CHALLENGES FOR TOURISM IN RELATION TO CLIMATE CHANGE ADAPTATION

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Abstract. One of the greatest challenges facing humanity today is climate change and global warming. Overall, there are two scenarios for global warming: one with less warming and one with more significant warming. For the territory of Bulgaria, there is a strong trend of rising maximum air temperatures in the summer. Average annual rainfall is expected to decrease by about 10% in Western Bulgaria, while the reduction in Eastern Bulgaria is expected to be greater (15-20%).
The report examines changes in the two most important climatic parameters for tourism activities – temperature and precipitation. Evidence shows that winter tourism will be much more negatively affected than summer tourism. The seasonality of tourism will also change – the summer season will be extended, while the winter season will shorten drastically.
Various adaptation measures and policies for climate change adaptation in the European Union are discussed, and suggestions are made on how they could be applied in Bulgaria.
In conclusion, it can be summarized that climate change will have a significant impact on tourism in Bulgaria, particularly on the two most popular types of tourism – seaside summer recreational tourism and winter ski tourism, which have pronounced seasonal characteristics and are highly susceptible to changes in climatic conditions.
Keywords: tourism; climate change; adaptation; policy; measures
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Introduction. Climate change affecting tourism – general

The climate system is very dynamic and varies in all time and geographical zones. Nevertheless, one of the biggest challenges facing all of humanity today is climate change and global warming. Rapid economic growth over the past few decades has been accompanied by a widespread increase in greenhouse gas emissions, which are largely responsible for these problems.

The main climate changes affecting tourism are primarily related to changes in temperatures and precipitation in a spatial and temporal (seasonal) aspect. Therefore, further analysis is based on research and predictions of these two parameters.

Recorded observations show that the global climate is changing and the changes that are occurring are visible all over the world. In recent decades, a clear trend of climate warming has been observed, accompanied by a decrease

in precipitation and its amounts. Naturally, the strength and pattern of these changes are regionally differentiated.

In general, there are two scenarios for global warming: with less and more warming. According to the results for the pessimistic scenario with greater warming at the end of the century (2080-2100), the increase in temperatures compared to the 1961-1990 average temperatures will be greatest in winter in Eastern Europe and the Scandinavian Peninsula (with up to 5°C), and in summer in southern Europe (with up to 7°C). But even under the less warming scenario, the global average air temperature is expected to rise by 2°C by the end of the century (David Suzuki Foundation 2009). This increase is accepted by many researchers and government organizations as a threshold that is critical for ecosystems and the global economy.

Southern Europe (including Bulgaria) will be distinguished not only by a hotter, but also by a drier summer, compared to the base climate period (1961-1990).

The future trends of the two main parameters (temperature and precipitation) were studied in Hungary, Romania and Bulgaria (Jacob, Horanyi 2009) for the period 2021-2050. and are compared with the reference period 1961-1990.

The main change is in the temperature and is quite significant: for 2021-2050. an increase in both annual and seasonal mean temperatures is expected. In the three countries under consideration, the annual average temperature is expected to rise by approximately 1.4-1.50C, and the greatest warming is expected to be in the autumn season for each of the three countries (for Bulgaria by 1.90C).

In terms of annual precipitation, relatively small changes are expected for the period 2021-2050. At the same time, significant differences in rainfall are expected in different seasons. While in spring and summer the decrease in precipitation is obvious, for all three countries in winter their increase is expected (Table 1).

Table 1. Expected changes in temperature and precipitation in Bulgaria in 2021 - 2050 compared to 1961-1990

Temperature (^{0}C)					Precipitation (%)				
Annual	Spring	Summer	Autumn	Winter	Annual	Spring	Summer	Autumn	Winter
1.5	1.2	1.6	**1.9**	1.4	-2.6	-4.4	**-10.2**	-0.1	**7.5**

Source: Jacob, Horanyi, 2009

For the territory of Bulgaria, there is a strong trend towards an increase in maximum air temperatures in summer and an increase in the number of tropical nights (with a minimum temperature above 20°C), as well as in the

duration of dry periods (consecutive number of days without precipitation). According to different scenarios, by 2050, average annual temperatures in the country are likely to increase by 1.6 -1.8°C to 2.1°C - 2.2°C, and by 2100 the increase may be with 3.3°C -3.5°C to 4.2°C – 4.3°C. The seasonal increase in air temperature in the country by 2025, according to the HadCM2 model, will be 1.0°C (winter), 1.1°C (spring), 1.4°C (summer) and 1.2 °C (autumn) (Alexandrov 2011, according to Nikolova M. 2012). There are also some internal differences for the territory of the country - the increase in the average annual temperature in the non-mountainous parts of the country is expected to be greater (by about 3.8°C-4.0°C).

