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CLIMATIC FEATURES AS A FACTOR FOR DEVELOPMENT OF TOURISM IN THE REPUBLIC OF MACEDONIA

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Abstract:

The development of tourism in general besides the anthropogenic factors have important natural features expressed through all their features, and one of them is the climate. When we talk about tourism in rural areas as an alternative form of tourism, we have to look at the climate characteristics from a different perspective, because alternative forms of tourism have a seasonal nature, and i.e. it is a specific form of tourism that is practiced throughout the year. Therefore it is not good to have extreme temperatures and climate both in the positive and the negative terms in the area in which tourism is going to be practiced. Temperature extremes might be suitable for primary or so-called mass forms of tourism such as summer or winter tourism, which largely depends on the number of sunny hours, air temperature, amount of snowfall, number of days with snow etc. But this is not the case when it comes to rural tourism, because it's practiced throughout the whole year and it's not dependent on the parameters that were given above, but this form of tourism requires an inviting climate all year round. It is therefore important to understand the basic climatic characteristics where the natural environment is an important factor for the development of tourism in the rural areas in the country.

Keywords: climate, rural tourism, temperature, seasons, altitude zones.

Jel Classification: Q26

INTRODUCTION

During the long geological past, the climate of our planet continuously has been changing. Warm and wet periods have changed to cold and dry. The Ice covers of the Polar Regions and the highest mountain have repeatedly come near the equator and the lower planes. Many areas of the Earth which now have hot and humid climates were once covered with eternal snow and ice. The climate changes through the geological

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past can be concluded from the remains (fossils) of flora and fauna, from the pedo cover of the earth's surface, on the basis of fluctuations in the levels of the lakes and seas, the quantity of water in rivers, the length of the glaciers and so on. The formation of today's Earth climate has changed over the course of its geologic history and that is depended on many factors and climatic elements. The climate has an influence on the human body such as: mood, physical activity, productivity, physical activity and more. People need rest and recreation in places and climates that suit their needs and health.

The climate is an important and integral component of the natural environment, but it also has a major impact on the economic activity, and this effect is particularly pronounced on the tourism and hospitality industry. According to (Panov 2006) "The climate is one of the most important factors for the development of tourism, as well as a necessary element for tourist valorisation of almost every area". Within the natural geographical conditions which are studied and analyzed for the purpose of tourism planning, climate characteristics are one of the most dynamic elements. Through climate elements, such as temperature, duration of sunshine, cloud cover, precipitation and wind are the clear indicators for suitability or the disadvantage of the area for the development of tourism and recreation. On the other hand, the extremes of certain climatic elements indicate the limitations associated with tourism development. From this we can conclude that the environment has a very important role on the development of tourism. The climate is one of the key elements of the environment, this fact further increase and deepens the relationship and the impact of the climate on the environment through tourism. This mutual relationship and impact is stressed by (Williams 2009) who says "however, tourism-environment relationships are not just fundamental, they are also highly complex, although the level of complexity has probably evolved through time as level of activity and spatial extent of tourism has increased".

THEORY AND METODOLOGY

The basic theoretical assumption in this paper is that every space in the country in terms of tourism development is highly dependent on climatic characteristics and thus planning the forms of tourism that could be developed in a given area is directly depending on the climatic characteristics of the same. In the context of the theoretical assumption that paper is observed by space height zonality, the kind of tourist movement is affected, or over depending on climatic characteristics that distinguish appropriate altitude zone of the Republic of Macedonia. When it is taken into consideration climate specific variables of individual climate elements that distinguish different elevation zones: zone to 400 meters above sea level, area of 400 to 800 meters above sea level, the zone from 800 to 1200 meters above sea level area and height over 1200 meters above sea level. The data are processed and analyzed secondary and related to climate elements (temperature, amount and type of precipitation, number of summer days, number of days covered with snow, sunny hours).

