

Sweet waters in the territory of Republic of Macedonia

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Abstract

This paper presents the waters in the territory of Republic of Macedonia, which are an important segment of the natural geographic base of each geographic region. The identification of natural features is a very important task for the propagation of the values of this region, taking protective measures and using them for various purposes. In the territory of Macedonia there are a large number of natural hydrographic objects with special values, which taking into account the characteristics they have, should be included in the category of natural resources of the Republic of Macedonia.

Keywords: resources, groundwater, rivers, lakes, etc.

1. Introduction

The Republic of Macedonia is a country located on the Balkan Peninsula in Southeastern Europe with a total area of 25,713 km².

The relief is mainly hilly and mountainous. The longest river in the Republic of Macedonia is Vardar river- 388 km (of which 301 km in the Republic of Macedonia) and mostly flows through the central part of the state, in this climatic region of the southern border of the Republic of Macedonia lie three great natural lakes, which are:

- The Ohrid Lake, which is divided between the Republic of Macedonia (2/3) and Albania (1/3)
- Prespa Lake is divided between the Republic of Macedonia, Albania and Greece
- Dojran Lake is divided between Macedonia and Greece.

2. Climate

The Republic of Macedonia is characterized by a highly complex relief structure, filled with mountains, lowlands, rolling, sharp peaks and other orographic forms.

There are high mountains, middle ones and low mountains which have a significant influence on the development of atmospheric processes in the country in the metrological regime as well as their spread in space with this in Macedonia's climate regime.

The mountainous structure allows direct impact from the north through the Kumanovo-Preshevo lowlands and through the Vardar slope and the influence of the Aegean Sea from the south is constantly felt. They are deeply embedded in the interior of the country by mitigating the southern thermal changes. The average temperature in the hottest month - July, is around 25 °C. Demir Kapija is the warmest city in the country with a summer temperature of up to 40 °C. The average temperature in the coldest month - January is relatively high with about 3°C.

Average annual rainfalls in areas with a changed Mediterranean climate are quite low. The average annual rainfall from the Vardar River is less than 500 mm, and this is one of the region's most dry region in the country. In other areas of the Mediterranean climate the rainfall reaches on average 600-750 mm.

The Mountain Climate in Macedonia - includes the high mountain regions of Macedonia. It is characterized by long and snowy winters and short and cold summers. Spring is cooler than autumn.

The temperature in the mountain climate decreases with height increase. That is why lower temperatures are found in the highest parts of the mountains. The Sarr Mountain, for example, has average negative temperature in the four months of the year, and it is also similar to other high mountains.

Colder months are January and February, and warmer July and August. However, even in warmer months there may be major weather changes and even snow.

Regarding precipitation, mountain climates have the highest annual rainfall in the country to approximately 1000 mm. If you go east and in the eastern part of the country the rainfall is reduced to 600-700 mm. The average period that snow rests in the mountains is from November to April but high snowy mountains can stay by the end of May. The gentle continental climate covers Macedonia's largest area. It is characterized by relatively cold and wet winters and warm and dry summers. Spring is cooler than autumn.

There are differences in average temperatures in mild continental climates. This is due to the adherence of differences in regional geographic latitude, altitude, etc. The average July temperature is higher in the Ovche Poles, Kochani and Skopje valleys. January's average temperature is lower in Malesevo's hollows.

The annual rainfall also varies, ranging from 490 mm, To the Ovche Poles cave at 760 mm in the Prespa hollow. The hydrographic features of Rr. Kosovo depend on geographic position, geological construction, relief, climate and plant coverings. In this space are presented all the water bodies, such as: springs, groundwater, rivers, lakes and thermos mineral waters.

3. Resources

In the territory of the Republic of Macedonia there are about 1,100 larger sources that provide water with a capacity of 1 l / sec.

About 800 are with a capacity of 1-5 l / sec, of which 300 sources provide 5 l / sec, while small is the number of sources that give 5-10 and 10 -30 l / sec.

Although 90 sources provide more than 30 l / sec, they provide 84% of the total amount of water in the country. Others, about 1,000 sources include 16% of the total amount of water.

Practically, more than 70% of total water and drinking water resources are concentrated in the western part of the country. In fact, here there are more water sources, unlike the eastern part where there is less, while fewer resources are in the Vardar valley.

80% of all sources are found in the pond of the river Vardar, then in the Black Drin pond, 15% in the Strumitsa pond, 5%.

The sources are found in the mountainous areas of Sharr, Bistritsa, Baba, Pelister, Jakupitsa, Jabllanitsa, Osogovo, Plakovitsa, while the poorest are the Pchinja river ponds, Bregalnitsa and the middle part of Vardar.

3.1. Powerful streams

Powerful streams with more than 1m³/ sec., known as sources that are related to intersections, in fact with limestone terrains. There are more in the Black Drin area, then in the upper part of the Vardar River, Babuna, Treska and the Black River. Some sources of the Trees in the village of Burimi, source in Babuna, Kadina, Belixka River, Black River and others represent sources of these rivers.

