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HOW LOCAL COMMUNITIES PERCEIVE CARPATHIAN RIVER VALLEYS PROTECTED BY NATURA 2000? – ECOSYSTEM SERVICES AND “HOME ADVISORS” APPROACH

**Jak społeczności lokalne postrzegają doliny rzek karpacckich chronione siecią Natura 2000? –
w świetle koncepcji usług ekosystemowych i metody doradców domowych**

Abstract: The introduction of the European Ecological Network Natura 2000 has been conflicting from the very beginning, leading often, both at the stage of the protected areas determining and plan of protective tasks developing, the opposition of local communities. The reasons for the conflicts are complex, both related to private ownership of land, misinformation about Natura 2000, lack of trust in nature management institutions as well as lack of knowledge and awareness regarding the advisability of introducing a new form of protection - Natura 2000.

The aim of this study was to analyse the perception of river valleys and the need to protect them by Natura 2000 Network (in the light of the ecosystem services concept) among local communities on the example of Carpathian rivers. The survey was conducted at the end of 2017 among 2221 residents from seven Natura 2000 sites covering river valleys in southern Poland using the “home advisor” method. The results show that the perception of protected Carpathian river valleys, as well as the perception of the ecosystem services performed by the river among local communities, are close to neutral. The function of the river as a fish source and recreational function are most perceived (by about 65% of respondents). The respondents' attitude towards the river is largely influenced by the flood problem. Half of the respondents heard about Natura 2000 Network and the vast majority of them (84%) consider the program necessary.

The research results can serve as a good practice for institutions dealing with nature management both in the studied areas and other Natura 2000 areas in Poland and in Europe.

Streszczenie: Wprowadzenie Europejskiej Sieci Ekologicznej Natura 2000 praktycznie od początku miało charakter konfliktowy, prowadząc często, zarówno na etapie wyznaczania poszczególnych terenów chronionych jak i opracowywania dla nich planów zadań ochronnych, do sprzeciwu lokalnych społeczności. Powody konfliktów były złożone, zarówno będąc związane z własnością prywatną gruntów, dezinformacją o Naturze 2000, brakiem zaufania do instytucji zarządzających ochroną przyrody jak również brakiem wiedzy i świadomości odnośnie celowości wprowadzenia nowej formy ochrony – Natura 2000.

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Celem niniejszej pracy jest analiza postrzegania dolin rzecznych i konieczności ich ochrony na obszarach Natura 2000 (w świetle koncepcji usług ekosystemowych) przez społeczności lokalne na przykładzie rzek karpackich. Badania ankietowe przeprowadzono w końcu 2017 r. wśród 2221 mieszkańców siedmiu obszarów naturalnych obejmujących doliny rzek w południowej części Polski przy użyciu metody „doradców domowych”. Wyniki pokazują, że percepcja chronionych dolin rzek karpackich jak również postrzeganie pełnionych przez rzekę usług ekosystemowych wśród społeczności lokalnych jest bliska neutralnej. Najbardziej dostrzegana jest funkcja rzeki jako źródła ryb i usługa rekreacyjna (przez około 65% respondentów). Na nastawienie respondentów do rzeki w dużej mierze wpływa problem powodzi. Wiedzę o programie Natura 2000 wykazuje połowa respondentów, a zdecydowana większość z nich (84%) uważa program za potrzebny.

Wyniki badań mogą służyć jako dobra praktyka dla instytucji zajmujących się zarządzaniem przyrodą zarówno na terenie badawczym, jak i innych obszarach Natura 2000 w Polsce i w Europie.

Key words: Natura 2000, local communities, the Carpathian river valleys, ecosystem services, environmental awareness, the method of “home advisors”.

Słowa kluczowe: Natura 2000, społeczności lokalne, doliny rzek karpackich, usługi ekosystemowe, świadomość ekologiczna, metoda „doradców domowych”.

INTRODUCTION

Protected areas (PA) are the fundamental building blocks of global conservation strategies. The establishment of PA aim to protect biodiversity and maintain key ecological processes and ecosystem services (Dudley 2008; Blicharska, Hilding-Rydevik 2018; Garcia-Lorenta 2018). Over the past decades, these goals have been expanded covering also well-being of residents (Naughton-Treves et al. 2005). This cannot be completed without a broad engagement of various stakeholder groups, including local residents, which is essential to ensure sustainable development in the protected areas (Lauber et al. 2008).

The European Ecological Network Natura 2000 (N2000), a considerable new PA form, combines biological, societal and economic perspectives. The general assumption of the Ecological Network is to reconcile the objectives of biodiversity conservation with sustainable development. The N2000 is, therefore, a complex social-ecological network in which site-specific conservation targets can only be achieved when integrated and harmonized with local social desires (Mikulcak et al. 2013).

