International Journal of Human Sciences
ISSN:1303-5134

Volume: 7 Issue: 1 Year: 2010

The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience

Kemalettin Şahin*

Abstract

The objective of this study is to put forth the relationship between 3S (sand-sea-sun) tourism in Samsun and climate conditions. That is why observations were made during the summer of 2008 (July, August) at the beaches selected by sampling method. The meteorological data about the time of day during which observations were made were taken from the internet site of Turkish State Meteorological Service. Also biometeorological thermal comfort indexes of Samsun were created. According to the data obtained, the months of July and August form the period during which tourism and recreational activities are at the highest level in the beaches of Samsun. During the sea season (July and August) the total number of days during which the wind speed was greater than or equal to 21.6 km/h limiting the usage of the beach and the sea was 17; the total number of days during which the sky was "mostly cloudy" was 20 (July 10 days, August 10 days). When all the other variables are considered (rain, condition of the sea...) the foremost ones being wind and cloud cover, it was determined that the total duration of 3S tourism in the area studied was intermittently 35 ±5 days. According to the thermal comfort index 94% of July and August are composed of "hot" days. According to humidity index 29 % of July and 13 % of August are composed of mild-calm days. As a result the most important natural factors negatively affecting 3S tourism in Samsun are Samsun's general location, its position in the general atmospheric circulation system and as a result of these the climate conditions and daily weather conditions. In this sense, it will be suitable that in order for Samsun to obtain a "tourism city" identity, it should be evaluated with the other alternative tourism appeals of 3S tourism.

Keywords: 3S tourism; sea season; wind speed; Thermal Comfort Index; Samsun

* Associated. Prof.Dr. Ondokuz Mayıs University, Faculty of Science and Letters, Department of Geography, PB 55210 Kurupelit- Samsun, TURKEY. e-mail: ksahin@omu.edu.tr

Şahin, K. (2010). The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience, *International Journal of Human Sciences* [Online]. 7:1. Available: http://www.insanbilimleri.com/en

Samsun'da iklimin 3S turizmine etkisi: 2008 yılı örneği

Kemalettin Şahin*

Özet

Bu çalışmanın amacı, Samsun'da 3S (kum-deniz-güneş) turizmi ile iklim koşulları arasındaki ilişkiyi ortaya koymaktır. Bu amaçla 2008 yılı yaz aylarında (Temmuz, Ağustos) örneklem yöntemiyle seçilen kumsallarda ziyaretçi gözlemlerinde bulunulmuştur. Gözlemde bulunulan saatlere ait meteorolojik veriler, Meteoroloji İşleri Genel Müdürlüğü'nün internet sitesinden elde edilmiştir. Ayrıca Samsun'un biyometeorolojik termal konfor indeksleri oluşturulmuştur. Elde edilen verilere göre Temmuz ve Ağustos ayları, Samsun kumsallarında turizm ve rekreasyonal aktivitelerinin en yoğun olduğu dönemdir. Deniz mevsiminde (Temmuz ve Ağustos) kumsal ve denizden yararlanmayı kısıtlayan 21.6 km/sa. ve üzeri hıza sahip rüzgarın kaydedildiği günler toplamı 17; gökyüzünün "çok bulutlu" günler sayısı toplamı ise 20'dir (Temmuz 10 gün, Ağustos 10 gün). Rüzgar ve bulut örtüsü başta olmak üzere diğer değişkenler (yağış, denizin durumu…) dikkate alındığında, çalışma alanında 3S turizminin süresi kesintili olarak 35 ±5 gündür. Termal konfor indeksine göre Temmuz ve Ağustos aylarının %94'ü "sıcak" günlerden oluşmaktadır. Nemlilik indeksine göre Temmuz ayının %29'u, Ağustos ayının ise %13'ü rahat-sakin günlerden meydana gelmektedir. Sonuç olarak, Samsun'un lokasyonu, genel atmosfer dolaşım sistemi içindeki yeri ve bunların efektif sonuçları olarak iklim özellikleri ve günlük hava koşulları, Samsun'da 3S turizmini olumsuz etkileyen en önemli doğal faktörlerdir. Bu anlamda Samsun'un "turizm kenti" niteliği kazanmasında 3S turizminin diğer alternatif turizm çekicilikleriyle birlikte değerlendirilmesi uygun olacaktır.

Anahtar Kelimeler: 3S turizmi; deniz mevsimi; rüzgâr hızı; Termal Konfor İndeks; Samsun

* Doç.Dr., Ondokuz Mayıs Üniversitesi Fen Edebiyat Fakültesi, Coğrafya Bölümü, 55210, Kurupelit, Samsun-Türkiye. - Samsun, Türkiye. e-mail: ksahin@omu.edu.tr

Şahin, K. (2010). The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience, *International Journal of Human Sciences* [Online]. 7:1. Available: http://www.insanbilimleri.com/en

Introduction

Tourism is one of the largest economical sectors in the world (Bigano *et al.* 2006). Weather and climate conditions are related to touristic activities at most times (Kozak *et al.* 2008; Matzarakis 2008). Geographical location, topographic view, plant and animal resources, climate and weather conditions form the natural resources of a location in tourism and recreational activities (De Freitas 2003; Kozak *et al.* 2008). Many climatic variables such as weather and sea temperature, duration and intensity of sun bathing, long wave beams and wind speed affect tourism activities (Andrade *et al.* 2007). Epstein and Moran (2006) emphasize that the ambient temperature at which people feel comfortable with respect to climatic conditions is higher in summer than in winter (Summer season: 23–27 ^{o}C; winter season: 20–25 ^{o}C).

