Babbie, 1995).

Results

The results of the survey conducted in the years 2020-2021 indicate that the strong supporters of forest management constitute the largest proportion of respondents (36.8%) (Fig. 1). The strong

opponents of forest management are the smallest group (3.4%). The weighted average (number of respondents who indicated a particular point on the scale) of public acceptability for the need for forest management is 5.40 points (out of 7.0 points). These results differ from those obtained in the 2005-2006 survey, when the share of strong supporters was clearly higher (57.2%). During that time, the weighted average was 6.08 points. The established differences are statistically relevant ($p < 0.001$). The stated values were calculated on the basis of answers given by 457, or 96.0% (2020-2021) and 935, or 98.7% (2005-2006) of respondents (the remaining 4.0% and 1.3% did not express their opinion).

Female and male responses, in both the current and previous survey, are not statistically significantly different (Table 2). Analysis of changes over time shows the same decline in acceptability for forest management in both social groups.

The results obtained for the various age groups indicate that while there was a clear correlation before – the older the respondents were, the more they were in favor of forest management, currently all age groups have very similar opinions (Table 3). Only among the youngest respondents (18-25 years), the opinion on the analyzed aspect did not change in a statistically significant manner.

Place of residence is the factor that differentiated the responses of people surveyed in 2005-2006. The group with the highest acceptance for forest management were residents of villages (Table 4). At the same time, responses given by inhabitants of cities, irrespective of the size, were similar. Over the period covered by the study, the largest decline of acceptance was observed among respondents from rural areas (from 6.30 points to 5.50 points), and the smallest – among residents of cities from 50.001 to 100 thousand inhabitants (from 5.81 points to 5.40 points).

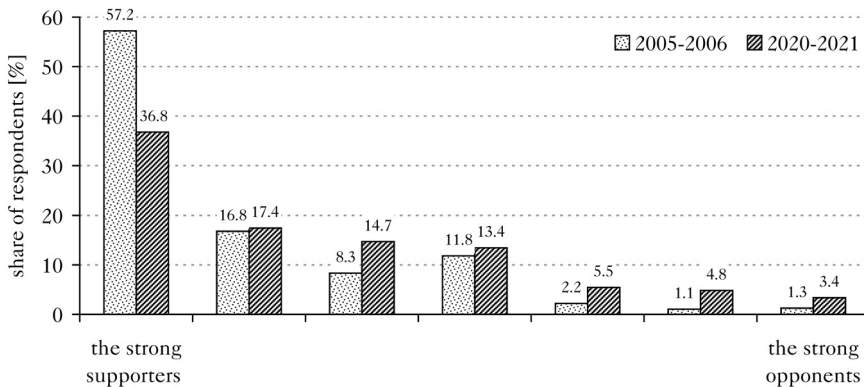


Fig. 1.

Public attitude towards the need for forest management in Poland – results of studies conducted in the years 2005-2006 and 2020-2021

Table 2.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on gender

Survey period	Gender		<i>p</i>
	women	men	
2005-2006	6.09	6.07	0.91
2020-2021	5.41	5.39	0.75
<i>p</i>	<0.001	<0.001	

At present the level of education does not affect the public evaluation of the need for forest management (Table 5). Previously the strongest supporters of forest management were persons with primary or vocational education. Simultaneously, respondents with secondary or university education shared the same opinion on the studied aspect.

Both in the earlier survey and in the current one the answers given by respondents did not differ in a statistically significant way depending on the field of their education (Table 6; 2005-2006 – $p=0.045$, however, further analysis in the form of multiple comparisons of mean ranks for all samples showed no differences). It is however noticeable that during the 2020-2021 survey the strongest supporters of forest management turned out to be the respondents with education

Table 3.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on age

Survey period	Age [years]					<i>p</i>
	18-25	26-35	36-45	46-55	>55	
2005-2006	5.60	5.94	6.23	6.35	6.46	<0.001
2020-2021	5.42	5.28	5.34	5.55	5.45	0.50
<i>p</i>	0.52	<0.001	<0.001	<0.001	<0.001	

Table 4.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on place of residence

Survey period	Place of residence				<i>p</i>
	village	city ≤50 thous. inhabitants	city 50.001-100 thous. inhabitants	city >100 thous. inhabitants	
2005-2006	6.30	5.94	5.81	5.86	<0.001
2020-2021	5.50	5.40	5.40	5.24	0.82
<i>p</i>	<0.001	0.01	0.15	0.007	

Table 5.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on education level

Survey period	Level of education			<i>p</i>
	primary or vocational	secondary	university	
2005-2006	6.22	5.98	6.02	0.01
2020-2021	5.49	5.45	5.33	0.87
<i>p</i>	<0.001	<0.001	<0.001	

Table 6.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on education field

Survey period	Field of education					<i>p</i>
	life sciences	liberal arts	general	economics	technical studies	
2005-2006	6.10	6.02	5.79	5.83	6.14	0.10
2020-2021	5.88	5.39	5.20	4.87	5.45	0.045
<i>p</i>	0.43	0.04	0.008	0.003	<0.001	

in the field of natural sciences. In the earlier survey, the same group was also the most positive about the aspect analyzed in the study (together with respondents with technical education). Analysis of changes over time shows that the largest decline in acceptance (by 0.96 points) was established among respondents with education in economics. The smallest change (by 0.22 points) characterized respondents with education in life sciences.