Despite N2000 sites has been introduced in the EU-15 countries over the last 27 years or so, and for about 15 years in Poland, the problem of appropriate network management still exists. This became a source of nature-people conflicts like controversy and lack of acceptance of the Ecological Network regulations, mainly by the local governments and local communities (Grodzińska-Jurczak, Cent 2011a; Głogowska et al. 2013; Redpath et al. 2013; Iojă et al. 2016). When analysing conservation conflicts, not just managerial or behavioural determinants should be considered but a broader interdisciplinary approach is to be taken into account (Baynham-Herd et al. 2018; Rechciński et al. 2019).

The Carpathian river valleys covered by the N2000 serve as an example of the described situation. Among the many reasons are attitudes and actions of local residents such as the flood protection in the form of hydro-technical installations, gravel collection and the riverbed destruction with mechanical equipment, as well as the municipal wastewater discharge and garbage disposal (information achieved from the interviewed respondents, and analysis of Plan of protective tasks for the Natura 2000 sites Biała Tarnowska, Czarna Orawa, Dolna Soła, Jasiołka, Łososina and Rzeka San, not publicly available). The mentioned problems are the source of conflicts of conservational goals,

i.e. maintaining the proper conservation status of species and habitats, and the economic and social needs of local residents (Grodzińska-Jurczak, Cent, 2011a; Pietrzyk-Kaszyńska et al. 2012; Warchalska-Troll 2018).

The natural environment of rivers and riverside areas is characterised by one of the highest biodiversity in the world, and the river valleys play an important role of ecological corridors (Nieznański 2003; Addy et al. 2016). Healthy, natural freshwater ecosystems are not only a natural value, but also play a role of the drinking water source, reducing floods and drought through natural retention, and increasing the tourist attractiveness of the region (Böck et al. 2015).

The above described "multi-functionality" of river valleys, as other conservation issues (e.g. biodiversity), has been increasingly taken into account in the concept of ecosystem services (ES) providing a new, anthropocentric justification for conserving species and ecosystems, based on our dependence on the goods and services they provide (Lamarque et al. 2011).

Although it is not a new approach, ES is still challenging a fully consistent theoretical classification and reliable identification (Díaz et al. 2018), not to mention appropriate tools to effectively implement concept into the conservation practices (e.g. communicating ecosystem conservation needs to diverse stakeholder groups) (Armsworth et al. 2007; Böck et al. 2015; Reid et al. 2006; Haines-Young, Potschin 2018). The so far most commonly used ES framework (the ES cascade) still lacks consistency while implemented in applied science (Potschin-Young et al. 2018), practically assessing not a particular ES and its stage in the cascade, which significantly depends on the ES category (Boerema et al. 2017). Eventually, evolving ES concept from currently heavily criticised monetary valuation understanding (Redford, Adams 2009) to recently proposed a social-ecological system perspective (Díaz et al. 2018) resulted in developing Common International Classification of Ecosystem Services (CICES) system (Haines-Young, Potschin 2013). Although theoretically well-constructed, CICES again has not proven as an applied worth tool, having been criticized as inconvenient by various local level stakeholders (Potschin, Haines-Young 2016). It is even more challenging, as the production of a particular ES needs to be assessed from a broad perspective. It is not that an ES is produced just by an ecosystem, various interactions mainly of human-nature (ecosystem) origin (e.g. economic, technical, institutional) affect its' generation (Palomo et al. 2016).

Despite the fact that ES concept has been applied in various case studies, testing a broader spectrum of environmental issues (e.g. river protection) (Brown, Fagerholm 2015) is required. A local-level insight and a careful consideration of characteristics of both environmental and social context for which the ES approach is applied seems to be of particular interest. Methodologically investigating ES perception is rather challenging (Brown et al. 2015), in a considerably high number of studies rather a social science (e.g. interviews, focus groups, and questionnaires) than purely ecological methodologies seemed to prove more effectively (Jacobs et al. 2018; Wartmann, Purves 2018).

"Home advisors" communication method involves visiting local residents by volunteers (usually, trained youth) to provide information materials, promote ecological attitudes and conduct a short survey on the attitudes and behaviour of residents. The communicative nature and high efficiency of the "home advisors" method (Grodzińska-Jurczak et al. 2003; Grodzińska-Jurczak et al. 2006; Grodzińska-Jurczak 2018) indicate that it can also be used to achieve success in the implementation and management of the Ecological Network Natura 2000. Information about stakeholder's perception N2000 and ecosystem services could be helpful in evaluating outcomes of PA management (Webb 2004) and preparation of recommendations for its improvement (Ciocănea 2016).

