

CONSIDERATIONS REGARDING THE CLIMATIC POTENTIAL FOR TOURISTIC ACTIVITY IN DOBRUJA

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Abstract. The purpose of this paper was to evaluate the climatic potential for touristic activities in Dobruja so that the valorization of the services in this domain should be as lucrative as possible. It was thus observed that the impact of climate on tourism is manifested firstly at the level of psychology, bad weather becoming through its inconveniences an obstacle rarely overcome by the tourist. This paper emphasizes the degree of involvement of the main climatic elements such as nebulosity, frequency of precipitations and their aggregation state, air temperature, winds etc. in the definition of the notion “good weather.”

Introduction

The purpose of this paper was to evaluate the climatic potential for touristic activities in Dobruja, so that the valuation of services in this field should be as lucrative as possible. If the landscape provides the material support for all recreational activities, the climate imposes their “state.” It generates the favorable or unfavorable “atmosphere” of the recreational activity, catalyzing or, on the contrary, inhibiting its development. The absolute majority of tourists reduce the importance of the climate to the “good weather”, whose frequency and duration are definitive for recreation and rest. It was thus observed that the climatic impact on tourism is manifested firstly at the level of individual psychology, the bad weather

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becoming, through its inconveniences, an obstacle rarely overcome by the tourist. This in spite of the fact that all the other elements involved in the satisfaction of the need for recreation or treatment are functional, starting with the attractive objectives up to the infrastructure or the touristic product. Several climatic elements are involved in the definition of the “good weather” such as: nebulosity, precipitations frequency and their aggregation state, air temperature, winds etc.

1. Material and method

In order to analyze the climatic and touristic potential of Dobruja, the main climatic elements (nebulosity, rain frequency and intensity, air temperature and winds) with impact on touristic activities were analyzed based on the data resulted from the recordings of 18 weather stations (table 1). Among these, 12 had an observation period of 41 years (1965-2005), while six of them had a shorter observation period, between 10 and 21 years. Also, two representative indexes were used for the elaboration of this study: the balneary climatic index (I.C.B.) and the climate-touristic index (I.C.T).

Tab. 1. The weather stations of Dobruja

Weather station	Altitude	Latitude	Longitude	Period observation
Sulina	3m	45°09'	29°40'	1965-2005
Sfântu Gheorghe	1 m	44°54'	29°36'	1965-2005
Constanța	13 m	44°13'	28°38'	1965-2005
Mangalia	6 m	43°49'	28°35'	1965-2005
Valu Traian	56 m	44°10'	28°29'	1965-2005
Jurilovca	38 m	44°46'	28°53'	1965-2005
Medgidia	70 m	44°15'	28°16'	1965-2005
Gorgova	3 m	45°11'	29°12'	1965-2005
Adamclisi	158 m	44°08'	28°00'	1965-2005
Corugea	219 m	44°44'	28°20'	1965-2005
Tulcea	4 m	45°11'	28°49'	1965-2005
Hârșova	38 m	44°41'	27°57'	1965-2005
Gloria	32 m	44°31'	29°34'	1991-2005
Chilia	5 m	45°25'	29°18'	1985-2005
Gura Portiței	2 m	44°41'	29°00'	1985-2005
Cernavodă	87 m	44°09'	28°03'	1985-2005
Mahmudia	168 m	45°05'	29°04'	1992-2005
Horia	58 m	45°03'	28°36'	1988-1997

2. The impact of the main climatic elements on the touristic activity in Dobruja

Nebulosity. It is the factor that influences directly the Sun shining, a vital parameter for the heliomarine cure in the littoral area of Dobruja. Nebulosity, when it does not occur excessively, that is, when it is made up of thin clouds (Cirrus), has a positive role diminishing the intensity of the caloric radiation in the afternoon. As shown in chapter three, Dobruja has relatively small regional differentiations in terms of the annual mean (tens) of nebulosity. Between 1965-2005, it varied between 5.0 tens in Mangalia and 5.6 tens in St. George.

Frequency and intensity of precipitations. Rain is also an immediate consequence of nebulosity. Rainy weather adds, at psychological level, extra stress determining the tourist to remain temporarily sedentary. However, in Dobruja, especially in the littoral area, where the balneo-marine tourism is practiced, the particularly low quantity of atmospheric precipitations constitutes a climatic resource.

