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THE ASSESSMENTOF CLIMATE CHANGE IMPACT ON THE ROMANIAN SEASIDE TOURISM

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Climate change is one of the major concerns facing the world today, estimated to generate both benefits and costs in various economic and social areas, i.e. agriculture, forestry, food industry, tourism, infrastructure, human health, settlements etc. The estimation of the specialists indicates that, generally, the costs of climate change will exceed the benefits. This paper aims to investigate the climate change impact on the Romanian seaside tourism.

Using various multiple regression models, the data indicate that the increase of mean air temperature and sunshine duration stimulate domestic tourist flows to Romanian seaside resorts. The economic impact of climate variability on tourism sector was estimated, considering various scenarios of analysis. However, future research is needed in order to extend the analysis, using a larger data base and applying the empirical investigation on other tourism destinations exposed to climate change.

Keywords:

Climate Change

Seaside Tourism

Assessment

Economic impact

Multiplier

Tourist flows

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I. INTRODUCTION

Global warming is a reality of our days and it can not be denied, as it may be confirmed by the climate data, indicating an increase in the global mean air temperature and ocean temperature, melting of the glaciers, sea level rise. According to IPCC (2007a), the increase in global mean air temperature in the mid-twentieth century is very likely to be caused by the increase in greenhouse gas (GHG) emissions resulting from human activities.

It is estimated that the effects of human activities can be extended to other aspects of the climate, continental mean temperature rise, heat waves with extreme temperatures, strong winds. IPCC (2007b) forecasts, based on the carbon dioxide emissions scenarios included in the *IPCC Special Report on Emission Scenarios (SRES)*, indicate that in the next two decades, the mean temperature will rise by 0.2°C per decade. Even if the concentrations of GHG and aerosols are kept constant, at the level of 2000 year, the IPCC projected a global warming of about 0.1°C per decade.

Recent papers in the field of climate change impact emphasize the climate-tourism relationships, the specialists developing various methodologies and empirical models to assess the impact of climate variability on tourism activities. The academic papers studied the climate change impact-case for specific countries (Gambarelli and Goria, 2004; Sygna et al, 2004; Hamilton and Tol, 2007; Hein et al, 2009) or costal area destinations (Jennings, 2004; Phillips and Jones, 2006; Surugiu and Surugiu, 2009; Buzinde et al., 2010; Surugiu et al, 2011). The search for suitable indicators is still a challenge for scientists developing these specific studies. The main findings suggests that coastal resorts respond more favourably to summer temperature rises than inland resorts (Bigano et al, 2005).

Eastern European economies started the climate change impact analyses in the recent years. Consequently, different European projects were dedicated to the study of climate variability and their impact (e.g. CECILIA (Central and Eastern European Climate Change Impact andVulnerability) or CLAVIER (Climate Change and Variability: Impact on Central and Eastern Europe)). The latter finished several analyses for tourism case studies in Bulgaria (winter tourism), Hungary (summer tourism) and Romania (both winter and summer tourism). The difficulty to compare them and especially their results come from the differences in scale and approaches.

There are different behaviours in which tourism manifests and differentiate in terms of scale and destination life cycle. Sun-sand model (Aguiló et al, 2005) is far from being an uniform mass tourism industry 'model' displaying generations of resorts passing through different phases of Butler's lifecycle model.The relationships and connections developed between summer tourism and environmental systems are even more complex, as physical phenomena generated by the interaction sea–dry land are counted as important variables, especially through coastal erosion and storm occurrence (Surugiu et al, 2011). Still, the strongest influence on the tourist preferences for a seaside resorts are exerted by air temperature, precipitations, sunshine duration.

According to the specialist's projections, in our country, climate change will be observed through the increased frequency of tropical days, decrease of winter days, affecting both winter and summer tourism, generating significant changes of tourist flows. Moreover, the mean and maximum air temperature in the summer season will significantly increase, generating considerable changes of tourist flows. These shifts of tourism demand will have a larger impact on tourism industry, as over 25% of total tourist arrivals registered in the Romanian accommodation units are concentrated in mountain and seaside resorts.

