NATURAL RESOURCES AND THEIR IMPACT ON THE DEVELOPMENT OF SERBIA[1]

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Abstract

The paper describes in detail the characteristics and significance of three Special Nature Reserve (SNR) in Serbia: Zasavica, Uvac and Stari Begej – Carska Bara. In particular, it is emphasized the natural resources of each of the reserves, as well as their importance and significance in the development of Serbia. For the purposes of this research, it was carried out surveys of the population and visitors in all three areas of the SNR. The subject of our research, protected natural resources and values, and their impact on the development of Serbia were observed in terms of the relationship of economy and ecology. The principal aim was to identify the value attitudes of the population and visitors in relation to the protection and special values that are located within protected natural areas. The paper presents the results of the comparative analysis of the population and visitors surveys for these three SNR. Our results pointed out the key problems faced by the SNR in Serbia during the conservation of the natural resources values, their protection, management, and projection of their future. The key investigative findings of our study are related to the fact that natural resources, located within the three reserves, are so important, that it «cannot be expressed in money», that the states needs to fund the reserve survival, and finally that privatisation or sale of any of these SNRs should not be carried out.

Key words: *Natural Resources, Zasavica, Uvac, Stari Begej - Carska Bara, Value of Natural Resources.*

INTRODUCTION

One of the most important questions of economic theory refers to the problem of the theory of value. Thus, the classical economic theory (Ricardo, 1817, and Marx, 1867) in the focus of their attention and explanation posed questions on production costs and the labour theory of value. By classical economic theory, the value is built from factors of production: natural resources, labour and capital creation. In contrast, the neoclassical school of economics (Marshall, 1890, and Pareto, 1896) commence at the premises that nothing material, or substantial there is in the notion of value, but the emphasis is placed on the subjective aspects of the producers and consumers behaviour on the market. The value is simply derived from the individual's subjective attitude towards the subject, attributing it a value that is measured and expresses in money. In fact, the value is determined by the expression «willingness to pay» (Drašković, 2013).

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However, the natural resources, except continuous, are significantly rare, so it opens up the issue of values, valuation and price of these resources, especially land, forests, clean water and air. The question of natural capital and goods valuation is still an open area to search for satisfactory answers. The methodological approach of values and valuation is limited by the understanding of the core of natural resources value. The very object valuation represents the accumulation of renewable or non-renewable, and continuous resources or goods given by the nature.

From the economic point of view, natural resources are analysed from the standpoint of their rarity and obtained a mark in the form of monetary value in terms of their scarcity and the possibility of using it for the production of exchangeable goods and services. Primarily, this access to resources is referred to resources such as land, forests, water, minerals, as well as some parts of local flora and fauna, which have become objects of market transactions (Drašković, 2013).

Protected areas of natural resources are complex forms of protection or special treatment of individual natural resources and space. Forms of protection are grouped in: national parks, restricted natural reserves, special reserves nature reserves, monuments of nature, protected habitats, nature parks and landscapes of exceptional characteristics (Drašković, 2013)

This paper is focused to selection of special nature reserves (SNR) like Zasavica, Uvac and Stari Begej – Carska Bara. Hereby it is presented a description of specific characteristics of each nature reserve. Our approach to the research was of economic, ecological, and partly of sociological point of view. Thus, the subject of protected natural resources and values, and their impact on the development of Serbia were assessed in terms of the relationship of economics and ecology. In order to perform this research there were conducted surveys of the population and visitors in relation to the protection and special values located within protected natural areas. Additionally, we presented the comparative results obtained by the analysis of population attitudes, both from the region and visitors of the selected reserves related to key resources, values, capital, and management. It is presented a detailed view of the challenges and advantages in sense of the development of each of the three selected SNR.

The structure of this paper is as follows: 1. Introduction, 2. Description of Characteristics and Significance of Special Nature Reserves, 3. Methodology of Research, 4. Results and Discussion, 5. Benefits versus Challenges for the Development of the Special Nature Reserves, and 6. Conclusion.

DESCRIPTION OF CHARACTERISTICS AND SIGNIFICANCE OF SPECIAL NATURE RESERVES

Special Nature Reserve Zasavica extends to an area comprising the municipalities of Sremska Mitrovica and Bogatić, surrounded by villages: Crna Bara, Banovo Polje, Ravnje, Radenković, Zasavica I and II, Salaš Noćajski, Noćaj and Mačvanska Mitrovica (SNR Zasavica, 2012, and Drašković, 2013).

