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THE NATURAL HERITAGE OF PALE MUNICIPALITY: LOCAL POPULATION ATTITUDES

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ABSTRACT

Natural and landscape complex of Pale municipality, where dominates mountainous areas, are characterized by diversity of geological and geomorphological phenomena and forms, as well as biological and ecosystem diversity. The significance of natural heritage is multiple, especially in terms of tourism and adapting the tourist offer to the needs and expectations of modern tourists. The aim of the research of this paper is to determine the Pale population attitudes in regarding natural heritage of the municipality. In accordance with the set goal, defined research questions were analyzed relative to gender, age, qualifications and employment.

Attitudes were analyzed according to the importance of natural heritage at local and national levels, importance for tourism development, economic prosperity and improvement of the quality of life. In terms of preserving and protecting the natural heritage of the municipality, several studies has been done, but in practice the situation is much worse, so the attitude of the Pale population was studied with respect to the importance of protecting and preserving the natural heritage.

Key words: *natural heritage, Pale municipality, population attitudes, protected natural resources, Republika Srpska*

INTRODUCTION

Nature as a matter of general interest to Republika Srpska gets special protection according to the Law on Nature Protection and to special regulations [1]. This Law regulates the protection and conservation of the nature, biological, geological and landscape diversity as part of the environment. Yet, natural heritage objects are often not sufficiently protected from unreasonable human activity. An obvious example of this claim is studied area, which is rich in various forms of the natural heritage which mainly isn't under any protection regime. In the past time, a study was conducted by an expert team of Republic Institute for the Protection of the Cultural, Historical and Natural Heritage of Republika Srpska to preserve the mountain Jahorina and the mountain Ravna planina as a protected landscape „Javorina” [2,3]. Unfortunately, the management structures did not recognize the value of such a project and the study was rejected. Intention to protect Jahorina mountain as category V - protected landscape, and it is confirmed by the Amendments to the Spatial Plan of Republika Srpska until 2025 [4]. Also, several other locations are planned for protection according to the IUCN classification, such as: special (geological) nature reserve Govještica, Banja stijena and Prača canyon (category Ib), protected natural area Trebević - Miljacka canyon (category V), nature park Romanija and nature park Ozren-Bukovik-Vučija Luka (both in category V) [4].

Importance of natural heritage is multiple, especially to improve the development of tourism and in terms of protection, conservation and sustainable use of natural resources, as well as long-term preservation of natural ecosystems and natural balance [5,6,7]. This rise a need for explore attitude of local population toward the importance of the natural heritage in local and national level. The aim of the research was to determine the attitudes and activities of Pale municipality population towards the natural heritage. According to main aim, the following survey questions were identified:

- What is the attitude of Pale municipality population relative to importance of natural heritage at local and national level, importance for the development of tourism, economic prosperity and improvement of quality of life. What is the attitude relative to protection of natural heritage?
- Is there a difference in population attitudes related to gender and age, education and employment?
- What are the activities of Pale population regarding the natural heritage, i.e. how often do they visit nature objects, parks or monuments, how often do they go to nature?

Studies of this character have not been done in this area so far, so this paper will attempt to answer the basic questions and problems regarding the state and perspective of natural heritage in the Pale municipality.

STUDY AREA

The Municipality Pale is located in the south-eastern part of Bosnia and Herzegovina and it is part of the city of East Sarajevo. It ranges between 43°40' and 43°58' northern latitude and 18°28' and 18°52' eastern longitude and has an area of 492 km². It is bordered by the mountain ranges of Romanija from the northeast, Gosina from the east, Jahorina from the southeast and south, Trebević from the west and Ozren from the northwest and north (Figure 1).