Average minimum temperatures will also increase by 1-2°C, with a larger increase expected in northern Bulgaria. By the end of the century, the increase may reach 4-5°C (according to the pessimistic scenario). It is expected to be higher in the summer, which is not favorable for the summer tourist season.

Average maximum winter temperatures also increase depending on the scenario by 1.0°C to 2.0°C for the period up to 2035, and by the end of the century it is expected that the increase should be from 1.5°C - 2.0°C to 5°C - 7°C in the Danube lowlands and from 4°C to 5°C for the rest of the country. Even an optimistic forecast will have a drastic impact on the country's winter tourism (combined with expected changes in rainfall).

Average summer maximum temperatures will increase by even higher values compared to 1961-1990. The expected increase in summer maximum temperatures for the period 2016-2035 is 2.0°C – 3.0°C under both scenarios. Towards the end of the 21st century, the optimistic scenario foresees an increase in the average maximum summer temperatures between 3.0°C and 4.0°C along the Black Sea coast, and in the rest of the country with 4.0°C to 5.0°C. According to the pessimistic scenario, the increase will be 5.0°C – 7.0°C along the Black Sea coast and 7.0°C – 9.0°C in the interior of the country.

During the transition seasons (spring and autumn) an increase in average minimum and average maximum temperatures is also expected, with this increase being greater in autumn compared to spring. For the period 2016-2035, the increase in mean spring minimum temperatures is expected to be between 1.0°C – 1.5°C. By the end of the century, the increase in average spring minimum temperatures will be 1.5°C – 2.0°C or 5.0°C – 7.0°C, depending on the scenario.

The increase in average autumn maximum temperatures is expected to be greatest towards the end of the century. Weaker - with from 4.0°C to 5.0°C - it will be along the Black Sea coast and Southeast Bulgaria, and in the interior of the country it will be from 5.0°C to 7.0°C.

Average annual precipitation is expected to decrease in Western Bulgaria by about 10%, and the decrease in Eastern Bulgaria is expected to be greater (by 15-20%). These intra-regional differences have implications for tourism in both mountain and Black Sea tourist destinations.

In Bulgaria, after the mid-1990s, annual precipitation has shown an upward trend in most regions of the country, with heavy rains, thunderstorms and sometimes hailstorms becoming more frequent in recent years in winter months such as January and February (Alexandrov 2010).

According to the optimistic scenario, it is expected initially (until 2035) that the average annual amount of precipitation will increase in Northwestern Bulgaria by about 10% and decrease by the same percentage in the rest of the country. Towards the end of the century, a slight increase in the values of this indicator is expected for most of the country, with the exception of the southernmost parts of Western and Central Bulgaria.

The pessimistic scenario initially foresees an increase in average annual precipitation in almost the entire country by about 10% during the period 2013-2035, except for its southernmost periphery. By the end of the century, however, under the same scenario, a decrease in the average values of the indicator is expected by between 10 and 20%, which will have an even stronger negative effect on all types of tourism and tourist destinations.

In terms of changes in average winter precipitation, the optimistic expectation is that it will be about 10% more across the country, except for its southwestern parts, which are expected to see a decrease of about 10%, which will by no means be any a bonus for our winter tourism, developed mostly in these destinations. By the end of the century, under the same scenario, winter precipitation will decrease by about 10% across the country.

In the case of summer precipitation, a decrease in the amounts is expected under all scenarios. The most drastic reduction was at the end of the century - by 20-30% throughout the country, and in South-Eastern Bulgaria - even by 30-40%.

Climate change impact on tourism in Bulgaria

Summer tourism

Summer is the best season for most outdoor tourist activities in European countries. Excellent conditions (especially for seaside tourism and recreation) are available around and near the Mediterranean Sea.

