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Developing Ecological Indicators of Sustainable Tourism in New Protected Areas: a Case Study of Saline Steppe and Forest Steppehabitats in Serbia

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Abstract

This paper is one of the results of three years research (2016-2019) of specific habitats of saline-steppes and forest steppes along the Mostonga River, in the northern part of Serbia (Autonomous Province of Vojvodina), with the aim of their valorization and protection in the future. Here is also situated a natural areain the process of protection known as "Middle Mostonga".An integral part of protection declaration procedure is the creation of so-called "Protection study", as a basic document for the planning of protection guidelines for certain natural areas, buttt also includes tourism development analysis. Therefore, the working group, composed of representatives of the Institute for Nature Conservation of Vojvodina Province in Novi Sad and the University of Novi Sad (Faculty of Sciences – Department of Geography, Tourism and Hotel Management), examined the opportunities for ecotourism development in the area of "Middle Mostonga". The main objective of this article is to forthwith frame the possibility for consistent application of sustainable development goals in the future protected area "Middle Mostonga" and its surroundings by setting a scheme of indicators of sustainable tourism. Total of 160 indicators were analyzed by the team of the experts in the field relying mostly on BACI design of ecological indicators of sustainable tourism. Five main steps in identification of the relevant indicators were defined. The results showed that it is possible to apply indicators related to the number of protected species, the number of individuals (units) within populations and habitat endangerment, as well as indicators that reflect the interest of the tourism industry for the development of tourism in this particular area.

Keywords: *protected areas; sustainable tourism; WTO indicators; salt steppes; forest steppes*

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Introduction

Conservation issues are at the forefront of public awareness. Losses of endangered species and increasing land degradation have galvanized public support for conservation. It is no accident that the interest and growth of ecotourism and nature-oriented tourism have coincided with this worldwide concern (Wearing, Neil, 2009). Protected areas are the principal global strategy for the conservation of nature, and hence there is considerable interest in better understanding and enhancing the effectiveness of their management (Bushell, Bricker, 2016). Tourism in protected areas is thoroughlystudied, and tourism management toolsare also topic in focus. In that direction, tourism is most often viewed through the positive or negative impacts that it has on the protected areas (Holden, 2000; Eagles et al., 2002; Buckley, 2009). Both ways of influencing protected areas are connected with the concept of sustainable development, which is widely used in tourism (Weaver, 2006) and whose consistency is confirmed through the application of sustainable tourism indicators.

A significant percentage of plant and animal species that inhabit saline steppes are rarely found within the boundaries of some other habitats. That is the reason whythey are important for preserving the overall biodiversity of rural areas (Isselstein et al., 2005). Numerous societies have great respect for such areas, among other things because they have recreational and tourist potential (Schüpbach et al., 2004).In countries like Hungary, some of the more developed ecotourism destinations are exactly located in protected areas with such natural units and the best example is the Hortobágy National Park (Weaver, 2001; Bodnár, 2004).

In order to better preserve the landscape of saline lands, which include wetlands, meadows, steppes and forest-steppe habitats, the Institute for Nature Conservation of Vojvodina Province – the qualified professional organization for nature protection, proposed "Middle Mostonga" to be placed under protection as a Landscape of Outstanding Features. Information about that can be found on the website of the Ministry of Environmental Protection from July 2019 (www.ekologija.gov.rs) which means that the protection procedure has been officially initiated. The Protection Study deeply insists on the development of sustainable tourism and ecotourism (Protection study, 2018).

Consequently, as the authors of this paper, we have taken the initiative to approach the definition of a framework for ecological indicators of sustainable tourism for several reasons: (1) Despite discussions of what good ecological indicators are, they can realistically provide information on changes in the environment (Castley et al., 2012); (2) Demand for sustainable tourism indicators has increased recently as they help in making sustainable tourism more concrete and operational concept (Tanguay et al., 2013); (3) Indicators determine the state of a natural resources, the impact that is achieved (caused), as well as the actions and consequences of the management efforts (Pasape et al., 2014).

Literature review

The literature highlights a large number of existing indicator sets developed by various organizations (World Tourism Organization, 2004; Scotland Indicators of Sustainable Development, 2006; OECD, 1998; English Tourism Council, 2002; Cairngorms National Park, 2006; ETIS, 2016), but very few evaluations of their implementation.

