

NATURAL PREDISPOSITIONS OF MOUNTAIN TOURISM IN BOSNIA AND HERZEGOVINA WITH SPECIAL EMPHASIS ON THE POSSIBILITIES OF DEVELOPMENT FOR HIKING, CLIMBING, SPELEOLOGY, AND SKI TOURING

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Abstract

Based on the rich mountainous natural features that Bosnia and Herzegovina has as a small country, it has numerous natural values that need to be further touristic valorization and evaluated. In this paper, emphasis is placed on touristic and recreational activities that are focused on the analysis of the natural predisposition for hiking, climbing, speleology, and ski touring. The analyzed part of the central Dinaric Mountain area is suitable for tourist affirmation of this kind of mountain tourism. It is necessary to promote these mentioned sports and recreational activities in the surrounding area and the same country. It is particularly highlighted in this paper to expand the protected areas in this country, which would stimulate economic development and better organize the mentioned types of mountain tourism.

Keywords: Natural conditions of the Central Dinaric mountains, hiking, climbing, speleology, ski touring, Bosnia and Herzegovina

1. Introduction

The definition of tourism was given at the WTO (World Tourism Organization) conference in 1991 which was held in Ottawa. According to this definition, tourism includes the activities of persons during their travel and stay in a place outside their place of residence, without interruption for no longer than one year, for vacation and other reasons. Many authors in their definitions of tourism and tourists converge based on an agreement that tourism is a mass phenomenon of modern society in which the tourist changes the place of permanent residence while traveling and visits the desired places to satisfy his recreational and cultural needs.

"Tourism is the travel or temporary stay of people outside their permanent residence for rest, entertainment, broadening of cultural horizons..." (Blažević and Pepeonik, 1997).

Therefore, tourism that is carried out in the mountains is called mountain tourism. It is most often divided into winter and summer - more precisely, mountain tourism in the warmer period. It represents the totality of relations and the phenomenon of socio-economic character, which includes recreation, travel, and vacation, and is doing economic office through the personal spending of tourists in mountain areas.

Bosnia and Herzegovina, more than 60% of which is represented by the mountainous relief of the central part of the Dinaric Mountain system, has been developing hiking and speleology for more than 120 years (Figure 1.). The first beginnings of the development of this type of tourism are related to the period when there was an Austro-Hungarian administration in Bosnia and Herzegovina. Mihić, L.J. (1973). notes that the organized climbing performed by trained climbers officially began in 1929.

in the Djeva Rock at the Romania Mountain, while organized development of tour skiing is associated only with the period after the Second World War.

Sport-and-recreational activities of mountain tourism include: Alpine skiing, Nordic skiing, ski touring, free riding, snowboarding, snowshoeing, snowmobiles, climbing, hiking –mountaineering, recreational hill

walking, trekking, speleology and speleotourism, paragliding, mountain biking, horse riding, then kayaking and rafting on the mountain rivers, canoeing on the mountain lakes. Then adrenaline sports canyoning and paragliding as well as many other, newer adventure sports related to mountainous areas. This paper lists mountain terrains in Bosnia and Herzegovina suitable for hiking, climbing, speleology, and ski touring (Fig. 1.).

2. Methods and materials

The author's research is focused on the main goal of the work - natural predispositions for the development of hiking, climbing, speleology, and tour skiing.

Domestic and foreign literature was used in this paper, as well as field and geomorphological, geological, and climate and vegetation research, In situ, were primarily used. The following methods were used during the preparation and creation of this article: Cartographic analysis of topographic maps scales 1:25,000, 1:50,000, and 1:100,000. For micro-details, we used the existing thematic maps and topographic plans of the research terrain as graphic materials. Furthermore, in the process of making the paper, we carried out methods of morphological, morphotectonic, and morphogenetic analysis of mountain terrains, and remote sensing methods primarily GIS and GOOGLE EARTH Pro in 2017. We especially emphasize our forty years of field experience in hiking, climbing, and tour skiing. Thus, based on empirical and scientific methods in this paper, we have performed an analysis of natural predispositions for further development of the mentioned types of sports and recreational types of mountain tourism.



Figure 1. Map od Bosnia and Herzegovina, source J: Đ. Marković (1988). *Geografski leksikon Jugoslavije*, Svjetlost, Sarajevo.

