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MAY OPERATORS OF FORESTRY MACHINES WORK ACCORDING TO THE ENVIRONMENTAL PROTECTION RULES?

New style of managing requires besides others so-called sustainable development. In forest it means to work with natural resources and in natural surroundings like before through the medium of new techniques and technologies considerate to the working and living environment. Evidently workers will work with new evolved forestry techniques. According to our operational hypotheses they feel working environment as unfriendly and they have very low cognitive knowledge. We used method of questionnaire. We put in questionnaire for the present to 905 persons working as and preparing to the forestry occupation. Result is that workers are not able to work considerate to the environment. Change of a social atmosphere is ahead of us yet. Forestry management needs to require wholly certainly forms of their work, and to monitor these forms under the threat of sanctions. Ecologically education initially in short theses, later on in principle of causality have to be learned concurrently.

Keywords: behaviour, environment, knowledge, questionnaire, social perception.

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Чи можуть оператори лісових машин працювати згідно з правилами охорони довкілля?

Новий стиль управління потребує, окрім іншого, так званого, сталого розвитку лісового господарства. Це означає, що потрібно працювати в лісі з новою технікою і технологією із більш бережливим ставленням до робочого та життєвого простору. Робітники будуть працювати із новоствореною лісовою технікою і, за нашими гіпотезами, вони будуть мати низькі пізнавальні знання і сприйматимуть негативно робоче середовище. Ми провели анкетування 905 осіб, які працюють в лісовому господарстві. Результат показав, що робітники працюють, нехтуючи правилами охорони довкілля. Зміна соціальної атмосфери ще попереду нас. Лісове господарювання шляхом різних санкцій повинне контролювати методи роботи своїх робітників та забезпечувати їх екологічне навчання.

Ключові слова: поведінка, довкілля, знання, анкетування, соціальне сприйняття.

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Introduction

The state of environment influencing the sustainable social and economical development meets with ever greater interest of the whole society. The forest is an Earth dominant which is not in good condition due to human activities and economic interests. The improvement of the woods health assumes, in area of ideas, a change in the approach to the forestry from predatory, through pragmatic and utilitarian way towards poly-functional forestry. According to Vyskot [1], the complex of forest's life-giving and life-maintaining functions is constituted by: a) economical functions – production; b) natural – biotic (primary production of plants and animals), environmental – stabilization, climatic, soil-formation (edafic), hydrological, landscaping; c) social – social recreation (satisfaction of human physical and psychical needs) and sanitary (the quality of environment for human health). The implementation of functional integrated forestry means to introduce and use the new environmentally friendly technologies. The question is: May operators of forestry machines work according to the environmental protection rules?

For this purpose, we made a questionnaire survey among forest workers and students of forestry in the Czech Republic who are preparing themselves for the forestry profession. The aim was to map out their ecology awareness in its cognitive, emotional and conative (performance) components (according to Kretch [2]), i.e. how are their attitudes. We wanted to know if the forest workers are able to reflect the knowledge of ecology and environment in their work. Our input hypothesis was the fact that the workers, namely not only forestry workers, consider their working environment as loading, detrimental and/or right to dangerous for them, for which reason their behaviour towards the environment is not enough considerate. If this hypothesis would be found as true, then the operators would not be able to use the modern technology in an environmentally friendly way and they would undoubtedly, albeit unwillingly, on the behalf of their effective work, injure the environment components. Thus, the new poly-functional forestry would be, from the production as well as motivation viewpoints, markedly limited just by the forest workers attitudes. It is just out of the question that they would work in the forest with regards to its non-wood-producing functions and, above all, with regards to the need of wholesome environment for the population.

The managers can enforce the environmentally friendly behaviour from irresponsible workers, i.e. those without the reflection of the environment state awareness, only through continuous control from outside under the threat of penalty, and/or this can be achieved from inside, by permanent cultivation of the worker's personality. By reflected environmentally friendly behaviour we understand the differentiation of man's attitude towards environment, which consist in:

- recognition of own image – by the inner answer to the question Who am I ...?
- self-assessment – by the inner answer to the question What kind of man should I be ...?
- tendency – by the inner answer to the question What kind of man do I want to be ...?
- power – by the inner answer to the question What can I do ...?
- determination of the social role – by inner answer to the question What am I to do ...?