Sustainable indicators are an essential and powerful tool in decision-making for sustainability and of any sustainability assessment (Cloquell-Ballester et al., 2006; Dahl, 2012; Gallopin,

1997; Meadows, 1998; Pintér et al., 2012). Selecting the suitable set of indicators is the most substantial step in planning and managing sustainable development. An unsuitable set of indicators or too many indicators either will show an inaccurate state or will provide unreliable data (Blažević, 2013; Durović, Lovrejentev, 2014; Sharareh, Badaruddin, 2013). Systematic monitoring of indicators enables us to compare the data through longer periods of time as well as interpretation and prediction of processes at a certain destination (Jurinčić, Popič, 2009).

The need for indicators of sustainable tourism comes from the perception that many destinations, especially natural areas, have been at risk due to insufficientawareness to the long-term sustainability of tourism destinations.According to that, a growing number of researchers involved in sustainable tourism research (Dwyer, Kim, 2003; Mycoo, 2006; Twining-Ward, Butler, 2002) have urged the need for sustainable tourism indicators.Without adequate indicators, the concept of sustainable tourism is meaningless as indicators provide the means to assess the effectiveness of government policies and actions as well as draw attention to problematic areas in the tourism industry so that appropriate management responses are activated (Butler, 1999; Reihanian et al., 2015).

National parks, nature reserves, and other protected areas have often been designated in areas of high biodiversity, endemism or ecological uniqueness, important ecosystem functions, or historic cultural heritage (Kalamandeen,Gillson, 2007). The efficiency and sustainability of protected areas for biodiversity conservation have been debated from many perspectives (Gaston et al., 2008; Ferraro et al., 2011; Khalyani et al., 2013; Noss et al., 2012). Biodiversity and habitat loss inside and outside protected areas are influenced by increased human activities (Laurance et al., 2012; Parks, Harcourt, 2002; Svancara et al., 2005). Ecological indicators should beunderstandable enough to make monitoring and modeling easy and consistent (Dale,Beyeler, 2001). According to Turnhout et al. (2007), the purpose of ecological indicators is to estimate the ecological quality of the ecosystems and they could serve as the instruments for assessing the effectiveness of policieson nature.

The significance of ecological impacts from tourism and recreation has been widely recognized (Cannas,Theuma, 2013; Dimoska,Petrevska, 2012; Latip et al., 2015; Modica et al., 2018; Rossberg et al., 2016; Tanguay et al., 2009, 2013; Torres-Delgado, Saarinen, 2013). Ecological indicators can help to understand the effects of management efforts, and provide a framework for obtaining objective supporting information to allow the industry to take credit for its successes. If the objective is to preserve natural environments, key indicators may be those which measure areas protected, or losses of critical attributes which are the focus of protection (species, ecosystems) (Daly, Cobb, 1989).

Conservationists from all over the world used different criteria for the assessment of natural areas with the potential to be designated as protected areas. Some of the criteria that are used are following: site uniqueness, site naturalness, representativeness, rarity (specific and habitat levels), species richness (diversity), fragility, vegetation structure, spatial connectivity, number of plant alliances, typicality, number of plant structural formations, irreplaceability, endemism and vulnerability (Laguna et al., 2004; Derous et al., 2007; Kier et al., 2009; Müller et al., 2020). According to Chape et al. (2003), usage of mentioned indicators contributed to the identification of a large number of various protected areas around the world (protected forests,nature reserves, micro-reserves, sanctuaries protected seascapes, etc.), taking into account the specific legislative and conservation needs of the different countries.

Even though ecological indicators are becoming popular among the stakeholders of nature protection and conservation planning, they still lack standardization. Therefore, it happens

that they are imitated and sometimes not applicable at all. Nevertheless, the main objective of indicators application is still the same: environment protection.

Material and Methods

Study area

In the northern part of Serbia saline steppes spread along the course of the Mostonga River, and they represent a reflection of the specific hydrological regime and continental climatic conditions, similar to the case of other areas with the saline steppes in the Pannonian Plain(Molnár,Borhidi, 2003;Fehér, 2007). The lands of these areas are rich in salt, and the subject of scientific analysis of their origin refers to two issues: (1) what is the source of the salt, and (2) what are the mechanisms and controls of its areal distribution? (Mádl-Szőnyi,Tóth, 2009).It is certain that these areas are not for farming development, that is the reason why they were bypassed by the development of intensive agriculture, but the areas of saline steppes are traditionally places of livestock development, which is attributed to preserving the original features of saline steppes to nowadays. Significant attention is provided, at the international level and in the European Union, to the protection of saline steppes because such habitats are a priority for protection(ŠefferováStanová et al., 2008; Milošević et al., 2020).

