Beyond topographic habitats: wavelets and wombling identify meso-scale boundaries in 64km^2 of lowland Amazon forest

D. Norris [a] and W. E. Magnusson [b]

[a] Coordenação de Biodiversidade,
Instituto Nacional de Pesquisas da Amazônia
Manaus, Brazil
dnorris75@gmail.com

[b] Coordenação de Biodiversidade,
Instituto Nacional de Pesquisas da Amazônia
Manaus, Brazil
bill@inpa.gov.br

Keywords: spatial ecology, species distribution modelling, monitoring of biodiversity.

Abstract: Abrupt floristic changes are well documented across broad scale gradients (altitude/topographic/soil/geologic). Local scale floristic "patchiness" has been related to a variety of factors including below ground resources, random effects/ecological drift and dispersal limitation. However, not all groups are congruent with meso-scale ($10^3 – 10^5$ m) floristic patterns and it remains unclear to what extent meso-scale boundaries are driven by spatial/environmental gradients and/or species responses. Here we use a combination of spatial boundary modeling approaches (clustering, wavelet and wombling) to identify biologically meaningful "habitat" and "non-habitat" boundaries (regions with higher rates of change in density/species composition) associated with 22 taxonomic groups (ranging from Oribatid mites to canopy trees) in 64km^2 of lowland Amazon forest. We then quantify spatial overlap in the identified boundaries to understand the spatial concordance between "habitat" and "non-habitat" boundaries. Our findings show that habitat categories that are commonly used in landscape ecology are not necessarily meaningful for understanding/representing the meso-scale spatial distribution of biological diversity in lowland Amazonia.