Materials and method

We enquired, in form of questionnaires, a sample of 905 people who work or are preparing themselves for the work in the forestry. The present file includes,

above all, 343 pupils of secondary forestry schools (37,9 %), further 238 students of Mendel University of Agriculture and Forestry (26,3 %), thereof 183 students of forestry and 55 of landscape management. These persons are so far only preparing themselves for the forestry worker profession but in a few years they will constitute a substantial part of the lower and middle-level forestry management. For the purpose of comparison, we examined also 65 students of landscape management in the University of Dundee, Scotland, UK (7,2 %). We also made questionnaire survey in 219 workers of managerial staff from different forestry firms. The group of manual workers was represented only by 40 workers from the School forestry enterprise in Krtiny (4,4 %). The reason for this is plain because the workers do not want to be distracted from their work by filling in the questionnaires, the managers are not willing to allow them to do it as we are not able, from financial reasons, to refund them the loss of earnings. We will pay further attention to the group of manual workers in the future.

We used the questionnaire survey method. The questionnaire implies 31 closed as well as open questions, sometimes rather complicated, which examine the respondents' attitudes towards the environment. The questionnaire is complemented in the conclusion by 19 anamnesis questions which were used as classification criteria. The whole data file was statistically treated by the programme SPSS Base 11.0.

Selected results

The basic attitude was examined by the question 1: Do you need a walk in the nature from time to time? Positive answer was given by 95 % of respondents within our file of foresters. No statistical difference between men and women was found, nor any difference in the quality of environment they live in. And on the contrary, statistically highly significant difference was found in relation to the age; this need decreases with the growing age to 89 %, whereas it increases with the increasing education level of education. Highly significant are also differences between individual social groups; the lowest need is in Scottish students (83 %) and manual workers (90 %). Definitely, this need developed with time. As found by Nechutova [3], to take a walk in the open landscape needed 74 %, by Sebestova [4] 85 % of grammar school students, by Sedivy [5] 91 % of secondary school students and by Pernica [6] 96 % of forestry workers.

Subjective assessment of the state of environment in the district of the respondents' domicile was with high significance different according to gender and age as well as according to the education degree (maximum scepticism displayed the secondary school students) and the social groups (maximum scepticism displayed the manual workers). The responses indicate the mean assessment tendency (Table 1).

Table 1. The domicile district assessment according to the environment quality (in %)

Quality of environment	good	average	poor
Relatively unpolluted	41,6	53,1	2,1
Average pollution level	34,3	57,9	4,4
High pollution level	21,7	61,7	14,2

The respondents' attitude to the quality of domicile district environment was examined by the question 7. The classification according to gender, age, edu-

cation and environment quality showed statistically highly significant differences. The women approved their higher emotionality, 20 % of them were in fear, whereas only 12 % of men were in fear. The fear was growing also with the age of respondents as well as with the decreasing quality of domicile district environment. As can be seen in the Table 2, a relatively high part of respondents did not answer this question, among them most commonly the manual workers and professional workers (managers); the student showed more sovereignty, but later we will see that this was unfounded.

Table 2. Attitude towards domicile district environment according to social groups (in %)

Social groups	indifferent	There are failures, but I am not in fear	There are so many problems that I am in fear
Manual workers	0,0	30,0	5,0
Secondary school students	2,6	62,7	7,9
University students	1,6	55,7	12,6
Professional workers	1,4	39,3	14,6

Further question No 9 was: In your opinion, how does the agricultural production influence the environment? The same question was asked as to the impact of forestry production. From their mutual comparison, there can be deduced not only different attitudes, but also different degree of ecological awareness. In the case of agriculture, the point in question was the soil, surface and underground water contamination by noxes (harmful pollutants) from plant production (fertilizers and biocides, oil and oil products leakages, but not industrial production pollutants).

Table 3. Attitudes to the agricultural production impact on the environment according to education (in %)

	contributes to improvement	has no influence	has little detrimental impact	significant detrimental impact	I do not know	No response
Primary school	33,3	33,3	33,3	0	0	0
Vocational schools	32,3	9,7	35,5	3,2	16,1	3,2
Secondary school	15,3	4,1	46,9	19,4	11,2	3,1
University	16,3	8,8	53,8	16,3	2,5	2,5
Secondary school students	6,8	10,4	51,6	19,7	6,3	5,2
University students	10,1	4,0	52,6	22,0	7,3	4,0

Respondents with lower level of education are more optimistic and they think, relatively more often (by reason of ignorance or juvenile romanticism), that the agriculture does contribute to the improvement (Table 3). With the increasing level of education, the share of realists who understand properly that the agriculture has little or significant detrimental impact on the environment is growing and the share of those who did not know or did not answer is diminishing.