For Romania, climate change represents a real challenge, especially since its impacts are felt in various sectors, more or less connected with the hospitality industry. Considering that over 20% of all overnight stays are recorded in the accommodation units located on the seaside, the changes of climate parameters and their effects will spread on tourism demand and consequently, on the intensity of tourist flows and economic efficiency of Romanian tourism activities.Romanian seaside tourism should register economic gains due to increase in air

temperature, but beyond a certain thermal threshold, the holidaysare cancelled, tourist flows reorienting to other destinations(Surugiu and Surugiu, 2009).
Even if the assessment of social and economic losses and gains generated by climate change in Romanian tourism sector is insufficient and inconsistent, the arguments to consider that the future climate trends are similar to those at global level exist. However, some patterns may be recorded for the Romanian seaside tourism, taking into account not only the natural and climatic conditions, but also the socio-economic characteristics, general and specific tourism infrastructure, the evolution of the physical and geographical setting of the region.
The assessment of climate variability on tourism flows is a difficult process, requiring a significant volume of information and large data base, including tourism and climate indicators for the elaboration of pertinent and valuable models, to incorporate the influences of various factors on the evolution of dependent variables.
The rest of the paper is organized as follows. Section 2 describes the main climatic and tourist trends in the last years. Section 3 describes the empirical evidences of climate change impact on domestic tourist flows in the Romanian seaside resorts. The economic impact of climate variability on tourism sector will be estimated, considering various scenarios of analysis. At the end of the paper we provide some concluding remarks.

A. Climate and seaside tourism: main trends

Romanian Black Sea Coast represents a major tourist attraction for thousands of tourists arriving in the eleventh seaside resorts of national interest, according to the Governmental Decision No. 852/2008 for the approval of the conditions and procedure to certificate the tourist resorts published in the Official Gazette 613/2008, namely: Cap Aurora, Costineşti, Eforie Nord, Eforie Sud, Jupiter, Mamaia, Mangalia, Neptun, Olimp,Saturn, Techirghiol and Venus. The natural resources, i.e. salt sea water with reinforcement properties for the body, marine bioclimatic and mineralized waters, salt lakes, therapeutic mud, along with the cultural heritage, i.e. Histria, Tomis, Callatis and others antiques ruins, monasteries and architectural monuments, have represented major tourist attractions for many decades. The patterns of marine bio-climate mainly refers to moderate temperatures, considerable thermo stability, reduced precipitations, number of sunny days (140 days/year), beautiful eastward orientation, humidity level, having an excellent effect for the human body. The balneal resources (i.e. mineral or mineralized waters and therapeutic mud) ensure the necessary elements for a complex treatment, enhancing the attractiveness of the seaside resorts.
In Romanian seaside resorts, climate change effects (e.g. heat waves, higher rainfalls, heavy precipitation, and costal erosion) were felt more pronounced in the last decade, especially affecting tourism activities and altering tourist flows. During the canicular (hot) periods, especially the long ones, a significant number of tourists preferred the seaside resorts, where sea breezes and lower temperatures and sea water temperature create physical and psychological comfort of tourists, i.e. during the hot summers of 2000-2003, 2006/2009 and the summer drought of 2007. Very high temperature during summer led the residents of large urban areas to move to seaside resorts, as a getaway option from the bustle and pollution of the cities and relaxation on the Black Sea resorts. The evolution of the monthly tourist arrivals indicates a pronounced seasonality of tourism activity in the seaside resorts, mainly between May and September, with a peak season in July and August (see Fig. 1).
Extremely drought years were registered in the decade 1991-2000 in 1992-1993, 1999-2000 and in the decade 2001-2010 in 2000-2001, 2001-2002, 2002-2003, 2006-2007, 2008-2009. The 2006–2007 year was excessively dry (379.0 l/m^2 between September 2006-July 2007)(Sandu, 2009).
The maximum air temperatures in the summer of 2007 were considerable higher, new daily records being registered in many meteorological stations. The tropical nights and canicular days