3. Results

3.1. *Natural possibilities for mountaineering and hiking in the mountains in Bosnia and Herzegovina (BiH)*:* “Doing mountaineering means getting to know the beauty of the country, enriching feelings. It also requires of man certain efforts, which do not pose a danger to the organism if they are within reasonable limits” (Z. Smerke, 1989).

Mountaineering and recreational hiking as their long tradition, because most of BiH consists of high and medium-high mountains of the Dinaric morphosystem with different angular slope inclinations (convex, steps, mixed, subvertical, subhorizontal slopes),(Table.).

Table 1.

	Slope inclinations
0-2 ⁰	Subhorizontal terrain
2-5 ⁰	Very gentle slopes
6-12 ⁰	Gentle slopes
13-32 ⁰	Steep slopes
33-55 ⁰	Very steep slopes
>55 ⁰	Extremely very steep slopes

According A. Bognar in Veliki geografski atlas Jugoslavije (1987)

Attractive for high-altitude mountaineering, with different angular slopes (convex, steps, mixed, sub-vertical, subhorizontal) are the mountain massifs and ridges: Maglič, Volujak, Ljubišnja, Zelengora, Vranica, Velež, Lelija and Treskavica, Bjelašnica, Visočica, Jahorina, Prenj, Čabulja, Čvrsnica, Vran, Klekovača, Cincar, Malovan, Osječnica, Dinara, Golija, Vitorog, Tušnica, Ljubuša, Kamešnica, Raduša, Šator, Gatačka Bjelašnica, Baba, Bijela Gora and Orjen and many other Bosnian mountains whose absolute altitudes mainly exceed 1800 - 2200m (A. Lepirica, 2013). A large number of these mountains do not have well-marked hiking trails, and many deserve the restoration and marking of existing mountain trails. Dinaric bare mountain ridges (Fig. 2.), rocky walls, caves and pits, sinkholes, dolines with mountain meadows and lakes, clean fast mountain rivers and waterfalls, water sources, dense mixed forests with many endemic kinds of flora and fauna represent the richness of the mountain landscape of this country.

In attractive mountain locations, there are built mountain and hunting lodges with limited accommodation capacity, connected to hiking trails and macadam roads. It is important to note that it is rare mountain structures in many high mountains in Bosnia and Herzegovina.



Figure 2. Highlander ascent to the highest peak of Treskavica Mountain (2088 m A.S.L.)
Photo: A. Lepirica

The highest mountains Maglić (2386 m A.S.L.), Zelengora (2015 m A.S.L.), and Volujak (2207 m A.S.L.) in southeast Bosnia, which are located within the National Park "Sutjeska", are the most visited by mountaineers and tourists during the late spring, summer and early autumn. It's the same case with the other mountains in Bosnia and Herzegovina. Thus, the same case with the Orjen Mountain (1803 m A.S.L.) in southeast Hercegovina (with famous glaciokarst landforms and stenoendemic whitebark pines) in the southeast Hercegovina as a tourist visits the subcutaneous karst of the Grmeč Mountain (1604 m A.S.L.), about 300 kilometers northwest (with dense forests and many karst phenomena -lake "Bobijaško oko", karst source of Sanica and Krušnica river, caves, dolines).

The tourist offers of the National Park "Sutjeska" next to 1000 m deep canyons Sutjeska and Hrčavka River, it also belongs primeval, pristine forest reserve "Perućica" with the spruce higher than 55 metres and 75 m high Skakavac waterfall. In the west, Bosnia still existed "Lom", "Janj" forest reserve with rich floristic, vegetation and rare kinds of wild animals (brown bear, gray wolf, otter, lynx, many kinds of birds, and others in the Red European list of endangered species) as "Radava" forest reserve in Igman Mountain (1667 m A.S.L.) near the Sarajevo. This is one of the last primeval mixed, dense forests of Southern Europe. The palaeoglacial and attractive clean mountain lakes (2112 m A.S.L.) like: Gornja and Donja Bara (Fig. 3.), Kladovopoljsko, Bijelo, Orlovačko, Štirinsko, Crno and Kotlaničko lake at the Zelengora Mountains (2015 m A.S.L.). Uloško lake

