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Vesna Oražem

UL, Biotehniška fakulteta, Slovenija, vesna.orazem7@gmail.com

Tatjana Vidic

BC Naklo, Slovenija, tatjana.vidic@gmail.com

Iztok Tomažič

UL, Biotehniška fakulteta, Slovenija, iztok.tomazic@bf.uni-lj.si

Izveček

Volk (*Canis lupus*) je druga najbolj pogosta vrsta velikih zveri v Sloveniji in Evropi. Varstvo te vrste temelji na večdimenzionalnosti, ki vključuje soglasje med širšo javnostjo, različnimi interesnimi skupinami, naravovarstveniki - varstvenimi biologi in politiko. V raziskavi smo ugotavljali odnos in znanje dijakov v programu naravovarstveni tehnik o volkovi. Ti dijaki bodo pri opravljanju svojega poklica predstavljali vsaj eno od že omenjenih dimenzij. Za ta namen smo uporabili anketni vprašalnik, ki je bil sestavljen iz 21 trditev, ki se nanašajo na ocenjevanje stališč in 21 vprašanj, ki se nanašajo na njihovo znanje o volkovi. V raziskavi je sodelovalo 184 dijakov iz dveh šol, izmed katerih se ena nahaja v območju pojavljanja volka. Rezultati raziskave so pokazali, da imajo dijaki, ne glede na regijo v kateri se šola nahaja, v splošnem pozitiven odnos do volkov. Njihov dosežek na preizkusu znanja pa ni bil tako visok. Na 21 vprašanj, ki se v anketnem vprašalniku nanašajo na znanje, so dijaki v povprečju le na polovico vprašanj odgovorili pravilno. Izobraževanje bodočih naravovarstvenih tehnikov naj bi se osredotočalo tudi na družbeno-znanstvene vidike, kot je varstvo velikih zveri.

Ključne besede: volk, naravovarstveni tehnik, znanje, stališča

Environmentalist students' attitude toward and knowledge about wolves

Abstract

Wolf (*Canis lupus*) is the second most abundant large carnivore in Slovenia and Europe. Its conservation can be considered as multidimensional, composed of a consensus between the general public, various interest groups, environmentalists - conservation biologists and politicians. In present study, we assessed students' attitude and knowledge regarding wolves enrolled in the Environmentalist study programme, given that their profession will be a part of this multidimensional consensus. For that purpose, we have used the questionnaire that included 21 attitudinal statements and 21 knowledge assessment questions. The study included 184 students from two schools, one located in close proximity to the wolf region. In general, the students were found to have positive attitudes towards wolves, regardless of their school region. Their knowledge of wolves however was found to be lesser, as on average only half of the knowledge assessment questions were answered correctly. Education of future environmentalists should therefore also focus on educating students about current socio-scientific issues, conservation of large carnivores being one of them.

Key words: wolf, environmentalist study programme, knowledge, attitude

1 Introduction

Conserving large carnivore species represents a great challenge in the field of biodiversity conservation. One-third of continental Europe is inhabited by at least one species of large carnivores. Most records from the 21st century reported a stable abundance of these species or even their increase. Positive public opinion, wildlife protection-legislation and practices supporting coexistence with humans contributed to their successful conservation (Chapron et al., 2014). In 1991, Slovenia enacted a vision of a sustainable use of natural resources. From this year onwards, all three large carnivore species are included in the Regulation on protected and wild animal species and also in the Nature Conservation Act (ZON-UPB2) (Official Gazette no. 96/2004). The country has also adopted a number of documents defining the obligations for the protection of large carnivores.

