

TOURISM AND ENVIRONMENTAL PROTECTION – AN ANALYSIS OF THE INDICATORS OF SUSTAINABLE TOURISM IN PROTECTED AREAS

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Abstract

Since tourist activities are directly related to natural resources, it is clear that the quality of the environment significantly determines the tourist visitation of certain destinations and regions. This paper presents the results of an analysis of the indicators of sustainable tourism developed by the World Tourism Organization (UNWTO), based on the example of the National park (NP) Đerdap (Serbia). The research included the analysis and evaluation of indicators related to the ecological value of the area and the direct impact of the tourist activity on nature protection. It has been found that the NP Đerdap has strong ecological attributes and that tourism does not significantly damage the environment. However, the unsustainable status of certain indicators (damage to forest ecosystems, water quality, the presence of landfills in the NP and the lack of water purification and recycling systems in tourist facilities) has also been identified.

Key Words: *indicators, evaluation, environment, NP Đerdap, Serbia*

JEL classification: Z32

Introduction

The continuous degradation of the natural environment due to the impact of human actions resulted in the establishment of protected areas at the end of the 19th century (Colchester, 2004), although, according to some historians, some areas in India had been specifically designated for the protection of natural resources already two millennia before (Holdgate,

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1999). These areas have been proven to be highly significant in many respects, such as the preservation of biodiversity, maintaining the productive capacity of the related ecosystems, protection of cultural elements, rural development, etc. (Colchester, 2004).

Over the past two decades, protected areas have become popular destinations for nature tourism and an important component of the international tourism industry. The intrinsic relationship between tourism and protected natural resources has been an important topic among authors dealing with the development of tourism industry (Eagles & McCool, 2002; Bushell & Eagles, 2007; Brankov, 2010; Bjeljac et al., 2012; Sivalioğlu & Berköz, 2012; Беляц et al., 2013; Bjeljac, 2015; Brankov et al., 2017). According to Eagles et al. (2002), “protected areas need tourism, and tourism needs protected areas. Though the relationship is complex and sometimes adversarial, tourism is always a critical component to consider in the establishment and management of protected areas” (p. xv). The promotion of ecological forms of tourism can be a solid basis for the integrated social and economic development of protected areas and it may encourage the activation of the local human resources (Hovardas & Poirazidis, 2006).

National parks are the most complex category of protected resources. Due to their protected status, these areas should conform to the sustainable forms of tourism development (Brankov, 2010; Brankov et al., 2015; Brankov et al., 2017). As any form of tourism can have negative impacts on the resources necessary for tourism activities, the management of national parks in the sphere of tourism should be observed as a serious challenge.

Serbia designated five national parks, which are fully accessible for tourist visits, though with some limitations necessary in protection zones. National parks are managed by dedicated public companies (PC), in accordance with the Law on National Parks. According to Herrick and McDonald (1992), we can observe national parks as tourist destinations that “are considered to be objective entities with a series of quantitative characteristics“. These characteristics can be measured based on certain criteria and on various levels (Arabatzis & Grigoroudis, 2010). Therefore, the subject of this research is the analysis of the relationship between tourism and environmental protection in the National Park Đerdap, through the interpretation of the indicators of sustainable tourism development.

Study area

The Đerdap National Park is located in the north-eastern part of Serbia, on the border with Romania. The area was declared a national park in 1974. It covers the territory of three municipalities (Golubac, Majdanpek and Kladovo), i.e. a total area of 637.68 km² (Figure 1). The NP Đerdap includes the narrow corridor of the Đerdap Gorge, i.e. its right valley slope side and the coastal section of the Danube from Golubac to Karataš, reaching 100 km in length (Nikolić, 2006; Prostorni plan područja posebne namene NP Đerdap, 2013).

Its main feature is the composite river valley of the Danube. In the Đerdap gorge, it consists of four gorges and three valleys, which alternate with each other. The Đerdap gorge is bounded by the Danube river on one side, whereas on the other it is surrounded by the low-mountain area (Severni Kučaj, Liškovac, Velika Reka and Miroč).