Figure 1. Geographical location of natural area in the progress of protection –"Middle Mostonga"

"Middle Mostonga" covers 3,130.66 ha in the area of the middle and canalized course of the Mostonga River. The largest part of this area includes meadows and pastures (53.83%).Forests cover 20.3% of the total area of the natural area, while other areas, which include wetlands, fields,

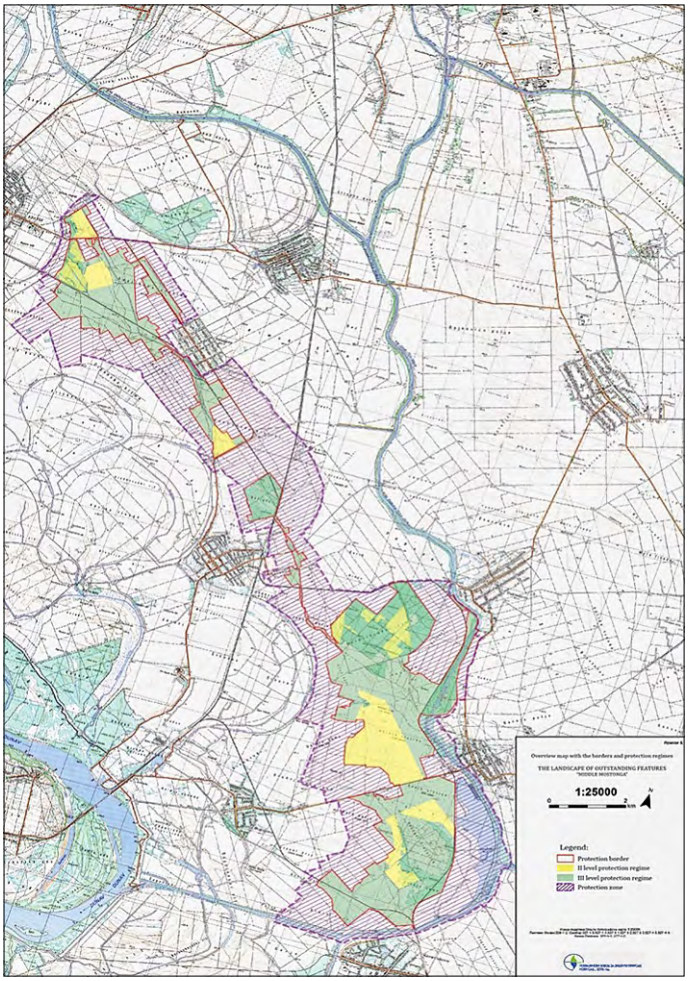

Figure 2. Boundaries of natural area in the progress of protection –"Middle Mostonga"
Source:Institute for Nature Conservation of Vojvodina Province

vineyards, and orchards, occupy 26.15%. "Middle Mostonga" represents a mosaic of swamp, meadow, saline steppe and forest-steppe vegetation. Particularly representative are the Pannonian pedunculate forests on the solonetz with a developed forest-steppe belt, which represent extremely important remnants of the once rich belt of forest-steppe mosaic along the Mostonga River.The remains of these forests are extremely valuable examples of forest-steppe Pannonian forests, which are preserved only here in Serbia, while in the Pannonian Basin they are still present only in a small number of localities in the eastern part of Hungary. Such features have influenced the distinctive diversity of valuable habitats and wildlife (Table 1).

In the area of "Middle Mostonga" there is a group of six habitat types, which are rare and due to functional instability and susceptibility to degradation fragile and representative (Ret/ Frag (A)/ Rep). In the group of a national and international important species, 54 taxonomies were recorded in the rank of species (49) in the rank of subspecies (5). Out of that, 13 are strictly protected species, that is, 34 species with 5 subspecies in the category of protected with the exception of commercial ones.