De Freitas (2003) evaluates the relationship between climate and weather conditions and tourism activities within "tourism climatology". Whereas Gomez-Martin (2005) emphasizes that the works based on the relationship between climate and tourism is traditionally made by two branches of geography (tourism and climatology). It is emphasized by Matzarakis *et al.* (2004) that the studies made in this field date back 30 years.

It is stated by Morgan *et al.* (2000) that of the people who prefer coastal areas consider climate and weather conditions while choosing the holiday location that they will stay in. Especially beaches are activity areas intensely sensitive to weather conditions. Beach users need climatic information in order to fully comprehend the weather and sea water temperature.

Samsun, with its long and wide beaches and fine sands is a city with shallow water beaches suitable for water sports. Despite all such natural attractions it attracts attention that investments related to coastal tourism are very small. With the assumption that the probable reasons of this problem are climate and weather conditions, the objective of this study is to put forth the relationship between climate and coastal tourism (3S tourism) in Samsun.

Study site

Coastal areas are historically and traditionally operated places containing a dense population due to their variety of rich resources (Mikhaylichenko 2006). Turkey is surrounded by sea on all three sides and is rich in both natural and human resources with its

Şahin, K. (2010). The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience, *International Journal of Human Sciences* [Online]. 7:1. Available: http://www.insanbilimleri.com/en

77x 10^6 km^2 area and a population of about 70 million and about 50% of the population live in coastal regions (Toros *et al.* 2005).

Black Sea region with its 141.156 km^2 area cover 18% of Turkey. The coastal length of this wide region with the Black Sea exceeds 1.000 km (Fig 1). In the eastern and western parts of the Black Sea region mountains reach high altitudes close to the coast. In mid Black Sea region mountains start to gain height after a certain distance away from the coast and the average height is below 1500 m. As a matter of fact Böğürtlen t. which is the peak of Kocadağ, a mountain located west of Samsun, is 1309 m. The city of Samsun located on the coastal belt of Black sea and its climate type is characteristic of "humid-mild climate type" with its mild winters, not so hot summer seasons, heavy showers scattered all through the year much less regularly and its relative humidity that increases during especially the summer months (Nişancı 1989).

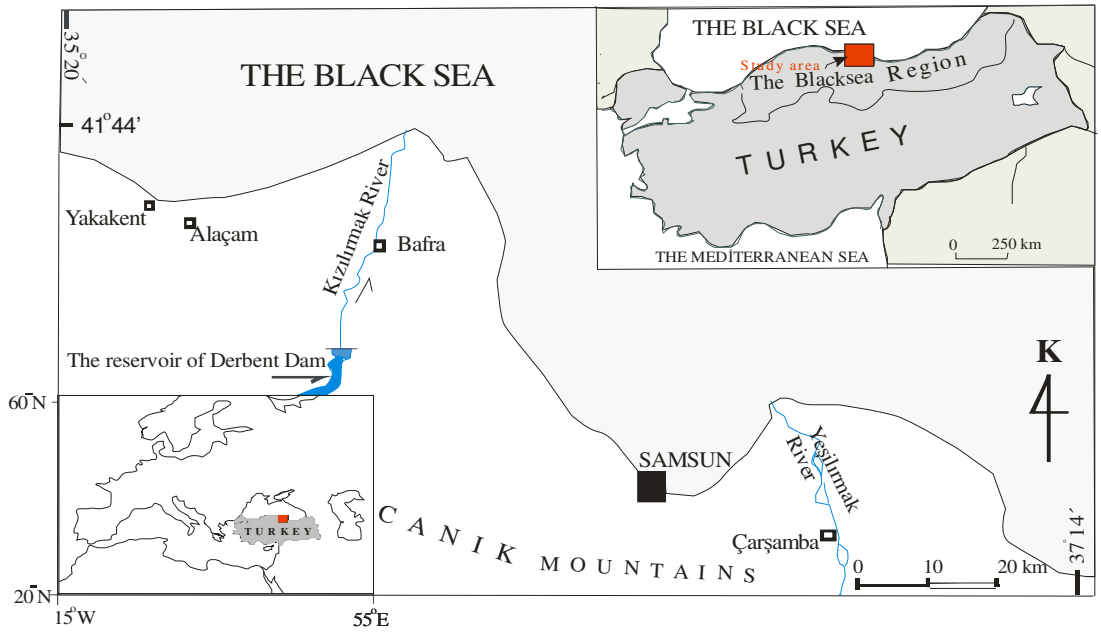

Fig 1. Location map

The coast length of the city of Samsun with Black Sea is about 206 km. Samsun, with its wide and long sandy beaches and shallow waters is a city with important tourist (natural, historical, cultural) attractions in its region. The coastal borders of the city are geographically located between 35° 20' - 37° 14' eastern longitudes. Samsun is the most suitable city for 3S (sand-sea-sun) tourism in the Black Sea coastal region. Turkey's two longest rivers (Kızılırmak river and Yeşilırmak river) meet the sea in the city limits of Samsun. Two of the

most important delta plains in Turkey are located at the estuary of these two rivers. Fruitful agricultural land has developed on these delta plains.

Samsun is the city with the highest population among the cities located in the coastal belt of Black Sea (Rize: 94.800; Trabzon: 228.826; Giresun: 89.241; Ordu: 134.005; Samsun: 423.859; Sinop: 34.755; Zonguldak: 107.354). Also the main transportation roads connecting Eastern Black Sea region to the Middle Black Sea region pass through this city. Samsun differentiates from the other areas of this region due to the fact that its location allows it to be reached by road, air, sea and railroad transportation.

