

## **NATURAL-GEOGRAPHICAL CHARACTERISTICS AND THEIR IMPORTANCE IN THE DEVELOPMENT OF THE RURAL TOURISM IN THE POLOG REGION**

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### **Abstract**

The subject of this paper is the natural-geographical characteristics of the rural environment in the Polog region. The aim of this paper is to analyze the impact of natural-geographical features on the development of rural tourism in this region. On a relatively small area of this region, the natural-geographical features are quite interesting and attractive when from a tourist point of view. Given the strategic position of the Polog region, good communication links, various morphological forms of relief, water richness, diversity of flora and fauna, we will show the importance of tourism development, specifically that of rural tourism in the region. A complete series of tourist activities of rural tourism in one area depend on the natural-geographical characteristics, i.e. the climatic and bio-geographical characteristics. Therefore, this paper we will present the level of development of rural tourism, which in the Polog region is relatively well developed. Some of the methods used in the paper are: analytical, descriptive method, cartographic, comparative method and field research. Analyses of the work shows that there is a basis for the development of rural tourism, but efforts remain to be made by the local population of the region, the local government and the central government. I think that the tendency of the development of tourism should be continued by investing in the infrastructure of the villages in the region and a special contribution should be made in the protection of the environment and biodiversity.

*Keywords:* rural tourism, rural development, natural geographical features, Polog region

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### **1. Introduction**

The Polog region is located in the northwestern part of the Republic of North Macedonia. It covers an area of 2417 km<sup>2</sup>, and in its framework are 184 settlements, of which 182 are rural and 2 urban settlements (Tetovo and Gostivar).

The Polog region, due to its geographical location, has a large number of natural and anthropogenic values, a solid foundation for rural tourism development and growth of a potential destination for rural tourism. The existence of slightly pleasant bio-climatic, hydrographic resources, relief forms, ecologically clean environment occurs as a basic factor for the development of rural tourism in the region.

Geological-geomorphologic (relief) motifs in the Polog region are manifested by the presence of Sharr Mountain, Zheden, Suva Gora, Mavrovo plateau, mountain massif Bistra, Deshat and the valley of the river Radika, which are quite interesting and attractive from a tourist point of view. On the other hand, the hydrographic motifs are presented with a rich water fund of rivers and lakes. The most important rivers are: Vardar River, Radika, Pena, Mazdracha, Bogovinje River, Mavrovo

River as well as lakes, such as Mavrovo Lake and a large number of glacial lakes in Sharr Mountain and Korab.

Based on the analyses done, we can relate that the Polog region, although it has a basis for development of rural tourism, still faces major infrastructural problems in rural areas, i.e. in deep mountain settlements, which affects the slow development of tourism in rural areas of the region, so there is urgent need for intervention in improving the infrastructure by the local population and the responsible structures.

## **2. Geographical position of the Polog region**

The Polog region is located in the northwestern part of the Republic of North Macedonia. It covers an area of 2416 km<sup>2</sup> or 9.7% of the territory of Republic of North Macedonia. According to the altitude, the lowest point of the region is located in the village Raotince (municipality of Jegunovce) 385m above sea level, with coordinates 42 ° 03'03 "ngw and 21 ° 08'21" egl, the highest point is the highest peak in the country, Golem Korab 2764 m with coordinates, 41 ° 47'25 "ngw 20 ° 32'48 "egl. The region consists of the following nine municipalities: Tetovo, Gostivar, Mavrovo and Rostushe, Zhelino, Tearce, Bogovinje, Vrapchishte, Jegunovce and Brvenica. It has 184 settlements, of which 182 are rural and 2 urban settlements (Tetovo and Gostivar).



