

MONITORING AND PREDICTING THE URBAN DEVELOPMENT OF GUATEMALA CITY, GUATEMALA.

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ABSTRACT:

Remote sensing has proven to be an efficient tool to study the development of cities. Cities uncontrolled expansion can bring many challenges and problems like an increase in carbon dioxide concentration or the need for a larger transportation and services network.

Guatemala is the country with the highest urbanization rate in America, and its largest city is Guatemala City, which shows a rapid increase in population from 1,813,825 inhabitants in 1994 to 3,207,600 in 2012. Governmental institutions need to prepare for this city's expansion and population increase by making the most sustainable decisions for land use, services distribution and natural disasters prevention.

The objective of this research is to monitor and predict the development of the urban area of Guatemala City for the following twenty years using spatial data and statistical analysis.

The study first collected related satellite images, statistical data and GIS (Geographical Information Systems) data to observe the urban changes of the city in the last twenty years. Then, the changes were studied through the analysis of a supervised classification performed on three Landsat images of Guatemala City, corresponding to the dates of 1994, 2003 and 2013 respectively. Statistics of the three images were then processed and integrated with other geographical and demographical databases to examine the changes in the city and provide information for the creation of a model.

A logit-based CA (cellular automata) model was applied to simulate the city's expansion. Images of 1994 and 2003 were used to calibrate the model and images from the year 2003 and 2013 were used to confirm its accuracy.

The model is expected to be able to create different urban growth scenarios that can serve as base to predict and plan the development of Guatemala City for the next twenty years.

SUGGESTED TOPICS:

GIS, decision support model.

Remote sensing applications, urban monitoring.

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