Materials and methods

In order to put forth the relationship between 3S tourism and climate conditions in Samsun, observations have been made in the beaches of Samsun in the summer of 2008. With these observations the times of the day during which visitors are scarce and dense were determined. Meteorological data (air maps, wind, temperature, rain maps etc.) related to these times were obtained from Turkish State Meteorological State. The observations were made between the times of 9-11 in the morning and 13-17 in the afternoon during which the beach and sea usage is high. By both the meteorological data and the data obtained through observations and by the threshold values accepted by international literature which affect the sea and beach tourism climatologically, the number of days and the quality of the sea season were determined.

The population data for the cities that are mentioned in this paper were obtained from the “Address Based Population Record System” database of the Turkish Statistical Institute.

The thermal equilibrium between the bodies of people who engage in tourist and recreational activities and the environment takes place as a result of a complex relationship between temperature, humidity, wind speed and radiation types (Angouridakis and Makrogiannis 1982). In this sense, the Thermohygrometric (THI) and humidex (H) biometeorological indices of the city of Samsun for the months of “July and August” were generated.

The means were used for the calculation of two widely used biometeorological indices (Conti et al., 2005:392; Kamoutsis et al. 2007; Yılmaz et al. 2007), the thermohygrometric (THI) and the humidex (H) indices, according to the following equations:

THI (^{o}C)=t-[(0.55 - 0.0055*f)*(t-14.5)] (1)

H=t+5/9*(e-10) (2)

Where t=air temperature (^{o}C), f=relative humidity (%) and e=the vapor pressure (hPa) which was calculated by the following function combining t and f (2).

$$e=6.112*10^{[(7.5t)/(237.7+t)]f/100} \quad (3)$$

Results

Weather types

Dry-warm weather dominates in Samsun during the summer months. On days when this type of weather is effective, cool northerly winds coming from the sea are recorded. A wide density of visitors are observed at the beach on days when the wind speed is low, the sky has few clouds or is partly cloudy. The frequency of this type of weather in July is 62 % and in August is 54% (Table 1). Based on the frequency data this weather type is followed by "warm-very cloudy" weather type (in July 19%; August 23%).

Table 1. Frequency of observation of the different weather types in Samsun during summer months.

Weather types	**July**		**August**	
	Frequency	**Percent**	**Frequency**	**Percent**
Warm- few and partly cloudy	19	62	17	54
Warm- very cloudy	6	19	7	23
Mild weather with short periods of rain	1	3	-	-
Mild weather with strong wind	5	16	7	23
Total	31	100	31	100

Temperature

January and February are the months when the monthly average temperature is lowest; whereas July and August are the months when the monthly average temperature is the highest (Table 2). During the summer months of 2008, at the time of observation the number of days at which the measured temperature values were equal or greater than 25^{o}C was 22 in July; and 30 in August. The months of July and August correspond to the most ideal period for 3S tourism in Samsun with respect to weather and sea water temperature.

Şahin, K. (2010). The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience, *International Journal of Human Sciences* [Online]. 7:1. Available: http://www.insanbilimleri.com/en

Table 2 Some meteorological parameters of Samsun based on long period averages (1974-2003)

Month	Mean air temperature (°C)	Mean maximum air temperature (°C)	Sunshine duration/day (h)	Precipitation (mm)	Relative humidity (%)	Water temperature (°C)
Jan	6.9	10.5	2.4	58.4	68.0	8.7
Feb	6.6	10.5	2.9	48.8	70.4	7.2
Mar	7.8	11.4	3.6	52.7	75.8	7.7
Apr	11.1	15.0	4.4	58.3	79.5	10.0
May	15.3	18.5	6.2	50.6	80.5	13.7
Jun	20.0	23.0	8.1	47.9	76.3	19.0
July	**23.1**	**26.0**	**8.7**	**31.3**	**73.4**	**23.3**
Aug	**23.2**	**26.4**	**8.0**	**31.5**	**73.7**	**24.8**
Sep	19.8	23.5	6.2	50.9	74.7	22.4
Oct	15.9	19.9	4.6	87.4	75.8	18.3
Nov	11.9	16.3	3.3	78.6	70.4	14.8
Dec	8.9	12.9	2.4	78.3	66.8	11.3

Source: The Samsun Meteorology Regional Directory Unpublished datas, 2005.

Windy

During the summer months Turkey is generally affected by the cool northerly air streams that form between Azor HP and Basra LP. The percentage of northerly winds in 2008 June was 63 %, in July this increased to 84% and in August to 87% (Fig. 2). The wind (its direction and speed) is one of the most important factors that affect 3S tourism in Samsun (Table 3). During stormy days the sea is rough and it is not possible to make use of the beach. In such days when the lengths of the waves are high drowning cases are frequently seen due to the depths that form on the surface of the sea.

