

## ABSTRACT

In the world's overall population, more than 50 percent of people live in cities, according to World Health Organization, this population is expected to increase continuously in future also. The main problem of urbanization is high population density, inadequate infrastructure, and lack of affordable housing, flooding, pollution, slum creation, crime, congestion, and poverty. In this context, it is must estimate the urban planning for sustainable utilization of our environment. In the present study, Coimbatore Corporation has been chosen for urban planning using Remote Sensing and Geographical Information System (GIS) technology. The detailed information and documents are collected from various sources for understanding the past and present situation of the study area.

The Coimbatore city is one the fast growing urban area in the State of Tamil Nadu, India. The main objective of the present study is to assess decadal land use/land cover change to understand the physical changes of the study area, to estimate the urban growth indices and urban growth probability analyses, to examine the urban sprawl pattern, to find a suitable site for future expansion of the city, to assess the required facility to cater the need of the people for future.

Coimbatore city, popularly known as Manchester of South India, is situated in the western part of the State of Tamil Nadu. The present population of the city is approximately 13 lakhs including a floating population of around 1.5 lakhs. The normal annual rainfall in a the district varies from about 550mm to 900mm during the period 1901-2014. The temperature recorded varies from 11.7°C to 42.6°C. The residences form the major occupied houses in the town with 95.97 percent of total occupied

census houses. Buried pediment covered large areal extent and spread in the central and eastern and northern part of the study area. The Coimbatore region has a dry belt with black cotton soil which is highly suitable for cotton cultivation.

The land use / land cover (LULC) change detection analyses show the attribute data derived from the supervised classification of Landsat scene, captured during 1989, 1999, and 2012. It is seen that during 1989 to 1999, the major changes are in two classes i.e., agriculture and built-up area. The built-up area increased by 10.9% and the agriculture land decreased by 14.5%. There are no significant changes in water bodies. The vegetation cover increased by 4.5% and the fallow land decreased by 0.9%. In 1999 to 2012, The built-up area was increased by 11.8% and the agriculture land was decreased by 12.1%, water bodies decreased by 0.5%, the vegetation cover decreased by 2.7% and the fallow land increased by 3.5%.

The Normalized Differences Vegetation Index (NDVI) change detection indicates during 1989-1999 NDVI has been changes between -0.5 to 0.5. The change during 1989-1999 the north-western part of the study area experience considerable decrease of bare surface, which is brought, either in cultivation or under forest. The lower value of -0.5 indicates the presence aquatic plants in extremely low proportion. The NDVI value above zero to one indicates the terrestrial vegetation with increase in their maximum proportion. The maximum NDVI value is 0.5 indicates comparative dense vegetation cover. It is evident that, the LULC and NDVI changes shows considerable area were decreased for urban development.

About ten indicators and indices were calculated to understand the study area urban characteristics. East zone is high alpha index value (1.99); which is the highest value among all the zones; it is due to more

alternative routes to reach the extreme of one zone to another. The Eta Index value of west zone only 0.26; This Zone is recognized as a "Highly Burn Area". This cannot be developed horizontally, so vertical development is to be done. To understand the urban growth probability in the study area, the FR, FL, and RE to model and the relationships of each driver to generate UGPI maps. The results have shown that the occurrence of the urban growth south-east part of the study area.

The zone wise Shannon's entropy model was utilized for urban sprawl analysis for the study area for the period from 1971 to 2014. The central zone is close to the upper limit of log 20, i.e. 1.301 shows the degree of dispersion of the built-up area. This increase in entropy increase in the built-up area indicates the scattered distribution. The east zone confirms that the development is highly dispersed as the entropy for 2012 is 0.97. It shows that rate of urban growth of Coimbatore city is quite high and needs proper management to attain sustainable development. The north zone entropy values is above 0.5 and indicating higher rate of sprawl than other zones. From the entropy analyses, the cities are developing in all directions resulting in large-scale changes in urban land use and urban sprawl. The spatial pattern of such changes is noticed on the urban margins or peripheral rural areas, than in the city centre.

In order to identify the areas suitable for urban development seven thematic layers namely elevation, slope, geomorphology, river density, land use, population density, and road density were integrated using weighted index overlay model. The entire area of the corporation has been divided into three categories, namely areas that are highly suitable for urban development, areas that are moderately suitable and that are poorly suitable. It is found from the suitability map that no area is found to be highly suitable (15%) for the development of the urban area.

It is found that annual urban growth rate will increase about 21% in the year 2051. Statistical tools of arithmetic mean, range, standard deviation, the coefficient of variation, kurtosis, skewness and regression analysis indicated that the significant increases observed from 2011 to 2051 in populations. The important bus stop and utility zone of colleges, industries, hospital, and hotel and schools buffer zone generated for bus stop utility. These buffers cover an area of 250, 500, 750 and 1000 meter from the bus stop location.

Conclusively, Landuse/landcover change detection analysis was carried out for the period 1989 to 2012 and urban sprawl analysis was done for the period 1971 to 2014. The study indicates that Built-up area is increased and agriculture area is reduced. Road network indices were developed and the study area is classified into undeveloped, well planned and highly burnt zones. Urban growth probability index was developed and the city is classified into very low, low, moderate and very high growth zones. Shannon's entropy analysis was done and found that the urban sprawl is steadily increasing from 1971 to till 2014. Numerical weighted parameter rating and Composite suitability index was developed and suitable sites for future expansion are identified. Urban growth and projection analysis was done using statistical methods and found the rate of urban growth till 2051. Markov chain analysis and cellular automata analysis was carried out for the future landuse/landcover projections till 2051. The result form the study shall be used by planners, policy makers, engineers and local body officials and administrators for the sustainable urban development of the Coimbatore city.