Table 1. *The most important natural values of "Middle Mostonga"*

"Middle Mostonga" – natural area subjected to official protection procedure		
Habitat types*	**Vascular flora**	**Birds**
• Pannonic loess steppes • Pannonic salt marshes with alkali grass (*Puccinellialimosa*) • Pannonic salt steppes and salt marshes with *Camphorosma annua* • Pannonic salt steppes and salt marshes • Pannonic salt steppes and salt marshes with wormwood • (*Artemisia santonicum*) • Pannonic saline steppes and salt marshes with couch grass (*Agropyrumrepens*)	• Mouse-ear (*Cerastiumsubtetrandrum*) • Meadow violet (*Viola pumila*) • Water mudwort (*Limosella aquatica*) • Bulbous saxifrage (*Saxifraga bulbifera*) • Autumn lady's-tresses (*Spiranthes spiralis*) • Autumn squill (*Scilla autumnalis*) • Bedstraw (*Galiumtenuissimum*) • (*Helictochloacompressa*) • Blinks (*Montia arvensis*) • Anual pearlwort (*Sagina apetala*)	• White-tailed eagle (*Haliaeetus albicilla*) • Black stork (*Ciconia nigra*) • Black kite (*Milvus migrans*) • Woodpeckers (*Piciformes*)

** according to Habitat classification is based on Serbian national legislative.*

Source: Protection study, 2018

The ornithological value of the area is reflected in the number of rare and protected species. The uniqueness of the "Middle Mostonga" area contributes to this, due to the connection of the complex of oak forests and vast meadows and pastures with permanent and occasional wetlands. It is rarely possible in Serbia to find a combination of such habitats on such a scale and such preservation. Richness of bird species is 207 species.

Data collection and analysis

The basis of the research is the collection of data on valuable species and habitats of "Middle Mostonga". Besides that, results from previous research and observations have also been considered. To apply the indicators of sustainable tourism, authors mostly relied on the ecological importance of BACI design: Before / After, Control / Impact, as well as on the importance of measuring during and after the time period concerned (Figure 3).

The impacts of the tourist activity can`t be monitored without the reference baseline, which could either be measured or assumed. If we don't know what plant or animal species may exist in some areas, we won't be able to tell if visitors are affecting their populations. Basic biological surveys should be a high priority for any protected area monitoring system (Buckley, 2003). That is why the collection of data on habitats and species in the field of "Middle Mostonga", otherwise very important for the proclamation of a protected area, is of key importance for the establishment of a set of ecological indicators of sustainable tourism.

Field research was conducted from 2016 to 2019 in the area of "Middle Mostonga". Twenty experts from the Institute for Nature Conservation of Vojvodina Province and the University of Novi Sad participated in this research. As a result of that work, a Protection Study was written under the full title "Landscape of Outstanding Features of Middle Mostonga, Proposal for Protection as a Category II Protected Area". A segment of research and results related to the most important species can be found in the Study area subchapter.

The second part of the research was related to the collection of the most important indicators of sustainable tourism that could be applied in this area. The process of collection and selection of the indicators started with the analysis of the indicators given in the guidebook: "Indicators of Sustainable Development for Tourism Destinations" (WTO, 2004). The process