European statistics show that August is currently the most popular month for tourist travel to Southeast Europe. However, the expectation is that as temperatures rise and the associated reduced comfort index (temperatures of over 400C in summer, for example, reduce personal comfort and may lead to an increase in the number of cardiac events, even fatal consequences) many tourists will shift to an earlier or later season (as climate models show that in

future June will be as warm as the current July, August and September) or to alternative destinations in other countries.

Climate change will directly affect tourism through the travel decision-making process. The climate has a direct impact on such decisions as "When should I go on vacation?" and "Where should I go on vacation?". In doing so, climate and weather influence these decisions in both the destination and the genetic area. Some resorts will lose their appeal when the temperature and humidity rise above comfort levels.

An indirect climate impact related to tourism and tourist destinations is the fact that without human intervention and regulation, sea level rise and its effects on coastal erosion will seriously threaten recreation and tourism activities in coastal destinations.

The analysis of trends in the annual distribution of foreign tourist visits and overnight stays by foreigners and Bulgarians since 2000 shows a significant extension of the summer tourist season in Bulgaria, mainly at the expense of the spring months.

On the basis of the above, it can be concluded that climatic changes in Bulgaria in the summer (in particular, the increase in air temperatures and the reduction of cloudy and rainy days) would create the conditions for a significant extension of the tourist season - initially, as research shows in the direction of spring, but subsequently (since the temperature in autumn is expected to rise more than in spring) also in the direction of autumn months.

Rising temperatures during the peak tourist summer season could lead to discomfort in some parts of the country, but especially along the Black Sea coast, this increase is expected to be not so high, and the forecasts are that the conditions according to the Tourism Climate Index will transform from ideal to excellent and very good. Nevertheless, these conditions could lead to an outflow of some of our traditional tourist markets from Western and Northern Europe, especially since the conditions for summer recreation in their own countries are expected to be significantly improved.

Threats to summer tourism in Bulgaria lie in the indirect effects of climate change - the lack of water for drinking and hygiene needs and in the increased need for energy sources to power the air conditioning installations along the entire coast. These problems are already present and can be observed in our southern tourism-competing countries - Cyprus, Turkey and Greece.

Winter tourism

Warmer temperatures have a significant effect on snow and ice. Warmer winter temperatures mean higher snow lines, thinner ice on lakes and shorter snowfall duration. Global warming directly threatens the length of the world's winter tourism season, the quality of the tourist experience and the variety of sports and other winter activities on offer. Globally, the permanent

summer snow line in mountain regions has risen by about 200 m, compared to the 60s of the twentieth century (David Suzuki Foundation 2009).

Ski resorts and other activities related to winter tourism will be hardest hit by climate change, which has a direct negative effect on local communities dependent on the jobs and income generated by this type of tourism. The worst predictions are that more than half of the world's ski season may disappear with few exceptions in the highest mountain resorts (On thin..., 2009).

According to Bürki et al. (2003), a ski resort is considered snow reliable if in 7 winters out of 10 it has a snow cover at least 30-50 cm thick available on at least 100 days in the period of 1 December to April 15. This shows that the main parameter determining the quality and reliability of a ski resort is the duration of the snow season.

Even with mass production of artificial snow, many ski resorts will count on fewer than 100 days of suitable winter conditions per year, a number generally accepted as the threshold of their financial viability, and will be forced out of business. It is estimated that by 2050, the annual expenditure of the Swiss winter tourism sector will rise by US$1.6 billion per year, making it the Swiss industry most affected by climate change (David Suzuki Foundation 2009).

The amount of snow in our country will decrease as a result of later winter snowfall and its earlier melting, as well as an increase in rain at the expense of snow. The decrease in snow cover and its duration will have a huge negative impact on ski resorts, especially those in the lower mountain regions.

Increasing global warming will cause more precipitation (as warmer air holds more moisture), shorter snow seasons, and greater reliance on costly and energy-intensive artificial snow production. This combination will be a key factor in determining the existence and survival of many ski destinations in the world and in Bulgaria.

The analysis of the cyclical changes in the snow cover shows rather alarming results. Cyclical changes are significant and in the future (2050) winters with insufficient snow are expected to occur more frequently than in the 1990s and 2000s. For example, periods with 2, 4, 5 or even 6 consecutive years of poor snow conditions can be expected in 2020-2050.