Occupation is the only social characteristic surveyed that was tied to statistically significant differences in respondents' answers not only in 2005-2006 but also currently (Table 7). During both surveys, the farmers demonstrated the highest acceptance for forest management. The largest decline in scores (by 0.95 points) was noted among white-collar workers, and the smallest in the group of students of schools and universities (by 0.13 points).

Results of the study conducted in 2005-2006 demonstrated that the time assigned for leisure and recreation in the forests was relevant for the evaluation of the need for forest management (Table 8). As it turned out, the strongest supporters of forest management were persons who allocate a few months per year, in total, for forest recreation. Currently, respondents' answers are not statistically significantly different, although a trend is visible that the more time the respondents spend in the forests, the more they accept doing forestry work. Analysis of changes over time shows that the assessment of the studied issue has changed (differences are statistically significant). The proportions of the various groups of respondents amounted to (the first number applies to the 2005-2006 survey): 'a few day' – 17.6%, 23.9%; 'several days' – 35.3%, 35.7%; 'a few weeks' – 30.5%, 33.0%; 'a few months' – 16.6%, 7.4%.

Acceptance of the need for forest management was not dependent, either previously or currently, on the frequency with which the person enjoying forest recreation encountered the various forestry work being done (logging, transport of timber, planting of forest) (Table 9). This is an interesting result, especially as currently the persons who encounter forestry works very frequently are the strongest supporters of forest management, and have changed their opinion the least (by 0.24 points). On the other hand, the current rating, expressed by respondents who answered 'quite often', is the lowest. However, the differences are not statistically significant. The shares of the various groups of respondents amounted to (the first value refers to the 2005-2006 survey):

Table 7.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on occupation

Survey period	Occupation				<i>p</i>
	farmer	blue-collar worker	white-collar worker	student	
2005-2006	6.57	6.17	6.17	5.44	<0.001
2020-2021	6.00	5.39	5.22	5.31	0.02
<i>p</i>	0.004	<0.001	<0.001	0.87	

Table 8.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on the time allocated for forest recreation during the year

Survey period	Time allocated for recreation in forests				<i>p</i>
	a few days	several days	a few weeks	a few months	
2005-2006	5.90	6.08	5.93	6.37	0.04
2020-2021	5.15	5.30	5.66	5.53	0.40
<i>p</i>	0.003	<0.001	0.046	<0.001	

'never or almost never' – 62%, 35%; 'from time to time' – 21%, 41%; 'quite often' – 12%, 17%; 'very frequently' – 5%, 6%.

The frequency of encountering signs informing of tree logging and prohibiting access to the area had a statistically significant effect on the perception of the need for forest management, which holds true for both surveys (Table 10). During the 2005-2006 survey it turned out that the more frequently (up to and including the 'quite often' group of respondents) people encountered such signs, the higher was the acceptance for forest management. At the same time, the persons who answered 'very frequently' gave the lowest rating for importance of forest management. Here it is worth noting that the share of respondents who 'very frequently' encounter the signs was and is the lowest. This comment refers also to the prior aspect (noticing forestry work being performed). The shares of the various groups of respondents amounted to (the first value refers to the 2005-2006 survey): 'never or almost never' – 76%, 36%; 'from time to time' – 14%, 41%; 'quite often' – 8%, 17%; 'very frequently' – 2%, 6%. It should be added that warning signs are placed not only for the time of ongoing logging, but for the whole period – from the start to end of the time of logging in the given forest area (they remain present also on days when work is not performed – usually Saturdays and Sundays).

The frequency of encountering deep ruts on forest roads, caused by vehicles transporting timber, was not a factor that statistically differentiated respondents' answers (Table 11). However, a current trend is evident: the more frequently the persons using forests for recreation encounter such ruts, the higher is their assessment rating of the need for forest management. The shares of the various groups of respondents amounted to (the first value refers to the 2005-2006 survey): 'never or almost never' – 47%, 27%; 'from time to time' – 22%, 48%; 'quite often' – 20%, 20%; 'very frequently' – 11%, 5%.