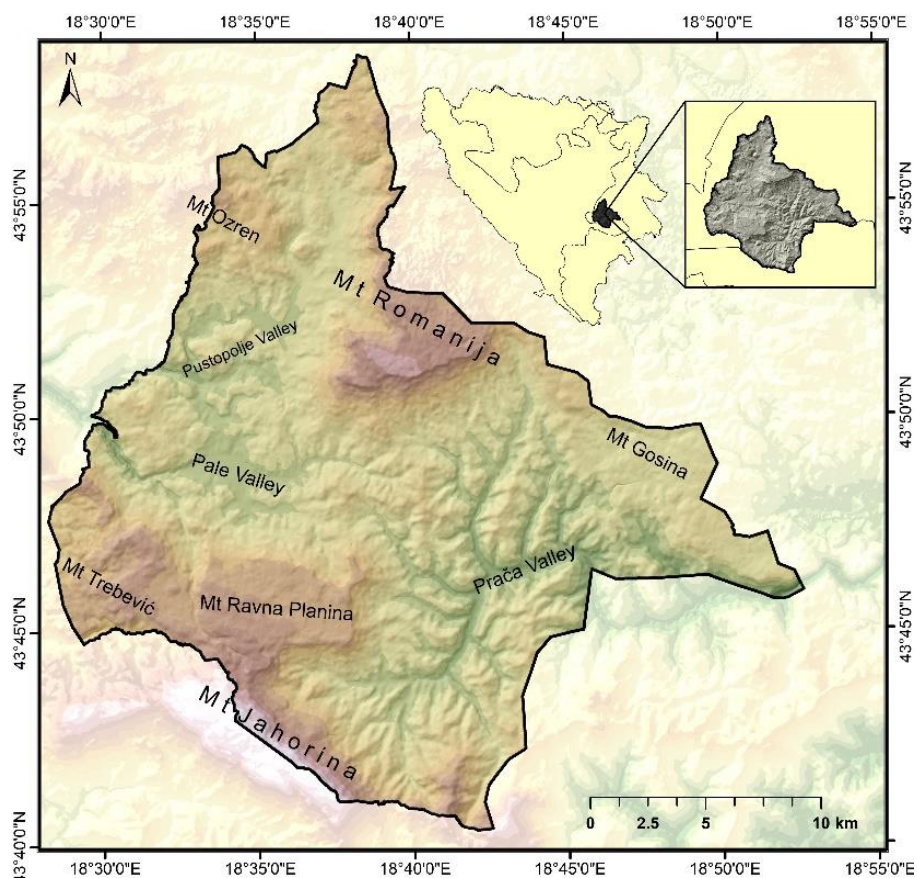


Figure 1. Location of study area in Bosnia and Herzegovina

The highest altitude of the municipality is on the mountain Jahorina, the peak Ogorjelica 1916m, and the lowest altitude is in the valley of the river Miljacka, in the area of settlement Dovlići (624 m). The urban part of Pale municipality is in the Pale Valley and covers an area of about 15.77 km² [8,9].

This, mostly mountainous area, is characterized by a great diversity of relief forms. This is the result of specific geological structure, karst and fluvial processes which had a significant influence on the relief formation. Today's forms and features of relief are the result of activities that happened in geological past through endogenous and exogenous processes.

THE NATURAL HERITAGE OF PALE MUNICIPALITY

The natural resources of the Pale municipality can be classified into several categories: mountains and hills; valleys and canyon valleys; caves and pits; the springs and the rivers and biodiversity.

Mountains and hills

Mountains are the dominant structures in the relief of the studied area. The average altitude of the terrain is 1066 m, and the height amplitude of 1292 m (from 624 to 1916 m), confirms the peculiarities of diverse mountainous terrain. The river valleys divide, ranges of mountains Romanija, Gosina and Ozren from range of Jahorina, Trebević and Ravna planina. These mountain systems have similarities in terms of tectonic features and geological structure. The highest parts of the mountainous are karstified and without river flows on the surface. Proluvial, gravitational and fluvial forms of relief have been developed in the peripheral areas surface.

