

Natural Conditions for Tourism Development in the Upper Drainage Area of the Rakitnica River

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Abstract:- This scientific article presents a spatial-planning synthesis, natural characteristics of the area and various types of mountain tourism in the upper drainage area of the Rakitnica River. When preparing this scientific work related to the possibilities of tourism development, we primarily used field methods-observations with the use of scientific and professional literature. So research, in situ, by direct monitoring of natural processes, the occurrence of especially geomorphological, microclimatic, hydrological processes - for many years in all seasons. Based on the geological, geomorphological, climatological, hydrological, pedological and biogeographic characteristics of the area, with an emphasis on the additional diversity of the landscape, we determined the possibilities for the most acceptable types of tourism and recreation. From the aspect of spatial planning the study area located within the prospective National Park: "Bjelasnica, Igman – Treskavica with Rakitnica Canyon Valley".

Keywords:- Upper Drainage Area Of The Rakitnica River, Natural Conditions, Spatial Planning, Mountain Tourism, Bosnia And Herzegovina.

I. INTRODUCTION

The analyzed area - upper drainage area of the Rakitnica River (a right tributary of the Neretva, long 32 kilometers) situated in the central part of Bosnia and Herzegovina (Figure 1.). In the regional sense, the considered area with a surface of about 60 square kilometers is located in the geomorphological macroentity: "High Central Dinarides" (Lepirica, 2013.). It is a mountainous area mainly located at altitudes above 1000 meters on morphological contact of three mountains: Bjelašnica (2067 meters above sea level), Visočica (1974 m A.S.L.), and Treskavica (2088 m A.S.L.) (Fig. 1. and 2.). Territorially, it is a west part of the of Trnovo municipality in Federation Bosnia and Herzegovina., with the mountain villages: Šabići, Kramari, Lukavac, Brda, Milišići, Umoljani, Bobovica and Tušila. These mountain villages are connected to the Sarajevo City (45-55 km far away) by an asphalt road (Fig.1. and 2.) and demographically marked by a small, older population. Research in this area from the field of natural and geosciences was carried out by: Popović 1935., Mojičević-Tomić 1966-1977., Mihić, 1984., Šilić 1987., Lepirica, 1998., 2006., 2010., 2013., 2015., Opačić&Banda, 2017., Šoljan, 2023.

II. METHODES

When preparing this scientific work related to the possibilities of tourism development, we primarily used field methods-observations with hand compas M-53, GPS and binocular type Opticron Savanna WP 6x30. So research, In situ, by direct monitoring of natural processes, the occurrence of especially geomorphological and microclimatic processes - for many years in all seasons. On the basis of these long-term field researchs, a geoeological analysis of the relief was carried out for the needs of tourism using the recreational potential method. These included physical convenience, aesthetic value and availability of valued landform. **Remote sensing was carried out using:** Topographic maps (scale 1:25 000 and scale 1:100 000), Base Geological Map OGC 100 and Satellite map Google Earth 2020.

In this article, the literature of the Urban Institute of Bosnia and Herzegovina and published revival and paper in natural and geosciences were used.

III. RESEARCH AND RESULTS

A. Geological and Geomorphological Possibilities for the Development of tourism

The study area with surrounding mountain slopes are dominantly lithologically represented in Jurassic-Cretaceous „Durmitor flysch formation“: sandstones, marls, marly limestones, calcarenites and breccias, (according Mojičević-Tomić, 1966-1977.). Upper part of Rakitnica Canyon Valley and short Rakitnica gorges near the confluence with Tušlička river and gorge Tušlička river near the Vrela location is located structurally expresses a tectonic window formed along the local fault zone where denudation of mechanically „softer“ flysch deposits uncovered Triassic carbonates (Lepirica, A., 2006.). A similar case is with the blind valleys of Krivnja and Jelenača, where the hydrogeological features are smaller blind stream flows. The attractive rocky crest of Puzim (1776 m A.S.L) is a smaller tectonic nappe of Triassic limestones. This rocky peak is suitable for climbing and as a tourist viewpoint (Fig.3.). The peak Ogorjeli Kuk (2071 m A.S.L) on neighboring Treskavica as well.

Also the tectonic setting of the area may have influenced the shaping of the valley (Furlani, S. At All, 2016.). The faults are represented by the Rakitnica fault (stretched E-W direction) along which the upper valley of Rakitnica is directly fluvial incised, and Umoljani Fault (stretched NW-

SE) several kilometers long along which the upper valley of Tušlička River and Umoljanski potok are incised. In the neighborhood is a local fault that stretches through the Sakota valley (in the N-S direction). At their fault contact, a valley extension was formed in which the settlements of Rakitnica, Šabići, Umoljani and Gornja Tušila developed. These are the village of Umoljani with mills on calcareous stream Sedrenik waterfalls and with structural flexure fold named „Aždaha“ in rock of the Pošijak, connected with legend about dragon attack on pilgrims. These are possible geosite point connected for geotourism. „Territorial inventories of geosites remain on the international agenda, and they can help in acquiring information for solving pure geological research tasks.“ (A Mikhailenko, D.A. Ruban, 2024.).

Quaternary moraine drifts and erratic boulders are a similar case in terms of geotourism. These landforms cover the slopes of northeastern Visočica and lowest slopes of Bjelašnica near the Umoljani (Basic Geological Map OGK 100, sheet Kalinovik-K13)(Fig.). Glacio-fluvial terraces and head moraines cover left side of Tušlička River Valley. The lowest positions of the valley extension of Rakitnica near

Šabić are filled with geologically younger Quaternary alluvial-proluvial deposits. Recent colluvial fans in the highest terrain above 1500 m A.S.L. situated below Ogorjeli Kuk (2071m A.S.L.), Puzim (1776 m A.S.L.) and Kaoca ridge crest (1956 m A.S.L.). The riverbed of Rakitnica in the upper canyon below Bobovica is covered with collapsed colluvium more than 2 km long. From morphological aspect, the upper valley of Rakitnica and its left tributaries Tušlička river represent the lower parts of the analyzed area. These are composite valleys characterized by a succession of smaller valley extensions and narrowings (upper canyon and inner gorges) (Lepirica, 2013.). In the small extension basins is a shallowly cut riverbeds of the gently meandering Rakitnica and Tušlička River, which is marked by lateral fluvial erosion and accumulation. Near the Šabići and Rakitnica villages are the largest widths of the valley bottom in this area, reaching up to 170 m, geomorphological represented by floodplain elongated along the riverbed (Fig 3. and 5.). The proluvial-deluvial fans are formed at the ends of ravines and gullies on the contact of the surrounding slopes with the flattened valleys bottom.

