

Using trait-based theory for predicting functional losses in dung beetle communities: Do species matter?

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Anthropogenically created habitat edges have pervasive impacts on the distribution and persistence of invertebrate species in forest ecosystems. The response of species to edge effects can be highly dependent on variability of species traits (response traits), which may in turn co-vary with traits that are important in ecosystem functioning (effect traits). Therefore, non-random loss of species, due to traits conferring higher susceptibility to extinction, may also result in the loss of functionally important species across a habitat edge gradient. In tropical ecosystems, dung beetles (Coleoptera: Scarabaeinae) are one of the most functionally important taxonomic groups providing critical ecosystem services such as nutrient cycling and secondary seed dispersal. However, there have been no studies which have quantified the effects of habitat edges on dung beetle abundance, species richness, species traits, or ecosystem function in forest remnants. We compared dung beetle community structure at forest edges, both protected and unprotected from intense livestock grazing in a severely-fragmented montane forest landscape surrounding the Ngel Nyaki forest reserve in Nigeria. This study has found significant effects of livestock exclusion on edge response functions in dung beetle abundance, species distributions and dung removal rates. Furthermore, results suggest that relative abundances of dung beetle species and provision of associated ecosystem functions are strongly determined by trait differentiation among these species. This study exemplifies the importance of measuring response and effect traits of species for predicting community and ecosystem responses to disturbances in intensively managed anthropogenic landscapes.