Picture 1: *Position and boundaries of the National Park Đerdap*



Source: *Made by the authors of the paper, 2018.*

The specific historical development, favourable climate and complex geomorphological characteristics led to great biogeographic richness and diversity. The area of the NP Đerdap is today a unique nature reserve of tertiary flora and fauna and it is represented by more than 1,100 plant species (Leksikon NP Đerdap, 2015). The unique natural conditions enabled the survival of diverse flora and fauna marked by endemic and relictual species.

Due to the favourable living conditions, humans have constantly been present in this territory, as evidenced by numerous archaeological sites and cultural monuments. An important element of the historical and cultural identity of the NP Đerdap is a diverse cultural heritage, which, in this case, can be observed as "...the basis of every culture, not only a representation of the past, but also an element of the present and future" (Terzić et al., 2015). Thanks to all of the above, the NP Đerdap is abundant in representative and attractive natural and cultural values.

Methodology

The method that relies on the indicators of sustainable tourism development defined by the World Tourism Organization (WTO, 2004), was applied in this study. Within this approach, the UNWTO developed about 50 problem topics (each with about 10–15 subtopics), classified into four categories (economic, social and cultural, environmental and management). Within each problem topic and subtopic, sets of indicators for tourist destinations were proposed. The final list included about 1000 potential indicators. In order to make the selection and reduce the number of indicators, the UNWTO elaborated an indicator selection procedure, which included an evaluation of the indicators using the proposed criteria.

This paper presents the results of a wider research of the indicators of sustainable tourism development in the national parks in Serbia (Brankov, 2015). We focused on the indicators defined within the problem topic related to nature protection and the impact of tourism on the environment. Due to the large number of proposed indicators within this topic, they were first evaluated using the aforementioned evaluation criteria (relevance, feasibility, credibility, clarity and comparability). In this way, the indicators to be included in the research were selected. Based on this, the analysis included a total of six indicators related to the ecological value of space (*the degree of protection; the recognition of international programs; protected, endemic and endangered species; the damage to forest ecosystems*), as well as the direct influence of tourist activities on nature protection (*river water quality, illegal landfills and purification and recycling systems*).

The analysis of the indicators of sustainable tourism

The degree of protection – *The Spatial plan of the Special Purpose Area of the National Park Đerdap* defines three zones of NP protection. The

directions of use and the purpose of the protected territory are thereby defined, and the type of protection regimes for each zone is determined based on its purpose and function.

The highest protection zone (degree I) covers an area of about 58.46 km² and includes 18 spatial units, representing the most valuable part of the NP. The zone under the protection degree II extends over an area of about 130 km² and includes 14 spatial units, falling into the category of the 'other natural values' of the national park. This territory covers the area in the vicinity of the sites under the highest degree of protection, the springs and the valleys of the Danube tributaries, the steep sections in the Danube Gorge, karst areas, etc. The zone under the protection degree III extends over an area of about 449 km². In this zone, selective and limited use of natural resources is allowed, as well as the following activities: actions aimed at improving the protected area, environment and cultural-historical values; the development of villages; the improvement of the economic condition and the living conditions of the local population; the construction of residential, infrastructure and tourist facilities.

The recognition of international programs – The NP Đerdap was granted a protected status on the basis of several different international conventions and documents and was declared an (Predlog plana upravljanja NP Đerdap za period 2017-2026. godina, 2016):

- *Internationally important area for birds* – IBA (Important Bird Areas), due to the great diversity of ornithofauna and rare and endangered species of birds. The area is established within the program *Birdlife International* under the name 'Đerdap' and it covers the area of the NP (with 170 identified species; it is assumed that about 200 species are living in the area) and Mala Vrbica, which includes marshes, loess sections and a fishpond between Kladovo, Kostol and Mala Vrbica (with 120 identified species; it is assumed that about 170 species are living in the area). This IBA territory was nominated as a *Ramsar area* in 2014.
- *Internationally important area for plants* – IPA (Important Plant Areas), established according to the program *Plant Life International – Plant Europe* under the name 'Đerdap and Kladovo-Radujevac'.
- *Selected prime area for butterflies* – PBA (Prime Butterfly Areas), established according to the program *Butterfly Conservation Europe* under the name of 'Đerdap and Mali krš' (with a total of 104 species and 8 target species in Đerdap and 86 species and 7 target species at Mali Krš);

