Multitemporal Classification to Evaluate a Transitional Forest Landscape, Brazil

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ABSTRACT:

The research aims to map land use and land cover distribution in the Paraíba Valley (Atlantic forest biome - Brazil) in 1985, 1995, 2005 and 2011 using a multi-stage classification approach to detect forest change trajectories by post classification comparison. The Improved normalized difference built-up index (BU) was used as the first stage to classify eucalyptus forest plantation. The Maximum Likelihood (ML) method was then used to classify agriculture, built-up areas, water, forest, degraded pasture, managed pasture and bare soil. A series of Landsat-5 Thematic Mapper (TM) images was used for the classification. The multistage approach was compared with two single-stage supervised classification tests by ML and Neural Network (NN). For the training sample collection we built a grid of 43 cells (dimensions: 25 x 25 Km) covering the study area and split 90% of training data for the classification procedure and 10% for validation. The kappa and overall accuracy results for the multi-stage approach, ML and NN methods for the year of 2011 are: 0.895 and 91.244%; 0.863 and 88.485%; 0.865 and 88.746% respectively. The Eucalyptus class was the only agricultural land use that increased during the study period. The degraded pasture class contributed with 74% for the forest regrowth suggesting that agricultural land abandonment is an important driver towards forest recovery in the region. The rates of deforestation reached an average of 3.83 between 1985 and 2011, however, concentrating more than 80% on secondary succession. Land trajectories in the Paraíba Valley is under a process of landscape changes where gains in forest cover overcome losses by deforestation indicating a forest transition process.

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