As far as the forestry production is concerned, the majority of respondents thinks positively that it does contribute to the improvement of environment. Only 1/8 to 1/4 respondents assumes that the forestry has little detrimental impact (soil erosion) and a smaller part of them (3 %) think that it has significant detrimental impact. Still a smaller part of them did not know or gave no response (Table 4). They know more since they study or work in the branch. The women are less optimistic than men,

only a half of them thinks that it contributes to the improvement. The differences in the distribution of frequencies are statistically highly significant ($p < 0,01$), only according to the age is the difference on the significance level $p < 0,05$.

Table 4. Attitudes to forestry production impact on environment according to education (in %)

	contributes to improvement	has no influence	has little detrimental impact	significant detrimental impact	I do not know	no comment
Primary school	100,0	0	0	0	0	0
Vocational schools	64,5	6,5	22,6	3,2	3,2	0
Secondary school	64,3	13,3	15,3	4,1	2,0	1
University	75,0	6,3	13,8	0	3,8	1,3
Secondary school students	68,0	12,0	16,9	0,3	2,2	0,5
University students	50,2	8,3	25,7	6,1	6,4	3,4

Rather difficult was for the respondents the impact assessment of eight individual components on the overall state of environment in their domicile district (question 10). They ought to utilise cognitive knowledge which however showed to be limited as it will come in sight. They assessed the impact of (1) water contamination by industrial and communal waste and agriculture, (2) industrial and communal waste dumps, (3) air pollution by industrial production, (4) noise and smoke exhaust from transportation, (5) deterioration of agricultural land by chemicalisation and by wind and water erosion, (6) disorder and untidiness of municipalities, working places and public areas, (7) damaging of landscape by mining of raw materials, (8) devastation of landscape green.

Table 5. Average assessment of environment components and statistical significance ANOVA

Order of components according to average assessment	Average assessment	Standard deviation	Social groups	Gender	Age	Environment quality	Education
1. Water	3,37	2,07	–	–	–	–	–
2. Dumps	3,59	2,09	–	+	–	–	–
3. Atmosphere	3,89	2,43	++	–	++	++	++
4. Transportation	4,46	2,31	++	–	+	–	–
5. Soil	4,76	2,14	–	–	–	–	–
6. Disorder	5,57	2,38	–	–	–	–	–
7. Landscape (mining)	5,66	2,34	–	–	–	++	–
8. Devastation of green	5,99	2,16	+	–	++	+	–

Statistical significance: ++ $p < 0,01$; + $p < 0,05$; – insignificant

It can be stated that the respondents identified, according to growing values of average assessment, as the most important the components influencing the overall state of the environment in the first group consisting of 1. water resources contamination, 2. dumping sites, 3. atmosphere pollution, 4. pollution by transportation, which are components perceivable both by sight (oil slicks, dirt, smoke, haze, dust etc.) and by the sense of smell (bad odours) and in the case of the forth group also by the sense of hearing (noise). The second, clearly distinguishable group is constituted by components having negative influence on the overall district envi-

ronment quality which is detectable only by sight: 5. soil erosion, 6. disorder, 7. landscape deterioration by mining and 8. devastation of landscape green.

We know from psychology that the major sense of man is the sight since the visual information generates 80-95 % of all information the greater part of which is usually immediately selected and forgotten in the brains and, what is of substantial importance, if they are not being strengthened (by training and thinking) they do not usually lead to immediate response. The involvement of other senses leads, vice versa, to immediate decision for survival, as for example: I will not remain in this bad smelling and noisy place, I will not swallow such bad tasting bite. Consequently, this means that the assessment and attitudes of respondents have been unfolded from sensual perception first of all. This has not necessarily to mean, not by a long chalk, that these perceptions were cognitively processed by them, with the aid of their experience, into knowledge, much less that these perceptions would be thought about and judged according to intricately determined attitudes and value orientation within temperamental component of the personality.