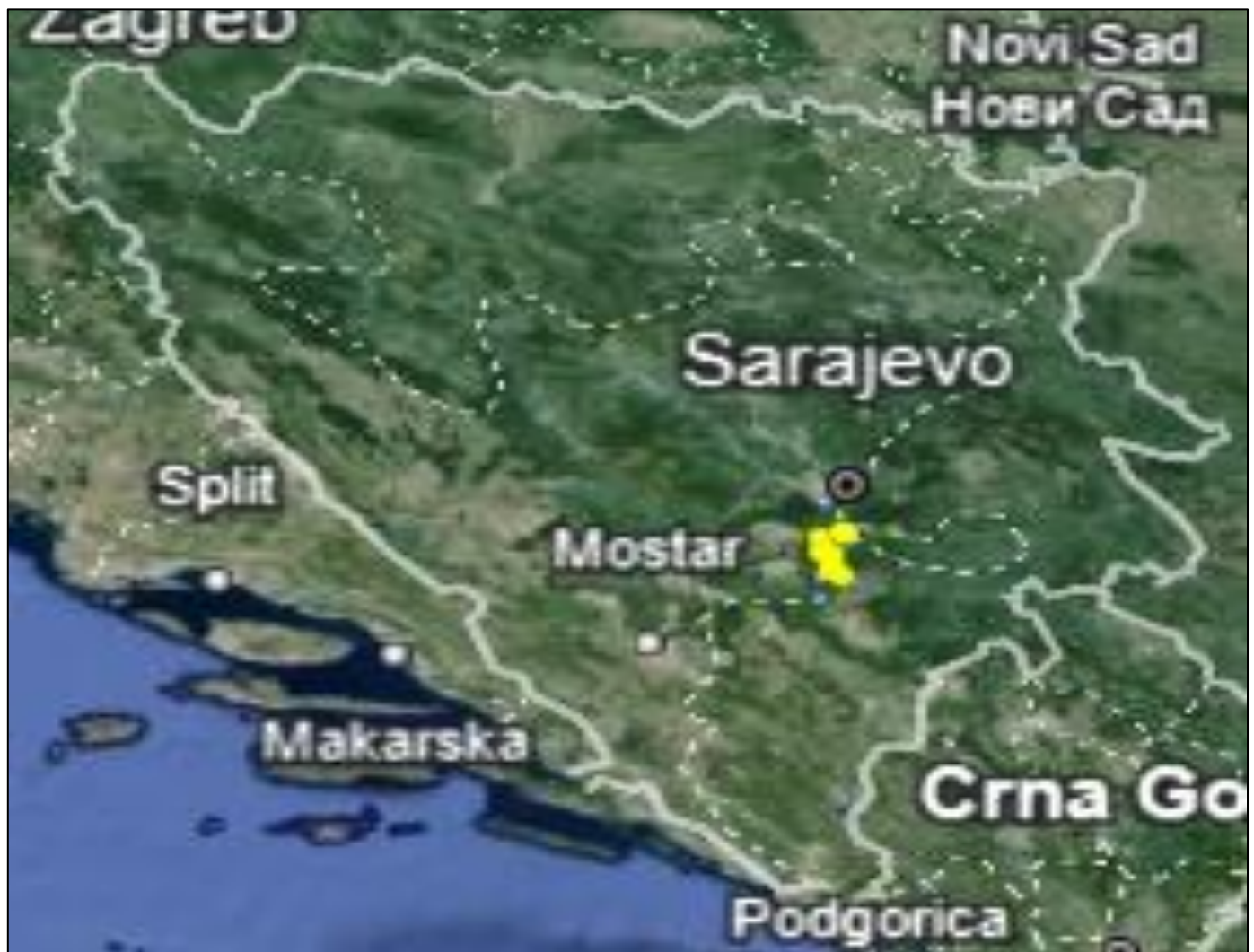


Fig 1(a): Position of the Research Area (Yellow Color)



Fig 1(b): Geographical Position of the Upper Rakitnica Drainage System (Google Earth 2020.)

The mountain karst of the highest ridge of Bjelašnica M.T.S. is the northern border of the study area. (Fig.) "Bjelašnica seen from above has the appearance of an undulating limestone mountain" (Mihić, Lj. 1984.). Bare

karst characterized Prut in Visočica M.T.S. Neighboring, higher terrain (between 1500 -1600 m A.S.L.) of eastern Bjelašnica and parts of the northeast Visočica is represented.

