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Evaluation of ecological awareness and superstition on Hermann's tortoise in Eastern and Southern Serbia

Original Article

Marko Nikolić
Faculty of Sciences and Mathematics, University of Niš, Višegradska 33, 18000 Niš, Serbia
Biological Society "Dr. Sava Petrović", Višegradska 33, 18000 Niš, Serbia
marko@bddsp.org.rs (corresponding author)

Dimitrija Savić-Zdravković
Faculty of Sciences and Mathematics, University of Niš, Višegradska 33, 18000 Niš, Serbia
Biological Society "Dr. Sava Petrović", Višegradska 33, 18000 Niš, Serbia

Jelka Crnobrnja-Isailović
Faculty of Sciences and Mathematics, University of Niš, Višegradska 33, 18000 Niš, Serbia
Institute for Biological Research "Siniša Stanković" – Institute of National Importance for Republic of Serbia, University of Belgrade, Despota Stefana 142, 11000 Belgrade, Serbia

Abstract:

Folk beliefs, religion and mythology, created through various cultural influences in Serbia, shaped today's attitudes toward wildlife. In this study we evaluated different levels of ecological awareness and superstition extent related to Hermann's tortoise (*Testudo hermanni*) through a systematized face-to-face questionnaire. The study was conducted in two protected and two unprotected areas of southern and eastern Serbia. The results confirmed the presence of myths and superstitions amongst locals and existing conflict between the humans and *T. hermanni*. These results also showed the lack of knowledge about national regulations related to protection of nature and *T. hermanni*, even in protected areas, with statistically signifficant differences among localities. To reduce this human/wildlife conflict, future conservation measures would have to take into account the views of the local population.

Key words:
Testudo hermanni, Serbia, ethnozoology, survey, questionnaire, protected areas, human-wildlife conflict

Apstrakt:

Procena nivoa ekološke svesti i sujeverja o šumskoj kornjači u Istočnoj i Južnoj Srbiji

Narodna verovanja, religija i mitologija, nastali pod dejstvom različitih kulturoloških uticaja u Srbiji, oblikovali su današnji odnos čoveka prema prirodi. U ovoj studiji procenjivali smo različite nivoe ekološke svesti i sujeverja lokalnog stanovništva o šumskoj kornjači (*Testudo hermanni*) putem anketiranja. Studija je sprovedena na dva zaštićena i dva nezaštićena područja Južne i Istočne Srbije. Rezultati su potvrdili prisustvo mitova i sujeverja među lokalnim stanovništvom i postojanje sukoba između ljudi i šumske kornjače. Ovi rezultati, takođe, pokazuju i nedostatak znanja o nacionalnim propisima koji se odnose na zaštitu prirode i zaštitu šumske kornjače, čak i kod stanovništva u zaštićenim područjima, sa statistički značajnim razlikama među lokalitetima. Da bi se smanjio ovaj sukob između ljudi i divljih životinja, buduće mere zaštite bi morale da uzmu u obzir stavove lokalnog stanovništva.

Ključne reči:
Testudo hermanni, Srbija, etnozoologija, anketa, upitnik, zaštićena područja, sukob između ljudi i divljih životinja

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Introduction

As it has been shown in many places worldwide, attitude of the local community regarding importance and conservation of wildlife plays a major role in restricting direct and indirect human impact on habitats and populations of endangered species. Local resource users can affect the implementation of conservation measures positively or negatively, therefore being a powerful conservation factor (Ramstad et al., 2007; Røskaft, et al., 2007; Ebua et al., 2011; Talukdar & Gupta, 2018). Local folk beliefs, religion and mythology contribute vastly to the formation of attitudes and opinions of the native local human population (further referred to as locals) towards nature and wildlife. Therefore, in recent decades, interdisciplinary fields of study, such as ethnozoology, nature conservation marketing, or social psychology, have made significant contributions to biodiversity conservation (Dickman, 2010; Alves & Souto, 2015; Wright et al., 2015).