We conclude from these considerations considering the assessment of the question 10 that the respondents' knowledge, as far as the environmental cognition component is concerned, is poor. There is another important fact that this assessment was made by the respondent in a more than sovereign way because the number of those respondents who did not answer or could not take any decision as they did not know anything about the problem was very small, only 3 to 5 % of the whole sample although at other questions was the share of lacking answers higher.

The table 5 shows also the statistical analysis of variance results (ANOVA). The highest differentiating influence of assessment was proved in sub-sets according to social groups and to the domicile district environment quality. This appears to be logical, if we take into consideration different social perception in different social groups, different emotionality according to respondents' age and different environmental sensitivity of people living in heavily contaminated regions and in relatively undamaged regions. Vice versa, the lowest differentiating influence was found according to gender and education. The non-existence of differences between men and women is surprising. The thesis taken over from general biology saying that the environmental sensitivity is higher in females than in males and does not lead, due their lower adaptability, to corresponding environmental behaviour whereas the lower environmental sensitivity of males can be manifested more rapidly in their environmental behaviour due to their higher adaptability (Wolanski [7]) is apparently not valid in the case of people as social beings. Low differentiating weight of education confirms that our above mentioned judgement, concerning the fact that the respondents' assessment was made rather on the basis of sensual perceptions than on the cognition process, was right!

Similarly complicated was the question 12 where the respondents ought to assess, evaluate and set up the sequence of significance from 1 (highest) down to 10 (lowest) tipped activities which are important in the environmental decision-making. The corresponding activities were as follows: (1) technology *investment* diminishing the impact of production on environment, (2) more rigorous disciplinary action and *penalizing* for the voluntary waste of environment, (3) *ban* on production activities

imposing damage on environment, (4) production process *control* considerate towards the environment, (5) control of production *equipment* so that it would not be harmful to the environment, (6) amendment and adoption of *legal regulations* on protection of nature, (7) better *informedness* (knowledgeability) about environmental problems, (8) support and *initiation* of the environmentally oriented activity of individuals and small groups, (9) provision of supra-standard *health care* in endangered regions, (10) granting of financial *bonuses* for the stay in endangered regions.

Table 6. Average assessment of activities as to their importance in environmental decision-making and the statistical significance ANOVA

Sequence of significance	Average assessment	Standard deviation	Social groups	Gender	Age	Environment quality	Educational
1. Investment	3,86	2,67	++	+	–	++	++
2. Penalties	4,31	2,80	–	–	–	–	–
3. Ban on detrimental production activities	4,64	2,94	–	–	+	–	+
4. Control	4,92	2,50	–	–	–	–	–
5. Technology	5,03	2,41	++	–	–	–	++
6. Legislation	5,20	2,87	–	–	–	–	–
7. Information	5,44	3,11	++	–	++	–	++
8. Initiative	6,51	2,94	–	–	–	–	–
9. Supra-standard health care	8,48	2,12	++	–	++	–	–
10. Bonuses	8,84	1,8	++	–	–	–	–

Statistical significance: ++ $p < 0,01$; + $p < 0,05$; – insignificant

The respondents put on the first place of importance the investment into protective equipment reducing the production process impact. In State enterprises, this matter is in the responsibility of state administration as well as of regional departments for environment, whereas in private companies, it is the owners' concern, to a certain extent enforceable by the State (legislation). On the second and third place are penalties for contamination and bans on activities having detrimental environmental impact, which are fully in the responsibility of the state administration. Between these activities on the third place and legislative activities on the sixth place have got activities – exclusively in the owners and companies' management competence and corresponding to environmentally friendly methods of production process management – as well as the control of production equipment and its maintenance in a state imposing no damage on the environment. Away down on the seventh place (!) was classified the information about environmental problems. They are followed by the support of initiative of individuals and small groups in the field of ecology. The last places are occupied by activities of little importance, formerly used for maintaining the social stability (barrier to ecologically conditioned migration) and for the compensation of consequences of residence in heavily affected areas.