The perception of forestry works as a factor disturbing recreation had and still has influence on reducing the level of acceptance for forest management (Table 12). At the same time, the current difference between the answers given by both groups of respondents is even larger – the need for forest management is rated lower (by 0.96 points) by persons who find their

Table 9.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on the frequency of encountering forestry works during recreation

Survey period	Frequency of encountering forestry works during recreation				<i>p</i>
	never or almost never	from time to time	quite often	very frequently	
2005-2006	6.03	6.05	6.18	6.03	0.42
2020-2021	5.42	5.39	5.25	5.79	0.20
<i>p</i>	<0.001	<0.001	0.001	0.42	

Table 10.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on the frequency of encountering, during recreation, signs informing of logging and prohibiting access to the area

Survey period	Frequency of encountering signs informing of logging				<i>p</i>
	never or almost never	from time to time	quite often	very frequently	
2005-2006	5.97	6.24	6.54	5.83	0.002
2020-2021	5.25	5.44	5.38	6.11	0.035
<i>p</i>	<0.001	<0.001	<0.001	0.65	

Table 11.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on the frequency of encountering, during recreation, the ruts caused by vehicles transporting timber

Survey period	Frequency of encountering deep ruts				<i>p</i>
	never or almost never	from time to time	quite often	very frequently	
2005-2006	6.01	6.21	5.94	6.11	0.77
2020-2021	5.19	5.51	5.34	5.73	0.16
<i>p</i>	<0.001	<0.001	0.010	0.93	

Table 12.

Public attitude towards the need for forest management in Poland (points, out of 7.0 points) – depending on the perception of forestry works as a factor disturbing recreation

Survey period	Perception of forestry works as a factor disturbing recreation		<i>p</i>
	yes	no	
2005-2006	5.57	6.08	0.016
2020-2021	4.58	5.54	0.001
<i>p</i>	0.026	<0.001	

recreation disrupted by forestry works. The shares of the two groups of respondents amounted to (the first value refers to the 2005-2006 survey): ‘yes’ – 5%, 14%; ‘no’ – 95%, 86%.

For the survey conducted in the years 2005-2006, the values presented in Tables 8-12 and the shares of the various groups of respondents were calculated based on the number of 698 respondents, as the remaining 237 persons (out of the total number of 935), who expressed their opinion on the need for forest management, declared that they do not rest in forests within the area covered by research (the Warlubie and Drwęca forest subdistricts).

Discussion

The results obtained during the surveys conducted in the years 2020-2021 indicate that the need for forest management in Poland is generally accepted by the society. Simultaneously, it should be noted that the changes were found in the form of a decline in the assessment of the importance of forest management – from 6.08 points (out of 7.0 pts) in the 2005-2006 study to 5.40 points nowadays. However, for the most part, the public still understands that carrying out forestry is crucial to meeting various social needs. At the same time, the high level of approval of the legitimacy of forest management may indicate that the majority of the public believes that forestry is carried out properly. The positive assessment of the quality of forest management is also confirmed by the results of the survey, indicating high confidence in the professional group of foresters, which was expressed by 3/4 of the respondents (Gołos, 2018; Grabowska, 2020). The public is aware of the benefits of productive use of forests (Gołos, 2018; Grabowska, 2020). Timber is an environment-friendly, renewable and largely irreplaceable raw material. The number of applications for timber is very large, estimated at as much as 30 thousand (Pachalis-Jakubowicz, 2008). The importance of the timber resource certainly influences most respondents’ positive perceptions of forest management.

When discussing public acceptability for forest management, we should attempt to clarify its meaning. According to Brunson (1996), it results from a judgmental process by which indi-

viduals: 1 – compare the perceived reality with its known alternatives; 2 – decide whether the ‘real’ conditions are superior, or sufficiently similar, to the most favorable alternative conditions. At the same time, it assumes that conditions arising from ‘natural’ causes are practically always acceptable (Brunson, 1993). One can agree with this assumption, however, at the same time one should take into account another condition indicated by the author – acceptability is judged in a geographic context (Brunson, 1993). It is not possible to carry out forest management, balancing all its various aspects (natural, ecological, social, economic, technical), in such a way that the character of all forests remains close to natural – this applies both to the global, regional and local perspective. This however does not mean that the adopted alternatives to natural forests do not meet public expectations or do not represent sustainable forests. Managed forests are preferred, by persons seeking recreation, more than natural forests (Gołos, 2018). The carrying out of forestry works enables the creation and continued maintenance the type of forest most preferred by the public, *i.e.*, old and full of light (Gołos, 2018). At the same time, as various studies have demonstrated, a managed forest has more restitution values than a natural forest (Herzog *et al.*, 2003; Martens *et al.*, 2011; Simkin *et al.*, 2020). Meanwhile, exposure to the landscape of managed timberland with dead timber does not reduce negative feelings, indicating that not every forest environment is equally restorative (Janeczko *et al.*, 2021). While each forest type reduces tension, the highest average value of tension reported by study participants was found when observing a commercial forest with dead trees infested by bark beetle (Janeczko *et al.*, 2021). Authors of this study, conducted in the Białowieża Forest, suppose that such kind of forest could be perceived as less safe (fear of dead trees falling over). In addition, fatigue reduction appeared to be lower in the reserve, which was associated with a greater number of stimuli compared to the managed forest. At the same time, locations with fresh logs were seen as more esthetically pleasing than locations with old logs or without them (Hauru *et al.*, 2014). The quoted results of selected studies, regarding psychological reactions, confirm the importance of forestry management in the context of shaping the character of forests which is the most appropriate for persons seeking recreation. This is especially important with regard to forest areas located in the immediate vicinity of large cities, where foresters through planned management activities can influence the increase in the recreational potential of forests (Dudek, 2017).