The wolf (*Canis lupus*) is the most represented species among the dog family (Jonozovič, 2003) and is Europe's second most abundant species of large carnivores, with an estimated total number larger than 12,000 individuals. Of all large carnivores, wolves are most successful in adapting to human-dominated landscapes (Chapron et al., 2014). Wolves live in packs that are known for their territoriality. Pack members have different roles in hunting, territory protection and even reproduction. Their preferred habitat are wide areas with large prey abundance and low disturbance. In the 19th and 20th century humans widely persecuted them until near-extinction. Recently, the protective legislation of the species resulted in their increased abundance and natural expansion (Jonozovič, 2003).

In Slovenia the wolf is a part of the Dinaric-Balkan wolf population (Majič Skrbinšek, 2012), which consist of approximately 5000 individuals (Krofel, 2016). Wolves are mostly distributed in South-western Slovenia, where daily conflicts occur with rural inhabitants, mostly livestock breeders. The wolf population of Slovenia is estimated to be between 32-43 individuals, as per records from 2010. Declining or increasing abundance trends of wolves remain unclear. In contrast to the abundance, home ranges of wolf packs are increasing (Majič Skrbinšek, 2012). It is very important to preserve wolf populations and habitats, including their main prey. Great attention should also be put on improving their coexistence with humans. The importance of species awareness and dispelling their human perceived threat should be focused on (Jonozovič, 2003), particularly as low acceptance of wolves is one of the major factors in their decreasing population numbers (Majič Skrbinšek, 2012).

In the past decades, many studies dealt with human perception and attitude towards various animal species. Many charismatic or flagship species including sharks (Thompson and Mintzes, 2002), dolphins (Barney et al., 2005), primates (Lukas and Ross, 2005), and invertebrates (Kellert, 1993; Killermann, 1996) were the main focus of attitudinal research. In recent years studies also cover species such as bats, spiders, snakes (Prokop and Tunnicliffe, 2008, 2010; Prokop et al., 2009; Tomažič, 2011a) and amphibians (Tomažič, 2011b).

Factors such as age, gender, education status, income, place of residence or interest group association (e.g. hunters, sheep breeders, conservationists), have all been shown to influence a person's attitude towards animals (Kellert, 1996). Our literature overview has shown that the same holds true for wolves (Bjerke et al., 1998; Williams et al., 2002; Ericsson and Heberlein, 2003, Karlsson and Sjöström, 2007).

General public stance toward wolf conservation is often positive, although some differences can be detected for people living in wolf habitats (Bjerke et al., 1998; Williams et al., 2002; Ericsson et al., 2003). Karlsson and Sjöström (2007) found that a favourable attitude towards wolf conservation is positively associated with distance to the nearest wolf territory. The effect of the distance variable was shown to have similar power as the variables of being a member of a nature conservation organization or being a hunter, owning livestock, or owning a hunting dog. Furthermore, the distance effect was present even on the micro-level, where people living in wolf territories had a more negative attitude towards conservation of wolves than people living just outside these territories.

According to Kellert (1996), education plays a crucial role in informing people about organisms and the environment, helping them develop positive attitudes and pro-environmental behaviours. It was found that the education level has a positive correlation with a more favourable attitude towards

insects (Kellert, 1993). When assessing the attitude and knowledge of wolves, the majority of studies includes participants of age 18 and upwards (i.e. Bjerke et al., 1998; Vittersø et al., 1998; Karlsson and Sjöström, 2007). Many times, primary or secondary school students are neglected, with some exceptions (Skogen, 2001; Prokop and Kubiato, 2008; Prokop and Tunnicliffe, 2010). In a study of Prokop and Tunnicliffe (2010) it was found that children between the age 10-15, are more familiar with unpopular animals, but their attitudes towards them are more negative. Also, the study has shown that girls had more negative attitudes toward wolves compared to boys, which can be explained from an evolutionary perspective, where a lower physical condition/ability of females does not allow them to escape from a predator attack (Røskaft et al. 2003). On the other hand, some differences can also be contributed to social factors (in Prokop and Tunnicliffe, 2010, p. 32). In conclusion, these age groups should also be included, particularly if they are preparing for a profession, which could directly impact decision making regarding environmental issues – that being the case of our study sample.

