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A Monthly Assessment of Human Bioclimatic Comfort Conditions in Istanbul

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ABSTRACT

Majority of tourists check the weather and climate comfort condition in choice of destination for travelling. Knowledge of climate information and its application can assist tourism planning and in reducing negative effects of weather and climate on tourists and this branch of the economy. The aim of this research is recognition of suitable months in Istanbul based on Mieczkowski's Tourism Climate Index (TCI), for an analyzed time-period from 1961 to 2016. To calculate the index is used the climatic elements of temperature, precipitation, relative humidity, sunshine hours and wind speed. The results of tourism bioclimatic comfort have revealed that Istanbul has a bioclimatic comfort in 7 months. Weather throughout 7 months from April to October is desirable. Thus, the best climate comfort conditions dominated for the warm seasons of the year with classification of Ideal in June, Excellent in May, July, August, and September, Very good in October, and Good in April for tourism activities. Moreover, daily thermal conditions of Istanbul city have showed the higher consistency in thermal conditions compared to daytime. Hence, the evaluation of human bioclimatic comfort conditions can be effective in tourism development planning.

Keywords: Tourism Climate Index, Bioclimatic, Comfort, Discomfort, Istanbul.

INTRODUCTION

Nowadays, weather and climate have great importance in developing of tourism industry. Weather and climate are key influences on the tourism sector worldwide (Perry and Smith, 1997), affecting the length and quality of tourism seasons and the environmental resources (Scott et al., 2004). Most of the tourists use the climate information for travelling and choice of destination. To bring so many tourism destinations in the world, owes its success to having favorable climate. The characteristics of weather and climate can scarcely disrupt human activities absolutely but they constitute a very important financial factor if viewed in the light of tourism. This implies that some regions of the world have a minimal tourism potential. Climatic conditions allow or favor certain outdoor tourist or recreational activities such as hiking, rafting, golf, and hunting, fishing and climbing (Gomez, 2005). Therefore, climate plays a decisive role in the selection of destinations for tourists.

So far, many efforts have been studied in the fields of assessing the climatic comfort of the human habitat (Matzarakis and Mayer, 1997; Hamilton et al., 2005; Mohammadi and Saeidi, 2008). By definition, the purpose of climatic comfort conditions is that the set of conditions that by temperature it is at least appropriate for majority of people (Jahanbakhsh, 1998). The bioclimatic investigates have confirmed that the subjective perception which the human body feels regardless of the environmental conditions. Today knowledge optimal models human bioclimatic comfort is use different models which most important thoroughly documented in many case studies (e.g. Scott and McBoyle, 2001; Amelung and Viner, 2006; de Freitas et al., 2008). Therefore, the objective of this study is to detect the length and quality of tourism seasons based on Mieczkowski's Tourism Climate Index in Istanbul city.

DATA AND METHODOLOGY

The megacity of Istanbul (Figure 1) is geographically located in the northwest of Turkey and one of the most populous cities in the world. This megacity is the heart of Turkey owing to the industry, commercialization, culture, and tourism. This city covers a total area 5,400 km2 approximately and has many hills with the highest point of 540 m at the Aydos hill (Demirkaya, 2011). Istanbul's climate is usually warm and dry in summer, cold and wet in winter. The average annual temperature is about 13.8 °C with a monthly maximum of 22.8 °C in August and a monthly minimum of 5.3 °C in February. The