- *Carpathian region* – NP Đerdap is the only area where the Framework Convention on the Protection and Sustainable Development of the Carpathians is applied in Serbia.
- *Potential "Emerald" area* – identified under the name 'Đerdap National Park', as part of the Emerald Network of Areas of Special Conservation Interest (ASCI).

It is noteworthy that the NP Đerdap is included in the preliminary list of sites nominated by Serbia for inscription on the UNESCO World Heritage List under the World Heritage Convention. Also, the NP Đerdap is one of the eight areas in Serbia nominated as a biosphere reserve under the UNESCO program *Man and Biosphere* (MaB) (Predlog plana upravljanja NP Đerdap za period 2017-2026. godina, 2016).

Protected, endemic and endangered species – According to the latest research, there are 1088 plant species growing in the area of the NP. In this area, 123 species of plants are protected, 42 of which are strictly protected (Leksikon NP Đerdap, 2015). The vegetation includes 70 plant communities, more than 50 of which are forest plants and bushes and 35 are relictual (Proposal of the Management Plan for the NP Đerdap for the period 2017–2026, 2016). The flora is not only marked by the richness of species but also by the fact that there are plants of different distribution, origin and age.

Due to a complex of deep gorges and a humid climate, without great temperature fluctuations, during the ice age, the ancient tertiary species of the Central European forest flora found a safe habitat in this area. In the Đerdap Gorge, this tertiary flora has survived in an almost unchanged form. The tertiary relicts are represented with 13 species – Turkish Filbert Hazel (*Corylus colurna*), English walnut (*Juglans regia*), Mediterranean hackberry (*Celtis australis*), etc. (Leksikon NP Đerdap, 2015).

In the area of Đerdap, 16 Balkan endemic species have been identified. The Preliminary Red List of Serbian Flora includes 48 plant species from this NP due to their rarity and vulnerability at the national level. In the *Red Book of Flora in Serbia – extinct and critically endangered taxa*, 10 species from the territory of the NP Đerdap are listed, three of which have disappeared: *Veronica bachofenii*, *Crocus banaticus* and *Tulipa hungarica* (Leksikon NP Đerdap, 2015).

Among the animal species, those having the status of protected or endangered species are particularly important. There are 63 species of mammals in the NP Đerdap (36 species are protected or strictly protected and 14 species are protected by the Law on Wildlife and Hunting) (Vodič kroz biologiju i kulturnu raznovrsnost NP Đerdap, 2012). A particularly endangered species of mammals, under the strict protection regime, is the bat. There are 15 different types of bats in the NP Đerdap region.

About 170 bird species have been identified in this region, but it is estimated that the actual number of diverse species is about 200 (Vodič kroz biologiju i kulturnu raznovrsnost NP Đerdap, 2012). There are 39 species in the priority category – listed in the Annex 1 of the European Commission's 2009/147 Birds Directive. This category includes: Pygmy cormorant (*Phalacrocorax pygmeus*), Little egret (*Egretta garzetta*), Black-crowned night heron (*Nycticorax nycticorax*), Purple heron (*Ardea purpurea*), Little bitern (*Ixobrychus minutus*), White Stork (*Ciconia ciconia*) and other bird species (Predlog plana upravljanja NP Đerdap za period 2017-2026. godina, 2016).

There are 58 fish species in the aquatic habitats of the NP Đerdap. The category of strictly protected species includes: the sterlet (*Acipenser ruthenus*), European weatherfish (*Misgurnus fossilis*), Crucian carp (*Carassius carassius*), tench (*Tinca tinca*), etc. (Vodič kroz biologiju i kulturnu raznovrsnost NP Đerdap, 2012).