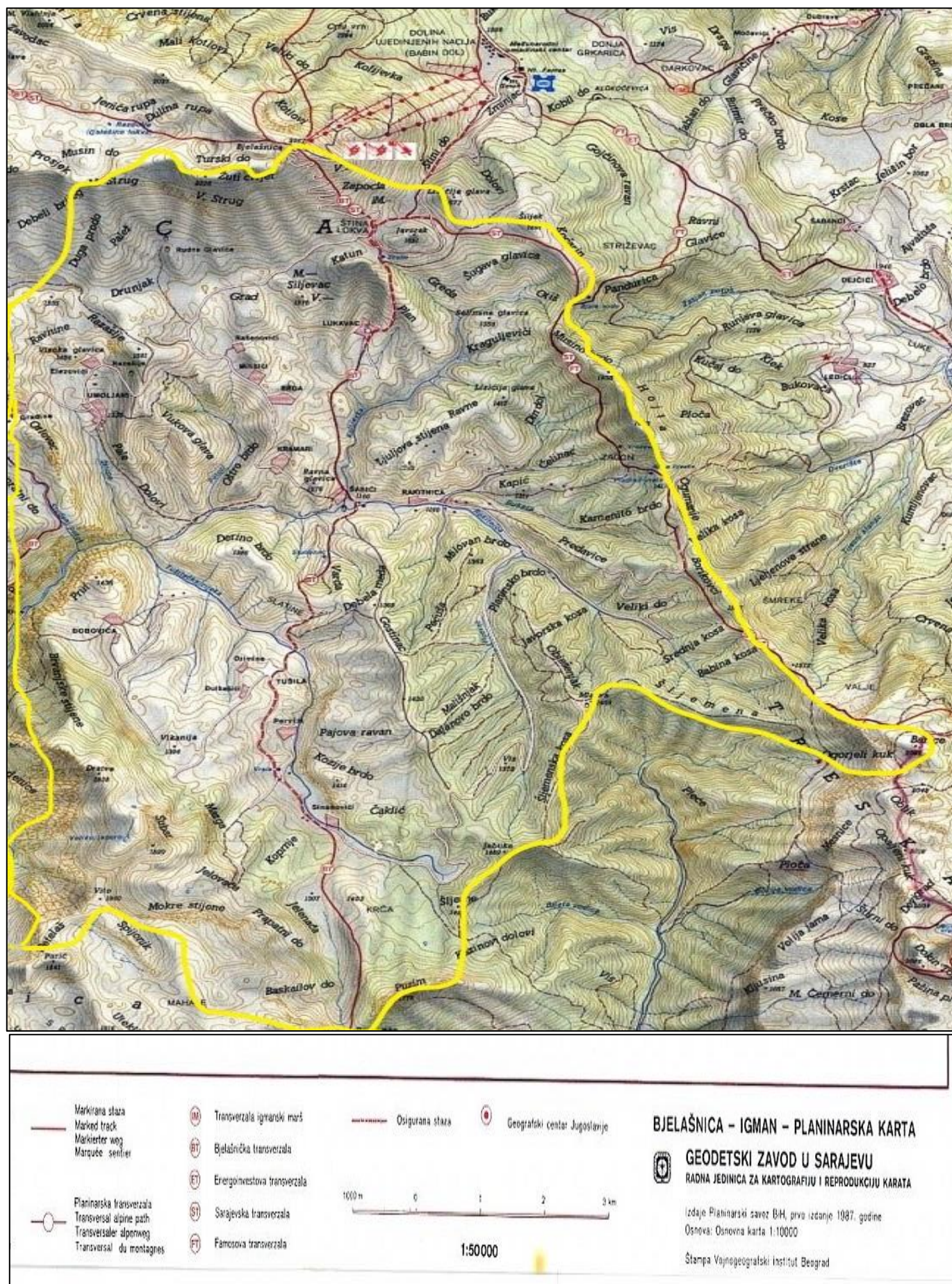


Fig 2: Topographical Map of the Analyzed

by karst uvalas of Ivanovo polje, Razošlje, Štirna lokva, Dugi Polje and Jelenača corosion interspersed with doline landforms. These uvala landforms which successively extend over 10 kilometers in length, generally in an E-W direction. „Furthermore, with the lowering of the karst base level, dolines and paleovalleys (recent uvalas) began to develop in limestone areas at higher elevations.“ (Şener, M.F., Şimşek, M., Utlu, M., Öztürk, M. Z., Sözbilir, H., 2023.)

After conducting a geological evaluation landforms in synthesis with the long-term observation of the duration of the dry period, we assessed that the previously mentioned

uvalas, very suitable for mountain biking and recreational horse riding. Those karst landforms are suitable for touring ski and for cross country in winter time.

A karst landscape where the dominant landforms are valleys cut by surface rivers is a fluvio-karst (Field, M. S., 2002.). The closer surroundings in the west are morphogenetically expressed by fluvio-karstic landform of the Rakitnica Canyon long 23,5 km (Lepirica, A., 2015.) are incised 900 metres deep into the Triassic dolomites and limestones. (Fig. and). Naturally favorable for canyoning.

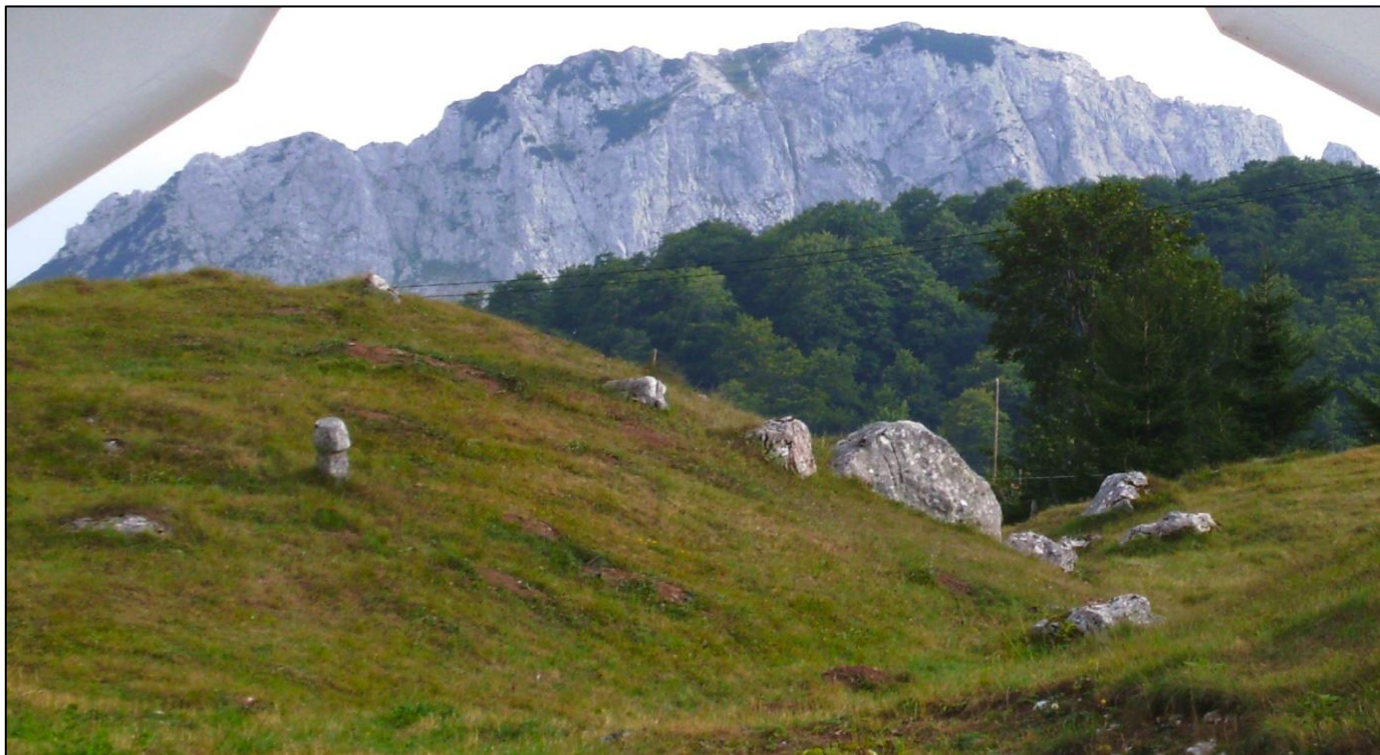


Fig 3: Rocky Face of the Puzim Crest (1776 m A.S.L.) Covers the Horizon; In the First Plan- the Erratic Boulders with One Old Muslim Tombstone (Left) Near the Village Gornja Tušila, (Photo:Alma Lepirica)

The lowest palaeoglacial microlandforms (between 1100-1250 m ASL) were represented by recessional moraines, erratic boulders and glaciofluvial terraces above riverbeds of the Tušlička River and Rakitnica River. (Fig.) „Decimeter-thick head moraines were discovered in the cuts of the asphalt road for Umljane above the Rakitnica floodplain“ (Lepirica, A., 2010.).