had a significant impact on tourism along the Black Sea Coast, their highest number being registered in southern and eastern part of the country. The heat waves in July were exceptional through their duration, of about two weeks, and their intensity. The level of thermal comfort in hot summer periods generates positive effects, up to a certain point, on tourist flows in the seaside resorts, increasing the arrivals' number. A significant increase of the Romanian tourists of 18.1% was registered in this extreme year. Graphicallyplotted,the mean air temperature, the sunshine duration and the domestic tourist flows, indicates strong and positive relationships, emphasizing the high temperature in the summer of 2007 (see Fig. 1 and Fig. 2).

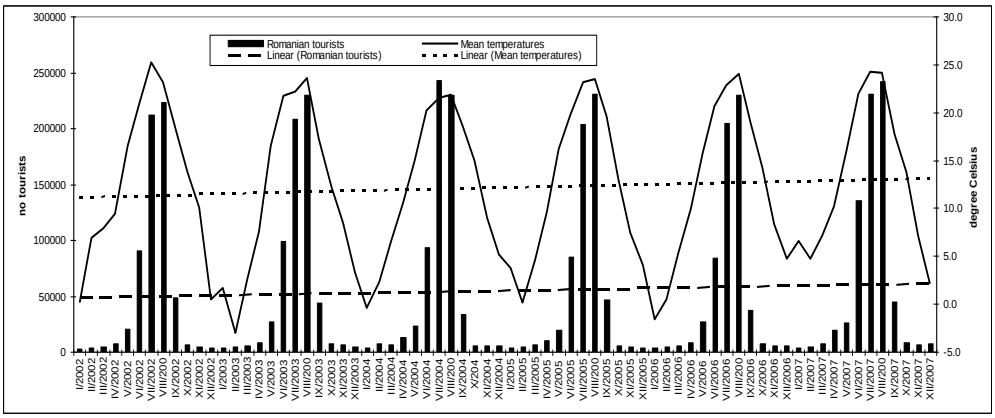

FIGURE 1. THE EVOLUTION OF THE MEAN AIR MONTHLY TEMPERATURES AND THE DOMESTIC TOURIST ARRIVALS, 01.2002 – 12.2007 PERIOD

Source: data processed from the NIS

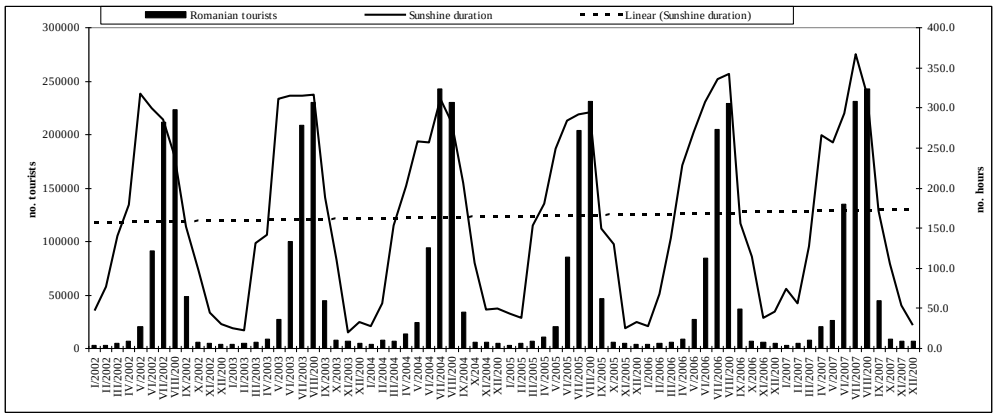

FIGURE 2. THE EVOLUTION OF THE SUNSHINE DURATION AND THE DOMESTIC TOURIST ARRIVALS, 01.2002-12.2007 PERIOD

Source: data processed from the NIS

Global warming also induces sea temperature rise, affecting the concentration of oxygen in the sea water, becoming insufficient to insure the life of plants and animals and generating an increase in the quantity of algae on the beach, and therefore, tourist discomfort. In the summer of 2010, hundreds of dead fishes were found along the beaches in Constanta, Mamaia, Navodari brought by the sea waves.