The sequence of assessment averages given by the respondents is, in part, indicative of their incompetence and/or that they pondered about these activities not enough. They assigned high weight to repressive actions for imposing damage on the environment. At the same time, it is or it should be clear to everybody that the best strategy with provably highest efficiency in many fields of human doing is

to suppress the bad state causes instead of to remove its consequences. That's why the precaution! The environmental crisis arises as the failure of human social behaviour. This failure can not be reformed by change of the institution (state, producer) which is responsible for this failure or has imposed it, but by a reflected change of human behaviour! The effective change in adaptability behaviour begins just at individuals and small groups. People can not mostly begin to change their behaviour, if they had not become aware that other kind of behaviour is anyway possible. From this consideration follows the importance of higher informedness and education factors. These both activities are, according to the respondents, at the end of the field. The change of attitudes, from which the motivation to any change of behaviour (so much the more of the ecological one) is saturated, can occur only after the ecological reflection. The anthropocentric pragmatisms, the drive for profit and recklessness towards the surrounding environment leads to hell, which already begun in some parts of the world, from whence begun the ecologically conditioned migration of inhabitants.

The results of statistical variance analyses are displayed in the table 6. The highest differentiating influence was proved in sub-sets according to social groups and education. Certain conformity, a little surprisingly, was found between the manual workers and the Scottish students in the University of Dundee. However, greatest differences between them were in the question of informedness, penalties and bonuses. We assumed that the students from Dundee would be more advanced in awareness of environmental problems, because their education in ecology questions lasted for substantial longer time. They did not disappoint our expectations and they gave the first place of importance just the need for higher informedness and initiative of individuals and small groups! These two activities, in our opinion the most important ones, reached in the group of respondents with highest achieved education the lowest average values, consequently they were the most important ones. The other classification criteria had not have the expected differentiating influence.

The question 14 was focused on the respondents' knowledge of environmental problems in within the scale: none – scarce – middle – deep – expert – scientist. The time tendency to denote one's own knowledge being at medium level is apparent since in my previous research (Sedivy [5]) 60 % of the secondary school students denoted their own knowledge as scarce (little), whereas now almost 70 % of them consider it to be on medium level. However, it is necessary to emphasize that these respondents are older, with higher education and forestry specialization.

Table 7. The knowledge level frequency according to social groups (in %)

Social groups	1 none	2 scarce	3 middle	4 deep	5 expert	6 scientist
Manual worker	0	22,5	72,5	5,0	0	0
Professional workers (managers)	0,5	5,0	72,1	17,8	3,7	0,9
Secondary school student	0	20,4	69,4	8,7	0,9	0,6
Student of Mendel University	0	21,4	66,4	11,8	0,4	0
Student from Dundee	0	15,4	67,7	15,4	0	1,5

As far as the last two categories in the table 7 are concerned, there is apparent the inadequacy of the environmental knowledge assessment at 3 or 2 secon-

dary school students, at 8 and/or 2 professional workers and at 1 student from Dundee, who sovereign designated themselves for experts and even scientists. Those 5 "scientists" (except for one) knew nothing about any particular action aimed to the redress of environmental damages and 50 % of those who designated themselves as experts also did not indicate anything. Those "scientists" also did not give any concrete example of the consequences of damaging of their domicile district environment. This is a demonstration how it is possible, by means of crosstabulation of different variables, to unmask "wise crackers" and to determine lie-score.

The level of problems knowledge was also averaged. A time shift towards middle assessment was detected (see the Figure 1). In the primary research of Šedivý [5], 60 % of respondents denoted their knowledge as scarce. However, it is notable that at that time the set consisted only of secondary school students, whereas the actual set is older, has higher education and, above all, specialized in forestry professions. The highest self-assessment was in the group of professional workers (managers) who as practitioners can have the feeling that they are in good shape. Nevertheless, the foregoing analyses exposed that this is not always based on their cognitive knowledge, what is the less the case in other social groups of manual workers and students which showed insignificant statistical differences.

