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CAN WINTER TOURISM BE TRULY SUSTAINABLE IN NATURAL PROTECTED AREAS?

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Abstract: Even though legally protected, many areas worldwide are under a certain level of human pressure. Significant for humanity for many reasons, mountain regions are also threatened because of different anthropogenic activities, especially the ones with developed winter tourism. There are four main ski resorts in Serbia (Kopaonik, Zlatibor, Stara Planina and Brezovica) and the strongest environmental impact is registered on Kopaonik Mountain. In this paper, we tried to answer if winter tourism could be sustainable in protected areas, especially on Kopaonik Mountain, which is recognized as the largest ski resort in Serbia and a natural protected area of the highest state level—a National Park. The main threats to the environment in Kopaonik National Park are logging, building and construction of ski slopes, urbanization, artificial snow use, illegal and unplanned building. Negative consequences of winter tourism development are land degradation, deforestation, loss and fragmentation of natural habitats, ecosystem disturbances, erosion, soil loss and pollution, water and air pollution, noise and light pollution. Harmonizing tourism development with conservation activities within natural protected areas is one of the main priorities of sustainable use of natural values and resources. For the successful and sustainable development of an area, it is necessary to conduct multidisciplinary planning, based on the results from the relevant scientific disciplines.

Keywords: nature protection; human impact; ski resorts; sustainability; Serbia

Introduction

One of the greatest challenges in science today is the prevention and control of massive biodiversity loss, which can be achieved by establishing protected areas. However, human impact is still present in the protected areas and can be of a large scope. Since the Convention on Biological Diversity held in 1992, the total world protected area has nearly doubled itself and nowadays it covers around 14.7% of the terrestrial area worldwide (Jones et al., 2018; UN Environment World Conservation Monitoring Centre, 2017). In Serbia, the first protected area was Obedska Bara Swamp (9,820 ha) established in 1874 and today the total protected area in Serbia counts 662,402 ha, i.e.,

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7.48% of the entire country territory (Institute for Nature Conservation of Serbia, 2018). Using the most comprehensive global map of human pressure on the environment, Jones et al. (2018) quantified the extent and intensity of human pressure within protected areas and the results showed that around six million square kilometers, i.e., 32.8% of the protected land worldwide is under intense human pressure.

Mountain areas are of great significance for humanity for many reasons. They cover 26.5% of the entire world terrestrial surface and support the 22% of the population worldwide living in the mountains (Convention on Biological Diversity, 2018; International Union for Conservation of Nature, World Commission on Protected Areas Mountains Specialist Group, 2018). Mountains are significant for lowland population as well, since they represent an important source of freshwater supplying more than half of the Earth's population and they provide large range of goods and services, such as water, timber, energy and biodiversity preservation (Convention on Biological Diversity, 2018; Viviroli, Dürr, Messerli, Meybeck, & Weingartner, 2007). Many exceptional mountain landscapes around the globe have a certain level of conservation status. Therefore, around 17% of mountain areas in the world (excluding Antarctica) are protected, i.e., 32.4% of the total land protected areas worldwide (International Union for Conservation of Nature, World Commission on Protected Areas Mountains Specialist Group, 2018). European mountains are of extraordinary natural values and beauty, and high-mountain habitats of Central and South Europe are characterized by great species richness and unique components of mountain biodiversity. The importance of high-mountain areas in Serbia can be seen in the fact that in Serbian mountains over 1,500 m a.s.l., which represent 1.6% of the total territory, are areas registered with the highest biodiversity compared to their size, due to a large number of relics and endemics (Matvejev & Simonov, 1999; Stevanović & Vasić, 1995).