The main aim of this study was to analyse the perception of Carpathian river valleys ecosystems and their protection by Natura 2000 among local communities using the “home advisors” method. Specifically, the objective was to assess the perception of protected river valleys and ES provided by them among local stakeholders and to evaluate awareness and attitudes of inhabitants of Polish Carpathians to N2000.

METHODS

The study focused on seven river valleys covered by Natura 2000 sites, which protect habitats and species associated with mountain rivers: Dolna Soła, Czarna Orawa, Łososina, Biała Tarnowska, Wisłoka z Dopływami, Jasiołka and Rzeka San (Fig. 1).



Figure 1. Natura 2000 sites performed in the following study
Rycina 1. Obszary Natura 2000 przedstawione w danym badaniu

Source: author's own elaboration.

Źródło: opracowanie własne.

The perception of Carpathian river valleys by local communities, their perception of ES and awareness on N2000 network and the need to protect nature by its implementation among residents were explored by using the method of "home advisors". Activities started in September 2017 from conducting 2-days training for students in the age of 12-16 in the municipalities situated near the selected Natura 2000 sites (Tuchów, Jabłonka, Raba Wyżna, Kęty, Chorkówka, Dukla, Jedlicze, Tarnowiec, Tymbark, Dubiecko, Fredropol, Krasieczyn, Krzywca, Medyka, Przemyśl, Żurawic, Biecz, Brzostek, Brzyska, Czarna, Dębowiec, Dębica, Jasło, Jodłowa, Kołaczyce, Krempna, Nowy Żmigród, Osiek Jasielski, Pilzno, Sękowa, Skołyszyn, Szerzyny, Żyraków). Youth were recruited through school authorities and teachers.

During the training, the students learned about the protection of N2000 sites, anthropogenic threats to nature conservation, benefits from preserving the natural condition of mountain rivers and were prepared for interviewing people. Then, each trained student conducted about 10 surveys

among residents of studied sites. No selection of homesteads was used, the students could go to friends or neighbours. The limitation was to conduct only one survey in one household.

The questionnaire contained 10 questions (Q), including three metrics (age, education, gender) and seven questions related to the environmental awareness of respondents (questionnaire with the answers is presented below). Respondents answered questions via "advisor", keeping their anonymity, after introduction and explanation of the surveys' purpose.

Respondents from different age ranges (from 18 to more than 60 years old) took part in the survey. Most of them have secondary level of education (from 58% in Czarna Orawa Natura 2000 site to 64% in Wisłoka z dopływami site), around ¼ has higher level of education (from 17% in Czarna Orawa site to 34% in Łososina site), and the rest – basic (from 7% in Dolna Soła site to 25% in Czarna Orawa site). Women were prevalent among respondents in all studied areas (from 54% in Biała Tarnowska and Rzeka San Natura 2000 sites to 69% in Wisłoka z dopływami site).

Answers were coded and entered into the electronic database. Data analysis was carried out using Microsoft Excel and SPSS Statistics 24.0.

RESULTS

In total 221 students played a role of "home advisors". They conducted questionnaire with 2221 inhabitants of selected Natura 2000 sites. The number of respondents from particular sites ranged from 258 to 417. Respondents were representative in terms of age, sex and education and correspond to the demographic structure in the analysed region of Poland (stat.gov.pl, 19.03.2019). Answers to the questionnaire for all studied N2000 sites are presented in table 1.

Table 1. Results of the questionnaire about Carpathian river valleys [%]

Tabela 1. Wyniki ankiety o dolinach rzek karpaccich [%]