total annual precipitation is 837.5 mm with a monthly maximum of 128.4 mm in December and a monthly minimum of 31.9 mm in July (Toros et al., 2017).
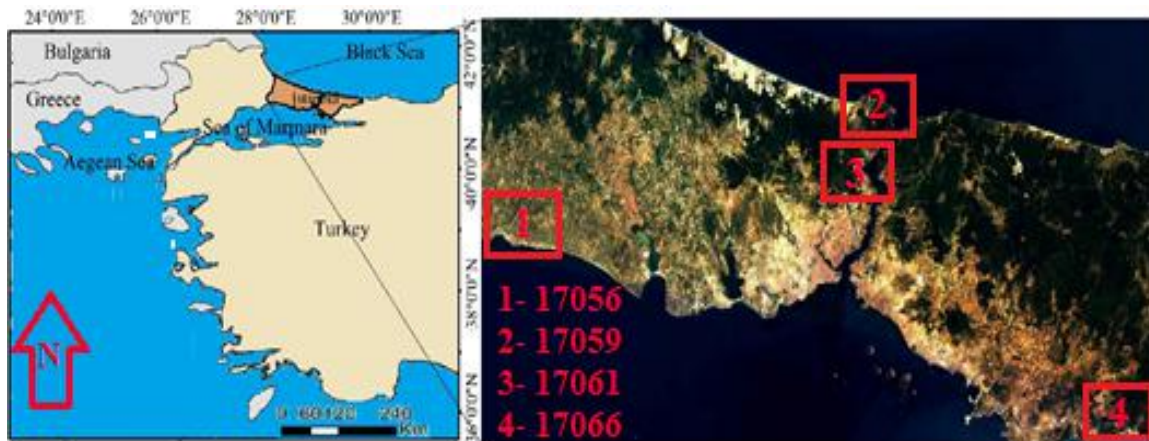
Figure 1. Geographical location of Istanbul city and the selected synoptic stations

To evaluate the climatic conditions for attractions of tourists in Istanbul city, the Tourism Climate Index is applied. In this regards, the daily meteorological parameters of average maximum daily temperature (cg), mean daily temperature (cg), minimum relative humidity (%), average relative humidity (%), rainfall (mm), total sunshine hours (h), average wind speed (km/h) are prepared from Sariyer station of Istanbul city for a long time-period of 1965 to 2016. Mieczkowski (Miesczkowski, 1985) developed Torism Climate Index (TCI). First, this index calculate five sub-indices, each represented by one or two monthly climate variables. The five sub-indices and their constituent variables were as follows: (1) CID day-time comfort index (maximum daily temperature (°C) and minimum daily relative humidity (%)), (2) CIA daily comfort index (mean daily temperature (°C) and mean daily relative humidity (%)), (3) precipitation (total precipitation, (mm)), (4) sunshine (total hours of sunshine), and (5) wind (average wind speed (m/s or km/h). Equation 1 represents the final TCI index calculated based on the previous sub-indices.

$$TCI= 2 [4 \, CID + 2 \, CIA + 4 \, R + 4 \, S + 2 \, W] \tag{1}$$

Based on each location's index value, its suitability for tourism activity has rated on a scale from –30 to 100. Mieczkowski, (1985) divided this scale into 10 categories, ranging from ideal (90-100), excellent (80-89), very good (70-79), Good (60-69) acceptable (50-59), and marginal (40-49) to extremely unfavorable (10-19) and impossible (9 to -30).
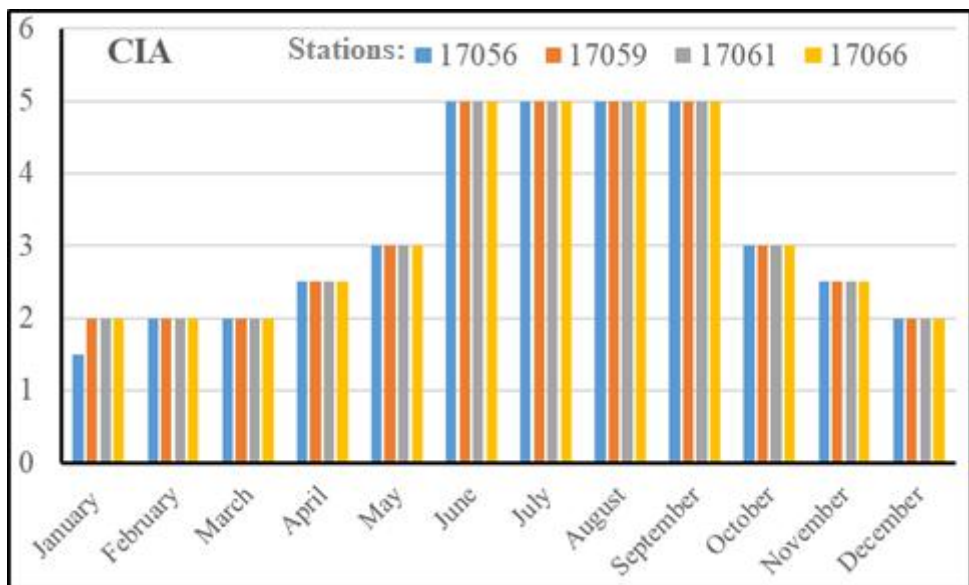
RESULTS AND DISCUSSIONS