**Figure 1.** Map of geographical position of the Polog region among the surrounding regions and countries (Rushiti, 2019)

Given the location and communication links, Polog region has a good tourist position, with certain advantages and some disadvantages, such as:

### *Strengths:*

- The Municipality of Jegunovce from the Polog region borders with the Republic of Kosovo (border crossing Jazhince);
- The Polog region is about 45-66 km (Tetovo-Gostivar) from the capital Skopje, which is the largest emission area for potential tourists in this region, given that the development of rural indicators are visitors from urban areas;

- Polog region is about 75-96 km (Tetovo-Gostivar) distance from Skopje International Airport;
- Through the Polog region passes the important Pan-European Corridor VIII, which connects the Adriatic Sea with the Black Sea, and which passes through Gostivar and Tetovo;
- Polog region has a good network of asphalt roads (paved roads) to each village, with a total local road network of 1505 km;
- In the Polog region there are also areas protected by law, the National Park "Mavrovo" and near this region there is a nature monument: Matka Canyon. Sharr Mountain National Park in the Republic of Kosovo, which covers the North parts of Sharr Mountain;
- The most visited tourist area in the Republic of North Macedonia, the Ohrid area is only 130 km away from Polog region.

*Weaknesses:*

- The Polog region borders with two neighboring countries, but only with the Republic of Kosovo does it have a border crossing;
- In the Polog region, the process of depopulation is more emphasized, especially in the mountainous areas. In various ways, this will adversely affect the development of rural tourism, especially in relation to the lack of young population, who are educated, qualified and able to work;
- Polog region is relatively far from the main corridor in Republic of North Macedonia K-10 (60 km);
- Relatively poor quality of local roads.

We can infer that the Polog region, due to its geographical location, has a large number of natural and anthropogenic values, a solid foundation for rural tourism development and growth of a potential destination for rural tourism.

### **1. Relief features of the Polog region**

On a relatively small area of Polog region, geological-geomorphologic (relief) features are quite interesting and attractive from a tourist point of view. The mountain massifs that surround the region are: Sharr Mountain, Zheden, Suva Gora, the Mavrovo plateau, the mountain massif Bistra, Deshat and the valley of the river Radika.

*Polog Valley* is created by young tertiary rifts, which are still seismically active today. Polog is one of the youngest tectonic valleys in the country and is an elongated, deep ridge filled with Upper Paleolithic gravel-sandy and clayey sediments and with various deposits of quarterly works, whose thickness ranges from 300 m in the Upper Polog to 600 m in the Lower Polog.

*The Zeden massif* from the tectonic aspect is a horst that is with large faults both on the east and northwest side and is limited by the east-Polog fault. The basic form of Zedenhorst is an elongated sycamore with a northeasterly direction, built of marbled limestone.

*Suva Gora* is a calcareous mountain, its whole structure is lined with dry valleys, which have been turned into numerous series of cracks and uvalas (karst depression), and there are two karst fields: Kofelnica and Zhivkova Dupka. On both sides of the Suva Gora, numerous valleys of the karst appear, which are dry for most of the year, with water flows only during heavy rains. Such geomorphologic forms can only act as additional tourist motifs, for the most part for various scientific or excursion movements.

*Sharr Mountain*, is one of the largest mountain massifs in the country with area of 1,600 km<sup>2</sup>. The mountain was formed during the younger Alpine period. On it, under the action of external forces, various other larger or smaller relief forms were formed, mostly from ice and fluvial erosion. The most famous peaks are: Titov Vrv (2748 m), Mal Turchin (2702 m), Bakrdan (2700 m), Ljuboten (2499 m), Piribeg (2524 m), Crn Vrv (2580 m), Kobilica (2526 m), Karanikola (2479 m), Plate (2467 m), Ceripashina (2525 m), Ginibeg (2610 m), Brustovec (2675 v), Rassengul (2383 m), etc. (Ademi, 2013).