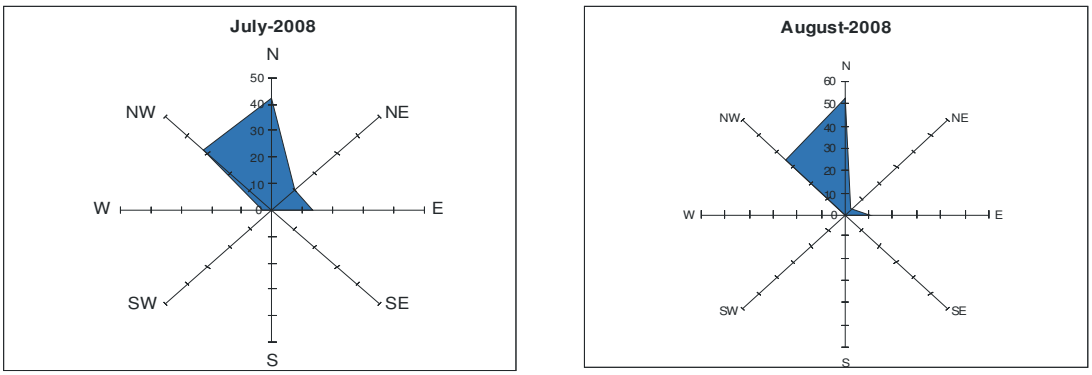

Fig. 2 The frequency of windy directions in the summer months of 2008 with two month (July and August).

Table 3 Meteorological parameters for a stormy day (01 August 2008).

Parameter	Data	Weather favourable/unfavorable for tourism
Weather type	Dry-hot	Favorable
Air temperature (^{o}C)	26	Favorable
Windy (speed and direction)	NW-34	Stormy- unfavorable
Relative humidity (%)	57	Favorable
Air pressure (hPa)	1016	Favorable
Cloud cover	Partly cloudy	Favorable
The wavy position of sea position / water temperature (^{o}C)	Very wavy/25	Unfavorable/favorable
THI / H indices values	23,38 /29,90	Hot/Some discomfort
Result	Unfavorable day for 3S tourism.	

The wind also has a biometeorological effect. According to Morgan *et al.* (2000) the wind affects the perception of heat in humans. It is pointed out that especially winds with speeds exceeding 4 m/s (=14.4 km/hr) disturbs the visitors on the beach; and that winds with speeds exceeding 5.6 m/s (=20.1 km/hr) scatter sands with radius of 0.21 and 0.25 mm. The grain size of the sands that form the sandy beaches of Samsun range between 0.21 and 0.25. Therefore the number of days in July during which the wind speed exceeded 14.4 km/hr (4 m/s) was 15; and in August this number was 14. De Freitas (2003) emphasizes that wind speeds that exceed 6 m/s (21.6 km/hr) negatively affect the beach users (and their personal belongings) directly or indirectly. The number of days for which the beach was used when the wind speed was taken to be 14.4 km/h and 21.6 km/h can be see in Table 4. The number of days in July and August for which the wind speed was optimal (<14.4 km/h) for beach use was 33.

Table 4 Number of days during which the beach and sea were able to be used with respect to wind speeds

Months	Optimal days (14.4 km/h.>)	14.5-21.6 km/h.	21.6 km/h. <
July	16	8	7
August	17	4	10
Total	33	12	17

Source: Adopted from De Freitas (2003) and Morgan et al. (2000).

During days in which wind speed was 21.6 km/h and more, northerly air streams were dominant and the N and NW direction frequencies were highest (Fig. 3).

Şahin, K. (2010). The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience, *International Journal of Human Sciences* [Online]. 7:1. Available: http://www.insanbilimleri.com/en

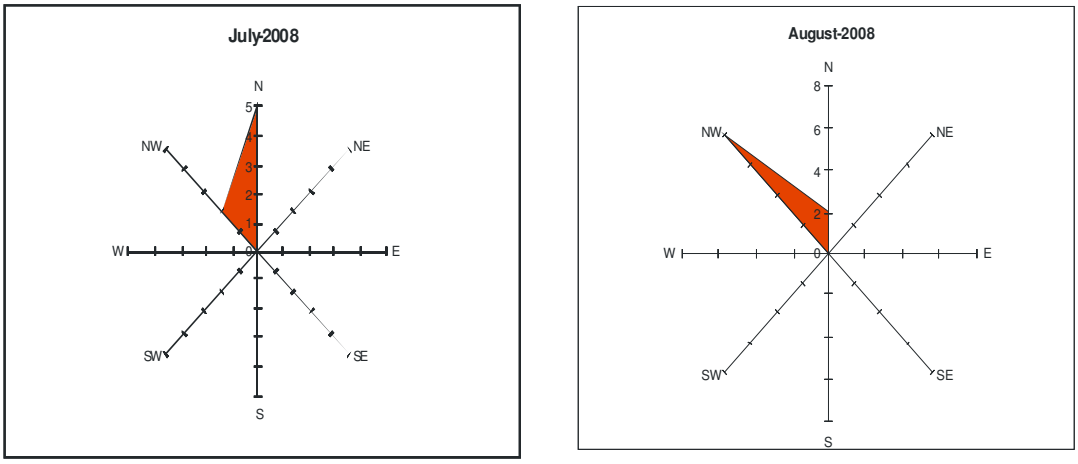

Fig. 3 The directions of winds with speeds equal to and greater that 21.6 km/h.

On stormy days the sea was very rough and it was not possible to make use of the beach or the sea. Thus, it was not possible to make use of the beach or the sea between 30 July and 5 august during which the wind speed ranged between 19 km/h and 34 km/h. The sea which was quite calm on July 6 due to low wind speed (N-8 km/h) was very rough on august 7 due to the wind speed increasing up to 30 km/h. On such days when the lengths of the waves are high the sea becomes turbid since the waves churn the sand size materials that form the sea floor. Therefore high speed winds cause high length waves in the sea and churn the sands that are on the floor of shallow waters limiting the usage of the sea.

