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Research Paper Geography

An Assessment of Thermal Comfort Zones in Terms of Tourists: A case study of Karveer Tehsil

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ABSTRACT

Climate has a strong influence on the tourism and recreation sector. Thermal comfort is one of the important considerations in tourism activity. Thermal comfort is a complex entity. Comfort zone delineate specific combinations of temperature and relative humidity (RH) ranges. These zones are different for winter and summer conditions. For the determination of comfort zone climograph is employed. On the basis of the zones of climograph comfort level is decided. This analysis helps to determine, which month in a year offers comfortable climatic condition for visit of tourists. So, this analysis supports to improve qualitative and quantitative tourism.

Keywords : Thermal comfort, climograph, scales of discomfort

Introduction
Thermal comfort is a complex entity. Several indices have been put forwarded from time to time to express thermal comfort and heat stress. In that case, two important indices are; air temperature and relative humidity, which decided the comfort level of a place. There is no unanimous decision on a single zone of comfort for all people because comfort is quite a complex subjective experience which depends not only on physical factors, but also on psychological factors which are difficult to determine (http://docs.google.com)

The comfort zone is a behavioural state within which a person operates in an anxiety neutral condition, using a limited set of behaviors to deliver a steady level of performance, usually without a sense of risk (White, 2009). Comfort zone delineate specific combinations of temperatures and relative humidity (RH) ranges where statistical tests have shown 80 % of the tested population to be comfortable.

The climograph is employed for the determination of comfort zones. This graph shows the interrelationship between two climatic variables, wet-bulb temperature and relative humidity. On the basis of the climatic zones in climograph the comfort level is determine for selected tourist places. This analysis helps to denote, which month in a year represents the comfortable climatic condition for the tourists to visit the study area. So, this supports to improve qualitative and quantitative tourism in study area.

Objectives
1. To find out the thermal comfort zones for tourism activity in the study area.
2. To recommends some suggestions in order to improve the tourists comfort.

Data Base
In order to meet above mentioned objectives the required data is mainly collected from the secondary sources. The secondary data is collected from the State Data Storage Center (SDSC) at Nashik. The other related data is collected District census handbook, Socio-economic review of Kolhapur district, Website of Kolhapur Municipal Corporation and available published and unpublished material, internet, Books and Maps.

Methodology
Griffith Taylor's climograph method is used to find out the thermal comfort zones. This graph represents two climatic variables at any one place, in which one variable (relative humidity) is plotted on abscissa and another (wet bulb temperature) is plotted on the ordinates. This graph is twelve sided figure. Each of twelve points showing wet-bulb temperature and relative humidity for individual month and it is marked by initial letters of the months and this twelve points joined together systematically with the help of scale. The four quadrants NW, NE, SE and SW represent the climatic condition as Scorching, Muggy, Raw and Keen respectively. With the help of these four zones the comfortable climatic conditions for human beings are identified.

A tentative scale of discomfort –Suggested by Taylor
40oF to 45oF- (Very rarely uncomfortable)
45oF to 55oF- (Ideal)
55oF to 60oF- (Very rarely uncomfortable)
60oF to 65oF- (Sometimes uncomfortable)
65oF to 70oF- (Often uncomfortable)
70oF to 75oF- (Usually uncomfortable)

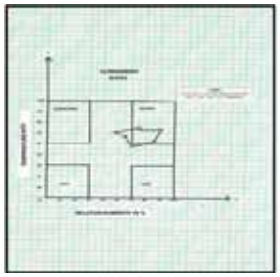
Study Area
The present study is restricted to Karveer tehsil. The Karveer tehsil is situated in the northern part of Kolhapur district of Maharashtra. It lies between 16o 42' 50" north to 16o 43' 55" north latitude and 74o 10' 52" east to 74o 11' 57" east longitude. The tehsil is well connected by rail and road with the major cities of India viz. Mumbai, Bengaluru, New Delhi and other important cities of Maharashtra like Pune, Sangli, and Miraj. The Karveer tehsil covered an area of 671.1 sq. km. It shares 8.2 percent of total area of Kolhapur district. The east-west width of tehsil is 30.20 km. And north-south length is 23.40 km. The study area is a part of Krishna basin (2nd largest river of south India) and is drained by Panchaganga River, a major tributary of Krishna River.