For the most powerful sources, St. Naum source at Monastery is considered, which yields from 1 to 6m³ / sec. In fact, this resource is made up of more small resources, all of which together form a larger source. This source gains water from Lake Prespa.

Other smaller sources in the Republic of Macedonia are the sources of Biljana in Ohrid, while in the vicinity of Struga is also the source Many, which with its small lake is used as a trout site.

There are many springs in the Polog valley, of which the most popular is the source on the Vardar River, which yields 1.5 m³ / sec. Water from this source is used to supply the city of Gostivar with electricity and to produce electricity.

It is important also the source Rashche, which is located at the foot of Mount Zheden, at the outskirts of Vardar from the mountain gorge of Dervenii. Rashche is considered to be one of the most important sources in the Republic of Macedonia because it supplies Skopje with its water supply.

The average annual water quantity at this source is 4.15 m³/ sec.

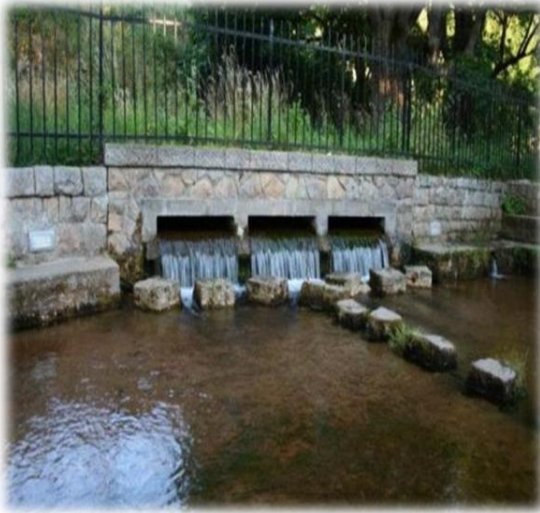


Fig. 1. The sources of Biljana



Fig. 2. The sources of St. Naum

4. Underground waters

An important part of the water resources in the country are also underground waters of wells that are supplied with rainwater, followed by watercourses that are released beside river beds, which are supplied by water from the rivers themselves.

The depth of the well water is not the same everywhere. In some areas of the wells the water rises to only a few feet, while in others it is released up to 20 meters. This type of water is very important. It is considered that about 60% of the rural settlements and about half of the town's settlements are supplied with drinking water, while in some cities the industry is supplied with water. Groundwater's are found in almost all the hollows, while more are in Pelagoni and in the Strumitsa and Radovish hillsides. Located in depth of 50-80 meters, but this water has a depth of 100 meters.

The waters are national wealth. Even perfectly normal to manage the state and it has mechanisms to stop any effort, but also ideas about possible manipulations and misuses. In fact, for the resources manages the state, while for water public companies.

Differences in these views are very important, creating unnecessary tensions over the real water risk to become an example of threats and trade. How much is it possible in practice, because there are always opportunities for misuse.

5. Rivers

The hydrometric network consists of a number of metering stations in rivers where continuous, qualitative and coordinated water volume measurements are carried out including the physic-chemical parameters of the rivers Macedonia's rivers belong to three river ponds:

1. Aegean pond, the largest, with an area of 22 319 km² or 87%.
2. Adriatic pond, with a surface area of 3 350 km² or 13%.
3. The Black Sea pond, with a surface of only 44 km² or 0.2%, is located on the northern side of Skopje's Black Sea - Karadak, where Morava Binica originates where the waters through Moravia and the Danube are transported to the Black Sea.

The Vardar River springs from the karst spring to village Vrutok (Gostivar) S-W at Hollow Polog at an altitude of 683m and flows to 43m at the Greek-Macedonian border in the south.

The overall length is 388 km / 301 km (within the country).

The main feature is the compositional-polygenic character: Switch to: Five hollows: Polog - 63.5 km, Skopje- 51km, Veles -7.5 km, Tikvesh -55 km and Gevgelija - Valandovo- 30.0km

Four Gorges: Derven - 21,5 km, Taor - 31 km, Veles -6 km, Demir Kapija - 19,5 km, 2/3 of the length or 207 km across the pier, 1/3 or 94 km in the gorge.

to Albania. This lake has been rated as the most polluted lake in the Balkans. Prespa is the highest tectonic lake in the Balkans with 853 meters above sea level. It is situated between the three states (of the territory of ethnic Albania): Macedonia, Greece and Albania.

There are some small streams flowing into the lake, while it itself does not have leakage. The lake is surrounded by high mountains above 2000 m in height. With a surface of 318.9 km² in size it is calculated immediately after Shkodra and Ohrid, but at 853 meters above sea level it is the highest lake in Albanian lands. The Prespa Valley is one of the most attractive tourist areas in the Balkans, exceptional natural beauty is distinguished for rich flora and fauna. There are about 1500 species of plants, more than 40 species of mammals, and 23 species of fish. In Prespa is also the Dalmatian pelican with the main concentration in Little Prespa.