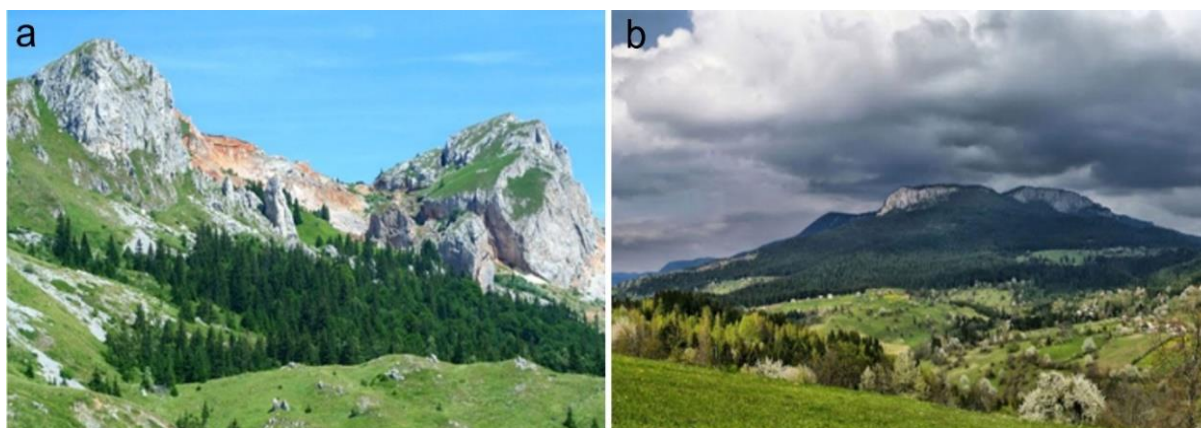


Figure 2. Mountains of Pale Municipality: (a) Mt. Jahorina – peak Trijeska; (b) Mt. Romanija

The Lower Triassic sandstones are an erosive base of the Middle Triassic limestones, which provided ideal conditions for the appearance of numerous surface and underground karst relief forms. Specific are the so-called red Bulog limestones, rich in cephalopod fossils named after the Han Bulog locality, located along the border of the Pale municipality, where these limestones were originally discovered [10].

The surrounding mountains recorded a growth of tourist activity, especially on the mountains of Jahorina, Trebević and Ravna planina [11]. Romanija has good potential for tourism development, which is why it is necessary to protect these natural complexes in order to preserve them from unsustainable development in the future.

In a slight proportion, was noted presence of diabase and dolerite of the Lower Triassic, so as special feature, in terms of natural heritage, stand out a small laccolith named Goli Koran, which is located near town of Pale (Figure 3) [10]. This natural heritage location is picnic and recreational area for the residents of Pale.



Figure 3. Laccolith Goli Koran near Pale settlement

Valleys and canyon valleys

The valleys are of polygenic origin, made in process faulting in relation to the surrounding positive morphostructures of the area and dominated by fluvial erosion. The valley of Pale and Pustopolje, the valleys of the river Paljanska Miljacka, The river of Mokranjska Miljacka and valley of the river Prača, are negative relief structures of the studied area. Due to the tendency of lowering of morphostructures, the main flows and their tributaries deposited a certain amount of alluvial material along the bottom of the valleys. The terrain has the lowest altitude on the west side where water courses of the Paljanska Miljacka river and the Mokranjska Miljacka river intrude into limestone rocks, building deep canyon valleys. Also, in the east, the terrain is lowered and opened up by the valley of the river Prača, which is cut mainly in flysch deposits of Carbon.

Caves and pits

In relation to the presence of karst rocks (29.5%), numerous underground karst relief forms occur in the studied area, among which the caves are the most numerous [8]. Currently, the only object under protection as monument of nature is the Orlovača Cave (Figure 4a), which is also the only tourist cave. In this area there are also Cave at the spring of the Mokranjska Miljacka river. Based on the explored canals, this is one of the longest speleological objects in B&H (more than 7200 m), followed by the Omladinska Cave (Figure 4b), rich in aragonite forms, the Novakova Cave, Rabbits, glaciers and numerous of other [12,13,14,15].

