

Urban expansion assessment by using remotely sensed data and the relative Shannon entropy model in GIS: a case study of Tripoli, Libya

ABSTRACT

Urban growth is a spatial dynamic phenomenon that indicates population growth, economic expansion, city importance level, and so on . The use of current and historical data in urbanization analysis is necessary in urban spatial studies and future urban planning. This research aims to study, examine, and assess the urban expansion of Tripoli spatially and temporally by using remotely sensed data, geographic information systems (GIS), and the statistical relative Shannon entropy model. Remotely sensed data (four satellite images from 1984, 1996, 2002, and 2010) and GIS were used to determine the extent of urban area and urban growth in Tripoli in five different directions. Shannon's entropy model was implemented to analyze and assess urban expansion trends as a process and pattern in the study area. Results show that the Tripoli metropolitan area has a high level of sprawl along its urban expansion history. The hypothesis employed for Shannon's entropy zone division produces good insights on overall urban growth, urban growth direction, and specific urban growth over time. The obtained results provide good guidance for modeling urban sprawl processes, understanding urbanization causative factors, and predicting future urban patterns. Furthermore, the findings of current paper can be used by decision makers and urban planners to identify past and present urban expansions tendencies to prepare for future urban demands.

Keyword: Urban sprawl; Shannon's entropy; Remote sensing; GIS; Tripoli