



DEFORESTATION AROUND SUBTROPICAL STREAMS DRIVES TAXONOMIC AND FUNCTIONAL NESTEDNESS OF AQUATIC INSECT COMMUNITIES

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Deforestation in river catchments alters freshwater ecosystem conditions, leading to biodiversity loss. However, it remains unclear whether these losses occur sequentially, resulting in nested patterns among communities. We investigated whether deforestation surrounding streams leads to taxonomic and functional nestedness of aquatic insects, reflecting differences in species tolerance to anthropogenic disturbance. We sampled aquatic insects along an environmental gradient in 100 subtropical streams with different levels of riparian vegetation loss, ranging from highly impacted to well-preserved sites. A Principal Component Analysis (PCA) indicated that variation in abiotic characteristics was significantly but weakly associated with the vegetation gradient. Deforestation revealed an ordered loss of genera, with some taxa significantly associated with more forested streams, such as *Macrogynoplax* (Plecoptera), *Hylistera* (Ephemeroptera) and *Huleechius* (Coleoptera). The reduction of native vegetation was related to a significant taxonomic (NODF = 34.56, $p < 0.001$) and functional nestedness (TraitNODF = 50.96, $p < 0.001$), with communities in more deforested streams forming subsets of the species and traits present



in more forested streams. Mantel tests ($r = 0.093$, $p = 0.003$) and dbRDA ($F_{(1,94)} = 2.34$, $p = 0.015$) indicated that the vegetation gradient affected only the nestedness component but not the turnover component ($r = -0.02$, $p = 0.745$; $F_{(1,94)} = 1.08$, $p = 0.359$) of beta diversity. Thus, the loss of native riparian vegetation not only promotes the sequential local extinction of sensitive taxa but also reduces the functional diversity of aquatic insects, potentially compromising biodiversity and ecosystem functioning in these ecosystems.

Palavras-chave: Land use; lotic ecosystems; turnover; NODF; Atlantic Forest; treeNODF.