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Assessment and Management of Natural Assets and Risks in Brezovica

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Abstract

This paper aimed to study the assessment and management of natural resources and risks in Brezovica. The main purpose of this paper is to present the natural values and risks of the components of Brezovica's geographical landscape. This paper uses several methods such as: The research method of the published literature on different physical-geographical aspects for the territory of Brezovica area and its elaboration in view of the subject study object, the method of observation of physical-geographical phenomena in Brezovica district terrain, survey method and interview method, statistical processing method, mapping method, terrain photography method, comparison method, prognosis method and analysis-synthesis method.

In this paper, it can be argued that the findings of this study may help Kosovo citizens and tourists from other countries who are more knowledgeable about Brezovica to appreciate the wealth of this country and be aware of the natural risks present in Brezovica.

Key words: Tourist, Brezovica, natural wealth, natural risks, assessment.

INTRODUCTION

One of the most important tasks of the geographer is to determine the quantitative values and anthropogenic natural risks according to the different taxonomic units of the geographical environment practically in our case for the Brezovica district. Their precise definition is very important for the development of the community of the area as they can also determine the measures that can be taken for a rational use of natural values and to prevent the destruction of these values by harmful natural processes as well as actions untested by human society (Trojan, 2008).

Postdam & Draqi (2007). The Brezovica Ski Resort still continues to be managed by the Serbian state structures, meaning that all revenues generated by this social enterprise from visitors, with the exception of car parking, flow into Serbian funds. As a result of Serbia's direct influence, the directorate of this center doesn't account to the municipal authorities of Shtërpcë as a business within its territory. This company doesn't pay any taxes to the state of Kosovo, a fact that damages the country's budget. The debt to the Tax Administration of Kosovo so far alone is 4.5 million euros. Whereas, the tax management laws are the same for all municipalities, but in the municipality of Shtërpcë, Serbia is emerging as the chief and it must accountable to it.

The topic of our study is built on the basis of several chapters that identify a reciprocal link between them and aim at identifying their respective values and risks. Such are Introduction, Geographical Position, Population and Economy, Geological Construction, Relief, Climate, Hydrography, Lands, the Plant and Animal World. The chapter on geographical position aims to determine the boundaries of the spatial extent of the territories, the boundaries, its positioning in the context of climatic, hydrological, land, vegetation, general regionalization, geological and relief areas. The geographical position identifies not only the basic features associated with the physical-geographical components and their values, but also the aspects that favor or hinder the development and interrelations with other territories within and abroad. Special emphasis is given to the chapter on the population and the economy of the district, which is related to the natural potential suitable for living (this is demonstrated by early population from prehistoric times to the present day) and the

management of the risks involved while minimizing their negative effects (Dollma & Pari, 2007).

RESEARCH OBJECTIVES

The research objectives are:

- To present the values and natural risks of the components of Brezovica's geographical landscape so that the community can take measures for a rational use and without negative effects during the intervention of the society.
- To know the dynamics and laws that physical-geographical components have in order for the intervention of society to function and not contradict them.
- To recognize the interplay of physical-geographic components and to predict the consequences arising from changes in one component and how it will be reflected in other components of the landscape.
- To know what the consequences will be and what measures should be taken to avoid the negative effects that may arise during this intervention.
- To consider risk phenomena of natural origin such as earthquakes, avalanches, crashes, landslides, frosts, fires and logging, floods, etc., mitigating or eliminating their negative effect.
- Recognize the positive values of landscape components by intervening in a studied way without creating adverse effects and preserving their values for future generations, (where it is important to preserve the land fund, natural vegetation from fires, logging, different diseases of plants etc.) and observe the laws of their development.
- To analyze the evolution of the components of the geographical landscape and the current influencing factors. It is important to make their prognosis based on their annual or perennial rhythmicity (droughts, avalanches, earthquakes, floods, etc.).

RESEARCH METHODOLOGY

The methods used to achieve the purpose of the paper are:

1. The research method of the published literature on various physical-geographical aspects for the territory of Brezovica

area and its elaboration in view of the subject study object. Theoretically we are based on the theoretical work of specific theoretical disciplines published in our country and in European countries;

2. Method of observation of physical-geographical phenomena in the terrain of Brezovica district;
3. Survey method and interview method;
4. Statistical processing method;
5. The mapping method;
6. The terrain photography method;
7. The method of comparison;
8. Aspects of geophysical character in relation to mass and energy;
9. The prognosis method;
10. The method of analysis-synthesis.

