ASSESSING LAND USE DYNAMICS USING GIS-BASED CELLULAR AUTOMATA AND MARKOV CHAIN

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Abstrak

Today, land use change has become one of the major issues in a developed region. Therefore, it is always important to monitor land use change within a certain period of time and predict patterns of future land use change on a spatial basis. The main objective of this research is to assess land use change in Maros regency up to a 20 year period. The analysis of land use change utilizes an integration method of Cellular Automata and Markov Chain (Cellular Automata-Markov) in Remote Sensing (RS) and Geographic Information System (GIS). The procedures used include: (i)) a preliminary data processing (geometric correction, radiometric correction, preparation of the composite image, object recognition) of Landsat images acquired in 2004, 2009, and 2012; (ii) classification of multispectral imagery; (iii) probability analysis to generate *Transitional Probability Matrix, Transitional Area Matrix*, and Markov RGF; (iv) validation of raster Markov RGF 20012 image layer with 2012 land use using a Kappa index; (v) using the same analysis in step (iii) but considering the driving factors of land use change and constrains; (vi) Analysis using Cellular Automata-Markov to generate land use change in the next 20 years. The results show that in year 2029, an increase in built up area, but on the other hand, a decline in agricultural land use especially paddy fields, agricultural land, water bodies, and other uses. In terms of land use decision making perspective, such information may be used to direct land use change to a more beneficial and sustainable situation.

Keywords: land use change; Cellular Automata-Markov; remote sensing; GIS.