The reasons for the aversion to forest management, expressed by some respondents, may be found in public unawareness of the changes in forest resources. In the course of the study conducted in 2004 on a representative sample of adult Poles, it turned out that the majority (54%) of respondents wrongly believed that the total area of forests in Poland is declining, and only 20% correctly thought that forests were growing (Bartczak, 2005). This is quite puzzling, because at the same time, within the same survey, the vast majority (81%) correctly answered that foresters perform afforestation of the logged forests. A study conducted at the same time in other European countries also found that large proportions of the public mistakenly believed that their country’s forests were declining: Italy – 70%, Switzerland – 66%, Great Britain – 44%, France – 33%, Austria – 31% (Rametsteiner and Kraxner, 2003). As a result of this study, it turned out that especially persons aged 15-25 are convinced of deforestation. A study conducted in 2013 demonstrated that the proportion of persons properly assessing changes – namely, the growing forest cover of Poland – amounted to only 13%, which indicates the universal mistaken belief that the area of forests is dwindling (Gołos, 2018). Meanwhile, according to statistical data, in the years 2000-2019 the area of forests in Poland was growing systematically and in the various years amounted to (values stated in millions of hectares): 2000 – 9.06, 2005 – 9.20, 2010 – 9.33, 2015 – 9.42, 2019 – 9.46 (Statistics Poland, 2016, 2020b). Thus, the proportion of forests in the land

area of the country rose from 29.8% to 30.9%. At the same time, as part of the implementation of the principle of expanding forest resources, only a part of the timber increment in Poland is harvested. In 2000, the volume of timber logged in Polish forests amounted to 27.7 million m³. In the following years, due to the rising social demand, the volume has been rising systematically and in 2019 reached the level of 42.4 million m³ (Statistics Poland, 2005, 2007, 2010, 2016, 2018, 2020b). During this period, a total of 717 million m³ was logged. Despite the increasing use of the forests over the analyzed period (2000-2019), standing timber volume increased significantly (by half) – currently it amounts to 2.65 billion m³ (Statistics Poland, 2005, 2020b). The policy of expanding forest resources has been implemented already in earlier years – in 1945, the area of forests in Poland was much smaller than it is today and amounted to 6.47 million hectares (forest cover – 21%), and the volume of standing timber – 0.91 billion m³ (Czuraj, 1982a, b). The growing stock of timber per 1 hectare of forest area in 1945 amounted to about 140 m³, and currently is twice as high (Raport, 2019). The growth of forest resources in Poland applies both to public and private forests (Raport, 2019; Statistics Poland, 2020b). According to data presented in the FAO report, in the years 2000-2010 the world lost annually 5.17 million hectares of forests, and in the years 2010-2020 – 4.74 million hectares (FAO, 2020). This accounted for, respectively, 0.13% and 0.12% of the total global forest area, which currently amounts to 4.06 billion hectares – or 30.8% of the land area of the Earth (FAO, 2020). The data indicates the reduction of global forest resources. Perhaps those respondents who demonstrate lower acceptance for the need for forest management are guided in their opinions by the mistaken belief that the negative changes regarding amount of forests on the Earth apply also to Poland.