In Serbia, various cultural influences shaped today's attitudes toward wildlife. One of the most serious wildlife threats in this country is illegal collecting for a variety of reasons, major ones being: for pet shops, use in food, folk medicine, or due to superstition and magic rituals (Durst & Mikuška, 2017; Nikolić & Golubović, 2017; Jovanović et al.,

2020). Tolstoy & Radenkovic (2001) describe the role of many animal species in local mythology, and Eastern Hermann's tortoise (*Testudo hermanni boettgeri*) is one of them. In addition to already known threatening factors such as natural catastrophes, road casualties, habitat fragmentation and loss (including urbanization), a direct human-wildlife conflict is also present (Van Dijk et al., 2004; Bertolero et al., 2011; Fernández–Chacón et al., 2011; Celse et al., 2014; Nikolić & Crnobrnja-Isailović, 2017). Nowadays, one of the most common myths about Hermann's tortoise is the belief in the healing properties of tortoise blood, which is believed to help treat serious illnesses (Nikolić & Crnobrnja-Isailović, 2017).

According to the Red Book of Reptiles of Serbia (Tomović et al., 2015), the Hermann's tortoise belongs to national category NT (Djordjević & Ljubisavljević, 2015) and its' global IUCN Red List status is also NT (Van Dijk et al., 2004). Besides, Hermann's tortoise is listed in Annexes II and IV of the Habitats Directive, in Annex II of the Bern Convention, and in Annex II of the CITES Convention. Although Hermann's tortoise is protected by both international and national acts, the problem of illegal hunting and trading is still unresolved. Tortoises are being collected and transported mainly to European Union countries. Thus, in 2005, 504 Hermann's tortoises were seized on the border between Serbia and Croatia, and a similar situation occurred in 2006 with 22 Hermann's and Greek tortoises (*Testudo graeca*) (Jovanović & Ajtić, 2011).

In order to solve this problem, it is necessary to understand it. Success in reducing negative anthropogenic impact and maintaining long-term sustainable management of natural resources depends a lot on the support of the local community. Also, understanding the attitudes of the locals, taking into account their needs, and respecting their opinions should become a priority in creating effective protection and conservation measures (Macura et al., 2011).

The main aim of this research was to determine and evaluate different levels of ecological awareness and superstition extent occurring among local inhabitants in protected and unprotected areas situated in the southern and eastern regions of Serbia. To achieve this goal, we conducted a survey about the awareness of the locals on the existence of protected areas and knowledge of national regulations related to protection of both nature and Hermann's tortoise. Finally, we examined the presence of myths and superstitions amongst locals, as well as their perceptions of the costs and benefits of Hermann's tortoise protection.

Materials and Methods

Study area

Surveying was conducted in a total of four locations in the municipalities of Serbia - two in the east and two in the south of the country (**Fig. 1**). Two of the four sites were located in protected areas: Donji Milanovac, on the territory of the "Djerdap" National Park in eastern Serbia, and Kunovica, 15 km from the city of Niš, on the territory of "Sićevačka klisura" Nature Park in southern Serbia (Niška Banja municipality). The other two sites were not located within the protected areas: Kladovo in eastern Serbia and Leskovac in southern Serbia. The presence of Hermann's tortoise populations was confirmed on all 4 localities (Golubović et al., 2019; Nikolić et al., 2020).

Sampling

Fieldwork was carried out from May to October 2016. The survey was conducted for 5 days per