Needs and analyzed data collected from official measurements of climatic elements made by the National Hydrometeorological Service Republic of Macedonia, as well as from published editions of appropriate subject area related to the paper. The data processing and preparation of paper applied several methods for scientific research in

tourism: Methods of analysis by means of which an analysis of data for obtaining the appropriate conclusions about climate impacts on tourism of appropriate space, inevitably applied and statistical methods using statistical data relating to the value of climate elements, and determining the areas located at different elevation zones in terms of development of different forms of tourism used a comparative method that has been done comparing and brought in interdependence and depending on space and climate characteristics, comparative method is especially important to determine the impact of climate on a tourist area or resort, (Maksin 2012) "to determine the activities of the climate of a resort or center is an important comparison of climatic elements ...", also presenting the climatic characteristics of the air temperature the Republic of Macedonia used the mapping method by which best visually achieve the desired effect and in the end is implemented method of generalization that according to (Ivanovic 2011) is "a methodical thought process through which individual and separate have encountered and understand general", which in this paper is very necessary to understand the impact of climate on tourism derived from specific and individual characteristics of climatic elements.

RESULTS AND DISCUSSION

OVERALL IMPACT OF CLIMATE AND THE CLIMATE CHARACTERISTICS ON TOURISM

In the process of tourism planning the most important climatic elements are analyzed. During the processing of the climatic characteristics for the purposes of tourism, firstly attention is paid to a particular region of space provided for tourist activities, all of these analyses depend on the type and form of tourism is being planned for development of the concrete area. The climate is one of the two components of each tourist destination, it specified (Goeldner and Brent Ritchie 2009) in their view "Any given destination is primarily and unchangeably characterized by its historiography (the nature and appearance of its landscape) and its climate (the kind of either it has over a period of years; i.e., the conditions of heat and cold, moisture and rains, and wind) ". Climatic features have the same impact on different forms of tourism. When it comes to the development of tourist destinations that are located on the water, it is necessary to determine the days with highest air temperature over 30°C, the length of the sunny days, average cloudiness, average number of days without rainfall and other climatic elements that positively influence the development of summer tourism. Contrary to the prior conclusion, the determination to build a winter-sports centre and the planning and development of winter sports mountain tourism, requires an analysis of the number of days with snow cover and the length of duration, the thickness of the snow cover, strength and frequency of winds, the average, maximum and minimum air temperatures and other climatic elements that positively influence the development of winter sport tourism. From the aspect of determining and evaluating of the suited area for tourism and recreation, or if it is suitable, unsuitable, or if its only somewhat suited to meet the travellers needs related to some values of some climatic elements, which have different values depending on whether it's a summer or winter recreational tourism. In this regard, for summer tourism to be recreational and to involve tourist

activities in the water, the air temperature should have a value higher than 18°C. In that case, suitable areas considered are where the temperature is above 18°C with at least 81 days in the year with the mentioned air temperature. For relatively convenient bathing are considered areas where the number of days is between 41 and 81 days, while the least suitable are considered those areas where the temperature of 18°C and above are present in less than 40 days in the year.

Table 1. Classification the area for the convenience of summer tourism by air temperature

Temperature of air °C	Duration in days	Convenience the area for summer tourism
min 18°C	> 81 days	most convenient
min 18°C	from 41 to 81 days	relatively convenient
min 18°C	< 40 days	least convenient

To have recreational winter sports tourism, the climate characteristics are a major factor in determining the area where the winter tourism and recreation should be performed. In this context, the most suitable areas for alpine disciplines are places in which the thickness of the snow cover is thicker than 15 cm on the grass and 50 cm on the stony and ruff part of the terrain, and the duration of the snow cover is more than three months above the parameters given above. Relatively favourable terrains for skiing are those parts of the terrain which have the appropriate thickness of snow cover and duration of the snow cover is at least two to three months in the in the year in the given parameters above. Terrains which are not favourable are all those which are under the given values, except areas and terrains where the snow lasts continuously from one to two months.

