The Impact of Climatic Comfort in Urban Tourism Development Case study: Gorgan city, GOLESTAN PROVINCE, IRAN

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Abstract: According to estimates done, a city with a growing tourism industry faces that affect climate on a large part of its capacity. This paper is to use documentary studies and methods quantity, based on meteorological statistics, 26 years old bring tourism climatic comfort index for Gorgan. Purpose of TCI indicators in different time periods have been used to describe the climatic situation in Gorgan. The results show that, with respect to the peak travel time in Iran, Gorgan best time to travel primarily in July and first half of April is and this is the second time in September.
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1. Introduction

Urban tourism is becoming the world's largest and highest paid industry, So that ten percent of employment world and ten percent of GDP is allocated to. (UNWTO, 2008) From 1950 through 2007, international tourist numbers have increased from 25 million to 903 million people and Income from this activity has reached 865 billion dollars. (Moreno & Amelung, 2009, 550) The result is predicted that by 2020 this number reached to 16 billion people.(UNWTO, 2001)

Currently 210 million people, equivalent to 3.8 percent of employees' worldwide, work in tourism-related industries and average 4 to 5 percent of its funding through the revenue sources of tourism takes. Climate is an important part of the capacity allocated to the tourism area. The weather and its diversity as a source is tourism. Most tourists stay in place, are due to weather. Climatic quality conditions with respect to its many elements, it may seem a little difficult. Climate data should be provided so that way people react to weather conditions or climate indicates and a degree in quantity, degree of excellence to include unacceptable. These indicators are easier to interpret the effects of various complex and atmospheric elements and compare the various places to provide this perspective. (De Freitas, 2002)

Tourism is one of the largest and fastest growing economic sectors. Tourism is obviously related to climate, as tourists prefer spending time outdoors and travel to enjoy the sun or landscape. It is therefore surprising that the tourism literature pays little attention to climate and climatic change (e.g., Witt and Witt, 1995), perhaps because climate is deemed constant and beyond control. It is equally surprising that the climate change impact literature pays little attention to tourism (Smith et al., 2001), but this can perhaps be explained by the fact that most climate change impact studies are done by field rather than climate experts.

The situation is now slowly changing (e.g., Nicholls, 1996). Five branches of literature have started to grow. Firstly, there are a few studies (e.g., Maddison, 2001) that build statistical models of the behavior of certain groups of tourists as a function of weather and climate and there are similar studies on recreational behavior.1 Secondly, there are a few studies (e.g., Abegg, 1996) that relate the fates of particular tourist destinations to climate change. Thirdly, there are studies (e.g., Matzarakis, 2002) that try to define indicators of the attractiveness of certain weather conditions to tourists. Fourthly, there are a few studies (e.g., Hamilton et al., 2003) that use simulation models of the tourism sector. Finally, a handful of studies (e.g., Berritella et al., 2004) analyze the economic implications.

Iran is among the first ten countries in terms of tourism attractions and Diversity of tourism is among the five countries of the world. Meanwhile in terms of attracting tourism is almost universal in the latter category. According to the 2002 World Tourism Organization, only 24 percent of tourists and tourism revenues 16 percent of the world belong to Iran. Twenty-year outlook for the country in 1404, gaining 2 percent of global tourism revenue and 1.5 percent of international tourists has been considered as a target.(Esmaili and et al,2010) To achieve these goals is dependent on factors affecting tourism, which is one of the most important climatic factors.

2. Material and method

The study of statistics Station Hashemabad, Gorgan, between 1984 to 2010 (period 26) to the monthly average is used. Excel statistical software was used for data analysis. Thus, after calculating the index of five indicators of TCI, the formula was put in the software and data placement, TCI index was calculated for 12 years, finally, the monthly chart was drawn.

2.1. Background investigation

Some researches show that tourism is clearly dependent on climate and has a major role in tourism demand (De Freitas, 2008). Others believe that the climate is not only a physical and thermal factor, but also an aesthetic element, the formation of plant communities and the environment is effectiv e(Jacqueline et al, 2004). In this context, Mieczkowski Comfort tourism climate indices involving seven climate elements designed to evaluate the suitability of climate for tourists (Mieczkowski, 1985). Several studies have been performed in this field in Iran, like, evaluate the climate of Sardasht City, where TCI index is used (Ebrahimi, 2004)。

