

## ARTICLES

**IDENTIFICATION OF NEGATIVE FACTORS AFFECTING SUSTAINABLE DEVELOPMENT IN SUTJESKA NATIONAL PARK****AUTHOR*****Edin Hrelja****Department of Geography Faculty of Science, University of Sarajevo, Zmaja od Bosne 33-35, 71000 Saajevo, Bosnia and Herzegovina,**e-mail: edin\_hrelja@yahoo.com*

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**ABSTRACT*****Identification of negative factors affecting sustainable development in Sutjeska National park***

*The topic of research are the problems of sustainable development of Sutjeska National Park. Within this, general geographic features are given in detail, while forms and degree of tourism pressure, as well as the intensity of environmental endangerment within the protected natural area, are analyzed. The forms and intensity of anthropogenic influences in the exploration area changed considerably during the historic-geographic development, from the use of area for summer pasture, through the exploitation of natural resources (forests and mineral raw materials), to tourism-motivated valuation in recent times. Such social influences have left visible traces in the natural environment and the landscape, which are reflected in the distorted ecological balance (spatially differentiated reduction of natural vegetation, on account of the expansion of pasture landscapes) and various forms of endangerment of the environment. Existing geoecological problems call for the future assessment of the resource base of the National Park to be strictly directed towards the principles of sustainable development. This implies, first of all, the development of sustainable tourism within the framework of tourism carrying capacity and constant care for the preservation of heritage (natural and cultural) as the strategic goal of development policy.*

**KEY WORDS***Sutjeska National Park, tourism pressure, sustainable development, geodiversity*

## **1.Introduction**

The concept of sustainable development is based on interaction of three interconnected systems: social, economic and environmental. The goal of sustainability is to strike a dynamic balance between the development processes of human communities with natural resources (Matutinović, 2007). Proper spatial management as a strategic development resource implies a long-term increase in its value, while inadequate spatial management usually results in its gradual degradation (Kunst, 2011). Sustainable development issues and its causes and effects are common topic in contemporary scientific research, while protecting natural areas are at the margins of such scientific interest. The aim of the study is to determine sustainable development impact factors in protected natural areas identified on the basis of a methodology for monitoring management effectiveness - Management Effectiveness Tracking Tool (Stolton, 2007). The assumption is that tourism development, construction of recreational infrastructure, agriculture and exploitation of forest resources have the greatest influence in the Sutjeska National Park.

In 1952, the Government of the Socialist Republic of Bosnia and Herzegovina passed the Decision on the allocation of Perućica (1,234 ha) from regular forest management, as a forestry facility needed for scientific research and teaching. The wider area of Perućica was declared a Sutjeska National Park in 1962. Sutjeska National Park is distinguished in this category of protection, primarily due to the memorial significance of the PLS (People's Liberation Struggle) but also due to the complementary natural-geographic sights consisted of rarities and the diversity of its natural heritage (geological, geomorphological and biological).

The distinguishment and protection in the category of national park contributed to the development of tourism, which enabled appropriate spatial interventions (construction of monuments, roads, trails, tourist accommodation capacities etc.) and reflected in the transformation of landscapes. From the point of view of sustainable development, it is important to note that tourist facilities and infrastructure are mainly localized in the area of Tjentište, which contributed to the preservation of natural vegetation, i.e ecological system in the wider area of the Park. Tourism development has also been accompanied by an increase in the number of visitors which reached 900,000 visits in the pre-war period (Prostorni plan NP Sutjeska, 2013).

War events, including the destruction of the material structure, have influenced the decay of tourist development in the Park in the mid-1990s (6,000 visits (Prostorni plan NP Sutjeska, 2013)), almost reaching the initial level from the beginning of the 1960s.

Many objects of the tourist industry have been demolished and the natural heritage, due to the poor financial situation of the population, has been exploited, which has significantly affected the landscape of the protected natural area. In the recent period, especially after the adoption of the IUCN classification regime in 2003, the situation is gradually improving. Devastated tourist facilities and accompanying infrastructure are being restored as a prerequisite for a new era of tourist development.

## 2. Geographical location

Sutjeska National Park is located on the far south-eastern part of Bosnia and Herzegovina, on the border with Montenegro. In the region-geographic perspective, it belongs to the eastern part of Central Bosnia, the subregion of Gornje Podrinje. The protected area extends into two administrative-territorial units – the municipalities of Foča and Gacko.