During the last decades, as a new kind of human pressure on sensitive mountain ecosystems, massive winter tourism and outdoor activities have increasingly become popular worldwide (Abegg, Koenig, Buerki, & Elsasser, 1997; Kangas, Vuori, Määttä-Juntunen, & Siikamäki, 2012). Growing development of these activities can be explained by many economic and social benefits, such as expanding the tourist season, extra income, possibilities for further investments of private sector, creating new employment opportunities, etc. (Elliot, Lloyd, & Rowan-Robinson, 1998; Holden, 2000). Due to the growing presence of winter sports, alpine and subalpine zones of the mountain regions are used for the construction and arrangement of ski slopes. However, in addition to the obvious advantages, the accelerated tourism development in the mountain areas increases the pressure on the functioning of sensitive and vulnerable ecosystems of the upper forest border and the ecosystems above this transition zone, which most often leads to a number of negative consequences for the mountain environments (Meijer zu Schlochtern, Rixen, Wipf, & Cornelissen, 2014). Further, in this specific environments, plant and animal communities consist of a high percentage of highly specialized and often relict and endemic species which are sensitive to environmental disturbances caused by the changes of their natural habitats by building ski pistes and the following facilities (Körner, 2003; Rixen, 2013). Creating special infrastructure for the development of winter tourism and sports is one of the main causes of nature degradation in mountain environments and this impact is spreading with growing popularity of winter sports and outdoor activities and with the expansion of the ski areas worldwide (Kangas, Tolvanen, Kälkäjä, & Siikamäki, 2009; Rixen, 2013). The building of ski slopes and the management of ski facilities cause physical disturbances in soil and vegetation, while production and maintenance of artificial snow

have impact on soil structure, chemical features and moisture, temperature regimes and the duration of plant growing season (Delgado et al., 2007; Wipf et al., 2005).

Kopaonik is one of the floristically richest mountains and one of centers of the arctic-alpine flora in the Balkan Peninsula (Lakušić, 1993; Stevanović et al., 2009). This area was being exposed to different human influences for centuries—from mining, forestry and agriculture to nature protection and tourism. From 1980s, winter tourism started to develop rapidly on Kopaonik Mountain and nowadays it represents the most dominant human activity in this area. Almost at the same time, the area including a ski resort was established as a National Park in 1981 because of its remarkable natural values. Today, the highest parts of Kopaonik Mountain represent both the largest ski resorts in Serbia and the protected natural area with the highest level of state protection at the same time. The aim of this study is to answer the questions if winter tourism can be truly sustainable in protected areas and if there is a conflict between economic development and nature conservation on the example of Kopaonik National Park.

Winter tourism in Serbia: general information

Mountains in Serbia have great potentials for all-season tourism development (Krunić, Milijić, & Djurdjević, 2010) and winter tourism is well developed in several mountain regions. Tourists find Serbian mountains interesting both in the winter and in the summer. During winter, besides skiing, tourists can enjoy other winter sports, such as snow board, snowmobile, and quad ski ride. In summer months, the tourist offer includes hiking and mountaineering, sightseeing and adventure activities, such as mountain biking, paragliding, horse riding, archery, bobsleigh on the rails, zip line, tubing, and panoramic cable-car ride. During the whole year, tourists can enjoy different indoor activities, such as diverse sports in sport halls, exercising in fitness centers, relaxing in swimming pools and spa centers. However, summer tourism season is still not adequately developed in Serbian mountains besides significant efforts oriented toward increasing the number of tourists throughout the summer months, so the winter season is still predominant, and with high environmental impact.

There are four main ski resorts in Serbia: Kopaonik, Zlatibor, Stara Planina, and Brezovica (Figure 1). With the tradition of ski tourism from 1930s, Kopaonik Mountain represents the oldest and the largest ski center in Serbia. The ski center is situated in southern Serbia, in the area of Suvo Rudište, the highest part of Kopaonik Mountain within the territory of the National Park established in 1981 (Figure 2). Today, Kopaonik is the largest ski center in Serbia, with more than 60 km of prepared paths for Alpine and Nordic skiing (Ski resorts of Serbia, 2019; Tourist Center Kopaonik, 2019). The system for making artificial snow covers around 97% of the entire territory of the ski resort, and all the trails are connected with the system of ski lifts and chairlifts, with the capacity of over 34,000 skiers per hour (Ski resorts of Serbia, 2019).