Air temperature is part of the equation only in case it manifests itself excessively. The scorching summer periods, with strong solar radiation, are as unfavorable to the recreation activities as the frosty winter time, with temperatures below -15°C. Apart from these values, air temperature has negative consequences on tourism. In Dobruja, however, the moderating effect induced by the thermal inertia of the sea leads to an optimum temperature, which is very favorable for touristic activities.

Winds. Depending on their duration and intensity, winds have a contrasting influence. Thus, the marine breeze has moderating action, especially in the littoral area, where it also has the role of transporter and disperser of aerosols. On the contrary, strong winds bring prejudices to the recreational act in the littoral area (blowing the sand off beaches and agitating the sea surface). The analyzed meteorological parameters act, in the absolute majority of the cases, in a tight correlation, determining certain types of climate and a hierarchy of their importance for tourism. Thus, the summer climate is characteristic for Dobruja.

It is characterized by a reduced nebulosity, high insolation, optimum temperatures, less frequent winds with low intensity, but also aerosols in high quantities. These factors compete to promote thalassotherapy, orienting tourists' options and offer from the recreational feature to the mixed one (curative-recreational). It is the optimal climate for practicing the heliomarine cure in the resorts on the littoral area of Dobruja. The maximum duration for good weather in this season explains also the peak of touristic demand. Most tourists allot time for recreation and resources in the summer, which is thus the best time for traveling.

3. The evaluation of the climatic potential of Dobruja based on the balneary climatic index and the climatic-touristic index

From the multitude of indices used on the Globe, we chose for this study the climatic-touristic index (established by R. Clausse and A. Guérout) and the climatic-balneary index (by L. Burnet), as these two can evaluate objectively the territory analyzed in this doctoral thesis.

3.1. The climatic-balneary index (I.C.B). This index, elaborated in 1963 by L. Burnet, evaluates the touristic quality in the summer by means of the following formula:

$$\text{ICB} = \text{N} / \text{T}$$

where: N = the number of rainy days in the four months characteristic to summer (May, June, July and August); T = the average air temperature in that period.

If the index value is below 3, the respective region has a high touristic potential; if it is between 3 and 8, the potential is satisfactory and if it is above 8, the potential is low.

The main disadvantages of this index are:

- The value indicated is an arbitrary number without absolute significance, therefore it cannot be concluded that in one region the touristic activities are, for example, five times more favorable than in a different one, but only that there are favorable conditions;
- It does not take into account other climatic elements, which is why it can give erroneous results outside the temperate zone.

According to an analysis of the data regarding the number of rainy days and average air temperatures in summer between 1965-2005 (based on which the climatic-balneary index was determined – table 2), we noticed that Dobruja has a high touristic potential (the value of this index being in all stations below 3), Fig. 1.

By analyzing figure 1, we may notice that the highest climatic-touristic potential is encountered in the littoral zone and the Danube Delta, where the ICB value is the lowest, below 1.5 (1.258 in Sulina; 1.277 in Chilia Veche; 1.297 in St. George; 1.499 in Constanța; 1.449 in Gorgova). The largest part of Dobruja has values inferior to those mentioned above (over 1.5 and even 1.8 in Negru Voda Plateau in Southern Dobrogea, but also in the western part of Dobruja: Macin Mountains and Tulcei Hills – e.g. ICB in Tulcea = 1.866), because of the higher altitudes and more frequent precipitations. Thus, based on this study, we can conclude that, even though the Dobruja territory has a high potential, the littoral area and the Danube Delta can be exploited to a maximum efficiency.