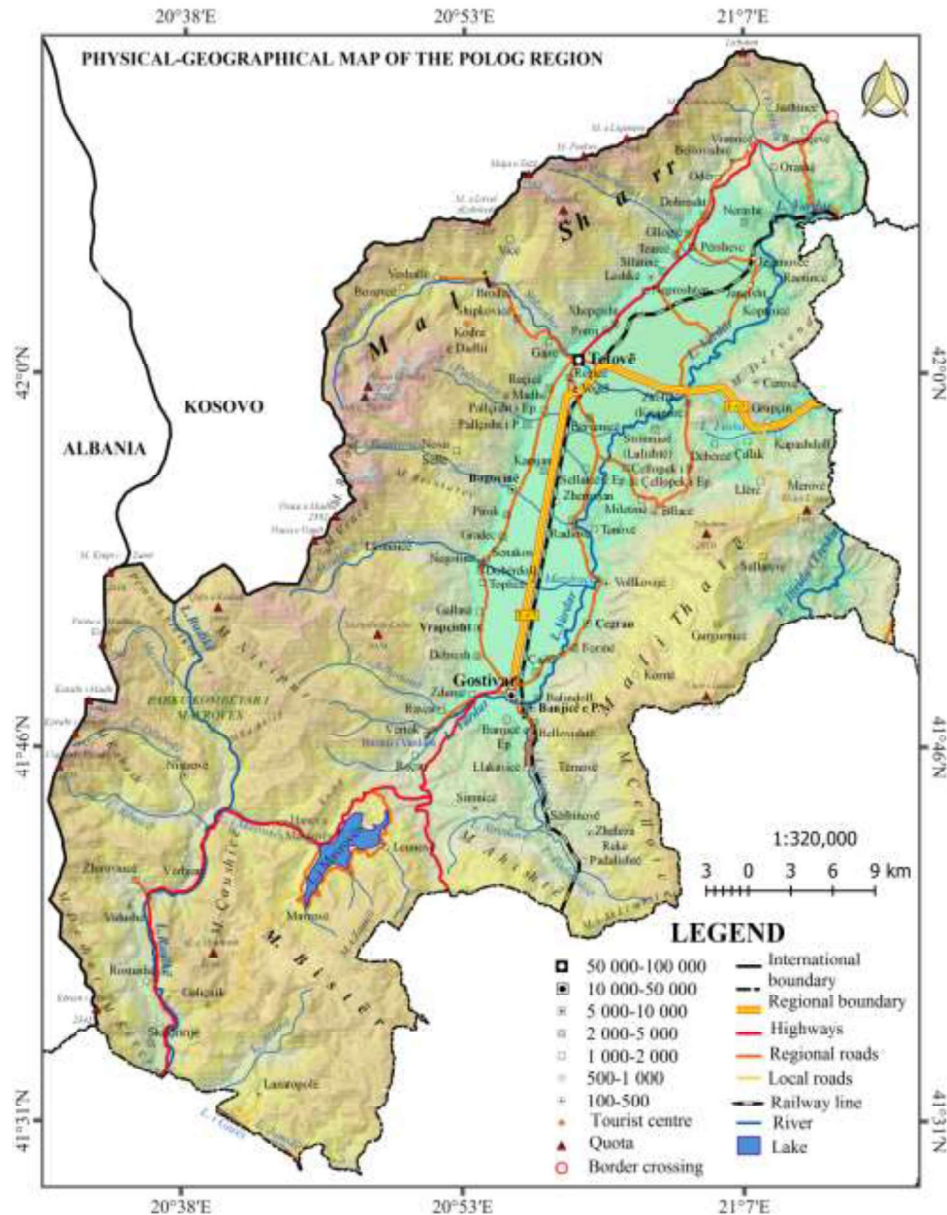
The mountain *Korab* rises in the North part of the Korab mountain massif. The straight line is meridian from north to south. The highest peak is Golem Korab (2753 m), which belongs to the territory of National Park Mavrovo. Mount Korab is characterized by a variety of relief forms. Fossilized cycles are home to a number of springs and occasional natural post-glacial lakes. From Korab Mountain to National Park Mavrovo belongs the eastern mountain side, which is characterized by a fairly large slope of the terrain, especially in the middle and south. After Golem Korab, Mount Korab has several peaks (summits) over 2000 meters above sea level. Among the top most important are: Korab 2 (2753m), Korab 3 (2745m), Mal Korab(2683m) etc.