Zlatibor Mountain is situated in southwestern Serbia and all-year tourism is developed in its central part, a spacious plateau about 30 km long and 12 km wide (Stojsavljević, Božić, Kovačević, Bubalo Živković, & Miljković, 2016). Ski center Tornik is situated on Zlatibor Mountain between 1,110 m and 1,490 m a.s.l. The capacity of the center is 5,400 skiers per hour, and four ski trails are covered with the system for making artificial snow during the season. In 2017, Zlatibor Mountain was established as a Nature Park (Uredba o proglašenju Parka prirode „Zlatibor", 2017), within the boundaries of which the ski resort is situated.

Stara Planina ski center is situated on Stara Planina Mountain, the largest mountain in southeast Serbia. The center includes ski trails on three locations with the total length of around 3,700 m (Ristić, Vasiljević, Radić, & Radivojević, 2009). Winter tourism in Stara Planina ski center is at the beginning of its development and the plan is to include a central area, ski trails and infrastructure, accommodation capacities and other facilities, parking space, and diverse public and service facilities. The potential of the future ski lifts capacity will be 21,900 skiers per hour (Tourist Organization Knjaževac, 2019). Because of its remarkable natural values, the area of 142,219.61 ha on Stara Planina Mountain was established as a Nature Park in 1997, while in 2009 this area decreased to 114,332 ha (Uredba o zaštiti Parka prirode „Stara planina", 1997; Uredba o zaštiti Parka prirode „Stara planina", 2009).

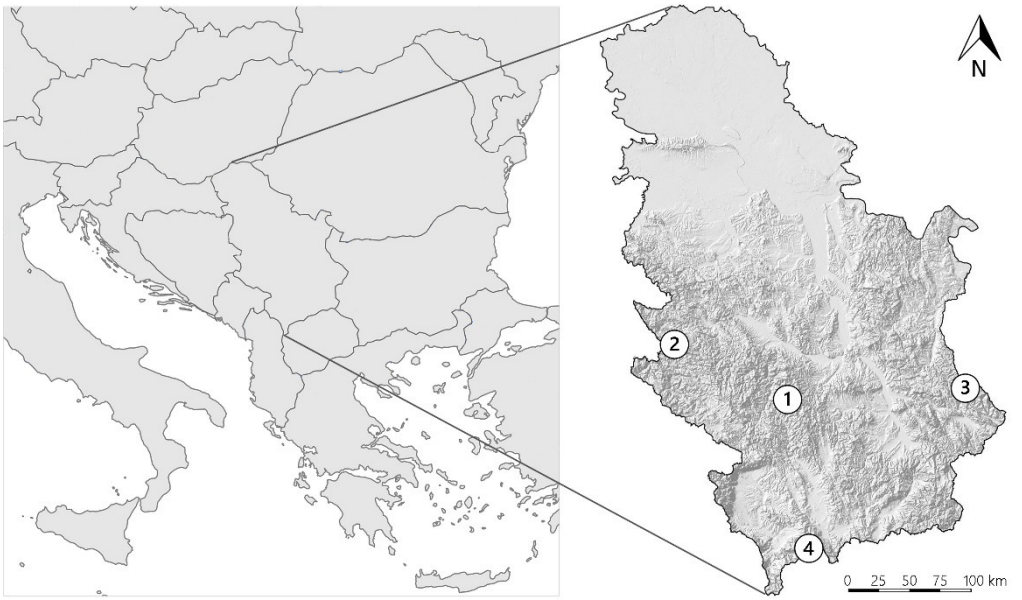

Figure 1. Geographic position of the main ski resorts in Serbia: (1) Kopaonik, (2) Zlatibor, (3) Stara Planina and (4) Brezovica.

The second largest ski resort in Serbia is Brezovica ski resort situated in southern Serbia, on northwestern slopes of Šara Mountain. Brezovica ski resort includes 9 ski paths with the longest being 3,500 m long. Brezovica winter center is situated within Šara National Park, established in 1993 due to its richness and diversity of plant and animal species.