1. LITERATURE REVIEW

Once you arrive at the ski resort, the climate and scenery change. You realize what beauty this gem of the Balkans has. But the cable car and ski lift do not work until 09:00. To reach the summit you have to go by cable car and from there enjoy the magnificent sights and required runways. One of the most sought after is the Great Meadow. There are professional and amateur skiers, but also children. After this runway, there are many others, such as the Eagle's Neck, which is considered the most difficult runway. This is not a long runway, but required by those who engage in extreme sports. The number of visitors is large, especially on weekends, and everyone seems to be enjoying these beauties. “I like the runways and the mountains. It's not the first time I'm coming and it certainly won't be the last”, says one visitor who seems to know these trails very well. Another track is the Lion’s Neck (Postdam & Draqi 2007).

But there are also foreign tourists. One couple was from the Czech Republic. “This place needs to be explored more. I didn't believe it would be so, ”they say. When you are at 2200 meters above sea level the air is also better and healthier. When you come down from the top you see that the center is occupied by children and family members. Some have come with their own equipment and some have rented them, but all are enjoying themselves. When you look at all the beauty, you immediately think about how much investment you need

to make Brezovica one of the most visited centers in the Balkans and Europe (Rogo & Meqaj (2008).

The villas are very expensive, and the rich who own them only sell them for hundreds of thousands of euros. Others who do not have these conditions come for a day or two, and below are various motels that cost even cheaper. The price is 10 euros per person, and the food is reasonably priced. Those in Brezovica have a message: *Come and visit this magnificent beauty*.

The altitude up to 2522 meters, Brezovica is located at an altitude of 900 to 2,522 meters, with an area of 2,500 hectares and is only 60 kilometers from Prishtina International Airport (Postdam & Draqi 2007).

The present paper deals extensively with the geological aspect through the presentation of paleotectonic and neotectonic evolution as they relate to the main features of geological structures such as anticline, syncline, horst and graben, their relief and lithological features, as well as many geomorphological processes and forms. The altitudes of mountainous areas affect the vertical zonality of almost all physical-geographical components of the area such as climatic zones, vegetation floors, land zonality, as well as many exogenous processes associated with them such as glacial action, intensive stream erosion processes, etc. (Trojan, 2008).

Another aspect of the study are the natural risks that are not scarce and that cause a lot of damage to the population. As such we can mention earthquakes formed by the impact of three powerful seismic lines that have had consequences both on buildings and on human casualties.

1.1. The main tectonic elements of the Brezovica area

According to Dollma & Pari, (2007) the structural construction and tectonic style of this area is determined by formative construction, geological development history of the region and age range. The wide age range ranging from the Ordovician to Plioquaternary, the diverse and potent sedimentary and magmatic formations that build these areas, the numerous folding stages of formation that formed several structural floors under the conditions of a pronounced compressive regime in the first stage development and horst-graben morphostructure formed at the new neotectonic stage.

In the conditions of a strong extensional regime they have conditioned a certain tectonic style with different creases and detachments with large horizontal tectonic displacements in the form of tectonic covers as well as contrast vertical movements that have formed today's morphostructure in the shape of the new molassic pits and the mountain blocks around them.

1.2. Lithology

According to Rogos & Meqaj (2008), in the lithological aspect this territory is also distinguished for the variety of rocks that constitute the land of this area and which play an important role both in the formation of various relief forms and in the geomorphological processes occurring there. The ultrabasic massif and the eastern carbonate periphery of the afrolites (i.e. magmatic and sedimentary rocks) have a very large role and a wide distribution in this territory. From the analysis of the topographic and lithological map with a scale of 1: 250000 we determine the distribution of the rocks of the area. (map no. 7, for rocks that appear on the surface).

Postdam & Draqi (2007). In the northeast part of the area show clay-silicic and sandy Ordovik-Silurion sandstones, while in the northernmost part appear conglomerates of red Permo-Triassic sandstones. To the south are Devonian limestone and silico-reglacial reefs. Further southwest and the Middle Triassic appear rifts and limestones, which extend along the meridional direction over a considerable area to the south. In the West of area appear deposits as clays, sandy-coal deposits, sand, Pleistocene-Holocene gravel-alevrolites.