The periods of significant precipitation influence the tourist motivation for travel. During rainy periods, the tourists reduce their average stay or even cancel their holidays on the seaside. Bad weather, with heavy rain, is not favourable for tourism activities, creating the discomfort of tourists and limiting beach walks and sea water baths.
The changes noticed in the evolution of annual quantities of precipitation during 1991-2007 were for the decade 1991-2000, the wettest years - 1991, 1997, and for the decade 2001-2010 - 2004 – 2005 / excessively rainy year (818,4 l/m^2)(Sandu, 2009).
The pluviometric volume of 2005 turned into absolute records. Considered individually, 2005 is an atypical year, the events being consistent with the tendency of increase in the extreme events, this trend highlighted by the numerical simulations under increased GHG emissions and the observation data from many regions around the world. On the Black Sea Coast, major floods occurred in September, exceeding major flood limit, which caused important material damages and even loss of life. The heavy rainfall and the floods in the summer of 2005, destroying infrastructure and equipments in the seaside resorts (i.e. Costinesti), decreased the number of tourist arrivals, of 5.5% in total arrivals and 6.9% in domestic arrivals respectively (see Fig. 3).

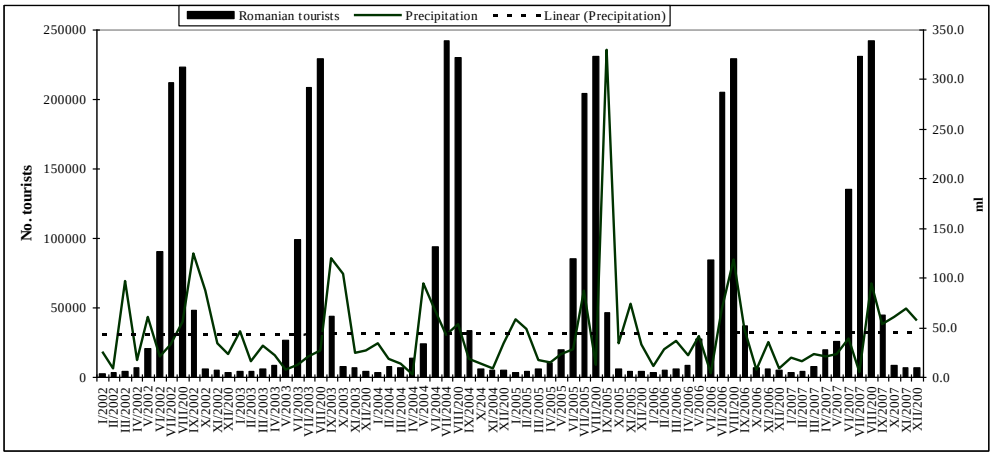

FIGURE 3. THE EVOLUTION OF THE PRECIPITATION AMOUNT AND THE DOMESTIC TOURIST ARRIVALS, 01.2002-12.2007 PERIOD

Source: data processed from the NIS

B. Empirical evidences

This section aims to investigate the relationships between climatic parameters and tourism parameters, in order to generate some conclusions regarding the impact of climate variability on tourism activity. Various econometric models will develop the existing relationships between climate and tourism, underlining the direct effects of climate parameters on tourist flows. The last section estimates the impact of climatic variability on tourism receipts through the sensitivity analysis.

I. DATA AND HYPOTHESES

The data considered in the model were both climatic parameters and tourism indicators, the above mentioned being described below.