In the short term, the economic impact on the regional and local economy will be modest. But the influences in the longer term will be much more negative. They will depend both on the snow conditions and on the preferences, demands and wishes of tourists in the resort and on the flexibility of the marketing policy of the hoteliers. The worst possible scenario (e.g. a drastic decrease in the number of visitors to Borovets due to a long cycle of "bad" winters) will lead to the closure of hotels and only the most competitive among them will survive.

Predictions about upcoming climate changes will have a much more significant negative effect on winter tourism than on all other types of tourism in Bulgaria. The expensive technique for the production of artificial snow will not be able to be compensated by tourist revenues, and its use even now repels a significant part of Bulgarian tourist flow from using our winter resorts.

Seasonality changes in Bulgarian tourism

Regardless of the forecasts for an increase in the number of visits and overnight stays in the country (both in general and during the summer season), the seasonality of Bulgarian tourism shows no increasing trends.

The analysis of the three indices for seasonality - $T_1=T_{max}/T_{min}$, $T_2=T_{max}/T_{total}$ and $T_3=T_{max}/T_{average}$ shows that even for some of the considered indicators there is a tendency to reduce seasonality, which means a more even distribution of tourist flows, a more uniform filling of the accommodation base, a higher occupancy percentage, both of the accommodation base and of those employed in tourism and nearing the values of the year-round types of tourism (e.g. balneological, cognitive, etc.) - Table. 2.

Table 2. Seasonality indices in Bulgaria by year

		2000 г.	2006 г.	2012 г.	2025 г.
No of foreign arrivals	**T_1**	2.5	4.7	6.0	10.7
	T_2	0.15	0.18	0.19	0.2
	T_3	1.8	2.1	2.9	2.7
No of foreign nights spent	**T_1**	21.9	23.1	26.0	22.8
	T_2	0.26	0.25	0.27	0.25
	T_3	3.2	3.0	3.3	3.0
No of Bulgarian nights spent	**T_1**	3.0	4.1	4.1	9.2
	T_2	0.17	0.18	0.18	0.18
	T_3	2.1	2.2	2.3	2.1

Source: Author's calculations

While the number of foreign arrivals does not show a downward trend in seasonality, the number of overnight stays does, especially in the T2 and T3 coefficients.

This once again proves that the processes of extending the summer tourist season as a result of temperature changes can now be observed in real time.

The problem of water for drinking and hygiene needs

It is obvious that in future Southern Europe will have worse climatic conditions for the development of summer tourism than the present. The

aggravated situation as a result of deteriorating thermal conditions is further exacerbated by increasing water scarcity in the region.

The presence of tourists leads to an increase in the demand for water well above the normal requirements of the local permanent population and the possibilities and capacity of the local water sources. The lack of water and the inability to provide the necessary amount for the needs of all sectors leads to the appearance and sometimes to the deepening of conflicts (especially with agriculture). The seasonal nature of coastal tourism and its geographical concentration (especially around the Mediterranean basin, where water has always been scarce) creates significant pressures at regional and local levels. Peak water consumption in tourism coincides with that of agriculture, population, the energy sector and nature. It also coincides with summer droughts, which will be exacerbated in the future due to expected climate changes.

According to the EEA (2003), tourists consume an average of 300 L of water per day, sometimes reaching 880 L for those staying in luxury hotels, an amount many times greater than that used by the local population. We must also not forget the need for water to maintain golf courses in various areas of Europe and in particular, in Bulgaria (where golf courses are located mainly along the Black Sea, which is generally characterized by its water deficit, especially in summer).

In mountainous regions, snowpack will continue to decrease, snowmelt will begin earlier and earlier, and snow-derived water will be increasingly scarce, thus placing the water supply not only for ski resorts, but also for the society and the economy as whole, at great risk.

Climate changes will lead to an increase in the shortage of drinking water, water for hygiene needs and, accordingly, to strict restrictions and regimes of water use (example - Cyprus), forest fires and urban smog.

The availability of snow, water and the thermal comfort of tourists are just three of the environmental issues that will be affected by climate change. Landscapes, biodiversity and the destruction of cultural and historical monuments are just a few examples of other areas that will also undergo changes.