In the territory that encompasses the “Brezovica” tectonic zone, the existence of an ultrabasic massif and carbonate periphery largely prevails. In the central part of the Brezovica Mountains are the Trias-Jura carbonate-siliceous rocks, Jurassic volcanogenic-sedimentary rocks, mixed jurassic-cretaceous ophiolitic rocks, carbonate rocks of the Cretaceous, Neogene and Quaternary molassic sandstone-conglomerate rocks and magmatic rocks. Carbonate and carbonate-silicon rocks are spread throughout the eastern part of the area to the west. Widespread are coarse-grained lime-stones (with a potential of 400-800 m) Rogos & Meqaj (2008). Their massive existence has favored numerous karstic processes and forms (karst pits and holes with a diameter of 15-30 and 40 m and depths up to 15-

20 m). Jurassic volcanogenic-sedimentary rocks propagate throughout the eastern contact of the Lura zone ultrabasic massif with the carbonic framework extending from north to south. Volcanogenic rocks intersect with sedimentary rocks (siliceous, clayey ress). The Jurassic and Cretaceous ophiolitic mixed rocks are located on the Triassic-Jurassic lime-stones and on the ophiolites of Gur Reç, Vinjolli etc. The Cretaceous rocks cover the western part of the Brezovica ultrabasic massif (Cretaceous Cr1-Cr2). Upper Cretaceous sedimentary formations extend over the Lower Cretaceous deposits (sections of the Arm in the north, west to north to south appear in the Silurian-Devonian clayey-silicon rifts (over the Chidne field) and in the form of a narrow meridional belt conglomerates of reddish sandstone appear of the Lower Permo-Triassic appear, while to the west the Middle Triassic appear rift and limestone. Likewise in the form of meridional bands to the west are the Middle Triassic rift and limestone, while to the west the upper Triassic limestone appears (Postdam & Draqi 2007).

In the western part of the Brezovica area, in the form of the meridional belt, clayey-sandy-limestone deposits of the Maastrichtian, appear limestone and silice of the Middle Jurassic and in the southern part appear the lower Cretaceous limestone. In the central part, there are autochthonous gypsum plots of P2-T1 which are surrounded by flishoidole of Pg2-3 types of this area. Evapartes (P2T1's gypsums) come in the form of diapirs that emerge in surface conditions. This outflow was accompanied by a strong and intense activity of the external forces especially the erosion process. Structural construction, elevation of mountain areas, elevated slopes favored river and stream erosion and denudation processes (Rogo & Meqaj 2008).

1.3. Geology and the possibility of finding and exploiting underground assets in Brezovica

Brezovica is located in the Northeast region of the Republic of Kosovo in terms of nature and economic development. In Brezovica predominate sedimentary formations, limestone, clays (flush), sandstone (deluvions, slopes, proluvions, colluvions). In this area from the conducted studies it turns out to have underground assets such as: sulfur, marble, chromium, chalk and some of them are still used. As mentioned above the underground composition of the geological layers of Brezovica carries wealth in its depth. Searches

were made revealing a variety of chromium sources in Selisht, marble in Muhur, iron in Serankol, clay in Vakuf (for brick-tile), galleries for sulfur in Kërcisht, drilling for drinking water in Maqellara (shallow surfaces). The question arises: What came out? Were these assets exploited? Employees of the time, both in everything and in the sector, spoke with reservations, but there were occasions when they expressed optimism, as numerous underground assets were found (Trojan, 2008).

1.4. The slopes exposure

Due to the geographical conditions of the Brezovica district dominated by hilly-mountainous terrain, the increase of the arable land stock will always take place on the slopes and the meridional (north-south) direction having more exposed western and eastern slopes. In this way, putting these slopes under culture becomes differentiated. The assessment of their economic and natural potential also requires determining their exposure. This is indispensable because it deals with many natural factors that must be anticipated before any construction or intervention in relief. For this purpose the amount of energy that the slope receives from solar radiation must be taken into account. The amount of rainfall, the direction of the prevailing winds in this territory, the amount of land moisture, the types of natural or cultivated vegetation, etc., vary as a function of slope exposure. The positive side is that the plants grow especially the trees as their drainage is much better and the sunshine is great. While some factors that increase the natural risk are deforestation without criteria, new land openings, floods and avalanches (Dollma & Pari, 2007).