in the Crvanj Mountain (1921 m A.S.L.) is suitable for camping and outdoor activities. Due to the natural aesthetics of their appearance and the very environment in which they are located, they represent potential destinations for mountain tourism in this part of the mountain region. Mostly, the lake shores serve as a camping area in the summer. The beauty of the neighboring Treskavica is completed by: Veliko, Crno, Platno, Bijelo, Trokunsko Lake, and the Gvozni Polje Lake. In western Bosnia, a significant tourist destination is the paleoglacial Šatorsko Lake on Šator Mountain. On Čvrstica Mountain (2222 m A.S.L.), it is Lake Crvenjak, and at its foot is Lake Blidinjsko. Green color Boračko Lake was formed at the foot of Prenj Mountain (2155 m A.S.L.), Lokvanjsko and Blatacko, and Kalajli Lake on Bjelašnica Mountain (2067 m A.S.L.). Especially, Prokoško Lake is an important tourist destination with tourist wood ethno village of the Central Bosnian

mountains. It is located at 1636 meters above sea level on the Vranica Mountain (2112 m A.S.L.). At the foot of this highest mountain in Central Bosnia, above Uskopaljska Zavala, there are Ždrimac Lakes, and not far from them is Crnodolski Slap. Lake Idovačko is located under the peak of Raduša(1956 m A.S.L.). Clear Kukavičko Lake in the forest was formed below Stožer Mountain(1756 m A.S.L.). Below the northeastern slopes of Crvnja is Backo or Lake Uloško. Mašičko Lake is at the foot of the dense primeval Tajan forest, and Paučko Lake, at the foot of the Konjuh Mountain (1328 m A.S.L.).



Figure 3. Lake Gornje Bare at the Zelengora Mountain, Photo: A. Lepirica

In addition to their recreational role in mountain tourism, many of these lakes are stocked and used for fishing. From a tourist point of view, the Trnovačko Lake, which is located in neighboring Montenegro near the border with Bosnia and Herzegovina, has an important role, but in a geomorphological sense, it belongs to the same Vlasulja Mountain massif (Maglić, Bioč, and Volujak). Mountaineers and tourists come to it from the Bosnian "Sutjeska" National Park at the state border with Montenegro.

The area of the "Sutjeska" National Park, which is located in the very southeast of Gornje Podrinje, according to its spatial planning function and rich natural contents, should represent the carrier of the development of numerous types of mountain tourism in the region. To achieve this, wider institutional support is needed with strategic planning guidelines. To develop regional tourism in the High Dinarides, it is necessary to search for solutions to integrate the highland area of Maglić, Volujak, and Bioč into a unique transnational park of BiH and Montenegro. In this way, in terms of nature and tourism, a unique ensemble would be formed, which would have the character of a regional natural park unique in this part of Europe.

Also, a slightly larger mountain region in northern Herzegovina with an area of about 1000 km², Prenj (2155 m A.S.L.), Čvrsnica (2222 m A.S.L.), and Čabulja (1798 m A.S.L.) mountains with the deep, alpine River Drežnica valley, due to its rich natural values, primarily geomorphological-geological geodiversity and biodiversity of plant and animal communities with numerous endemic species, deserves a certain protective and promotional categorization, an epithet that can also be in the domain of a National Park (Group of authors, 1980. *Prirodne i kulturno –historijske vrijednosti BiH, Spatial plan of Bosnia and Herzegovina, Phase B - Valorization*).

The mountain area of Bjelašnica(2067 m A.S.L), Treskavica (2088m A.S.L), and Visočica (1974 m A.S.L.), with 900 meters deep canyon of Rakitnica, it deserved the epithet of National Park a long time ago, half a century ago according to environmental planners (Group of authors, 1980).

The mountain ridges, peaks, slopes, coves, and hundred-year-old forests of the mountains of western Bosnia and southwestern Bosnia have all the predispositions for the development of summer and winter high-altitude mountaineering, and ski touring. These are the mountains: Ljubišnja (2239 m A.S.L.), Vitorog (1907 m A.S.L.), Lunjevača(1797 m A.S.L.), Klekovača (1961 m A.S.L), Cincar (2006 m A.S.L), Osječenica(1803 m A.S.L), Dinara (1913 m A.S.L),,, Kamešnica(1856 m A.S.L.), Plješevica(1654 m A.S.L), Ujilica(1659 m A.S.L). Jadovnik(1654 m A.S.L). Golija (1893 m A.S.L), Raduša (1956 m A.S.L)., Šator (1873 m A.S.L), and Ljubuša (1797 m A.S.L) and Visočica (1974 m A.S.L.).