Adaptation measures to climate change

• Building awareness to highlight the importance of climate change, its potential impact on tourism and other economic sectors, and opportunities to mitigate human contribution to climate change

• Collecting data to improve the management base, including arrivals by mode of transport and type of tourism, as well as national differences in holiday times, length of stay, costs and flexibility in these parameters

• Strengthening the knowledge base on climate change and possible adaptation measures
• Assessment and capacity building for climate change adaptation of various stakeholder groups.
• Development of new activities and tourism products that are "weatherproof" (short-term) as well as "climate-proof" (long-term), opening of new markets

Adaptation, which will require significant investments, includes the development of new domestic tourism destinations. New infrastructure, new hotels, restaurants, entertainment facilities, etc. will have to be created over time based on demand, built through private investment aimed at attracting new market segments and developing new products.

If these efforts are successful, the growth of tourism will lead to an increase in energy consumption. The sector should consider opportunities to conserve energy and increase the share of renewable energy sources and commit to offsets to reduce vulnerability. These mitigation efforts represent an additional cost to the sector that should be taken into account when planning for a low-carbon future.

Climate change adaptation policies

Although the public management of climate change adaptation has received increasing attention from both policymakers and researchers in recent years, it is still largely unclear how governments intend to implement mitigation and adaptation policies in tourism and other economic sectors.

There are four main challenges that are key in the context of climate change adaptation policy development. These include: (1) how to better integrate adaptation policies horizontally across policy sectors; (2) how to integrate vertically across all levels of competence, (3) how to integrate diverse and changing knowledge and scientific facts; and (4) how to involve non-state stakeholders in adaptation policy development (UNDP, 2004). In many countries, governments use a variety of institutional innovations (management approaches) to address these four challenges.

The review shows that most of these approaches have been reduced to soft, voluntary policy measures that often address more than one of these four challenges simultaneously. National adaptation strategies are usually central to adaptation management.

A report by the National Bank of Greece (Bank of Greece 2014) recommends the development of special and alternative forms of tourism, as well as a redefinition of the peak season for sun and sea tourism, which could help the Greek industry overcome the observed decline in the number of international visits in the middle of summer due to very high air temperatures. This can be achieved by improving products and services, and targeting intensive rather than extensive development (seeking, for example, to increase

expenditure per visitor per capita rather than increasing total arrivals) and by reducing seasonality of Greek tourism. Specifically, four adaptation measures were investigated, namely: beach stabilization; artificial sanding of beaches; construction of dikes/breakwaters and rockfill shoreline protection systems; and beach drainage. So far, the downward trend in international visits has not been confirmed, indicating that there is still no risk, that Mediterranean summers will become excessively hot.

EU policies are not focused on the tourism sector itself, but include the sector in most of the documents related to it. One of the latest such documents is the EU's 7th Environment Action Program (EEAP) "Living well within the limits of our planet" (*ec.europa.eu/environment/action-programme/)*. In it, the EU formulates its vision for the future until 2050: a low-carbon society, a green, circular economy and sustainable ecosystems as the basis for the well-being of citizens.

Over the years, a number of documents related to tourism development in Bulgaria were developed. Unfortunately, they did not have a continuation after the expiration of the terms in them and are currently not part of the current legal framework of the tourism policy in the country. Nevertheless, some of the issues raised in them can be referred to a number of CCA options in the tourism sector.

There is no AIC policy or strategy developed specifically for tourism in Bulgaria. The main sources for any measures are to be found in the Law on Tourism, the National Strategy for Sustainable Tourism Development 2017-2030 and the Strategic Plan for the Development of Cultural Tourism in Bulgaria.

Gaps and obstacles for climate change adaptation in Bulgaria

Bulgaria faces challenges in the implementation of CCA actions, including addressing numerous gaps and obstacles that prevent it from responding adequately to climate changes. Most of the gaps and obstacles identified are common to the entire economic and natural environment and affect all economic sectors, not only tourism.

- Lack of information on climate change and its impact on tourism, as well as on tourism's contribution to global warming
- Lack or very low level of awareness of negative consequences and opportunities for the sector as a result of climate change.
- Low level of infrastructure development
- Highly fragmented tourism industry
- Lack of personnel in tourism
- The level of uncertainty about future climate change
- Lack of sufficient financial resources
- Lack of a legal framework

• The sector itself has other priorities

Options for adaptation

Development of a Sectoral Policy on Climate Change
Providing a comprehensive legal framework
Raising awareness of climate change and its impacts on the tourism sector.
Development of monitoring indicators
Strengthening the sectoral knowledge base
Regional and sub-sectoral assessment of adaptive capacity.
Capacity building
Specific adaptation measures

Among the specific adaptation measures most important are:

1. Development of adaptation measures for summer tourism;
2. Development of adaptation measures for winter tourism;
3. Development of new types of tourism;
4. Development of new products and packages of various and higher quality;
5. Development of new destinations, mainly in the interior of the country;
6. Identification of new tourism segments (new segmentation);
7. Development and implementation of new marketing policies, strategies and approaches;
8. Development of resource management innovations at the sub-sector (enterprise) level.

Four main steps need to be taken to adapt the tourism sector:

1) Improvement of the legal framework of CCA as a whole for the country
2) Development of a National Adaptation Strategy and Action Plan for CCA in the tourism sector
3) Development of a set of climate change-sensitive tourism indicators
4) Wider dissemination of CCA knowledge, with the aim of reaching local tourism entrepreneurs

It can be summarized that the identified options for adaptation for the Bulgarian tourism sector cover mostly soft and basic measures, forming the national base for the development of future more specific and more detailed adaptation.

Conclusions

The report emphasizes the importance of various measures to initiate the process of adaptation to climate change in Bulgaria's economically important tourism sector. They include:

Building awareness

Climate change is a reality, and it is already affecting tourism. In Bulgaria, this includes extreme weather events, reduced snow reliability, and storms, which affect the number of arrivals and behavior of tourists, as well as

their holiday satisfaction. It is important that more stakeholders are aware of the challenges accompanying climate change, as well as the risks and opportunities for adaptation. Incorporating information on climate change vulnerabilities as well as the sector's contribution to climate change is of great importance to increase the overall level of preparedness.

Data collection and statistics

In order to manage the tourism system, it is necessary to know both the markets and the responses of demand for tourism services to adverse situations. Data should be collected on arrivals and types of transport used, market share, length of stay, costs, as well as flexibility in these parameters between countries and types of tourists. It is equally important to understand how tourists respond to extreme events as analogs for the future in which such events may become more frequent and intense. The collected data can be analyzed in order to better manage existing tourism products and to develop new ones; increase length of stay and costs; and promoting vacations during transitional seasons.

Innovations

In order to be able to undertake preventive adaptation, attempts should be made to diversify the tourist product in Bulgaria. This may include new products and activities, the development of new regional tourism destinations, marketing efforts focused on the increasingly attractive transitional season, longer length of stay, and more spending opportunities for tourists. Taken together, these measures can contribute to a more stable tourism product that is less susceptible to extreme events and longer-term climate change. It may also be desirable to explore low-carbon ways to reduce the sector's contribution to climate change, more broadly in line with the Paris Agreement.

Management

The climate change challenge can only be met if there is cooperation between the public and private sectors. The Ministry of Tourism, in collaboration with other ministries and government bodies, has a key role in initiating the process of developing the sectoral climate change policy for tourism, which emphasizes awareness building, data collection and innovation. By taking the lead in policy development to achieve this goal, the Ministry of Tourism should coordinate a process focused on policy formulation as well as acquisition of grant and funding opportunities. This process should begin immediately.

It should be noted that the proposed adaptation measures are developed in the right direction, but in general they cannot be implemented in the short term - both in terms of financial resources due to the lack of designated funds in the budget of the Ministry of Tourism, but also due to the need for broad expertise for the development of a sectoral strategy for adapting to climate change in tourism. The reasons for this are presence of a low level of awareness

and interest in the issue in the sector, lack of scientific research on the topic in the tourism sector, lack of developed strategic sector documents, etc. This places the sector in a difficult starting position in its actions to prepare and implement climate change adaptation measures.

It is most appropriate that the measures for adaptation to climate change be specified and evaluated in a National Strategy and Action Plan regarding adaptation to climate change in the tourism sector in accordance with the measures proposed.

In support of the above observations, it should be stated that a large part of the activities require the allocation of additional funds in the budget of the Ministry of Tourism.

Climate changes will improve the conditions for tourism in Europe as a whole and increase the number of overnight stays. The only one affected by them will again be Southern Europe, where more than half of the European Union's capacity for tourist accommodation is now concentrated. Expectations are for a reduction in overnight stays in this part of the continent by 1 to 4% for the various scenarios. According to the scenarios for a temperature increase of 4.1 to 5.4 °C in the rest of the continent, the number of overnight stays there will increase by 15 to 25%, respectively.

The generalization of the above discussed results of already known studies and the current own research on the trends in the impact of climate change on Bulgarian tourism can be systematized and formulated in the following conclusions and trends:

1. The summer tourist season will be extended (both in spring and autumn) - the reason is the increase in temperatures in the country, expected more in the autumn season;

2. Bio-comfort will decrease during the peak summer season, when one can expect a significant decrease in the number of overnight stays, mainly by foreigners;

3. The winter tourist season will be significantly shortened, and in places with a lower altitude it may completely disappear - the reason is an increase in temperatures in the country, an increase in the percentage of liquid precipitation in winter, an increase in the level of the permanent snow line, the earlier melting snow;

4. Seasonality in general will decrease, or at least increase at a slow rate due to the reduction of the winter season and the extension of the summer season;

5. There will be a significant shortage of water for the drinking and hygienic needs of tourists, especially in Eastern Bulgaria, where about 75% of the tourism accommodation base is concentrated. Golf tourism will also experience severe water shortages to maintain its greens. Reason - reduction of water by 15-20 to 30% in Eastern Bulgaria, by 10% in the rest of the country;

6. There will be significant changes in the structure of tourist flows in the country. Some of the traditional visitors will decrease or even disappear due to the improvement of climatic conditions and consequently the opportunities for recreation in their own countries (e.g. Germany, Great Britain, Poland, Scandinavian countries, etc.)

7. Bulgarian tourism should increasingly rely on the domestic tourist flow. Tourist enterprises and organizations should promptly redirect and turn their attention to retaining Bulgarian tourists in the country and satisfying their demands and needs;

8. The occupancy of the accommodation base has chances to increase. The reason is the extended summer tourist season. The winter ski season is still quite short and the reduction in winter resort occupancy should not have a significant impact on overall base occupancy.

9. The employment of tourism workforce also has chances to be increased, thus creating opportunities for less turnover, increase in the qualification and income of the staff and ultimately increase in the quality of tourist services in Bulgaria. And consequently, increases in tourism revenues can be expected;

10. Tourism revenues may increase during the summer season if the above forecasts come true. Of great importance will be the reaction and adaptation of the tourism business to the new challenges before it, which have arisen as a result of climate changes in the world and Europe.

The above findings and conclusions are presented in a synthesized form in table 3.

Table 3. Assessment of the impact of climate change on sustainable tourism development in Bulgaria in the 21st century

	Spring	Summer	Autumn	Winter	Final effect
Revenues	↑↑	↔/↑	↑↑	↓↓	↑
Accommodation occupancy	↑↑	↔/↑	↑↑	↓↓	↑
Personnel occupancy	↑↑	↔/↑	↑↑	↔/↓	↑
Water use	↑↑	↑↑↑	↑	↓	↑↑
Energy use	↑↑	↑↑↑	↑↑	↑↑	↑↑↑
Biodiversity	↑↑	↓↓	↔/↑	↔/↓	↔/↓

Source: Author's vision

In conclusion, it can be summarized that climate changes will have a significant impact on tourism in Bulgaria, especially on the two most popular types of tourism - sea summer recreational and winter ski tourism, which have a pronounced seasonal characteristic and are most susceptible to changes in the climatic conditions.

At the same time, some alternative year-round types of tourism, which are very promising for our country, but are not yet sufficiently developed for various reasons (balneological, cultural-cognitive, religious, itinerary, culinary, wine, etc.) will not be affected as much by these climate changes or their modification will not be as pronounced. Even they can become compensatory in terms of use of accommodation facilities and available tourist staff. With good marketing strategies, tourism in the country can increase its contribution to the Bulgarian GDP.

In this sense, the Bulgarian tourism industry as a whole and the individual business units in it must develop strategies for their future development and for corresponding adaptation to the expected changes. New integrated and diversified tourist products should be developed, which are not so subject to the climatic and weather conditions in the country and its individual destinations, to be offered on new markets and especially on the Bulgarian market, which is no less useful and productive than the foreign ones.

The decrease in income and employment resulting from climate change in places can very successfully be compensated by offering higher quality tourism products on the one hand and by attracting higher paying, more educated and more cultured tourists on the other. Quantity, both in supply and demand, should be successfully replaced by quality.

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