Table 2. Classification the area for the convenience of winter tourism according to the thickness and duration on snow cover

Thickness of snow cover in cm		Duration on snow cover in days	Convenience the area for winter tourism
on grass surface	on stone surface		
min 15 cm	min 50 cm	up to 90 days	most convenient
min 15 cm	min 50 cm	up to 60 days	relatively convenient
min 15 cm	min 50 cm	< 60 days	least convenient

Climatic characteristics, i.e. knowledge of all climate elements and their synthesis allow accurate calculation for the duration of the tourist season. Examples of areas where water tourism can be developed, is where the air temperature starting from May to September is higher than 18°C, this indicates that the tourist season in this area can be planned for a period of five months. These areas do not only have favourable summer temperatures, but an annual average temperature which is quite high and makes the stay more enjoyable for the tourists. In this sense, for tourism and recreation in terms of temperature, the most important data are the average midyear temperatures and also the winter temperatures. The midyear temperatures are Above 16°C and the high winter temperatures are above 9°C which allows for the extension of the tourist season, tourist can use these natural resources for recreation during the cold part of the year.

The importances for tourism are the climatic features or climatic elements such as the number of cloudy days and the number of sunny hours. For summer tourism, whether its mountain or water based, despite the midyear cloudiness it is necessary for us to know the data for cloud cover in the summer months. Despite the big role of the sunny days in the tourist area they also have a psychological effect on the tourists; the numerous sunny days also have special advantage for tourism development. Our lake resorts are characterized with a relatively large number of sunny hours over 2,300 which make a pleasant stay for the tourists. In addition to the sunny weather, there are other environmental benefits, such as high expression of calm periods without wind, the refreshing influence of winds, and the occurrence of rainfall and so on. Seasonal winds blowing from land to water, where comfortable refreshment is provided and thus reducing the summer heat. In addition to this, it is necessary to know the amount of rainfall during the summer months. The short-term rainfall is favourable and it does not affect the air temperature, but it greatly purifies the air, and thus enables a more pleasant stay for the tourists. From the above it can be seen that a large impact on the climate is expressed in spatial organization and spatial displacement of certain recreational sectors of the tourism industry.

CLIMATE CHARACTERISTICS IN THE REPUBLIC OF MACEDONIA

The climate in the Republic of Macedonia is characterized by a specific spatial and temporal distribution of air, thus determining the different types of climates given in different areas of the country. (Lazarevski 1993) describes the climate in Macedonia as follows “In most of the country the climate is Mediterranean and continental, at the higher mountainous the climate and the highest parts of the country the climate is alpine”. This is characterised by long and warm summers and relatively long and cold winters, that is exactly what affects mostly the development of almost all types of tourism. The average annual temperature is 11,9°C while the average summer temperature is 21,1°C.

Table 3. The Average monthly and annual air temperatures in the Republic of Macedonia °C for the period 1970–2011²

mon	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	aver.
°C	-1,3	3,2	7,8	11,6	16,2	20,5	23,1	22,6	17,5	13,3	7,3	2,0	11,9

Precipitation is not as abundant in the summer, while in winter and the higher areas are mostly covered with snow. This provides excellent opportunities for the development of stationary summer and winter sports tourism. In fact, the average annual precipitation value is 565 mm/m², while the average monthly value is 47.2 mm/m².

² Source: NHSRM

Table 4. Average monthly and annual amounts of precipitation in the Republic of Macedonia in mm/m2 for the period 1970–2011³

mon	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	aver.
l/m ²	43,5	28,5	35	62	55,7	42,3	36,5	41	47	65,6	44,3	63,9	47,2

The average humidity, with value is 71.6% is almost ideal for the stay of tourists and the same is true for the number of days with ideal weather throughout the year which is near 90 days. This environment affects the development of almost all types of tourism, such as stationary summer tourism, winter sports tourism, health tourism, rural tourism, fishing-hunting tourism, transit tourism and other forms of tourism.