The climate of Alabama using TCI indicators have been examined, the results of these indicators, the tourism climate maps were presented (Ranjbar, 2009). Assessment of climate conditions for tourism development in Chabahar harbor anger, as an article in which researchers have concluded that the optimal period in December, January, February and March are (Esamaili and et al,2010).” TCI new method in calculating the climate – tourism” An article in which researchers focuses on climatic factors, the proposed use of the TCI index,The relationship between climate, with annual tourism trends in the county of Marvdasht is An article in which researchers have concluded, the period in spring and autumn climate is optimal comfort (Ranjbar and et al, 2010) Finally, the spatial representation of climatic comfort of the Lorestan Province of the TCI, That article, in the comfort of the best months of April, May and October and the worst months of January, February and June has been set.(Hasanvand and et al,2011)

2.2. Case study

Gorgan city As the center of the province of Gorgan in Gorgan county between 54 ° and 12.9 minutes to 54 ° and 44.9 minutes east longitude and 36 ° and 30.6 minutes to 36 ° and 58.8 minutes north latitude is located. Figure 1 shows the location of this city in the county of Gorgan. (Planning Deputy of Golestan province, 2009).

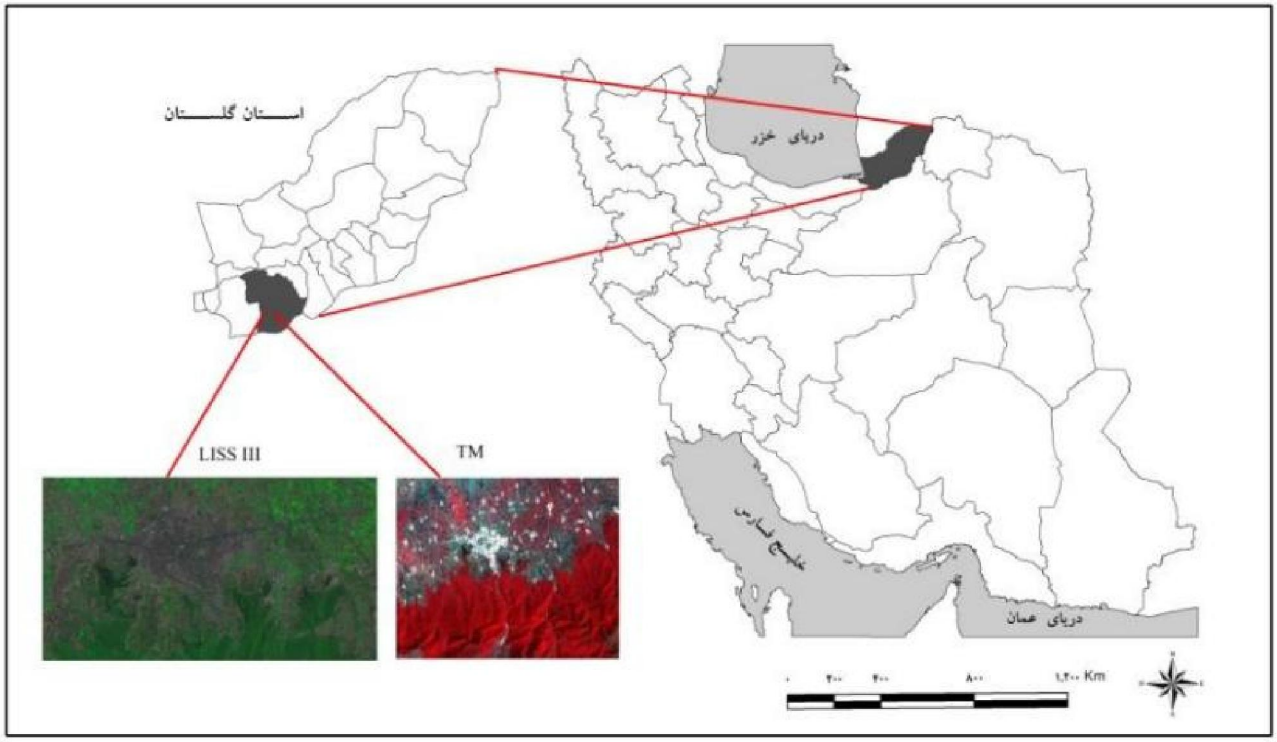

Figure 1: location of Gorgan. (Planning Deputy of Golestan province, 2009)

2.3. Theoretical study;

Tourism, recreation, weather and climate

A better estimate of well-being of society should consider the following variables:

1. Current effective per capita consumption flows; (hosseini, 2011)
2. Net societal accumulation of stocks of productive resources;
3. Income distribution;
4. Economic security;

Tourism as a development agent, the above four factors are considered. In the tourism literature, there are three different types of study where the importance of climate and weather has been examined: destination image studies, climate index studies and in daily use models of recreational sites. Of the 142 destination image papers that are reviewed by Pike (2002)[1], only one specifically dealt with weather. This was a study by Lohmann and Kaim, who note that there is a lack of empirical evidence on the importance of weather/climate on destination choice decision-making. Using a representative survey of German citizens, the importance of certain destination characteristics was assessed. Landscape was found to be the most important aspect even before price considerations (Lohmann and Kaim, 1999).