Palaeoglacial valleys with erratics boulders and moraine drifts are: Studeno polje, Dolovi (Bjelašnica M.T.S.) and Baskailov do, Gornja Tušila, Jelenača (Visočica M.T.S.) which are suitable for geotourism. (Fig. 3). Typical palaeocirques hollows (above 1600 m ASL) are Mokre Stijene, Kaoca and Veliko jezero in the Visočica MTS and Saruk and Balića jezero were incised in the higher slopes of the Bjelašica MTS. The highest palaeoarete are Kaoca ridge (1956 m ASL), main ridge of the northeast Visočica M.T.S. (Fig.4.)

The formation of karren is affected by the presence or lack of the cover and the soil, the characteristics of the surfaces created by glacial erosion and snow water. (Veress, 2019.). Palaeoglaciokarstic features marked by Bjelašnica's highest ridge Debela Brda and Ogorjeli Kuk in the Treskavica mountain with formation of karren and kamenitzas (Fig.). Palaeo glacial polished surface Vikanija, longer than 60 metres, reshaped in the northeast slopes of the Visočica MTS. **These are marked highlander routes connected with ridge of Kaoc on Visočica, Bjelašnica and Treskavica higher ridges.** Hillslope relief on the impermeable rocks reshaped by the combined action of weathering, landsliding, creeping and flooding processes is represented northeast, east and south parts of this area. It is an elongated wooded slopes of the mid-mountain ridges: Jabuka, Šljemen, Mlakve, Predavice, Milovan brda and Slatina from the south, and Borikovac and Hojte (Fig.). Their ridges with altitudes vary in the range of 1380 - 1675 m. geomorphic reshaped in flysch clasts. In this part of area, the low slopes covered with elongated proluvial fans.



Fig 4: Palaeoaretas Kaoca with Pyramidal Peak Vito (1956 m ASL), Two Palaeocirques are Located Directly Below Peak ; Photo:Alen Lepirica

Not far from the upper valley of Rakitnica, in the Bjelašnica south piedmont, there are several tourist destinations. These are the village of Umoljani (1350 m A.S.L.) and higher Studeno polje (1450 m A.S.L.) with meandering course of Studeni potok, waterfalls of Studeni potok that collapse 350 m deep into the upper canyon of Rakitnica with 21 cascades in spring and autumn which is attraction for hikers and tourists. Further surroundings of the considered area are the high mountain ridges of Oblja (1896 m above sea level) which sharply separate the upper Lukomir, the highest village in BiH, (1490 m A.S.L.) from the upper Rakitnica river drainage system in which the villages of Zabjelašnica are concentrated.

From the geomorphological point of view, this attractive landscape were described by polymorphism or richness of relief forms and a pronounced degree of geodiversity for different kinds of sports and recreational activities. In this work, we applied the method of geoecological evaluation of the relief for the needs of different types of sports and recreation. The geoecological evaluation was carried out on the basis of physical convenience, aesthetic value and traffic availability of the analyzed landform for a certain type of tourism, i.e. sports and recreation. The main limiting factors in the geoecological evaluation of landforms are: mobility of slopes, inaccessibility, lower absolute altitude of peaks. „ The evaluation carried out pointed to valuable and potentially valuable parts of the relief, but also to those limiting elements of the landscape, due to which certain parts have not been sufficiently valorized for tourism”(M. Arapović, M. Mamut 2023.).

According Saletto-Janković, (1995): "Walking - easy walking at a moderate speed, shorter duration (up to 3 hours), with the aim of visiting closer and more accessible certain parts, a promising protected area on, designated hiking trails“. Hiking of longer duration (more than 3 hours), on the slopes of smaller or larger slopes (up to 450 grades), with the aim of visiting attractive natural sights (geomorphological, hydrological, rare plant and animal species, etc.) as well as other natural beauties of the landscape. Mountaineering and free climbing - achieving ascents in steep slopes greater than 55 0, with or without the use of securing auxiliary equipment (free climbing).

The valleys of Rakitnica, Tušlička river, Kolijevka, the slopes of Slatina and the foothills of Visočica and southern Bjelašnica dotted with forests, meadows and glades are intersected by mountain trails. These are more gently sloping terrains with slopes lower than 15 0 s, suitable for recreational walks and mass visits of tourists of different age groups for the purpose of recreational stay in nature in the warmer part of the year especially in the mountain meadows: Studeno Polje, Krivnja, Jelenića, Slatina, Valley of Crna Rijeka (Fig.11.). Their relative proximity to the main road favors this type of recreation.

Mountain lodges in Šabići, Bijele Vode and Tušili, a mountain house in Umoljani and the traditional hospitality of mountaineers from Zabjelašnica villages can significantly influence the development of hiking and mountain ecotourism in general in this area. Just a few kilometers north of Šabići, near the main road, existed the zip-line long 1000

metres (is one of the longest in Bosnia and Herzegovina). We will list some of the hiking trails that are marked as those on the trails: mountain lodge Bijele vode - Štirni do- Babin do, Umoljani - Rakitnica canyon, Umoljani - Crveni klanac- Dugo polje, Umoljani – Studeno Polje-Gornji Lukomir, then Sabici - Slatine - Tusila, mountain lodge "Vrela" - peaks Vito and Drvstva, or direction to the village Bobovica. In winter, due to the high snow cover, high mountain hiking can have full application on the slopes of Bjelašnica, Visočica and Treskavica. Mountain biking is a very popular here, for this reason, a trail for mountain biking has been opened here: Rakitnica-Dujmovići, about 20 kilometers long. Therefore, asphalt road Sarajevo-Dolina UN- Šabići-Tušila- Boračko jezero- Konjic, long about 100 kilometres is important from this aspect. Numerous macadam roads and above mentioned asphalt road connected Sarajevo with this area and Konjic with Boračko lake and Neretva river have main role for the more massive mountain biking. So this area has good opportunities for this type of sport recreational activities. This applies to the following itineraries: Sabici - Rakitnica village - Pijevac valley - Vis – Sinanovici, Sabici - Kramari - Milisici - Dugo polje - Lukomir with further continuation towards Vrdolje and Konjic or a variant of turning from Štirna Lokva- Ivanovo polje - Umoljan, Sabici - village Rakitnica -

Borikovci - Dujmovici – Trnovo, Sabici - Sinanovici - Bjelimici - Glavicevo - Boračko Lake, Sabici - Sinanovici - Gornja Ljuta - Argud - Kalinovik or variant Argud – Glavicevo.