TABLE 1. DESCRIPTION OF THE VARIABLES

Variable	Description
TUR	No. of domestic tourists in seaside resorts
TUR(-1)	No. of domestic tourists in seaside resorts in T-1 period
TSEXPBOP	Tourist services (% of Services exports, BoP)
TSIMPBOP	Tourist services (% of Services imports, BoP)
CIP	Consumption Price Index (2005 = 100)
HHFC	Households final consumption expenditure per capita (constant 2000 US$)
TEMP	Mean monthly temperature, seaside resorts, degrees Celsius (station Mangalia)
DS	Sunshine duration, hours (station Mangalia)
PREP	Precipitation amount, ml (station Mangalia)
Dummy	Climatic variability in the years with negative impact on tourist flows

Source: data processed by the authors

Several hypotheses regarding the influence of the climatic parameters on the tourist flows were addressed, namely:

- *Hypothesis 1:* The increase of the air temperature motivates tourists to travel to the seaside resorts, however to a certain comfort level, beyond which tourists will feel thermal discomfort and will cancel their holiday.
- *Hypothesis 2:* The rainfall during summer season is not an attraction element for tourists and does not motivate their travel to the seaside resorts.
- *Hypothesis 3*: The sunshine duration is a stimulating factor for tourist to travel to the seaside resorts and for heliomarine cure.

The developed econometric models employing climatic parameters used monthly data during the summer season, May–September, 2002 to 2007 period respectively. For the variables TSEXPBOP, TSIMPBOP, CIP and HHFC annual data (1993-2009 period) were used, collected from the World Bank. The descriptive statistics are presented below.

TABLE 2. DESCRIPTIVE STATISTICS

	LOGTUR	LOGCIP	LOGHHFC	LOGTSEXPBOP	LOGTSIMPBOP
Media	5.849	1.474	3.191	1.318	1.334
Maximum	5.946	2.104	3.371	1.602	1.580
Minimum	5.789	0.000	3.031	1.114	1.146
Std. Dev.	0.050	0.664	0.1101	0.161	0.145
Skewness	0.466	-0.904	0.285	0.600	0.564
Kurtosis	1.952	2.516	1.788	2.072	2.051
Jarque-Bera	1.392390	2.483	1.271	1.630	1.540

Source: data processed by the authors

II. RESULTS AND DISCUSSIONS

Starting from the scientific literature and taking into consideration the stimulating and restrictive factors of domestic tourist flows, the following dynamic regression model was developed:

$$TUR = f(TSEXPBOP, TSIMPBOP, CIP, HHFC, Dummy) \quad (1)$$

Considering the share of the domestic tourists of over 90% of total arrivals, empirical analysis is displayed considering only domestic flows. The results of the regression model are displayed in Table 3. The R-squared value indicates that the independent variables explain 90.8% in the variation of tourists. The associated p-values for t-statistics validate the coefficients of the explanatory variables, while F-statistic indicates that the model as a whole has statistically significant predictive capability. The value of Durbin-Watson statistic was inconclusive and therefore the LM Test was applied to test the serial correlation, indicating no serial correlation.

TABLE 3. MODEL DESCRIPTION 1

Dependent variable: LOGTUR		
Explanatory variables	Coefficient	t-Statistic
DUM	-0.041***	-3.282
LOGCIP	-0.138***	-3.851
LOGHHFC	0.651***	6.477
LOGTSEXPBOP	-0.295**	-2.805
LOGTSIMPBOP	0.338**	2.547
LOGTUR(-1)	-0.303*	-2.145
α	5.694***	7.515
No. observations=17, Period: 1993-2009, R-squared=0.908, Adjusted R-squared=0.847, F-statistic=14.800***		
Breusch-Godfrey Serial Correlation LM Test: F-statistic=1.891, Obs*R-squared =5.613*		

Note: ***/**/* statistically significant at 1%, 5% and 10% level
Source: data processed by the authors

The regression results indicate that the unfavorable climatic conditions for heliomarine cure have a relatively low impact on tourist flows, compared with the other economic variables (trade, prices, consumption) considered in the model.