Damage to the forest ecosystem – Although forest ecosystems are predominant in the NP Đerdap, no significant studies in the past have been carried out that would lead to the development of a special forest management system within this NP. For this reason, detailed planning has been undertaken over the past several years in order to create a unified plan for the future.

The forest land covers 5,0376.13 ha of the NP, 38,226.13 ha (75.8%) of which are owned by the state and 12,150.00 ha (24.2%) are privately owned. Forest covers 97% of the forest land, which is considered to be the optimal forestry.

The Đerdap National Park Public Company defines the main causes of damage to forest ecosystems in the NP Đerdap. The deterioration of the health status of the forest adversely affects:

1. The drying of forests;

2. Forest fires;
3. Pests of entomological and phytopathological origin.

On the territory of the NP Đerdap drying is observed in nearly all forest ecosystems (about 370 km²), but it has a moderate intensity in most of the territory (Table 1). This phenomenon is most often caused by biotic factors (*Gipsy moth (lumantria dispar)*, harmful insects, fungi, etc.), but the causes of the decline of forest ecosystems also include changes in climatic factors and increased pollution. Drying has affected all types of trees, whereas sessile oak trees are the most severely threatened (Predlog plana upravljanja NP Đerdap za period 2017-2026. godina, 2016).

Table 1: *Forest drying intensity in the NP Đerdap*

Intensity of drying	Area (ha)	%
0-5	25 245,00	66,55
6-10	4 618,00	12,17
11-20	4 908,00	12,94
over 20	3 162,64	8,34
Total	37 933, 64	100,00

Source: *Godišnji plan gazdovanja šumama za 2014. godinu, 2013.*

The forest area of the NP Đerdap is exposed to a medium fire risk. This type of threat is the greatest in spring and autumn, during long, warm and dry periods. According to the categorization of forest fire threats, three categories of vulnerability have been identified in the area of the NP Đerdap:

- II category, which includes hardly flammable vegetation (mixed forests of oak species, pure and mixed forests of oak and beech on all substrates except limestone) on the area of about 240 km²;
- III category, which includes moderately flammable vegetation (black pine, spruce, pine and fir tree culture) on the area of 4 km²;
- IV category, which includes easily flammable vegetation (the canyon of the Brnjica River, Boljetinska River and the Danube River) on the area of 121.5 km².

The degradation of forest ecosystems in the NP Đerdap also causes pests of entomological and phytopathological origin. The forests are most endangered by oak defoliators (green oak tortix, mottled umber, winter moth), which lead to reduced growth and physiological weakening of trees. If the pests persist for several years, the trees are attacked by other

secondary insects and fungi, eventually leading to drying. In order to prevent this, there is a regular annual monitoring of the populations of the most harmful insects.

The deteriorating health of forest ecosystems is also affected by the damage caused by glaze, more precisely from the ice retained on trees, resulting in severe damage, fractures of large branches or whole trees. In the NP Đerdap, the ridge – the watershed of the Kožica and Pesača basins, is particularly vulnerable.

Quality of river water – The data on the water quality of the Danube river between 2006 and 2011 provided by the Republic Hydro-meteorological Service of Serbia (http://www.hidmet.gov.rs/index_eng.php) were used to analyze this indicator. A systematic analysis of the river water quality was carried out at three hydrological stations: Veliko Gradište, Dobra and Tekija. The obtained data were used to determine the pollution degree of the river water based on the WPI (Water Pollution Index) (Brankov et al., 2012).

Observing the entire six-year period cumulatively, (Table 2), it can be concluded that all analyzed profiles fall into the water quality class IV, with the lowest WPI value registered at the Tekija profile (2.28), and the highest at the Dobra profile (2.90). The analysis shows that the lowest pollution in the 2006–2008 period was recorded at the profile (Tekija) (class III of water pollution according to WPI values), with the exception of 2008, when it slightly exceeded the lower limit for the water class IV. During 2009 and 2010, the lowest pollution was recorded at the Dobra profile (IV class). In 2011, the lowest values of the WPI index were recorded at all stations.