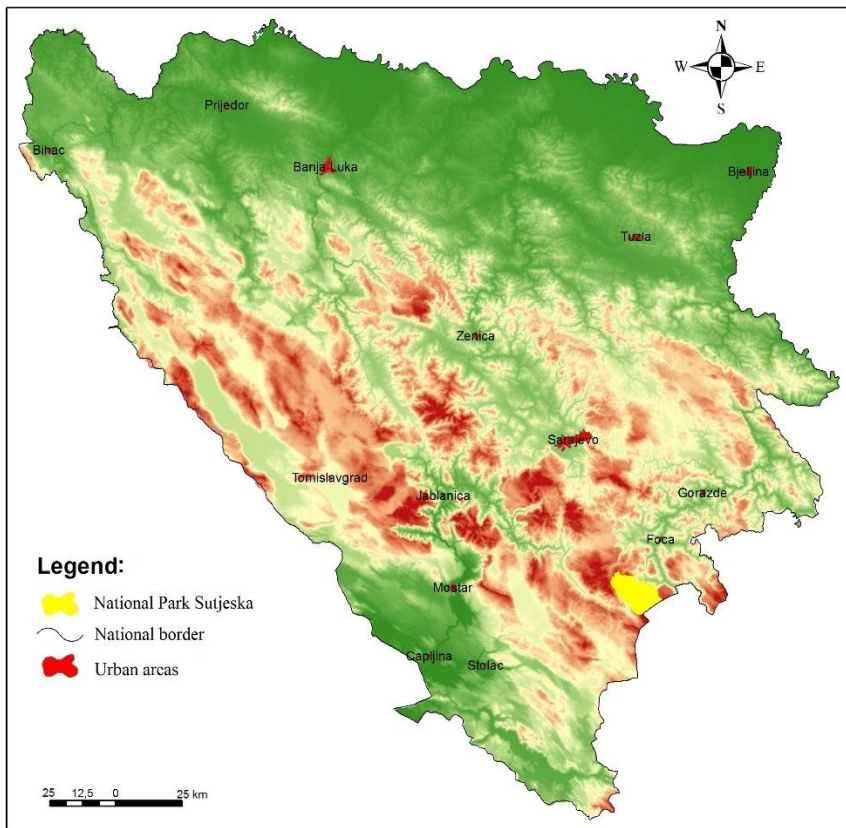


Figure 1. Location of National Park Sutjeska  
Source: Hrelja, 2017.

From a geological point of view, the wider area of the Park was built mainly from the sedimentary and clastic rocks of Mesozoic age, with the presence of the magma rocks (Trubelja, Miladinović, 1969). Triassic sediments have the largest spread within the protected natural area. Cretaceous sediments occupy larger areas in the central and southwestern parts of the Park, while the Jurassic sediments are fragmented in the central and southeastern parts of the area. Sutjeska National Park is located in the highest mountain range of Bosnia and Herzegovina, in the northeastern part of the Upper Central Dinarid Geomorphological Region (Lepirica, 2009). From the morphostructural aspect, this high-altitude belt of the Central Dinarides is dominated by a terrain created during Alpine orogenesis (Bušatlija, 1969).

This part of the Dinarides is characterized by intense terrain fragmentation, with deep canyons and cliffs over which high mountain peaks emerge. The explored area is under the influence of the Mediterranean and continental climate, with the characteristics of moderate geographic latitudes. According to the Köppen-Geiger classification, the moderately warm and humid climate (C) and the moderately cold climate (D) are represented depending on the influence factors and the thermal characteristics. The lowest temperatures are in January (Čemerno  $-4,5^{\circ}\text{C}$ , Suha  $-3,1^{\circ}\text{C}$  i Tjentište  $-1^{\circ}\text{C}$ ), and the highest are in July and August with  $13^{\circ}\text{C}$  (Suhoj),  $14,9^{\circ}\text{C}$  (Čemerno), and  $18^{\circ}\text{C}$  (Tjentište). Annual precipitation at Čemerno is 1.527 mm, 1.428 mm in Suhoj and 1.280 mm in Tjentište (Milosavljević, 1969).

The orographic structures of Lelija and Zelengora build up the watershed between the upper Neretva and the tributaries of Drina. The exploration area is mostly under the drainage of Sutjeska River with its most important tributaries Hrčavka and Perućica, and some terrains are in the karstic hydrographic regime. Sutjeska is the left tributary of the Drina with a surface area of  $322\text{ km}^2$ .