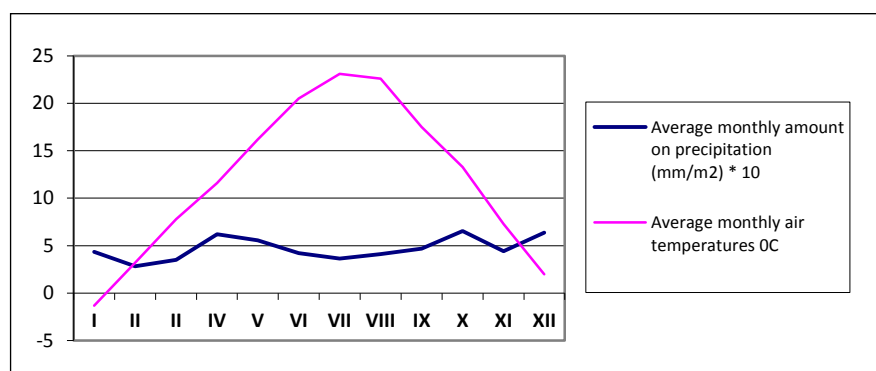


Figure 1. Relation between temperature and precipitation during the year

The most important wind in the country is called Vardarec which blows in the valley of the Vardar River. Throughout the year the average speed of the wind is 3.0 m/sec. The average values of calm days in the whole country ranges from 1,000 cases are 342. Most windy areas are: Lazaropole (12), Kriva Palanka (14), Ohrid (156) and Popova Shapka (224), the least windy are: Berovo (490), Kavadarci (477), Veles (472) and Prilep (438). The yearly average of sunshine is around 2112 hours in Skopje to 2405 in Shtip, where the maximum is in July and the minimum sunshine is in the month of December. In the Ohrid-Struga region as the largest tourist centres in Macedonia the sunshine value is quite high and its value is around 2335 hours. The average cloudiness in tenths is 5, 04/10 and these parameters are quite equal at all of the measuring stations in the country, while the average number of days which are perfect are (95,0). The measuring stations with most sunny days are: Dojran (130,2), Valandovo (129,2), Strumica (126,2) and Gevegelija with (122,6) sunny days, while the areas with the least sunny days are: Makedonski Brod (58,5), Krushevo (68,1), Skopje (73,0) and Tetovo with (78,5). The average cloudy days are (96, 5). The most cloudy is in Tetovo with a value of (130, 9), next is Kichevo (119,5), Lazaropole (108,7), Makedonski Brod (107, 2), Skopje (105,5) Mavrovi Anovi (105,0), Radovish (104,0) and Resen 102,9) cloudy days. Places with the least cloudy days of only (69, 4) are Gevegelija and Valandovo with (76,0). The average days with fog are (17,2) and the

³ Source: NHSRM

leader and the most cloudy is the capital city of Skopje with (71,4) foggy days. The areas with the least fog are Resen (3,3), Valandovo (4,7), and Ohrid (4,9).

In terms of annual thermal regime in the Republic of Macedonia there are two basic annual periods and they are as follows cold and hot. The warm temperatures of the year generally range from 15 to 25°C in more than V to X month in the year, which are suitable for outdoor recreation. But with the increasing height of the sea level, or in mountainous areas, the lengths of these warm periods are reduced. So to assess the value of the climate for tourism in our country during the summer months, we will use the so-called "index of summer" (J), by the English climatologist M. Pulter. This indicator is calculated using the following form: $J = W1 + W2 - W3$, where W1 is the sum of average temperatures, W2 is the duration of the solar glow, W3-amount of rainfall for the three summer months. In Macedonia, the index of summer time is calculated based on data from meteorological measurement possible number of points Lazarevski (1993). Macedonia with its geographical location and various conditions is characterized by different climatic characteristics, and thus it has diversified index of the summer time. The index moves from 668 in Popova Shapka to 950 in Gevegelija. But when taken as a whole, a significant part of our valley spatial units have a relatively high value, or more than (800) the index in the summer period can be considered as ideal for development of tourism activities specifically for recreation and water sports. However the index of (800) is the highest value reached mainly in areas where the Mediterranean climate prevails, so that the region covered by the sun (800) are bright, sunny and warm summers with little rainfall and as a result such areas are identified as favourable for the development of summer tourism, or for bathing and other recreational and tourist activities on the water.