Table 2: *The value of the WPI index in the 2006–2011 period*

Hydrological station	2006	2007	2008	2009	2010	2011	WPI
Veliko Gradište	1.77	2.85	1.53	3.28	4.10	1.15	2.44
	III	IV	III	IV	V	III	IV
Dobra	2.71	5.33	2.11	2.90	3.27	1.11	2.90
	IV	V	IV	IV	IV	III	IV
Tekija	1.22	2.18	1.55	4.16	3.48	1.11	2.28
	III	IV	III	V	IV	III	IV

The annual WPI analysis shows the deviations of values over years for the same hydrological stations. In 2006, the WPI values indicated class

II–IV of river water pollution. A similar situation was recorded in 2008. During 2007, the quality of water varied from class IV to class V, just like in 2009 and 2010, when the recorded values indicated class IV and class V. However, in 2011, quality class III was recorded at all profiles.

As far as the analysis of the influence of individual parameters on the degree of pollution is concerned, the increased values of the elements that serve as the indicators of organic pollution (BPK5, saprobiological index, coliform germs) were registered. The increased number of germs indicated significant pollution coming from the communal waters of the settlements on the Danube bank. Increased values of BOD5 are typical of the biological activity of wastewater and they are the main indicator of organic pollution. There are numerous causes for increased values of the above-mentioned parameters. Unregulated sewage systems and the absence of wastewater treatment plants in the municipalities of the Đerdap sector (Golubac, Majdanpek and Kladovo) are the most important ones. This results in the direct discharge of municipal and industrial wastewater into the river receivers. Consequently, the Danube is contaminated with bacteria of faecal origin, especially during summer. Of particular importance is the problem of domestic wastewater in the village of Boljetin, in the strict protection zone of the NP Đerdap, where a large percentage of households do not have cesspits, and wastewater flows directly into the Boljetinska River, the Danube tributary (Master plan turističke destinacije “Donje Podunavlje”, 2007). In addition, there are a large number of uncontrolled dumpsites and large quantities of waste (illegal landfills) in the vicinity of urban and rural settlements.

Over a six-year period, increased orthophosphate values were observed (10–18 times higher than the defined standards for the class I) at all analyzed stations. Phosphorus reached the Danube in the form of orthophosphates through sewage and industrial outflows, but also from agricultural land and pastures. Increased concentrations of this element affected the growth of the water flora. In order to decompose this flora, aerobic bacteria consume oxygen from the water, which adversely affects the living world of the river. It has been scientifically proven that phosphorus that enters the Danube in the Danube–Tisza–Danube channel zone reaches as far as the Black Sea, which indicates the contamination of the wider Danube basin (Ilić, 2004, according to Milanović et al., 2011).

The analysis of the parameters used to calculate the WPI index in the Đerdap sector of the Danube river leads to the general conclusion that

organic pollution dominates (coliform germs, BPK5, saprobiological index, etc.), while the measured values of heavy metals are mostly within the allowed limits or slightly above them; accordingly, their impact on water pollution is relatively small.

All of the listed causes of water pollution negatively affect the possibilities of tourist use of the Danube's water. The obtained WPI values confirm that, in the area of the NP, the river water mainly falls into the category IV, although in 2011, the category III was also recorded. During the two-year period (2009–2010), water was constantly in the categories IV or V (impure and polluted water), which significantly affected its tourist attributes. Although the values of harmful elements in the Danube water still allowed bathing and recreation, it is clear that any further pollution would contribute to the emergence of new problems regarding the preservation of the ecological stability of river systems.

Bathing tourism (beaches in Golubac, Donji Milanovac, Tekija, Kladovo, etc.), nautical tourism (cruising along the Đerdap gorge) and sport and recreational tourism (various events and sport and recreational activities on the water) are an important segment of the tourist offer that directly depends on the quality of river water. In this respect, it is necessary to ensure the adequate management of the Danube basin in the context of a wider international cooperation.