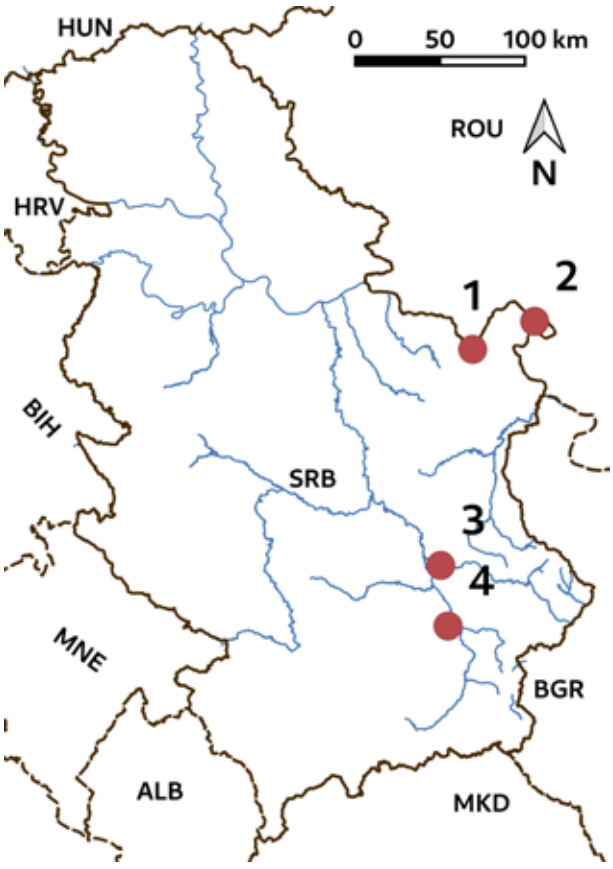

Fig. 1. Map of Serbia with the research localities marked as following: 1 – Donji Milanovac, 2 – Kladovo, 3 – Niš, 4 – Leskovac; 1 - 44°27'50.48"N, 22° 9'2.63"E; 2 - 44°36'24.96"N, 22°36'49.19"E; 3 - 43°19'5.73"N, 21°53'47.89"E; 4 - 42°59'48.00"N, 21°56'39.03"E

locality, and residents were interviewed between 9:00 and 17:00. The research team toured the defined area on foot and, according to the principle of chance, the residents were interviewed face-to-face. The conversation with one respondent lasted 15-20 minutes. During one day, 20-25 respondents were interviewed. Our total sample included 389 inhabitants (**Tab. 1**).

Questionnaire

The face-to-face questionnaire was designed based on a study by Veličković et al. (2015). The questions were divided into three sections. The first section contained questions about the respondents' awareness of the existence and role of protected areas, and the presence of such areas in their close surroundings. The second section contained questions about superstition on one hand; as well as questions about the presence of myths related to the healing properties of Hermann's tortoise and whether the respondents believed in them, on the other hand. Respondents were also able to state whether they were aware of what was believed to be used for these purposes (blood, eggs, legs or something else that was not listed), which diseases are believed to be curable in this way, have they heard of cures, and have they had similar experiences. Finally, respondents answered questions about the existence of legal protection for Hermann's tortoise and whether conservation actions should be done to preserve this species. The questions were formulated in a non-suggestive way to enable to the respondents to give as honest and complete answers as possible.

Statistical analysis

Respondents' answers to superstition questions were presented in the form of categorical variables, and the Chi-square (with Yates Correction for Continuity for 2x2 tables) test of the IBM SPSS Statistics ver. 25. Software package was used to assess the statistical significance of differences in respondents' answers. The awareness of the locals about the existence of protected areas in their surroundings and the presence of myths about the healing properties of tortoises was marked with appropriate codes in relation to the attitude towards their claims (1–yes, 2–no, 3–not familiar with the topic). The data was organized using Microsoft Office 365 Excel Apps, where graphic figures were also created.

Table 1. Basic data about respondents

Locality	Region	Protected area	Number of inhabitants	Number of respondents	Average age (%)	Male respondents (%)
Donji Milanovac	East Serbia	Yes	2410	97	49.1	49.5
Kladovo	East Serbia	No	8869	93	44.5	55.9
Niš (Niška Banja municipality)	South Serbia	Yes	14098	100	48.6	40
Leskovac	South Serbia	No	60288	99	49.8	51.5

Table 2. Superstitious respondents in protected and unprotected areas (in percentages)

	% of respondents	Df	Syg.
Protected area	34.2	1	0.044
Non-Protected area	24.4	1	

Results

The survey conducted at four localities in Serbia included a total of 389 respondents (**Tab. 1**). By analyzing the survey results and applying the Chi-square test (**Tab. 2**) we found that there were mild statistically significant differences between the number of superstitious residents of protected areas compared to other respondents: $X^2(1, n=389) = 4.07$, $p=0.044$.

The results have shown that many respondents believe in the myth that blood, eggs or meat of Hermann's tortoise have healing properties (**Tab. 3**). As many as 72.6% of respondents in eastern Serbia answered that these myths are present in their environment and that they knew someone who used tortoises for healing purposes. In relation to 55.3% of respondents in southern Serbia, significant statistical differences were found: $X^2(1, n=389)=11.93$, $p=0.001$. Statistically significant differences were also found when it comes to the percentage distribution by localities $X^2(3, n=389) =16.24$, $p=0.001$. Most respondents who believed

Table 3. Respondents per region who believe in the healing properties of Hermann's tortoise (in percentages)

Region	% of respondents	Df	Syg.
East Serbia	72.6	1	0.001
South Serbia	55.3	1	

in the myth of the healing properties of Hermann's tortoise were recorded in Donji Milanovac (76.3%), and the least in Leskovac (50%) (**Tab. 4**).

