

Assessing tourism suitability through the Tourism Climate Index in Kandy, Sri Lanka

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1. Introduction

Climate is one of the physical sources extremely affected not only for thinking of human beings but also the behaviour and activities of all living being in the world (Eludoyin, 2013). Climate has a strong influence on the tourism and recreation sectors (Daniel & Geoff Mc, 2001). Therefore, the climate is directly and significantly influenced to the tourists' decision-making processes, influencing where and when tourists' travel, as well as the associated distribution of tourism expenditures (Daniel, Michelle, et al., 2016). Wilton and Wirjanto (1998) estimated that, if a 1oC above normal summer temperature increases, domestic tourism expenditures will increase by approximately 4% in Canada. It seems to be that, tourism has become one of the largest economic sectors in the world and is a significant contributor to many national and local economies. Tourism climate indices (TCI) are commonly used to describe the climate conditions suitability for tourism industry, from the planning, investment or daily operations perspectives. As a tourism destination, Sri Lanka can compete successfully with other destinations partly because of its pivotal geographical position (Fernando, 2017). It is determined by special and unique climatic condition in the country. But today Sri Lanka also faced in a stressful situation on heat stress in some period (Srimalee & Rekha, 2017) and those climatic changes are directly influence to change the tourist destinations in the country also. But analysis of TCI in Sri Lanka is limited in to certain framework and it seems to be a kind of shortcoming in a climatological research sector in the county.

In this study Kandy is selected as a study area of the research, which is situated in the Central Highland of Sri Lanka by giving much attraction to the tourist activities in the county. The main objective of this study was find out the tourism climate comfortable period of Kandy, using tourism climate index (TCI) introduced by Mieczkowski in 1985 (Crowe, 1976). Here the whole study mainly based on the highly accurate indexes. These indices represent a quantitative evaluation of world climate for the purposes of international tourism. A series of rating systems is developed to provide a systematic basis for assessing the climatic elements that most affect the quality of the tourism experience. This would be very useful for future studies in Sri Lanka, and it will also be helpful for planning and making policies for various sectors of the development of the country. Thus, this field of study might be a turning point in Sri Lankan tourism industry.

2. Materials and Methods

Details about comfort levels of remaining climatic condition are provided for a tourist activity by TCI. This index for the first time was introduced one of the famous Geographer Mieczkowski in 1985. 7 main climatic variables have been used to calculate TCI by him. They were maximum daily temperature, minimum daily relative humidity, mean daily temperature, mean daily relative humidity, rainfall, sunshine hours and wind speed. For this study 14 years' data has been collected from Katugasthota and Gannoruwa agro meteorological station in Sri Lanka during the period 2008 to 2022.

$$TCI = (2(4CID + CIA + 2R + 2S + w))^{[1]}$$

where, CID = Day Time Comfort Index

CIA = Daily Comfort Index

R = Rainfall

S = Sunshine Hours

W = Wind Speed

$$ET = \text{Temperature} - 0.4 * (\text{Tem} - 10) * (1 - \text{Humidity} / 100)$$

Where, ET = Effective Temperature

Basically, temperature and relative humidity are used to calculate the CID and CIA sub-indexes. Tourist outdoor activities mostly can be seen in the day time. Therefore, Maximum daily temperature (°C) and minimum daily relative humidity (%) have been used for CID calculation. ET value also necessary to calculate. There are number of ways to calculate the Effective Temperature. In the meantime, the equation (2) has been used to calculate the ET. To get the maximum rating scales for CID and CIA, the ET value should be in between 22°C and 26°C. When ET value is below 20°C or above 26°C, the rating scale gradually comes down.

3. Results and Discussion

Kandy is a city in the hill country of the Central Province in Sri Lanka. It is known for its temperate, humid warm climate, area in Sri Lanka. Due to its highland location (western slope of the central highland), and monsoon rainfall pattern, Kandy has a highland wet zone climate (Koppen climate classification Am), having no pronounced dry season, a monsoon-like Rainy season and with a mean annual temperature of 25.2 °C. (77.4 °F).

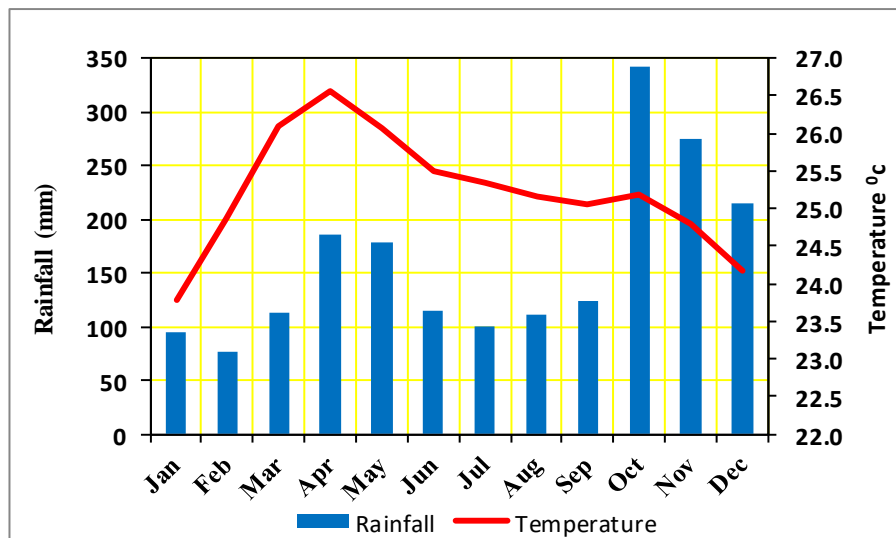


Figure 1: Monthly distribution pattern of rainfall (mm) and temperature (°C) Kandy (2008 - 2022)