DIFFERENCE IN THE CLIMATE CHARACTERISTICS BY THE ALTITUDE ZONES IN THE REPUBLIC OF MACEDONIA

With increasing altitude the value of the index decreases, in such spaces valuable climatic features are changed such as: clean, ventilated, and thinner partially ionized air the solar glow is at a higher level and ultraviolet radiation is increased and so on and so on. In this case it refers to the mountainous areas which are characterized by their specific climatic values and characteristics. They also provide an opportunity to develop stationary summer mountain tourism or rest and relaxation in the fine mountain air. In the lowland areas the sun is low and cooler, the ultraviolet rays and rich red (heat) radiation in the mountains is quite strong, so at the higher altitude the skin can get darker, despite staying in the shade. Regarding the benefits and values of the different climate zones and elevation changes in thermal regime in the winter time of year tourist values and benefits of climate are completely transmitted in mountainous areas, thus enabling the development of winter-sports tourism. Based on the analysis and the perception of climate and climate characteristics as tourist value, specifically in order to emphasize its impact, it is necessary to give a proper assessment of its effects in areas and space for individual parts. The need to approach climate-tourist organising by regions, is the way of the heterogeneity of the relief structure which can be correctly perceived for the role of climate in tourism. In terms of climate-tourist reigning particular importance have the individual climate elements, that require

processing of the following indicators: air temperature (mid monthly temperatures in seasons, the length of summer days with temperatures above 25°C), the amount of rain and snow (length and thickness of snow cover). These values though general previously presented in individual presentation, and climate-tourist reigning need to be evaluated jointly in order to express spatial differences of the region and the individual parametric values with their positive or negative impact to some extent to determine branch of tourist-recreational activity in the region. In the area of the Republic of Macedonia in terms of its structure and relief in terms of climate-tourism regionalization is a necessary to process for the parametric values referred to all spatial relief units, determined by altitude. However, in the course of their regionalization all of morphological units should be valued separately. The various features of climate depends on the altitude of the area, they have a different impact on tourists and therefore a different impact on the opportunities and incentives for the development of tourism in the region with different altitudes. This was stressed by (Stetic 2003) where he says that "most favourable climate for the tourists staying is at an altitude of 600–1200 meters. The higher altitudes require a period of adjustment". The author makes separation of four basic types of climate according to altitude which have different impacts on tourists, such as: climate of small heights (300–600 m a.s.l) climate of high altitudes (600–1200 m a.s.l) climate of high altitudes (1200–2000 m) and the climate at very high altitudes above (2000 meters).