Cloud cover

According to the observation results obtained from the beaches, even if other environment conditions (temperature, wind, the sea being calm) are suitable, the number of visitors on the beach is very low on “cloudy” days. Therefore “cloudiness” also negatively affects beach tourism. Because people come to the beach to sun bath and swim. During the July and August of the summer of 2008, a total of 20 “very cloudy” days were recorded (Fig. 4).

Şahin, K. (2010). The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience, *International Journal of Human Sciences* [Online]. 7:1. Available: http://www.insanbilimleri.com/en

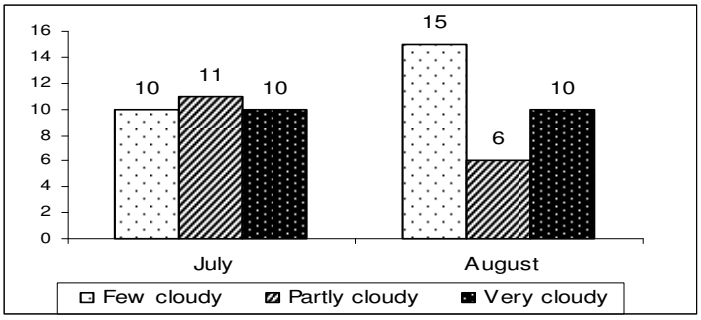

Fig. 4 Frequency of observation of the different cloud cover in Samsun.

Bathing water temperature

The average monthly sea water temperature during July 2008 was 24.2 °C; and in August it was 26.2 °C. During the last week of August the temperature increases up to 27 degrees. The long period average for sea water temperature of July and August range between 23-25 °C. Morgan *et al.* (2000), designed a water temperature scale for swimming and bathing, ranging from 'too cold' at temperatures <18 °C, to 'too hot' > 29°C, with an optimum of 21 - 27 °C. According to this, the sea water temperature in Samsun during summer months is between "optimal values".

Unstable weather conditions

Unstable weather conditions that are affective in Samsun during summer negatively affect the 3S tourism. Several examples can be given to such days; on 29 June there is a very suitable environment for beach tourism up to 15:30 (Temperature 27^{o}C; wind N 13 km/h). However at about 17:00 the wind speed was recorded to be 30 km/h. This is a factor that limits making use of both the sea and the beach. Another example is the records and observations from the weekends. July 5th Saturday was a suitable day for beach-sea tourism according to daily weather condition and meteorological values (Temperature: 27^{o}C; wind E-12 km/h, sunny with light clouds). There were many visitors on the beach and in the sea. One day later on Sunday, the weather conditions were similar until up to 3.20 pm (Wind E-5 km/h). However after 3.20 pm the sunny and hot weather left its place to thunderous, light shower and stormy weather conditions (Wind speed recorded at 3:50 pm was N-56 km/h). This weather condition lasted until 4.30 pm.

Şahin, K. (2010). The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience, *International Journal of Human Sciences* [Online]. 7:1. Available: http://www.insanbilimleri.com/en

The number of rainy days

Even though heavy showers are not frequently seen in summer months it affects the usage of the beach with its direct (humidifying of the beach, wastes dragged by the rain) and indirect (sea and beach pollution) affects. For example, after the light rain that was recorded on 12th of July at about 3 pm, it was conspicuous to see that there was almost no one on the beach on the 13th and 14th of July. Three rainy days were recorded during July 2008.

Air temperature and relative humidity

The temperature and relative humidity values measured during the day in July and august were compared with the monthly averages for 2008 (Fig. 5). When the mean humidity of the air is considered for two month period it is seen that it is above 60% (Fig. 6). High humidity-temperature and calm weather conditions in July and august cause people to live sultry-heavy days.

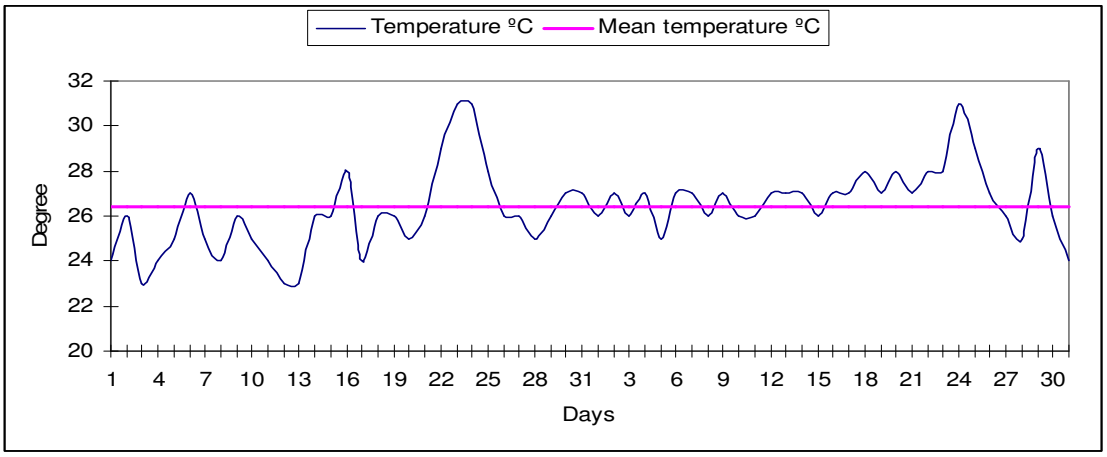

Fig 5. The daytime temperature values measured in the summer months of 2008.