An appropriate climate type can lead to positive responses from tourists, and tourists can plan their travel plans according to the desired climatic conditions. Therefore, some meteorological parameters of Istanbul city includes; average temperature, relative humidity, rainfall, sunshine hours, and wind speed has been analyzed using the Tourism Climate Index concerning the assessment of best time for tourism during the year.

The daytime thermal comfort (CID) index is showing the thermal comfort during the maximum tourist activity as well as it calculated based on two meteorological parameters of maximum daily temperature and minimum daily relative humidity. The results of this index based on all studied stations showed that the desirable type of thermal conditions during the daytime for human activities revealed during the four months of May, June, September, and October (Figure 2). On the other side, the four months of warm seasons includes; June, July, August, and September revealed a consistent of the time-period for human activities based on the daily thermal comfort (CIA) levels (Figure 3). This index is showing thermal comfort over 24 hours based on two meteorological parameters of mean daily temperature and mean daily

relative humidity. Thus, the daily thermal conditions of Istanbul city are more biocompatible than the daytime thermal conditions resulted in all of studied stations. This result could be affected by the main characteristic of climate type of Istanbul concerning the existence of higher atmospheric humidity during the days compared to moderate relative humidity during the nights.
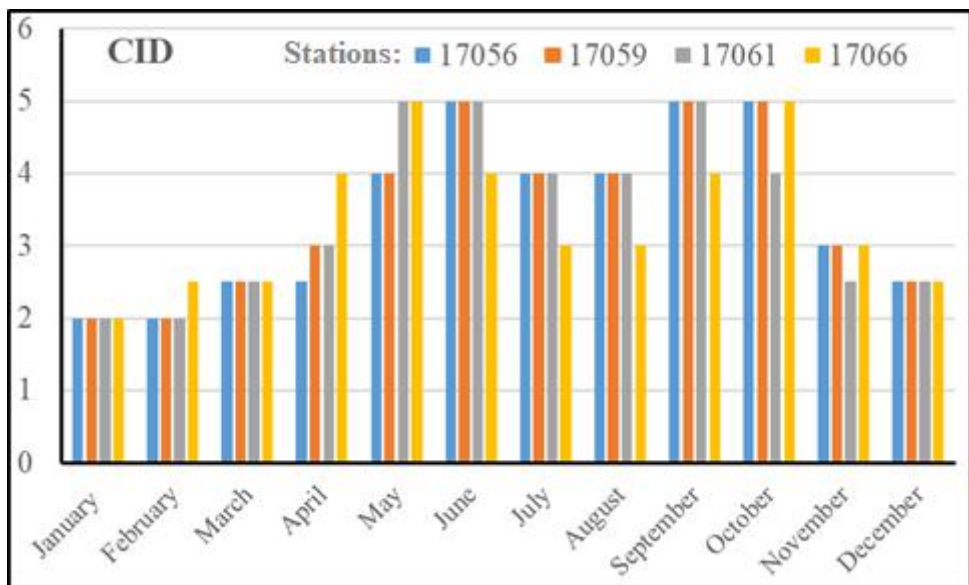