Q1. Please indicate what the river valley is associated with?								
	BT	Ł	WD	RS	CR	J	DS	All
respect for nature	65,6	71,0	84,8	74,3	84,4	77,3	78,9	65,6
beauty	58,2	74,4	84,9	77,8	87,6	78,8	80,5	58,2
relaxation	48,2	70,4	71,8	74,9	83,5	78,0	89,9	48,2
security	24,1	47,1	24,9	30,1	44,9	36,8	36,6	24,1
danger	69,0	44,0	64,7	61,7	48,6	54,8	58,8	69,0
communication and/or transport problem	38,4	31,5	34,0	34,4	31,5	33,1	22,4	38,4
dirt	71,9	56,3	58,0	67,5	39,4	62,1	47,6	71,9
bad odour	38,6	36,7	37,4	50,1	29,4	43,3	24,1	38,6
the river is indifferent to me	30,8	25,1	16,8	21,5	12,6	21,8	8,3	30,8
Q2. For what purpose/purposes do you come to the river valley?								
	BT	Ł	WD	RS	CR	J	DS	All
rest	39,5	69,8	73,7	75,4	85,6	78,1	84,4	39,5
meetings	27,8	47,8	41,6	57,9	59,2	42,1	49,4	27,8
stroll	56,9	65,3	79,6	73,5	75,0	73,2	87,9	56,9
sport	21,4	37,3	37,9	40,7	44,5	45,5	41,7	21,4
picnic, fireplace, grill	29,9	40,4	33,6	48,0	52,6	41,9	52,8	29,9
participation in a cultural event	15,6	15,4	18,6	30,4	24,2	25,6	15,7	15,6
fishing	36,2	27,4	29,0	42,2	32,2	32,7	19,2	36,2
another purpose	26,1	37,6	30,3	34,8	39,0	27,1	35,6	26,1
I do not go to the river at all	20,4	10,1	7,4	4,3	2,6	7,1	5,1	20,4

Table 1. Continued from page 185

Tabela 1. Ciąg dalszy ze strony 185

Q3. Please indicate how much you agree with the opinion that the river valley perform the listed functions.								
	BT	Ł	WD	RS	CR	J	DS	All
recreational								
Definitely YES	12,5	16,4	18,3	20,7	23,3	25,2	36,8	21,6
Rather YES	27,5	39,9	43,0	39,2	46,6	42,1	52,3	41,5
Rather NOT	28,9	19,0	23,3	19,5	13,5	14,7	6,6	18,3
Definitely NOT	23,6	13,1	9,5	13,5	10,6	8,3	2,7	11,7
I do not know	7,5	11,6	5,8	7,2	6,0	9,8	1,6	7,0
educational								
Definitely YES	10,0	10,0	12,8	13,8	17,9	17,8	19,0	14,4
Rather YES	26,5	42,0	36,8	28,8	39,3	34,5	48,8	36,2
Rather NOT	31,9	24,9	30,4	32,2	25,4	26,9	22,5	28,1
Definitely NOT	18,6	13,4	8,8	14,5	9,0	11,4	2,7	11,3
I do not know	12,9	9,7	11,2	10,7	8,4	9,5	7,0	10,0
transport								
Definitely YES	4,0	6,3	4,3	9,5	4,9	5,6	3,1	5,6
Rather YES	8,0	14,9	6,7	25,8	17,2	10,8	13,6	14,4
Rather NOT	37,0	33,2	44,4	33,3	37,1	34,3	37,6	36,9
Definitely NOT	40,6	35,1	34,0	21,9	32,2	40,7	32,2	33,0
I do not know	10,5	10,4	10,7	9,5	8,6	8,6	13,6	10,2
energy production								
Definitely YES	5,0	7,1	4,3	15,9	7,8	7,9	23,6	10,1
Rather YES	14,7	15,4	16,8	28,0	15,5	12,4	31,4	19,4
Rather NOT	28,4	30,0	26,9	23,9	30,7	27,4	21,3	26,9
Definitely NOT	28,4	30,7	33,5	15,0	36,2	30,8	8,9	26,3
I do not know	23,4	16,9	18,6	17,1	9,8	21,4	14,7	17,2
source of drinking water								
Definitely YES	29,4	9,3	16,6	18,0	12,7	26,4	18,7	18,4
Rather YES	22,2	22,7	19,6	22,8	15,3	24,2	22,6	21,1
Rather NOT	16,1	24,2	19,3	19,2	33,1	21,1	28,8	23,0
Definitely NOT	21,1	30,1	33,5	27,7	29,7	18,9	23,3	26,9
I do not know	11,1	13,8	11,0	12,4	9,2	9,4	6,6	10,6
mitigating the drought								
Definitely YES	15,2	17,5	17,5	21,2	32,5	24,4	35,0	23,1
Rather YES	32,5	32,0	35,5	34,7	38,0	37,2	35,8	35,2
Rather NOT	19,9	22,3	17,5	17,8	15,7	15,0	14,8	17,5
Definitely NOT	10,8	8,2	10,9	8,0	7,2	12,0	4,7	8,8
I do not know	21,7	20,1	18,6	18,3	6,7	11,3	9,7	15,3
mitigation of floods								
Definitely YES	3,6	12,7	8,8	11,0	14,8	12,9	21,8	12,0
Rather YES	20,4	18,4	24,7	24,4	34,8	22,7	30,4	25,4
Rather NOT	23,7	34,1	31,6	26,2	27,0	23,5	23,7	27,3
Definitely NOT	31,2	11,6	16,0	15,4	12,5	20,5	14,0	17,0
I do not know	21,1	23,2	18,9	23,0	11,0	20,5	10,1	18,4
soil fertilization								
Definitely YES	19,1	12,2	17,4	20,1	19,3	19,9	24,1	18,9
Rather YES	38,6	41,2	36,7	37,1	41,2	40,6	31,1	38,1
Rather NOT	15,5	19,8	19,8	14,7	19,6	18,0	21,0	18,2
Definitely NOT	11,6	7,6	7,2	9,8	10,5	9,8	7,0	9,1
I do not know	15,2	19,1	18,8	18,2	9,4	11,7	16,7	15,7