A survey by Bjerke et al. (1998) has shown an education dependent increase and age dependent decrease of support of wolf conservation among people in wolf territories. Negative attitudes towards wolves may come from the fear of wolf attacks on humans. It is also a possible that negative attitudes toward large carnivores can be attributed to the influence of mass media. They publish stories about large carnivores, which attack and kill livestock (Røskaft et al., 2003) or even people (in: Røskaft et al., 2007). Kellert (1985) believes that people are reluctant to accept wolves due to the impact of fairy tales such as Little Red Riding Hood, The Three Little Pigs and Peter and the Wolf, where wolves appear as bloodthirsty animals.

Large carnivores are still viewed as a threat for certain interest group associations, particularly sheep and goat breeders. Even though the State reimburses the damages resulting from animal attacks, their negative views are still largely of an economic nature. Nevertheless, domestic livestock attacks by wolves and human wild animal hunting competitions are two key causes of the negative attitude increase towards wolves in addition to the killing of hunting dogs and the possibility of attacks on humans (Skogen, 2001).

1.1 Purpose of the study

During their career, students of Environmentalist study programme may be directly involved in organism conservation, including large carnivores. Consequently, they will make decisions with an impact on the populations of these organisms. Therefore, we designed an empirical study to determine students' attitudes toward and knowledge about wolves, to assess how their attitudes and knowledge differ according to schools' proximity to wolf habitats. In the study, respondents from two secondary vocational schools were included. One school is located in the area of occurrence of the wolf (WA), the other outside the area (OWA). The information gathered in the study directly relates to the Environmentalist study programme and can be beneficial in improvements to the design of the programme itself.

1.2 Research questions

For the present study, we defined three research questions.

R1: What is the level of students' knowledge about wolves and how they perceive them (attitudes)?

R2: Are there differences in attitude toward wolves between students who attend WA school and those who attend OWA school?

R3: Are there differences in knowledge about wolves between students who attend WA school and those who attend OWA school?

2 Materials and methods

2.1 Study sample

The sample of students surveyed was based on non-random sampling. For our study, two vocational high schools with the same education programme were selected, namely the School of Agriculture and biotechnical gymnasium Grm in Novo mesto and Biotechnical Centre in Naklo. The former is located in the wolf area (WA) and latter outside the wolf area (OWA). Students that were included in the study were a part of the Environmentalist study programme, which lasts for four years. In the school year 2015/2016, we included 184 students from both schools, 90 (48.9%) from WA and 94 (51.1%) from OWA. In total, 42 first, 44 second, 52 third and 46 fourth year students participated in the study

(22.8%, 23.9%, 28.3% and 25.0% respectively). According to gender, there were 84 (45.7%) male and 94 (51.1%) female students and 6 students who have not offer a response to this question. There were no statistically significant differences found for the following distributions: gender x school, school x grade, gender x grade (Chi^2 ; all $p < 0.05$).

2.2 Instrument

The questionnaire used for the empirical research consisted of three parts and was prepared at the Biotechnical Faculty in Ljubljana (Nagode, 2014) and also used in the project SloWolf (2016). The first part contained questions about the respondent's socio-demographics, from which we only include the school area as independent variable in this report. The second part of the questionnaire consisted of 21 attitude items. The items were on the 5-point Likert type scale (1 – strongly disagree to 5 – strongly agree) and were divided into several attitudinal groups examining interested, negative, conservation, and moralistic attitudes toward wolves. The items were grouped into individual categories based on a prior study (Nagode, 2014), where the validity and reliability of the questionnaire has already been validated. The third part of the questionnaire assessed the students' knowledge of wolves using 12 true/false statements and 9 multiple choice questions related to biology and wolf conservation.