This territory was placed under special protection by regulations on protection of the areas of Zasavica from 1999. The reserve is a natural resource of the first category, having a great importance for the Republic of Serbia. The river Zasavica represents a key natural resource comprising reserve area. The area has characteristics of continental climate. The area of Zasavica combined the two types of vegetation. One is wetland, and the other steppe (SNR Zasavica, 2012, and Drašković, 2013).

Zasavica is a special natural value, which owns more than 800 plant species. The most important and most valuable plant on the reservation is Aldrovanda which is Zasavica only habitat in Serbia. Based on a number of researches of the waters of Zasavica, it was observed diversity of fish population. The special value of the reserves represents the presence of globally threatened species of the fish Umbra Kramer for which the water of Zasavica is one of the two remaining habitats in Serbia. The most specific and most valuable bird in the reserves is ferruginous duck, a globally endangered species on

the planet. In addition to the immediate natural values and resources, within the reserve have been developed actions related to the maintenance and breeding of rare and endangered indigenous species. The reserve breed the old type of pig bred – Mangalitza, the old types of cattle – Podolian ox, and Balkan donkey (SNR Zasavica, 2012, and Drašković, 2013).

Uvac, the Special Nature Reserve covers an area of Western Serbia, that is, the parts of the territory of the municipalities of Nova Varoš, Sjenica, Prijepolje, and Ivanjica. Inside the reserve and its surroundings borders a number of villages, and the largest are Radoinja, Lopiže Gornje and Donje, Komarani, Akmadžici, Ursule and Uvac (Nature Reserve Uvac, 2007, and Drašković, 2013).

The reserve is defined as a natural resource of great importance. The main objective was to protect the habitat of Griffon vulture as an endangered species. The reserve has natural values, primary water and forest resources, and environmental wholes of special values. The reserve comprise numerous and spacious cave habitats with specific inadequately explores fauna. Moreover, this area is characterized by extremely attractive, peculiar, and distinctive elements with strong relief ornaments of limestone cliffs, and gorges of river valleys. Special geographical unit represent a whole series of strangulated meanders of the river Uvac near villages Molitve and Radoinje. The reserve contains three large and morphogenetic, paleontological, hydrological and biological extremely interesting caves (Ušačka, Tubića, and Baždarska) (Nature Reserve Uvac, 2007, and Drašković, 2013).

The essential natural resources of the reserves Uvac are as follows: waters of lakes of Uvac, streams, sources and wells, groundwater; *land* – pastures and meadows, smaller pieces of arable land, and orchards; *forests* – coniferous and deciduous; *wildlife* – game birds and wild game, *fishes* – about 20 species of which are two-thirds of indigenous origin. Reserve Uvac's flora comprises over 500 species of higher plants, among which a greater number are rare, endemic, medicinal, or edible herbaceous and woody plants. Forest area consists of the communities of pure deciduous and coniferous, and mixed forests.

The reserve presents the well-preserved fragments of tall stands of beech, spruce, and fir, as well as pure stands of spruce. The reserve was established as an area for the protection of Griffon vulture (Gyps fulvus) population, which is one of the most significant representatives of the bird fauna in Serbia. Griffon vulture is a bird of Mediterranean origin, and it represents in nature, one of the important factors in the food chain and purification of nature by preventing the spread of infectious diseases (Nature Reserve Uvac, 2007, and Drašković, 2013).

The area of Special Nature Reserve Stari Begej – Carska Bara is located in central Banat in AP Vojvodina, municipality of the city of Zrenjanin. Nature reserve comprises the territory between the mouths of the river Begej in Tisa. The reserve extends to areas of cadastral municipalities of Belo Blato, Knićanin, Lukino Selo, Stajićevo, and Perlez (Republic Agency for Spatial Planning, 2009, and Drašković, 2013).

Special Nature Reserve Stari Begej – Carska Bara is defined as natural resource of great importance. Special Nature Reserve is also included in the list of wetlands of international importance. The habitats include ponds, meadows, and willow and poplar forests, on following locations: Carska Bara, Tiganjica, Perleska Bara, and fishponds of Ečka. This area is an essential habitat for birds that nest there, the ones that spend the winter, and those, which pass by that area. Geomorphologic diversity of the territory consists of loess plateau, loess terrace, and alluvial plain. The area is rich resource of surface and groundwater in the formation of which affect the rivers Danube, Tisa, Stari Begej, Plovni Begej, as well as ponds and lakes formed as fishponds. The territory of Carska Bara combined two types of vegetation, one, wetlands and water lands, and the other heath land with fragments of gentle salt marsh spaces (Republic Agency for Spatial Planning, 2009, and Drašković, 2013).