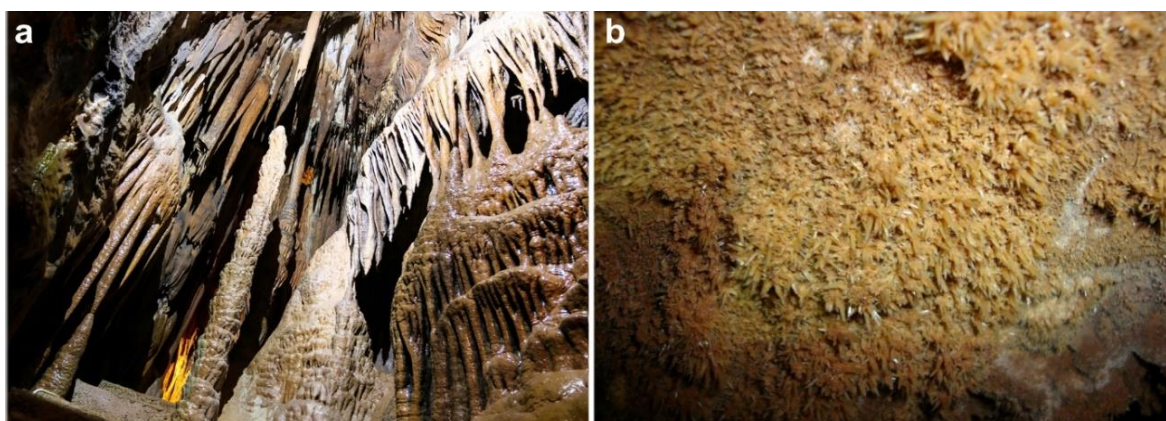


Figure 4. (a) Flowstone from Orlovača Cave; (b) Aragonite from Omladinska Cave

One of the deepest pits in Republika Srpska - the Bezdán pit (-207 m) is located in this area, on the mountain Ozren [13,16]. In addition to caves, pits and abysses, in this relatively small area, just below meeting point of the Paljanska Miljacka river and the river of Mokranjska Miljacka, there is a natural bridge - called the Demir Kapija [15,17].

Springs and rivers

This area is rich in aquifers and springs of the rivers Prača, Paljanska and Mokranjska Miljacka. The springs of these rivers are located in karst area and are specific on their appearance forms and high natural values. The area of the spring of Paljanska Miljacka is protected, due to the water supply of Pale settlement as well as because of the occurrence of large deposits, waterfalls and cascades on the wider area of the spring [18]. The spring of the Mokranjska Miljacka River is one of the longest caves in the territory of Bosnia and Herzegovina.

The spring of the River Prača is high capacity karst spring which was partly captivated during the Austro-Hungarian Monarchy. These watercourses have high flows and high water quality, whose springs are located in upper elevations of the municipality. Picnic sites are located at the springs of these watercourses, especially Paljanska Miljacka and Prača, as well as beside their tributaries. These watercourses have canyon valleys with many endemic species which are preserved due to specific conditions of the environment and isolation.



Figure 5. Tufa sediments and waterfalls on spring of Paljanska Miljacka

Biodiversity

Biodiversity of Pale mostly is presented in the diversity of flora. Due to mountainous relief in this area mainly prevail meadows and forests. Non-forest vegetation includes mountain meadows and pastures within the forest zone, as well as vegetation of subalpine meadows and pastures. The forest vegetation is divided by altitude zones from lowest elevations to the highest peaks. Mountain ranges are characterized by richness in floral habitats. The flora of the mountain Jahorina stands out in terms of vascular plants, including 1159 species.