Somewhat north of the highest Dinaric Mountain range are medium-high mountains high from 1300-1700 m A.S.L. Those are the next mountains: Trebević, Bukovik, Igman, Crepoljsko, Konjuh, Borja, Romanija, Javor, Grmeč, Ranča, Ravan Planina, Kruščica, Lopata, Tajan, Zvijezda, Raduša, Pliješ, Jahorinski Borovac and Klek, Kovac, Varda, Devetak and Veliki Stolac. Their forested slopes are more moderate slopes of the high mountain massifs and, in addition to hiking, are suitable for mass excursions and recreational walks and the development of specific health and spa tourism. In those areas there are numerous local picnic spots such as: Trebević, Crepoljsko, Bukovik, Igman (Sarajevo), Lisac, Smetovi, Pepelari (Zenica), Zlaća (Banovići), Muška Voda (Kladanj), Romanija, Ravna planina (Pale), Ponjeri (Kakanj), Lopata (Kreševo), Kruščica (Vitez), Hajdučke vode (Teslić), Cicelj (Cajniče), Ravanci (Rudo), Bijeje Vode (Goražde), Javor (Vlasenica) Borike (Rogatica), Dobre Vode (Kalinovik), Husremovac (Trnovo), Veliko Polje (Igman), Rujište (Mostar), Zabrdje (Vitez).

A special natural wealth for the development of mountain tourism due to its natural characteristics is the interesting areas of the mountain plains. Bijeje vode in the vicinity of Goražde with its complete infrastructure represents a unique space that needs to be additionally enriched with appropriate infrastructure and thus be further valorized in the function of tourism throughout the year.

Mountain viewpoints i.e., observation points with a wide radius of view, are very important as tourist destinations (Lj. J. Mihić, 1973). Certainly, the most famous in the region is the viewpoint near the Dragoš saddle with a view of the Perućica rainforest and the 75 m high Skakavac waterfall, where the Perućica River tumbles over the cliffs, while the rocky sections of Volujak and Tovarnica in the background block the view. Then the viewpoints on Čvrstica on top of Pločno, from where you can see the Dalmatian mountains with Biokovo in addition to the highest Bosnian and Herzegovina mountains. Then there are lookouts from the top of Vilinac (2,116 m A.S.L.), and the lookout from the top of Veliki Šljemen (1943 m A.S.L.). The lookout point at the top of Bjelašnica (2,067 m A.S.L.) is one of the most important lookout points with a viewing radius of over 100 km, from where you can also see Durmitor in the southeast.

The Vijenac viewpoint near Gornji Lukomir offers a view of the canyon of the Rakitnica River and the mountains of Jahorina Visočica and Prenja. The Vranovina and Zlatni bor canyon viewpoints in the southeast of Bosnia, from which there are extraordinary views of the snow-capped peaks of Durmitor, Maglić, Piva Mountain, and the deeply cut canyon stream of the Tara, which in hypsometric terms represents a height difference around of 2,000 m.

From some of the highest peaks and ridges, the mentioned high mountains, the radius of sight reaches over 100 km as the crow flies. There are other lower altitude locations with attractive views such as Veliki Strop, Plasa, Tise, and Žljeb on Čvrstica, Poda in Lelija, (view of the central massif of Zelengora), Zagorje near Kalinovik (view of Lelija, Treskavica, Crvanj and the central massif Zelengora), mountain Bokšanica and Sušica (view of Drina canyon).

Viewpoints are important destinations of mountain tourism, but in the future they should be an integral part of the overall tourist offer of BiH which implies their arrangement and construction for future visitors. Analysis of tourist attendance shows that the most visited viewpoint is at Trebević (1,150 m above sea level). Due to

greater air pollution in Sarajevo, especially in the winter, the lookout point on Trebević, along with gondola transport, records a large influx of residents and tourists from Sarajevo. The wide views that adorn this foothill of Trebević include: Vlašić Mountain and the next central Bosnian mountains, Bukovik, Romanija, Ravna planina, Bjelašnica, Bitovnja and Vranica