Şahin, K. (2010). The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience, *International Journal of Human Sciences* [Online]. 7:1. Available: http://www.insanbilimleri.com/en

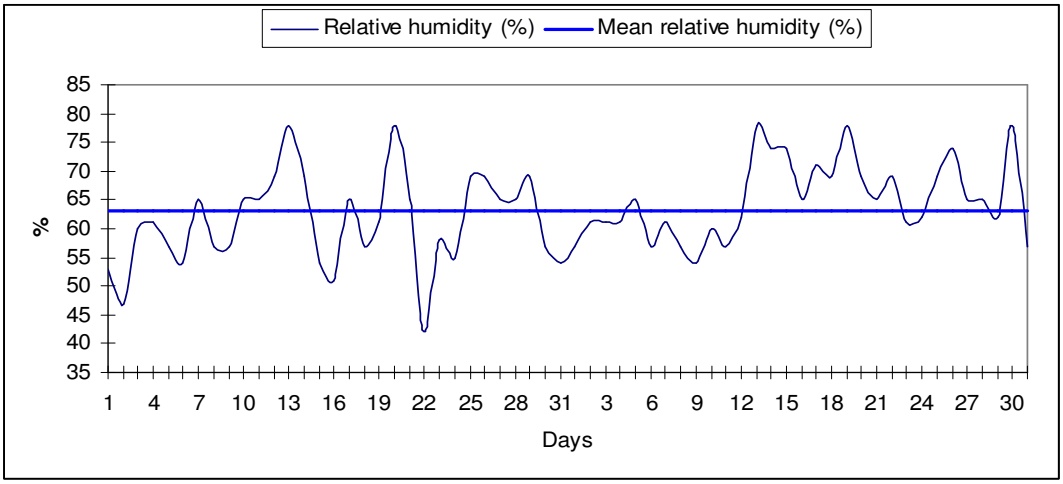

Fig 6. The daytime relative humidity values measured in the summer months of 2008.

Table 5. Daily course of the meteorological factors that negatively affect 3S tourism during the summer months of 2008.

Days	Wind	Very cloudy	Wavy sea	Precipitation	Days	Wind	Very cloudy	Wavy sea	Precipitation
1					1	•		•	
2					2	•		•	
3	•		•		3	•	•	•	
4					4	•	•	•	
5					5	•	•	•	
6	•	•	•	•	6				
7	•		•		7	•		•	
8					8		•		
9					9		•		
10					10				
11		•			11				
12		•		•	12				
13	•	•	•		13	•		•	
14	•	•	•		14	•		•	
15					15		•	•	
16					16				
17		•	•		17				
18					18				
19					19				
20					20				
21					21				
22					22				
23					23				
24					24				
25	•		•		25	•		•	
26		•			26				
27		•			27		•		
28		•			28		•		
29		•		•	29				
30			•		30		•		
31	•		•		31	•	•	•	
The favourable days for 3S Tourism. Total:31 day.									

Şahin, K. (2010). The impact of climatic on 3S tourism in Samsun, Turkey: The summer 2008 experience, *International Journal of Human Sciences* [Online]. 7:1. Available: http://www.insanbilimleri.com/en

The period of 3S tourism in Samsun

The activity period for 3S tourism in 2008 for Samsun was determined to be 16 days in July and 15 days in August with a total of 31 days (Table 5). Stormy days along with mostly cloudy and rainy days are factors leading up to this result.

The human thermal comfort [Thermohygrometric index (THI) and humidity index (H)]

Tablo 6 The values of the Thermohygrometric Index (THI) and Humidity Index (H) in Samsun during sea season of 2008.

	July	**August**		**July**	**August**
Days	THI	THI	Days	H	H
1	19,32	23,28	1	27.70	29.90
2	19,81	24,32	2	28.24	35.66
3	20,35	23,53	3	20.72	30.57
4	20,39	24,32	4	23.75	35.66
5	20,23	22,98	5	26.08	27.01
6	20,31	24,04	6	34.03	34.73
7	20,56	24,32	7	27.01	35.66
8	20,23	23,28	8	23.03	26.90
9	20,23	23,84	9	29.90	34.03
10	21,36	23,47	10	27.01	30.40
11	21,36	23,28	11	23.67	29.90
12	21,55	24,39	12	21.21	35.89
13	21,97	25,49	13	21.70	39.62
14	21,55	25,21	14	31.89	38.69
15	20,85	24,36	15	29.40	32.72
16	20,71	24,59	16	38.91	36.59
17	22,17	25,01	17	23.67	37.99
18	21,75	25,7	18	29.90	44.79
19	21,96	25,49	19	30.57	39.62
20	22,85	25,7	20	28.53	44.73
21	22,17	24,59	21	31.23	36.59
22	20,97	25,7	22	42.00	44.73
23	21,81	25,1	23	71.77	42.14
24	21,65	27,55	24	69.38	74.97
25	23,21	26,53	25	44.73	53.93
26	23,21	25,21	26	31.89	38.69
27	22,98	23,79	27	31.23	31.23
28	22,98	22,98	28	27.01	27.01
29	23,21	25,97	29	31.89	50.83
30	22,52	24,61	30	34.73	33.39
31	22,34	21,75	31	34.03	23.03

Temperature and air humidity also have biometeorological effects (Cengiz *et al.* 2008). Indeed days when the air humidity is between 50-70% and the temperature is between 15-20 ^{o}C are ranges during which people want to be normal and comfortable (Toros *et al.* 2005). According to the biometeorological index results (Table 6) obtained for Samsun by taking 2008 year values as the basis, more than half of the month of July is composed of days people (54%) call as "hot" and 43% of "relaxing-calm" days and 3% of "cool" days (Table 7). Whereas 94% of the days in August were "hot" according to people and 6% was "very hot".