Table 1. Continued from page 186

Tabela 1. Ciąg dalszy ze strony 186

water purification								
Definitely YES	10,4	8,6	8,6	10,3	13,6	17,3	11,0	11,3
Rather YES	24,0	17,9	23,8	20,6	27,2	22,9	34,3	24,1
Rather NOT	28,0	30,6	30,2	26,0	27,5	20,7	22,8	26,7
Definitely NOT	13,6	14,2	9,1	12,5	11,8	12,8	7,9	11,7
I do not know	24,0	28,7	28,3	30,6	19,9	26,3	24,0	26,2
air purification								
Definitely YES	6,9	6,8	12,8	8,8	14,5	22,0	14,0	12,1
Rather YES	16,4	18,2	26,1	24,2	34,6	28,8	29,1	25,6
Rather NOT	30,5	27,3	23,9	19,1	23,8	17,4	21,7	23,2
Definitely NOT	18,9	18,6	10,6	10,8	6,7	10,6	8,5	11,8
I do not know	27,3	29,2	26,6	37,2	20,3	21,2	26,7	27,4
source of fish								
Definitely YES	26,0	22,9	25,5	43,8	27,1	36,7	34,5	31,4
Rather YES	34,7	36,8	43,3	31,0	37,9	39,3	35,7	36,9
Rather NOT	14,1	18,8	14,5	8,5	18,4	9,0	17,4	14,1
Definitely NOT	12,3	12,0	8,6	4,8	10,8	5,6	3,9	8,2
I do not know	13,0	9,4	8,1	11,9	5,8	9,4	8,5	9,4
protection of biodiversity								
Definitely YES	16,8	10,5	25,3	21,6	23,3	28,5	31,1	22,5
Rather YES	30,5	34,8	39,1	22,1	35,7	29,6	38,5	32,5
Rather NOT	13,6	20,2	11,2	12,5	10,1	7,1	7,8	11,8
Definitely NOT	6,8	5,6	4,3	7,0	4,6	5,2	1,6	5,1
I do not know	32,3	28,8	20,2	36,8	26,2	29,6	21,0	28,1
Q4. Have you heard about Natura 2000?								
	BT	L	WD	RS	CR	J	DS	All
YES	37	44	59	41	58	49	53	49
NO	63	56	41	59	42	51	47	51
Q5. If so: Do you think that it is needed or unnecessary?								
	BT	L	WD	RS	CR	J	DS	All
Necessary	60	38	52	54	47	69	72	55
Rather necessary	25	35	29	29	37	21	20	29
Rather unnecessary	4	8	4	5	5	3	2	4
Unnecessary	2	12	4	5	1	2	1	4
I have no opinion	10	8	11	7	10	4	6	8
Q6. Did you observed (in the last year) that someone around you:								
	BT	L	WD	RS	CR	J	DS	All
drained the sewage into the river								
Many times	9,3	11,6	9,9	12,0	9,9	6,3	1,9	9,0
Several times	12,9	17,6	15,2	12,7	9,0	2,2	5,8	11,1
Once	6,1	13,9	7,2	10,7	6,1	9,3	4,7	8,3
Never	71,7	56,9	67,7	64,6	75,1	82,1	87,5	71,6
was throwing waste to the river								
Many times	8,3	16,9	13,6	11,0	11,3	7,5	8,6	11,1
Several times	18,3	20,6	16,8	22,5	24,3	12,4	14,8	18,9
Once	13,3	10,9	15,2	17,8	11,8	12,4	7,8	13,2
Never	60,1	51,7	54,4	48,7	52,6	67,8	68,9	56,8
was fishing with electricity								
Many times	2,5	5,2	1,6	5,7	4,9	1,9	0,0	3,3
Several times	2,2	3,0	1,9	7,1	5,5	3,0	2,3	3,8