The research results indicate that the Reserve flora line up 500 plant taxa and over 55 species of aquatic macrophytes. Reserve vegetation consists of aquatic macrophytes, wetland vegetation, tall

forests vegetation, meadows, and steppe pastures. Reserve fauna is diverse and comprises entomofauna (dragonflies), ihtiosuna, consisting of 24 species of fish. In the year 2000, the area was declared of international importance for birds. Concerning birds, for the whole region the typical are herons, cormorants, storks, geese and ducks, birds of prey gulls, cuckoos, swallows, starlings, and crows. Reserve inhabits mammals which way of life is subjected by the natural environment of water habitats, fens, and riparian forests (Republic Agency for Spatial Planning, 2009, and Drašković, 2013).

METHODOLOGY OF RESEARCH

Our research was carried out with a combination of methods and techniques of interviews and surveys. Performed were extensive surveys of population living adjacent to, and within special protected areas of SNR: Zasavica, Uvac and Stari Begej – Carska Bara. The technique of data collection (surveys) was realized based on pre-prepared questionnaire interviews, while trained interviewers conducted an immediate, individual interview with the persons interviewed. The procedure was developed on a way that the interviewer read the questions and registered answers.

The content of questions in the interview scheme was designed in order to give to respondent the ability to answer within the pre-prepared range of possible answers. It was envisaged the option that the interviewed person gave another response provided outside the range of answers. The concept of the questionnaire was structured to represent a combination of closed and open answers. The interview gave opportunity to the respondent to respond to specific questions with multiple-choice options ranked by a particular priority of value or importance. (Drašković, 2013).

Concerning the RSP Zasavica, a sample survey from the year 2012 is 0.94% of the population, due to the fact that the population census from 2011 was 10.986, while the survey included 103 respondents. Pool environment was conducted in the first half of the 2012 in SNR Uvac on a sample of 103 adult age population. The population of the surveyed villages is 1639, and the sample of respondents comprises 6.28% of all residents of the village. Pool for the SNR Stari Begej – Carska Bara was carried out during the spring of 2012 on 104 respondents. The selected sample for conducting the survey and the survey – interview of the residents and visitors was completely random.

The other surveys technique was conducted in the same reserves, but on the other participant population. Reserve visitors were interviewed. The standard survey technique was performed. Printed questionnaires were placed in specific locations visited by tourists. Surveyed persons by free will had option, without the presence of interviewer, to answer the questions. The content of questions in the survey for visitors partly consisted of the ones from the survey – interview, conducted over the population living in and nearby the reserve.

Surveys or interviews, gave the visitors and residents the opportunity to present their specific quantitative and valuable qualifications in relation to the protected area, but also about the content of the survey or questionnaire. Survey or interview offered the option of being anonymous in the sense of expression, without noting any personal data of surveyed persons. The interview was individual, and lasted on average about 30 minutes per person interviewed (Drašković, 2013).

The use of survey methods and interviews represent a useful combination of research techniques and methods. Economic researches and partly some research in the field of ecology should rely on techniques and methods such as survey and interview. These techniques are available as methods for collecting reliable scientific information relating to subjective views, opinions and attitudes of value on different social and economic facts and factors. Nevertheless, their range and reliability have certain limitations. The limitations lie primarily in the complexity of the survey content, the selected

sample and the impact of pooling errors, which should be kept to the lowest possible level (Šušnjić, 1977, 1999).

Data processing, statistical analysis and numerical expression of the results were carried out by using SPSS software support.

RESULTS AND DISCUSSION

This chapter presents a comparative analysis of the results of a survey conducted for three representatives SNR: Zasavica, Uvac and Stari Begej – Carska Bara. A comparative overview of the results obtained by surveys among population living within or in the immediate environment of the SNR indicated a high correlation of obtained results with respect to some key aspects, the value of natural resources, their protection, management and projection of their future.

Results of the surveys carried out among the population in areas of SNR Zasavica, Uvac and Carska Bara are sorted in tables 1, 2, 3 and 4, while the results of the surveys taken among visitors of the three listed SNR are sorted in tables 5 and 6.

