

## **Vegetation indicates diversity of soil macroinvertebrates: a case study with termites along a land-use intensification gradient in lowland Sumatra**

### **Abstract**

Macroinvertebrates have an important role in the maintenance of soil structural stability and fertility in many natural and man-modified habitats. Efficient cataloguing of these animals, as a part of rapid biodiversity assessments, is hampered by high species richness, inherent inaccessibility and a strong tendency towards aggregated distribution. Current debate concerning the relative merits of transects (rapid, but at best semi-quantitative) and alternative sampling approaches such as grid-based or randomised placements of monoliths or cores (labour intensive, but statistically preferable) has initiated a search for satisfactory indicator groups or surrogates of belowground faunal diversity. Here, we use well-characterised, forest-derived plant and termite assemblages to show there can be a key role for plant indicators. We catalogued all vascular plant species, plant functional attributes (PFAs), plant functional types (PFTs), and vegetational structure in seven IBOY-designated sites along a gradient of disturbance and land-use intensification in lowland Sumatra, using a rapid survey protocol. We simultaneously sampled the termite assemblage in the same sites by a more exhaustive process involving microhabitat exploration. There were highly significant, positive correlations between species richness of all termites (and of soil-feeders, the most important termite functional group) and, respectively, mean canopy height ( $r > 0.96$ ), woody plant basal area ( $r > 0.95$ ), the ratio of plant species richness to richness of PFTs ( $r > 0.97$ ), and plant species richness ( $r > 0.85$ ). There was no significant correlation between any individual plant and termite species. There were significant correlations between 18 individual PFAs and 24 of the 54 termite species, and between 12 PFTs and 38 termite species. In addition, 6 PFTs and 10 PFAs were highly correlated with termite species richness and relative abundance. Causal linkages between termites and their plant predictors are briefly discussed. Plant-based heterogeneity and aboveground habitat structure may therefore predict termite diversity response to disturbance. We conclude that for rapid, multi-taxon surveys including belowground macroinvertebrates, logistic efficiency may be achieved by the use of specific, readily observable plant indicators.