Almost 20% of these species located in Bosnia and Herzegovina are located on this mountain. Moreover, 15% of these species are the endemic ones [2,19,20]. High diversity of fauna is also registered in this area, especially birds [21]. Also, in regard to the diversity of plant and animal species, mountain Romanija and Trebević have similar characteristics.

The existence of canyons of the Paljanska and Mokranjska Miljacka contributes to diversity of species in the area of Pale municipality. These canyon valleys represent the refugia of relict ecosystems, which have the highest values in the biodiversity of Bosnia and Herzegovina.

MATERIALS AND METHODS

Survey size and instruments

Surveys of the attitudes of the local population about the importance of the natural heritage in the municipality of Pale were conducted on the basis of a survey questionnaire. In attitudes survey, 409 respondents answered the questionnaire. The youngest participant was 15 years old while the oldest participant was 71. By census report from 2013 [22], population of Municipality Pale is 20359. Respondents taking part in the survey represent 2% of the population of the municipality of Pale. The survey was conducted in the Autumn of 2019 and data processing and analysis were done from December 2019 to January 2020.

For the purpose of this research, the questionnaire was constructed consisting of 4 items of objective type (gender, age, education and employment) and 9 items of subjective type (6 for attitude research and 3 for behavior research). Residents of the Pale municipality expressed their attitudes and behavior by completing a 5-point Likert scale of assessment. Responses of complete agreement with the attitudes given in questionnaire had a value of 5, and the answers of complete disagreement had value of 1. The structure of the survey sample was given with respect to the variables: gender, age, education and employment, and it is presented in Table 1.

Table 1. Sample structure in relation to given variables (N = 409)

Variable		No of participants	(%)
Gender	Male	135	33
	Female	274	67
Age	15 - 25	256	62.6
	≥ 26	153	37.4
Education level	Elementary school	88	21.5
	Secondary school	135	33.0
	Student	71	17.4
	University degree	115	28.1
Employment	Employed	152	37.2
	Unemployed	257	62.8

RESULTS AND DISCUSSION

The IBM SPSS 20.0 [23] is used for data processing and analysis. Short summary of the data sample is given in descriptive statistics calculating measures: mean (M), standard deviation (SD), the minimum and maximum values of the variables. Items are ranked by its mean values (Table 2). The highest level of the agreement have Items 6.12 Protection of the natural heritage is very important and 6.7 A natural heritage is very important for local area.

Table 2. Item rankings by its mean value

Items	N	Min	Max	M	SD
6.12 Protection of natural heritage is very important	409	1.00	5.00	4.7653	0.59299
6.7 Natural heritage is important for the local area		1.00	5.00	4.6870	0.61823
6.8 Natural heritage is important for the entities and entire country		1.00	5.00	4.6284	0.67430
6.11 Students should learn about natural heritage in school		1.00	5.00	4.6112	0.73629
6.9 Natural heritage can improve the quality of life of people in municipality Pale		1.00	5.00	4.5623	0.75189
6.10 Natural heritage makes people of area proud		1.00	5.00	4.5623	0.77120

In addition, statistical tests were used to test the research hypotheses. The analysis of respondents' attitudes towards natural heritage was performed by non-parametric tests, Mann Whitney U test and Kruskal Wallis H test. The first step was to examine the respondents' attitudes towards natural heritage in relation to the variables: gender, age and employment. The results of the Mann Whitney U test are shown in Table 3.

