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THE LANDSCAPE FEATURES IN MACEDONIA IN THE FUNCTION OF ITS ECONOMIC DEVELOPMENT

Abstract: The Republic of Macedonia has very characteristic and specific landscape diversity. It is no coincidence that most geographers have accepted the definition that it resembles a chessboard. It is for these reasons that Macedonia has attracted a large number of geographers from various professions of this science to conduct explorations therein, and especially the numerous geomorphologists and geologists from almost all neighboring countries.

This paper will cover all contour patterns; both, the macro-landscape and some of the micro-landscape contours that have special significance for the economic development of the country. The first will be analyzed large mountain massifs, such as: Shar Mountain, Korabski mountain and lower parts, Jablanica, Karaorman, Pelister, Horsastiklinorium Galicica, Bistra, Jakupica, Eastern Macedonian thunder mountains, such as: Osogovo, Plachekovi mountains, Kozjak and others. Of course, here we will talk about the relatively smaller mountain foothills and all together they will be put in function of the economic development of the country.

From the lowland macro-landscapef forms, the larger valleys will be analyzed and also put in function of the economic development of Macedonia, such as: Pelagonija, which is the largest valley in Macedonia and which extends to the neighboring Republic of Greece, Skopje Valley, Polog Valley, then the Strumica-Valandovo valley, the Tikvesh Valley but also some of the river extensions, such as the Veles river streams, and some of the other smaller valleys or valley parts in the republic.

These macro-landscape patterns are of great importance for the economic development of Macedonia, and especially for the development of agriculture on the one hand, but also as suitable places for raising settlements and commercial buildings, on the other hand.

The paper will address some smaller but also significant forms of terrain for the purpose of the economic development, and especially for the development of tourism, such as caves, sections and peaks, rocky rivers, as well as some of the other micro-landscape karsts shapes and forms. Here, from the caves, the most talked about will be the cave forms in the canyon of the river Treska near Matka, then the caves Bela Voda and Ubavica and others. From the sections, emphasis will be given to those in the Demir Kapija gorge, on which several world-class mountaineering trails have been built, and from the rocky rivers, to the ones on the Pelister and Jablanica mountains.

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North Macedonia is a country situated in southeastern Europe with geographic coordinates 41°50′N 22°00′E, bordering Kosovo and Serbia to the north, Bulgaria to the east, Greece to the south and Albania to the west. The country is part of the wider region of Macedonia and makes up most of Vardar Macedonia. The country is a major transportation

corridor from Western and Central Europe to Southern Europe and the Aegean Sea. North Macedonia is a landlocked country but has three major natural lakes: Lake Ohrid, Lake Prespa and Lake Dojran. It has a water area of 857 km^2, while its land area is 24,856 km^2.

Republic of North Macedonia is a landlocked country in the central part of Balkan Peninsula, Southeast Europe. The country is characterised by high elevation gradient and high geodiversity. These attributes, complemented by the complexity of several variances of Mediterranean and Continental climate (Melovski et al. 2013) contributed towards the high diversity of ecosystems with distinctive organisation and distribution (Filipovski et al. 1996; MOEPP 2018). Throughout centuries, these natural ecosystems have been reshaped in accord with the culturally diverse background of the inhabitants and their accustomed practices. This has left a distinct human imprint on nature and led to formation of a specific landscape mosaic. Considering the complexity of factors contributing to landscape diversity in North Macedonia first step in landscape typification was to prioritise and organise the major factors according to their importance and contribution.[1]

Total of 41 landscape types have been identified, on a higher hierarchical level organised within 8 landscape groups. The character of natural landscapes is provided by relief, climate, geology, soils and vegetation cover set along elevation gradient. The character of cultural landscapes is withal provided by land use and settlement patterns with reference to landscape cultural specifics and historicity. Research outputs provide an opportunity to further address the importance of spatial configuration for ecological processes and hopes to serve as a methodological and conceptual guideline for succeeding national landscape classifications in the region.