As part of sustainable forest management, Polish forests are classified based on their dominant function. The majority of forests managed by the State Forests National Forest Holding (55% of area) have mainly environmental function (Raport, 2019). These forests have protective character (including the protection of water resources and soil). They also serve the economic function, but with modifications that involve the limitation of clearcutting, increasing the rotation age, modification of species composition (Raport, 2019). Forests where the production function dominates constitute currently 45% of all forests managed by the State Forests. The management of these forests takes into account the demands, tied, among others, to the broadly understood protection of nature. With respect to the social (primarily tourism and recreation) function of forests, these areas are very important for the fulfillment of the public's needs regarding leisure and recreation – regardless of their primary function. This results from the principle of multifunctionality of forests – not only on the national or regional level, but in the vast majority also with respect to individual forest stands. In terms of meeting social needs, it is worth noting the possibility of harvesting non-wood forest products, including primarily bilberries and mushrooms, which is not only one of the forms of recreation, but also can be a significant source of income for the population, especially of rural areas (Gołos and Kaliszewski, 2016). In order to promote sustainable forest management, support scientific research and conduct forest education of the society, 25 Promotional Forest Complexes were established in Poland. Their total forest area exceeds 1.2 million hectares. These Complexes comprise one or several forest districts (a total of 74 forest districts and 8 other entities, including experimental forestry facilities of universities) (www.lasy.gov.pl/en/our-forests...). The Promotional Forest Complexes have been in place for many years (the first 7 PFCs were established in 1994, and the last 6 – in 2011). Despite that, a study from 2013 revealed that as many as 60% of respondents did not know what the PFCs were (Gołos, 2018). The problem of lack of public awareness of sustainable forest management principles was present a lot earlier – in 2004 as many as two-thirds of respondents have not heard

of these principles (Bartczak, 2005). Currently this problem appears to be smaller – almost 70% of respondents are aware that timber logged in state forests is certified (Gołos, 2018). This however does not need to mean that the society is aware that certification applies to the whole process of sustainable forest management. Forest management in Poland's state forests is carried out in accordance with the principles of forest preservation, sustainable development and nature conservation, as confirmed by international certificates. All forests managed by the State Forests are certified under the PEFC system (www.lasy.gov.pl/en/our-work...). From the very beginning (1990) Poland has been participating in the voluntary European process promoting inter-governmental dialogue and cooperation on forest policy in Europe – the Ministerial Conference on the Protection of Forests in Europe (MCPFE; referred to as Forest Europe). One of the achievements of this cooperation are the internationally agreed guidelines, criteria and indicators for sustainable forest management (www.foresteurope.org). The fulfillment of postulates that forests in Poland perform many functions is also confirmed by the designation, within the Natura 2000 network, of 145 Special Bird Protection Areas and 849 Special Habitat Conservation Areas. The Natura 2000 areas cover: almost 20% of the land area of the country (or 6,1 million hectares); 38% of the forests managed by the State Forests (or 2,7 million hectares) (Raport, 2019; Statistics Poland, 2020a). Moreover, 125 landscape parks were created, with total area of 2.6 million hectares, of which forests account for 55%; 23 national parks (315 thousand hectares, forests – 62%); 1501 nature reserves (170 thousand hectares, woodland reserves – 40%) (Statistics Poland, 2020a). In the field of biodiversity protection and enhancement, the State Forests undertake many activities, financed both from its own resources and from external sources. These activities include projects related to the protection of all types of forests, natural habitats, protection of plant and animal species, nature inventories, genetic research and many others (Raport, 2006, 2019).

The juxtaposition of information presented above, regarding the principles and actual results of forestry with the results of scientific research on the public awareness in that regard leads to the conclusion that it is justified to attempt to influence the perception of importance of forest management, formulated by the skeptical, smaller group of the society – especially as the share of this group is growing. At the same time it is necessary to keep in mind that changes in the perception of forests occur in two directions – not only in the public awareness, but also in the principles and regulations for forest management (Gołos, 2018). Moreover, these phenomena occur at different times, and frequently the practical actions of foresters are ahead of the changes in public awareness, as some of them need to be undertaken fast. This results, and will result increasingly frequently, from the growing influence of climatic, political, cultural and economic changes on the forestry management processes (Paschalis-Jakubowicz, 2020). This entails the need for changing the manner in which issues of forests and forestry are presented to the society. Forest and nature education should strive to achieve balance between the commitment to imparting knowledge about the objectives and principles of forest use (timber harvesting) and attention to ecological and environmental aspects (Gołos, 2018). This is exceptionally important, as the one-sided presentation of the forest ecosystem, only as an element of nature, leads to local social conflicts. In extreme situations, these conflicts can turn into categorical demands for the implementation of nature conservation in commercial forests, at the expense of the level of activity (forestry works) necessary for the sustainability of the forest (Gołos, 2018). The example of such situation is the ongoing conflict regarding the Białowieża Forest, which in fact is not a problem of only local character. At this point, it is important to note that the perception of a given aspect depends not only on the extent, but also on the manner in which a person comes into contact with the reality being evaluated. This point is developed further – as part of the

discussion of the impact of the Internet and direct observation on the level of acceptance for forest management.