Sutjeska National Park is an area of great diversity of flora and fauna. Biogeographic specificity of the area is the result of continental and Mediterranean climate influences. Vertical profile analysis clearly distinguishes the vegetation belts, from pastures, through natural lawns, the transitional woodland/shrub, vegetation shrubs, forests, coniferous forests, mixed forests, areas with scarce vegetation, and areas that are poorly covered by vegetation (bare rocks). One of the largest rainforests in Europe-Perućica (1.434 hectares) is situated in the National Park (Marković, 1970; Plan upravljanja NP Sutjeska, 2013).

### **3. Research methodology**

The methodological concept of the realization of the research is defined according to the objectives and the tasks of the work, related to determining the problem of sustainable development of the Sutjeska National Park. During the work, a number of methods and methodological procedures were used, which ultimately gave a complex result, namely the disturbance of the area was spatially geovisualised, and factors that contributed to its disruption were separated. General scientific methods were applied in the realization of the research: the spatial analysis method, the geostatistical method, the quantitative method, the comparative analysis method (comparative method), the GIS method, field observations method, and the synthesis of all collected and analyzed data.

Research on the topic was conducted in several phases:

The first phase involves the collection of relevant literature dealing with the issue, management and problems of sustainable development of protected natural areas. The second phase implies a detailed analysis of anthropogenic impact factors on the sustainability of the protected area and their spatial arrangement. Field observation are also conducted in this phase of research. The main goal of field observations were confirmation of results obtained by desk work and to collect photo material. The third phase of the research is consisted of uniting analyzed contents and their complex systematization, and providing research results.

### **4. Endangering the geodiversity of Sutjeska National park**

The issues of sustainable development are focused on contemporary scientific research, focusing on the causes and consequences of ever more dramatic changes in the natural environment. Protected natural areas are on the margins of such scientific interest. Less interest in their sustainable development is the consequence of pervasive perception that the natural heritage of such areas is sufficiently protected by the status of the protected area itself (Martinić, 2010; Rodríguez-Rodríguez, 2012). However, in a considerable number of national parks and nature parks, such perception is incompatible with spatial reality, as their environment is increasingly burdened and often overburdened by excessive anthropogenic pressure, above all by tourist development above their capacity level (Hrelja et al. 2016 ).

Anthropogenic influence during historical-geographic development on the natural system of the Park is cumulatively manifested in the existing vegetation cover, i.e the difference between climate zonal and existing vegetation.

The analysis, where the vegetation structure (relations between altered natural vegetation cover and anthropogenised surfaces) was used as an indicator, determined as the result anthropogenic changes in plant cover (reduction of plant communities). Natural vegetation decreased in the total surface area by 4.9%. As the main factors, influencing the changes in the natural environment, the following can be distinguished: forest harvesting, building tourist facilities, weekend houses and supporting infrastructure as well as developing agriculture (through cultivating plots and developing agriculture on predominantly agricultural land in larger areas) (Figure 2).