Tab. 2 - The value of the climatic-balneary index in Dobruja between 1965-2005

Station	Number of rainy days in the summer season	The average temperature of the air (°C) in the summer season	The value of the climatic-balneary
Mangalia	28,2	19,5	1,446
Constanța	30,1	20,07	1,499
Hârșova	32,7	20,27	1,613
Medgidia	34,2	19,87	1,721
Adamclisi	33,7	19,65	1,715
Sulina	25,8	20,5	1,258
Sf. Gheorghe	26,4	20,35	1,297
Gorgova	30	20,7	1,449
Tulcea	38,1	20,42	1,866
Chilia	26,2	20,52	1,277

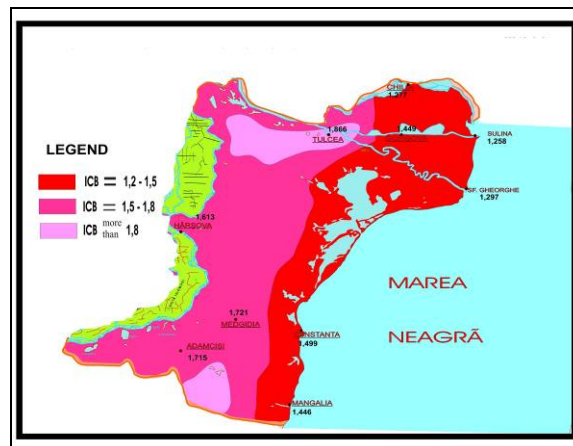


Fig. 1 - The climatic-touristic potential evaluated by the climatic-balneary index (ICB), in Dobruja (1965-2005)

3.2. *The climatic-touristic index (I.C.T).* The interdependence among the meteorological elements and their variability in space and time has led to the

necessity to calculate a climatic-touristic index. An expression of this is given by Clause and Guérout (according to Fărcaș and colab., 1968) who take into account three main elements, namely: sunshine duration, temperature and precipitation duration in a given region, which they associate in the following formula:

$$I = \frac{S+T-5D}{5}$$

where: I = the climatic-touristic index; S = sunshine duration (in hours); T = average air temperature (°C); D = average precipitation duration during the day (hours) (considering that an hour of rain equals five hours of sunshine). This index allows the establishment of an optimal duration for the touristic season and open air cures during the warm period of the year. In order to emphasize the climatic-touristic potential of Dobruja, we stopped at this index in particular, as it takes into account those meteorological parameters with the highest impact on the summer touristic activities (the main type of tourism in the analyzed territory). From this perspective, using the data in table 3, we analyzed the ICT for the entire summer season (May-August) but also for each month in turn.

Tab. 3 - Average values in May, June, July and August, but also for the entire summer, for the elements calculated for the determination of the climatic-touristic index in Dobruja (1965-2005)

Station	In May			In June			In July			In August			The average of the summer season		
	S (ore)	T(°C)	D (ore)	S (ore)	T(°C)	D (ore)	S (ore)	T(°C)	D (ore)	S (ore)	T(°C)	D (ore)	S (ore)	T(°C)	D (ore)
Constanța	263,6	15,6	3,67	286,6	20,2	3,36	325,6	22,4	2,71	305,4	22,1	2,01	295,3	20,07	2,94
Mangalia	264	15	3,21	302,5	19,6	3,12	324,6	21,8	2,59	305	21,6	2,09	299,02	19,5	2,75
Hârsova	259,5	16,7	3,75	286,6	20,6	3,84	313,1	22,3	2,94	299	21,5	2,25	289,7	20,27	3,19
Adamclisi	251,8	15,9	3,91	280,3	19,8	4	305,7	21,8	3,06	284,9	21,1	2,21	280,67	19,65	3,29
Tulcea	247,8	16,5	4,03	244,2	20,6	4,08	314,8	22,7	3,17	302,9	21,9	2,44	277,42	20,42	3,43
Sulina	257,3	15,7	3,02	282	20,5	2,8	312,5	23	2,36	291	22,8	1,9	285,7	20,5	2,52
Sf.Gheorghe	275	15,8	3,06	305,1	20,5	2,88	338,8	22,9	2,4	318,6	22,2	1,97	309,37	20,35	2,58
Gorgova	258,9	16,7	3,64	289,7	20,9	3,32	319,6	23,1	2,67	303,2	22,1	1,97	292,85	20,7	2,9
Chilia Veche	262,9	16,6	3,02	285,8	20,7	2,84	330,1	22,8	2,36	300,8	22	1,94	294,9	20,52	2,54

ICT distribution in May in Dobruja. Based on the data in table 3, we could calculate and represent (for Dobruja) the climatic-touristic index for May (Fig. 2).