1.5. Factors affecting avalanches occurrence

a) The impact of relief. Knowing the morphology of the slopes where the avalanches are formed greatly influences the size of the avalanche, their fall density and the selection of avalanche measures. Among the most important features of the terrain that influence the formation of avalanches are: the slope of the slopes, the slope profile, the slope exposure, characteristic forms of terrain, etc. The slope of the slopes that can cause avalanches according to world literature is estimated at the limits of 22º-60º. The largest number of avalanches has fallen on the 30º-40º terrain slopes and accounts for 34% of the

cases). The slope profile greatly influences, in convex forms the slope increases as the avalanches fall. Converse slopes generally favor the formation of tile-shaped avalanches, etc. (Boriqi, 2006).

b) The slopes exposure. The slopes exposure combined with prevailing wind direction. The northern, eastern and northeast slopes account for 46.6% of all avalanche cases. This phenomenon is related to the fact that these slopes receive less solar energy and the snow surface in this case is maximally cooled due to radiation energy loss and the snow layer is colder and less susceptible to metamorphism compared to the warm sunny slopes (Boriqi, 2006).

On the north oriented slope there are 12 avalanche corridors while on the southern slope there are only 3 such corridors. But on the southern-oriented slopes in the spring approaching when warmer southern winds blow, the snow-covered southern slopes become dangerous as the melt snow makes it more porous and favors slab-shaped avalanches fall. Based on the analysis of avalanches falling at different altitudes is showed that 27.5% of the avalanches belong to altitudes below 1000m, 23.5% to altitudes 1000-1250m, 25.4% to altitudes 1500-2000m and 12.5% to altitudes above 2000m. Avalanches are formed throughout the range of altitudes but there is a predominance of avalanches above altitude 1000 m where snow formation and snow accumulation conditions are more favorable. The avalanches potential is different. It varies from 150m to an average of 450m. Throwing from different altitudes determines the destructive force of avalanches, a phenomenon that needs to be taken into account defensive proportions. The snow accumulation basins located at the upper part of the avalanches have different dimensions (from the large ones with 100-150m length, 50-100m width and 80m height) as on the western slope (Meqaj, 2008).

Small basins are also found along the large snow accumulation basins, but some may not have a watershed. Snow accumulation basins have different origins of erosion of running waters. But they may also have been formed by glacial action once in the form of glacial circuses. Even tectonic fractures favor the fall of avalanches. Climbing rocks and terraces or automobilistic roads on the slopes of the mountains constitute a natural defensive construction against avalanches (an example is the existence of 7

terraced levels on the western slope of Korabi). Other factors that influence avalanche formation are: snow formation and properties (metamorphosis plasticity, temperature, stability, modulus of motion, aggregate state (solid, liquid,, etc.)), depth of old snow, surface condition, layer, density of new snow, intensity of snowfall, thermal impact, wind, vegetation features, anthropogenic activity, logging, forest burning, mountain slope works (profit of agricultural lands, opening of mines, construction of industrial facilities, quarrying, paving, explosives, use of firearms, heavy vehicle movements, aircraft flying) (Meqaj, 2008).

1.6. Signs of danger of distinguished avalanches

The slope morphology affects the avalanche dimensions, the density and velocity of the fall and the selection of avalanche measures. Avalanches that arise in erosional and glacial furrows are insignificant in volume and are characterized by frequent falls almost after each snowfall. The study of the morphology of avalanche groups, flow channels and formed cones allows marking on the avalanches contour map to determine the regime of their fall and to determine the methods of fighting them. Snow basins have different configurations and slopes. Parallel strings similar to snowmelt sands, these sands are formed by fractured rock materials of 2-5 m height but can reach up to 15 m. The avalanche behavior cone consists of terrain-displaced snow and chaotic timber or rock material that hasn't been rolled over the surface of the avalanche. Avalanche hills are 2-3m high (Boriqi, 2006).

1.7. Preventive measures against avalanches risk

According to Boriqi, (2006) it is necessary that in addition to work on avalanche risk prognosis, a series of preventive measures be taken to prevent avalanche falls and to protect from them. This requires the comprehensive scientific study of snow and avalanche and the organization of anti-avalanche service and protection in order to elaborate one of the theoretical and practical measures of avalanche protection. It is worth noting that in many countries around the world there is a perfect scientific service for avalanche study and protection. E.g. in Switzerland it was created as early in 1931.

"The National Committee for Avalanche Protection" deals with scientific research and avalanche protection. The Avalanche

Study Institute was created in Austria in 1948. Also in other countries (Germany, Italy, France, etc.). There isn't special institution in our country to deal with the study of snow avalanches and protection from them. We think that it is already necessary to create such a service in us. This service may be at the Ministry of Defense as part of the floods protection services, earthquakes. This service should cooperate with relevant scientific institutions. Also in the northern district municipalities should be set up anti-avalanche protection staffs, where there should be a plan of current measures and prospects for avalanche prevention in residential and economically important areas. The most effective protection and prevention measures are vegetation and mainly tall coniferous but also leafy forests. But for the forest to play its role, it must be dense enough and its upper limit reaches the upper limit of the snowfall rupture (Meqaj, 2008).