Table 1. Continued from page 187

Tabela 1. Ciąg dalszy ze strony 187

Once	7,9	9,0	3,2	8,8	8,7	6,0	5,4	7,0
Never	87,5	82,8	93,3	78,4	80,9	89,1	92,2	85,9
took gravel from the river								
Many times	7,6	11,7	7,5	13,7	7,0	6,7	1,2	8,2
Several times	10,1	15,5	10,4	16,9	16,2	9,0	8,6	12,7
Once	13,7	15,2	9,6	14,2	17,4	9,3	8,9	12,8
Never	68,7	57,6	72,5	55,3	59,4	75,0	81,3	66,3
rode a heavy machine or quad on the river								
Many times	6,8	19,5	11,3	13,1	25,8	9,8	6,6	13,6
Several times	7,5	27,3	13,1	14,3	24,6	15,8	15,6	16,8
Once	9,0	11,2	11,0	14,3	15,1	13,9	10,9	12,4
Never	76,7	41,9	64,6	58,4	34,5	60,5	66,9	57,3
collected the garbage encountered on the river								
Many times	4,3	9,4	8,3	14,7	5,2	4,1	5,4	7,8
Several times	14,7	22,1	16,8	22,2	18,8	17,9	29,6	20,1
Once	16,5	16,1	16,0	20,8	16,2	14,9	19,8	17,3
Never	64,5	52,4	58,9	42,3	59,7	63,1	45,1	54,8
report noticed environmental threats								
Many times	2,5	scie2	2,9	4,4	3,5	1,5	1,2	3,0
Several times	4,7	7,5	6,1	7,8	7,5	3,0	3,9	6,0
Once	10,0	10,1	6,9	14,6	9,8	9,7	11,3	10,5
Never	82,8	77,9	84,0	73,2	79,2	85,8	83,6	80,5
Q7. Which opinion do you prefer more?								
	BT	Ł	WD	RS	CR	J	DS	All
The rivers should be fully regulated and the banks permanently reinforced, regardless of the costs	45	39,6	57,6	41,1	58,4	46,6	44,4	48
Rivers should not be regulated and the banks strengthened, except for the protection of roads and buildings	26,3	37,3	26,7	28,7	25	32,8	39,3	30,3
I have no opinion	28,8	23,1	15,7	30,2	16,6	20,5	16,3	21,8
Q8. Age range:								
	BT	Ł	WD	RS	CR	J	DS	All
18-29	24,4	18,7	13,9	23,8	21,7	14,2	17,5	19,3
30-39	24,4	28,4	28,5	21,6	24,9	25,5	20,6	24,8
40-49	25,8	26,5	30,4	24,5	27,0	25,1	30,0	27,0
50-59	14,3	16,8	13,3	14,6	12,5	15,4	15,6	14,5
60+	11,1	9,7	13,9	15,5	13,9	19,9	16,3	14,3
Q9. Level of education:								
	BT	Ł	WD	RS	CR	J	DS	All
basic	13,0	7,5	12,3	10,1	25,4	12,4	7,4	12,9
secondary	59,1	58,6	63,5	61,2	58,1	60,3	61,6	60,4
higher	27,9	34,0	24,3	28,7	16,5	27,3	31,0	26,7
Q10. Sex								
	BT	Ł	WD	RS	CR	J	DS	All
woman	53,6	57,8	68,6	54,0	64,5	63,8	62,4	60,7
man	46,4	42,2	31,4	46,0	35,5	36,2	37,6	39,3

Note: names of the Natura 2000 sites in the table: BT – Biała Tarnowska, Ł – Łososina, WD – Wisłoka z dopływami, RS – Rzeka San, CO – Czarna Orawa, J – Jasiołka, DS – Dolna Soła, All – All studied Natura 2000 sites

Source: author's own elaboration.

Źródło: opracowanie własne.

The results of the survey show that respondents associate river valley with beauty, respect for nature and relaxation (more than 70% of respondents). Among the frequently chosen associations (almost 60%) there are also dirt and danger, which indicates the existing problem of littering river valleys and flood hazard. In contrast, "security" was mentioned by 34% of respondents. For approximately 1/3 of respondents, the river valley is associated with the problem of bad odour or communication problems. For almost 1/5 of the respondents, the river valley is indifferent.

Most often, the inhabitants of selected N2000 sites use the river valley as a place for stroll and rest (more than 70%). Furthermore, river valley is a place for social gatherings like meetings (47%), picnics, bonfires or grilling (43%) and doing sports (39%). The less frequently indicated goals of coming to the river were fishing, participation in cultural events and another purpose. Relatively few people do not visit the river at all (8%).