Some mountains have smaller ski infrastructures developed, such as Divčibare, Goč, Golija and Zlatar. Divčibare is a plateau situated on Maljen Mountain in western Serbia, and there are several ski pistes, the longest of which is 850 m long. There are four nature reserves: Crna reka, Čalački potok, Zabalac and Vražji vir. Goč resort is situated on Goč Mountain in central Serbia and has several ski pistes. Goč-Gvozdac was proclaimed a special nature reserve in 2014. Golija is the highest mountain in southwestern Serbia and ski resort Odvraćenica is situated at 1,744 m a.s.l. There are five ski lifts and seven ski pistes. Golija was established in 2001 as a Nature Park and as a

Biosphere Reserve (Golija-Studenica). It is easy to conclude that almost all significant ski centers in Serbia are situated in the areas that have established certain level of legal nature protection.

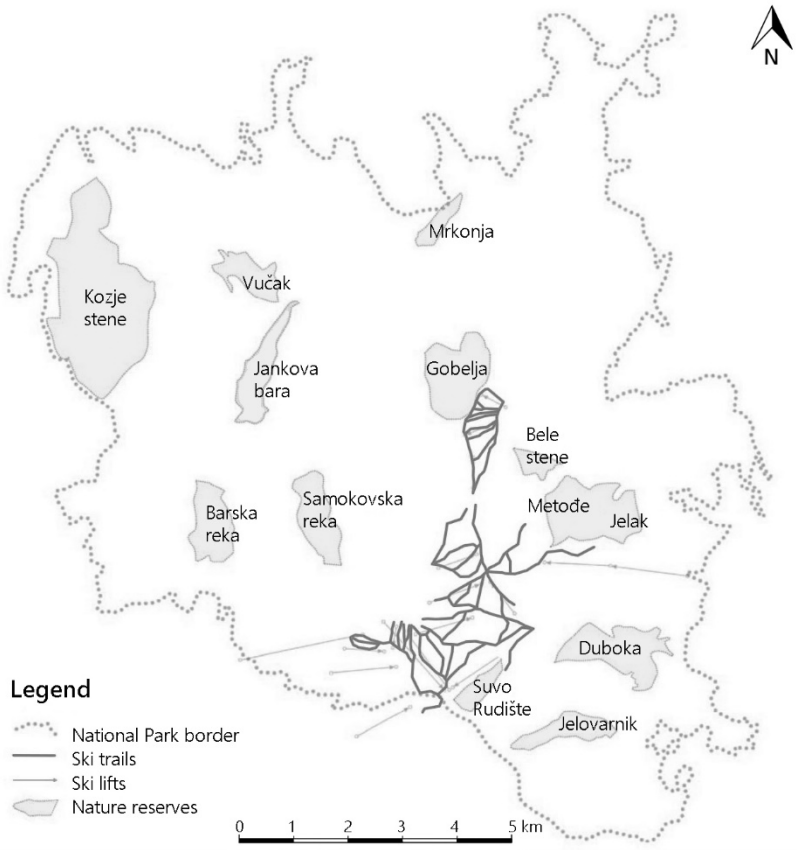

Figure 2. The location of the nature reserves, ski trails and ski lifts in Kopaonik National Park. Adapted from "*Leksikoni nacionalnih parkova Srbije—Kopaonik"* [Lexicons of National parks of Serbia—Kopaonik] by D. Miljanović (Ed.), 2015, Belgrade, Serbia: Službeni glasnik, Geografski institut „Jovan Cvijić" SASA; Kopaonik, Serbia: Javno preduzeće „Nacionalni park Kopaonik".