The ways to connect geoheritage sites within a region can be different depending on the aim of the travel: by car, to get to a specific site and then move rapidly to another; on foot, if specific geotrails have been equipped to link sites only along, for example, mountain trails and by bike, which can be considered an in-between type of mobility. All these specific forms of tourism may be considered in the framework of geotourism“. (Senese, A.; Pelfini, M.; Maragno, D.; Bollati, I.M.; Fugazza, D.; Vaghi, L.; Federici, M.; Grimaldi, L.; Belotti, P.; Lauri, P.; et al. 2024).

Horseback or recreational riding has its natural predispositions for development in mainly flattened terrains of the: Slatina, Šljemen, Krivnja, Jelenča, Dolovi, Bobovica, Ozimine.

It is important to note that Dugo polje, with its space and position, has predispositions for the construction of a stable of autochthonous Bosnian mountain horses and a sheep farm.



Fig 5: First Inner Gorge in Rakitnica Canyon Valley (Photo: Alen Lepirica)

The upper Canyon of Rakitnica River has natural predispositions for the development of Canyoning, rock climbing, and hiking (Fig. 5) can be performed in rocky limestone cliffs: Brvanjske stijene and above Rakitnica Canyon and in the rock Puzim not far from Gornja Tušila village (Fig.3.).

"Canyoning is a multisport recreational activity that, in addition to swimming and minirafting, includes mountaineering and mountaineering with or without securing equipment (free climbing) with the aim of overcoming the canyon straits and getting to know the original wildlife." (Lepirica, 2006.) It is especially popular with the younger population of mountaineers and nature lovers. Regarding this type of recreation, we emphasize the nearby Rakitnica canyon as one of the most famous in our country (Fig 5.). It is visited during the summer by domestic and foreign tourists. The closest to Šabići is the narrow inner gorge of Rakitnica downstream from the bridge on the asphalt road Šabići - Sinanovići. Downstream from the confluence of the Tušlička river with Rakitnica is the beginning of a 23 km long canyon that ends not far from the confluence of the Rakitnica and Neretva rivers. In the attractive canyon valley, there are eleven inner gorges that present a challenge for even more experienced mountaineers and climbers. The closest to Šabići, about 4 km away, is the first canyon inner gorge, the steep right side of which is flooded by the attractive waterfalls of Studeni potok in spring and autumn. (Fig 5).

Thus, this area is interesting for scientific research and the development of geotourism.

B. Climatic Characteristics of the Area

Rates of land surface processes provide insights into climatic and tectonic influences on topography" (De Lisle, C., Yanites, B. J., 2024.).

In the study area, large topographical differences in height of 900 meters had an effect directly reflect the existence of several climatic types in this relatively small area. **The northernmost point of the research area is the peak of Bjelašnica (2067 m A.S.L.), where a meteorological observatory was built in 1892.** because specific geographical position at the contact of maritime influences from the south and continental from the north, altitudes that in some places exceed 2,000 m above sea level.

The higher slopes of the high mountain massifs of Bjelašnica, Treskavica and Visočica are influenced by the harsh alpine climate and are covered with snow for five and six months of the year. For example, on the Bjelašnica meteorological observatory the **average annual air temperature was 1,2 °C** for measured period 1961-1980. (Table 1.) (Table 4., 32 pp, in Stefanović, V. et All, 1983.).

Table 1: Average Monthly Air Temperatures Measured at the Meteorological Observatory on the Top of Bjelašnica Mountain, for Period of 1961-1980. (Source: Hidrometeorološki zavod SR Bosne i Hercegovine, Sarajevo 1991.)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	ann. temp. °C
-6,4	-6,5	-4,4	-1,2	3,8	7,2	9,5	9,6	6,8	2,8	-1,6	-4,9	1,2



Fig 6: Gradina Shepperd Houses and Rocky Slopes of Obalj, Bellow (1896 m A.S.L.) In February; Photo: Lepirica Alen

The snow cover lasts for about five months and on the surrounding high mountain ridges and shady slopes for over six months. During the winter and early spring months, the height of snow deposits in the higher mountain slopes reaches over 2 m in height. Precipitation is of nival-pluvial character and their average annual amount is more than 1700 mm. Summers are short, while late autumns and springs are snowily and rainy with strong orcan winds bura and jugo.

The lower slopes of Bjelašnica, which directly gravitate to the Upper Rakitnica valley, as well as the above-mentioned relief depression in which this rural settlement is located, are under the influence of the mountain climate the lowest terrains between 1250 – 1195 m A.S.L.. In the time with winter anticiklonal atmosferic pressure, the microclimate of the Rakitnica and Tušlička River valley depression is characterized by temperature inversions, which are especially pronounced in winter with accompanying ground - radiation fogs. Then the temperatures drop below 0°C and Rakitnica freezes in the riverbed. Relative humidity is high, higher than 75%.,The characterictis microclimate found in the mountain areas has not only recreational but also medicinal value.“ (Dolecki R & Dolecki L. 2023.) "A longer stay in the mountains has a positive effect on the nervous system, has a preventive effect on the body, relieves stress, improves vision and strengthens the immune system". (Dragović, R., 2004.)

After conducting a geocological evaluation landforms in synthesis with the long-term observation of the duration of the snow cover, we assessed that the Visočica slopes on the relation: Subar peak (1800 m A.S.L.) - Kaoca - Katun - Vrela (1200 m A.S.L.) oriented predominantly towards the northeast, on a length of about 2,3 km with slope gradients

mostly between 20-35 degrees would be suitable for the construction of a ski track and a ski lift. Thus, the development of alpine skiing on Visočica M.T.S., which would relieve the ski center of Bjelašnica, 17 km away, during the ski season. Mountain ridges, slopes, uvalas and valleys of the nearby Bjelašnica, Visočica and Treskavica massifs have been covered with snow for more than five months. They provide unimagined opportunities for touring skiing as a specific type of high-altitude skiing, especially in the early spring period when the slopes are covered with quality firn snow (Fig. 6. and 7.). Then the mountain terrains above 1500 m A.S.L. in this area in a radius of more than 20 km in the direction of east, south, west and northwest represent a natural piste for touring skiers. For Cross country fans, terrains with gentle slopes are the most suitable. In the immediate vicinity of Šabić, these are in winter: the upper valley of Rakitnica, the flattened terrains of Slatina, Mlakva, Obješenjak, Krivnja from the south. From the northwest, it is a road to Lukomir, which connected uvala Dugi polje and more flattened area of the highland of Niska Bjelašnica, for more than 15 km and further across Vrdolje to Konjic. There are possibilities of a branch near Razošlje towards Štirni dol and further towards Babin dol or towards Bijele Vode and back towards Šabići. In general, there are numerous variants of tours and itineraries for cross country due to the mentioned climatic, relief and infrastructural benefits.