Illegal landfills and systems for purifying and recycling – although the environment in the territory of the NP Đerdap is mainly preserved, the communal infrastructure is one of the problems that have not been resolved yet. According to the *Rulebook on the internal order in the NP Đerdap* (2014), the following activities are forbidden in the area of the NP: the disposal of municipal, industrial and construction waste and packaging (except for municipal and agricultural waste originating in the protected area), as well as the unregulated discharge of wastewater from households, industrial and other facilities, contrary to water management regulations. However, the situation is quite different in reality.

According to the *Spatial Plan for the Special Purpose Area of National Park Đerdap*, no dumpsites are officially allowed in the area. However, in reality, the presence of spontaneous dumps in this area is a serious problem. Taking into account that the territory of the NP Đerdap is not entirely covered by a developed waste collection system, waste is deposited on

numerous illegal landfills along roads, on agricultural land, near public buildings, in green areas within residential areas and along rivers.

As the collection of municipal waste in the territory of the settlements within the NP Đerdap is under the jurisdiction of municipal utility companies, the underlying cause of this phenomenon is the poor awareness of the local, predominantly rural inhabitants, who do not use utility services. The dumps located at distances less than 100 m from the settlement or 50 m from the river bank are the greatest risk to the environment and human health. However, such dumps are the most frequent in the territory of the NP Đerdap. Illegal landfills can be found along the roads and on the slopes of the road embankments.

According to the *Report on the number of landfills and dumpsites in the area of the National Park Đerdap* (2010), 58 landfills are registered in this area. The Public company NP Đerdap regularly organizes the cleaning of such landfills, which reduces their number. However, new ones are constantly emerging. Local people and members of non-governmental organizations are involved in these actions, along with the employees. Despite their exceptional ecological value, Porečki Zaliv and the canyon of the Boljetinska River are especially endangered by the constant formation of spontaneous dumps.

The shared feature of all accommodation and catering facilities of the NP Đerdap is that they do not have their own wastewater treatment systems, due to which wastewater is discharged directly into the urban sewage system without purification. Also, hotel facilities and restaurants, as well as all tourism companies, deposit waste into containers that are used by households. This type of waste is not recycled within the tourist facilities.

The interpretation of the indicators

Once the analysis of the selected indicators had been completed, it was necessary to interpret the results, in order to define the guidelines for future actions related to the management of the protected area. This process involved the defining of reference points, i.e. the criteria by which to assess the value of individual indicators or threshold values, which identified the critical changes of the indicators. In this case, determining the so-called 'acceptable range of values' was performed in order to determine whether the indicator was out of the identified range in a positive/negative sense. If the indicator value deviated from the

acceptable range in a negative context, that was a signal for future action on the part of the management aimed at improving its status and bringing it to a sustainable level.

Table 3: *Interpretation of the indicators*

Issue theme	Indicator	Acceptable range	Interpretation
Nature conservation and impact of tourism on the environment	The degree of protection	Defined zone of area protection with different purpose and activity control	GOOD
	The recognition of international programs	The presence of international recognition	GOOD
	Protected, endemic and endangered species	Interpreted on the basis of the reference point	GOOD
	Damage to the forest ecosystems	Interpreted on the basis of the reference point	BAD
	Quality of river water	III - IV class (WPI)	ACCEPTABLE
	Illegal landfills and systems for purifying and recycling	The absence of landfills, 30-50% of accommodation capacities	BAD

The acceptable range was defined by consulting the results of modern studies on tourism – the Samoa Sustainable Tourism Indicator Project (SSITP) and the Kangaroo Island Tourism Optimization Management Model (TOMM) (UNWTO 2004). The selected studies are based on the use of indicators of sustainable tourism and they specify the acceptable values for each indicator. A successful example from practice – the NP Plitvice Lakes (Croatia), was used as a reference point when estimating the value of certain indicators.

