

Abstract

One of the most important components of environmental change brought on by humans is climate change, which has a lengthy history dating back to the establishment of early cities. Shannon's Entropy is used in the study with the help of the Geographic Information System (GIS) and remote sensing technology. There's little doubt that population expansion corresponds to the number of wants that people have. Over time, as human requirements increase, so does the demand for land resources to support ongoing activity. In this scenario, the level of urban activity will keep rising, leading to the growth and development of the city. In addition to population dynamics, physical aspects like topography, geomorphology, and geology also influence urban expansion. The city of Noida, which has experienced fast growth, is located adjacent to the Yamuna River in a prosperous agricultural region. By examining the geographic dispersion pattern of an urbanised area, this study demonstrates the extent to which the Shannon Entropy Index (H) is utilised to evaluate the viability of urban growth. Based on the distance to the city centre, which divides the study territory into 18 zones, the Shannon Entropy Index was developed. Entropy scales have a range of 0 to $\ln(n)$. Differences between values closer to $\ln(n)$, which show a distributed distribution of the built-up area, and values closer to 0, which show an incredibly compact or monocentric distribution, can be seen. For a better understanding of the outcomes, values can also be normalised within a range. In order to identify urban built-up regions and track their development over time, data from Landsat 8 and 9 images from 2013 and 2022 were collected. The Maximum Likelihood Algorithm was used to classify the images. Over the years 2013 to 2022, the built-up area is expected to rise by 31%. These statistics are used to assess urban expansion using Shannon's Entropy and determine the direction of sprawl. Here we have considered three factors which influences the urban sprawl massively those are natural factors, social factors, and economic factors. Within those factors we have considered five elements, NDVI, industrial sector, medical facilities, educational sector, and road network and accordingly weightage are given, and it is clearly visible that the parameters are highly influencing the direction of the urban city. We have concluded that due to the population pull from Delhi and due to the active influence of the natural factors, social factors, and economic factors the urban sprawl is taking place at the north-western part of the city.