Study of Climatic Conditions for Tourism Development by the Aid of a TCI Index (The Studied Case: Kohkiloye Boyerahmad Province)

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Abstract
Climate is an important consideration for planning and management of tourist activities as it has a major effect on a tourist's experience. The Tourism Climate Comfort Index (TCI)determines the suitability of a climate for tourism in a specified area. TCI mainly consists of the following seven parameters: averages of maximum daily temperature for each month in terms of Celsius(T max); average daily minimum levels of humidity for each month as a percentage (RH min);average of daily temperatures for each month in terms of Celsius (DBT); average of daily humidity levels for each month in terms of percentage (RH mean); the average of daily total rainfall for each month in terms of millimeters (R), the average of records for daily wind speed for each month in terms of Km/ h (W), the average daily total sunshine hours for each month (S), the daily average hours of sunlight (s) for each month. Calculations for these parameters are all made according to the relevant mathematic relations and evaluations for these parameters are classified and entered into the GIS environment, so that a climate profile for tourism is determined for different regions. This research has attempted to survey and evaluate the conditions for tourism in Kohkilouye and Boerahmad (K.B) province based on the TCI. The results of this analysis using the TCI show that May and October have the best climatic conditions in K.B province and the months of January; February and December have the worst conditions for tourists.

Key words: Tourism, climate, the climate of touristy rest, TCI, K.B province

1- Introduction

1-1- Clarification of the research problem

Economic development in every country requires investment in all the different sectors of its economy. Furthermore, regional development in terms of employment opportunity, production and economic stimulation all require investment in the infrastructure of a region. Many countries of the world are finding that tourism can attract foreign investment and develop a region's economy towards reaching its full potential(Scott et al., 2004). It is widely accepted that climate has a great impact on people's lives, their health and general sense of well-being, so it makes good sense to consider climate in planning tourist development of a region (Ziaei & Bakhtiari, 2009). The study of climatein terms ofvariations across time and place is a good way to analyze environmental conditions for planning tourism and social events in an area (Tavallaee, 2007). The specific climate conditions of a region present an important factor affecting levels of tourist activities in a region (Ziaei & Bakhtiari, 2009).

The term people's welfare is used in this study to describe environmental climatic conditions that affect people's comfort such as heat and humidity; a state of welfare is reached when at least 80% of randomly selected individuals in a set of conditions have a stable mental state and a sense of well-being (Kasmaee, 1993). A person's sense of welfare in a climate depends on the thermal balance of a human body to its surroundings. This equilibrium depends on factors such as the particular weather conditions of the immediate surroundings; an individual's level of physical activity, temperature and relative humidity and sun's radiation level (Ramazani, 2006). The simultaneous effects of various climatic elements have brought about the employment of several methods to determine the specific climatic conditions across times and places. Indicators of climates for tourists are generally classified according to the following categories: primitive indicators that lack the required relationship between climatic and physiological elements and bio-climatic indicators that include more factors. These indicators usually consider the compound effect of climatic factors. Those indicators related to human physiologies, stem from the relationship of the human body to an environment. These have obtained a higher value in studies

concerning climatic biology of man and meteorology for tourism (Zolfaqari, 2007). The tourism index (TCI) is a compound method of analysis, first presented by Michofski in 1985. In reality TCI is a combination of factors that affect a tourist's welfare. Helped by this indicator the most reasonable time for traveling, in terms of a tourist's welfare can be determined by climate. Furthermore, calculations can be made for different parts of the country and even for different parts of the world that may be used by tourists as information that may be helpful in choosing a destination.

1-2- The importance and necessity of research

As a greater part of tourism today is based on the basis of utilizing physics-natural peculiarities, the development of tourist attractions is not based only on aspect but on a wide spectrum of resources, particularly natural resources.Climate is therefore a valuable asset for a tourism industry, so it is very valuable for planners to be aware of the climatic conditions for days when tourists are to visit historical places. Therefore it is very important to determine and specify indicators that may maximize tourists' welfare. Kohkilouye and Boerahmad province has great potential as an attractive tourist region so with TCI analysis, precise programming can be applied to attract tourists and to manage the tourist industry more effectively.