Table 3. Results of Mann Whitney U tests by gender, age and employment

	Variable	N	M_{rank}	Sum_{rank}	Mdn	U	Z	p	
Attitudes of the population toward the importance of natural heritage	Gender	Male	135	187.21	25273.0	4.8333	16093.0	-2.303	0.021
		Female	274	213.77	58572.0	5.0000			
		Σ	409						
	Age	$s \leq 25$	256	183.86	47068.0	4.8333	14172.0	-5.043	0.000
		$s \geq 26$	153	240.37	36777.0	5.0000			
		Σ	409						
	Employment	Employed	152	237.82	36149.0	5.0000	14543.0	-4.655	0.000
		Unemployed	257	185.59	47696.0	4.8333			
		Σ	409						

* significance level $p \leq 0.05$

According to the results of the Mann Whitney U test (Table 3), there is a statistically significant difference (0.021) in attitudes toward the importance of natural heritage between men and women. Women on average had more positive attitude (Mdn = 5.0, N = 274) than men (Mdn = 4.833, N = 135).

The variable of age was recoded into a binary variable. The first group consists of respondents up to 25 years old and the second group consists of respondents aged 26 and over. Due to the asymmetric distribution of responses across the groups, the Mann Whitney U test is applied for testing hypothesis of the variable age. The significance level p is less than 0.05 ($p=0.000$) confirming that there is significant difference ($Z = -5.043$) in attitudes towards the importance of natural heritage between these groups. The older group, consisted of respondents aged 26 and over, has in average more positive attitudes about the importance of natural heritage (Mdn = 5.0, N= 153), than the group of younger respondents (Mdn = 4.83, N= 256).

Analyzing the distribution of responses by employment, asymmetric distribution of responses was observed in both groups. Results obtained by Mann Whitney U test indicate that there is a difference in attitudes ($p \leq 0.05$) toward the importance of natural heritage between employed and unemployed respondents. Employed respondents have on average more positive attitude (Mdn = 5.0, N = 152), than the unemployed respondents (Mdn = 4.833, N = 257), Table 4.

Table 4. The Impact of education of the respondents on attitudes about the importance of natural heritage

Education	N	M_{rank}	Mdn	χ^2	df	p
Elementary school (1)	88	178.90	4.8333	24.052	3	0.000
Secondary school (2)	135	221.20	5.0000			
Student (3)	71	164.51	4.6667			
University degree (4)	115	230.95	5.0000			

Survey of the attitudes of respondents in relation to their education level was conducted by Kruskal Wallis H test. The result shows a significant difference in attitudes about the importance of natural heritage between respondents according to education level (primary education, n = 88; secondary school, n = 135; student n = 71; university degree, n = 115). Comparing the groups of respondents (Mrank) it is revealed that the most positive attitude towards the importance of natural heritage has a group of university degree respondents (Mrank = 230.65, Mdn = 5), followed by the respondents with

secondary school degree (Mrank = 221.20, Mdn = 5). Comparing the four groups of respondents by education level, the greatest difference is observed between attitudes of students and attitudes of university degree respondents. Also, there is significant difference between students' attitudes and attitudes of respondents with secondary school education, Table 5.

Table 5. Mean values by the items representing behavior toward importance of natural heritage

	5.6 Visits to natural features in past year (mountain, river, cave etc.)	5.7 Visits to national park or nature park, natural monument etc.	5.8 Visits to nature (in general)
M	3.6333	2.5232	4.533

The arithmetic means of the responses by behavior items indicates that the respondents mostly go for a short excursions and short stay in nature, while they least visit protected natural features such national parks, nature parks and natural monuments. Frequency of visits by items is presented in Figure 6.

Results revealed that more than 70% of respondents visits nature features in general (item 5.8) at least once a month, whilst 33% of them visits natural features such as mountains, rivers, caves etc. (item 5.6) at least once a month. Evidently, the least visited are National parks, nature parks and natural monuments (item 5.7) because 20% of the respondents did not visited these places not even once, while 36% of them responded they visited these places only once a year.