The mean air temperature during the day and also during the night, the sunshine duration, the precipitation amount represent the main climatic factors motivating travellers to arrive in seaside resorts. It should be noted that the oscillatory evolution of tourist arrivals during one month compared with those recorded a year earlier, is the result, on the one hand, of the influence exerted by climatic parameters and, on the other hand, to other influences, especially economic factors (e.g. income, exchange rates, inflation), social, cultural, organizational agents.

In order to analyse the relationship between domestic tourist arrivals and climatic parameters, two multiple regressions models were developed (see Table 4). The second model considered as explanatory variables the mean temperature and sunshine duration, while the third model includes an additional climatic variables, precipitation amount respectively. The dependent variable is the domestic tourist arrivals. All the indicators are expressed in logarithm form, in a dynamic regression model. Expressing the variables in logarithm form, the regression coefficients

may be interpreted as the elasticity of the tourism demand to the variation of the climatic parameters.

The second regression coefficients mean air temperature (*LogTEMP*) and sunshine duration (*LogDS*) are significant at 1% level and the *LogTUR(-1)* is significant 10% level,respectively. The results indicate that the proposed regression model fits thedata well and no serial correlations exist in the model. Consequently, the relationship between arrivals and mean temperatureis strong and positive. An increase of 1% of the mean temperature generates an increase of 4.72% of the domestic arrivals, while an increase of 1% in the sunshine duration causes a 0.812% increase in the domestic tourist demand in the seaside resorts.

The third econometric model developed aims to introduce the precipitation amount, together with air temperature and sunshine duration in the seaside resorts in order to explain the evolution of the domestic tourist arrivals during the summer season. The regression model is validated and 92.4% of the variation in the domestic arrivals can be explained by the mean temperature, sunshine duration, precipitation amount, and past values of the Romanian tourist arrivals. The Durbin-Watson statistic indicates no autocorrelation of the errors. The coefficients of *LogTEMP* and *LogDS* are validated at 1% level of significance, while *LogPREP* at 5% significance level. The results of the model show that climatic parameters bring a positive influence on tourist arrivals, which confirms the expected sign, still for precipitation amount the sign is positive. During the summer, the periods with high precipitations are shorter; the negative influences should be looked during the heavy rainfalls, like the ones in 2005.

TABLE 4. MODEL DESCRIPTION 2 AND 3

Dependent variable: LOGTUR			
No. observations=30, Period=05-09.2002-2007			
Explanatory variables	**Model 2**	**Model 3**	**Expected sign**
LogTEMP	4.720*** (10.951)	4.619*** (11.579)	+
LogDS	0.812*** (2.986)	1.053*** (3.896)	+
LogTUR(-1)	0.130* (1.925)	0.107* (1.716)	+
LogPREP		0.123** (2.354)	-
α	-3.811*** (-5.767)	-4.343*** (-6.697)	
R-squared	0.928	0.941	
Adjusted R-squared	0.916	0.932	
F-statistic	77.28***	96.25***	
Durbin-Watson stat	1.748	1.787	

Note:***/**/* statistically significant at 1%, 5% and 10% level, t-statistic is displayed in brackets

Source:data processed by the authors

Previous results indicate that climate variability expressed through increase in air temperature and sunshine duration, generate positive effects on the domestic tourism demand and even limit the economic losses of other economic sector (e.g. agriculture, food industry etc.).

III. IMPACT OF CLIMATIC VARIABILITY ON TOURISM RECEIPTS: SENSITIVITY ANALYSIS

The economic impact may refer to influences of climate changes on countries GDP, incomes, revenues, infrastructure, prices of various some products due to production decrease etc.The total impact of climate change is typically estimated as the difference between today's economy with today's climate and today's economy with some future climate (Tol, 2008). Surugiu and Surugiu (2009) conclude that seaside tourism may gain thousands of euro due to increase in mean air temperature during the summer season.

In the previous section, three regression models were developed, the best fits for our future purposes been given by Model 2. Consequently, for the assessment of the economic impact of climatic variability, the results of this model will be valorised. The sensitivity analysis will consider the changes in tourism demand during the summer season, May-September period respectively.

The assessment of the impact of climatic variability on tourism receipts, will consider several scenarios, as follows:

- *Scenario 1:*The monthly air temperature rises with 3% by 2015, 6% by 2020 and 9% by 2025 (2007 is considered the base year). All the other climatic parameters remain constant. The tourist expenditure increase in 2015, 2020 and 2025 by 10%, 20% and 25% respectively.
- *Scenario 2*: The sunshine duration increases with 3% by 2015, 6% by 2020 and 9% by 2025 (2007 is considered the base year). All the other climatic parameters remain constant.The tourist expenditure increase in 2015, 2020 and 2025 by 10%, 20% and 25% respectively.

Considering the first scenario of analysis, the results indicate that an increase of mean air temperature generates an increase in domestic tourism demand, the revenues rising in the peak season (July and August) to 85.4 million Euros and 89.5 million Euros, respectively in 2020, and 91.5 million Euros and 95.9 million Euros in 2025 (see Table 5). In 2015, the tourism revenues will increase with 33.3 million Euros as compared with the base year 2007, while in 2025 the revenues will rise with 78.5 million Euros (see Table 6).

Under the second scenario of analysis, considering the increase in sunshine duration, the tourism revenues will register a lower growth rate during the peak season, reaching 73.2 million Euros in July, and 76.7 million Euros in August, in 2015, while by 2025 the revenues will register 88.1 million Euros and 92.3 million Euros, during the same peak month. The increase in tourist revenues as compared with the base year will be of 51.3 million Euros in 2020 and 68.5 million Euros by 2025.

TABLE 5. THE ECONOMIC IMPACT OF CLIMATE VARIABILITY

Month		V	VI	VII	VIII	IX
Scenario 1						
Increase in tourism demand (%)	**2015**	106.79	106.79	106.79	106.79	106.79
	2020	109.90	109.90	109.90	109.90	109.90
	2025	113.01	113.01	113.01	113.01	113.01
Total revenues (million Euros)	**2015**	8.5	44.4	76.1	79.7	14.8
	2020	9.5	49.9	85.4	89.5	16.7
	2025	10.2	53.5	91.5	95.9	17.8
Scenario 2						
Increase in tourism demand (%)	**2015**	102.81	102.81	102.81	102.81	102.81
	2020	105.80	105.80	105.80	105.80	105.80
	2025	108.80	108.80	108.80	108.80	108.80
Total revenues (million Euros)	**2015**	8.2	42.8	73.2	76.7	14.3
	2020	9.2	48.1	82.2	86.2	16.0
	2025	9.8	51.5	88.1	92.3	17.1

Note: The average daily expenditure per tourist is 40 Euro (INCDT, 2005).

Source:data processed by the authors

TABLE 6. - THE EVOLUTION OF THE TOURIST REVENUES DURING THE SUMMER SEASON

Indicators	2015	2020	2025
Scenario 1			
Total revenues per season (million Euros)	223.6	251.0	268.9
Absolute increase of tourism revenues (base year 2007)	33.3	60.7	78.5
Increase of tourism revenues considering tourism multiplier	80.6	147.1	190.4
Scenario 2			
Total revenues per season (million Euros)	215.2	241.6	258.8
Absolute increase of tourism revenues (base year 2007)	24.9	51.3	68.5
Increase of tourism revenues considering tourism multiplier	60.4	124.4	166.1

Source:data processed by the authors

On the other hand, the economic impact of climate change in tourism sector is more complex if considering tourism multiplier effect. Tourist expenditures generate effects at three different levels – the direct, indirect and induced effects (Cooper et al, 1993) upon output, value added, income, employment, taxes, import, government revenue, sales or transactions and so on and, consequently, the associated multipliers may be estimated. Tourism multipliers represents a reflection of the circulation of one monetary unit through an economic system, and the larger

the value of tourism multipliers, the greater the tourism impact on the economy (Hall and Page, 1999). Consequently, the increase of tourism demand in seaside resorts drives the increase in tourism revenues. The estimated tourism multiplier for hotel, restaurant and travel agencies was 2.424 (INCDT, 2009), thus the economic benefits from climate change could be higher, rising to 190.4 million Euros in 2025 for the first scenario and to 166.1 million Euros, considering the second scenario.
These results should be analysed with caution because several restrictions were imposed considering the variation of one climatic parameter, while others remain constant. In reality, the weather system is even more complex, having several influences on other economic sectors, i.e. agriculture, food industry, forestry, indirectly connected with the tourism sector.

