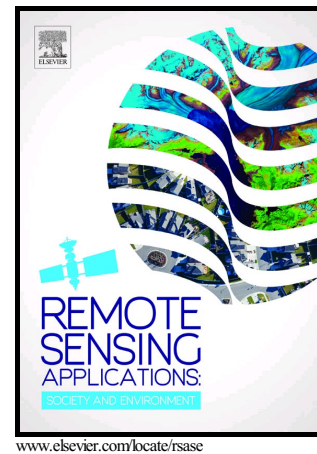


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Landsat study of deforestation in the Amazon region of Colombia: Departments of Caquetá and Putumayo

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Abstract

The Amazon rainforest, the largest in the world in terms of size and diversity, is recognized as a source of ecological services for both local and worldwide communities. Ten percent of its territory belongs to Colombia, covering approximately 35% of the country's total area. In spite of global efforts, it continues to be vulnerable to deforestation pressures. In the departments of Caquetá and Putumayo, human activities such as logging and cattle ranching are the main causes of deforestation, which is increasing the department's vulnerability to climate change and natural hazards. However, there is a lack of consistent quantitative monitoring in the Colombian Amazon region, not only of total deforestation rates but also of specific locations and causes of deforestation, despite its high rates of deforestation compared to neighboring Ecuador. In this study, Landsat 7 ETM+ and Landsat 8 images over a sixteen-year period were used to map recent changes in land cover in the departments affected by deforestation. Supervised classifications were made using the Maximum Likelihood Classifier (MLC) and expert classification system, using False Color IR composites which were effective for identifying vegetation land cover. Over sixteen years, the Tropical Rainforest land cover in the study region lost 5.2% of its area, corresponding to 3020.56 square kilometers. Overall, the study region shows an annual rate of deforestation of 0.46%, and for Caquetá alone that rate is 0.77% - about twice as high as estimates from previous studies of between 0.38% and 0.4% loss rates for tropical South America. No single factor driving deforestation was found; rather, different regions within the study area displayed different rates and causes. The particularly rapid deforestation in the department of Caquetá and the encroachment of agricultural activities into national park reserves may be explained by higher colonization pressures and intensification of illegal coca cultivation.

Keywords: Deforestation; Image Classification; Change Detection; Environmental Conflict

1. Introduction

The world's largest tropical rainforests are found in Asia, Central Africa, and Amazonia, covering about 12% of Earth's land surface (excluding ice-covered areas such as

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