This representation shows that the highest values of this index are in the east and north-east of Dobruja, on the littoral and in the Danube Delta (55.1 in St. George; 52.88 in Chilia Veche; 52.59 in Mangalia; 52.17 in Constanța and 51.58 in Sulina), as well as in the west, in the Danube (51.49 in Hârșova) everglades due to the moderating effect of the sea and of the Danube.

At the opposite pole, the lowest potential is remarked in the highest regions in the north and north-west (48.89 in Tulcea), because of the weather instability with negative effect on touristic activities, but also in the south and central-south (49.63 in Adamclisi) because of the high climatic continentality.

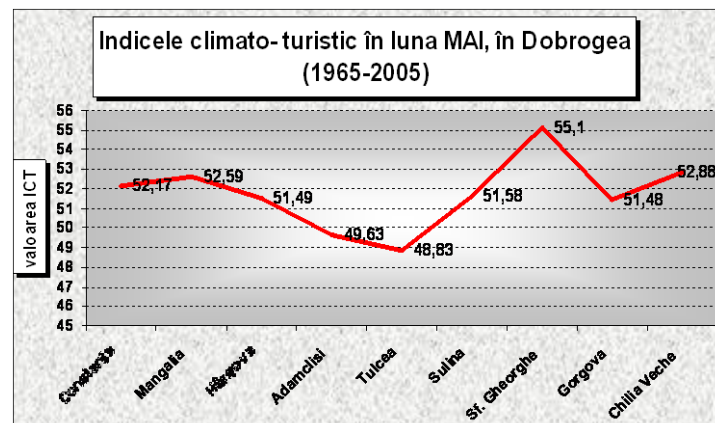


Fig. 2 - The climatic-touristic index (I.C.T) in May, in Dobruja (1965-2005)

- ICT distribution in June in Dobruja. A higher value of the climatic-touristic index is noticed in this month at all the analyzed meteorological stations. Similarly to the previous month, the area influenced by the sea is distinguished clearly (62.24 in St. George; 61.3 in Mangalia and over 58 in Constanța, Chilia Veche and Gorgova) in contrast with the high regions or with those with strong continental character (56.02 in Adamclisi or even 48.88 in Tulcea) (Fig. 3).

- ICT distribution in July in Dobruja. As July is the hottest month, the index had its maximum value at all the stations (in all locations its value exceeded 62), which shows the highest degree of favorability for heliotherapy (Fig. 4).

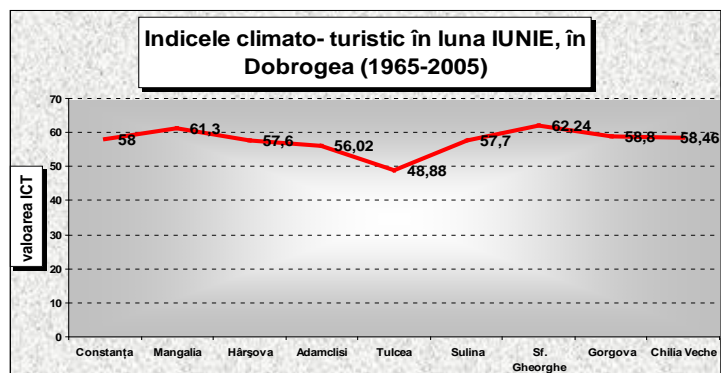


Fig. 3 - The climatic-touristic index (I.C.T) in June, in Dobruja (1965-2005)

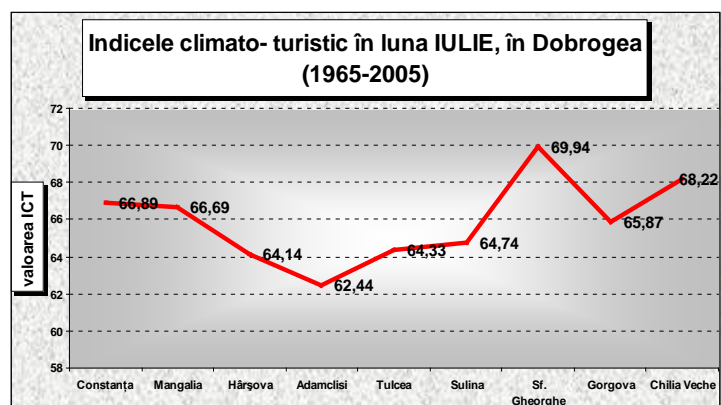


Fig. 4 - The climatic-touristic index (I.C.T) in July, in Dobruja (1965-2005)

- ICT distribution in August in Dobruja. After the summer solstice, the climatic-touristic index has a gradually lower value and in August its value goes below 64 in almost all the stations, except the south-east of the Danube Delta (66.19 in St. George) and even below 60 in the center of the Southern Dobruja Plateau, where, in Adamclisi between 1965-2005, its value had an average of only 58.99. Fig. 5.