An Assessment of Thermal Comfort Zones in the Study

Area (from 1995-2009)

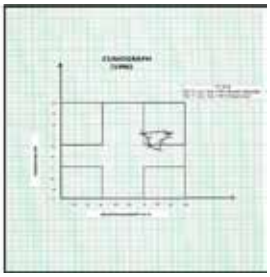
The climograph-A is a twelve sided graph, which shows the climatic conditions of Karveer tehsil. The average climatic conditions as per the climograph for year 1995 are unpleasantly warm & damp throughout the year. But specifically the three months January, February and March represents the pleasant/comfortable climatic conditions for human beings with less than 70 per cent relative humidity with wet bulb temperature near about 60 to 70oF (fig. 1). The climograph-B shows the climatic conditions of January and February months are comfortable to some extent due to decline in temperature below 60oF with relative humidity 70 to 80 per cent. The remaining months with temperature more than 60oF and relative humidity is more than 70 per cent indicates usually uncomfortable condition, which represents unpleasantly warm and damp weather (fig. 2). The curvature on the climograph-C displays the climatic conditions of Karveer tehsil in 1997. In general, there is muggy climatic condition. The February month shows the ideal climatic condition with temperature below 55oF, while the January month displays very rarely uncomfortable climatic condition for human beings (fig. 3).

As per the climograph-D, the climatic condition of April to October months indicates the usually uncomfortable conditions for human beings with the more than 70oF temperature, while remaining months viz: January, February and December shows the unpleasantly warm and damp weather because of very high humidity and temperature (fig. 4). The climograph-E of year 1999 denotes that the climatic conditions of Karveer tehsil in the month of January are very rarely uncomfortable, while in the month of December climatic conditions are sometime uncomfortable. All remaining months are come under the muggy zone, which displays the unpleasantly warm and damp weather (fig. 5). The Climograph of the Karveer tehsil of year 2000 represents the muggy climatic conditions throughout the year. The months from February to November expresses the muggy climatic condition, which means that the weather is unpleasantly warm and damp. The January month denotes unusually uncomfortable condition, besides that month of December also has comfortable climatic conditions with temperature below 60oF (fig. 6). The climograph-G characterizes the muggy climatic condition with slight variations in average figures of relative humidity. The months of January to November comes under the unpleasant warm and damp weather conditions. Only the month of December come under the unusually uncomfortable weather condition, which means December month has comfortable climatic conditions in terms of Tourists (fig. 7). All months in year 2002, except January and December, shows the high temperature (above 70oF) and also very high humidity (above 75 %). Therefore, the average condition of the study area denotes unpleasantly warm and damp weather (fig. 8). The slanted line on the climograph-I shows that all the months are come under the muggy climatic condition with temperature more than 60oF and relative humidity more than 75 per cent. The average weather condition denotes that the study area has unpleasantly warm and damp weather (fig. 9). The climograph-J indicates that the months of January, February, November and December have sometimes comfortable thermal conditions for human beings due the decrease in temperature. The average climatic conditions of remaining months represent the unpleasantly warm and damp weather (fig. 10). The climograph-K represents the months of January and February represents the comfortable weather conditions to some extent due to the lower temperature (below 65oF). While remaining all months have high temperature and high relative humidity, which indicates the unpleasantly warm and damp weather (fig. 11). The climatic conditions of Karveer tehsil of year 2006 are displayed by climograph-L. The months of January to October and December having very high temperature and relative humidity, therefore, all above mentioned months represents the unpleasantly warm and damp weather conditions. The month of November come under the unusually uncomfortable condition with high temperature, but low relative humidity (fig.12).