3.1. Climbing: High rocky walls from limestone and dolomite structures, several hundreds of meters high, in the mountains of Bosnia and Herzegovina are suitable for adrenaline sport - climbing in the dry rock and in combined climbing in the ice-dry rock in the wintertime. These are Dinaric rock walls, neotectonically predisposed by the sub-vertical uplift of the wings of reverse faults, which have been geomorphologically reshaped by cracking along the joints, karst corrosion, and gravitational collapse. The hugest rocks there are in: Velež, Prenj, Čvrsnica, Čabulja, Volujak mountains, and in the sides of the Rakitnica canyon. The largest rock section in BiH with a relative height of about 1,000 m is Veliki Kuk on Čvrsnica. Also, from the aspect of the development of alpinism, the northern, rocky barrier of Velež, over 13 km long, with an average height of about 400 m, stands out. Then there are over 400 m high rocks of Prenj such as: Cetina (Fig. 4) and Izgorjela Gruda, Otiš rock, Osobac rock, Sivadija. Possible rock formations for alpinism climbing are the rocky face of Vilin Kuk and the impressive rocky monoliths of Crno Polje Osobac and Vidrine Grude. On Čvrsnica Mountain, next to the largest Veliki kuk, there are the rocks of Pešti brdo, Međed, and Mezić rocks.



Figure 4. Cetina (1992 m A.S.L.) high rocky face in the Prenj mountain (photo :Alen Lepirica)

The southern rocky border towards the Drežnica valley is formed by the rock walls of Strmoglavnica, over 600 m high, and Karauševica. In front of the Čvrsnica massif near Doljani, Ilijina Gruda rises in Oklanica, over 300 m high. The rocky barriers of Crvene Stijene in Romania played an important role in the development of BiH alpinism. The rocks of Zubovi, Oblik, Treskač and Nikoline, Čabenske, and Zavite rocks on Treskavica are also interesting for climbers. The great rock wall of Treskavac on Zelengora rises about 800 m above the

canyon of Hrčavka, and a little further east, the massive rock cliffs of Lica, in Volujak, above the canyon of Sutjeska. The rocks of the Rakitnica canyon are great challenges for climbers. These are the overhanging rocks of Vadotina, Handrap, and Orahovica, with relative heights of over 250-300 m. The Mačkić rocks in the Manjača Mountain, above the Banjica Spring, and the Zvečaj gorge rocks above the Vrbas River, are the largest in the Bosnian Krajina heights of over 250-300 m. In addition to the mentioned mountain rocks, the rocks of Maglić, Volujak, Vlahinjski kotlovi on Bjelašnica, Devećanske stijene on Vlašić and numerous icy, steep, frozen slopes of Bosnia and Herzegovina's high mountains are interesting for winter alpinism.

The beginning of the organized development of alpinism in BiH dates back to 1929. when Drago Šefer and Jovo Ilić made the first ascent through the Djeva rock in Romanija (LJ. Mihić, 1974). The development of BiH alpinism intensified after the Second World War when numerous mountaineering routes were climbed in: the Romanija, Prenja, Treskavica, Čvrstica mountains. In snowy and icy conditions, winter routes were climbed in the rocks of Prenj (Velika kapa, Sivadija, Cetina), Velež, Treskavica, Volujak (Badanj), Vlašić (Devećanske stijene), Bjelašnica (Vlahinjski kotlovi). At that time, a prominent role in the development of BiH alpinism was played by the Sarajevo School of Alpinism, whose instructors were prominent BiH alpinists.

Also the last time, the cables secured trails through the rocks called ferratas were built through the Veliki Kuk in Čvrstica, Botin in Velež, Vlašić, and River Drinjača Canyon, on Romanija, Trebević mountain.

During winter and early spring, rocky cliffs are exposed to the destructive periglacial effect of cryo-fraction - ice curtains and ice wedges in rock crevices. Then there are frequent collapse movements of snow-ice avalanches that directly participate in the denudation-erosion reshaping of the slopes. Avalanche activity is especially pronounced when the warm and dry Dinarskogorski fen blows. In winter, due to the influence of wind currents on the top parts of huge rocky walls: Velež, Pešti brda, Pločno and Jelinak in Čvrstica, then Cetina and Velika Kapa in Prenj, and Tmorac and Velika Vljajna in Čabulja, kilometer-long snow eaves are formed, sometimes over 4 m wide (A. Lepirica, 2013). These are real winter dangers for alpinists and highlanders in foggy weather or snow blizzards that are common on these mountains.