In connection with the question on whether they have, suffer or not any damage from the existence of the reserve, a relatively low percentage of respondents expressed to suffer any damage. The highest percentage of respondents pleaded to have damage from the reserve Zasavica, about 14.56% of them, and lowest number considered to have no harm from the reserve Carska Bara (see Table 1). Concerning SNR Zasavica, the perception of harm is mostly linked to the reintroduction of beavers, for Uvac these are wild animals, and Carska Bara, bird cormorant and flooding areas.

Table 1. Answers to Questions - Whether or not the respondents had any damages and benefits from SNR, and the Maximum amount of damages, expressed in cash.

Damages and benefits that the respondents have from SNR				*Max. amount of damage expressed in cash*
SNR	**YES, damage exists**	**NO Damage exists**	**Interviewee Benefits (%)**	**Amount of Damage (RSD)**
Zasavica	14.56%	85.44%	Rural tourism 27.8%	20.000
Uvac	7.8%	92.2%	Rural tourism 52.4%	10.000
Carska Bara	5.8%	94.2%	Rural tourism 55%	20.000

Source: Authors calculations, and Drašković (2013).

Over 85% of Zasavica respondents, and over 90% of Uvac, and Carska Bara, believe that they do not suffer any damage from the reserves. When it comes to the perception of benefits that they have or could have from the reserve, respondents have opted the benefits in the economic and not in ecological sense. The lowest percentages, only 27.8% of Zasavica residents, and residents surrounding Zasavica, have a standpoint of its usefulness, one that is related to the rural or eco-tourism. In this case, 85.44% of the respondents feel that there is no damage, but at the same time feel that they don't have a significant benefit from the reserve. As for reserves Uvac, and Carska Bara, there is a high (92.2% and 94.2%) perception that damages do not exist, and at the same time residents see a chance to, indirectly, in economic terms, use the reserves' resources through the development of rural and eco-tourism (Table 1).

When the respondents declared themselves on a specific quantification of the amount of damages they suffer from the reserve annually, the results were that the maximum damage quantified amounts to RSD 20,000. The least damage is suffered by the Uvac's reserve neighbouring residents, i.e., only 10,000 RSD (Table 1).

When the respondents expressed the eco-system value in cash, the results that prevailed were that the natural resources found within reserve are very large and complex and «cannot be expressed in cash ». Such view was taken from the surveyed neighbouring residents of Carska Bara reserve. They believe that the reserve is worth more than 5 million euros (see Table 2).

Table 2. Answers to Questions - Can SNR are expressed in cash, and How much would they pay if they were given an opportunity to buy SNR.

Money Value SNR		*If they had an opportunity, they would buy SNR*	
SNR	**Description**	**Would pay an amount of (%)**	**Would not pay anything (%)**
Zasavica	Cannot be expressed in cash 65.7%	Over 5 million € and more 42.7%	11,5%
Uvac	Cannot be expressed in cash 88.3%	Over 5 million € and more 62.1%	10.7%
Carska Bara	It is worth 5 million € and more 81.7%	Not more than 4 million € 53.9%	1,9% without an answer

Source: Authors calculations, and Drašković (2013).

When the respondents are brought into a position to evaluate the reserve resources as a whole, assuming that they are the buyers of the reserve, the approach as to defining the value changes. Now, it becomes more accurate, not defined as an infinite size, hence «cannot be expressed in cash», and it is quantified in specific amounts. The respondents from the surrounding reserve Zasavica, and Uvac find that the value of the reserve is over 5 million euros, and respondents from the Carska Bara surrounding find that the value does not exceed more than 4 million euros. The point of view of 11.5% surveyed, is that they wouldn't pay any price for the purchase of Zasavica reserve, and in the case of Uvac reserve, that percentage is 10.7% (Table 2).

The point of view as to whether or not the government should or should not finance the sustainability and survival of the special reserve, majority of the respondents believe that the government should finance the survival of the reserve. In case of Zasavica 84.5% and in case of Uvac 99% of those surveyed.

A high percentage, 98.1% of Carska Bara surrounding residents surveyed, feels that the government should financially participate. 15.5% of those surveyed residents feel that the government should not finance the survival of Zasavica reserve, 1% that of Uvac residents surveyed, and 1.9% that of Carska Bara residents surveyed (see Table 3).