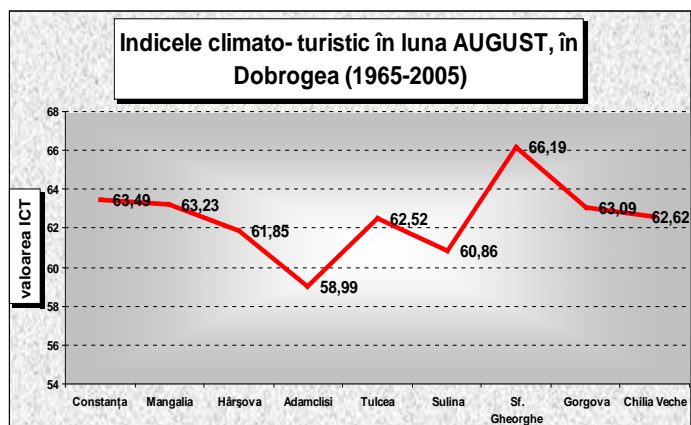


Fig. 5 - The climatic-touristic index (I.C.T) in August, in Dobruja (1965-2005)

3.3 *The recurrence of ICT in the summer on the territory of Dobruja.* In the summer, Dobruja has a high climatic-touristic potential (over 50 in all directions), with values of over 60 in the littoral area (63.37 in St. George; 60.95 in Mangalia; 60.54 in Chilia Veche and 60.14 in Constanța), which is where the best conditions exist for its exploitation. Apart from this area, even though the premises are optimal, the potential is reduced, reaching the value of 56.14 in Tulcea (Fig. 6).

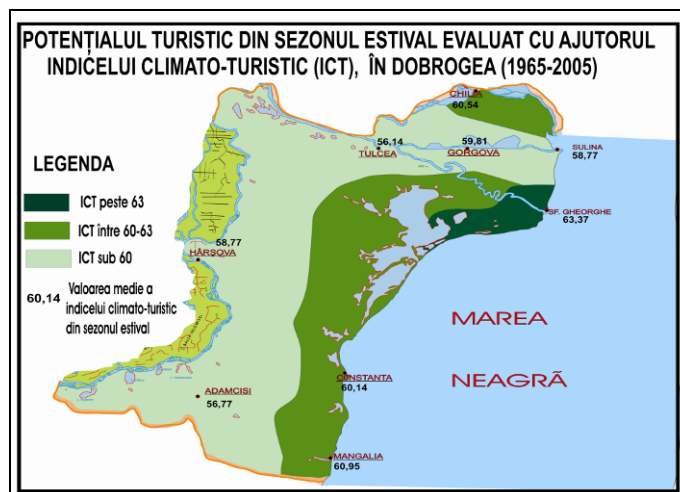


Fig. 6 - The touristic potential of the summer season evaluated by the climato-touristic index (ICT), in Dobruja (1965-2005)

Conclusions

The touristic potential resulted from the spatial association of the touristic fund with the corresponding technical and material basis is an indicator of maximum importance, being synonymous to the touristic offer. This is included, through its components, in a similar number of premises for the promotion of the phenomenon itself: to locate and accomplish. One of the determining factors for the development of touristic services in the analyzed territory is the climate, a factor analyzed in a subchapter of this paper.

Considering the elements mentioned above, we can say that in Dobruja, especially the littoral and the Danube Delta, the particularly high balneary and recreational potential, regardless of the climatic and touristic indexes used for its evaluation, has led to a strong development of tourism and of the accommodation business. The high climatic and touristic potential of the littoral is also emphasized by the thermal comfort, for which the following case study was accomplished.

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