The long history of human settlement in Europe has resulted in an outstanding richness and diversity of landscapes (Meeus 1995; Mücher et al. 2010). Changes resulting from both socio-economic and environmental processes have affected the ecological, aesthetic and cultural-historical values of many of Europe's valued landscapes (Meeus et al. 1990; Hunziker et al. 2008; De Pablo et al. 2012). Following the Pan-European Biological and Landscape Diversity Strategy (Council of Europe 1996), the European Landscape Convention (Council of Europe 2000) has further drawn attention to the need for landscape preservation, committing the parties to account for their landscape diversity and to address the processes and effects of landscape change. Importance of landscapes for biodiversity is presently recognised in the worldwide biodiversity conservation efforts (Beresford and Phillips 2000). As nature conservation focus broadened to encompass landscape, conservation efforts aim towards an integrated action at a 'landscape scale' that allows for broader social, economic, and policy factors that are critical to sustainable livelihoods and ecosystems to be addressed more effectively.

A number of studies have raised the matter of land use/land cover changes and reflected on the importance of landscape composition and structure with regards to habitat connectivity and wildlife conservation. These data are presented in various thesis.

Later in 2016, in the frame of National Strategy for Nature Conservation of Republic of North Macedonia, build upon the previous landscape assessments and identify and characterise the overall landscape diversity in the Country. The study provides insight into the importance of landscape type and configuration for biodiversity conservation with reference to the National Ecological Network ultimately aiming to contribute towards integral nature protection on a 'landscape scale'. Considering the importance of these results as a background for implementation of other conservational and scientific projects in the country, and recognising the limited availability and robustness of project reports, the purpose of this paper is to provide an updated structured overview of results initially presented within the National Strategy for Nature Conservation of Republic of North Macedonia .In detail, this paper aims to: (i) provide overview of the landscape diversity in North Macedonia on both local and regional scale; (ii) to provide landscape valorisation and identify the nationally most

[1] https://en.wikipedia.org/wiki/Macedonia_(region)

valuable landscapes (considering natural, conservational and cultural-historic value) and; (iii) to indicate the most relevant threats to landscape diversity in North Macedonia.[2]

Landscape identification the starting point in landscapes definition on a large scale is often climate Considering the relatively small area of North Macedonia, variation of climate as a standalone factor is insufficient (climate changes along the gradient of geographical latitude at much larger distances). Instead, the climate changes along the elevation gradient and it is significantly influenced by landform. The effect of relief and elevation on climate and vegetation, and consequently on the type and intensity of use of natural resources is prominent and therefore these criteria had a dominant role in differentiation of different landscape types. This approach led to formation of tabular matrix of differentiating criteria (Fig. 1, Tab. 1) for identifying and delineating landscape units: 1. Elevation: The main elevation belts relative to which defining landscape criteria are set in the matrix () were defined on the basis of distribution of vegetation zones Data layers obtained by georeferenced maps of biomes and climate-vegetation-soil zones

The relief of Macedonia is mostly mountainous. There are mountains that cover about 75% of the territory. The relief of Macedonia is composed of hills, low, medium and high mountains, plateaus, valleys, river valleys and other relief forms. The lowest point in the Republic of Macedonia is located at 44 m above sea level near the village of Bogorodica near Gevgelija, and the highest is at 2,746 m above sea level on the top Golem Korab. Today's relief has been created under the influence of internal and external forces over a long period of millions of years. Many millions years ago this territory was covered with water from the great sea. Later, strong tectonic movements raised the seabed and created the mainland. Later, strong tectonic movements raised the seabed and created the mainland. It was the Rhodope mainland - the oldest in our country. The tectonic movements were much stronger in the following periods and they caused some parts of the Rhodope mainland to rise and others to descend. This is how the old mountains and most of the mountains in this area were created. To the west of this land rose the young mountains that belong to the Sharr mountain range. Tectonic movements were followed by earthquakes and live volcanoes. The consequence of them are the volcanic piles in the Kratovo, Radovish and Kozuf Mountains.