1-3-Research background

The effect of climate on levels of tourist activity and tourist satisfaction makes climate an important consideration in decision making and planning tourist destinations. With regards to the importance of tourism and tourist attractions for communities, lots of research has been done in this field to determine the most reasonable climatic conditions for tourists, some of which are as follows:

1-3-1- Matzarakis(2001) in an article entitled 'Weather and climatic conditions for the tourist industry in Greece' mentions that because of great geographical differences between Greek internal regions and islands, climatic conditions also differ, so that in the Greek Islands, climatic conditions are good during July and the temperature is lower than that of other parts. The temperature at noon in October is lower than 18^0C, which means that these regions, at that time of day, register as having conditions of thermal welfare or a little warmer, therefore

no physiological stress is induced. However, domestic regions of Greece have a worse climatic condition than the islands at that time.

1-3-2- Amelung and Viner (2006)in an article entitled, 'Mediterranean Tourism, future surveys with TCI index', examines climatic change predictions for Mediterranean regions using the TCI index. These examinations predict that weather will become extremely hot in the Mediterranean region in the summer,but the weather in northern Europe will become more comfortable. Results obtained from these examinations also indicate that climatic conditions become more pleasant in the majority of Mediterranean regions, particularity in Spain, Greece and Turkey.

1-3-3- Bynoe and Howard (2009) in an article entitled 'Climatic changes and the future of tourism in Caraeib' determine the most comfortable times for tourist activities in North America,Western and Eastern Europe and the Pacific coast between May and August and in the Middle East, Asia and Africa between December and April. The study also determined the best time for tourist activities in Caraeib to be between December and April.

1-3-4- Zolfaghari in an article, entitled "Determination of the reasonable time calendar for an excursion in Tabriz using the temperature predictions for 2007', concludes that the climatic resting period in Tabriz,using indicators of physiologic equal temperature and predictions for 2007 concluded that the climatic resting period in Tabriz lasts but only for a period of 45 days, from early June until July (Zolfaqari, 2007).

1-3-5- Shayan, in an article entitled 'Studying the climatic conditions of Kish Island with the purpose of developing tourism' utilizing TCI in 2009, introduces the winter season as the best season.

1-3-6- Esmaeili and Saber Haghighat in an article entitled 'Evaluation of the climatic resting conditions of Chahbahar port' aimed at the development of tourism,and concluded that in the cold seasons of the year when more than half the country has unfavorable conditions for tourists, Chahbahar port enjoys favorable climatic conditions and is therefore,a good tourist destination during that time.

1-4- The objectives of the research
The most important aims of this research are:

1-4-1- Determination of the comfort climate of tourists in Kohkiloye and Boyerahmad

1-4-2- Preparing a timetable for visiting the tourist sites of Kohkiloye and Boyerahmad province.

2-Materials and Methods
2-1- The scope under study

The Kohkiloye and Boyerahmad province is located between $29^0 55^/$ ~ $31^0 32^/$ N and $49^0 57^/$ ~ $51^0 52^/$ E. From the geographical point of view this province is located in south western Iran and borders Chaharmahal and Bakhtiari province to the North; Bushehr to the south; Farsand and Esfahan to the east and by Khuzestan to the west. The province has 13 towns, 14 wards, 40 villages; an oasis with a population of 2026 and 1077 unpopulated ones. It has an area of 16264 km^2 with a population of 595,000 people. It is completely mountainous and on relatively high ground with about 3.1 of land in the province formed by high and unlevel land. It is surrounded by the Zagross chain of mountains to the north and east and by the black and white mountains to the south and southeast.

As for climate, this province can be regarded as having two regions; a hot region and a cold region. The hot region incorporates the townships of Kohkiloye and Gachsaran and Boierahmad and Denais in the cold region. The center of Kohkiloye and Boyerahmad is Yasooj town at an altitude of 18650 m above sea level.

It has the most beautiful natural views and is located on the slopes of Dena Mountain.

2-2- TCI Index

The comfort indicators reset out in diagrams and tables showing the collective effects of all factors affecting comfort (Shayan & Keshavarzi, 2009). There are different methods used to classify climate in terms of levels of comfort, they refer to the physiologic equal temperature indicator, the estimation of votes medium indicator and the indicator of group challenge. The TCI indicator, which was first presented by Michkofsky in 1985, is in reality, a combination of climatic factors affecting a tourist's welfare. This indicator is propounded from the climatic dimension of the tourism industry.

In this article, the indicator in question was calculated for a 20 year' period for 9 synoptic stations in Eastern Azarbaijan province and then results were applied to the Geographical Information System (GIS). These climatic conditions were then graded for each month of the year in the region. The merit of the TCI indicator compared with other indicators is that this indicator uses all the important climatic variables that collectively control the thermal conditions of the human body in relation to tourist activities such as temperature, humidity, rainfall, wind and sunshine hours. TCI can offer information in the field of climatic conditions for destinations at different times of the year and offers tourists the facility to choose a time to travel when climate conditions are most favorable for them (Sarraf& etal., 2010). There are seven parameters used in this index, they are as follows: 1- The average of daily dry temperatures for each month in terms of Celsius(DBT). 2- The average of daily levels of humidity for each as a percentage (RH mean). 3- The average of daily maximum dry temperatures for each month in terms of Celsius, (Tmax). 4- The average daily levels of minimum humidity for each month as a percentage (RH min). 5- The average daily total rainfall for each month in millimeters. 6- The average of daily total sunshine hours for each month (S). 7- The average of daily wind speed records for each month in Km/ h (W).

These seven variables are taken into consideration as five parameters in calculations for TCI, of which 3 variables are used as independent parameters and the other two variables are used in the form of bioclimatic variables. These five parameters are as follows:

1- Daily comfort index (CDI): that includes the maximum daily temperature and the average minimum daily relative humidity. This index shows the thermal comfort conditions when the maximum tourist activity is performed and its share in TCI is 40%. In order to measure thermal comfort, an expression of physiology and psychic welfare of an individual is obtained from the variables of temperature andrelative humidity. In this index the most favorable conditions of the region from the viewpoint of thermal comfort are in the range of $20\sim27^0$C for temperature and 30~70% relative humidity.

2-Day and night comfort index (CIA): includes the average daily temperatures and average daily relative humidity records. This index

shows the thermal comfort conditions in a full 24 hours and its share on TCI is 15% and in order to calculate it, the relevant figure is utilized.
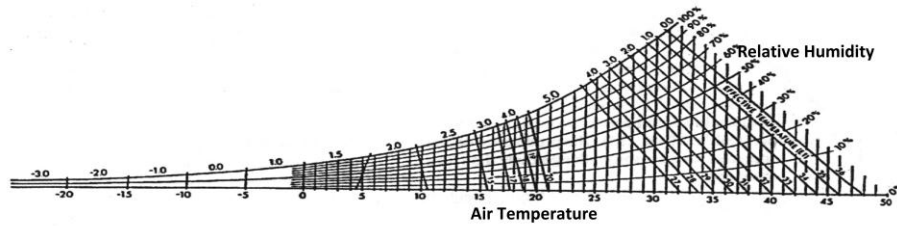

Figure 1. Comfort Index

3-Scale of rainfall: rain generally has a negative effect on tourist activity. The share of rainfall on TCI is obtained from the relevant table. In this grading system, when the quality of rain increases its grade comes down, which means there is a negative effect of rainfall on tourist activities.

Table 1: Classification of rainfall grading on the TCI index

Grading	Monthly rainfall average in millimeters
5	14.9-0
4.5	29.9-15
4	44.9-30
3.5	59.9-45
3	74.9-60
2.5	89.9-75
2	104.9-90
1.5	119.9-105
1	134.9-120
0.5	149.9-135
0	150 or more

4- The number of sunshine hours(S): sunshine generally has a positive effect on tourist activities. It is important from the point of view of mental attitude and for the quality of the photograph that the tourist wants to take. However this factor has a disturbing effect in hot climates where it may cause sunburn. This index, like that for rain has a value of 20% in TCI and generally more sunshine more credits.

Table 2: Variable levels of sunshine in TCI

Monthly Rank	Sunshine hours average per day
5	10 hours and more
4.5	9-9:59
4	8-8:59
3.5	7-7;59
3	6-6:59
2.5	5-5:59
2	4-4:59
1.5	3-3:59
1	2-2:59

0.5	1-1:59
0	Less than 1 hour

5- Airflow (wind speed average 'W'): is a completed variable in evaluations of climate for tourist activities. By transmission of warmth via hard blowing and increasing perspiration and removal of thermal layers of the air round the skin has a role in feelings of comfort. The effect of this variable depends on temperature. Because of evaporation and cooling, weather has a positive effect but in cold climates, wind has a negative effect on people's thermal comfort. Four types of grading systems have been considered for wind. Normal rates in the system lies in the third column of the table, in which the lowest monthly average of wind speed has the highest grade. This system is used when the maximum average temperature is between 15 and 24^0Celsius. The Alize wind system (column 2) shows the positive effects of evaporation and cooling of wind in high temperatures. This system is used when the average maximum temperature is between 24^0Cand 33^0C. In this scale those wind records with a moderate speed create the highest climate rating, gaining the highest grade of 5.

The first column of the table is used to place hot climate a regions that is when the average daily maximum temperature is more than 33^0C. Wind generally has a negative effect, but it can have a positive effect in low speed. For this reason winds that have low speeds gain the highest grade of 2. With regards to the negative effect of wind at low air temperatures, a monogram has been drawn so that it may be utilized for months when the maximum daily temperature is less than 15^0C and the medium wind speed is more than 8 Km/h. This monogram is shown in figures 2-4.

Table 3: Grading of the wind parameters in TCI

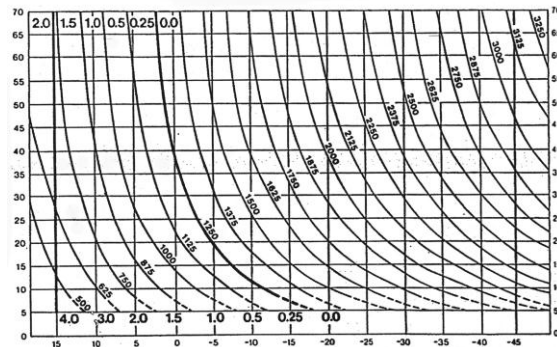| Wind Speed）Km/h(	Beufort Scale	Normal System	Alize Winds System	Hot Climates
<2.88	1	5	2	2
2.88-5.75	2	4.5	2.5	1.5
5.76-9.03	2	4	3	1
9.04-12.23	2	3.5	4	0.5
12.24-19.79	3	3	5	0
19.80-2429	4	2.5	4	0
24.30-28.79	4	2	3	0
28.80-38.52	5	1	2	0
>38.52	6	0	0	0

Figure 2. Grading system for the cooling effect of wind on the TCI index

In order to calculate the TCI index, the above variables, with regard to their relative values in TCI are weighted and are put in formula No. 1 to obtain a TCI rating.

Formula No.1   TCI=2(4CID+CIA+2R+2S+W)

In this formula CID determines a comfort index and a combination of averages of maximum temperature and averages of minimum relative humidity. CIA is the index of 24-hour comfort and contains average temperatures and the average of relative humidity;, R is rainfall;,S is sunshine and, W is wind speed.

After calculations of TCI of stations for each month of the year due to the fact that the results are in the form of dots, in order to specify the scope of TCI for all areas of the province, dot like data are generalized for all areas of the province. In order to generalize, dot like results for all province,(IDW) the method was used and with this practice the stations are converted to surface information, thus the TCI map is obtained for the whole province. Finally, having calculated TCI, its numerical quantity lies between 0 and 100, thus each region will have a number with regard to its climatic conditions. In table No. 4 one type of classification has been offered for this index.

Table 4: The numerical quantities of tourism climatic index and naming of the relevant   climatic groups

Climatic Group	Grade	Range of TCI index
Ideal	9	90 - 100
Excellent	8	80 - 89
Very good	7	70 - 79
Good	6	60 - 69
Acceptable	5	50 - 59
Unsuitable	4	40 - 49
Unsuitable	3	30 - 39
Very unsuitable	2	20 - 29
Very unsuitable	1	10 - 19
Intolerable	0	(-9) - 9

Intolerable	1-	(-20) - 20

3- Research Findings

The TCI index for Kohkilouye and Boyerahmad province was surveyed on a monthly scale using TCI. The results for each month are as follows:

3-1- The TCI map for January and February: with regards to data available in map No. 3 the mountainous regions in Kohkilouyeh and Boirahmad province such as Dena region, Zagross chain of mountains, Siahkooh,Safid kooh, Kooh Eshkar, Alborz and Kooh neel have unfavorable climatic conditions, other regions of the province are either in critical conditions or in areas of extreme climatic condition; map No. 4 shows that the highland area shave unfavorable conditions and the surrounding slopes have critical conditions, and the other regions of the province have acceptable climate levels, the low regions to the south and west adjacent to Khuzistan have good conditions.
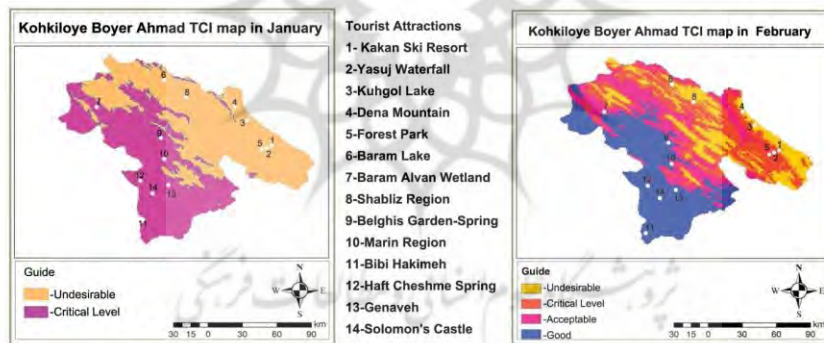

Figure 3.   **Figure 4.**
TCI map of Kohkilouye in January   **TCI map of Kohkilouye in February**

3-2- TCI map for March and April: TCI map No. 5 for Dena and Zagross regions lie in the mountainous and war stricken regions,those regions around the highlands have acceptable conditions, and the other southern and western regions of the province, with regards to being adjacent to Khozistan province have good conditions. Map No.6 shows that the TCI of the mountainous regions of Dena and Zagross have good climatic and extreme conditions and the regions around the highlands are in good conditions and the other southern and western

regions of the province adjacent to Khuzistan province have excellent conditions.
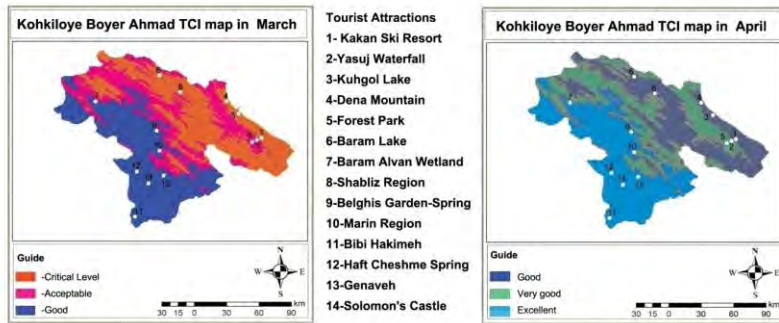

Figure 5.
TCI map of Kohkilouye in April

Figure 6.
TCI map of Kohkilouye in March

3-3- The TCI map for May and June: map No. 7 shows the climatic conditions in May (Ordibehesht 11th to Khordad 10th), it demonstrates that from the climatic point of view the province is divided into two regions: the northern and eastern highlands are located in areas with ideal climatic conditions and southern and western regions are in areas with excellent conditions and the slopes of the highlands have ideal climatic conditions and finally the southern and western regions, because of their adjacency to Khuzistan province have very good climatic conditions.
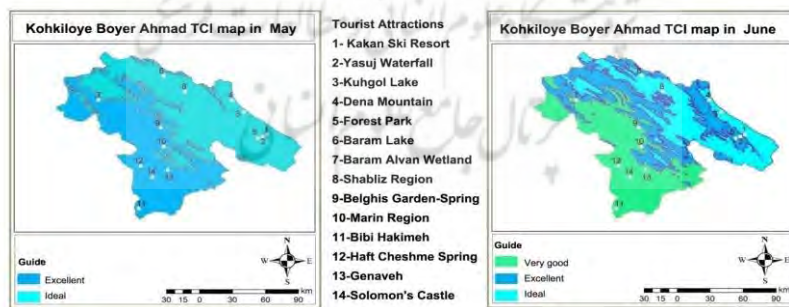

Figure 7.
TCI map of Kohkilouye in May

Figure 8.
TCI map of Kohkilouye in June

3-4- TCI map in July and August: maps No. 9 and 10demonstrate that the northern and eastern (Dena and Zagross) regions have excellent climatic conditions and Dena and Zagross highlands have very good climatic conditions and finally the low regions of the province (South and West) have good climatic conditions.
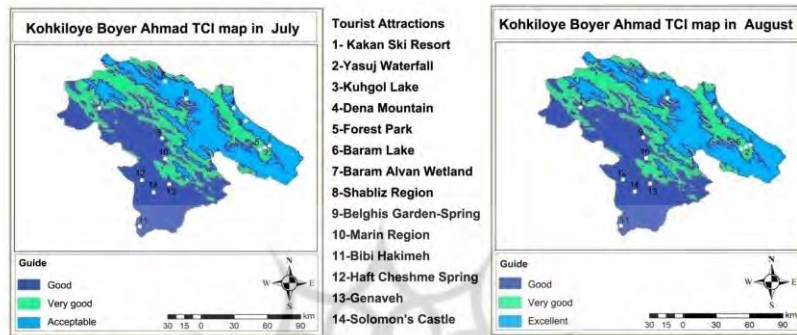

Figure 9.
TCI map of Kohkilouye in July

Figure 10.
TCI map of Kohkilouye in August

3-5- The TCI map of September and November with regards to map No. 11for September (Shhrivar 1st toMehr 2nd)shows that the highlands and high regions in this month have excellent climatic conditions and the slopes of mountains have ideal climatic condition and the low regions of the province(south and west) are in good climatic conditions and map No. 12for October in the north and west regions of Dena and Zagross highlands have excellent climatic conditions and other low regions of the province (south and west) have ideal climatic conditions.
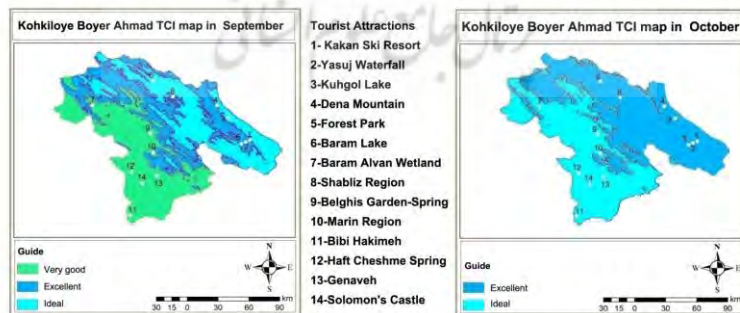

Figure 11.

Figure 12.

TCI map of Kohkilouye in September   TCI map of Kohkilouye in October

3-6- The TCI map in November and December: As demonstrated in maps No. 13 and 14 showthat the high regions and the highlands of Dena and Zagross regions are in good climatic conditions and the other lowlands adjacent to Khozestan have very good climatic conditions,and the TCI map in December the mountainous regions.

Highlands and slopes have critical and extreme climatic conditions. Other regions of the province have acceptable climatic conditions.
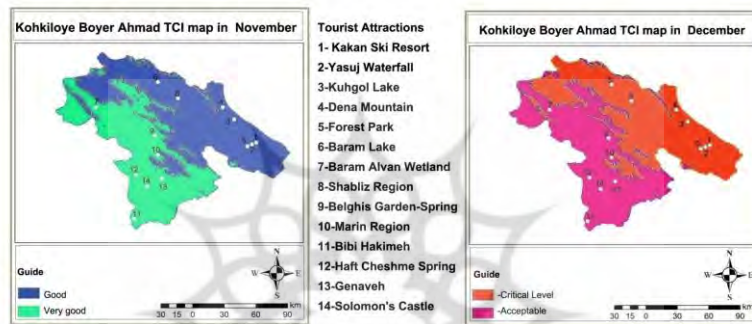

Figure 13:
TCI map of Kohkilouye in November

Figure 14:
TCI map of Kohkilouye in December

4- Discussion and Conclusion

The climatic conditions of a region have a major affect on visitor attraction to an area. Tourists can be attracted or discouraged from visiting a particular place at a certain time due to its climate. Climate plays an important role in the development of tourism in an area together with geographical location, topography, natural views and the flora and fauna. Thus it can be asserted that the climate is an important natural resource of an area, affecting the seasonal duration and quality of the tourism industry in an area as well as the health and comfort of individual tourists (Scott and et al., 2004). In Kohkilouyeh and Boyerahmad there are different climatic conditions in different regions in different seasons of the year that affect an area as a tourist attraction, so evaluation the of an area's climate may help planners to optimize development of the tourist industry of an area. Conclusions achieved by the employment of the TCI index to determine climatic conditions in the province indicate that there is seasonal variation among the

different regions of the province, so that, with regards to the annual peculiarity of the TCI index throughout the province in January, Dena regions and Zagross chain of mountains have undesirable climatic conditions and the other regions of the province have critical climatic conditions. In February the highlands have undesirable climatic conditions and the other regions of the province have acceptable conditions. With regards to the TCI index this province in January and February has the most unpleasant conditions. March, which coincides with the end of winter and the beginning of spring Dena and Zagross mountainous regions have critical climatic condition and in April the mountainous regions have pleasant climatic conditions and the other regions have splendid conditions and most of the southern regions, adjacent to the best regions of Khozestan draw tourists' attention. With regards to the TCI index May and October have excellent climatic conditions for tourists and are the most favorable months in the province. With regards to the TCI index travelling to this province is evaluated as very good.

Table 5: Proposed Calendar for Visiting Tourist Attractions of KB Province According to TCI Index

Feb/ March Esfand	Jan/ Feb Bahman	Dec/Jan Dey	Nov/ Dec Azar	Oct/ Nov Aban	Sep/Oct Mehr	Aug/Sep Shahrivar	July/Aug Mordad	June/ July Tir	May/June Khordad	April/ May Ordibehesht	March/ April Farvardin	Time / Attraction
Critical	Undesirable	Undesirable	Critical	Good	Excellent	Excellent	Very Good	Very Good	Ideal	Ideal	Good	Kakan Ski Resort
Acceptable	Critical	Undesirable	Critical	Good	Excellent	Excellent	Very Good	Very Good	Excellent	Ideal	Very Good	Yasuj Waterfall
Critical	Undesirable	Undesirable	Critical	Good	Excellent	Ideal	Excellent	Excellent	Ideal	Ideal	Good	Kuhgol Lake
Critical	Undesirable	Undesirable	Critical	Good	Excellent	Ideal	Excellent	Excellent	Ideal	Ideal	Good	Dena Mountain
Acceptable	Critical	Undesirable	Critical	Good	Excellent	Excellent	Very Good	Very Good	Excellent	Ideal	Very Good	Forest Park
Critical	Undesirable	Undesirable	Critical	Good	Excellent	Ideal	Excellent	Excellent	Ideal	Ideal	Good	Baram Lake
Good	Acceptable	Critical Level	Acceptable	Very Good	Ideal	Excellent	Good	Good	Very Good	Ideal	Excellent	Baram Alvan Waterland
Critical	Undesirable	Undesirable	Critical	Good	Excellent	Excellent	Very Good	Very Good	Ideal	Ideal	Good	Shabliz Region
Good	Good	Critical	Acceptable	Very Good	Ideal	Good	Good	Good	Very Good	Excellent	Excellent	Belghis Garden Spring
Acceptable	Critical	Critical	Acceptable	Very Good	Ideal	Good	Good	Good	Very Good	Excellent	Excellent	Marin Region
Good	Good	Critical	Acceptable	Very Good	Ideal	Good	Good	Good	Very Good	Excellent	Excellent	Bibi Hakimeh
Good	Good	Critical	Acceptable	Very Good	Ideal	Good	Good	Good	Very Good	Excellent	Excellent	Haft Cheshme Spring
Good	Good	Critical	Acceptable	Very Good	Ideal	Good	Good	Good	Very Good	Excellent	Excellent	Genaveh
Good	Good	Critical	Acceptable	Very Good	Ideal	Good	Good	Good	Very Good	Excellent	Excellent	Solomon's Castle

References

Amelung, B., & Viner, D.(2006). Mediterranean Tourism: Exploring the future with the Tourism Climatic Index, Journal of Sustainable Tourism, 14, 349- 366.