In a snow avalanche in February 1971, on the slopes of Lupoglav in Prenj, three alpinists died. The Memorial Day to Lupoglav became a mass regional alpinist-mountaineering manifestation in memory of the fallen alpinists: Zija Jajatović, Bora Stjepanović, and Ilija Dilber. Alpinists from Bosnia and Herzegovina made successful expedition ascents in the Andes, Tian Shan, and the Himalayas. Bosnian climbers managed to overcome two of three of the most demanding Alpine rocks: the Grandes Jorasses and the northern face of the Matterhorn.

In mountaineering magazines such as "Naše planine", "Planinski Vestnik", then in the mountaineering section "Oslobođenje", descriptions of mountaineering routes are given. To promote alpinism in Bosnia and Herzegovina, alpinist guides are printed: Velež, Romania, the Internet pages of Zona 2 000, SŠA are edited, and alpinists are also featured in local radio and TV shows.

3.2. Speleology: Bosnia and Herzegovina has good natural predispositions for the development of speleology on the kind as adrenalin- research tourism because numerous caves and pits, of which over 4,000 have been recorded in total according to the Catastre of Speleological Objects of Bosnia and Herzegovina (Mulaomerović, J., Zahirović D. & E. Handžić, 2006). Cave systems in the mountainous area: Ledenica in Jadovnik, Orlovača, Bijambarska caves, Đuričina and Dimšina caves, Ponikva near Vareš, Djevojačka cave near Brateljević, Bebrova cave, Dugovještica, Ledenjača, Lukina cave in Mašica, Mačkića cave, Novakova cave in Romania, recently discovered cave system in Kaštelj on Javornik mountain. Other caves of the Dinaric Mountain high belt are also known, they were polygenetically shaped by corrosion-corrasion processes and the collapse of rocky vaults within the microtectonically cracked carbonate rock substrate. The underground halls of the aforementioned karst cave recesses are richly decorated with accumulation microforms of cave jewelry: stalactites, stalagmites, stalagmites or calcite columns, cave salves, canopies, calcite tubs, and

draperies, and other microforms, which gives our caves a special aesthetic feature and tourist attraction (A. Lepirica, 2013).

In the mountainous terrains, there are frequent occurrences of an altitudinal succession of sub-vertical cave openings in rugged cliffs, such as those in the Rakitnica canyon or Mačkića rocks and the Kozičke sides above the springs of Banjica and Kozica in the Bosnian Krajina. Many cave systems have permanent underground streams. They emerge on the topographic surface in the form of caves, strong karst springs such as: Duman or Bistrica in Livno, Željeznička vrela under Treskavica, Pridvorička vrela, Orlje spring, Dugovještica, Mokranjska Miljacka, Duman in Livno, then Voklijska karst springs and fissure springs such as Bosna springs under Igman, the springs of Pliva, Sana, Janja, Sanica and Ribnik in Bosanska Krajina, Plave vode in Travnik. These are very important touristic natural resources, especially suitable for recreation during the summer heat and humidity. It is also important to mention the Black Spring in the Unca Canyon, the Komadino Spring and Mlješčak in the Neretva Canyon, the springs in the Upper Neretva Valley (such as the upper and lower Krupac), the Lađanica Spring and the intermittent Vrutak Spring in Župa Glavatičevska, the Rame Spring (Krupić), the Humska Spring in the Rakitnica canyon, the spring of Krupa near Zovik, the spring of the upper basin of the Drina (the Dobropolj river), the Lučka spring, Skakavci in the Hrčavka canyon, the spring along the lower course of the Tara, and many others.