Residents from the analysed PA mostly agree with the function of the river as the source of fish and recreational function (around 65% of respondents), the function of biodiversity protection, mitigating the drought and soil fertilization (around 55%), educational function (51%). Less frequently perceived ES of the river valley are the air and water purification, flood mitigation function and the function of drinking water source (around 40%), energy production (30%) and transport function (20%). Role of the river valley in the air and water purification, as well as biodiversity protection cause the greatest uncertainty: almost 30% of respondents chose the answer "I do not know".

According to the collected data, 49% of respondents were familiar with the Natura 2000 Ecological Network and the vast majority of them consider it necessary (55%) or rather necessary (29%). Only 8% of respondents consider it unnecessary and the same number has no opinion on this topic.

The answers to the Q6 show that the most frequently noticed environmental threat is disposing of waste to the river and ride a heavy machine or quad on the river (more than 40%), which connected with the collection of gravel (34%). Draining the sewage into the river and fishing with electricity was less frequently mentioned by local residents: 28% and 14%, respectively. But activities that help protect nature of the Carpathian river valleys are also taking place: a collection of garbage encountered on the river was observed by 45% of respondents and 1/5 of respondents know people who reported noticed environmental threats or did it personally.

Almost half of the respondents support full regulation of the rivers and 30% for leaving the natural course of the Carpathian rivers. The rest (22%) - have no opinion on this topic.

The results of the analysis show that awareness about the Natura 2000 program correlates very poorly with the education of the respondents (Cramér's $V = 0.12$), as well as the perception of the need for its implementation (Spearman's $\rho = 0.12$).

DISCUSSION

Perception of protected Carpathian river valleys by local communities

Environmental socio-psychological studies have found that attitudes are important determinants of environmentally oriented behaviour (Glasman, Albarracin 2006). There are many examples from around the world of an effect of social values changing on the water resources management (Per-ring 2015; Brummer et al. 2017). Such subjective parameters, such as opinions and perceptions of the river valley among local residents are widely used in assessing river restoration success both

with objective parameters, such as hydromorphological changes and changes in fish and benthic invertebrate assemblages (Jähnig et al. 2011; Chen et al. 2016).

The analysis shows that the perception of the Carpathian river valleys by local communities is rather neutral. The "Biała Tarnowska" site stands out in these terms because of the predominance of negative associations connected with the Biała river valley, low perception of its ecosystem services and low level of awareness about the Natura 2000 program among the local community. At the same time, a relatively large part of the local community of this area shows some ignorance of the natural values of the Biała River: for almost 30% of the population the river valley is indifferent, and 20% does not go to the river at all. Most likely, this is related to the high level of the river valley littering - 70% of respondents associated the river with "dirt". This is explained in the Plan of protective tasks for the N2000 site "Biała Tarnowska" where significant littering of the area is highlighted, which is not only the result of direct actions of local residents, but the rubbish is carried out also from the upper part of the river valley. This fact indicates the need for ecological education and other actions aimed at preserving or improving the quality of the natural environment not only in the protected area but along the whole river basin. A similar system of integrated management is the basis of the Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council).

The flood problem, characteristic for many Carpathian rivers, influences the attitude of the local communities to the river valleys. "Danger" as an association with the river was indicated by respondents about 20% more often than "safety", the total regulation of the river is supported by 48% of respondents. Flood monitoring is already carried out for the majority of the Carpathian rivers (monitoring.prospect.pl, 03.03.2019). However, the best protection is risk prevention by identifying the areas of potential floods (Nieznański 2003) and education of local residents about modern methods of protection against floods.

In spite of placing river valleys under protection, activities threatening nature are still observed by the inhabitants of the studied areas (e.g. illegal collection of gravel from the river, waste dumping or ejection of sewage into the river, fishing with electricity). At the same time, cases of reporting noticed environmental threats are also often taking place among residents. It shows that the main part of local communities living near protected areas do not ignore the potentially destructive actions of others and are interested in maintaining the quality of rivers ecosystems.

Perception of ecosystem services

The usual way to assign a value of ecosystem services is based on ecological and economic assessments (Costanza et al. 1997). However, those assessments do not take into account the values of people living in an area (Fagerholm et al. 2012). This is fundamental as people are ecosystem service users, thus ecosystem services and their changes must be assessed both objectively and subjectively, since the value of a service arises only when humans appreciate or benefit from it (Aretano et al. 2013; Costanza et al. 2017).

Referring to the water resources, the assessment of the ES perception by local communities is used, for example, during planning river restoration (Petursdottir et al. 2013; Perring 2015). Research has shown that projects which involve increasing of the ecosystem services that are most appreciated by people are more likely to receive public support (Golet 2006).