The highest peaks of Bjelašnica (2067 m A.S.L.), Mokrih stijene, Kaoc (1956 m A.S.L.) and Puzim (1776 m A.S.L.) on Visočica M.T.S. and Barica (2072 m A.S.L.) on Treskavica M.T.S. are suitable for paragliding due to their overhanging position and steep terrain (Fig 4 and 6.).



Fig 7: Touring Skier (Author) in Studeno Polje in January (1500 m A.S.L.). In the First Plan - Meanders of the Stream Studeni Potok and Palaeoarete in Background;Photo: Gordan Čahtarević

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Opačić, V.T. and Banda A (2017) state in their Case Study of Bjelašnica: „Tourists find all clusters more attractive than locals, except for the cluster - climate and geomorphological attractions, where there are no significant differences“.

C. Hydrographic Characteristics

The analyzed area, in the potamological sense, is located in the immediate vicinity of the orographic watershed Pontus-Adria. It belongs to the Neretva hydro system or the Adriatic basin. In the Rakitnica village where the confluence of the Black River, Bukota and Pijevac stream creates Rakitnica River, a small river with an average annual flow of less than $1.5 \text{ m}^3 / \text{sec}$. (Fig.8.). The river Rakitnica, right tributary of Neretva River, is 32 km long. Hydrographically, it is characterized by two maxima (spring and late autumn) and two minima (winter and summer) of the flow, with a nival-pluvial flow regime. It is a mountain stream whose upper basin is dendritic drainage pattern because predominantly impermeable lithological composition. After heavy rainfall and sudden melting of snow in this type of river network, there is a rapid concentration of torrents and high flow of sediments. Therefore, Rakitnica is of a torrential character. The lengths of its tributaries Pijevac, Bukata stream, Tušlička river and surrounding streams do not exceed 10 km. At the contact of flysch and fissure-cracked limestone, we have the appearance of sinkholes in Krivnja and Jelenača and the sinking of the Šakota stream in its own bed. These are isolated occurrences that represent contact karst. Somewhat lower down in the upper canyon of Rakitnica, from intersected joints in the limestone rocks of Prut, the permanent karst spring Stubišnik is existing. These are just some of the many natural attractions of this area that can attract both domestic and foreign tourists. This part of river is suitable for swimming and refreshing in the summer, too. (Fig.8.)



Fig 8: Rakitnica's Riverbed, Cut Into Flysch, is Suitable for Refreshment in the Summer;
Photo:Alma Lepirica

D. Pedological composition

Rendzine and brown acid soils on flysch predominate here.. They are suitable for the development and cultivation of forests, which are an irreplaceable factor in the balance of natural processes and a special aesthetic component of the landscape of this area. The highest mountain areas of Bjelašnica and Treskavica pedologically are shallow soils - lithosols. The narrow bottom of the valley, along the meandering course of Rakitnica, is represented by alluvial soil – fluvisol. Ecologically clean - healthy food and other products are increasingly in demand in the market of Western and Central Europe, where soils are poisoned by acid rain and saturated with artificial substances. Here, in addition to traditional dairy products (cream, milk, bellows cheese, etc.), the production of bread and potatoes should be mentioned because the surrounding mountain soils and meadows are suitable for growing rye, barley and potatoes. The production of forest and meadow honey also has its development possibilities in these fields, which is already visible in Umoljani and other sunny and wind-protected areas. All this also refers to the organized collection of wild medicinal herbs for the needs of the pharmaceutical, food and cosmetic industries. The planning of the above should include pharmacologists, biologists in order to rationally use the undoubted potential of this area.

E. Flora and Fauna

The source part of the Rakitnica river basin covers the area from Šabići to Bijela Lijeska on Hojta in one direction and from Šabići to Puzim in the other direction. According to the real vegetation map (Stefanović, V. et All, 1983.), mountain pastures, beech and fir forests (*Abieti-Fagetum*) predominate. In the modern period, they are exposed to irrational logging. Lush meadows and pastures with their enclaves and clearings fit harmoniously into this beautiful calm landscape. The highest vegetation on calcareous screes in the alpine belt, for example of Bjelašnica M.T.S., encompasses 101 species. (Trakić, S. at All., 2021.)

In general, the vegetation of the mountainous part of the Rakitnica drainage basin is extremely interesting not only because it is located in the contact area of continental and sub-Mediterranean climatic influences, but also because of contact with the mountain edge of the Herzegovinian floral endemic center (Prenj, Čvrstica, Čabulja M.T.S.). For the aforementioned center, biologists Redžić, S., Barudanović, S., Trakić, S. and D. Kulijer (2011.) point out: "That high level of floristic and vegetation richness places this area among the most diverse areas both in Europe and whole Mediterranean.

Therefore, endemic floras species are also represented here. For example - Lovely stepmother (*Viola elegantula* Schott), Serbian pancicia (*Pancicija serbica*), various species of widows (*Knautia*), lincura (*Gentiana lutea* L.) and other species of the genus rennet (*Gentiana cca*) (Šilić, Č., 1984., Šoljan, D., 2023.) (Fig.9. and 10.). Kantarion or Gospina trava for the treatment of mild depression and numerous medicinal and vitamin-rich species. The occurrence of raspberries and strawberries is more prevalent on felling areas and blueberries exist on forest glades and mountain pastures. It is this area that abounds in the highest quality

species of mushrooms in significant quantities, which is especially true of porcini and chanterelle. Along the course of Rakitnica grows turnips (*Petasites officinalis*) and a species of willow (Gen. *Salix*) which the locals call rakita, from which the name Rakitnica originates. Thus, these areas with numerous types of medicinal plants have predispositions for the development of the domestic pharmaceutical and food industry (mushroom cultivation and production). This refers to the organized collection of wild medicinal plants and the development of purchase stations in Šabići and Tušili. Of course, pharmacology experts should be included in the above activities in relation to planning and exploiting the undoubted potential of this area.