Weather and bio-climate were ranked third and eighth respectively for all destinations. Moreover, they found that although weather is an important factor, destinations are also chosen in spite of the likely bad weather. Measuring the importance of destination characteristics is also the focus of a study by Hu and Ritchie, where they review several studies from the 1970s and find that "natural beauty and climate" were of universal importance in defining destinations' attractiveness (Hu and Ritchie, 1993). A good climate and the possibility to sunbathe were included in Shoemaker's list of destination attributes (Shoemaker, 1994)

De Freitas classifies climate according to its aesthetic, physical and thermal aspects. The thermal aspect is argued to be a composite of temperature, wind, humidity and radiation (De Freitas, 2001). There is growing evidence, however, that climate has significant neurological and psychological effects (Parker 2001), which may also have some influence on the choice of holiday destination. In order to capture the complexity of the thermal aspect of climate, numerical indices have been developed and these allow comparisons of suitability of different destinations for different tourism activities. De Freitas found that the relationship between HEBIDEX, a body-atmosphere energy budget index, and the subjective rating of the weather by beach users was highly correlated. Furthermore, he found that the optimal thermal conditions for beach users were not at the minimum heat stress level but at a point of mild heat stress (De Freitas, 1990). Matzarakis uses an index of thermal comfort to identify areas of Greece where there is high likelihood of heat stress occurring (Matzarakis, 2002). Dwyer has estimated a daily site use model, for urban forest recreation, using data on noon temperature, percentage sunshine, and percentage rain and snow depth. Although not intended as a climate change study, he goes on to examine the effects of increases in the climate variables. These, however, are not related to any climate change scenario. A temperature increase, of ten degrees, increases the daily use levels from September to May but decreases them in July (Dwyer, 1988). Brandenburg and Arnberger attempt to predict daily use levels of the Danube Flood Plains National Park in Austria. They find that using standard climate data does not produce any satisfactory results. Instead they use the Physiological Equivalent Temperature (PET), the occurrence of precipitation and cloud cover to estimate the number of visitors per day in total and for four groups: cyclists, hikers, joggers and dog walkers. The PET value is very important in determining the use levels, particularly for cyclists and hikers (Brandenburg and Arnberger, 2001). Thorson and their friends find a positive relationship between thermal comfort and park use in urban areas of Sweden (Thorson et al, 2004).

2.4. Tourism Climatic Indices

The tourism climatic index as a concept has evolved from more general knowledge about the influence of climatic conditions on the physical wellbeing of humans. In the 1960s and 1970s systematic research in this field yielded many insights, ranging from preferred temperatures, and the role of relative humidity to the appreciation of wind effects. It should be noted that the appreciation of climatic conditions is also dependent on a host of non-climatic factors, such as the level of activity, clothing, and genetic setup.

Mieczkowski was among the first to apply the general findings about human comfort to the specific activities related to recreation and tourism. He devised a tourism climatic index consisting of five sub-indices, describing daytime thermal comfort, daily thermal comfort, precipitation, hours of sunshine, and wind speed. The mapping of raw data to sub-index values depends on the kind and level of tourist activity. Beach holidays require climatic conditions different from ski holidays; in his article, light activities, such as touring, is used as a reference. (Mieczkowski, 1985, 225)

Values for all variables are mean monthly values. The thermal comfort sub indices are based on effective temperature, 1 which is a measure of temperature that

[1] - These were published in the period 1973 to 2000.

takes the effect of relative humidity into account. According to the latest bio-meteorological literature, both short and long wave radiation are essential for deriving modern thermal indices (Matzarakis, 2001). Information on these environmental parameters is, however, not generally available in observed climate datasets. The wind sub-index combines information about wind speed and temperature. The other sub-indices are based on single variables and reflect either the empirical findings of physiological research or qualitative assessments of tourist preferences, for example in relation to precipitation. For a detailed description of the set of variables, and the calculation of the sub-indices, see Mieczkowski (1985). All sub-indices have a maximum value of 5. Mieczkowski proposed the following equation for calculating the TCI for outdoor recreational activities:

TCI = 2. (4. ThC_{DT} + ThC_{DL} + 2. Sun. Prec + Wind) Equation (1)

TCI = Tourism Climate Index

ThC_{DT} = Daytime Thermal Comfort Index

ThC_{DL} = Daily Thermal Comfort Index

Sun = Index of the amount of sunshine

Prec = Index of the amount of precipitation

Wind = Index of the appreciation of wind

The weights used in the equation are ultimately subjective, although they do ,have a basis in scientific knowledge. In the equation proposed by Mieczkowski the highest weight is given to the daytime comfort index to reflect the fact that tourists are generally most active during the day. The amount of sunshine and the amount of precipitation are given the second-highest weights, followed by daily thermal comfort and wind speed. After summing the weighted individual components, the result is multiplied by two, so that the maximum TCI score is 100.

Mieczkowski proposed a classification of TCI scores, with values in excess of 60 corresponding to 'good' conditions, scores exceeding 70 representing 'very good' climatic conditions, levels of over 80 corresponding to 'excellent' conditions, and scores of 90 or more standing for 'ideal' circumstances.While the Mieczkowski index, and other indices such as the one developed by Hatch, were not originally devised to explore the impacts of climate change on tourist comfort, they can be used for that purpose (Hatch,1988,) . See Rotmans and et al for a grid-based application to Europe (Rotmans et al, 1994) and Scott and Mcboyle for a case-based application to various cities in North America. In this paper the Mieczkowski index is used to explore the changes in the climatic resources for tourism brought about by climate change in the Mediterranean region. The aim is to identify possible major shifts in the climatic attractiveness of various regions in the world in different seasons. The implications for the distribution of TCI values over the year are also considered ,following the example of Scott and Mcboyle (Scott and Mcboyle,2001).

3. Result

TCI index combining seven climate parameters, including mean maximum temperature, mean temperature, Average minimum relative humidity, mean relative humidity, total precipitation, average sunshine hours and average wind speed is obtained. Monthly average of all the above parameters as used in this index. This index is an index that combines the following five climatic parameters mentioned above are achieved (Ranjbar, 2010). CIA, CID, comfort indices are in the TCI. Their rate of sykrometric diagram is achieved. By definition Ashra, "Thermal Comfort" is a mental condition that makes the environment comfortable. That person, in terms of thermal comfort conditions are warmer or colder than they would prefer (Ebrahimi, 2004). All sub-indices used in the TCI, the spectrum of 5 (good) to 3 - (extremely poor) are allocated to them. Grade 5 rating in the most desirable formula is TCI.

Table 1: TCI sub-indices and their scores (Scott, 2004).

sub-indices	Climate variables	TCI scores
CID	Average maximum temperature and average minimum relative humidity	40
CIA	Average temperature and average relative humidity	10
R	Total Rainfall	20
S	The number of sunshine hours	20
W	Average wind speed	10

Finally, the TCI calculated for all months of the year, the values obtained from this index range from 30 - to 100 is. The point 100 as the ideal conditions for tourism and -30 Conditions for tourism is impossible. The tourism climate index, TCI is divided into 10 qualitative scale is given in Table 2 (Scott, 2004).

Table 2: Values of quality tourism climate index, TCI (Ranjbar, 2010)

Descriptive Rating	TCI scores
Ideal	90 to 100
Excellent	70 to 89
Very good	60 to 69
Acceptable	50 to 59
Poor - marginal	40 to 49
Inappropriate	30 to 39
Very poor	20 to 29
Extremely poor	10 to 19
Impossible	-30 to 9

This index has the advantage over other methods: Considering all aspects of climate on tourism, including thermal and physiological aspects, Being a combination of aspects of climatology, Tourism and bioclimatic, Less complexity of computation, Estimating the index values for the next months and periods of Tourism, Help of this index, the best time for tourists to travel in terms of climatic comfort is determined (Ziai and Bakhtiari, 2009).

Discussion

The average annual temperature in the course of study for Gorgan City is 17.6 degrees Celsius. Figure 2 is derived based on the calculations. According to calculations, the maximum index that reflects the desirability, in the months May, June and October are shown. Best of TCI, the higher assessment and acceptable in the worst conditions seen. This means that Gorgan City in terms of climatic comfort is totally acceptable level. Table 3 shows details of TCI index calculations.

