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## Spatial e temporal heterogeneity in a fragment of tropical seasonal forest in SE Brazil

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### **Abstract**

The purpose of the present contribution was investigate the possibility of detecting patterns of spatial temporal variation of the tree community of a small (4,0 ha) fragment of tropical semideciduous forest that could be related to environmental variables, particularly those related to the substrate and edge effects. The forest fragment, known as Mata da Lagoa, is situated in the municipality of Lavras, SE Brazil. Two surveys were carried out, in 2000 and 2005, in 29 permanent sample plots with 20 × 20 m of dimensions which were systematically distributed over the fragment area. All individual trees with diameter at breast height (dbh) ≥ 5 cm registered in the plots were identified to the species level and measured (dbh and height). A topographic survey was carried out and produced topographic variables for each plot. An 'edge factor' was calculated per plot from the fragment morphometry. Measures of resistance to penetration were made to assess soil compaction at each plot. Samples of the top 20 cm of soil were collected from each plot for chemical and textural analyses. Two soil categories with a distribution unrelated to topography were found in the fragment and combined with drainage classes to define four soil habitats: Upper Argisols, Lower Argisols, Upper Nitosols and Lower Nitosols. The soil pH and the levels of exchangeable bases were both higher in the Nitosols than in the Argisols. The composition and structure of the tree community differed among the soil habitats. A canonical correspondence analysis indicated that the spatial distribution of the species' abundances was significantly correlated with four environmental variables: drainage classes, mean elevation, saturation of bases and saturation of aluminum, which explained 17% of total variance. No correlations were detected with both forest edges and soil compaction. Therefore, the distribution of tree species in the fragment is apparently influenced primarily by soil nutritional status and ground water regime. Rates of mortality and recruitment of trees and gain and loss of basal area were obtained for the whole sample, four pre-defined soil habitats, diameter classes and tree populations. The tree community was in an unstable phase in the period, once mortality rates surpassed recruitment rates and loss rates of basal area surpassed gain rates. These overall changes were possibly related to a degradation phase of the sylvigenetic cycle, probably triggered by a severe past disturbance event. The tree community dynamics was not homogenous throughout the fragment, differed significantly among habitats defined by different soils

and drainage regimes, but showed no spatial autocorrelation. The environmental variables that most strongly correlated with the variations of the dynamics rates were those related with the availability of light, water and mineral nutrients. In contrast with the overall trends, understory species expanded in density in the period, probably also in response to the same disturbance event.

**Key-words:** edge effect, forest dynamics, forest fragmentation, tropical semideciduous forest, soils, species-environment correlations, topography