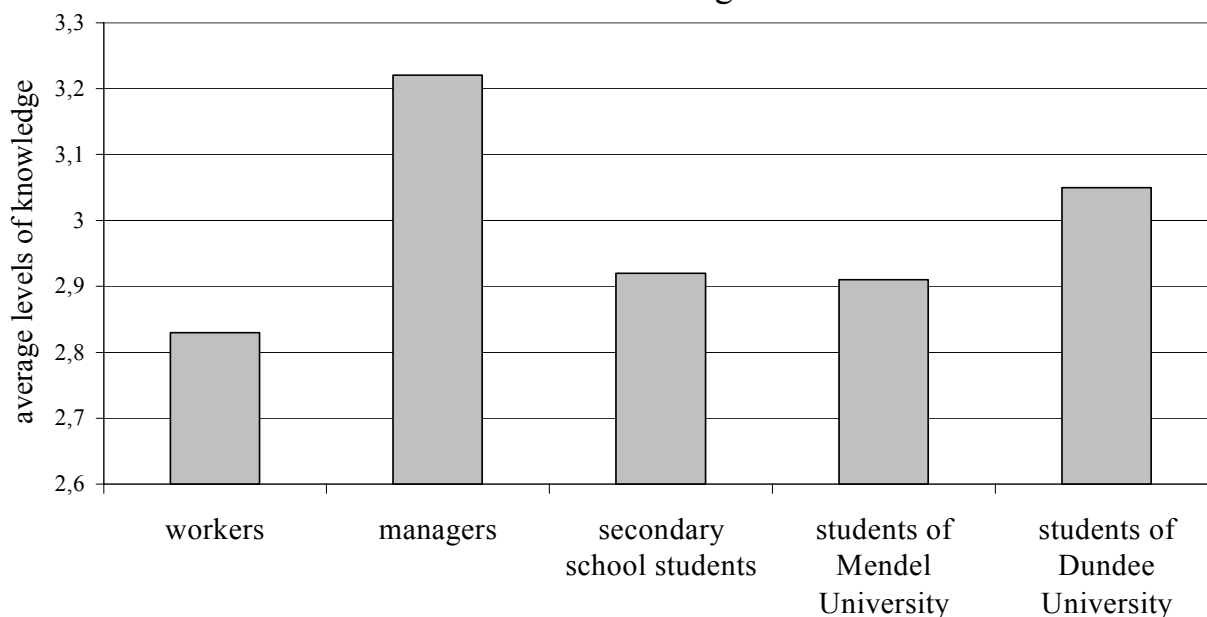


Figure 1. Average levels of knowledge of environmental problems

Let us look at the sources of ecological and environmental information (question 13). In the age of information technologies, it is not surprising that the respondents designated as the information source, in the first place, mass media: TV (84,1 %), daily paper (74,4 %), radio (44,3 %). From the high percentage of respondents' informedness from mass media follows the high responsibility of reporters for relevant and comprehensive information they convey to the majority of inhabitants. The emphasis has to be laid on the quantity as well as quality of communicated information. The respondents assigned undeniable importance to the school which was denoted as the source of information by 59,4 % of them. There is a certain shift in the importance the respondent assign to the school in comparison with the year 1987, when the original research took place; at that time was the school as the sour-

ce of information denoted only by 48 % of respondents. All the same, this fact is unfavourable because the school as well as the family should participate in the education of young people (including the ecological education). Poor interconnectedness of ecological information (e.g. the cause and consequence interchange, imperfection of the cognitive component inter alia in consequence of the emphasis on sensual perceptions, not thinking about the problems) and also small accentuation; the influence of the school education is apparent only in 2/3 of the students. The suggested failure of the school takes a significant part in the failure of social phenomenon, which the environmental behaviour represents without any doubt. Talking with friends (ca 42 %) is on the third place and is important particularly for young respondents and respondents with primary education. Sources of information provided by experts at different actions and in professional journals were represented by 30 % (we have proved a difference in the frequency distribution $p < 0,05$). More than 20 % of respondents take advantage of talks in the family and journals (Pernica [6]).

According to psychological model of Kretch [2], the cognitive component of ecological awareness should result in practical behaviour. How are the actual activities of respondent which should positively manifest themselves in their environment?, was the question 24; answers are in the table 8.

Table 8. Frequency of activities supporting the environment (in %)

Positive activity	Manual workers	Professional workers	Secondary school students	Students of Mendel University	Students in Dundee	% share
Green planting	50,0	34,2	57,1	40,3	9,2	43,4
Refuse collection	2,5	8,2	10,2	18,9	16,9	12,2
Occupation	20,0	25,6	0	0	0	7,1
Member of ecological organisation	0,0	2,7	4,4	7,6	1,5	4,4
Expert studies	0	0,9	1,7	5,9	4,6	2,8
Animal care	0	2,7	1,7	1,7	0	1,8
Not stated	27,5	24,2	24,8	25,6	67,7	28,1

It seems to be O.K. because 72 % of respondents answered the question 24 positively. The planting of green prevails; however, it a constituent part of practical learning process in a substantial part of examined set. Then follow the refuse collection and the activities within the respondents' occupation (more than 7 %). Still, it is very difficult to say, if they would perform the environmentally friendly activity even without command, i.e. consciously and voluntarily in an independent position. After the subtraction of the professionally performed activities, there remain only a few activities of conscious and willing individuals.