The third highest mountain in the region is the mountain *Bistra*, with an area of 572.8 km<sup>2</sup>. Andis built of Paleozoic rocks, Mesozoic sediments and Quaternary deposits. The mountain has a strongly pronounced karst relief. A number of surface and underground forms of karst relief can be found here. The most striking and famous are the karst fields: Suvo Pole, Toni Voda, Govedarnik, Bardash, Solomunica, Gorno and Dolno Polje, Tri bar, and Lazaropole. Underground karst forms, caves, pits and abysses were also found. The caves Alilica and Kalina Dupka are widely known, which abound in imposing cave jewelry and a mix of corridors that lead quite deep into the interior. The mountain is a large flattened massif, surrounded by numerous mountain peaks, more significant are: Medenica (2163 m), Bistra (2102 m), Carbula (2151 m), Lake Peak (2014 m), etc. (Hamiti, 2010).

The mountain *Deshat* is located on Macedonian-Albanian border. The total area belonging to the territory of North Macedonia is 53 km<sup>2</sup>. Most of the mountain is in the area of Mavrovo National Park. The highest peak is Velivar with 2373 m, high rocky and stony ridge covered with lush and tall grass. There are several small glacial lakes. The most popular is the lake Lokuvat 1560 m altitude and is the lowest glacial lake in the country. From the top of Velivar there is a beautiful view of the river valley Radika with the monastery "St. Jovan "Bigorski and the mountain Bistra.

*Tourist attractions:* high mountain relief, picturesque nature, excellent panoramic view, caves, steep cliffs.

*Types of tourism related to rural tourism:* mountain tourism, mountaineering, ecotourism, trekking, geo-tourism, paragliding, mountaineering, and speleo-tourism.



**Figure 7.** Map of natural-geographical characteristics (Rushiti, 2019)

## **2. Climatic features in function of rural tourism**

Climate is of great importance in building a rural tourist offer and developing tourism economy. The climatic characteristics of an area depend on a number of rural tourism activities. (Panov, 1998).

The Polog region has a typical continental climate with special temperature specifics for hot summers and cold winters. To make an analysis of the climatic elements, which are important for rural tourism in the Polog region, we will use the data from meteorological stations, located in Tetovo, Gostivar, Popova Shapka, MavroviAnovi and Lazaropole.

*Air temperature* is an important element in determining the climatic-tourist characteristics of the region. In general, the average annual temperatures going from Lower Polog to upper Polog are gradually decreasing from 11 °C in Tetovo to 10 °C in Gostivar, after higher altitudes of 7.9 °C in Mavrovo and 8 7.8 ° on Popova Shapka is 4.6 °C. This also means that with altitude, temperatures drop.

*Solar insolation* is a positive phenomenon for rural tourism because it provides various activities in nature, increases mood and has a beneficial effect on health. The Polog region area is characterized by long-term solar radiation, which averages 2,000 hours per year. Maximum levels occur in the summer months, especially in July, when the highest number of visitors is expected in rural areas. (Mustafi, 2008)

*Rainfall* is of great importance for rural tourism in many respects. Intense rainfall negatively affects the ability of tourists to use their planned time. The average annual precipitation in Polog region is 780 mm on average per year in Tetovo, 1200 mm in Popova Shapka, 890 mm in Gostivar, 920 mm in Mavrovo and 1020 mm in Lazaropole. In terms of precipitation, in the eastern part of the region they are mostly in the form of rain, and in the western higher lands in the winter months they are in the form of snow. What is very important for the eastern mountainous areas is that the atmosphere is quite clean, the presence of oxygen is great, and thus has an excellent convenience for health-recreational tourism in this area.

*Wind* is an important climate element. The Polog region includes the North, northeast, northwest and south winds, east and south-east. In the Polog region from the north, air masses penetrate through the wide openness of the Lower Polog to the north.