In the 2005-2006 survey, persons aged 18-25 demonstrated the lowest acceptance for the need for forest management. The perceptions of this group of respondents have not changed over the study period of 15 years. For the other age groups, there has been a change (decrease) in the perception of the need for forestry work and thus there are currently no statistically significant differences in opinion by age. A clear decrease of perception of importance of forest management has been observed with respect to residents of villages, which is quite puzzling. In 2005, 36% of households in urban areas and 19% in rural areas were technically able to access the Internet (Statistics Poland, 2006). Currently both the residents of cities and of rural areas have the same (very good) access to the Internet – in 2020, their proportions amounted to, respectively, 91% and 89% of households (Statistics Poland, 2021). This may explain the equalization of opinions, not only between different groups of respondents, distinguished by place of residence, but also within other social characteristics – age, education level (Statistics Poland, 2006, 2021). It appears probable that information transmitted over the Internet led to a decline of the public acceptance for forest management, and the largest decline was observed among residents of rural areas, people over the age of 35 and those with primary or vocational education. Having in mind both the sustainable forest use and the observance of forest protection principles in forest management, one can reach the conclusion that information about forests and forestry in Poland, placed on the Internet, is not always reliable. Official websites, in particular the website of Statistics Poland (www.stat.gov.pl), the State Forests National Forest Holding (www.lasy.gov.pl), the Forest Data Bank (www.bdl.lasy.gov.pl), present detailed, regularly updated information (based on detailed forest inventories). Apart from them, there is a lot of informal communication on the Internet (*e.g.* social media, forums), which may be not always based on reality. Information on forests should be communicated to the society with the use of various sources. As the study conducted in the years 2005-2006 demonstrated, the public named the following media as the most important sources for information (on forest leisure and recreation opportunities): the Internet (34% of respondents), television (30%) and the press (29%) (Kikulski, 2009). Currently the importance of the Internet is certainly much larger, which stems from the almost unlimited access of the society to this source of information. This makes it all the more urgent to make the public aware of not only the benefits but also the dangers of the widespread ability to post information on the Internet. Referring additionally to the issue of declining acceptance of the need for forest management by rural residents, it is worth noting a new trend – the migration of people from cities to the countryside for environmental reasons (Kłos, 2017). Persons who previously lived in urban areas had less direct contact with the forest so far, which has certainly affected their perception of aspects of forestry.

The survey conducted in the years 2005-2006 has demonstrated statistically significant differences regarding the perception of the need for forest management in Poland for the vast majority of social characteristics (age, place of residence, level of education, occupation). Whereas now we see a change involving the equalization of public acceptance for the aspect discussed in this paper. This change does not apply to field of education – within that characteristic, no statistically significant differences have been found in the answers given by respondents, neither during the earlier, nor during the current survey. This is an interesting aspect, as one could suppose that persons with education in economics would be more supportive, and persons with education in life sciences less supportive, of forest management. Meanwhile, the obtained results were just the opposite. This can mean that persons with education in economics do not appreciate the eco-

nomie function of forestry, while persons with background in life sciences see forest management not only as an element of timber production, but also as a way to protect forests.

The performance of forest management (forestry works) imposes certain limitations on the opportunities for tourism and recreation in forests. However, as studies have shown, this factor is of little importance because persons spending time in the forest relatively rarely encounter forestry works currently being done, though more often over the years (Kikulski, 2011, 2021a). This results from the spatial and temporal distribution of both the forestry works and the tourist and recreational traffic (Kikulski, 2011). It should be added that in 15 years (2005-2006 – 2020-2021) the proportion of respondents who find their recreation disturbed by forestry works grew three-fold (from 5% to 15%), with a concurrent, but much smaller, increase in the volume of logging (by 36%) (Kikulski, 2021a). In the study presented in this paper, it turned out that persons engaged in forest recreation and who find their recreation disturbed by forestry works, show a lower acceptance for forestry management. This correlation can be an important explanation for the level of public acceptability for forest management, which declines with time. However, at the same time, it is necessary to keep in mind that in both the 2005-2006 and current surveys, there appeared to be no statistically significant relationship between acceptance for forest management and frequency of encountering forestry works. This suggests that the more frequent encountering of forestry works is not a factor leading to reduction of the acceptance level being studied. Moreover, both surveys demonstrated that the increased frequency of encountering warning signs informing of logging (and prohibiting entry to the area) results in higher acceptance for the need for forest management. At the same time, while not statistically significant, there is currently a surprising trend: the more often respondents encounter ruts caused by vehicles transporting timber, the higher they rate the importance of the issue. Aside from the influence of various observed aspects of forestry works on the assessment of the need for forest management, another important result of the studies is the correlation between answers of respondents with the time they allocate for forest leisure and recreation. It turned out that persons spending more time in the forests have a higher opinion on the importance of forest management.

Taking into account the presented results of the study, it should be clearly stated that the longer direct observation of forests, activities performed there, as well as the effects of forestry work have a positive impact on people's understanding of the dependencies regarding forestry management. The validity of this statement is confirmed by the results of another study, which showed that respondents who spent more time in forests rated the work of foresters higher (Krokowska-Paluszak *et al.*, 2017). Moreover, respondents who encounter the work of foresters more frequently have a better assessment of the forests they visit.

Conclusions

The results show that Polish society understands the importance of forest management. This is evident from both the 2005-2006 and 2020-2021 surveys. However, the noticeable decline, over 15 years, in the level of acceptance of the need for forest management (from 6.08 points to 5.40 points – for a total of 7 points possible) lead to the need to consider the reasons for such change. This change has no basis in the condition of forest resources in Poland, which have been increasing systematically for many years. However, justified doubt exists as to whether the public has the adequate knowledge of that issue. This is the key, as only the proper knowledge may shape the right awareness, and only the right awareness can be the basis for correct perception.

The reasons for the lower assessment of the importance of forest management, expressed by part of the respondents, include:

- ✦ incomplete knowledge on the status of forest resources and the sustainable forestry principles;
- ✦ probably erroneous relating of the adverse changes in the global forest area also to the territory of Poland;
- ✦ the dubious reliability of some of the information on forests and forestry, communicated over the Internet;
- ✦ perception of forestry works as a factor disturbing recreation.

Whereas actions that may influence the reversal of negative changes in the perception of the need for forest management can include:

- ✦ convincing the skeptical part of the public to use primarily those sources of information on forests and forestry that contain information based on the results of a detailed forest inventory; at the same time it is necessary to make Internet users more aware of the need to verify the information that they pass on – this is crucial especially in terms of social media which, considering at the same time the widespread access to the Internet, are a source of knowledge that is questionable in terms of reliability and timeliness;
- ✦ underscoring the significant importance of own, direct observations of forests and their management, which are dependent on time spent in the forests, for the development of one's own awareness and the subsequently expressed opinion;
- ✦ including in the widely understood nature and forest education the appropriate scope of not only the ecological and natural aspects, but also the transfer of knowledge about the objectives and principles for use of forests as sources of raw materials; it is particularly important to stress that the growing logging activity results from the constantly rising social demand for timber and that the harvesting of timber in Poland not only does not reduce forest resources, but covers only part of the timber growth;
- ✦ influencing the perception of forestry work as a positive aspect that provides, in particular, access to timber that is needed and valued by society; this would enable better understanding certain time and space constraints during forest recreation, which are tied to the productive utilization of forests.

It is necessary to take the suggested actions, as public participation in the decisions on forests and forestry becomes increasingly important – this is a vital element in the process of forest management, which in Poland for many years has taken into account the multifunctional role of forests. At the same time, it is necessary to keep in mind that the principles of forest management undergo continuous changes, of which the society needs to be aware. Therefore, there is the necessity to undertake, primarily by forest managers, educational and information activities to the widest possible extent.

Conflicts of interest

The author declare no conflicts of interests.

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STRESZCZENIE

Spółeczna percepcja potrzeby gospodarowania lasami w Polsce – ocena stanu obecnego oraz zachodzących zmian

Celem badań było określenie poziomu społecznej akceptacji potrzeby gospodarowania lasami w Polsce (pozyskiwanie drewna, sadzenie lasu na powierzchniach wyciętych, pielęgnacja lasu, ochrona lasu przed zagrożeniami) oraz poznanie zmian zachodzących w tym zakresie (lata 2005-2006 oraz 2020-2021). Przeprowadzono wywiady kwestionariuszowe, podczas których respondenci wskazywali punkt na skali: od „zdecydowany zwolennik gospodarowania lasem” (7 pkt) do „zdecydowany przeciwnik gospodarowania lasem” (1 pkt). Aktualną ocenę zasadności prowadzenia gospodarki leśnej ustalono na podstawie odpowiedzi 476 osób dobranych w sposób

reprezentatywny, tj. mając na uwadze dane statystyczne w zakresie płci, wieku i miejsca zamieszkania Polaków (tab. 1). Ankietowano osoby wypoczywające w lasach w różnych miejscach w Polsce (175 nadleśnictw). W badaniach wzięli udział dalsi członkowie rodzin i znajomi oraz respondenci nieznanymi prowadzącym wywiady. Wywiady przeprowadzono głównie on-line (65% – telefon, 29% – wideorozmowa), wcześniej przesłano (e-mail) kwestionariusz ankiety. Badania w latach 2005-2006 zrealizowano na terenie obrębów Warlubie (Bory Tucholskie) i Drwęca (Pojezierze Iławskie), stanowiących typowe lasy gospodarcze oraz pełniących w dużej mierze również funkcje turystyczno-rekreacyjne dla ludności z różnych części Polski. Wywiady przeprowadzono z grupą 947 osób (ludność miejscowa oraz przyjezdni) wybranych w sposób reprezentatywny (metody: ustalonej ścieżki, Kisha). W obydwu badaniach wzięły udział osoby dorosłe, które nie mają związku z gospodarowaniem zasobami leśnymi.