Development of tourism in Kopaonik Mountain

The territory of Kopaonik Mountain was being changed by humanity for centuries—from mining, forestry, agriculture to nature conservation and tourism nowadays. Today, the dominant activity is winter tourism. Since the early development of science in the Balkans, in the 19th century, Kopaonik Mountain has been an interesting destination for both scientists and nature lovers. Relatively isolated position comparing to other Balkan mountains, complex geological past, rich and specific plant and animal life, has made this mountain attractive and famous destination for many scientific expeditions. In the beginning of the 20th century, scientific and research expeditions were followed

by mountaineers and winter sports lovers, so the year 1935, when the first course of skiing was organized in Kopaonik Mountain, is considered the year of the beginning of winter tourism development. In the same year, the first mountain house was opened. Several skiing competitions were held from 1935–1941, such as the First Serbian Championship in Alpine events, Belgrade, Sarajevo, Skopje Three-team Championship, and others. During the Second World War an old mountain house was destroyed, but in 1948 a new house arose named Olga Dedijer, after a famous doctor and skier. After the Second World War, besides military, forestry and mining activities, tourist infrastructure began its expansion. Olga Dedijer mountain house with 200 beds started to work in 1948, and in 1949, under the highest peak where the start line of the ski race was situated, a small house was built for the competitors, as well as the one at the finish line of the race, below the Krčmar voda locality (Infokop, 2019). The primary electrification of this area was finished in 1948. In 1951, the Mausoleum of Josif Pančić, after whom the highest peak of Kopaonik (2,017 m) was later named was erected (previously, the highest peak carried the name of King Milan Obrenović) (Ćurčić, 2017). Since 1956, the accommodation for pupils of elementary and high schools from Serbia started to work. During 1958, "Vila nad sunčanom dolinom" was built and in 1966 the annex by the villa with 16 bungalows. During 1962, the first cableway was built in the length of 1,700 m for tourism purpose, and also the cableways for mining purpose, i.e., for the exploitation of iron ore at Suvo Rudište locality.

During the 1970s, the Kopaonik Regional Spatial Plan and General Urban Plan of Tourist Settlement Pajino Preslo were adopted, while in 1979, the General Urban Plan of Suvo Rudište—Jaram on the area of 168 ha was accepted. The building of the accommodation property of "Jugobanka" with 105 beds in 1974 signified the start of building of high-quality accommodation properties, which was followed by the modernization of infrastructure—building of the road Jošanička Banja-Kopaonik in 1975, street lighting and water supply system in 1977. All these activities contributed to raising the reputation and the importance of Kopaonik Mountain, which was proclaimed an international winter sports center in 1981. Next year (1982), Balkan Ski Cup was held on this mountain, and in 1983 the European Ski Cup. The settlement developed rapidly in the period from 1981 to 1986. During this period, the largest number of hotel facilities were built ("Karavan" in 1981, "Bačište" in 1982, that burnt down during bombing in 1999, "Putnik" in 1985, new building "Olga Dedijer" in 1986, apartments "Sunčani Vrhovi"—Ras, Brvenik, Koznik, Jelac, and Maglič in 1986) and others. Central Water Supply Service "Suvo Rudište" was built in 1983, Health Clinic in 1983, as well as the Congress Center and many other properties. During 1987, "Atlas" from Dubrovnik and YAT from Belgrade opened their new facilities—Hotel "JAT" and "Putnik-A". During 1988, the settlement got two multi-storey buildings for the needs of the collective housing of employees. In addition, for the needs of organized tourism development (the largest tourist traffic was recorded in 1992 with 119,264 visitors and 733,359 realized overnight stays) significant infrastructural systems were built—ski lifts (11.8 km), 20 Alpine ski trails (total length exceeding 30 km), 20 km of Nordic ski trails, parking lots, etc. (Statistical Office of the Republic of Serbia, 1994). All the trails are connected with a system of ski lifts with a capacity of over 34,000 skiers per hour.

Today, Kopaonik represents the largest ski center in Serbia, with 62 km of arranged pistes (21 beginner, 9 intermediate and 6 expert) and ski roads for Alpine and Nordic skiing. The system for making artificial snow covers around 97% of the total territory of the ski center. All the ski slopes are connected by the cable system.