In addition to the internal forces that created the mountains and valleys, external forces are of great importance for the formation of the relief of the Republic of Macedonia. These are: heat from the Sun, then precipitation, water (river and lake), ice and wind. Under their influence, the rocks and soil on the surface are crushed, decomposed, crushed, and then with the help of gravity, water and wind are blown to more distant places. This action of external forces is called erosion. The erosion create the river valleys and alluvial plains, then the abrasive relief along the lake shores, the glacial (glacial) relief of the high mountains, the karst relief in the limestone areas, etc. Text Box: Stone dolls in the locality Kuklica near Kratovo, caused by erosion. Check online what these dolls are called and what the legends are about them. Do you know about similar phenomena? Text Box: Do you know. . . Hundreds of millions of years ago, most of the territory of our country was a vast sea surface, and the highest parts of Korab, Jablanica, Bistra, Galicica and other mountains, were located on the seabed. If all the high mountains in the Republic of Macedonia were stacked on top of each other, their height would reach almost 30 km. There are about 300-400 caves in the Republic of Macedonia, 2 of which are longer than 1 km and about a hundred precipices, several of which are deeper than 100 m. Due to the influence of internal and external forces, the relief of our country has a great height difference. Thus, the lowest point in the Republic of Macedonia is the riverbed of the river Vardar on the border with Greece (44 m), and the highest point is the peak Golem Korab (2753 m) on the mountain Korab. It is interesting that our country, according to the average height of 830 m is among the tallest in Europe.

[2] https://en.wikipedia.org/wiki/Geography_of_North_Macedonia

The mountains are medium high (from 1000 m to 2000 m), with the exception of the vast Osogovo Mountains to the north and Belasica to the south (along the border with Bulgaria and Greece). The mountains mainly stretch in a west-east direction, similar to the valleys and valleys that separate them. In addition to the mentioned, more significant mountains in this area that stretch along the border with Bulgaria are: Vlaina, Maleshevo Mountains and Ograzden. To the west of them is Plachkovica (1754 m), then Obozna, Golak, and to the north towards the border with Serbia are the mountains German and Kozjak. They are all intersected by deep river valleys and gorges, tributaries of the rivers Pchinja, Bregalnica and Strumica. Significant areas of these mountains are under forests and pastures. In the dense forest areas, especially in the Osogovo Mountains, Plachkovica, Belasica and Maleshevo Mountains, there are a number of mountain springs with high quality water, part of which is bottled for drinking. In the lower parts, due to the needs for wood, pastures and arable land, the forests are cut down and there is strong erosion.

Landscape valorisation aims at determining the importance of a particular landscape or landscape specific by referring to specified value criteria. Valuation criteria vary depending on the purpose for valorisation. In this study, landscapes are valued mainly from the aspect of their functional value for the conservation of biodiversity. In addition, here we attribute value with reference to cultural values of landscapes, uniqueness of the landscape and the visual landscape quality. Valorisation criteria: • Landscape character. It refers to the distinctive and recognizable pattern of features that characterise the specific landscape type (Lausch et al. 2015). This criterion is applied when comparing two landscape units of the same type. • Landscape condition. The criterion is related to landscape character and indicates the representability of the pattern of landscape features that characterise the landscape type (Bertollo 2001). The criterion allows comparison of landscape units within landscape type, but also comparison between different landscapes types. • Landscape natural and cultural values. It refers to the aspects attributing importance to a given landscape type with reference to both its natural and cultural values. Landscape can be characterised as important for conservation due to its value for biodiversity conservation (Opdam et al. 2003), possession of exceptional scenic values (Fry et al. 2009; Ramos and Pastor 2012; Frank et al. 2013; or possession of important cultural or historical features (The criterion allows comparison of landscape units within landscape type, but also comparison between different landscapes types. • Landscape sensitivity. This criterion is related to landscape condition and indicates the landscape integrity i.e. landscape capacity to endure change without undergoing significant alteration of the basic features that define the landscape character (Usher 2001). While assessing landscape sensitivity present threats were also considered.[3] This criterion allows Geology and soils: Geological types were simplified, primarily based on their pH properties, into silicate rocks and carbonate rocks, then second generalisation was based on mineral composition and origin (e.g. serpentine, granite, gneiss) or formation type e.g. sedimentary. Soil types were also generalised (saline, clay, alluvial, brown mountainous soils, etc.). Geology data layer was based on georeferenced and digitised Geological Map of Macedonia in 1:100000 scale (Federal Geological Institute, Belgrade) and data on soil types were retrieved from MASIS (Soil Map of the Republic of Macedonia, Macedonian Soil Information System (MASIS), Ministry of Agriculture, Forestry and Water Economy of the Republic of Macedonia). 5. Land use: This criterion mainly reflects the type and intensity of land use (size and type of croplands, intensive versus extensive practices, presence of hedgerows etc.). Land use data was based on land use vector data (Agency for Real Estate Cadaster of the Republic of Macedonia) complemented by field specific data.

