THE CLIMATE COMFORT AND RISK ASSESSMENT FOR TOURISM IN BALI, INDONESIA

Presented by: KADEK SUMAJA

Co Writer:
KADEK MAS SATRYABAWA
WENY ANGGI MUSTIKA
SINDY MAHARANI

INDONESIA AGENCY FOR METEOROLOGY, CLIMATOLOGY AND GEOPHYSICS
I GUSTI NGURAH RAI METEOROLOGICAL STATION
BALI, INDONESIA
Tourism is the main source of economic driving in Bali and unfortunately, it is one of the economic sectors that are mostly affected by climate conditions which tend to change.

Moreover, since climate comfort could affect the pattern of tourist visits as well as tourist preferences, it is one of the key elements that must be considered to increase the number of tourists visiting.

The Holiday Climate Index (HCI) highlight the significance of climate as a factor in sustaining the competitiveness of coastal and urban destinations.

Humidex is a measure of how hot we feel, how the combined effects of warm temperatures and humidity are perceived.
OBJECTIVE

- Analyzing and mapping the comfort level of the tourism climate using Holiday Climate Index (HCI) and Humidity Index (Humidex).
- Finding the most comfortable month and the relationship between climate indicators and tourist visits
4 Meteorological station and 20 Rain gauge:
- Maximum and Average temperature (°C)
- Relative humidity (%)
- Cloud cover (%)
- Precipitation (mm/day)
- Wind speed (km/h)

DATA AND METHODS

Start

Data collecting 2011-2020 Observation (BMKG)

Processing into Specified parameter & location

Calculating Thermal comfort (TC)

Rating the parameter

Calculating HCI urban/beach and Humidex

2011-2020 Tourists Arrival to Bali (BPS)

HCI & Humidex classification

QGIS Mapping

Relationship Analysis

Climate comfort Analysis

Finish

**HCI: Urban** = 2(TC) + 4(A) + 3(P) + (W)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>TC (°C)</th>
<th>A (% cloud cover)</th>
<th>P (mm/day)</th>
<th>W (km/hr)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>0-19</td>
<td>23-25</td>
<td>1-9</td>
<td>0.00</td>
<td>11-20</td>
<td>Good</td>
</tr>
<tr>
<td>TC</td>
<td>20-29</td>
<td>27-28</td>
<td>3.00-5.99</td>
<td>0 or 20-29</td>
<td>0 or 31-40</td>
<td>Acceptable</td>
</tr>
<tr>
<td>TC</td>
<td>30-39</td>
<td>29-31</td>
<td>6,00-8,99</td>
<td>61-70</td>
<td>10-21 - 30</td>
<td>Hot</td>
</tr>
</tbody>
</table>

**Humidex** = T + \( \frac{5}{9} \left( 6.112 \times 10 \left( \frac{7.5 \times T}{237.7 + T} \right) \right) \times \frac{H}{100} \) - 10

<table>
<thead>
<tr>
<th>TC</th>
<th>0-49</th>
<th>18-19</th>
<th>0 or 29-32</th>
<th>0 or 29-32</th>
<th>3 or 33-36</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>50-59</td>
<td>20-21</td>
<td>33-36</td>
<td>33-36</td>
<td>33-36</td>
<td>Good</td>
</tr>
<tr>
<td>TC</td>
<td>60-69</td>
<td>21-22</td>
<td>36-37</td>
<td>37-38</td>
<td>38-39</td>
<td>Acceptable</td>
</tr>
<tr>
<td>TC</td>
<td>70-79</td>
<td>22-23</td>
<td>39-40</td>
<td>39-41</td>
<td>41-42</td>
<td>Marginal</td>
</tr>
<tr>
<td>TC</td>
<td>80-89</td>
<td>23-24</td>
<td>40-41</td>
<td>42-43</td>
<td>43-44</td>
<td>Unacceptable</td>
</tr>
<tr>
<td>TC</td>
<td>90-99</td>
<td>24-25</td>
<td>41-42</td>
<td>44-45</td>
<td>45-46</td>
<td>Dangerous</td>
</tr>
</tbody>
</table>

**TC**: Thermal comfort (°C)

**Tx**: Maximum temperature (°C)

**H**: Relative humidity (%)

**A**: Cloud cover (%)

**P**: Precipitation (mm/day)

**W**: Wind speed (km/h)
RESULTS AND ANALYSIS

Climate parameter in Bali during 20 years periods (2001-2020)
RESULTS AND ANALYSIS

Holiday Climate Index (HCI)
RESULTS AND ANALYSIS

Holiday Climate Index (HCI)
The relationship between HCI and Humidex with international visitors

<table>
<thead>
<tr>
<th></th>
<th>HCI</th>
<th>HCI Beach</th>
<th>HUMIDEX</th>
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</thead>
<tbody>
<tr>
<td>CORRELATION</td>
<td>0.733</td>
<td>0.728</td>
<td>-0.879</td>
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</table>
The proper month to do urban tourism in Bali is in April to November and to do beach tourism is in May to October.

Little discomfort is in May to October.

High relationship between Monthly HCl and number of foreign visitor as well as Monthly Humidex and number of visitor but in negative pattern.

Overall humidex in range little discomfort to some discomfort can be anticipated by adequate water supply and aware of hourly temperature and relative humidity report.
THANK YOU