Awareness of 40% respondents believe that it is necessary that penalties should be high enough not only to discourage the behaviour of those who destroy natural resources and valuables, but also be high enough to secure the recovery of the resources. In case of Zasavica and Uvac, 4.9% of surveyed residents feel it is not necessary to have penalties for destroying natural resources, or in case of Stari Begej - Carska Bara 2.1% (Table 3).

Table 3. Answers to Questions - Should the government finance the survival and sustainability of SNR, and according to the respondent's opinion, How high should the penalty be for destroying SNR.

The government should finance the survival and sustainability of SNR			*Degree of penalty for destroying SNR's valuables*	
SNR	**YES**	**NO**	**It should exist**	**It should not exist**
Zasavica	84.5%	15.5%	Two times and more of the property value 41.7%	4.9%
Uvac	99%	1%	Ten times and more of the property value 54.4%	4.9%
Carska Bara	98.1%	1.9%	Ten times and more of the property value 45.4%	2.1%

Source: Authors calculations, and Drašković (2013).

Rating on the manner of reserve management[4] in terms of «good» or «bad» management, provides the following indicators. Zasavica is considered well managed by 46.5% of respondents, and bad by 34%. In case of Uvca 75.7% respondents considered it to have good management, and 15.5% bad management. 29.4% of respondents feel that Carska Bara is managed well, and 44.1% that it is managed badly (see Table 4). It is possible to conclude, that the poorest score data is given to Carska Bara, from the fact that it is *de facto,* in an economic conflict of interest with the management of fisheries and management of protected marsh area, that is adjacent to the fisheries. A smaller conflict of interest is present in cases of Zasavica and Uvac reserves management (Drašković, 2013).

Table 4. Answers to Questions - How to manage SNR, and Should SNR be sold (privatized).

How to manage SNR			*SNR should be sold (privatized)*	
Reserve	**Good**	**Bad**	**YES**	**NO**
Zasavica	46.6%	34%	11.7%	86.4%
Uvac	75.7%	15.5%	1.9%	93.2%
Carska Bara	29.4%	44.1%	9.6%	88.5%

Source: Authors calculations, and Drašković (2013).

There is a high correlation in responses from different areas, i.e., surrounding, related to privatization of special natural resources. For the sale or privatization of reserves, 11.7% respondents answered affirmatively, 1.9% for the sale of Zasavica, 93.2% from Uvac's reserve surrounding and 88.5% from the Carska Bara's reserve surrounding (Table 4).

Views on the values of natural reserves represent a major factor that encouraged visitors to come to the nature protected areas. Given that the analysed reserves have different dominant nature values and resources, different data is obtained from the visitors' view. Zasavica and Carska Bara are located in the plain area and their key resources are water, forest, landscape, and rare bird species.

The intact nature is highly ranked (94%) and the rare species, like griffon vulture (72%) are the most highly ranked by the visitors of Uvac reserve. Space arrangement was valued by only 22%. Evaluation of space arrangement is referred to the results of investments into the access to nature areas. Visitors believe that the values of rare animal species (50%) and intact nature (11%) are values which Carska Bara possesses. The space arrangement, as a value, is determined by (39%) of the surveyed visitors. In the case of Zasavica reserve, 65% of the respondents valued the rare animal species, such as beaver,

[4] SNR Zasavica is managed by a social, NGO – organization "Association Gorani" from Sremska Mitrovica. Uvac reserve has a specialized management established by the government as a Trade Enterprise, and reserve Stari Begej – Carska Bara, is managed by a private capital association, fishery Ečka (Drašković, 2013).

thereafter some native animal species such as mangalitza, Prairie ox, Balkan donkey, sheep, and thereafter the intact nature 58% followed by arrangement of space 46% (see Table 5).

Table 5. Answers to Questions – Which nature values are the most important in SNR, and Can the values be expressed in cash?

Which nature values are the most important in SNR				*Value of SNR in cash*
SNR	**Rate animal species**	**Intact nature**	**Arrangement of space**	**It cannot be expressed in cash**
Zasavica	65%	58%	46%	71%
Uvac	72%	94%	22%	92.4%
Carska Bara	50%	11%	39%	88.89%

Source: Authors calculations, and Drašković (2013).

The viewpoint of the respondents-visitors, regarding the evaluation of reserves and expressing it in monetary terms, corresponds to the views of those respondents from the reserves' surrounding. Majority of the respondents – reserve visitors have such values that «cannot be expressed in cash», 71% of Zasavica visitors, 92.4% of Uvac visitors, and 88.89% of Carska Bara visitors (see Table 5).

