Assessment of Urban Heat Island Effect in Jalgaon City of Maharashtra

Dr. Pradnya P. Jangle
Associate Professor & Head
PG & Research Dept. of Geography, M. J. College, Jalgaon, MH

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ABSTRACT Urban areas have a wide variety of functions as being a district head quarters Jalgaon city is performing a variety of functions it provide employment opportunities to the surrounding areas. There is a continuous flow of peoples from surrounding villages to Jalgaon city. Others factors also attract them now a day's tendency of peoples to live in urban areas is increase urban centers are growing fatly. Urban structure of the city which increase land use planning, building morphology, surface character along with the anthropogenic heat generated from vehicles, air conditions, cause increases in air temperature or urban heat Island. Increasing air pollution and energy consumption of building providing thermal comport. All these factors eventually lead to emission of green house gasses its advocation impact on human health.

Keywords: Urbanization, Anthropogenic, Effect, Satellite Data and Jalgaon City

INTRODUCTION Urbanization refers to the population shift from rural to urban areas, "the gradual increase in the proportion of people living in urban areas", and the ways in which each society adapts to the change. It is predominantly the process by which towns and cities are formed and become larger as more people begin living and working in central areas. The existence of urban heat islands has become a growing concern over the years. An urban heat island is formed when industrial and urban areas produce and retain heat. Much of the solar energy that reaches rural areas is consumed by evaporation of water from vegetation and soil. In cities, where there is less vegetation and exposed soil, most of the sun's energy is instead absorbed by buildings and asphalt; leading to higher surface temperatures. Vehicles, factories and industrial and domestic heating and cooling units release even more heat. As a result, cities are often 1 to 3 °C (1.8 to 5.4 °F) warmer than surrounding landscapes, Impacts also include reducing soil moisture and a reduction in reabsorption of carbon dioxide emissions.

Urban structure of a city which includes, land use planning, building morphology, surface characters along with the anthropogenic heat which is generated from vehicles and equipment such as air conditioners are the most crucial factors causing increase in air temperature or urban heat island. These in turn increase air pollution and also energy consumption of buildings in providing thermal comfort inside the buildings by use of refrigeration. This eventually leads to an increase of greenhouse gas emissions and negative impacts on health of citizens of developing cities. Urbanization has led to rampant deforestation and construction activities in urban areas. The reduction in urban green cover and the increase of built-up hard surfaces as well as emissions are primary causes of urban heat islands.


STUDY AREA Jalgaon city is located in between 20º58’94” to 21º01’36” N latitudes and 75º31’29” to 75º35’19” E longitudes its covers 95 km² area of northern Maharashtra. It is major administrative headquarters, trading center, collection center of Jalgaon district. (location map of 1).
AIMS AND OBJECTIVES:

- Analysis of heating effect in study area by observing change in LST pattern.
- To calculate LULC of Jalgaon city area for relating change in LST with respect to Land use.

DATABASE:

Secondary satellite based data has been used for the given study. Landsat-5 of 1998 and Landsat-8 of 2017 has been used with both thermal and visible Bands.

1. **Landsat 5 (1998):** Data of Landsat 5 of Jalgaon city with 2,3,4 -visible and 6- thermal band.
2. Landsat 8 (2017): Data of Landsat 8 with visible band 2,4,5 and 10-Thermal band.
METHODOLOGY

Fig.1: Flow chart of Methodology
RESULTS:

1. Land surface Temperature Analysis

<table>
<thead>
<tr>
<th>OBSERVATION AREA</th>
<th>27 October 1998</th>
<th>31 October 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devendra Nagar</td>
<td>30.78°C</td>
<td>35.51°C</td>
</tr>
<tr>
<td>Mahavir Nagar</td>
<td>29.39°C</td>
<td>38.21°C</td>
</tr>
<tr>
<td>Pimprala</td>
<td>29°C</td>
<td>34°C</td>
</tr>
</tbody>
</table>

**Source:** Compiled by researcher

**Temperature Range**

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>OCT 1998</th>
<th>OCT 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Minimum</td>
<td>23°C</td>
<td>27°C</td>
</tr>
<tr>
<td>Average Maximum</td>
<td>34°C</td>
<td>39°C</td>
</tr>
</tbody>
</table>

**Source:** Compiled by researcher

The present study reveals that, from 1998 to 2017 the temperature of Jalgaon city has increased significantly. Land Surface Temperature is rising due to increasing build up and decreasing in water resources and vegetation. Three sample areas have been selected for LST change analysis from Devendra nagar, Mahavir nagar and Pimprala for LST analysis. It observed that in year 1998 minimum and maximum average temperature was 23°C & 34°C respectively while, In the year 2017 minimum average temperature was 27°C and maximum average temperature 39°C.33. It clearly shows that temperature has been increased from year 1998 to 2017.
2. LULC Change Detection Analysis (Area Sq. km):

<table>
<thead>
<tr>
<th>Class</th>
<th>1998</th>
<th>2017</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water body</td>
<td>3.17</td>
<td>2.71</td>
<td>0.46</td>
</tr>
<tr>
<td>Agriculture / vegetation</td>
<td>28.68</td>
<td>15.31</td>
<td>13.37</td>
</tr>
<tr>
<td>Built up</td>
<td>36.61</td>
<td>47.84</td>
<td>11.23</td>
</tr>
</tbody>
</table>

Source: Compiled by researcher

In the above table, it can be clearly observed that area under water bodies, agriculture and vegetation has decreased by 0.46 sq. km. and 13.37 sq. km. build up area has increased by 11.23 sq.km.

CONCLUSION

1. The present study ravel that average Land Surface Temperature of Jalgaon city area has increased significantly from year 1998 to 2017.
2. The study also showed that, the area under built up has increased drastically while area under water bodies, agriculture and vegetation decreased.
3. The study also concludes that there is a positive correlation between increasing built up and LST. More difference in Land Surface Temperature is observed in newly built up area along the bordering regions.
4. The problem can be solve by planting more and more trees in surrounding area of Jalgaon city.

REFERENCES: