

# The perception of forests by the Czech Republic general public

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**Abstract:** Forests as a part of landscape do not fulfil their economic function (timber production) only but a lot of other non-economic functions, especially ecological ones. Both economic and non-economic functions are indisputable and equally important for society. The aim of this paper is to identify current attitudes to forest perceptions by citizens in the Czech Republic. Primary data were obtained by means of a questionnaire research survey which was carried out in 2018. Altogether 824 respondents took part in this survey ( $n = 824$ ). From the results follows that approximately 70% of respondents visit forest at least three times a month. In connection with this, the relationship between respondents' forest visit frequency and the forest density in the region where they come from was confirmed. 60% of respondents consider the forest exploitation and forest management to be the most important cause of damage and threats to forest. In relation to forest, 46% of respondents consider forest conservation and protection to be the most important topics.

**Keywords:** forest functions; public opinion; recreational function of forest; damage; threat to forests, forest visitors

The crucial importance of forests for human life is indisputable. Forests influenced human life in the past in the same way they influence them during present day. The relationship between people and forest has been crucial for the development of society (RITTER, DAUKSTA 2013). The condition of forests around the world are more and more influenced by factors connected with global change. At the present all forests face threats in the form of climate change, air pollution and invasive pests (TRUMBORE et al. 2015).

The role of forest and its importance has changed in the course of the humankind. It is necessary to emphasize that even now there exist different opinions about the perception of forest importance from the point of view of its various functions. The significance

of various functions differs in the more and more globalized world both from the point of view of different continents and particularly in connection with the economic development of different regions and their specific natural condition. The global deforestation and gradual degeneration of forest leads to the loss of biodiversity and the decline of ecosystem services (CICCARESE et al. 2012). PERUGINI et al. (2012) refer to the significance of policy creation in the area of forestry, primarily in relation to global climate change at the worldwide level. In the European context the adjustment of forestry to climate change means a high priority for the preservation of forest goods and services' provision (LINDNER, KOLSTRÖM 2008). From the above mentioned follows that forests have had

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the decisive impact on the achievement of the current standard of living in the whole civilized world. This century is bound to become the epoch in which the quality and conditions of environment, healthy forests and clean fresh air will play the decisive role in the quality of human life (TRUMBORE et al. 2015).

FADY et al. (2016), forest protection and sustainable forest management in the 21<sup>st</sup> century mean challenges for forestry and policy makers, therefore public awareness and expectations in the area of forestry are extremely valuable for both the forests' owners and authorities (BETHMANN et al. 2018). SADECKY et al. (2014) point out, that even though there were some research and studies concerning this topic carried out in the past, the perception of forests and forestry by general public has not been fully researched yet. One of the most important studies was a study called Shaping Forest Communication in the European Union: Public Perceptions of Forests and Forestry study carried out by the ECORYS agency (hereafter ECORYS only) (RAMETSTEINER et al. 2009), in which took part 11,106 respondents of the age 16 and more from 27 EU countries.

While forest owners naturally prefer the economic function of forests, the general public consider ecological value to be the most important element of forest (DOBSINSKA, SARVASOVA 2016). This was confirmed ECORYS (RAMETSTEINER et al. 2009) follows that for the European public the most important topic connected with forests is their preserving and protection and their impact on environment as well. Moreover, from the study follows that the preservation of biodiversity is perceived by the public to be much more important than their recreational function. People naturally desire to have healthy forests so that they become the source of renewable energy and building material and to provide services such as the storage of carbon, preserving of biodiversity and climate regulation (TRUMBORE et al. 2015). Furthermore the society requires forests to provide a wide range of ecosystem services, from timber, raw materials and renewable sources of energy to socio-cultural facilities and natural habitat for nature protection (FADY et al. 2016). HUNZIGER et al. (2011) add that in the general public's view the most important function of urban forests is a wide-ranging offer of rest and relaxation opportunities.

ŠIŠÁK and SLOUP (2010) consider forest visits to be an important phenomenon of the present. DOBSINSKA and SARVASOVA (2016) add that

the main reason why forests are visited by general public (both lay and professional) was recreational activity, which is confirmed by SKLODOVSKI et al. (2013). According to PEJCHA and ŠIŠÁK (2010), the recreational function of forest has had an increasing importance, particularly for people who seek in forests peace and quiet, relaxation, recharging of physical and mental batteries etc.

In their research DOBSINSKA and SARVASOVA (2016) reveal that during the last decades the awareness about environmental issues in forestry has been increasing due to environmental education. Closely connected with it is the general public interest in information related to forest protection, the carrying out of various forest functions and the relationship between forest and climate change. This fact was confirmed by the ECORYS research as well.

The aim of this paper is to identify current attitudes to forest perceptions by citizens in the Czech Republic by means of primary data research. A theoretical framework is given in the Introduction section. The Materials and Methods section includes a description of the primary research and the investigated sample of respondents. The Results section presents the findings while the Discussion section focuses on discussion and comparison of the findings with similar surveys investigating this issue.

## MATERIAL AND METHODS

The theoretical starting points of the paper are dealt with based on secondary sources represented by reviewed journal articles, specialized literature and scientific proceedings. Primary data were obtained from our own research which was carried by means of a questionnaire research survey. In preparing the questionnaire the authors were inspired by the already completed ECORYS research from 2009.

The questionnaire contained 15 questions. The first 9 questions were related to forest perception, the second part of the questionnaire was aimed at socio-demographic characteristics. The questionnaire was distributed to respondents electronically. Altogether 824 respondents of the age of 15 and above took part in the survey which was carried out in 2018.

The basic socio-demographic characteristics of the observed sample were as follows:

- out of respondents who participated in the questionnaire survey 64.7% (533) were females and 35.3% (291) males.

– individual age categories were represented as follows: 15–29 years 22.1 % (182) of respondents, 30–39 years 31.7% (261) of respondents, 40–59 years 22.8% (188) of respondents, 60 years and more 23.4% (193) of respondents.

As for the size of residence where respondents have their permanent domicile, their distribution was as follows: In municipalities up to 499 inhabitants live 10.6% (85), 14.3% (115) respondents stated that they have their permanent residence in smaller municipalities with the number of inhabitants up to 1,999 inhabitants. Altogether 18.1% (145) respondents stated that they live in municipalities up to 9,999 inhabitants. The last but one group of respondents, who live in municipalities up to 99,999 inhabitants, was formed by 24.4% respondents (196). In municipalities with the number of inhabitants over 100,000 inhabitants live 32.6% (262) respondents. To obtain a better and clearer picture in description of these figures, municipalities were aggregated into larger groups than those used for municipality size structure in the questionnaire.

In the paper were tested hypotheses connected with fulfilling the main aim. It concerned the statistical testing of independence between categorical data obtained from the above described questionnaire. Data were arranged into contingency tables. The relationship between categorical variables was examined with the use of Chi-square test of independency (AGRESTI 2013). The test results were based on the critical value and *p*-value. When *p*-value was lower than the level of statistical significance 0.05, the null hypotheses was rejected. One part of the testing was the assessing of Chi-square test assumptions. For calculations the statistical software SPSS (IBM, USA) was used.

In connection with the hypothesis testing the density of forests was used as one of the observed factors and because of the testing needs three levels of region density in the Czech Republic were set up.

For the testing purposes three categories of forest density in the regions of the Czech Republic. The density of regions (in %) was aggregated as follows:

the least forested regions with the density below 30% (the capital Prague, Central Bohemian region, Pardubice region and South Moravian region). To medium forested regions with the forest density between 30.1–40% belong South Bohemian region, Plzeň region, Ústí nad Labem region, Hradec Králové region, Vysočina region, Olomouc region, Zlín region and Moravian-Silesian region. The highest forest density, above 40.1%, can be found in Carlsbad (Karlovy Vary) region and Liberec region.

For the needs of test statistics 5 null hypotheses were stated as follows:

$H_1$ : Respondents' opinion about the forest condition is not related to the forest density of the region where they have their permanent domicile.

$H_2$ : Respondents' opinion about causes of damage and threats to forests is not related to the forest density of the region where they originally come from.

$H_3$ : Respondents' interest in learning more about well-balanced approach to the protection and utilization of forests is not related to their gender.

$H_4$ : Respondents' interest in the forest condition is not related to their age.

$H_5$ : Respondents' frequency of forest visits is not related to the forest density of the region where they have their permanent domicile.

## RESULTS

The questionnaire research showed these results following from respondents' answers to questions concerning the topics they consider to be the most important in connection with forests, how often they visit forests (a year, in average) and what is in their opinion the most important cause of damage and the second most important threat to forests in our country (Table 1).

From the results presented in Fig. 1. it follows that in connection to forests the respondents consider as the most important topic forest conservation and protection (45.5%). As second, but with the difference of nearly 10% follows environment, for-

Table 1. The most important and the second most important threat and cause of damage to forests (in %)

Importance	Forest fires	Storms	Wild animals	Invasive species	Harvesting and management damage	Unknown	Other
The first	1.4	16.6	1.3	13.0	61.0	2.5	4.2
The second	5.23	31.3	3.5	24.0	24.4	5.1	6.5

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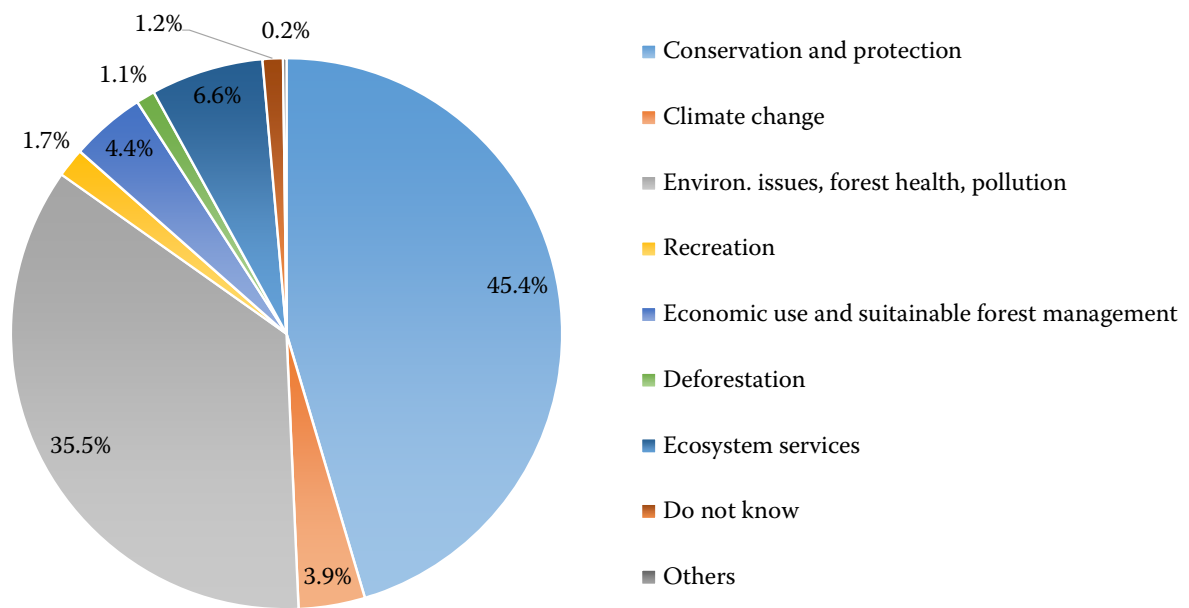


Fig. 1. The level of importance of topics related to forest

est health and air pollution. As the least important topics are considered deforestation and recreation.

Table 1. presents respondents' views on the most important and the second most important cause of damage and threat to forests.

Respondents consider, as can be seen from data shown in Table 1, the forest exploitation and forest management (61.0%) to be the first important cause of damage and threats to forest. According to respondents this cause of damage is followed by

storms, though to a far lesser extent (16.6%). Nevertheless, storms were considered by respondents to be the second most important cause of damage and threat to forests –31.3%. From the research it follows that in respondents' opinion the least damage to forests is caused by forest fires and wild animals.

The following diagram (Fig. 2) shows often the respondents to the questionnaire visit forest.

Based on the questionnaire results we can state that 41.7% (343) of respondents visit forest once a week

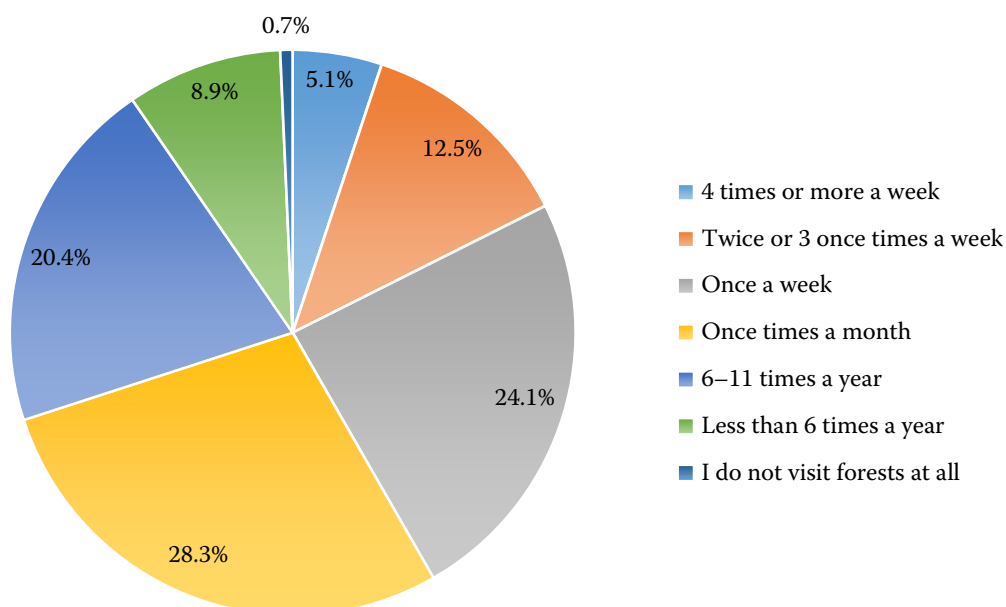


Fig. 2. The level of respondents' forest visit frequency (on average per year)

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Table 2. The relationship between respondents' view on forest condition and the forest density of a region where they have their permanent domicile

Forest density	Forest condition				Total
	Is improving	Is staying the same stable	Is deteriorating	I do not know	
Least forested regions	63	63	182	19	327
Medium forested regions	63	82	256	8	409
Most forested regions	21	24	38	5	88
Total	147	169	476	32	824

at least, 28.3% (233) of respondents visit forest once, twice or three times a month. 29.3% (242) of respondents visit forest less than once a month. Only 0.7% (6) of respondents replied that they never visit forest.

From the testing of prepared null hypotheses follow these Tables 2–6.

To meet the chi-square test assumptions, original questionnaire categories “is getting better a lot” and “Is getting better to some extent” were aggregated to “Is getting better”. In the same way original categories “Is getting worse to some extent” and “Is getting worse a lot” were aggregated to “Is getting worse”.

The Pearson chi-square test statistics is 18.688 (at six degrees of freedom),  $p$ -value is 0.005. This was compared with the level of significance 0.05. Because the  $p$ -value is smaller than the level of significance, the null hypothesis about “independence” was rejected. The dependence of respondents' view on forest condition on the forest density of a region

where they have their permanent domicile, was confirmed.

Based on test results, with chi-square test having the value 3.667 and  $p$ -value was 0.722, the null hypothesis  $H_2$  is not rejected. Respondents' view on causes of damage and threat to forest does not depend on the forest density of the region where they originally come from.

Based on research results ( $p$ -value is smaller than  $\alpha$  0.05) the relationship between gender and interest to learn more about well-balanced approach to forest protection. Females expressed higher level of interest to learn more about well-balanced approach to forest protection and its use. Therefore the null hypothesis  $H_3$  is rejected.

The hypothesis  $H_4$  that there is no relationship between the age and respondent's interests in forest condition was not at the level of significance 0.05 rejected. The value of the chi-square test

Table 3. The relationship between respondents' view on causes of damage and threat to forest and the forest density of a region where they originally come from

Forest density	View on causes of damage and threat to forest				Total
	Harvesting and improper management	Storms and forest fires	Wild animals	Invasive species, Other and I do not know	
Least forested regions	195	59	7	66	327
Medium forested regions	244	77	5	83	409
Most forested regions	56	18	0	14	88
Total	495	154	12	163	824

Table 4. The relationship between respondents' interest to learn more about well-balanced approach to forest protection and use, and gender (1 – not important at all, 2 – small importance, 3 – average, 4 – important, 5 – very important)

Gender	Scale				Total
	1 a 2	3	4	5	
Male	67	87	79	58	291
Female	68	184	168	113	533
Total	135	271	247	171	824



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Table 5. The relationship between respondents' interest in forest condition and the age of the respondents (1 – not important at all, 2 – small importance, 3 – average, 4 – important, 5 – very important)

Age (years)	Scale				Total
	1 a 2	3	4	5	
15–29	35	59	48	40	182
30–39	32	63	89	77	261
40–59	31	59	51	47	188
60 and more	27	63	57	46	193
Total	125	244	245	210	824

was 13.301 and  $p$ -value was 0.149. From these figures follows that respondents' interest in forest condition does not depend on the age.

For the last tested null hypothesis  $H_5$  individual answers concerning the frequency of forest visits were aggregated to two categories only: the category „Often“ covers original categories 1–3 (once a week at least) and the category „Rarely or never“ includes original categories 4–7 (from the frequency “less than once a month” to the answer “never”). To the calculated statistics chi square (24.32) corresponds  $p$ -value smaller than 0.001. At the level of significance 0.05 the null hypothesis  $H_5$  can be rejected. The frequency of forest visits depends on the forest of the region where they have their permanent domicile. Only 33.3% of respondents from the least forested regions visit forest “Often”, in medium forested regions it is 44.6% of respondents and in the most forested regions it is 61.4% of respondents.

## DISCUSSION

The questionnaire research results showed that people in the Czech Republic consider in relation to forest as the most important topics forest conservation and protection (45.5%) and the problems connected with environment, health forest and air pollution (35.5%).

According to SKŁODOWSKI et al. (2013) people perceive as the most important function of forest forests to be a habitat for plants and animals as well as a place for recreation. Therefore, they consider as the most important task of forestry the conservation of biodiversity and landscape (PASTORELLA et al. 2016). Even though recreation as the most important topics in relation to forest as stated only by 1.1% respondents in the Czech Republic, research in neighbouring countries confirmed the irreplaceable recreational role of forest for inhabitants (SKŁODOWSKI et al. 2013; DOBSINSKA, SARVASOVA 2016).

From the research followed relationship between the respondents' view on forest condition and the forest density of the region where they have their permanent domicile. It is understandable that people living in the vicinity of forests can – owing to a better access to forests – manifest better awareness of forest condition in their surroundings and they perceive forest, forest management and forest rules more sensitively. Local people perceive forest and its functions in a different way from those who visit forests for recreational purposes. Really strong relationship between people (or more respectively local community) and forest is especially strong in mountainous areas whose inhabitants perceive the vicinity of forest as an integral part of surroundings they live in. However, they face here a rather high frequency of visitors who often use forests solely for recreational purposes (DE MEO et al. 2015).

Table 6. The relationship between respondents' forest visit frequency and the forest density of a region where they have their permanent domicile

Forest density	Frequency		Total
	rarely or never	often	
Least forested regions	218	109	327
Medium forested regions	229	180	409
Most forested regions	34	54	88
Total	481	343	824

Nevertheless, there emerge some tension among forest visitors as well: The reason is simple: they on the one hand require adequate facilities and conditions for their recreation, on the other hand they desire for the forests not to be visited by a lot of other people as less frequent visits would preserve in forest higher feeling of nature.

Moreover, the research showed that the forest density of the region where people live depends on their forest visit frequency. Approximately 70% respondents from the Czech Republic stated that they visit forest rather often, e.g. at least three times a month or more frequently. In this respect, in comparison with the research carried out in 2009 (RAMETSTEINER et al. 2009) there occurred a change in the Czech public's forest visit frequency: then nearly 17% of respondents answered that they visited forest very often or rather often, e.g. once a week at least but 56.0% of respondents stated that they visited forest very rarely (e.g. once or twice a year) RIEDL (2010). In the research carried out in 2018 only 10.0% of respondents declared that they never visited forest or if they did it was less than twice a year.

People perceive threat to forest and possible causes of damage to them as well. As the most important cause of damage and threat to forest is considered forest harvesting and management (60.0%), as the second, but already far less important cause the respondents declared storms (16.6%). The same main causes of damage to forest in the Czech Republic showed research by SADECKY et al. (2014) or RIEDL (2010). Even though damage caused by fire or insects can contribute to natural dynamics of forest health, the interaction of increasing temperatures, drought, original insect species and pathogens or deadly forest fires has led to the biggest death of forest (MILLAR, STEPHENSON 2015).

In the last few decades the awareness of the questions of environment in forestry has been increasing as a result of changes in environmental education. (DOBSINSKA, SARVASOVA 2016). However, RIEDL (2010) points out that the image of forestry and forest management is being influenced by information from mass media and other sources. Nevertheless he warns that people are not able to evaluate mediated information objectively.

The questionnaire research proved that respondents' interest in forest is related to respondents' age. Therefore it is clear that forest visitors representing all age categories consider as the most important forest conservation and protection (45.8%),

which in comparison with the ECORYS research is 6.0% less than in 2009 (RAMETSTEINER et al. 2009). On the other hand, respondents' interest in environment, forest health and air pollution rose (35.7%). This is perspicuous as this is a global topic which together with climate change has been becoming more and more important. Respondents are well aware of the fact that unless forest is healthy it will not be able to comply with its functions adequately.

## CONCLUSIONS

The protection of environment has been one of the most urgent problems of the 21<sup>st</sup> century and will definitely be in the future. A great deal of studies proved that both lay and professional public are well aware of the global threat as people are more and more confronted with the results of the long-term erroneous handling of nature and sources it provides. A major role in the area of environment play forests, particularly their non-economic functions. Therefore, it is necessary to protect them. Nevertheless, in forest protection must participate not only forest owners and managers but general public as well. Therefore sources (from specialized literature) concerning the perception of forest and forestry by general public were collected. Nevertheless, this topic has not been fully researched yet. The results of the carried out questionnaire research among the inhabitants of the Czech Republic were compared with the results of the ECORYS agency study of 2009. It was found out that forest harvesting and poor forest management are still considered to be the most important cause of damage and threat to forest. While in 2009 this cause was stated by 52 % of respondents, in 2018 it was already 60 % of respondents. This finding is not really favourable for forest managers. As the second most important cause of damage and threat to forest the respondents declared storms, forest fires and invasive species. Moreover, it was proved that more than one half of the respondents are interested in forest, in particular in relation to the protection of environment, forest health and air pollution. Therefore, they consider forest conservation and protection to be more important than the ecosystem services of forest, its economic use or its recreational function. These respondents would also welcome more detailed information about a well-balanced approach to the protection and use of forest. This

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attitude proves that the respondents are not indifferent to the way in which forests are handled. Not only politicians but forest owners (among them the Czech state) as well should be aware of this fact, as they have principal responsibility for the protection and management of forest and the use of its great potential. In future, more attention should be paid to communication among forest managers, politicians and general public. The fact that the majority of public consider (based mainly on information from mass media) poor forest management to be the most frequent cause of threat to forests, might not reflect the reality that not all the forest owners manage their forests poorly or only exploit them but that they campaign for the protection and renewal of forest.

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