Out of a total of 197 respondents living in selected localities within protected areas in southern and eastern Serbia, 55.3% of respondents were informed about the existence of protected areas and of the fact that they are located in their immediate vicinity (**Fig. 2**). Additionally, 44.7% of respondents outside protected areas were informed according to the survey. The most informed inhabitants were found in Donji Milanovac (68%, p=0.000), and the least in Leskovac (19%, p=0.000).

Attitudes of the locals that the Hermann's tortoise should be protected and preserved were statistically significantly differentamong localities X^2 (3, n =389)=8.71, p=0.033. Out of the total number of respondents who agree that Hermann's tortoise should be protected, the smallest share was Donji Milanovac with 23% (**Fig. 3**), which is located in both eastern Serbia and in the protected area.

Discussion

The interaction of the local, indigenous human population with nature is conditioned by various direct or indirect reasons. The direct reasons are the purchase of food, the purchase of medicinal raw materials, or the quest for new natural sites (Alves & Souto, 2015). As humans have become the dominant species on the planet (Ehrlich & Ehrlich, 2008), throughout history human civilization has influenced the living world and biodiversity in many ways. In general, the interaction of the locals with nature has always taken place in different ways, and they vary depending on the cultural influence and the environment itself that we observe (Alves & Souto, 2015). Understanding the ecological context for resolving human-wildlife conflicts is not enough; therefore, different socio-economic aspects, cultural influences, attitudes of the actors involved and interactions between them must be considered (Salom et al., 2021).

Our research has shown that 34.2% of the population in protected areas was superstitious (**Tab. 2**), in comparison to 24.4% (p=0.044) of

Table 4. Respondents per locality who believe in the healing properties of Hermann's tortoise (in percentages) (column "HT") and difference inawareness of the respondents from different localities about the existence of protected areas in their surroundings (column "PA")

Locality	HT	Df	Syg.	PA	Df	Syg.
Donji Milanovac	76.3	3	0.001	68.0	3	0.001
Kladovo	68.8	3		65.6	3	
Niš	60.6	3		33.3	3	
Leskovac	50.0	3		19.0	3	

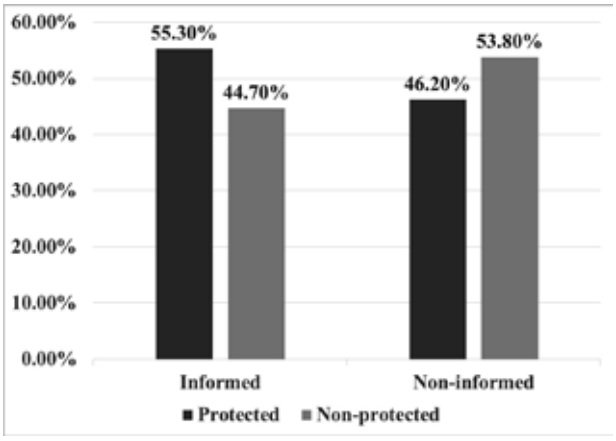

Fig. 2. Awareness of the respondents about the existence of protected areas in their environment in relation to whether they live in the territory of the protected area or not

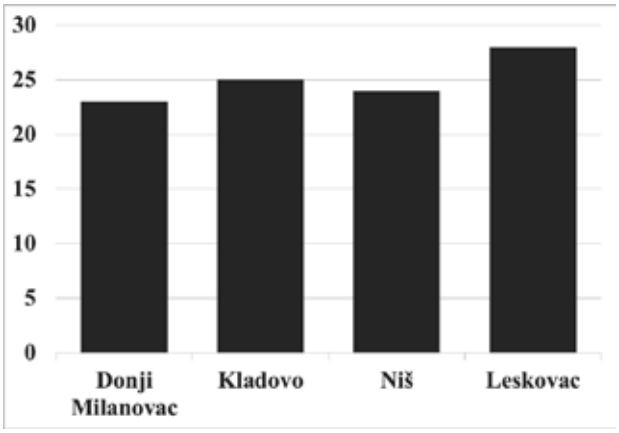

Fig. 3. Respondents who are aware that the Hermann's tortoise should be protected by law (Percentage representation of respondents in relation to the total sample)

Table 5. The attitude of the respondents per locality that the Hermann's tortoise should be protected and preserved

Locality	% of respondents	Df	Syg.
Donji Milanovac	74.2	3	0.033
Kladovo	79.6	3	
Niš	89.9	3	
Leskovac	77.0	3	

superstitious people who live in non-protected areas. The population that inhabits protected areas lives in more rural environment (economically underdeveloped areas far from large settlements), so it can be assumed that this is another reason why myths and folk beliefs are more present there. In the results of the study by Nikolić et al. (2019) it was stated that superstition is more present in eastern than in southern Serbia. The presence of superstitions related to wild animals also means a greater threat to wildlife (Kulišić et al., 1998). Our previous research confirmed the assumption that local beliefs and myths can be a powerful cause of animal endangerment in both Eastern and Southern Serbia (Nikolić & Crnobrnja-Isailović, 2017; Nikolić et al., 2018).

