

Name: Maisnam Sandhyarani Devi

Supervisor: Prof. Rocket Ibrahim

Department: Geography

Faculty: Natural Sciences

Title: “Spatio temporal Analysis of Environment: A Case Study of Imphal”

Key Words- Urbanisation, Urban Sprawl, Land use/ Land cover, Satellite Image Environmental Degradation.

Abstract

An attempt has been made to find out how Imphal city evolved during the past history and the process involved in the levels of urbanization. Study has also tried to understand the urban characteristics of the city of Imphal to know the degree of encroachment on fertile agricultural land and loss of open/vacant land by urban activities. The decadal expansion of city area and land use/ land cover changes have been identified to find out the change detection in different time periods and to know how the urban expansion has effected its land use\ land cover change. The study is spread over a period of forty years time span (1970-2010). The study includes all the urban expansion that has taken place in different parts of the city during study period. To identify the type of sprawl in Imphal, supervised classification of urban sprawl maps were prepared with the help of topographical sheet and satellite imageries. Finally, three step overlay analysis method has been employed to detect the built-up area changes from the year 1970 to 2010. Mapping of land use / land cover were also prepared with the help of topographical sheet and satellite imageries for showing change detection of the study area and its surrounding area. The raster images have converted into vector class polygons for various land use categories by onscreen digitization technique. After finishing the land use statistics of those consecutive periods, Land Consumption Rate (LCR) and Land Absorption Coefficient (LAC) techniques have been used to justify if there is a balanced condition exists between growth of town and population. The study found that during the year 1970 the total built-up area is about 1378 hectares. Out of this total built-up area, municipality areas occupy 1238 hectares and its surroundings urban areas occupy 140 hectares. In the year 2010 the areas has increased to 3202 hectares. It is also observed that the built-up areas are dispersed in the year 1970 after that it shows compact settlement. Urban

sprawl has taken place in all directions north, east, south and west of the town but this is more pronounced to the south along the highways than to the North West and east, which is obstructed by hills on North West and low lying areas on the east.

The land use/ land cover pattern of a region is an outcome of urban sprawl and socio-economic factors and their utilization by man in time and space. In the year 1970 majority of the area was under open/vacant land (33.66 per cent). A built-up area occupies the second level with 33.11 per cent. It is found that agricultural land occupies the third level with 23.79 per cent. The land use/ land cover classes 3 to 7 per cent area include vegetation (3.77 per cent) and water bodies (5.67 per cent). In the year 2010, urban land use is dominated by residential areas, which occupy by 55.60 per cent. Agricultural land and public and semi public sector occupy second and third level with 13.21 per cent and 10.50 per cent respectively. From the study, it is found that the built-up area experiences a huge change in the study area. In the year 1970 built-up area occupies second level; it is 33.11 per cent to the total study area. In the year 2010 built-up area increased to 76.93 per cent (occupied first level). There is about 139.67 per cent increase in urban built-up area during the period of 1970-2010. The growth during 1970-2010 was encroaching mainly on open space, vegetation and agricultural areas and small amount of water bodies. The study found that once open space finished, the prime target will be agricultural land. Air, water and noise data have been analyzed to understand status of environment in the city due to increased population pressure. In the River Nambul, at Humpbridge and Heirangoithong the mean values of DO and BOD were found not meeting the desired criteria. The Imphal River at Mahabali and Minuthong the parameters of DO and BOD became polluted year by year. The site located at thickly populated area and core area of the city has more polluted the water compared to thinly populated area. Noise level at Kangla Park and Singjeimei market were found that it has increased year by year. In Imphal city the annual mean concentrations of SO₂, NO₂, SPM and RSPM for commercial and residential were within the standard limit however vehicular traffic increased the air pollution of the city.