

MODELLING ENVIRONMENTAL DYNAMICS OF LAND USE/COVER MAP FOR MUNICIPALITY OF FORMOSA (GO)

Diniz, M. S.; Almeida, W.S.

Universidade de Brasília.

SUMMARY: The Municipality of Formosa (GO), like others municipalities near the Federal District of Brazil, has experienced a significant urban expansion which has significantly impaired the enforcement of Public Policies regarding preservation and proper use of urban space. This research aimed the analysis of environmental vulnerability of the Municipality of Formosa in the last two decades, accounting for both the natural and manmade induced vulnerabilities, *i.e.*, those appearing because of the inherited physical geographical characteristics and those introduced by human occupation of space, respectively. Also, a model of the municipality environmental dynamics for the generation of prospective land use maps was proposed. We used data from geology and pedology digital maps, drainage and road networks, terrain declivity obtained from the Digital Terrain Model SRTM/NASA, as well as images of the Landsat Thematic Mapper 5 and 8 sensors. The land use maps of 1999 and 2014 were generated using image processing and classification algorithms on the Landsat images and environmental vulnerability maps were generated using both the Analytic Hierarchy Process framework and Fuzzy Logic, by superposition of the maps of geology, pedology, Land use, and terrain declivity. Finally, one of the identified areas with high environmental vulnerability was chosen to have its environmental dynamics modelled; specifically, we simulated the area's prospective land use map for the year of 2019 using the software ArcGIS/Erdas Co., SPRING geoprocessing systems and Dynamic EGO/UFGM, an environmental modelling platform for the design of analytical and space-time models. Our results showed that human occupation has raised the environmental fragility level, especially in the areas of urban development, agriculture and intensive pasture. Moreover, the prospective scenario for year 2019 reveals a clear tendency for urban expansion encompassing the shore of Lagoa Feia, the main waterbody of the region and an area of permanent preservation in Brazil, which should be protected and covered by native vegetation, according to Federal regulations. Also, there is the possibility of erosion process intensification, and consequently, waterbody silting. Besides the environmental analysis of the Municipality of Formosa, this research proposes a predictive tool that allows for the generation of future graphic scenarios, enabling the visualization of geographical areas occupation tendency that, augmented with land use and environmental vulnerability maps, subsidize public policies for urban and rural planning, sanitation, and mitigation measures to reduce environmental impacts of anthropic disorderly growth.

KEYWORDS: ENVIRONMENTAL VULNERABILITY; MODELLING; URBAN PLANNING.