A superstitious human population also could mean a greater impact of myths and folk beliefs on increase of hunting, killing and expelling animals from their natural habitat. In **Tab. 3**, 72.6% (p=0.001) of the respondents who inhabit the protected areas believed that Hermann's tortoise has healing properties. Myths about the healing properties of Hermann's tortoise blood, eggs or meat are most present in Donji Milanovac (76.3%, p=0.001), followed by Kladovo (68.8%, p=0.001). Also, in southern Serbia, the presence of these myths was higher in protected areas, but in a smaller percentage than in the east of the country (**Tab. 3**).

One of the warning results of the research is the uninformedness of local inhabitants about the legal regulations on the protection of nature and, particularly, on the protection of the Hermann's tortoise. According to the collected data, 55.3% of the population in protected areas knows about the existence of protection regimes in their environment. Although no statistically significant difference was found in relation to the population living outside the protected areas (**Fig. 2**), the worrying fact is that only slightly more than half of the population was informed on this issue. The results from **Tab. 4** revealed that 68% of the inhabitants of Donji Milanovac knew about the existence of the National Park ($X^2(3, n=389) = 69.080$, $p<0.001$). Thus, almost a third of the respondents did not know that they live within the territory of the largest protected area in Serbia, which covers 63,608.45 ha and was placed under protection in 1974 (Stanisavljević et al., 2012). The lowest level of awareness in the population from southern Serbia was in Leskovac–only 19% ($p<0.001$). There, the inhabitants live far from protected areas, so only a fifth of the total surveyed population was aware of their existence.

We recorded large populations of Hermann's tortoise near all four investigated localities (Nikolić et al., 2020), so we also know that the residents are in frequent contact with them. But, this study shows more warning results, and that is the attitude of the respondents on the topic of whether Hermann's tortoise should be protected. Our research showed that 80.2% of the respondents are aware that Hermann's tortoise should be protected (p=0.033), but a negligible number of respondents knew that this species isalready protected by law (n=7 in total) (Službeni glasnik RS, 5/2010, 47/2011, 32/2016 i 98/2016). However, among the localities, the smallest share (23%) belonged again to Donji Milanovac (**Fig. 3**). As 25.8% (p=0.033) of the inhabitants of Donji Milanovac were aware that Hermann's tortoise should not be protected (**Tab. 5**), and, at the same time, the presence of folk beliefs and myths was greatest in that locality, this lack of informedness plus superstition suppose to be a direct threat to the populations of this species in the National Park. What is also warning are different motives of the respondents when it comes to "protection" of the Hermann's tortoise. An indirect threat to this species can behidden by the motives for protection (Ballouard et al., 2020): The motive of caring for Hermann's tortoise should be investigated further, because his "care" for tortoises can be a concern to have enough tortoises for healing, illegal hunting, or for various magical rituals. Hermann's tortoises live near humans, they are harmless, they are slow and relatively small, so people can easily take them from nature to keep as pets (Williams, 1999). Also, many people find that collecting Hermann's tortoises and carrying them home is safer for the tortoise, than if they are in their natural habitat, because they look vulnerable. This parallel between caring for and endangering tortoises is widespread in children (Ballouard et al., 2020). The adequate tool for reducing this type of negative anthropogenic impact in creating successful conservation strategies is education (Howe, 2009). Education of young people (students and other locals), should become a priority in the sphere of nature conservation, as

well as continued education of the locals as a part of conservation activities in protected areas.

The presence of myths and superstitions, as well as residents' perceptions of the benefits and costs of Hermann's tortoise protection was, according to our knowledge, examined for the first time in the recent scientific literature in Serbia. It revealed that the conflict between the humans and this species still cannot be neglected and that, to reduce this conflict, future conservation measures would have to take into account the views of the local population, and even to involve the locals in the planning and implementation of conservation actions.

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