When the forest is damaged by fires, loggings, etc., it must be immediately replanted, while new forests grow should block by rock ambushes and pillars that should be erected where detachment begins. Near the forest fund it turns out that it is necessary to do reforestation in the northern districts of the country where in Dibër is needed to do reforestation in 380 ha. We also think that protected forests should be declared all those forests that lie in close proximity to residential areas and various socio-economic objects preventing (loggings without criteria, fires and grazing of livestock). Preventive measures aim to disrupt the mechanical integrity of the snow mass in order to increase its durability and reduce the possibility of sliding and avalanches formation. Artificial shocks are also used for the same purpose in order to avoid danger on the roads of people and vehicles. To reduce costs can be avoided roads in vulnerable areas or residential centers. It is therefore important that in the endangered areas must not carry out any construction or they must be accompanied in advance with safeguards. The purpose of studying avalanches and other natural phenomena is to utilize resources nowadays, to not damage or destroy habitats. This is a concept with wide appeal (Boriqi, 2006).

1.8. Tourism

According to Postdam & Draqi (2007) the district of Brezovica has great tourism potential which can be used for its development. Altitude above sea level, the plant and animal world, climatic

conditions have very positive impact on the development of tourism. There are numerous areas where harmonious natural values are harmoniously combined with the rich material, spiritual heritage of their populations. Based on nature values for tourism we note that in the district of Brezovica there are many picturesque areas with special values for the development of mountain tourism.

Sport tourism is mainly based on the development of winter sports. Part of it is white tourism that has a broader meaning. It incorporates various outdoor activities such as skiing, mountaineering, hunting, rafting, etc. In addition to tourist values there are also artistic-cultural, health values. This movement relies on the natural potential of Brezovica, favored by climatic conditions where the thickness of the snow reaches 1.5-2.5 m and extends from October to June (Trojan, 2008).

Transit tourism includes travel by people traveling to or staying temporarily in different places and centers. In this type of tourist activity are introduced: work trips, business trips, education by foreigners and locals, expeditions for study purposes such as those of students of geography, history and literature (Dollma & Pari, 2007).

RECOMMENDATIONS

Most prominent are:

- Tourism development in the country should be obligatory for Kosovo society. The sooner this is understood, the better. When it is realized that tourism is a branch that can be benefited, not only materially, then the attitudes of Albanian citizens and others in Kosovo would change in relation to their natural and cultural environment.
- Tourism development must be coherent with national and local policies for the overall development of the country.
- Tourism must move from the level of negligence to the level of treatment among the most serious of the development areas in the country.
- What happened to Brezovica should not happen anywhere in Kosovo. The example of the behavior of power directly involved in it must be the worst model for its non-repetition.

- Aspects of tourism and environmental protection are interrelated. In this segment, the situation reflects dissatisfaction and the need for change.
- Without going into the aspects of the deep contaminants that are dealt with in this paper, we highlight a segment that is recommended to change as soon as possible. It is not known where in Kosovo there may be any roads on the sidewalks or edges of which waste aren't found, are dumped, aren't removed and aren't sanctioned by the state. Even worse, they have often become illegal dumps in terms of their status and "very legal" in terms of their durability and presence in front of passers which may be tourists.
- Improving tourist conditions would indirectly increase the interest in professional education. Indirectly, many schools and other modes of professional education would also be professionalized, especially for the younger generation of population.
- If the industry has lost its primacy as the main branch of Kosovo's economy and if the same is difficult to come back, why not find alternatives to this primacy, e.g. agriculture and tourism. Of course such opinions need to be discussed at specialist levels with adequate analysis and strategies.
- The level of tourism treatment as stated is minimal, this approach must change rapidly. Understanding that actions to promote tourism are actions to regulate the environment in which every citizen lives mean the greatest achievement.
- Educational structures from middle to upper levels are not fully supportive of trends for more developed tourism. With these educational profiles that Kosovo has and with this deficit of specialists it is difficult to achieve desirable results.
- Another problem is the aspect of central institutions' approach to developments in the country. It is urgent to stop the indifferent approach of the central government towards the local ones. In the consultations between specialists, surveys and interviews conducted in many municipalities of Kosovo it has become known that these institutions at the two levels do not have any common cooperation for tourism development.

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