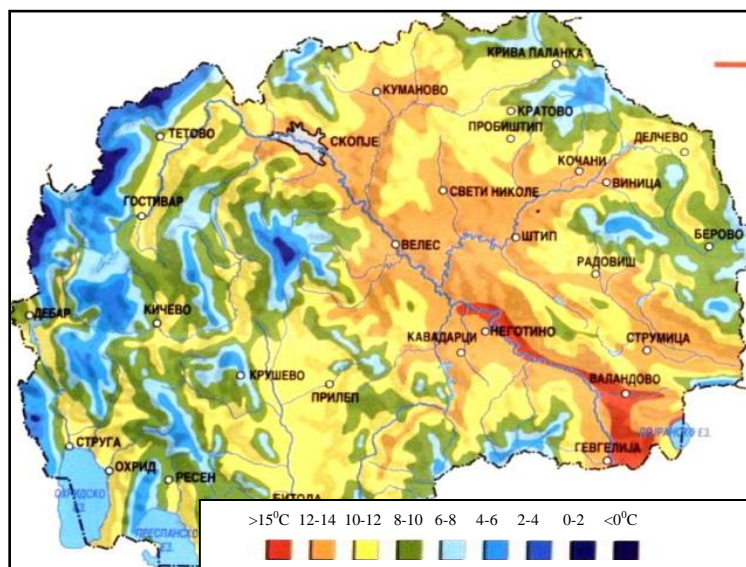


Figure 1. Zonal division in mean annual temperatures Republic of Macedonia

Altitude relief zones to 400 m a.s.l is characterized by the following basic climatic characteristics: a high temperature amplitude passing 23°C, has many summer days with temperatures above 25°C (over 100 days), a significantly high amount of sunny hours which range through 2300 h / year, and have a low annual rainfall primarily in

the summer (450 to 650 mm/m²) and in August only about (30 mm/m²). These values are typical climate of the South and the regions of Ovche Pole, Strumica and Radovish Valley, Dojran Valley and others. The above climatic features are very suitable for summer recreation or recreation related to bathing, sunbathing and resting near water.

Spatial relief units from 400 to 800 m a.s.l are characterized by lower temperature amplitudes and are below 21°C, the number of summer days with temperatures exceeding 25°C range from 60 to 99 days, solar glow is between 1800 and 2300 h / year has a somewhat higher value of annual amounts of rainfall amounting to nearly 800 mm/m². At these altitude zones are Polog, Pelagonia valley Kriva Palanka, Ohrid valley, Kichevo valley and Delchevo valley etc... In this climate zone according to the characteristics and properties of the environment, should be included Prespa valley (850 m a.s.l), which is a little bit higher than the height of the area but because it is partially fields with water from Lake Prespa it affects the microclimate. Such influence is felt on the temperature in the valley, especially the air temperature in the winter months. There is also prolonged solar glow (2295 h / yr) and a climate with a boundary value and the number of summer days (64). Taken as a whole in such climatic conditions there are still favourable opportunities for the development of summer stationary tourism (bathing, sunbathing, recreation, water sports, etc). In this and in previous altitudes which have the appearance of thermal springs there are conditions for development of spa tourism, given the climatic characteristics of a modified Mediterranean climate allows use of these resources (thermo sources) throughout the year. The altitude belt located between 800 and 1,200 m is characterised with cooler summers, the number of summer days is quite low (between 20 and 40 days) excluding Berovo valley where the values range up to 60 days. Due to the altitude, and reduced annual temperatures which are below 19°C, the winter months are colder and the length and duration of snow cover varies depending on the morphology of the relief and they range between 40 and 90 days. The solar glow is considerably long and it is a factor for pleasant feeling of tourists during the summer months and is between 2100 to 2300 h / year. In this climate there are opportunities to develop stationary summer tourism (leisure, recreation, and sports), health tourism, hunting tourism and conditions for winter sports. Stationary summer tourism is particularly present in the mountainous region of Maleshevo Mountains, Plachkovica, Ograzhden and many other mountain areas in the country there are other residential and other tourist facilities. This group is specifically allocated in the Maleshevo Mountains with their specific climatic features and according to (Gjorgievski 2012) "The climatic feature in the Maleshevo valley is also suitable for tourism development, because of the altitude and its features the climate is specific to mountains. It is particularly important in terms of tourism because of the large amounts of snow in the winter period, while in the summer lower temperatures prevail and the air is fresher unlike the surrounding areas".