The results of the evaluation of the indicators are shown in Table 3. The indicators related to nature protection are very well rated, indicating that natural values are the main attributes of this area. This is evidenced by the three-stage protection regime in the NP Đerdap that should enable sustainable management of the protected territory. Priority actions were set for each regime, and the indicator related to this issue was rated as “good”. The zoning ensures that the most environmentally valuable areas

are strictly protected, and the use of territory for tourist purposes is allowed on a limited scale. The indicator relating to the presence of protected, endemic and relict species is also highly rated. There are numerous endemic and relict species in the NP Đerdap, as well as those endangered and protected by national laws and international conventions. Similarly, in the reference site – the Plitvice Lakes National Park, the presence of the aforementioned flora categories is significant and it exceeds 1% of the total biogeographical diversity. Directly related to this indicator is the recognition of international conventions and programs, since it is based on the presence of the analyzed biogeographical categories. Keeping in mind the ongoing process of forest drying (primarily conifers) in the territory of Serbia, which culminated in 2012–2013, the indicator of the damage done to forest ecosystems is not on a sustainable level. Unlike the NP Plitvice Lakes, where extreme small-scale drying was registered during a ten-year period (2003–2013), intensive drying in almost all forest ecosystems is present in the NP Đerdap. More than half of the total territory of the NP is affected by drying, where the intensity of drying is exceptionally strong on about 5% of the protected territory (31.6 km²).

The values of the indicator of the river water quality are within an acceptable range and the obtained WPI values confirm that the Danube water in the territory of the NP Đerdap mainly falls into the class IV (or even V), marked by impure water, with a tendency of quality improvement in 2011 (class III). As the river water is used for bathing and recreational purposes, any further deterioration of its quality would affect the sustainable tourism development. The analysis identified the unsustainable status of the indicator 'the presence of illegal landfills and systems for purifying and recycling'. Illegal landfills and dumpsites are usually located along the banks of the rivers and roads and they are a serious problem. Accommodation and catering facilities in the territory of the NP Đerdap do not have their own wastewater treatment systems and do not recycle their own solid waste, which is contrary to the current environmental standards.

Conclusion

The indicator analysis confirms that the NP Đerdap has strong ecological values and that tourism does not cause any significant damage to the environment. Although there is a good basis for planning and development of sustainable tourism in the NP Đerdap, it is necessary to

resolve the identified development problems. This primarily applies to unsolved ecological issues due to the absence of water purification and recycling systems in tourist facilities, and generally, in the territory of the municipalities within the NP. Also, a permanent solution to the formation of illegal landfills in the NP Đerdap is yet to be devised. All of the listed issues directly cause environmental deterioration and particularly affect the vulnerable hydrographic resources, which are one of the main tourist values of the NP.

In order to achieve the heterogeneous goals of sustainable tourism development and eliminate the observed development problems, it is necessary to implement some actions in the following period:

- infrastructure regulation (proposal: construction of appropriate devices for wastewater treatment and a local government initiative to determine a special point for waste collecting and recycling);
- the promotion of the importance of environmental quality for the sustainable tourism development of national parks, through the education of various stakeholders (visitors, community, employees in tourism), etc.;
- devising local ecological action plans with detailed operation guidelines;
- defining the indicators of sustainable tourism as a system for early problem identification, and monitoring the achieved effects in the sphere of protected area management;

These activities should become the basic development orientation of national parks. However, ecological criteria should not be neglected in an attempt to create a sustainable tourist offer. For all entities of the tourism industry, especially the leading accommodation capacities, the management of resources based on ecological principles must be the basic business goal. In order to successfully implement the mentioned activities, joint actions of planners and managers of tourism development, experts within different fields and decision-makers at the micro and macro levels are necessary. In this regard, the results of this research represent an initial step, since they are adaptable to different users (academic structures, managers of national parks and other protected objects, tourist organizations), which makes them directly applicable. The results of this research may be useful in the context of future activities related to the management of tourist activities in national parks. Since the application of indicators has enabled us to identify the results of the past

actions and the existing and imminent problems, it also makes it possible to direct future management activities in a sustainable direction.

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