Sustainability of tourism on Kopaonik Mountain

The concept of sustainable tourism has developed as a consequence of the degrading effects of tourism, which is one of the largest industries worldwide and with the aim of reducing negative impact of tourism activities (Hashemkhani Zolfani, Sedaghat, Maknoon, & Kazimieras Zavadskas, 2015). A concept, formed partly as a response to tourism negative effects on the environment as well as on the society, gradually evolved into a concept of positive changes in tourism and with a significant role in identifying ways to provide benefits (Bramwell & Lane, 1993, 2013). There are many definitions of sustainable tourism. According to the United Nations Environment Programme (UNEP) and the World Tourism Organization (WTO) (2005), sustainable tourism is defined as: "Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities" (p. 12). The concept of sustainable tourism can be applied to all destination types, and its main aims are: "a) make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural resources and biodiversity, b) respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance, and c) ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities, and contributing to poverty alleviation" (UNEP & WTO, 2005, p. 11).

In Serbia, according to the State Tourism Development Strategy for the period 2016-2025 (Vlada Republike Srbije, Ministarstvo trgovine, turizma i telekomunikacija, 2016), one of the main aims is economic, environmental and social development of tourism. According to the same document, protected natural areas are of great importance for the development of tourist products offered both to domestic and foreign visitors and their further improvement and sustainable protection system present a significant factor in the increase of the tourism traffic and income. The strategy discusses possible negative impacts of tourism on the environment in the protected areas, and highlights the main threats—inadequate identifying of potential conflicts between tourism development projects and conservation actions, excessive and poorly planned or managed development of tourism activities, inadequate tourist capacities and poor management, etc. (Vlada Republike Srbije, Ministarstvo trgovine, turizma i telekomunikacija, 2016).

Today, Kopaonik Mountain is recognized as a natural protected area of the highest state protection level (National Park) and one of the main tourist centers in Serbia. The jurisdiction over this natural protected area is given to Public Company "Nacionalni park Kopaonik" and their basic task is the protection and improvement of nature and environment of Kopaonik Mountain, and all the conservation activities are carried out in accordance with the Serbian Law on Environment protection and the Law on National parks, international conventions, and other legal acts (Nacionalni park Kopaonik, 2019). In 1997, Kopaonik was proclaimed an Important Bird Area (IBA) where around ½ of the total Serbian avifauna lives. Kopaonik area is categorized into B2 category, i.e., "the site is one of the 'n' most important in the country for species with an unfavorable conservation status in Europe (SPEC1/2/3) and for which the site-protection approach is thought to be appropriate" and identified as an IBA in danger in 2018 and under very high pressure (BirdLife International, 2019, "European IBA categories and criteria", para. 9). The threats identified for this site were the following: logging and wood harvesting of large scale, human work and other activities, abstraction of surface water, tourism and recreation, roads and railroads (BirdLife

International, 2019). Kopaonik is home to 145 butterfly species which is around 73% of the total Serbian butterfly fauna and is recognized as a Prime Butterfly Area (PBA).

With great popularity of this destination, the awareness of the environment degradation is growing. Many studies in the past indicated nature degradation on Kopaonik mountain, especially from the 1980s up to present (Figure 3). According to Jovičić (1990), the nature of Kopaonik Mountain is seriously degraded mainly because of human activities, such as forestry, urbanization and tourism, and conservation measures proposed were: afforestation, establishing of new strictly protected nature reserves on Kopaonik Mountain, further financial investments in protection activities, the inclusion of nature conservation significance into spatial plans, etc. Vasović (1990) discussed the main causes of nature degradation on Kopaonik Mountain and highlighted mining, logging, fire, inadequate and poorly planned agricultural activities and tourism. He noticed that the area of Suvo Rudište, where ski resort is situated, represents "the most distinctive functional area" in former Yugoslavia and southeast Europe—a ski center with a lot of economic and non-economic functions situated in the highest area, below the tree line and within the territory of National Park. The environmental impact in ski resorts in Serbia is causing notable environmental disturbances and significant loss of functionality, such as urbanization, construction work, logging, excavation, erosion, noise, air and water pollution. One of the consequences of these activities is erosion, and ski resorts in Serbia were built without a clear vision of potential erosion risks, so some erosion forms were registered on Kopaonik, such as furrows and gullies, road erosion, etc. (Ristić et al., 2009). Some analyses of tourism activities and products pointed out certain weaknesses, such as, among others, the lack of protection and maintenance of resources within Kopaonik National Park, illegal construction works, poor implementation of the protection policy of natural resources (Bojović & Plavša, 2011).

