

Spatial Patterns of Urban Expansion in Kuwait City between 1989 and 2001

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Abstract : Urbanization is a complex phenomenon that occurs during the city's development from one form to another. In other words, it is the process when the activities in the land use/land cover change from rural to urban. Since the oil exploration, Kuwait City has been growing rapidly due to its urbanization and population growth by both natural growth and inward immigration. The main objective of this study is to detect changes in urban land use/land cover and to examine the changing spatial patterns of urban growth in and around Kuwait City between 1989 and 2001. In addition, this study also evaluates the spatial patterns of the changes detected and how they can be related to the spatial configuration of the city. Recently, the use of remote sensing and geographic information systems became very useful and important tools in urban studies because of the integration of them can allow and provide the analysts and planners to detect, monitor and analyze the urban growth in a region effectively. Moreover, both planners and users can predict the trends of the growth in urban areas in the future with remotely sensed and GIS data because they can be effectively updated with required precision levels. In order to identify the new urban areas between 1989 and 2001, the study uses satellite images of the study area and remote sensing technology for classifying these images. Unsupervised classification method was applied to classify images to land use and land cover data layers. After finishing the unsupervised classification method, GIS overlay function was applied to the classified images for detecting the locations and patterns of the new urban areas that developed during the study period. GIS was also utilized to evaluate the distribution of the spatial patterns. For example, Moran's index was applied for all data inputs to examine the urban growth distribution. Furthermore, this study assesses if the spatial patterns and process of these changes take place in a random fashion or with certain identifiable trends. During the study period, the result of this study indicates that the urban growth has occurred and expanded 10% from 32.4% in 1989 to 42.4% in 2001. Also, the results revealed that the largest increase of the urban area occurred between the major highways after the forth ring road from the center of Kuwait City. Moreover, the spatial distribution of urban growth occurred in cluster manners.

Keywords : geographic information systems, remote sensing, urbanization, urban growth

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