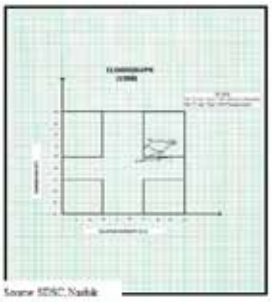
Climograph-A: 1995

Figure 1



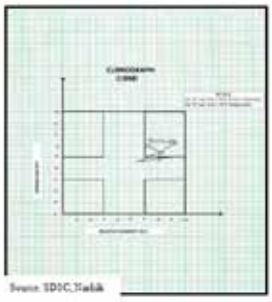
Climograph-B: 1996

Figure 2



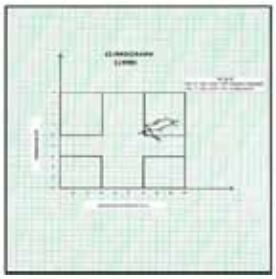
Climograph-C: 1997

Figure 3



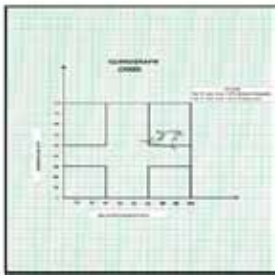
Climograph-D: 1998

Figure 4



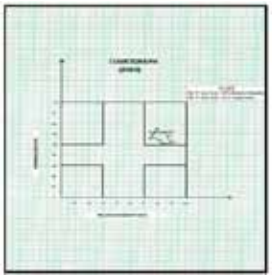
Climograph-E: 1999

Figure 5



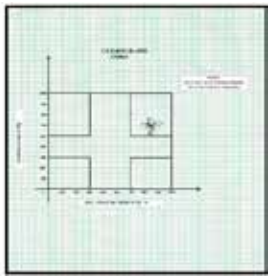
Climograph-F: 2000

Figure 6



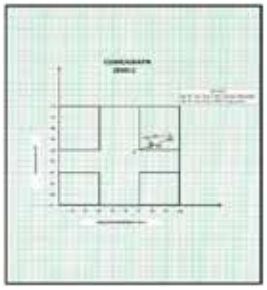
Climograph-G: 2001

Figure 7



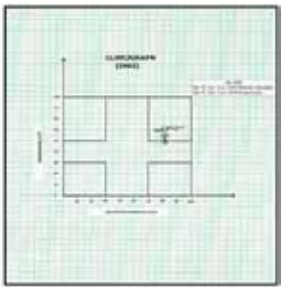
Climograph-H: 2002

Figure 8



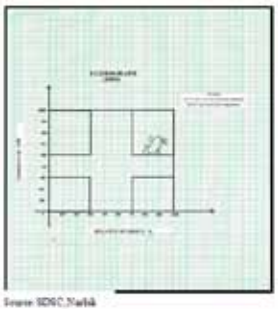
Climograph-I: 2003

Figure 9

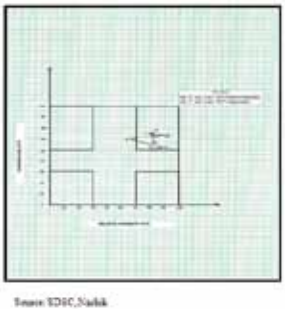


Climograph-J: 2004

Figure 10



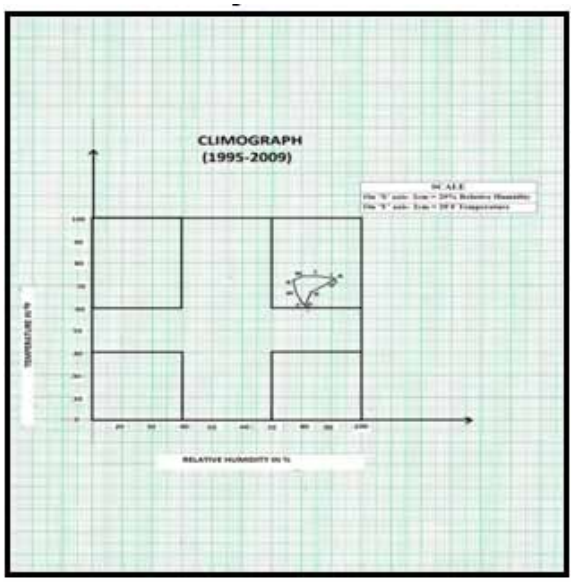
Climograph-K: 2005
Figure 11



Climograph-L: 2006
Figure 12

Climograph-M: 2007
Figure 13

Climograph-N: 2009
Figure 14



Climograph-O: 1995-2009
Figure 15

The climograph-M of the Karveer tehsil of this particular year indicates that the months of January, February and December come under the sometimes uncomfortable zone and months of November and March come under often uncomfortable climatic zone. Remaining months are come under the usually uncomfortable conditions (fig.13). This climograph-N illustrates that most of the months in that specific year displayed the temperature more than 70oF and relative humidity above 80 per cent. Therefore, the entire study area represents the unpleasantly warm and damp weather conditions (fig. 14).

Conclusion

For the present investigation, the climatic data from year 1995 to 2009 is employed to find out the thermally comfort zones in study area. As per the technique devised by G. Taylor, most of the part of study area incorporated in Muggy climatic conditions with temperature above 60oF and relative humidity more than 70 per cent. Therefore, the study area characterizes the unpleasantly warm and damp weather conditions, which is sometimes thermally uncomfortable for human beings. But the average climatic conditions of the months of January, February, November and December represents the pleasant/ comfortable climatic conditions for human beings with less than 70 per cent relative humidity and near about 60 to 70oF wet bulb temperature. Therefore, the months of January and February are all time suitable/comfortable months for tourists to visit the tourists' places in Karveer tehsil, while, most of the time, the months of November and December are comfortable but sometime this months are rarely uncomfortable for tourists to visit.

Suggestions

The average climatic conditions of the January, February, November and December months represents the pleasant/ comfortable climatic conditions (as per the G. Taylor's technique) for human beings with less than 70 per cent relative humidity and near about 60 to 70oF wet bulb temperature. Therefore, the moths of January, December are the very suitable months for tourists to visit the tourist places in Karveer tehsil. Whereas, the months of February and November are most of the times comfortable but some time represents unfavorable climatic conditions.

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