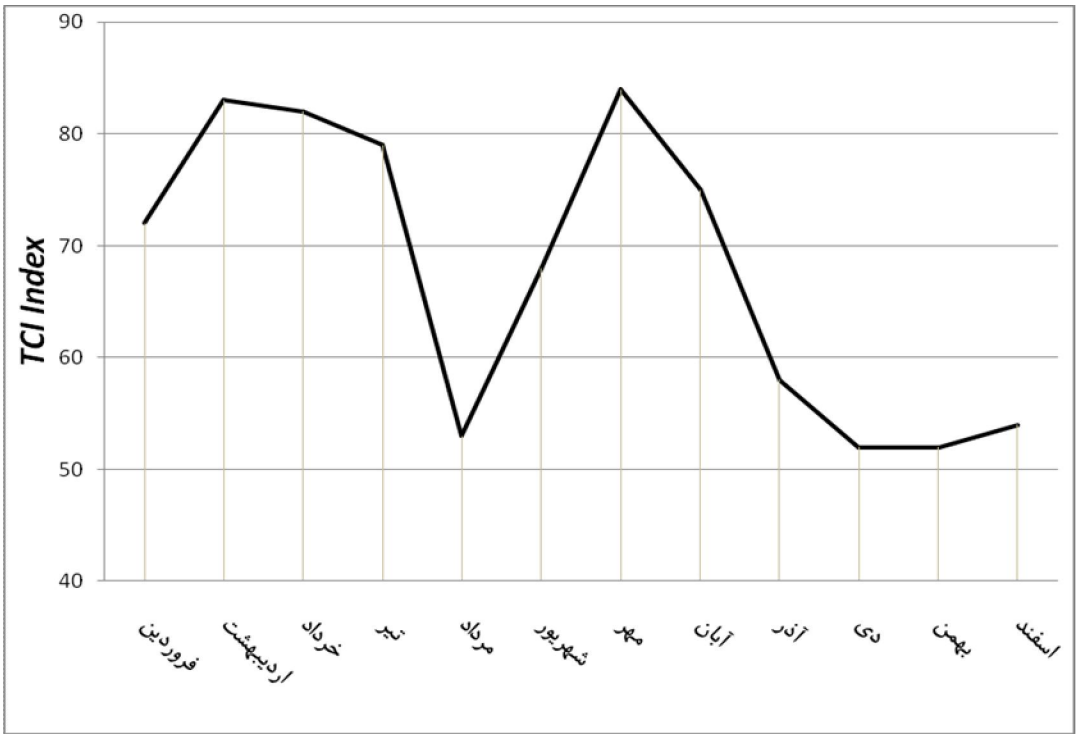

Figure 2: Diagram Index TCI Gorgan City (authors)

Considering that Gorgan City in the province's administrative center, this also acts as a travel terminals. The city as a service for travelers passing through the city of Mashhad acts. Hence the desirability of more TCI shows its importance. Considering that the minimum acceptable level of this index, it is desirable to travel in other months. The branches of tourism such as commercial or cultural tourism, which are more attached to the closed spaces, Can have a relative boom in the city in all seasons.

4. Conclusion

Iran routinely travel seasons in the second half of June to the end of September as summer trips and in the first half of April, as well as trips to New Year are considered. The TCI index in July and first half of April will be evaluated as well. The implementation of the TCI index and the usual travel seasons, good seasons are set to travel to the city of Gorgan. However, with little tolerance for September as well as travel to the city of Gorgan. Comfort climate on tourism development in the city of Gorgan has a great impact; this effect can be seen in Table Two.

Table 3: Details of TCI (authors' calculations)

quality	CID	CIA	R	S	W	TCI	month
Very good	4.5	2.5	3.5	2.5	3.5	72	April
Excellent	5	4.5	3.5	3	4	83	may
Excellent	3.5	5	4.5	4	5	82	June
Very good	3.5	4.5	4.5	3.5	5	79	July
acceptable	1.5	4.5	4.5	3.5	0	53	august
good	2.5	5	4	3.5	4	68	September
excellent	5	5	3.5	3	4	84	October
Very good	5	3	3	2.5	3.5	75	November
acceptable	3	2.5	3.5	2	3.5	58	December
acceptable	2.5	2	3.5	2	3	52	January
acceptable	2.5	2	3.5	2	3	52	February
acceptable	2.5	2	3.5	2	4	54	march

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