Despite the planned balanced distribution of tourist capacities according to the Development program of the Spatial Plan of Kopaonik from 1968 (Mitrović, 1968), especially between mountain and hilly parts of Kopaonik, the epicenter of tourism development remains Suvo Rudište, which is under the highest environmental pressure in the area. Besides the main tourist settlement, Kopaonik, other tourist centers on Kopaonik evolved—Brzeće, Srebrnac, Lisina, Čajetina and Treska (UNDP PRO Novi Pazar, 2009). Today, it is estimated that there are 10,500 beds within the territory of the National Park, but not evenly distributed and not in accordance with development plans of the area.

Building of ski slopes and ski lifts and artificial snow system lead to the degradation of vegetation and surface soil layer, which cause fragmentation and destruction of forests and other natural habitats, changes in the landscape morphology and the intensification of erosion. Also, covering soil with artificial snow, besides physical, causes significant changes in the chemical structure and humidity of soil, as well as the changes in the dynamics of plant growing. Illegal building and uncontrolled expansion of tourist settlements cause diverse communal problems, such as inadequate waste disposal and pollution of streams and springs. Unplanned expansion of the settlements often causes the creation of landfills without organized waste collection and destruction. One of the problems in Kopaonik ski resort is the noise, caused by inadequately loud music from accommodation and other facilities, and by traffic as well. On some localities in ski resort, loudspeakers play loud music during the day. Artificial lights can also impact wildlife, because some species are active in the night, searching for food, shelter or mate, so it shortens the time for activities in the dark. Some types of artificial lights can produce high level of infrared light which have negative consequences on some plant species.

Fortunately for nature conservation but unfortunately for agriculture, some studies show that natural reforestation of abandoned pastures and meadows was registered on the territory of Kopaonik National Park (Ćurčić, 2017). These processes can be explained with population migration from rural to urban areas, ageing, depopulation and changes in land-use from agricultural to other purposes.

Figure 3. Human impact in Kopaonik ski resort: a) gully on the ski slope, Velika Gobelja locality, (b) building of new accommodation facilities, (c) construction works on new hotel capacities in Kopaonik tourist settlement, (d) roads and cut spruce forests for tourism purposes (Photo: N. B. Ćurčić, 2014-2016).

Conclusion

Even though today's humanity is aware of the environment vulnerability more than ever in history, human activities still cause many negative consequences in mountain areas. Accelerated winter tourism development leads to conflicts with regulations and laws of natural protected areas, because of the lack of cooperation during planning activities and mutual problem solving, related to land-use and conservation of natural values. In Kopaonik National Park, the advantage in the development is primarily given to tourism and Kopaonik is mainly presented as a ski resort where its natural values and potentials, as well as cultural and historical significance, are neglected. Many environmental disturbances were registered: destroyed vegetation and soil surface, fragmentation

and loss of forests, migrations and extinction of species, increased erosion and flood risks, changes in physical and chemical soil structure, water, soil and air pollution, noise, and light pollution.

Therefore, Kopaonik Mountain does not represent an adequate model for tourism development in Serbia. This pace of the development will soon lead to the increase of intensity and saturation of tourism in the area, inappropriate exploitation of natural resources and further to environment degradation, which will inevitably affect the tourism itself. On the other side, tourism on Kopaonik Mountain is important both for the state and for the local community, because of many social and economic benefits. Finding the balance and harmonizing the tourism development with the management and legal framework of the natural protected area is one of the main priorities of sustainable use of natural values and resources. For successful and sustainable development of some area, it is necessary to conduct multidisciplinary planning, based on the results from all the relevant scientific disciplines. Without rational planning in the following decades, the area of the ski resort will almost certainly become bare land with gullies and other erosion forms and will not be an attractive tourist destination anymore.

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