II. CONCLUSION

Pervious research papers emphasized that climate change will mostly affect mountain and seaside tourist destinations, being most vulnerable to extreme weather events and global warming. Certain climate phenomena, such as hot days in summer season, may generate short-term positive effects on tourism activity as a result of increasing tourist flows in coastal resorts during these periods and therefore increased revenues. However, on long term, sustainable action plans are needed taking into consideration both positive and negative effects of climate change, and considering that after a certain point, the positive effects may be offset or even outweighed by the negative ones.
Independent analysis of the influences exerted by the variation in climatic parameters (temperature, precipitation, sunshine duration) is a difficult process to be achieved because of the interdependences between different factors of influence. Thus, the influence of climatic parameters can be felt indirectly through other important factors, as adverse weather conditions (e.g. floods, drought, heat waves) may reduce the agricultural production, and the effects will be felt by the increases in food prices, inflation and decrease of purchasing power and indirectly in other economic sectors, i.e. through the decrease in tourism consumption. In this case, the effects of climate variability are felt indirectly on the tourism sectors and sometimes with a time-lag. Thus, cumulative direct and indirect effects are higher than originally estimated.
Future research in field of climate change impact on tourism sector should focus on various different aspects related to at least three investigations. Firstly, data collection of climate parameters and tourist indicators, long time series, modelling different types of influences exerted by climate variability on the tourism activity. Secondly, expanding the research and analyse of the climate change impact on other tourism destinations (mountain, balneal resorts, cultural destinations especially, large cities or urban areas). Thirdly, estimation in the wider economic terms of the costs and benefits of climate change impact on tourism activities.
The enhanced planning and management of tourism along with sustainable tourism development are answer for minimizing the negative externalities of tourism activities (Bigano et al, 2005). Sinclair and Stabler (2002)see sustainability as the cornerstone of the development of the tourism industry, as the concerns regarding the environmental deterioration are growing, governments and agents being under pressure to implement the principles of sustainable development and to obtain positive results after implementing them.

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PROCJENA UTJECAJA KLIMATSKIH PROMJENA NA OBALNI TURIZAM U RUMUNJSKOJ

***Sažetak*:** Klimatske promjene su jedna od osnovnih briga današnjeg svijeta za koje se smatra da generiraju kako dobitak tako i troškove na raznim ekonomskim i društvenim poljima, npr. u poljoprivredi, šumarstvu, prehrambenoj industriji, turizmu, infrastrukturi, ljudskom zdravlju, naseljima, itd. Procjene stručnjaka ukazuju na to da, općenito govoreći, troškovi uzrokovani klimatskim promjenama premašuju dobitke. Cilj ovog rada je istražiti utjecaj klimatskih promjena na obalni turizam u Rumunjskoj. Koristeći razne višestruke regresijske modele, podaci ukazuju na to da povećanje srednje vrijednosti temperature zraka i trajanje sunčanih dana potiču domaća turistička kretanja prema rumunjskim obalnim destinacijama. Ekonomski učinak klimatske varijabilnosti na turistički sektor je procijenjen uzimajući u obzir različite scenarije analize. Ipak, potrebno je još istraživanja kako bi se analiza proširila uz pomoć veće baze podataka i koristeći empirijsko istraživanje u drugim turističkim destinacijama na koje utječu klimatske promjene.

***Ključne riječi*:** klimatske promjene, obalni turizam, procjena, ekonomski učinak, multiplikator, turistički tokovi, Rumunjska