2.3 Statistical analysis

Raw data, obtained from the questionnaires was inputted into the computer program Microsoft Office Excel and later transferred to the program SPSS. For comparing the students' knowledge and attitude according to school region and gender, basic descriptive and inference statistics were used. To compare differences in attitude between WA and OWA school the statistical test for two independent samples (Mann-Whitney U test) was used, with calculated effect sizes (formula: $r = z/\sqrt{N}$). The nonparametric test was used, as the data on some attitudinal items followed the non-Gaussian distribution. Chi^2 test was used to compare the frequency of students correct and wrong answers according to school region.

3 Results

Results are presented in two parts: the first part shows the student's knowledge about wolves and the second their attitudes towards wolves, both in relation to their school area.

3.1 Students' knowledge about wolves according to school location

The knowledge part of the questionnaire consisted of 12 true/false statements and 9 multiple choice questions. As shown in Table 1, the students' achievement was equal in the true/false part of the questionnaire. The differences emerged on the multiple choice questions, where students from OWA school showed more knowledge than their WA counterparts. This difference resulted in a difference of the total knowledge score, however with very low effect size (< 0.2). On average the students achieved less than 50% of the total score of 21 points.

Table 1: Students' knowledge score according to the school region

Knowledge	WA		OWA		Mann-Whitney		Effect size
	Mean	SE	Mean	SE	Z	p	
DN	5.8	0.239	6.3	0.254	-1.74	0.082	-0.13
IZ	3.7	0.155	4.0	0.139	-2.26	0.024	-0.17
TOTAL	9.5	0.331	10.4	0.346	-2.21	0.027	-0.16

Note: WA - wolf area school, OWA - school outside wolf area;
 DN - true/false statement; IZ - multiple choice question

Table 2 shows the students' answers for each individual question. For true/false statements, more than 50% of the students correctly answered half of the questions and on multiple choice questions, more than 50% of the students correctly answered only one third of the questions.

Table 2: Students knowledge about wolves according to school region

	ITEM	<i>f</i> wrong (%)		<i>f</i> correct (%)		Chi-square test	
		WA	OWA	WA	OWA	Chi ²	<i>p</i>
DN08	Wolf is an endangered species in Slovenia.	22	26	78	74	0.28	0.599
DN02	Wolves do not need to be hunted in order to protect people.	23	19	77	81	0.48	0.488
DN10	People can replace the ecological role of wolves in nature.	30	31	70	69	0.02	0.900
DN03	Hunting wolves is not an effective method for prevention of livestock predation.	37	24	63	76	3.23	0.072
DN07	Wolves are solitary animals.	37	31	63	69	0.70	0.404
DN12	Because of their high abundance in Slovenia, wolves attack farm animals.	37	30	63	70	0.98	0.322
DN01	Wolves are dangerous to people.	51	44	49	56	1.04	0.309
DN06	Wolf is not native to Slovenia.	51	46	49	54	0.53	0.467
DN05	Wolf predated the most healthy herbivores in nature.	78	72	22	28	0.73	0.395
DN11	Many wolf cubs die before being one year old.	78	71	22	29	1.02	0.312
DN04	In wolves urination does not depend on gender (as in dogs) but on social position.	81	79	19	21	0.16	0.686
DN09	Wolf walks or runs around 7 km per day.	93	94	7	6	0.01	0.938
IZ09	Encircle skull which is typical for carnivores.	8	10	92	90	0.19	0.665
IZ01	Wolves are classified in family of:	19	12	81	88	1.84	0.175
IZ06	Wolves live most of their lives:	33	21	67	79	3.38	0.066
IZ04	In Slovenia, wolves main pray represent:	67	51	33	49	4.62	0.032
IZ05	Wolf hunts especially:	70	63	30	37	1.08	0.299
IZ03	In Slovenia, average body mass of (male) wolf is between:	74	77	26	23	0.12	0.734
IZ02	In your opinion, how many wolves live in Slovenia?	82	77	18	23	0.89	0.346
IZ08	How many cubs do wolves have?	88	94	12	6	1.87	0.172
IZ07	Wolves mate:	93	93	7	7	0.04	0.836

Note: WA - wolf area school, OWA - school outside wolf area; DN - true/falls statement; IZ - multiple choice question; df = 1.