Rural tourism is affected by various climatic features, however, the most attractive for this region is the continental-mountain climate associated with the altitude of 600 - 1500 m above sea level. This is especially true for forested areas, where a micro-modification effect occurs. In the future, with the expected increase in temperatures as a result of global warming, these areas will be even more significant and more sought for tourism.

*Tourist attractions:* sun, clean and fresh air, mountain climate, pleasant climate.

*Types of tourism related to rural tourism:* ecotourism, picnic tourism, health tourism.

### **3. Hydrographic features in function of rural tourism**

The territory of the Polog region is abundant in water flows, with rivers rich in water throughout the year, with springs and thermal mineral waters. This region belongs to the catchment area of the river Vardar. All these waters belong to the Aegean Basin. Parts of the waters of the region belong to the Adriatic basin, through the river Radika. From a tourist point of view, different hydrographic objects have a special role and different significance for the development of rural tourism in Polog region.

*Mineral and thermo mineral waters* are a special type of groundwater. Mineral and thermo mineral springs have been reported in Polog region, which can be touristically valorized. Their appearance is related to the fault line that occurs at the foot of Sharr Mountain. Most of them are cold mineral waters.

Polog region is rich in *river network*. The main hydrographic network in the region is represented by the river Vardar and Radika, together with its tributaries. Here, due to the different geological composition of the mountains that enclose the region, there is an asymmetric river

network. The eastern frame has only one river, and the western one has a developed and dense river network. The most famous spring in the region is the karst spring of the river Vardar, known as Vrutok. The village of Vrutok, known for its spring and specialized fish restaurants, today is a modern rural settlement with huge potential for rural and eco-tourism.

The river *Vardar* is the largest river in the country. It springs from a karst spring near the village of Vrutok, in the southwestern part of the Republic of Macedonia, at the foot of Sharr Mountain, at an altitude of 683.5 m. Left tributaries to be found in the Polog region are: Duf River, Jelovjane River, Vrapchishte River, Mazdracha River, Bogovinje River, Kamenjane River, Palchisht River, Pena River, Poroj River, Leshok, Bistrica, Gabrovnica, Odri River and other smaller rivers. The larger right tributary is the Lakavica River. The valley of the river Vardar has some sites, which are characterized as extraordinary natural environments. Such is the Sharr Mountain part of the river that has conditions for the development of fishing tourism, because it is rich in a variety of fish stock, especially river trout. The Sharr Mountain Valley can be activated for tourism very successfully.

As a source of the river *Radika* is considered the watercourse, which is formed northwest of the peak Big Vraca (Golema Vratsa), at an altitude of 2,260 m. The river Radika receives a large number of tributaries from the source to the inflow along its length on both sides. Among them, the most important tributaries of the first row are: Ubav Potok, river Stirovica, river Ribnica, river Zirovnica, river Lopushnik, river Trebishka, river Bitushnica and Rostushka on the right, and Adzina, Brodechka, Bogdevska, Mavrovska, Galichka and Lava River from Mala river.

*Mavrovo River* is one of the largest left tributaries of Radika. The total length is 19.9 km. In the Mavrovo Valley, the river valley is significantly expanded. Before the inflow into the river Radika, the valley is built in massive gray-white marbles and has a gorgeous canyon shape. With the construction of the Mavrovo Reservoir, part of the river valley in the Mavrovo Valley has been emptied.

In the Polog region, the most numerous permanent natural lakes are *glacial lakes*, which are formed in the cirques, and are found at the bottom of the valleys and in sea sediments, on Sharr Mountain and Mount Korab. Sharr Mountain after Pirin and Rila, available with the largest number of glacial lakes on the Balkan Peninsula. The most famous Sharr Mountain glacial lakes are: Livadica Lake, Dolnodobreshko Lake, Gornodebresko, Golem Gol, Mal Gol, Krivoshisko Lake, Bogovinsko Lake, Crno Lake. On Mount Korab, the most famous glacial lakes are Lake Korab, Lake Korab, Lake Bacilli Kamen, and Lake Babin Kamen. (Zikov, 1998).

*Lake Mavrovo* or accumulation is an anthropogenic hydrological object, built at the entrance of Mavrovo River in the Mavrovo Valley. Its length is 210m, height 56 m, the greatest depth of the reservoir is 50 m. Lake Mavrovo feeds on water from the immediate catchment area and river streams that flow directly into the lake, such as: Leunovska, Nikiforovska, Gornokraiska or Mavrovska, then from the waters of Gorna Radika, whose total catchment area is, from the Sharr waters (Novoselska, Uliverichka, Kamenjanska, Jelovska, Mazdraca).

The waters from Upper Radika, the river Belichica and the Sharr waters, are brought into the Lake by an underground tunnel surface canal. The waters of Lake Mavrovo are mainly used for electricity production, but also for irrigation, tourism and fishing.

In Polog region there is also the highest *waterfall* in the country, Dlabok Dol, 136 m high. On Sharr Mountain there are several waterfalls, the most famous of which is the Belovish Waterfall with a height of about 80 meters. Another well-known and visited waterfall by tourists is Duf with a height of 28 m, located near the village of Rostusha. On the Korab Mountain on the Dlaboka Reka River, the Korabi Waterfall is 136 m high.

On the Radika River is the most attractive canyon in the country, the 42 km long Borich Canyon, with hundreds of meters high vertical sides. Geologically, a large area in the Polog region belongs to the limestone composition. Thus, various karst surface and underground forms are found here. Of all of them, the caves are the most attractive. For tourists we recommend the caves Sharkova Dupka on Bistra (a cave that is suitable for visiting) and Gjonovica or Ubavica on the mountain Bukovic, as well as the caves on the mountain Suva Gora.

*Tourist attractions:* cold springs, waterfalls, riverbeds, mountain lakes.

*Types of tourism related to rural tourism:* ecotourism, fishing tourism, apiculture.

#### **4. Bio-geographical features in function of rural tourism**

The development of tourism in rural areas allows to get acquainted with the flora and fauna, which helps to preserve the environment. Those who prefer rural tourism have the opportunity to be in close contact with nature, admire the natural beauties and enjoy them.

The space occupied by Polog region is very impressive and specific, given the high-altitude difference between the highest and lowest parts (valley bottom - mountain peaks), the flora and fauna are characterized by a very pronounced zonality. In this regard, the most interesting are Sharr Mountain and Bistra, which are considered to be the richest mountains, and in which the geomorphologic and climatic diversity have influenced the emergence of an invaluable wealth of flora and fauna.

The fresh air in the forest attracts a walk and recreation, and the richness of hunting and fishing species emphasizes the possibility of developing different types of tourism related to rural tourism. The beautiful landscapes offered by Polog region are an important element for the development of rural tourism in this region. We will look at the flora in Polog region according to its natural units that are suitable for tourist valorization. We will focus mostly on those types that are most important for rural tourism.

In the eastern part of the Polog region, on the mountains Suva Gora and Zeden, mostly due to the limestone composition and other natural-geographical conditions, there is no developed vegetation and it has no basis to be tourist valorized. In the western part of the Polog region, Sharr Mountain, Bistra and Korab are rich in biographical aspects, they will be valorized.

In Sharr Mountain, the most important plants in the plant world are deciduous forests, beech forests, hornbeam forests, oak and chestnut forests (the most common are: oak, beech, fir, spruce, Macedonian pine, mulberry, black pine, white pine). Sharr Mountain Tea (*Sideritis scardica*) is known to be harvested during summer. From medical plants, there can be found gentiana. Alpine rose, mahogany, fresco, etc. are also remnants of the glacial age. Sharr Mountain is also rich in forest fruits (blackberries, blueberries, raspberries and wild strawberries).