De, Freitas, C.R., Scott, D.,& McBoyle, G.(2008). Second generation Climate Index for Tourism (CIT) specification and verification, International Journal Biometeorol, 5, 399- 407.

Ebrahimi, A., Ghaderi, E., Rehmeti, S., & Akbari, R. (2010). Investigation of effect of advertisement on tourist attraction, Geography and Development, 17, 139- 156.

Ebrahimzade, I., & Aqasizade, A.(2009). Analysis of effective factors on tourism development in coastal area of Chabahar based on strategic model of SWOT, Urban and Regional Studies, 1, 107- 128.

Eccles, G.,& Costa, J.(1996). Perspectives on tourism development, International Journal of Contemporary Hospitality Management, 8, 44- 51.

Esmaeeli, R., Saber Haghighat, A.,& Malbosi, Sh.(2010). Evaluation of comfort climatic condition of Chabahar Port in the course of tourism development, Articles of the 4th International Congress of Islamic Countries Geographers (ICIWG) 14- 16 April 2010 Zahedan Iran, 1- 10.

Farzin, M..(2008). Economy of Tourism, Commercial Studies Institution, (Chapter1)

Font, Xavier.,& Ahjem, Tor E.(1999). Searching for a balance in tourism development strategies, International Journal of Contemporary Hospitality Management, 11, 73- 77.

Kasmaee, M.(1993).Climatic Stratification of Iran, Housing and residential environment, Research Center of Building and House, (Chapter1)

Mahmudi, P. (2008). Tourism and determining scope of climatic comfort in Marivan based on indicator of effective temperature, Geography Education Growth,3, 44- 49.

Matzarakis, A.(2001). Climate and bioclimate information for tourism in Greece.In Proceedings of the first international workshop on climate, tourism and recreation, ed. By A, Matzarakis & C.R. De Freitas. International Society of Biometeorology, Commission on Climate Tourism and Recreation,171- 184.

Maureen, D., Agnew, J., &Palutikof.P (2001). Climate Impacts on the Demand for Tourism. In Proceedings of the first international workshop on climate, tourism and recreation, Edit. By A, Matzarakis & C.R. De Freitas, December 2001, 42- 50.

Mieczkowski, Z.(1985). The tourism climate index: a method of evaluating world climate for tourism. The Canadian Geographer, 29, 220- 233.

Ramazani, B.(2006). Knowing ecotourism potentials of bioclimatic comfort of Kiaklaye wetland of Langrood by the method of Evanza, Geography and Regional Development, 7, 73- 87.

Saraf, B., Jelali, T., & Jelal Kemali, A.(2010). Climatourism stratification of Arasbaran Region based on TCI index, Geographical Space, 30, 63- 88.

Scott, D., McBoyle, G., & Schwartzentruber, M. (2004). Climate change and the distribution of climatic resources for tourism in North America, Climate Research (Clim Res), 27, 105-117.

Shayan, S., & Keshavarzi, H.(2009). Study of climatic condition of Kish Island for tourism development based on TCI index, selected papers of the 5th National Conference of Persian Gulf, 49- 61

Tavallaee, S.(2007). Review of tourism industry, Tehran University, (Chapter 1).

Winston, M., Denny, L.B., & Stacia, H. (2009). Climate change and tourism features in the Caribban, Munich Personal Repec Archive (MPRA),December 2009, 1- 36.

Ziaee B.,& Bakhtyari, A.(2009). Tourism comfort climate index of Kish Island, selected papers of the 5th National Conference of Persian Gulf, 83- 102.

Zolfaqari, H.(2007). Determining the suitable time for touring to Tabriz based on Physiological equivalent temperature parameters, Geographical Researches, 62, 129- 141.