Wyniki badań prowadzonych w latach 2020-2021 świadczą, że największy udział (36,8%) stanowią zdecydowani zwolennicy gospodarowania lasem (ryc. 1). Średnia wartość punktowa społecznej akceptacji potrzeby prowadzenia gospodarki leśnej wynosi 5,40 pkt. Wyniki te różnią się statystycznie od uzyskanych w badaniach w latach 2005-2006 (zdecydowani zwolennicy 57,2%, średnia 6,08 pkt), co wskazuje na zauważalną negatywną tendencję.

Odpowiedzi kobiet i mężczyzn zarówno w bieżących, jak i wcześniejszych badaniach nie różniły się istotnie statystycznie (tab. 2). W latach 2005-2006 istniała wyraźna zależność (rosnąco) akceptacji potrzeby gospodarowania lasami od wieku ankietowanych (tab. 3). Obecnie respondenci mają podobne zdanie. Grupę najbardziej rozumiejącą zasadność prowadzenia gospodarki leśnej stanowili mieszkańcy wsi (tab. 4). Aktualnie opinie mieszkańców wsi i miast nie różnią się istotnie. Wykształcenie nie ma obecnie wpływu na ocenę potrzeby gospodarowania lasami (tab. 5). Wcześniej największymi zwolennikami były osoby z wykształceniem podstawowym lub zasadniczym zawodowym. W obu badaniach odpowiedzi nie różniły się statystycznie w zależności od kierunku wykształcenia (tab. 6). Uwagę zwraca aktualna różnica w ocenie między respondentami o wykształceniu przyrodniczym (najwyższa) i ekonomicznym (najniższa). Zawód jest jedyną cechą społeczną, w ramach której w latach 2005-2006 oraz 2020-2021 stwierdzono statystycznie istotne różnice (tab. 7). Potrzebę gospodarowania lasami najbardziej akceptowali i nadal akceptują rolnicy. Ponadto wcześniej grupa „uczeń, student” bardzo wyraźnie odbiegała od pozostałych (ocena najniższa). We wcześniejszych badaniach największym zrozumieniem prowadzenia gospodarki leśnej odznaczały się osoby, które wypoczywały w lesie w sumie kilka miesięcy w roku (różnice istotne) (tab. 8). Obecnie ta grupa respondentów jest druga w kolejności – za ankietowanymi, którzy spędzają w lesie kilka tygodni (różnice nie są istotne). Częstość natrafiania przez respondentów podczas wypoczynku na wykonywane prace leśne nie wpłynęła istotnie na odpowiedzi (tab. 9). Zauważalne jest, że aktualnie osoby, które bardzo często napotykały takie prace, są największymi zwolennikami gospodarowania lasem. Napotykanie tablic informujących o ścinie drzew i zakazujących wstępu wpłynęło na opinie respondentów – generalnie rosnąco (tab. 10). Częstość natrafiania na drogach leśnych na głębokie koleiny powodowane przez pojazdy transportujące drewno nie wpłynęła istotnie na odpowiedzi, choć aktualnie widoczna jest pewna zależność (rosnąco) (tab. 11). Postrzeganie prac leśnych jako czynnika przeszkadzającego podczas wypoczynku wpłynęło (malejąco) na akceptację gospodarki leśnej – jest to widoczne zwłaszcza obecnie (tab. 12).

Wyniki świadczą, że społeczeństwo w większości rozumie znaczenie gospodarowania lasami, jednak należy zwrócić uwagę na niekorzystne zmiany. W kształtowaniu świadomości społecznej w zakresie lasów i leśnictwa istotne jest podkreślanie konieczności korzystania z wiarygodnych źródeł informacji. Bardzo ważne są własne bezpośrednie obserwacje podczas pobytu w lesie oraz

oficjalne dane statystyczne. Internet jest obecnie powszechnie dostępny, co oprócz możliwości wiąże się również z zagrożeniami w postaci przekazu niezetelnych informacji. Szeroko rozumiana edukacja leśna musi uwzględniać nie tylko aspekty przyrodnicze i ekologiczne, ale również przekaz wiedzy dotyczącej znaczenia i zasad surowcowego (drewno) użytkowania lasu.