Figure 2. Monthly thermal comfort conditions in Istanbul based on the CID index

Figure 3. Monthly thermal comfort conditions in Istanbul based on the CIA index

An appropriate climate can lead to positive responses from tourists, and tourists can plan their travel schedule according to the desired climatic conditions. The results of assessing the monthly climate comfort condition using Mieczkowski's Tourism climate index indicated that the best months for tourists based on suitable existence of bioclimatic comfort conditions dominated for the months of warm seasons of the year. In this regards, the best rank of tourism climate index revealed for the June with the ideal classification. Then, the second classification 'excellent' of tourism climate index exposed for the majority of months during the warm seasons includes; May, July, August, and September. Overall, the best time for tourist activities based on the capability of climate comfort obtained in the warm seasons of the year, while, there are no suitable climate comfort conditions during the cold seasons of the year (Figure 4).
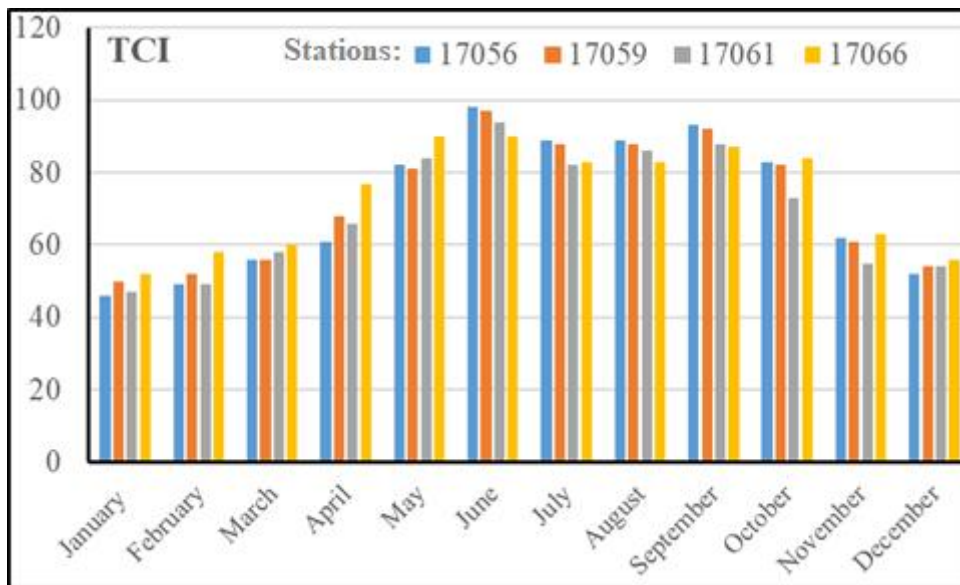
Figure 4. Monthly bioclimatic comfort condition in Istanbul based on the TCI index

CONCLUSION

Certainly, tourism proposed as motive force in the development of contemporary world. In the present study, monthly climatic comfort conditions investigated for determining the suitable months of Istanbul's climate regarding the tourist activities. The results of tourism bioclimatic comfort have shown that Istanbul has a bioclimatic comfort in 7 months. Weather throughout 7 months from April to October is desirable. Thus, the best climate comfort conditions dominated for the warm seasons of the year with classification of Ideal in June, Excellent in May, July, August, and September, Very good in October, and Good in April for tourism activities. Moreover, the daily thermal conditions of Istanbul city are more biocompatible than the daytime thermal conditions based on all results of studied stations. Overall, the best time for tourist activities based on the capability of climate comfort obtained in the warm seasons of the year, while, the cold seasons of the year in the most inappropriate of comfort condition. These results should be note to administrators due to better development of tourism industry for this city.

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