Regarding the amount of penalty that should be paid for destruction of natural resources and reserve goods, most respondents-visitors believe that the penalty should be ten times higher in comparison to the individual retail value of that particular natural resource. 49% of Zasavica, 61% Uvac, and 44.4% Stari Begej - Carska Bara (see Table 6).

A very small number of visitors believe that there should be no penalty for destruction of natural resources 1-2% (Table 6). This is far less than the viewpoint of the population in the region Zasavica and Uvac, where 4.9% of the respondents felt that there should be no penalty. Visitors have more stringent criteria for the protection of natural resources, as compared to the residents in the region.

Most of the respondents-visitors expressed their readiness to participate in financing the survival of valuables, in the protected areas. This view was expressed by 68% in Zasavica, even 80% in Uvac and only 50% in Carska Bara. No interest was shown for participation in financing the reserves, 29% Zasavica respondents, 12.4% Uvac visitors and 44.5% Carska Bara visitors (Table 6). It is interesting that Uvac reserve enjoys the highest affection by visitors, regarding the protection of natural resources and goods. We assume that the expressed willingness to financially participate, regardless of which reserve is in question, would be, by far, modest when it would come to the actual giving of money for the needs of the reserve.

Table 6. Answers to Questions - The Amount of penalty for destroying of goods in SNR, Would the visitors be prepared to participate in financing the survival of SNR, and Should it be sold (privatised).

Amount of penalty for destroying goods in SNR			*Readiness to participate in financing the survival of SNR*		*Should it be sold (privatized) SNR*	
SNR	**It should exist**	**It should not exist**	**YES**	**NO**	**YES**	**NO**
Zasavica	Ten times and more than the value of the asset 49%	2%	68%	29%	8.4%	66.4%
Uvac	Ten times and more than the value of the asset 61%	1%	80%	12.4%	3.8%	81%
Carska Bara	Ten times more than the value of the asset 44,4%	0%	50%	44.45%	0%	77.78%

Source: Authors calculations, and Drašković (2013).

Majority believe that nature reserves should not be sold, 66.4% in respect to Zasavica, 81% in respect to Uvac, and 77.78% in respect to Carska Bara. 8.4% visitors who were interviewed believe that Zasavica should be sold, while 11.7% residents interviewed were from the surrounding area. In case of Uvac, 3.8% visitors – respondents feel that the nature reserve should be sold, while that option was presented only by 1.9% by the residents from the surrounding area. In case of Carska Bara, an affirmative answer was given, as for the sale of the same; any respondent-visitor did not give answer, while 9.6% of respondent-residents from the surrounding area were for that option. There is a high degree of consensus among visitors and residents from the surrounding reserve, one which is related to the assumed possibility of privatization or sale of nature reserve. Representative data concerning visitors' views on Carska Bara, was small (see Table 6).

Future research could develop in the direction of modelling, the so-called "prey-predator" model, in literature known as Lotka (1925) – Volterra (1926) model, for all three SNR. "Prey-predator" models originate from biology where the predators are foxes and preys are rabbits and, initially, were considered a rabbit population under the onslaughts of foxes. Consequently, in ecological sense, the predator can be a pollutant, while the prey would be natural wealth. Similarly, in the paper by Drašković and Minović (2012), predators on the Serbian market, were large companies in retail trade, while the prey represented small shops in this industry. Thus, although the authors Drašković and Minović (2012); Minović et al. (2013) and their numeric simulations of the proposed models, used examples in economics and finances, at the same time, this kind of "prey-predator" model is used in ecology, physics, computer science, demography and sociology. Therefore, the development of "prey-predator" model for all three special nature reserves, would clearly identify, in each reserve, on one hand, the predator population, and on the other, prey population. In this manner the insight of the intensity of mutual interaction, and preciseness of benefits and damages from the same, SNR could be assessed.

BENEFITS VERSUS CHALLENGES FOR THE DEVELOPMENT OF SPECIAL NATURE RESERVES

For the development of all three considered SNR, Zasavica, Uvac, and Carska Bara, economic activity of tourism is important. Also, for all three SNR, in addition to the special nature values, resources and the environment, which these reserves possess, such as proximity to transportation infrastructure, also applies. All three reserves are close to the main roads that connect different towns in Serbia. Within the reserves Zasavica, and Carska Bara tourist services are provided: tour of the reserve by a tour boat, photo safari by a rowing boat, walking through health trails, bird watching, and bike rental, while inside the reserve Uvac travel services are primarily confined to the tourist boat tour of the reserve, and observing the colony of griffon vulture and caves (SNR Zasavica, 2012, Republic Agency for Spatial Planning, 2009, Nature Reserve Uvac, 2007).