North Macedonia has a unique climate explained by its location and topography. The climate of the plains is a Mediterranean climate combined with the influence of the Black Sea.[1] The country also holds continental characteristics, which are accentuated by the mountains in the south which prevent

[3] https://www.researchgate.net/publication/339447395_Landscape_diversity_in_North_Macedonia

hot air from the south from moving to the north. Conversely, the Šar Mountains, which are located in the northwestern part, block cold northern winds. In whole, the northern and western parts of the country are relatively close to a Continental climate and the southern and eastern to a Mediterranean climate.

North Macedonia has four seasons, but the lengths of the seasons varies based on geography. The spring is often very short. Summers are subtropical and it is not uncommon to see temperatures of above 40 °C (104 °F) during this season, especially in the plains along the valley of the Vardar river.[1] Winters, although moderate, can be quite cold. Snowfalls during winter are common and occasionally heavy. The average annual temperature of the air is 11.5 °C (53 °F), but the plains experience higher temperatures, 15 °C (59 °F).[2] The warmest month is July, which has an average temperature of 22.2 °C (72 °F) and the coldest is January, with a temperature of 0.3 °C (33 °F). The maximum and minimum temperatures recorded in North Macedonia to date are 45.7 °C (114 °F) and −31.5 °C (−25 °F), respectively.

The rainfall is abundant in the western and eastern parts of the country, but the temperature decreases significantly in the Vardar region. This region sees warmer winters through the *Vardarec* wind. This wind comes up from the mouth of the Vardar river and brings warm air.[1] Skopje, considered a low-lying city, has an average of 64 rainy days per year. The month of October is the wettest with 61 mm; the driest is August with 28 mm. Rains are most common in the spring and fall.

Landscape diversity the landscape diversity in North Macedonia is presented with total of 41 landscape types (Tab. 1, Fig. 2) organised within 8 landscape groups (Fig. 3): Urban and industrial-mining landscapes; Agricultural landscapes, Rural landscapes, Hilly dry grasslands landscape, Forest landscapes, Mountain grasslands landscapes, Mountain rocky landscapes and Lake landscapes. Due to the specific climatic and biogeographic characteristics along the elevation gradient and due to the specifics and the intensity of land use, all landscape types have specific structural and functional properties. Also, there is a notable difference between separate landscape units within the identified landscape types. However, considering the scope of this study we only elaborate the specifics of landscape groups with reference to the general specifics of landscape types within.[4]

The **economy of North Macedonia** has become more liberalized, with an improved business environment, Since its independence from Yugoslavia in 1991, which deprived the country of its key protected markets and the large transfer payments from Belgrade. Prior to independence, North Macedonia was Yugoslavia's poorest republic (only 5% of the total federal output of goods and services).

Successful privatization in 2000 boosted the country's reserves to over $700 million. Also, the leadership demonstrated a continuing commitment to economic reform, free trade, and regional integration. The economy can meet its basic food, coal and hydroelectric power needs but depends on outside sources for all of its petroleum and natural gas and most of its modern machinery and parts. Inflation jumped to 11% in 2000 largely due to higher oil prices but the currency has calmed since the exchange rate was normalised when the EU Stabilization and Association Agreement entered into force in 2004.[5]

North Macedonia experiences one of Europe's biggest growth rates at an average of 4% (even during the political crisis) making it comparable to nations such as Romania and Poland.