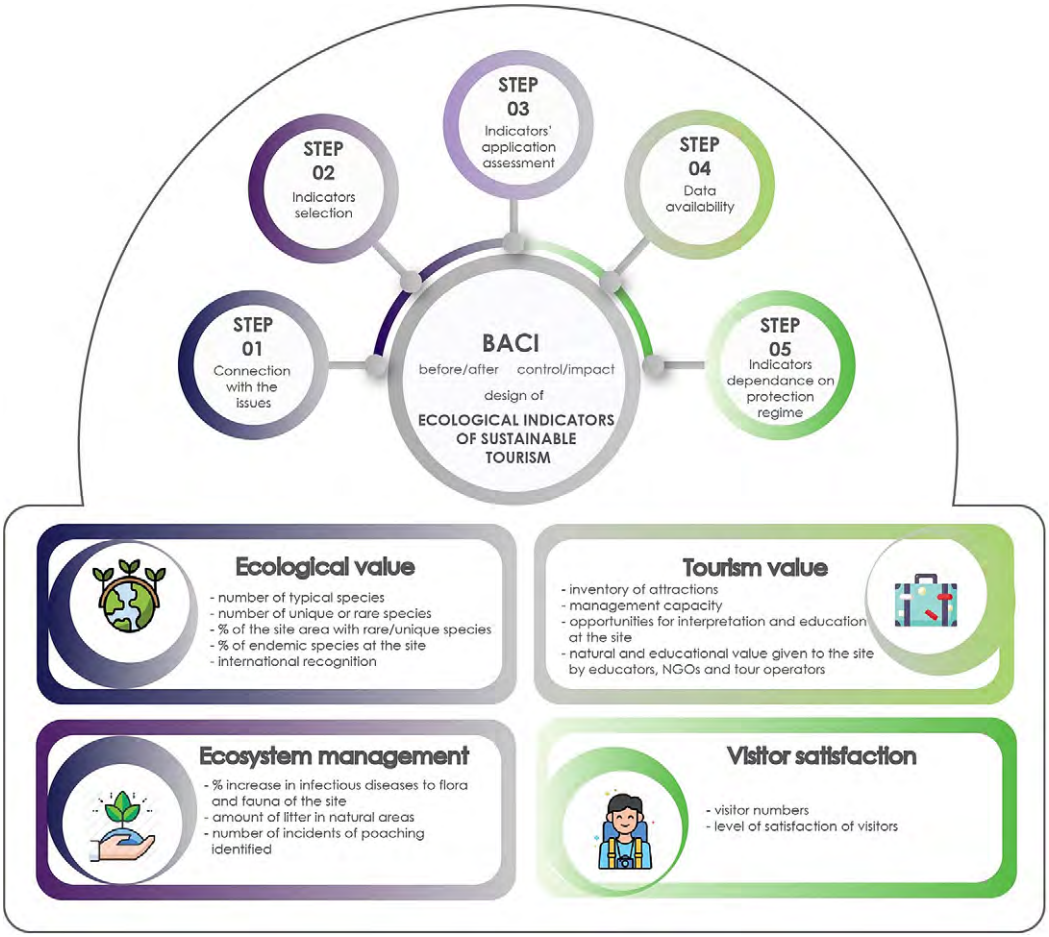

Figure 3. BACI design of ecological indicators of sustainable tourism

continued with the assessment of the concrete and individual case studies and experiences related to ecological indicators of sustainable tourism(Castley et al., 2012; Tanguay et al., 2013). The lists of the selected indicators wasevaluated by the team of twenty experts in the field.

The data analysis primarily referred to the selection of adequate ecological indicators that could already be applied now and that should be applied. One of the main selection criteria is the available database on the number of species and habitats. At the moment, this may seem superfluous, because the tourism of this area is still not sufficiently developed. However, the "Before / After" concept (BACI) assures us that in the future such data may be far more important than it seems now.

Results

Step 1. Connection with the most important issues/questions of nature protection

The area around the Mostonga River is a typical example of the Pannonian landscape with the presence of the remains and species characteristic for the Eurasian forest-steppe zone. In this

part of Europe, suchlandscapes reach their western borders. The value of this area is emphasized in the fact that it is completely surrounded by arable land, as well as the representativeness of preserved habitats and the number of preserved species. During fieldwork on these habitats, we recorded 54 significant species and subspecies of vascular flora, i.e, 23 species and subspecies on saline habitats, and 14 species and subspecies on the steppe and forest-steppe habitats.

Therefore, the first step in determining the list of ecological indicators of sustainable tourism is contained in the connection with the key issues of nature protection in this area, and they can be recognized in the fulfillment of conditions for the protection of this area. There are three fundamental characteristics, provided by the Law on Nature Protection (Official Gazette RS, no. 36/2009, 88/2010, 91/2010 – corrected, 14/16, 95/2018), which determine the fulfillment of conditions for the protection of saline steppe and forest-steppe along the Mostonga River and they are: (1) autochthony; (2) representativeness and (3) integrity.*The autochthony* is reflected in the preservation of a specific mosaic of forest, grass and wetland habitats, which forms a characteristic landscape of the Pannonian forest-steppe, unique in Europe. *The representativeness* is manifested in the fact that it is rare to find a combination of these habitats anywhere in northern Serbia, to such an extent and with such preservation. All this has led to the presence of 174 strictly protected bird species and 59 species listed in Annex I of the European Union Birds Directive. This defines them as the species on the basis of which the Areas of Special Protection for Bird Species within the Natura 2000 network are nominated. *The integrity* is contained in the assessment that the "Middle Mostonga" in the north, across the upper course of the Mostonga River, is connected to the saline steppes developed between the Danube and Tisza rivers in Hungary. Also, with them, "Middle Mostonga" represents a naturally preserved entirety. In the south, this area is connected to the lower course of the Mostonga, which flows into the Danube.