3.2 Students' attitudes toward wolves according to school location

Table 3 shows that students' attitudes did not significantly differ between schools. The only statistically significant difference was found on only one statement, "*I am afraid of wolves*" and even on that statement the effect size was small (0.19). Students of OWA school expressed less fear than students of WA school. All students expressed positive interest toward learning about wolves, were neutral in their negativistic perspective, held firm pro-conservation position about wolves, and were morally against mistreatment of animals. The only exception was on the statement "*I would ban any kind of hunting of wild game*" where they expressed a neutral attitude. The two excluded items were not placed within any category because the meaning of the items can place those items on two categories. But analysed separately, students stated that they would rather see a live animal than an animal model and do not believe that wolves are evil.

Table 3: Students attitudes toward wolves according to school region

ITEM	WA		OWA		ALL		Mann-Whitney U test		
	Mean	SE	Mean	SE	Mean	SE	Z	p	Effect size
INTEREST									
I would like to learn about different habitats of wolves.	3.8	0.10	3.9	0.10	3.9	0.07	-0.77	0.441	-0.06
I would like to know how wolves developed.	4.0	0.11	3.8	0.10	3.9	0.08	-1.16	0.245	-0.09
I like to read about wolves.	2.9	0.11	3.2	0.11	3.0	0.08	-1.59	0.112	-0.12
I like to watch popular science broadcasts about wolves.	3.4	0.12	3.4	0.11	3.4	0.08	-0.17	0.867	-0.01
NEGATIVISTIC									
I am afraid of wolves.	2.9	0.14	2.4	0.14	2.6	0.10	-2.58	0.010	-0.19
I would be afraid walking through the forest, if I knew that wolves live there.	2.8	0.13	2.7	0.13	2.7	0.09	-0.44	0.657	-0.03
I would camp only where there are no wolves.	3.0	0.12	3.1	0.12	3.0	0.08	-0.65	0.515	-0.05
I would accept the wolf presence in forests near my neighbourhood.	3.7	0.12	3.8	0.11	3.7	0.08	-0.65	0.513	-0.05
Wolves should not be near human settlements.	3.0	0.11	2.9	0.12	2.9	0.08	-0.70	0.483	-0.05
Wolves are not dangerous to human.	3.1	0.11	3.2	0.09	3.2	0.07	-1.44	0.150	-0.11
CONSERVATION									
There is no need to preserve wolves in Slovenia, because they live elsewhere in Europe.	1.3	0.07	1.4	0.09	1.3	0.06	-0.52	0.607	-0.04
All wolves should be exterminated.	1.3	0.08	1.2	0.08	1.3	0.06	-1.14	0.256	-0.08
In Slovenia, wolves should be preserved for future generations.	4.4	0.08	4.4	0.09	4.4	0.06	-0.20	0.844	-0.01
Wolves should have rights too.	4.4	0.09	4.3	0.09	4.3	0.07	-0.25	0.806	-0.02
In Slovenia, wolves' abundance should increase.	3.8	0.10	4.0	0.10	3.9	0.07	-1.48	0.139	-0.11
MORALISTIC									
It is cruel to keep wolves in captivity.	4.2	0.12	3.9	0.12	4.1	0.09	-1.96	0.050	-0.14
If all wolves would be killed in Slovenia, it would bother me.	4.4	0.11	4.6	0.09	4.5	0.07	-0.61	0.545	-0.04
Killing wolves for fun is cruel.	4.5	0.13	4.5	0.13	4.5	0.09	-0.74	0.457	-0.05
I would ban any kind of wild game hunting.	3.2	0.15	3.5	0.13	3.3	0.10	-1.10	0.273	-0.08
EXCLUDED ITEMS (MIXED MEANING)									
I would rather observe a model of the wolf than a live animal.	2.2	0.14	2.1	0.15	2.2	0.10	-0.66	0.510	-0.05
Wolves are evil by nature because they attack livestock (sheep).	2.4	0.11	2.4	0.11	2.4	0.08	-0.06	0.953	0.00

