

SPATIAL ANALYSIS OF FOREST FRAGMENTATION FOR BUFFER ZONE MANAGEMENT IN THE ATLANTIC FOREST OF RIO DE JANEIRO, BRAZIL

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The Brazilian Atlantic Forest is one of the most diverse ecosystems on Earth, being the habitat for numerous endangered and endemic species. Historical deforestation has led to a reduction of the forest cover to only 11.6 – 16.0 % of its original extend, which is estimated with 1.0 to 1.5 million km². The remaining forests are highly fragmented and in many places still under high land use pressure. Therefore the Atlantic Forest is considered a biodiversity hotspot.

Conservation strategies are regionally concentrated in two Biodiversity Conservation Corridors (BCCs): The Central corridor and the Serra do Mar corridor. The latter covers an area of about 120,600 km² in the states of Rio de Janeiro, São Paulo, Minas Gerais, and Paraná, and represents the largest relatively intact block of Atlantic Forest. The study area of the presented research is located in the northeastern Serra do Mar corridor, in the upper Guapi-Macacu Watershed, at the foothills of the Serra dos Órgãos mountain range in the state of Rio de Janeiro.

The study aims at analyzing land use changes during the last 70 years, as well as the actual state of forest fragmentation. The analysis was conducted based on visual interpretation of historic aerial images from 1966 and 1973 and supervised classifications of satellite images (LANDSAT 5 from 1980 and SPOT 5 from 2003 and 2008). The land use classifications of the SPOT 5 images were conducted in ENVI 4.7 using a Support Vector Machine Classifier. Visual interpretation of the historical images and subsequent comparison with the forest cover derived from image classification proved to be successful for the identification of main areas of change.

An analysis of forest patterns using FRAGSTATS and ArcGIS 9.3 to calculate landscape metrics demonstrate that out of 330 forest fragments (> 0.5 ha) located in the study area only 94 appeared to be larger than 5 ha. Assuming that the fragments are influenced by an edge effect of 100 m, only 52 fragments appeared to encompass one or more core areas. It could be shown that intensive deforestation and fragmentation processes took place in the mid-20th century. In the last two decades, deforestation slowed and some forest gaps closed most likely due to natural succession of abandoned pastures and small plantations. The results of this study are used to support the buffer zone management and define conservation and reforestation priorities in the watershed.

