The Effective Bioclimatic Indices on Evaluating Human Comfort (A Case Study: Shiraz City)

M. Safaeipoor, M. Shabankari, T. Taghavi
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Extended Abstract
1- Introduction

Knowing climatic potentials as the background of human activities, constitutes the base for most of the environmental planning and logistics of land; therefore, the majority of the planning of urban development, construction, habitat, architectural, and tourism expansion is perfectly assured when it is accompanied by weather cognition and the use of its various potencies. The most ancient studies and models for knowing and for the degree of influence of climatic elements on human organism along with its bioclimatic diagrams have been done by Bogda in Nigeria (2003) who compared different indices with each other such as Mahani (Evanza) indices, bioclimatic diagram, and the effective temperature. Morillon-Galvez (2004) provided a human bioclimatic atlas Mexico by analyzing given climatic data based on indices of (Olgyay and Givoni). Bouden and Grab (2005) also examined thermal comfort in five cities of Tunisia in two regions. Toy and colleagues (2007) studied and determined the bioclimatic comfort in three different land uses, urban, rural, and urban-sylvan region, in the city of Erzurum in Turkey. In recent years, studies have been done in resort climatology of Arizona in USA by Hartz and colleagues (2006), thermal comfort in Sun Moon Lake by Lin and Matzarakis (2008), and determination of bioclimatic comfort in Erzurn-Rize expressway corridor by using Geographical Intelligence System (GIS) by Zengin and colleagues (2009). The bulk of studies done in the context of evaluating the bioclimatic of Iran embody various subjects. Some of these studies have investigated the evaluation of only bioclimatic and human comfort conditions, such as Kaviani...
(1372), Jahanbakhsh (1377:68), Zolfaghar (1386:129), Mohammadi and Saeedi (1387:45), Mahmooodi (1387:44) and Nazemosadat and Majnoni Haris (1387:71). Another group of studies has evaluated bioclimatic of building by indexes of Mahani, Givoni, and Terjung. Some of them are Movahedi and Asakereh (1370), Najar Salyghe (1383: 144), (Khoshhal: 1385) and Shahbakti and Shafiee (1389:59-63). The other group of studies also investigates bioclimatic of Iran in relation with tourism activities, such as Bazrpash and colleagues (1387:94), Sari Sarraf (1389:63), Farajzadeh and Ahmadi (1389:31-42), and Farajzadeh and Matzarakis (2009:545).

2- Data and Methodology

In the present study, monthly given data of climatic elements of Shiraz with 39-yearly statistical period (1971-2009) and with the help of models and bioclimatic indexes of Terjung, Baker, effective temperature, neurotic pressure, and TCI have been evaluated and the best time (months) for planning the environmental activities have been determined in order to reveal the best conditions for human comfort during a year.

3- Discussion

Since Shiraz, one of the biggest and most populated cities of Iran, has been considered as one of the biggest tourism-industrial poles, the present study while using the most reliable empirical models tries to analyze the bioclimatic conditions of Shiraz from two perspectives: its thermal qualities, and its physiological influences, and a suitable model has been offered for determining the degree of comfort, or the lack of comfort in the studied region during days, months, years, and seasons.

Terjung index reveals that Shiraz during months of January, February, March, April, November, and December has very cool physiological conditions. Months of July and August have hot bioclimatic conditions. Physiological conditions are moderate during months of May June, September, and October. In the method of Baker, during cold period of the year (months of December, January, February, March) moderate changes of human bioclimatic as a result of cool and cold weather is observed in Shiraz. Environmental conditions in spring change from relative stimulus and pressure to moderate and mild conditions. Environmental conditions during summer are tolerable, and in spring because of having moderate, mild weather, they are suitable for human comfort.

The results of analyzing Tourism Climate index (TCI), show that months April and November have the best climatic condition (the excellent degree) for comfort. The months of December, January, February, March by sitting in the group of good degree have the relative appropriate conditions for environmental activities. Shiraz is not suitable for tourism activities during the months of June until September because of its low degree and the lack of conditions for comfort.

There are conditions of comfort in neurotic pressure index during the months of June until October. May and October have cool conditions of comfort
while the months of April and November have very cool coefficient of comfort. Coefficient of comfort is cold during the months of January, February, March, and December, and finally August has warm coefficient with conditions of comfort. In Effective Bioclimatic Indexes during the months of May until October conditions of comfort while the months of July and August have warm conditions and the other months have very cool conditions.

The study and comparison of indexes reveal that the best conditions of comfort for environmental activities in Shiraz from time perspective are in May, June, September and October. During the cold period of every year (from November to April), Shiraz is excluded from the limits of bioclimatic comfort because of its very cool bioclimatic conditions. It also has warm and unfavorable bioclimatic conditions during July and August. As a whole, spring with its unique conditions for human comfort is the best season for environmental and tourism activities in Shiraz.

4- Conclusion
The analysis of human comfort by using bioclimatic indexes reveals that bioclimatic index of Shiraz mostly has a wide range of variety during the year and changes from warm conditions to very cool conditions. Despite trivial differences, all indexes present the same aspects of climatic comfort of Shiraz.

The analysis and comparison of bioclimatic indexes reveal that from time perspective the best conditions for environmental activities Shiraz is in May, June, September and October. During cold period of year (from December to March), Shiraz is excluded from the limits of bioclimatic comfort because of its very cool bioclimatic conditions. It also has warm and unfavorable bioclimatic conditions during July and August. As a whole, spring with its unique conditions for human comfort, is the best season for environmental and tourism activities in Shiraz.

Key words: Bio-climatic comfort, Terjung, Baker, Neurotic strain, TCI, Effective temperature

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