Note: SE - standard error; WA - wolf area school, OWA - school outside wolf area

4 Discussion

Results of our study have shown that students, regardless of the school region, hold positive attitudes toward wolves. On the other hand, we found that they lack the knowledge about these animals, as they achieved less than 50% of the total score on the knowledge part of the questionnaire.

Conservation literacy guidelines published by the Society for Conservation Biology (Trombulak et al., 2004) propose that conservation biology education should represent one of the most important goals for every society. They state that “*conservation education needs to occur at all levels in all societies so that humans can better learn to coexist with nature*” (p. 1187) and that conservation education programs should “*seek to develop in people a deeper understanding of the importance and tools of conservation biology*” (p. 1187). Finally, they note that “*education is most successful when it focuses on developing knowledge, skills, and attitudes in a way that gives people extended direct experience. Conservation biologists have a unique set of knowledge, skills, and concerns to share with others*” (p. 1189).

Positive attitudes reported by the answers of the students in this study can be considered as a good sign in the light of pro-environmental behaviour. Other surveys of environmental and wildlife groups also show an average of 69% support towards wolf conservation (Williams et al., 2002). Our study, conducted on the Environmentalist programme students in Slovenia, has shown an even higher support toward wolf conservation, with an average of 83%.

On the other hand, knowledge of students about wolves was not satisfactory, which could be solved with the inclusion of large carnivore related topics into their education programme. Particularly as large carnivores are the only large predators found in Slovenia and are an umbrella species, because of their key role in sustaining healthy ecosystems in which they live in (SloWolf, 2016). Understanding the biology of the animals is important, as positive attitudes alone do not always result in pro-environmental behaviour, which was confirmed for dolphins (Barney et al., 2005). This notion is especially important in the case of the examined study programme, that prepares young environmentalists to make professional decisions, which are not solely based on their attitude, but also on a firm conceptual understanding of the underlying biology and accompanying environmental issues. Furthermore, they must acquire skills on communicating modern socio-scientific issues to the general public, such as conservation of large carnivores, which also requires knowledge on conservation biology topics.

In their introduction, Chapron et al. (2014) examine the deeply rooted hostility towards large carnivores in human history and culture, which caused the historical reduction of large carnivore abundance and distribution. Conservation of large carnivores in present times intertwines with broader emotional, political, and socioeconomic issues. Additional problem of their conservation lies in their small pack size, coupled with their large spatial requirements, which is why the conservation needs to be planned and coordinated on a wide scale, not only within but also across national borders.

Our study did not show any significant differences in attitude and knowledge between the compared schools, while some other studies reported that attitudes toward conservation of wolves are often different if people live in the wolf area or not (Bjerke et al., 1998; Williams et al., 2002; Ericsson et al., 2003). Even more so - a positive association was shown between favourable attitudes towards wolf conservation and distance to the nearest wolf territory (Karlsson and Sjöström, 2007) and a negative association between rural residents (e.g. farmers) which hold more negative attitudes toward wolves (Chavez et al., 2005; Ericsson and Heberlein, 2003).

In this report we present the effect of only one independent variable (location) and is a preliminary report of the study that included several other variables, including gender, place of residence, school grade, additional vocational study programmes, and others. Nevertheless, these preliminary results show that, education must focus more on informing students about the biology and conservation of large carnivores regardless of the school area. This can be achieved within the regular biology instruction, such as a planned nature day, fieldwork activities or visiting the ZOO, where students can meet animal experts and live animals (Nagode and Tomažič, 2014).

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