Given all the valuable natural features, as well as the fact that terms such as "autochthony" and "representativeness" are often associated with ecotourism, the area of "Middle Mostonga" is suitable for tourism development. Finally, tourism could help to better present the protection of this ecologically valuable area.

Step 2. Selection of the relevant indicators for protected areas

The second step in the selection of ecological indicators of sustainable tourism was related to the review and analysis of those indicators that are intended for individual types of tourist destinations (WTO, 2004). The review referred to groups of indicators for destinations whose character is identical or similar to the destinations of protected areas, namely: (1) natural and sensitive ecological sites; (2) ecotourism destinations and (3) parks and protected areas. Each of these three groups of destinations have features that can be associated with the natural area of saline steppe and forest-steppe along the Mostonga stream. At the same time, this is an attempt to encourage the planning, development and use of indicators in the process of declaring protected areas, which has not been the case so far.

In this first step, 160 indicators recommended by the WTO were analyzed. As many as 78 indicators are for destinations that are characterized by natural values and ecologically sensitive areas. These indicators are classified into seven subgroups: Ecological value, Tourism value, Site management, Management of spaces for tourism use, Community participation, Ecosystem management, Visitor satisfaction. In the group Parks and protected areas, 28 indicators were analyzed in six subgroups: Visitor numbers, Integrity of key protected systems,

Damage attributable to visitor activity, Level of visitor control and monitoring, Marketing and Management. The group (Ecotourism Destinations) does not recommend specific indicators related to ecotourism but shows the basic elements of ecotourism. Some of them are especially important for understanding the general context of saline steppes and forest-steppes that are the subject of this paper, and in particular: Conservation of the natural environment at ecotourism destinations and areas; Relations with the local community, preservation of cultural assets; Information and interpretation. We believe that these elements should be more integrated into tourism development plans and promoted among tourism employees and among those who are in nature protection.

The analysis of WTO indicators has convinced us that some of them can already be applied in this natural area, which is still in the process of protection and is not a tourist destination, while some are still not acceptable. Therefore, the next step of the research was aimed at examining the possibility of applying indicators and narrowing their final list.

Step 3. Possibility of indicators' application

The third step considered a more detailed analysis of the potential tourist destination's character of the future protected area "Middle Mostonga" and the possibility of collecting information that would provide objective data for the establishment of the final list of indicators. The final result is a narrowing of the list of indicators and the selection of those whose application is possible, in accordance with the character of the destination.

Table 2. *List of selected WTO indicators whose application is envisaged in the area of "Middle Mostonga" and proposed data sources for their determination*

Issue	Indicators	Data sources
Ecological value	• Number of species typical of the area present at the site (and numbers of individuals) • Number of unique or rare species present at the site (and numbers of individuals) • % of site area occupied by rare or unique species • % of endemic species at the site • International recognitions	• Monitoring provided by competent experts of the Institute for Nature Conservation of Vojvodina Province • Photographic material of ecotourists and visitors
Tourism value	• Inventory of attractions (distinguished natural features, including flora and fauna, landscapes) • Management capacity: presence of a management body; plan; site restoration and regeneration programs (% of site covered) • Number of opportunities for interpretation and education at the site (existence of guided visits, printed self-explanatory materials, interpretive, and informative panels, trails, interpretation centers, farm schools, nature schools, educational itineraries, etc.) • Natural and educational value given to the site by educators (local, provincial, national, international organizations), by NGOs, by Tour Operators. (Subjective ratings - use questionnaire) • Number of access routes in good condition for tourism use, (paths, motorized, airstrips, boat access, etc) • Presence of key ecological features of the site in media and tourism promotional materials.	• Monitoring provided by competent experts of the Institute for Nature Conservation of Vojvodina Province • Photographic material of ecotourists and visitors • Data from local tourist organizations • Data from independent experts and researchers

Issue	Indicators	Data sources
Ecosystem management (Impacts on flora and fauna)	• % increase in infectious diseases (local and introduced) to flora and fauna of the site • Amount of litter in natural areas (seasonality of waste can relate to tourist numbers) • Number of incidents of poaching identified	• Monitoring provided by competent experts of the Institute for Nature Conservation of Vojvodina Province • Local government data
Visitor satisfaction	• Visitor numbers • Level of satisfaction of visitors (questionnaire)	• Survey research (university, management)