It is worth noting that the perception of ecosystem services does not depend on the awareness of the beneficiaries (Böck et al. 2015). So even respondents who are not well informed about the

concept of ES are able to sufficiently evaluate them. This, in turn, allows acceptance of the data obtained in this study as a real reflection of the respondents' opinions on the subject.

Among the N2000 sites included in this study, the "Dolna Soła" area stands out the most in terms of the perception of some ecosystem services. Recreational service is highly valued by residents (89% of respondents agree with this function of the river valley). This area completely overlaps with another bird area called "Dolina Dolnej Soły" and the Soła River is recognised as the biggest natural and landscape asset of the region. The acceptance of the river's role in energy production among inhabitants from the "Dolna Soła" is also extremely high (55%). This is due to the presence of three hydroelectric plants on the Soła cascade (Jaguś 2018).

In general, however, the perception of ES among the inhabitants of the studied N2000 sites is relatively low. Partially it could be justified by the fact that individuals do not possess perfect information or appropriate processing abilities about the relationship between ES and their wellbeing (Kahneman 2011; Fioramonti 2014). This points out the need to raise the awareness of residents about the benefits of preserving the natural character of mountain rivers because the way they use the environment greatly affects the state of ecosystems and often reduces their potential. Loss of functions provided by natural ecosystems in the long-term may have a negative impact on human well-being (Hewelke, Graczyk 2016).

Awareness of Natura 2000

In most EU member countries the N2000 areas have been designated practically exclusively on the basis of environmental criteria, without taking into account social or economic factors (Luzar-Błaż et al. 2017).

Research shows that the most problems related to the implementation of the Ecological Network in Poland result from due to lack of awareness and information about functioning principles of the Ecological Network (Głogowska et al. 2013; Cent et al. 2015).

In Poland, nature conservation governance can be improved, among other things, by ensuring the involvement of a wide range of stakeholders in the decision-making process. On certain examples from the UE-15 countries, owing to the public participation approach, conflicts that mainly occur in initial phases of the Natura2000 implementation were reduced or altogether resolved and the programme's image among various social and occupational groups was markedly improved (Cent et al. 2014). But not all problems can be solved with the participation of the community due to the lack of appropriate competence and knowledge of potential participants in the process, and a natural conflict of interests between the assumed objectives of nature protection and the economic interests of individual people, e.g. land owners (Grodzińska-Jurczak, Cent 2011b).

In the last 10 years, the awareness of N2000 areas in Poland has increased, but the results depend on the place where the research was conducted, as well as the profession and education of the respondents (Pietrzyk-Kaszyńska et al. 2012; Kachaniak et al. 2014; Perepeczko 2012). According to the results of the present study, about 50% of the respondents living near the protected Carpathian rivers heard about N2000. Although, such a level of awareness is still insufficient for the efficient operation of the Program. This indicates a strong need to raise the environmental awareness of local residents and to change their attitudes towards protected areas.

However, according to several studies conducted in Poland (Pietrzyk-Kaszyńska et al. 2012; Głogowska et al. 2013; Cent et al. 2015; Chmielewski, Głogowska 2015; Luzar-Błaż et al. 2017), the greater part of local societies see the positive impact of the functioning of the Ecological Net-

work on the protection of local nature and the real potential of the program for combining conservation activities with local development. Comparing to this study, 84% of respondents being aware of N2000 consider the Program to be necessary or rather necessary.

Improvement in the attitude to the Ecological Network is not accidental. The economic analysis shows that rural areas with the N2000 network areas do not differ from other areas in terms of the level of socio-economic development, and in some cases show even better results. Therefore, the presence of Natura 2000 areas does not pose any threat to the economy and development of communities, but only modifies the way of preparing and implementing the investment (Gutowska 2015; Cieślak et al. 2015).

CONCLUSIONS

This study is an example of using a new approach (“home advisor” method) in the assessment of the local community’s perception of protected areas. The used method involves youth and gets them closer to local environmental problems. Moreover, properly constructed questionnaire allows not only get the information about the respondent’s opinion but affects the residents’ awareness and attitudes to the issue.

Attention to the ES concept will improve everyday decision making, particularly important at the local level, by encouraging consideration of both the needs and priorities of ES beneficiaries and of the ecosystem structures, processes and functions that support ES.

The results of the questionnaire about Carpathian river valleys also give information about existing environmental problems (destructive for nature activities of local inhabitants), possible reasons for such situation (limited knowledge about Natura 2000 Programme assumptions and low ecosystem services awareness). Information provided by the study could be helpful for organizations involved in environmental management and protection (ex. to evaluate outcomes of protected areas management and prepare recommendations for its improvement).

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