There are numerous active, periodically active, and dry (inactive) caves in the mountain macroregion. These are: Megara and Klokočevica on Bjelašnica, then Tito's cave, Bastaška and Vodena cave, in the vicinity of Drvar, Hrustovača and Dabarska cave, near Sanski Most, caves near Martin Brod, Ivanovića cave on Srnetica, Baranova cave on Osječenica, Vasnovačka cave on Grmeč, Međugorje cave on Shator, Bukovica and Vrbine caves, on the edge of Duvanjsko polje. Cave systems were also developed on the slopes of Jastrebnjak above Podgorija pods. The cave openings (entrances) of Dizdar's cave, Mali Dum, and Veliki Dum, are located in the rocky cliffs, above the town of Livno. The caves of Listvača and Sniježnica are formed in the karst of the Grabovica mountain surface, and Stanina cave, in the neighboring Midena Mountain. Then follow the mountain caves: Jelova cave, Ovčija cave and Barzilovka on Dinara, Vilina, Crvena and Čavareva caves on Čvrstica, cave in Muharnica, Poljička cave on Prenj Mountain, Ledenica cave on Čabulja. Curnića cave and Kurdeševa cave are located on Viduša Mountain and Prosječenica cave in Podveležje. The cave openings of Novakuša, Snjetica, Rušpija, Provalija, Visibaba, and Ljelješnica were formed on the slopes not far from Nevesinjsko polje. The cave entrances Velika cave and Lepirnica are located on the edge of Fatničko polje, Vilina cave on the edge of Ključko polje, Ratkovača, and Jejinovača, not far from the plain of Dabarsko polje. Then, Stanina cave in Trusina, Jošarova cave in Gatačka Bjelašnica, and Vranjača cave in Bjelašnica, above Popovo polje. Glavičina Cave and Treskavica in the canyons of Neretva, Rakitnica, Hrčavka, on the high ground of Zagorje. It is important to point out that many cave systems in the mountainous area have not been investigated using appropriate speleomorphological methods.

According to data from the "Catastre of Speleological Objects of Bosnia and Herzegovina" (2006), pits are more numerous than caves. Subhorizontal, narrow openings of pits called "sniježnica", "ledenica", "zvekara", "zvonuša", with very steep, sub-vertical underground channels, are observed on mountain surfaces, pediments, and lower slope slopes. Some pits are habitats of wild pigeons, so they are called "Golubnjače" or "Golubinka". Mostly, they are concentrated: on the surface of Rora, in western Bosnia, in the area of Podveležje and Rudin in eastern Herzegovina, Midena and Grabovnica, between Duvanjsko and Livanjsko polje, on the foothills - pediments above Dabarsko and Fatnica polje. Numerous pits are located on the lower rugged mountain terrains of Trusina, Viduša, Sitnica, Sniježnica and Gatačka Bjelašnica. In the west, they are marked in relief by gently sloping mid-mountain and higher mountain terrains: Grmeč (pit in Palež, Ledenjača, Dvostruka jama), Osječenica (Antina jama, Bezdanka, Matina zavlaka, Čavranuša), Ljubuša (Turanuša, Snižnjača), Čabulja (Đžigara and Čavkarica), Dinara (Zuta Jama and Visidna Voda), Kamešnica (Dvográjná Voda), Staretina (Velika Sniježnjača), Javorova Kosa (Ledara), Štor (Pantrijevac, Ledenača), Bobija (Ledana), Paklina Mountains (Begovača), Ravašnica (Golubnjača and Ninkovača). In the east of the macroregion there are pits:

Hrguda (pits under Orlovce), Gatačka Bjelašnica (pit Bezistanica, pit in Razmuči and Ajkalova pit above Slatopolje), Babe (pit Jasikovac and Vranjača on the Ljut pediment), Snježnica (pit under Oblim kuk), Trusina (pits of Obodina, Čavkarica and pits near Rupar). In the mountainous areas of Dinara, Velež, Klekovača, Vitoroga, and Hrbina mountains, there are numerous nameless pits (A. Lepirica, 2013). So far, the deepest pit in Bosnia and Herzegovina, called "Invisible Water", is 653 m deep. It was discovered by Croatian speleologists on Mount Dinara. Its opening is located at an altitude of 1,250 m. The bottom of the pit is represented by a lake, sometimes over 20 m deep. It is assumed that it communicates hydrologically with the spring of Rumina, in the Cetina basin, in neighboring Croatia.

There are few organized mountain caves for tourist visits. Mainly these are: Middle Bijambar Cave in Ilijaš Municipality, Titova Cave near Drvar, Ledenica near Bosansko Grahovo, Djevojačka Cave near Kladanj, Orlovača near Pale, Megara and Klokočevica caves on Bjelašnica. Speleologist J. Mulaomerović (2011) points out that our caves, as a tourist resource, represent a sustainable product of speleotourism, and that they are very important for the economic development of local communities. Here, the traffic location, the size of the cave, and the aesthetic, paleontological, cultural, biological, and religious values of the caves are of special importance for the development of speleotourism.