As a consequence, it means that in an absolute majority of respondents, there was no any difference in the reflection of man's attitude towards the environment. Seemingly, only a few of them asked themselves the questions mentioned in the introduction: Who am I ...? Who should I be ...?, Who I want to be ...? What can I do ...? What am I to do ...? Inwardly, they did not surpassed the emotive stage based on sensual perceptions; they do not thing over. The thinking is a non-perception activity resolving problems within given relations. Thinking helps to adapt

to living conditions by making possible to go beyond the perceived reality (importance) and beyond the presence (future).

The attitude is the preparedness to action, a learned pre-disposition to perceive, think and feel, perform. The attitudes are formed by taking over the attitude patterns from other people. Some attitudes are being developed by imitating of behaviour patterns we identify us with, but the primary influence has the family, school and crew. Responses to social effects: 1. obedience – man obeys in order to avoid the punishment or to win an award which is also liable to an authority; 2. identification – man unites with another man and imitates him because he admires him; identification differs from obedience by believing in accepted (!) values; 3. internalisation – the value is being realized without external pressure, because it is constituent part of the value scale the man accepted because he is convinced of its rightness.

Conclusion

We have found a relatively low level of the cognitive component of ecological consciousness in respondents from the Czech Republic, as well a relatively high sensitivity of respondents to changes in their environment. Above all, the respondents from heavily affected areas much more often admitted their bad feelings, that they have fear and anxiety.

It is evident that formerly was the normal attitude to ecological changes characterised by ignorant indifference and idleness, namely by reason of delaying of analysis behind the synthesis as well as of delayed comprehensive knowledge of the problems. The information vacuum in the field of ecology participated, too. We assume that ecological information influences by its additive stimulation the motivation component of the conscience. Ecological information and education proved themselves in the system of environmental awareness as essential. This was confirmed not only by the fact that the respondents with higher education showed a higher repletion of the cognitive component of consciousness, higher sensitivity and higher willingness to the reflected environmental behaviour.

Recommendation based on the founded results: 1. Efficient utilisation of the environmentally friendly technologies can be realised, in the first stage, only by means of continuous control and repression of improper behaviour of the forestry machines operators. 2. At the same time, educational courses and training should be started, what would supply the cognitive component with information with the aim of changing step-by-step the attitudes of these workers to the environment. 3. In a long-term perspective, we see the transformation of forestry from a purely industrial branch into a functionally integrated branch as a possibility to change the behaviour of these workers, when the internalisation of aspects of "consideration of the environment" as a integral part of economical as well as non-wood-producing functions will take place, which will become one of the major conditions of ecological forestry.

Call for cooperation

We call all forestry workers in the Ukraine for cooperation with the aim to create a social ecological picture illustrating the attitudes of the workers within the whole Carpathian Arch. It would concern also the forestry workers and students in Slovakia and Rumania which took part in the questionnaire survey. For the purpose

of comparison with Central Europe, the project could be complemented by attitudes of forestry workers from North European countries. We would ask for a grant within the European Union.

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ANALYSIS OF INJURIES OCCURRING IN TREES AS A RESULT OF TIMBER HARVESTING

The research was located in three regions of southern Poland which differ in their topographical features and, consequently, in the degree of accessibility of tree stands. Harvesting was carried out in coniferous and deciduous stands, composed of the main forest species: pine in the lowlands; spruce, fir and beech in the uplands. The technologies used for this research were characteristic of the above-mentioned regions, where difficult topographical conditions, limited access to stands and insufficient equipment of workers who carry out harvesting for the state forests make fully mechanized work difficult. Considering the degree of work mechanization, the technologies used were manual-mechanized [4]. The latter technology applied manual labour for most activities, including the stage of logging.

Keywords: manual-mechanized timber harvesting, tree injuries.

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Аналіз пошкоджень дерев, спричинених лісозаготівельною діяльністю

Дослідження проводилося в трьох регіонах південної Польщі, що різняться своїми топографічними особливостями і ступенем доступності лісових масивів.

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