Table 7 Relation of human thermal comfort with Thermohygrometric (THI) and Humidex (H) indices relative frequencies of classes of Thermohygrometric (THI) and Humidex (H) indices values in Samsun during summer months of 2008 with two month (July and August).

Human thermal comfort class according to THI	**THI value (^{o}C)**	**July (%)**	**August (%)**	**Human thermal comfort class according to H**	**H value (^{o}C)**	**July (%)**	**August (%)**
Hyperglacial	< -40	-	-	-			
Glacial	-39.9 to -20	-	-	-			
Extremely cold	-19.9 to -10	-	-	-			
Very cold	-9.9 to -1.8	-	-	-			
Cold	-1.7 to +12.9	-	-	-			
Cool	+13 to +14.9	-	-	**Comfortable**	H < 27	29	13
Comfortable	+15 to +19.9	6	-	**Some discomfort**	27 ≤ H < 30	23	3
Hot	+20 to +26.4	94	94	**Great discomfort**	30 ≤ H < 40	36	62
Very hot	+26.5 to +29.9	-	6	**Dangerous**	40 ≤ H < 55	6	19
Torrid	> +30	-	-	**Very dangerous**	H ≥ 55 (heat stroke imminent)	6	3

According to humidity index, 29% of July and 13% of August are composed of days which people refer to as "relaxing-calm". In addition to this during July and August there are also some "very dangerous days" even if their ratios are low.

Discussion and conclusion

In this study period in 2008, duration of 3S tourism in Samsun particularly wind (direction and speed), mainly under the control of factors such as cloud cover and precipitation that has been identified. When these variables are considered sea season in Samsun corresponds to the months of July and august. The emphasis given in tourism studies of Matzarakis (2008) to the fact that consideration of temperature, relative humidity, rain, daily sun bathing time and sea water temperature for periods of 1 month is necessary, is in accordance with the climate values considered in this study. The emphasis given by Gómez Martín (2004) to the fact that tourists visiting Catalonia (Spain) mostly prefer the months of July and august shows similarities to the 3S tourism period put forth in this study. In the study

made by Bigano et al. (2006), their emphasis on the fact that they made sea and sand research due to the sensitivity of tourists to the climate is in accordance with the topics considered in this study.

In the summer months of 2008 mostly "hot-slightly cloudy" days were dominant in Samsun. The fact that De Freitas (2003) defined the ideal atmosphere conditions for coastal tourism as days with wind speeds of 6 m/s or less and a slightly cloudy sky with "mildly hot" conditions supports the study.

The most important variable directly and indirectly affecting 3S tourism in Samsun is the wind. Strong winds have negative effects since they cause waves on the sea and also the scattering of sand. North is the wind direction having the highest frequency during summer months (July %84; august %87). Number of days on which winds with speeds of 21.6 km/h and higher negatively affected sea and beach usage was determined to be 7 in July and 10 in august. The fact that De Freitas (2003) emphasizes that winds with speeds over a certain value cause boredom on people and that by scattering sand and dust disturbs them, supports the results obtained from the article. The same researcher in another study (De Freitas 2006) emphasizes the importance of this topic by stating that people making use of the beach are affected by meteorological conditions such as wind and cloud cover.

The average temperature of the research area during July and August is about 23 ^{o}C (July, 23.1; August 23.2 ^{o}C). Lise *et al.* (2002) stated that tourists from OECD countries prefer temperatures of about 21 ^{o}C (the average of the year's hottest month) while choosing their vacation spots globally which shows similarities with the average summer month temperatures in Samsun.

The number of days during the sea season for which the measured temperature was 25 ^{o}C and more corresponded to 71% in July and 97% in August. Scott *et al*. (2007) states that people who vacation on the beach prefer 27 °C, those that prefer city tourism prefer 22 °C and those that prefer mountainous areas prefer 19 °C weather temperature. These results show similarities with the temperatures of the studied area.

Cloudy days are another variable negatively affecting 3S tourism. In Samsun a total of 20 days were determined to be mostly cloudy, 10 days in July and 10 days in August. Lise *et al.* (2002) state that many tourists wish to relax by sun bathing, watching the view and swimming. They indicate that this is why it is important for the place that they go to be sunny and have mild weather conditions which is in accordance with the subject of this study.

The intensity and duration of the rain have direct and indirect affects on 3S tourism. On days with heavy rain rivers and rain water carry waste to the sea. Also since after the rain the beaches are humid, it is disadvantageous for the people on the beach.

The sea water temperature in Samsun varies between 24-26 ^{o}C in July and August. These values are indicated to be optimal and mild by the visitors. The fact that Morgan *et al.* (2000) indicate the optimal coastal sea water temperature that tourists prefer as 22-26 ^{o}C, is in accordance with the sea water temperature measurements made at the research area.

According to the thermal comfort index, almost all of July and August (%94) are composed of days that people will "hot". According to the humidity index the weather will be felt to be as "comfortable and mild" on 29% of July and 13% of august. The fact that Toros *et al.* (2005) emphasize the weather temperature, absolute humidity and wind speed as important meteorological factors affecting the thermal comfort of people, is in accordance with the method of our study. The fact that these same studies state that with the increase of weather humidity in summer months the affects of temperature will be felt more by people also are climatological reasons explaining why some days in the second half of July and in august were considered to be "sultry-heavy".

The duration of 3S tourism in Samsun is controlled by the climate and weather conditions. For 2008 this duration was intermittently a total of 35 ±5 days.