Lake Dojran is a lake with a surface of 43.1 km² (16.6 sq mi) divided between the Republic of Macedonia (27.3 km², 10.5 sq mi) and Greece (15.8 km², 6.1 sq mi). To the west is the New Dojran town, north of the Belasitsa mountain and south is the Greek town Dojran. The lake has a rounded shape, a maximum depth of 10 m and a north-south length with 8.9 km (5.5 mi) and 7.1 km (4.4 mi) for most of it, making it the third most lake largely in the Republic of Macedonia behind Lake Ohrid and Prespa.

The real place where you can feel the Mediterranean climate impact is the area of Lake Dojran, the southeastern part of Macedonia. The opening towards the south and the low altitude above sea level (148 meters) cause average annual water temperature of about 15-18 degrees and in summer up to 25-27 degrees, Lake Dojran, with a surface of 43, 1 km², is the smallest tectonic lake in which is a relic from High production of plankton also means fish wealth. In the lake there are about 15 species of fish. Summer in Dojran is hot and dry and the winter is mild and wet. If you are looking for tranquility and rest, in the embrace of the Mediterranean environment, surrounded by unrivaled beauty of nature, Dojran is the right place.

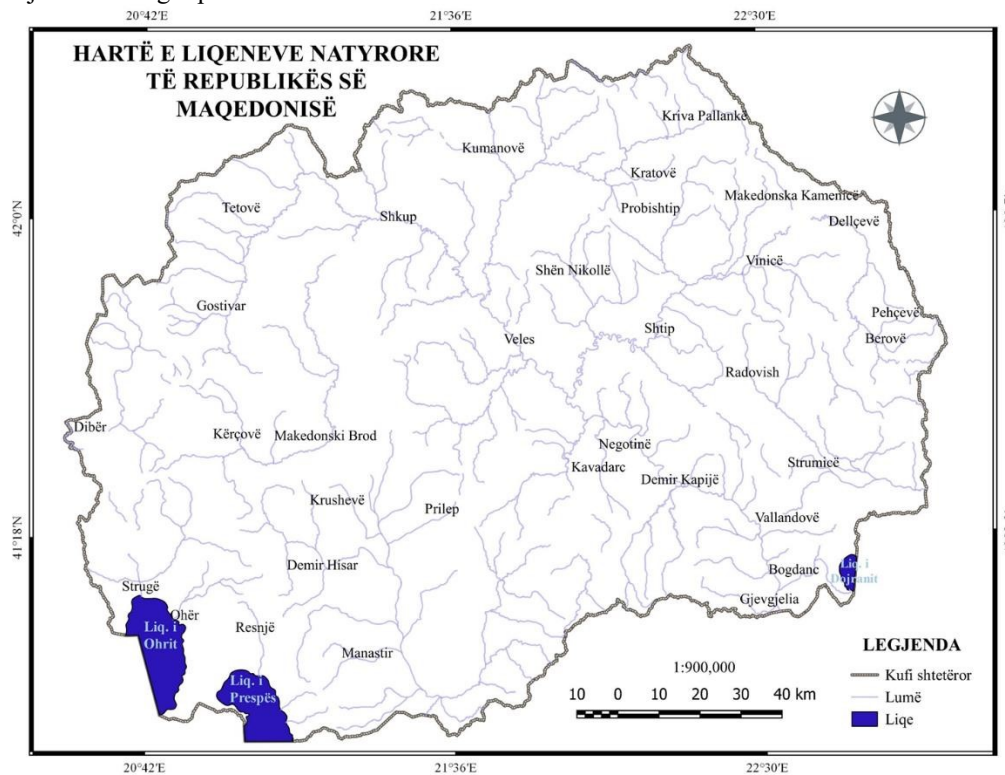


Fig. 4. The lakes in Macedonia

7. Conclusions

Waters in the territory of R. Macedonia are an important segment of this geographic region. The identification of natural features is a very important task for the propagation of the values of this region, the taking of protection measures and their utilization for various purposes. On the territory of Macedonia there are a large number of natural hydrographic objects with special values, which taking into account the characteristics they have, should be included in the category of natural resources of the Republic of Macedonia.

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The mountains that are divided into high middle and low mountains that have a significant impact on the development of atmospheric processes in the country in the metrological regime as well as their spreading in space with this in the climate regime of Macedonia. The territory of the Republic of Macedonia has about 1,100 larger sources that provide water with a capacity of 1 l / sec. In practice, more than 70% of the total water and drinking water resources are concentrated in the western part of the country. Strong leakage with more than 1m³ / sec. , known as sources which are known as rock bound to limestone terrain. There are more in the Black Drin area, then in the upper part of the Vardar River, Babuna, Treska and the Black River.

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