There are areas with dogwood and hazelnuts. The picking (harvesting) of Sharr Mountain tea, as well as other medical plants and forest fruits are very important for the planning of rural tourism, and events can be organized to collect these fruits, of course in the traditional way and traditional customs and folk costumes. The plant world in the mountains Bistra and Korab determines the presence of many species of fungi, forests.



The quality and protected forests are especially important, and the numerous endemic plant species are present in this area, which with their rarity and uniqueness emphasize the curious dimension. Flower pastures also have a certain aesthetic value, which in the summer are excellent grounds for walking. The diverse natural conditions in Polog region have made it a massive habitat and refuge for a variety of faunal elements and species.

Among the animals that live in this area today are: the fox, the marten, the badger, the bear, the rabbit, the squirrel and the deer. The bear and lynx live in the higher parts of Sharr Mountain. Wild boar, wild goat and deer can be seen in the highlands of Sharr Mountain and they are a great attraction for tourists. Snakes, turtles and lizards can also be found on Zeden and Suva Gora, and we have domestic animals: sheep, cattle, horses, donkeys, goats. Among the birds that are especially interesting are: golden - suri eagle, white-headed vulture - sub, gray falcon, leopard, large grouse and others. The presence of 126 bird species has been registered on Sharr Mountain, which is 40% of the total number of 311 registered bird species that exist on the territory of Republic of North Macedonia. A special attraction of this area in the Sharr Mountain, is The Shari Dog, an endemic dog.

The fauna of Mount Bistra and Korab is characterized by considerable diversity. It consists of about 140 species of birds, the most important of which are: the gray falcon, the eagle cruiser, the red (golden) eagle, the forest owl, the big owl, the meadow eagle, the steppe eagle, as well as 11 species of amphibians, 12 species of reptiles and 38 species of mammals. (Petkovski, Vasilevski, Matevski, Orlandini, 2011). The most important mammals are the bear, the lynx, the wild boar, and the wild cat. The terrain offers a wonderful opportunity to explore while riding a horse or while riding bicycles and hiking trails, and the surrounding mountain slopes offer camping opportunities and long walks.

*Tourist Attractions:* Forest complexes, clean nature, diverse flora and fauna.

*Types of tourism related to rural tourism:* hunting tourism, eco-tourism.

## **5. Conclusion**

This paper focuses on the analysis of natural-geophysical features and their impact on the development of rural tourism in the research region.

Polog region with favorable geographical position, mild climate, richness of forests and vegetation, extraordinary landscape values of the relief, rich hydrography, with many villages has great potential for development of rural tourism. So the region has many tourist motifs, which are valorized and represent a significant tourist activity.

The average annual temperature of the region is 11.5 °C, which enables sustainable development of tourism, and also the Polog region is presented with a number of geomorphologic motifs, and the most important for rural tourism are the mountains: Korab, Bistra and Sharr Mountain.

The main factor for rural tourism is the hydrographic network, in fact the river network: the river Vardar, Radika, Pena, etc. The lakes that contribute to the development of this type of tourism in the region are: Mavrovo Lake and glacial lakes.

The most famous Sharr Mountain glacial lakes are: Livadic Lake, Dolnodobreshko Lake, Gornodebresko, Golem Gol, Mal Gol, Krivoshisko Lake, Bogovinsko Lake, Crno Lake. On Mount Korab, the most famous glacial lakes are Lake Korab, Lake Korab, Lake Bacilli Kamen, and Lake BabinKamen.

From the presented so far it can be concluded that in the rural environment of Polog region, rural tourism is presented with a tendency to develop and increase, which means that the natural-geographical features are satisfied, this being assisted by the existence of National Park Mavrovo and the territory of Sharr Mountain, proposed to be declared a protected area, in fact a national park.

The development of rural tourism should raise the awareness of a wider circle of people, i.e. the care for the preservation of the natural environment and the biodiversity of natural ecosystems, given that the greatest contribution is made by man with excessive exploitation and degradation.

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