The high altitudes of these mountain areas affected the survival of glacial relics such as the snow vole (*Chyonomus nivalis*) whose habitats are the highest peaks of Bjelašnica and the Siberian grasshopper (*Gomohocerus sibiricus*) which appeared en masse in the area of the peak ridges of Bjelašnica in 1952. There are diurnal butterflies from the genus *Erebia*, dark and brown wings, then runners from the genus *Pterostichus* and others. Bonacci, T., Biscaccianti, A. B. Biscaccianti, Siclari, A., Carlomagno, F., Bonelli, D., Mendicino, F., Plewa, R., Jaworski, T. & M. Pezzi (2022) point out that it is geological and the biogeographical past was the key determining factor the current distribution of the species.



Fig 9: (*Viola elegantula*)



Fig 10: (*Vipera Ammodytes*) in the Studeno polje
Photo: Alen Lepirica

Today, alpine jackdaws nest on the vertical cliffs of Visočica and Bjelašnica. So here there are good opportunities for the development of scientific-research tourism. Soaring eagle, falcon and hawk inhabit this area. The whole Zabjelašnica is adorned with the richness of the bird world. The dense beech forest of the Gluhača not far from Tušilo was named because rare deaf grouse. In the dense forests of the source and canyon part of Rakitnica, large game is hidden: brown bears, gray wolf and wild cats. Roe deer are numerous and chamois are rare. Of the wood animals present are the foxes, martens, squirrels and badgers. Hunting lookouts here can be used for tourist photo safaris. In addition to rabbits, this area is inhabited by numerous rodents, voles and down. The genus of reptiles is represented by lizards and snakes. One of the three separate regions can be identified in Bosnia and Herzegovina, which are of special importance for venomous snakes the Balkans and beyond (the so-called Important Viper Areas - IVA). These are the mountain massifs in which all three venomous vipers live in the same area: *Vipera ammodytes*, *V. berus* and *V. ursinii*. (Fig. 10.). IVA areas in BiH are mountain massifs Bjelašnica-Visočica according to the data of the herpetological database BHHU-ATRA". (Zimić, A., Šunje, E. at All (2024).

Brown trout exist in Rakitnica, which testifies to the non-pollution of this watercourse. In the context of the development of ecotourism, sport and fly fishing in the upper canyon is primarily meant here. This implies restocking and renewal of the fish farm of brown trout in this mountain watercourse with mandatory measures for monitoring and protection of the fish population.

F. Landscape

Peaks that in some places exceed over 2000 m above sea level with extraordinary views, rich species of flora and fauna with endemic phenomena and the diversity of landscapes from gentle valleys to high alpine terrains at relatively short distances in this area is a challenge for passionate nature lovers (Fig.11.).

"The landscape perspective might be regarded as a core aspect of the geotourism experience as humans have a long history of the appreciation of scenery" (Newsome, D. & Ladd, P., 2022.). From the top of Bjelašnica (2067 m A.S.L.) there is a unique viewpoint that reaches east to Ljubišnja M.T.S (2232 m A.S.L.) and Durmitor M.T.S. (2522 m A.S.L.) in Montenegro, in the south to the rocky barrier of Velež M.T.S. (1969 m A.S.L.), in the west to Cincar M.T.S. (2006 m A.S.L.), with a radius of view over 100 km as the crow flies in clear weather which is a real tourist attraction (Lepirica 1998.). That's why they should rebuild the restaurant-viewpoint at the top of Bjelašnica, which was demolished in the last war. Also, a small viewpoint restaurant on the Puzim's rocky peak (1776 m A.S.L.), accessible by cable car gondola from Tušil, would be a real attraction with an excellent view of the central, high Dinaric Mountains and the valley of the upper Neretva and its tributaries.

Engineer Jovo Popović (1935.) states: "From the peaks of Visočica there is an indescribably beautiful view of the mountains and the surrounding areas. So to the north to Bjelašnica and Hojta, to the northeast to Treskavica mountain, to the east to Zelengora, to the southeast to the Morine plateau; to the south to the Crvanj and Velež mountains and to the southwest to the eastern parts of the Prenj mountain. Looking at that magnificent scene, the observer suddenly cried out: "God, you are great."

So far, the well-preserved natural ambience of the considered area with attractive landscape-ambient from valleys to high mountain ridges has very good natural predispositions for the development of Mountain tourism connected with ecotourism and rural tourism. One of the basic predispositions for the development of tourism in Zabjelašnica villages: Sabici, Rakitnica, Umoljani, Brda, Milišići, Kramari, Bobovica, Gornja i Donja Tušila are their central position in between the mountain massifs of Bjelašnica, Visočica and Treskavica. A few kilometers between Sabic and Gornja Tušila (Sinanovići) are picturesque landscapes of the highlands of Slatine, Sljeme, Bijele Vode, Borikovac and Hojte overgrown with mixed forests and rounded peaks interspersed with meadows and clearings with numerous clear mountain streams. We can conclude that the immediate vicinity of Upper Rakitnica drainage system by its differentiated relief and geological features, climatic

diversity, hydrological conditions, rich and diverse flora and faunal composition. Thus, it should be noted that this mountains are famous for its high ridges, mountain lakes, rich mountain springs, attractive landscape and ambient structure, which is represented by the alternation of mountain pastures with rocky sections and dense mixed forests. Such attractive and diverse landscape was primarily influenced by the neotectonic succession of the Durmitor flysch and Triassic limestones at relatively short distances which is significant for the future development of geotourism. „Indeed, geoconservation often goes hand in hand with geotourism development“.(Fedorov, Y.A.; Mikhailenko, A.V.; Ruban, D.A. (2022). „The vision of establishing Geopark reflect passion and commitment to the protection and promotion of

the geological heritage in region, while also providing attractive space for the development educational tourism and ecotourism“(Bobrowska, A. et All, 2024.).

The rendzina soils in this area are suitable for the development and cultivation of forests, which are an irreplaceable factor in the balance of natural processes and a special aesthetic component of the landscape of this area (Fig.11.). Then there are the medieval necropolis of stećak tombstones which together with described natural characteristics they can influence that this area is protected and put into a touristic function. . Furthermore, rural settlements with autochthonous costumes and traditional habits of mountaineers from those villages.