Climate characteristics of higher the altitudes than 1200 m a.s.l have few summer days (0 to 17) with the highest value of 17 days was observed in Krushevo the altitude zone is characterized by low summer temperatures, which results in short and cool summers, relatively cold and snowy winters with different duration of the snow cover, and this is dependent on the altitude and the location and amount of days (90–150 days). Here in this zone the height of the mountains in the country is emphasized by Shar Planina which features the longest continuous duration of snow cover. In these high zones winter months also have negative average temperature, annual temperature

and the amplitude is rather insignificant and it's less than 16°C. It should be noted that certain convenience in order to represent tourism and the high number of sunny hours the number in this height range between 2000–2330 h / year and temperature inversion that occur during the winter months of the year. The areas which are located in the elevation zones have most favourable conditions for the development of winter sport tourism and some other tourist activities and some alternative tourism forms that are practiced during the summer periods of the year.

SIGNIFICANCE OF THE STUDY

As is clearly shown that climate is an essential element or one of the elements of the tourist area, hence the importance and significance of this paper is that the tourism planning of any area in the country. However the features of climate elements that positively affect a variety of different forms of tourism. The most developed tourist area in the country, and it's Ohrid-Struga tourist area is the zone height of 400–800 meters above sea level and here is primarily developed summer lake tourism. Climatic features of this area are modified under the influence of a lake that created special microclimate. The second most developed tourist area is influenced by mountain climate and these are mountainous areas it found over 1200 meters above sea level in this region in the country, under the influence of climatic features is developed winter-sports tourism and this covers most mountains and mountain peaks that are spatially spaced in more tourist regions, areas and zones on the territory of Macedonia. But as most interesting occurs zone height of 800–1200 meters above sea level with its specific climate characteristics, because at this altitude zone climate are such a positive influence on the development of alternative forms of tourism that space can be developed across the territory of Macedonia at this altitude zone (for relief characteristics discussed above) but also characteristics of the climate in this area is such height to support the tourist movement in most of the year, thus avoiding the seasonal nature of tourism. Such thinking and understanding of the climatic characteristics of the territory of the Republic of Macedonia for the purpose of tourism is a necessity when planning for tourism development tourism in Macedonia has, especially as tourism is rapidly growing and prosperous industry in the state, but also because of the fact that this issue in the country is not paid enough attention and there are no specific studies done dealing with climate regionalization for the purpose of tourism.

CONCLUSION

Climate characteristics undoubtedly appear as one of the main factors that condition the development of tourism in a given space. They have a strong and pronounced influence on the development of all forms of tourism. This impacts as presented in this paper, we have seen that it can be positive and negative, but also climatic characteristics do not have the same effect on different forms of tourism. In light of this understanding are not the same climate characteristics that have a positive influence the development of summer tourism and rural tourism or development of winter sport tourism and rural

tourism. Rural forms of tourism are not seasonally dependent with the summer and winter, but they are going throughout the whole year, so climate characteristics that positively affect this travel form should be beneficial for the stay of tourists throughout the year and especially in spring and autumn. General climatic characteristics of the territory of the Republic of Macedonia have such conveniently affecting on the development of forms of rural tourism. Republic of Macedonia is characterized by predominantly mountainous terrain, according to (Stojmilov 2011) more than 70% of the territory of the Republic of Macedonia are mountains. It means that it is a space suitable for rural tourism. Therefore follows that the general climatic characteristics except for tourism, many important features and climate in different altitudinal zones, in particular climate zone features a height of 600–1200 meters above sea level, because this altitude zone is most suitable and most visited by tourists. Precisely this height zone is characterized by such features climate where summers are cooler and offer a pleasurable residence for tourists, spring and autumn are specifically expressed in seasons where no great extremes to climate elements. According to this and taking into account all previously presented climatic characteristics, we can conclude that climate along with all its peculiarities positively affect the development of rural tourism in the country, especially when it comes to rural areas that are in the zone height of 600–1200 m altitude, allowing warm air to stay and activities of tourists most of the year.

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