As a result, even though the research area is rich in natural resources (sand, sea, sun, natural views), the close relation of the duration of sea season with the climate conditions of the area can be stated to be the most important natural factor preventing the investments to increase 3S tourism in Samsun. That is why it will be suitable to make use of the sea and sun tourism along with other alternative tourism attractions in order for the city of Samsun, located in the southern shores of Black Sea, to gain a "tourism city" identity.

References

Andrade H, Alcoforado MJ, and Oliveira S. (2007). Developments in tourism climatology. In: Methodologies to assess the effects of climate on tourism: Weather type and individual Perception. http://www.mif.uni-freiburg.de/isb/ws3/report.htm. Accessed 25 Dec 2008.

Angouridakis and Makrogiannis TJ. (1982). The Discomfort-index in Thessaloniki, Greece. Int. J. Biometeor 26:53-59. doi: 10.1007/BF02187617.

Bigano A, Hamilton JM, Tol RSJ. (2006). The Impact of Climate on Holiday Destination Choice. Climatic Change 76: 389–406. doi: 10.1007/s10584-005-9015-0.

Cengiz T, Akbulak C, Çalışkan V, Kelkit A. (2008). Climate Comfortable for Tourism: A Case Study of Çanakkale. In, BALWOIS 2008 – Ohrid, Republic of Macedonia

– 27, 31 May 2008. In: http://balwois.com/balwois/administration/full_paper/ffp-1184.pdf. Accessed 18 Oct 2008.

Conti S, Meli P, Minelli G, Solimini R, Toccaceli V, Vichi M, Beltrano C, Perini L. (2005). Epidemiologic study of mortality during the Summer 2003 heat wave in Italy. Environmental Research 98:390–399. doi:10.1016/j.envres.2004.10.009

De Freitas CR. (2003). Tourism climatology: evaluating environmental information for decision making and business planning in the recreation and tourism sector. Int J Biometeorol 48:45–54. DOI:10.1007/s00484-003-0177-z

De Freitas CR .(2006). Recreation climate assessment. International Journal of Climatology 10:89-103. doi:10.1002/joc.3370100110

De Freitas CR, Scott D, McBoyle G. (2008). A second generation climate index for tourism (CIT):specification and verification. Int J Biometeorol 52:399–407. DOI 10.1007/s00484-007-0134-3

Epstein Y, Moran DS. (2006). Thermal Comfort and the Heat Stress Indices. Industrial Health 44:388–398. doi:10.2486/indhealth.44.388

Gómez Martín MB.(2004). An evaluation of the tourist potential of the climate in Catalonia (Spain): A regional study. Geografiska Annaler: Series A, Physical Geography 86:249–264. doi:10.1111/j.0435-3676.2004.00229.x

Gómez Martin MB. (2005). Weather, climate and tourism. Annals of Tourism Research. 32:571–591. doi:10.1016/j.annals.2004.08.004

Kamoutsis A, Matsoukis A, Charalampopoulos I, Chronopoulou-Sereli A. (2007). Developments in tourism climatology. In: Biometeorological conditions in mountainous communities and adjacent urban center in Greece by the use of Indices: The case study of mountainous Nafpaktia district. http://www.mif.uni-freiburg.de/isb/ws3/report.htm Accessed 26 Dec 2008

Kozak N, Uysal M, Birkan İ. (2008). An analysis of cities based on tourism supply and climatic conditions in Turkey. Tourism Geographies 10:81–97. DOI: 10.1080/14616680701825230

Lin TP, Matzarakis A.(2008). Tourism climate and thermal comfort in Sun Moon Lake, Taiwan. Int J Biometeorol 52:281–290. DOI 10.1007/s00484-007-0122-7 Lise W, Tol SJT. (2002). Impact of climate on tourist demand, Climatic Change. 55: 429–449

Matzarakis A, De Freitas CR, Scott D. (2004). Developments in Tourism Climatology. In: Tourism and recreation climatology. http://www.mif.uni-freiburg.de/isb/ws2/report/report12.pdf . Accessed 11 Nov 2008

Matzarakis A (2008) Proceedings of the First International Workshop on Climate, Tourism and Recreation. In: Climate and bioclimate information for tourism in Greece. http://www.mif.uni-freiburg.de/isb/ws/papers/13_matzarakis2.pdf. Accessed 18 Oct 2008

Mikhaylichenko YG. (2006). Development of an integrated coastal zone management system for the Black and Caspian Seas. Mitigation And Adaptation Strategies For Global Change 11:521–537. DOI: 10.1007/s11027-006-3461-5

Morgan R, Gatell E, Junyent R, Micallef A, Özhan E, Williams AT. (2000). An improved user-based beach Climate index. Journal of Coastal Conservation 6:41-50 .

Nişancı, A. (1989). An important period towards the seasonal weather types in the Middle Black Sea Region. The Geographical Researchs, Atatürk Culture, Literature and History Higher Institution, Geography Science and Application Department I 69-84

Scott D, Gössling S, De Freitas CR. (2007). Developments in Tourism Climatology. In: Climate preferences for tourism: An exploratory tri-nation comparison. http://www.mif.uni-freiburg.de/isb/ws3/report.htm. Accessed 25 Dec 2008.

Toros H, Deniz A, Saylan L, Sen O, Baloglu M. (2005). Spatial variability of chilling temperature in Turkey and its effect on human comfort. Meteorology and Atmospheric Physics 88:107–118

Yılmaz S, Toy S, Yılmaz H. (2007). Human thermal comfort over three different land surfaces during summer in the city of Erzurum, Turkey. Atmósfera 3:289-297