North Macedonia's economy has almost always been completely agricultural in nature from the beginning of the Ottoman Empire when it was part of the District of Üsküp and Province of Salonika. It concentrated on pasture farming and vineyard growing. Opium poppy, introduced into the region in 1835, became an important crop as well by the late 19th century, and remained so until the 1930s[6].

[4] https://www.wdl.org/en/item/11815/

[6] https://www.usaid.gov/macedonia/economic-growth-and-trade

Rural landscapes occupy 25% of the total area of North Macedonia and are represented by 9 landscape types The diversity of rural landscapes reflects the diversity of human practices accommodated to the availability (or scarcity) of resources. For the purpose of this graph Complex cultivation patterns includes Vineyards and Fruit trees and berry plantations; Heterogeneous agriculture stands for Land principally occupied by agriculture, with significant areas of natural vegetation. Rural landscapes in North Macedonia are predominantly presented by the type 'Hilly rural landscapes' (33%) (42 % with 'Mariovo landscape' included), then 'Rolling rural landscape' (32%) (34% with 'Rolling rural landscape with hedges included'), while the highest diversity of landscape types is found within mountain rural landscapes (24%).

Hilly dry grasslands landscapes occupy only 7% of the total area of North Macedonia and are represented by 5 landscape types.

The 'Dry grassland landscape on silicate ground' dominates over other landscape types within this group and occupies 50% of the total area under Hilly dry grasslands landscapes.

Forest landscapes occupy 39% of the total area of North Macedonia and are represented by 7 landscape types (Tab. 1, Fig. 2, Fig. 3). Most dominant forest landscape type in North Macedonia is 'Mesophilous broadleaf forest landscape' (47%) followed by 'Thermophilous degraded forests landscape' (34%). Forest landscapes are distributed on an average elevation that ranges from 380 m ('Pseudomaquis landscape'; see Fig. 2, code 6) to 1540 m ('Spruce-fir forest landscape'; see Fig. 2, code 30). This landscape has quite a varied relief mostly presented with mild to moderately steep and steep slopes, then gorges, ravines and valleys. Considering the high difference in elevation, the climate variances span from sub-Mediterranean to warm Continental and Continental with Mountainous.

Macedonia, as a mountain country, has extraordinary natural preconditions and possibilities for developing mountain tourism. Although it possesses different types of accommodation facilities (mountain lodges and houses; children and youth vocation f acilities; boarding houses; etc.), Macedonia is facing many challenges. The article investigates the current level of mountain tourism development by elaborating the case of the National Park "Pelister" – Bitola (Macedonia). The analysis is based on qualit ative research method and incorporates: a) Survey and interviews with mountaineers and responsible persons for mountain tourism development; and b) Secondary data analysis, by reviewing literature. Generally, it was concluded that the evaluated national pa rk has numerous weaknesses that need to be addressed and various profound limiting factors that prevent its tourism development. Yet, by segmented and a tailor - made promotion, the National Park "Pelister" may gain many economic benefits thus overcoming the current scarce tourism valorization and at the same time, may boost mountain tourism development in Macedonia.

The National Park "Pelister" is located in the Southwest part of Macedonia as a part of the Baba mountain. The park encompasses 171.5 km thus representing 43% of the mountain. The longitude is 22 km, and the amplitude is 14 km. The park starts from 891 m above the sea level, and spreads to 2,601 m. The average high is 1,746 m. Based on that, the park belongs to the group of highly mountaineered national parks with around 50 picks over 2,000 m. being simultaneously the most south mountain from an Alpine kind.[7]

Pelister is a national park since 1948, due to the presence of the endemic Pinus peuce, the variety of the geology, specific climatic and hydrographic conditions, as well as the endemic flora and fauna. The Baba mountain along with the pick of Pelister has many anthropogenic values in terms of archeological sites, midlevel churches and monasteries, memorial sites and so forth.

[7] https://park-pelister.com/

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