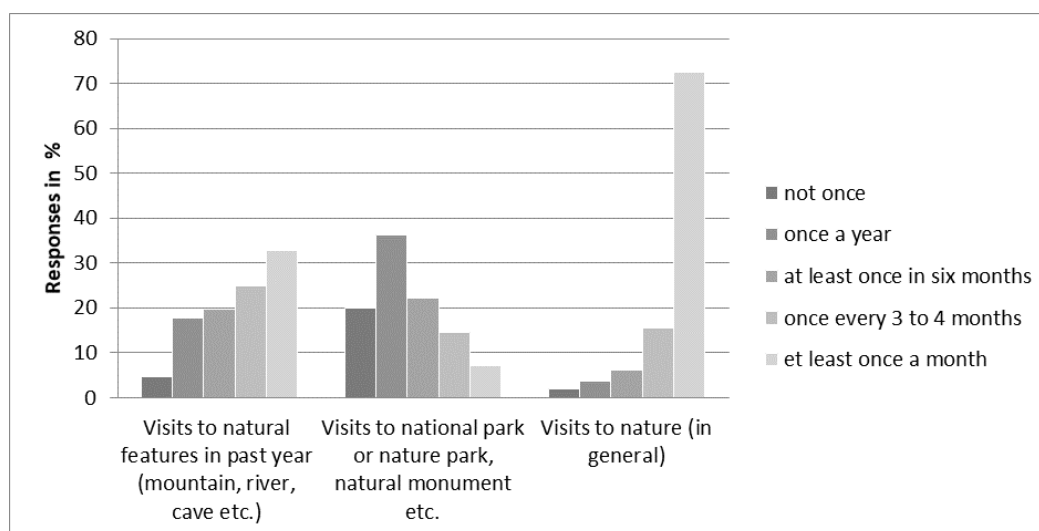


Figure 6. Behavior tendencies according to frequency of visits

Such ratio between behavior items can be justified due to proximity of a large number of excursion sites and walking areas, which are located right next to the municipal center. This causes respondents to visit natural features in general more often than National parks that are significantly further away.

CONCLUSION

At the time of the survey, the only protected natural feature in the Pale municipality was the Orlovača Cave, which belongs to category of protected natural monuments. According to the study of the Republic Institute for the Protection of the Cultural, Historical and Natural Heritage of Republika Srpska, several natural areas should be put under the regime of protection. Special attention is given to natural areas as Jahorina - Ravna planina and Romanija as well as the natural features such as mountain Trebević, the Canyon of river Miljacka, the Canyon of river Prača and part of the mountain Ozren. These natural features partly belong to territory of Pale municipality. Previously defined proposal for proclamation of parts of mountain Jahorina as a protected landscape was rejected, that further on causes unsustainable tourism development and many other geocological problems.

Better protection of natural heritage would affect the preservation of the natural rarities and specificities of this area and it could also influence its better promotion causing sustainable development of tourist activities. Protection of natural heritage can also improve tourist offer and could harmonize human activities and sectoral development plans and programs with the sustainable use of natural resources. A long-term preservation of natural ecosystems and natural balance could also cause fulfilment of people's needs for nature exploration and develop respectfulness toward the environment.

The survey of the attitudes of the population of Pale municipality was conducted in relation to these statements and what is confirmed by the extremely positive attitudes of the respondents toward the importance of natural heritage. However, there are some discrepancies with respect to gender, age and employment. Slightly more positive attitude is revealed in female population than in male population. Also, the older group of respondents as much as the most educated respondents have more positive attitudes toward the importance of natural heritage. Younger respondents have lesser positive attitudes and particularly concerning are students who have the least positive attitudes toward the importance of natural heritage.

Finally, the behavior tendencies and frequency of visits of respondents were put into the relationship. The results reveal that the people of Pale municipality most frequently visit nature in general, usually through short excursions and walks, whilst they least visit national parks, nature parks, etc. These are preliminary studies and thus omissions and errors are an inevitable in these circumstances. During the processing of the data, it was found that the respondents gave identical marks on many items of the questionnaire, which is a possible consequence of poor formulation of the question. However, this examination has raised several new research questions and dilemmas and provided an opportunity to continue the research while eliminating the identified lapses.

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