Figure 5. Calcite baths, microspeleothem in the cave in Kaštijelj,
Photo: V. Obradović

3.4. Ski touring: Touring skiing is a specific type of skiing in which you move along mountain slopes, make ascents, and descend wild snowy terrains. That's why you need special ski equipment, tour bindings, and, of course, great mountaineering experience because you're moving through the wilderness. Ski touring Tour skiing or high-mountain skiing would have its full application during the winter and early spring months when the highest quality snow conditions with granular snow-firn are on the high mountains of Bosnia and

Herzegovina. Suitable for this type of mountain tourism are mountains with gradual, slopes with various vertical angles as: Bjelašnica, Visočica, Vranica, Plješevica, Golija, Raduša, Jahorina, Ljubuša, Vran, Treskavica, Cincar, Dinara, Kamešnica, Vlašić, Zelengora, Lelija, and Crvanj. (Table 1.).

Suitable for this type of mountain tourism are mountains with gradual, steps slopes, with various vertical angles as: Bjelašnica, Visočica, Vranica, Plješevica, Golija, Raduša, Jahorina, Ljubuša, Vran, Treskavica, Cincar, Osječenica, Grmeč, Plješevica, Ravan, Varda, Dinara, Kamešnica, Vlašić, Zelengora, Lelija, and Crvanj. (Table 1.).

There are high mountains with very steep slopes, (33-55⁰) interesting even for more experienced tour skiers, especially ski riders those who love adventure. These are primarily Čvrsnica, Klekovača, Prenj, Treskavica, Maglić and Volujak (Table 1.).

To be an experienced, trained tour skier with ski furs, crampons and ice axe is to be the king of the mountain in winter, because you cannot fall through the snow and you can climb steep frozen slopes. On the mountain Bjelašnica traditionally held "Bjelašnički dan" famous for the competition in the Touring skiing from the top of Bjelašnica (2067 m above sea level) to the mountain lodge in Stanari.

4. Discussion and Conclusion

The mountains of Bosnia and Herzegovina are characterized by diverse and rich, still preserved, natural contents and rarities. Such a basis provides important opportunities for the development of hiking, climbing, speleology and tour skiing as a part of the Mountain tourism. The development of Bosnian mountain tourism is constantly increasing with an obvious tendency to increase the number of foreign and domestic tourists (Group of authors. 2018). Thanks to the growth trend, new tourist organizations and companies are emerging, especially in the private sector that specializes in various types of mountain tourism. Work is starting to be done in several ways to promote mountain tourism, which was contributed by the inclusion of BiH on the tourist map. "Via Dinarica", which also contributed to the creation of projects for cross-border cooperation with neighboring countries. The need for the development of mountain tourism resulted in the improvement of the existing infrastructure and the construction of new infrastructural facilities that primarily relate to accommodation facilities and traffic infrastructure. Mountain houses have recently been restored or built as well as in many other places in the mountains of Bosnia and Herzegovina. A richer and more comprehensive tourist offer is represented by the Dobrun - Vardište tourist railways in the municipality of Višegrad, then in the municipality of Banovići under the Konjuh Mountain or on the Zvijezda Mountain within the protected area of Bijambare. The function of mountain tourism is the construction, widening and asphaltting of mountain roads that connect mountain tourism destinations on the following routes: Sarajevo - Čavljak or Sarajevo - Gornja Tušila - Visočica - Bjelimići, Pale - Ravna planina, Mostar - Rujišta or Mostar - Goranci, Posušje - Risovac, then the construction of the road Foča - Velenići - Brštanovica above the deep, attractive gorge of Tara, Gacko - Lake Orlovačko, as well as many other mountain roads on Kamešnica, Klekovača, Šator and other BiH mountains whose road infrastructure needs to be modernized for the needs of tourism.

In order goal of this paper is represented to protect mountain areas in the form of National Parks for example as Bjelašnica, Igman and Treskavica mountains with the canyon of the river Rakitnica, then areas on the mountains of Prenj, Čvrsnica and Čabulja. Such ideas, based on landscape-environmental, natural scientific, aesthetic, recreational, ecological criteria. Existing protected areas need to be connected with neighboring states and their tourist regions based on the implementation of strategic guidelines for sustainable tourism development in this part of Europe.

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