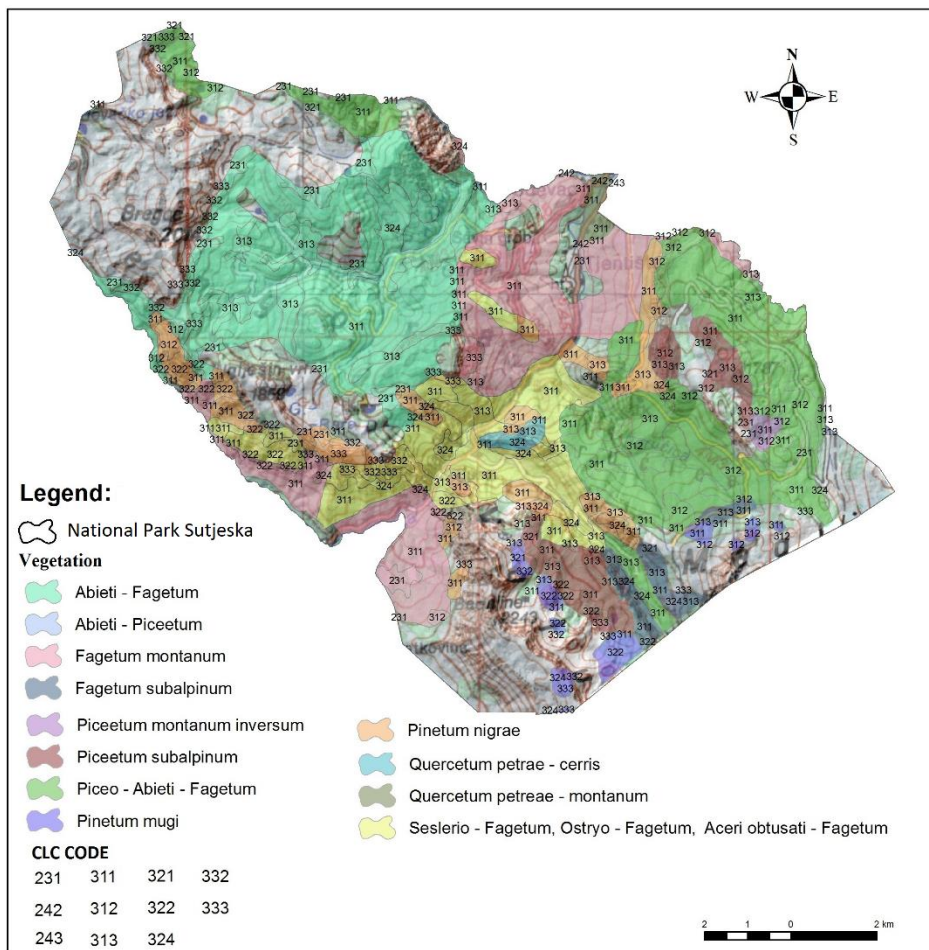


Figure 2. Degree of degradation of natural vegetation in Sutjeska National Park  
 Source: Hrelja, 2017.

Areas used for agricultural purposes are small (1,496.91 ha or 9.32% of the area of the Park) and an extensive land treatment method is usually performed, with minimal or no involvement of artificial fertilizers, pesticides or herbicides. Therefore, apart from the impact on the reduction of the vegetation and the visual degradation of the area, no negative impacts on other component parts of the ecosystem have been expressed.

Until 2010, the economic management of forests, which included cutting and transport of wood assortments (Prostorni plan NP Sutjeska, 2013) was conducted on the territory of the National Park. This way of forest management also implied the construction of forest roads and other supporting infrastructures, which certainly had a negative impact on the quality of the environment (by taking on forest land and its degradation).

Significant negative impacts on the sustainable functioning of the National Park (landscape changes) have also been created as a result of the construction of artificial areas: settlements and facilities intended for tourist exploitation. According to the administrative structure of the Park area, the area is divided between two municipalities (Foča and Gacko) with one inhabited place Tjentište (on the territory of Foča municipality). According to the statistics of the Central Bureau of Statistics of the Republic of Bosnia and Herzegovina and the Institute for Statistics of the Federation of Bosnia and Herzegovina today (according to the 2013 census) the inhabited area of Tjentište has 88 inhabitants, which is 77.6% less than in 1991.

The premises where the tourist facilities are built are very small and occupy an area of 3.43 ha or 0.02% of the total area of the Park. The largest number of tourist facilities, 3,083 ha, have been built in planed areas in the transition zone with the third protection regime. However, although small in size (0.39 ha), private tourist facilities (secondary housing) with ancillary infrastructure built independent of the protection zone represent a problem and a violation of the guidelines defined by the Spatial Plan and the Management Plan for the Protected Natural Area (Figure 3.).