Step 4. Data availability

Data availability was one of the key criteria for verifying the list of proposed ecological indicators. Each of the proposed indicators was subsequently confirmed during this step. Here we insisted on seeing whether databases can provide a degree of sustainability in the Middle Mostonga area. We have also strongly linked this step to nature protection. According to the Protection Study (2018), within the "Guidelines for the Improvement of Nature Protection", a set of measures are identified, such as (1) guidelines for the improvement of the management of individual habitats and (2) guidelines for the management of populations of strictly protected species. The key task in ensuring these protection goals is monitoring, which refers to the populations of strictly protected species, habitats, and the number of entities of protected species in a certain area. Thus, thanks to this regular activity in the management of some protected area, the information has been provided for the implementation of the list of ecological indicators of sustainable tourism in this area. The monitoring activity is continuously carried out by the expert team of the Provincial Institute for Nature Conservation (Institute for Nature Conservation of Vojvodina Province), as one of the organizations responsible for nature protection in the Republic of Serbia.

Step 5. Dependence of ecological indicators on the protection regime

This step is mostly related to the technique of zoning tourism in protected areas, which is crucial for the sustainable development of tourism in such destinations. In this particular situation, we have linked zoning and carrying capacity to the protection regime in "Middle Mostonga". According to Article 34, paragraph 1, of the Law on Nature Protection (Official Gazette of RS, no. 36/2009, 88/2010 and 91/2010 - corrected, 14/2016 and 95/2018), the landscape of outstanding features, the category to be taken by "Middle Mostonga" is defined as "an area of recognizable appearance with significant natural, biological-ecological, esthetic and cultural-historical values, which developed as a result of the interaction of nature, natural potentials of the area and traditional life of local residents. " The following protection regime is planned to be established in "Middle Mostonga": (1) protection regime of the II degree and (2) protection regime of the III degree and (3) protection zone. The total area of the area proposed for protection is 3,130.66 ha, with the regime of the II degree of protection amounting to 695.81 ha (22.23%) and the regime of protection of the III degree of protection 2,434.85 ha (77.77%) (Figure 2).

The proposed set of ecological indicators of sustainable tourism may be identical for the II and III levels of protection, but the model of sustainable development must differ in the measures of tourist activities and the number of tourists visiting this area. While the presentation

and promotion of its values is enabled in the entire area of the area intended for protection, it is envisaged that in the II level of protection, activities that would violate the overall values of this area will be limited. This primarily refers to the ban on movement outside the dirt roads and paths marked for the tourist activities.

Conclusion

The fundamental argument of this paper is that selection and implementation of the ecological indicators of sustainable tourism must be considered from the very beginning in the proclamation of some protected area. In this case, it is very valuable habitats of salt steppes and forest-steppes in the north of Serbia. During the research period (2016-2019), a significant number of rare and protected species were identified here, as well as the conservation of habitats that were representative at the level of the Pannonian Plain. Even though this area does not leave obvious exceptional landscape characteristics, due to its representativeness and preservation, it is extremely suitable for the development of ecotourism.

Developing a framework for the application of sustainable tourism indicators according to the results of our researchmust start from tight integration with nature protection measures and with nature protection institutions. It is impossible to provide data that would give insight into the sustainability of tourism without the data that can be provided by field work of employees in nature protection (Management staff of protected area, Provincial Institute for Nature Protection as leading institution for nature protection in Vojvodina). This especially refers to the data on the number of protected species, individuals (units) within populations, as well as the degree of habitat preservation.

In forming the list of indicators for encouraging the development of ecologically sustainable tourism, we mostly relied on the list of indicators recommended by a group of WTO experts. Out of a total of 160 indicators, we realized that it is possible to apply those related to the number of protected species, the number of individuals (units) within populations and habitat endangerment. We have added to the list of these indicators those that can show the interest of the tourism industry for the development of tourism in this area, and they relate to: existence of guided visits, printed self-explanatory materials, interpretive and informative panels, trails, interpretation centers, nature schools, educational itineraries, etc.).

Finally, this paper supports the initiative to introduce the creation of a list of sustainable tourism indicators as an integral part of the process of declaring new protected areas in Serbia. It is quite certain that it also carries a dose of subjectivity, which, from a time distance, can be discussed with several arguments. Therefore, it is necessary to subject the list of indicators to revision and new verification in a period of three years, which would enable the correction of subjective conclusions, which is inevitable with the indicators of sustainable tourism.

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