During the First Inter Monsoon (FIM) period (March to April) the sun located as an overhead to Sri Lanka and the maximum temperature goes up rapidly. April is recognize as the hottest month in the year. During the Period of Second Inter Monsoon (SIM) (October to November), more than 250mm rainfall can be observed in the station (Figure 1). In this period, ITCZ situated again over Sri Lanka. Because of that, in the evening or later part of the day, rainfall is experienced with thunder and lightning. The cyclone conditions are also reported in this period. When the rainfall is rising up ward, temperature has gone down. However there is comfortable climatic environment for tourist activities can be seen in Kandy and its surround

areas in the central hills. According to TC index always Kandy belongs to very good and good categories.

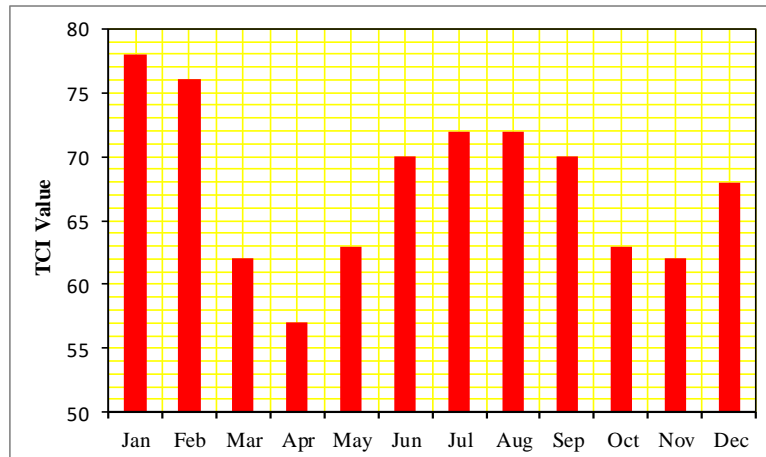


Figure 2: Monthly distribution pattern of Tourism Climate Index (TCI) in Kandy with comfortable categories (2008 - 2022)

Table 01: tourists destination categorized in term of TCI Score

TCI Score	CATOGARY
30 - 39	Unfavourable
40 - 49	Marginal
50 - 59	Acceptable
60 - 69	Good
70 - 79	Very Good
80 - 89	Excellent
90 - 100	Ideal

The results indicated that the TCI varies from acceptable to very good category in Kandy. January is the most favourable month for tourism and the highest value of TCI (73: very good) has been recorded in this month. January and February (71: very good) have most favourable tourism climate comfortable period due to pleasantly warm temperature , clear sky, low rainfall, and long sunshine hours. In contrast, the months of April (54: Acceptable) and may (58: Acceptable) have lowest favourable tourism climate comfortable period due to high humidity within high temperature(humid and warm) and unfavourable rainfall. October (56: Acceptable) also had the lowest comfortable condition due to high rainfall and low sunshine hours (figure 2). season wise, the northeast monsoon brought a comfortable climatic environment for tourist activities due to substantial values obtained by the CID and CIA. The first intermonsoon and second intermonsoon have the lowest (acceptable) comfortable climate environment for tourist activities in Kandy.

The sun is exactly about the equator (vernal equinox, March 21) in the first intermonsoon, and the highest temperature is recorded in that period by the effect it receives. Therefore, its make unfavourable climate condition for tourist activities. The second intermonsoon season also has the least comfortable climate conditions for tourist activities due to the unfavourable rainfall and low sunshine hours. Thus this study confirmed that January to February is the most comfortable period of the year for tourism in Kandy, Sri Lanka.

4. Conclusion

As far as it is concerned Sri Lanka is a very good and comfortable and favourable country for tourist destination. Kandy is one of the famous tourist attractive places in the country. Climatic condition and speciality of the situation are crating unique beauty in the land and it gives

uncountable tourist value to the area. When the monthly TCI concern in Kandy district, there are no any unfavourable season or month lower than 30-39 category of TCI. All values are recording up to Acceptable category and the TC index of Kandy is always belonging to very good and good categories. It was clearly observed on monthly, seasonally and annually basis the TCI concern Kandy is one of the most suitable and comfortable tourism destination city in the world. Furthermore, Applying the Tourism Climate Index to the entire country of Sri Lanka, as well as developing a map of spatiotemporal comfortable tourism climate places and seasons, will help the tourism sector in Sri Lanka thrive sustainably.

5. Keywords

Tourism Climate Index, comfortable, Northeast monsoon, Inter monsoon

6. References

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