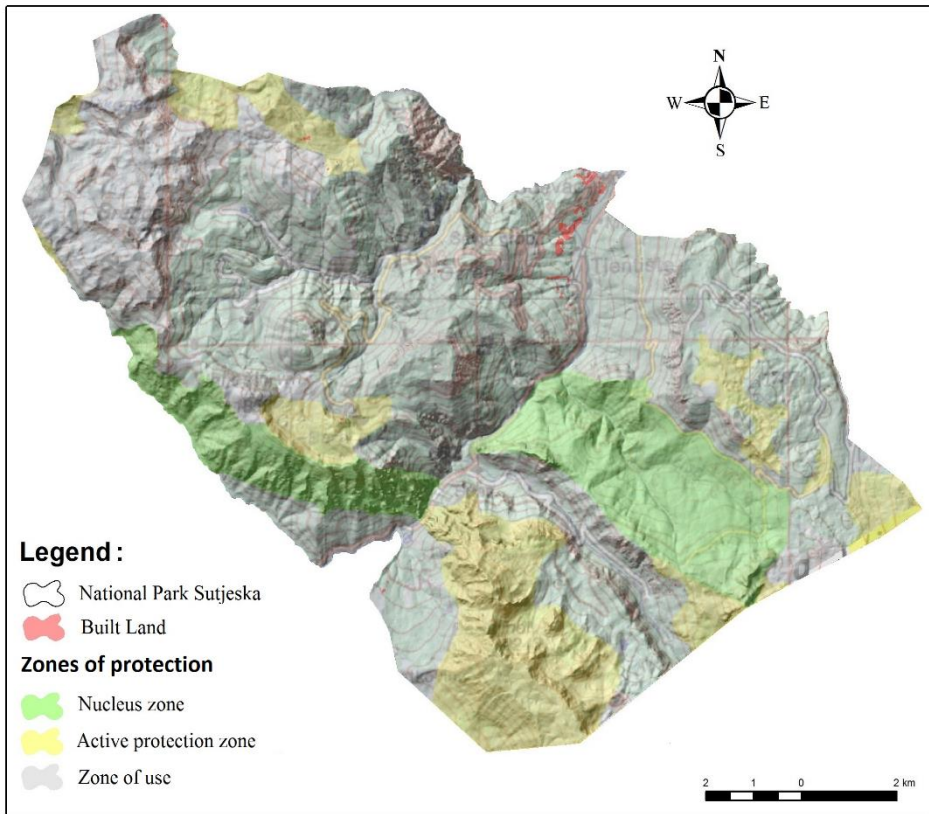


Figure 3. The distribution of construction-built areas in separate protected zones in Sutjeska National Park Source: Hrelja, E., 2017.

In addition to the abovementioned negative effects of socio-economic development, it is very important to mention geocological problems related to water management and solid waste in the Park. The obsolete and overdue infrastructure for collecting and transporting sanitary wastewaters, accumulated in business, accommodation, tourist and hospitality facilities in the National Park, poses a threat to the quality of the closest watercourses (Prostorni plan NP Sutjeska, 2013). Also, the unresolved issue of wastewater collection and purification and their uncontrolled entry into water (especially in lakes) leads to eutrophication of lake water.

There is a strong interest in the use of surface watercourses of the Park for energy purposes. The concession for the construction of small hydropower plants in Sutjeska National Park was given in 2006. However, impact studies have not been approved because of non-compliance with the procedures for making impact studies, especially because the procedure was conducted without the existing Spatial Plan for the area of special purposes of Sutjeska National Park.



A specific problem in the National Park is the management of solid waste. Because of the large area of the Park and the transit road, and due to the existence of a large number of transit visitors as well as excursionists, illegal landfills appear occasionally on the territory of the National Park. Waste landfills are mostly deployed along the main road Foča - Gacko and at places of excursion within the park, thus significantly affecting the visual degradation of space. In addition to visitors who dispose of packaging of food products, waste from the locally populated households is also visible at landfills. The competent municipal communal organization from Foča has not provided waste collection and disposal services so far, and the landfills that occasionally appear are sanctioned by the involvement of the Park administration (Prostorni plan NP Sutjeska, 2013).

## 5. Conclusion

The carried research completely confirmed the assumptions of the stated in research the introductory part of the research. Based on the results of the research, it is possible to outline the following conclusions:

- Sutjeska National Park is characterized by a very valuable natural-geographic and historical-geographical specificities of the area;
- Evaluation of the resource base of the Park is largely left to the random processes, without the use of planning management consistent with sustainable development. The narrower parts of the Park were affected by the intensive tourism characterized by the dynamic construction of tourist-accommodation facilities after 1960. The largest number of tourist facilities was built in the area foreseen for construction, however a considerable number of tourist facilities were built outside this zone of use.
- Due to its favorable traffic position, the Park represents a transit area and is under considerable influence of uncontrolled tourist movements taking place in this area.
- The protected area is nowadays exposed to more significant anthropogenic pressure. Thereat, the most significant impact on sustainable development is the following: forest harvesting, construction of tourist facilities, vacation homes and supporting infrastructure, as well as the development of agriculture (through cultivating plots and development of agriculture on predominantly agricultural land in larger areas).

Confirming the assumptions leads to the conclusion about the existence of important problems of sustainable development of the Sutjeska National Park. In order to solve the accumulated environmental, social and economic problems, it is necessary to develop long-term strategic plans, based on component and complex area research.

When making plans and strategies for future development, special attention should be paid to the features of geographical area, based on which a functional reorganization of area would be performed and would, in doing so, give rise to the assumption of the logical use of natural resources.

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