Fig 11: The Picturesque Landscape of the Upper Rakitnica River Valley with Slopes Overgrown with Fir forest on the Jurassic Flysch; In the Background it is 400 Metres High Rocky Wall of Ogorjeli Kuk (Treskavica M.T-S.) Reshaped on Triassic Limestones; Photo Alen Lepirica

Also 12 km faraway from Sabc we can consider the northern and eastern slopes of the Bjelašnica massif with main Ski center in Federation of Bosnia nad Hercegovina named Babin dol or „United Nations Valley“, which is one of the most important points of winter tourism in BiH with many hotels, apartments, restaurants and supporting infrastructure. Not far away are Malo and Veliko polje on Igman, then the primieval forest Radava, Ravna vala, and the picnic area Hrustemovac and Gornja Grkarica, which are

interesting as daily tourist destinations. The relatively short distance (45 km) and the road connection with the Sarajevo agglomeration, complement the already mentioned, extremely favorable characteristics of the position for the future rural and ecotourism development of this area. "The preservation of the area of the mountains Bjelasnica, Igman, Treskavica and Visočica, from the aspect of the quality of life of the citizens of Sarajevo Canton, means the preservation of aquatic, forest and endemic species“(Grupa autora, 2017.). In

his dissertation, Lepirica (2006) especially points out that Rakitnica Canyon should have the status of strictly protected nature reserves with a more limited number of visitors from this aspect (Fig. 5.).

Mountain lodges in Šabići, Bijele Vode and Tušili, a mountain house in Umoljani and the traditional hospitality of mountaineers from Zabjelašnica villages can significantly influence the development of hiking and mountain ecotourism for this reason.

The previously mentioned richness of the animal world and pitoresque landscape could, in order to expand the ecotourism offer (while respecting a more humane approach to wild animals), encourage the development of photo safaris. The main points would be the current hunting checkpoints or natural observation posts from which game could be visually monitored. This primarily applies to the canyon area and the surrounding forest areas. There is a school in nature in Šabići, which would enrich its contents and practically bring natural phenomena and processes closer to the younger population with more efficient ecological education. All this implies the renewal of the stock of game that is endangered in these post-war times by a wide range of direct and indirect negative anthropogenic influences. For the purpose of rural development, the guides would be local residents of Šabić and surrounding villages. In addition to the rich natural features of this area, which is characterized by a pronounced degree of geodiversity and biodiversity, a valuable specific cultural and historical heritage should be added. This primarily refers to the autochthonous Bjelasnica architecture in the neighboring village of Gornji Lukomir (the only one preserved in this area), destroyed Illyrian forts, numerous medieval necropolises of stećak tombstones, tombstones from the Ottoman period and Bjelasnica costumes, customs and traditions of bygone times that may attract ethnologists and historians.

IV. DISCUSSION

These are primarily very positive local developments in every respect - economic, sports, health and demographic. Today, in the analysed area, a restaurant was built, then a mountain lodge, and a hotel is being built on the right bank of the Rakitnica River in Šabići. A modern "School in nature" was built, for education primary and secondary school students. In the neighboring Bjelašnica villages: Rakitnica, Lukavac, Milišići, Brda, Kramari, Umoljani, modern facilities-restorants with traditional food and houses, apartmans intended for mountain and rural tourism have been arranged. We can conclude that this area started with tourist development, especially in the warmer period of the year, primarily recreational walking, hiking and mountain biking, although there are numerous opportunities for winter sports as well. Based on the above, on this occasion we would especially like to emphasize the programs of ecotourism offer (daily and multi-day) which must have a rich and diverse content adapted to different age populations of the tourist. This is particularly significant because ten kilometers north is the modern hotel and apartment complex of the Ski Center Bjelašnica, which is connected to this area by an

asphalt road. This would expand primarily the summer tourist offer of the Bjelašnica ski center in Babin Dol, whose ski resort capacity is 8,396 skiers/hour with an accommodation capacity of over 5,000 beds (Grupa autora, 2017.). And finally, it is important to note that this area is territorially located within the prospective National Park "Bjelasnica, Igman, Treskavica, Visočica with Rakitnica Canyon Valley". Here, in addition to traditional dairy products (cream, milk, bellows cheese, etc.), the production of bread and potatoes should be mentioned because the surrounding mountain soils and meadows are suitable for growing rye, barley and potatoes. The production of meadow and forest honey also has its development predispositions in these fields, which is already visible in Umoljani and other sunny and wind-protected areas. All this also refers to the organized collection of wild medicinal herbs for the needs of the pharmaceutical, food and cosmetic industries (Lepirica, 1998.). The planning of the above should include pharmacologists, biologists in order to rationally use the undoubted potential of this area. Construction of fishponds (brown trout) on the Rakitnica and Tušlička rijeka for the gastronomic offer of the Bjelašnica Ski Resort hotel complex and the surroundings of Sarajevo. Construction and reconstruction of existing facilities, design, development and installation of tourist signage, creation and installation of tourist websites (within NP "Bjelasnica-Igman"), development of promotional materials and marketing strategy. All this includes measures: development of tourist marketing, development of tourist potentials and tourist products, protection and promotion of authentic cultural and historical heritage and natural resources with education of tourist workers, all with the aim of developing ecotourism and rural tourism in analyzed area. Main problem for the development of tourism in the upper-source valley of Rakitnica are there minefields from the last war in Bosnia and Herzegovina. According to map M 1: 25000, (Source: BH Mine Action Center, Sarajevo 2002.), are located in a wide altitude range in the east and southeast of the considered area. Contamination of land with mines in the upper basin of Rakitnica is a current problem that should be solved as soon as possible by demining. The following dangerous microlocations are: Rakitnica riverbed upstream of the Rakitnica village and Bukata stream in the neighborhood. Therefore, microlocations on the relatively flat top peaks of Predavica, on the northern slopes of the Mlakva (1457 m A.S.L.) and Milovan hills (1362 m A.S.L.).

V. CONCLUSION

In the last fifteen years, the spontaneous intensification of the development of mountain tourism, ecotourism and rural tourism began in the area of the upper drainage of the Rakitnica River. The whole area is very interesting and attractive for scientists and scientific research, especially for geomorphologists, dendrologists, biologists, climatologists, ethnologists, geologists, geographers and others that could affect the initiation of a specific scientific research type of tourism. On the basis of many years of field research, a geological, geomorphological, climatological and geoeological analyses of the study area for the needs of types of tourism that are developing are: walking (recreational), hiking, mountain biking, touring and alpine

skiing, cross country, climbing, canyoning, fishing and horse back, paragliding, mountain ecotourism, fotosafari, geotourism and researching tourism.

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