Problems from the standpoint of reserve Zasavica development are those that apply to some cultural practices in agriculture within protected areas of Zasavica, which affect the increase of pollution of water and soil, due to the use of mineral fertilizers, as well as, the use of plant protection products. A similar problem is present in Carska Bara reserve, because the protection from municipal and industrial pollution of this reserve is on a low level, due to the fact that industrial capacity in agriculture does not have a system for water treatment. The same problem arises in the case of municipal waste from the settlements, which are in the surrounding protected areas. Water quality in Zasavica is classified in category I and II, while in Carska Bara in II and III class, with a tendency to further deterioration, due to the effects of the mineral fertilizers used in its surrounding. Protection from the municipal pollution of Zasavica area is relatively on a low level, as the communal capacity does not have the system for water treatment (SNR Zasavica, 2012, and the Republic Agency for Spatial Planning, 2009).

For the development of rural tourism of Uvac reserve, promising investments are necessary for adapting rural households for tourist services, also needed are marketing investments in order to bring information closer to the potential visitors, such as are the special values of Uvac reserve. The limiting factor for the rapid development of tourism services is that there are obstacles in the activation of the Visitor's centre, which was built in the dam Kokin Brod (Nature Reserve Uvac, 2007, and Drašković, 2013). Close to Zasavica reserve is Sirmium, that is a historical, archaeological site of great value, as well as, a historical monument from the time of first Serbian Uprising in 1804 and 1813 (SNR Zasavica, 2012, and Drašković, 2013). In order to sustain and improve the nature values of Carska Bara reserve in the future, it is necessary to invest in the environment protection. The necessary investment should be in air protection by ensuring the gasification of the village, organizing waste collection and recycling, as well as, sanitation of the existing dumps, forming a green area along the roadside. The water protection would improve by developing separate sewer systems in the settlements, improvement of wastewater treatment, improvement of flood protection by setting up sanitary protection space, and by reducing the use of fertilizers and pesticides. The mentioned procedures would, at the same time, contribute to the improvement and protection of land (Republic Agency for Spatial Planning, 2009, and Drašković, 2013).

CONCLUSION

This paper presents specific characteristics and key values of goods for the three special nature reserves Zasavica, Uvac and Stari Begej-Carska Bara. The protected nature resources and their valuables, and influence on the development of Serbia, are observed in terms of the relationship between economy and ecology. The presented methodology used, includes the population and visitors survey on all three locations of special nature reserves. The results of our research were to identify the value judgments of the population and visitors that are within the protected nature areas. Our results obtained from the research of the three SNR surrounding population viewpoints, indicates that the majority of the population does not suffer any damage from the reserves. When it comes to the perception of the benefits that respondents have or could have, the results of both types of surveyed population and visitors, indicates the prevailing approach of the respondents when expressing the value of eco-systems in cash, and i.e., that the natural resources found within the three reserves, are very big and complex that it "*cannot be expressed in money*". Consequently, the awareness of respondents (residents and visitors) is that it is necessary for penalties to be high enough, not only to discourage the behaviour of those who destroy natural resources and valuables, but also to be high enough so to provide the resource recovery, and is the viewpoint of over 40% of the respondents in Zasavica, and over 50% in Uvac. The results of our research indicate that the majority of respondents of all three SNR's population believe that the government should fund the survival of the reserves. Furthermore, most visitors and residents, from the surrounding of all three reserves, believe that privatization or sale of the nature reserves should not be performed.

The future research could be focused in three directions. The first being creation of a common model by which all three special nature reserves operate. That is, from the model it would be possible to see what connects these three SNR, and what are dominating points of divergence. The second direction could define the sustainable development of these three SNR, through inclusion of external costs, similar to Minović and Drašković (2012)[5]. The third direction would involve modelling the so-called «prey-predator» model, for all three SNR, similar as in the paper by Drašković and Minović (2012)[6].

[5] These authors, through the numeric simulation, showed the unsustainable economic and environmental development in the framework of the assumptions for the Serbian data.
[6] These authors have made a "predator-prey" model for the retail market in Serbia.

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