

Dung Beetle Functional Diversity and Ecosystem Services (Resource Relocation) in Different Land Use Types in the Upper Walawe Basin Area

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Abstract

Conversion of forest habitat to different land uses will change the environmental quality of the altered land. Since the relationship between anthropogenic disturbance and animal diversity and ecosystem services emerged, much scientific research has been conducted on this aspect. The present study focuses on comparing dung beetles, a known biological indicator, on examining five diverse environs (large forests, forest patches, Pinus plantations (*Pinus caribaea*), home gardens, and tea plantations) Coprophagous beetles of the subfamily Scarabaeinae (Coleoptera: Scarabaeidae). This study examined whether dung beetles' diversity, species richness, functional groups, and ecosystem services (dung removal) vary with the habitat types. We also assumed that the intensity of anthropogenic activities varies in these habitats. The experiment was conducted for 48 hours each in five habitat types with three selected replicates per each habitat type. The Shannon-Weiner Diversity Index shows that the highest dung beetle diversity is recorded in large forest areas (2.1719). The highest species abundance (186) and richness (22) were recorded in the large forest. The lowest species abundance was recorded in tea plantations (109). The lowest species richness was recorded in pinus plantations (10). Moreover, functional group diversity is high in habitats with fewer human activities. The dominant species in large forests is *Onthophagus favrei* (dominance index-2.9%). In forest patches and pinus plantations, *Onthophagus amphinasus* (19%) and *Paracopris signatus* (36.30%) appeared consecutively. In home gardens and tea plantations, the most dominant species is *Onthophagus unifasiatus* (26.50% and 28.40%). Habitats with anthropogenic activities have less species richness and a high dominance index. Furthermore, dung beetle resource relocation efficiency was skewed toward forest areas. The highest dung removal percentage was recorded in forest areas (large forest-9.58% and forest patches-7.33%). The dung removal in the anthropogenic activities related to land uses was decreased as a home garden (7.17%), Pinus plantation (6.58%), and tea plantation (5.42%). Moreover, large dung beetles (body mass \geq 0.5 g) were only recorded in large forests and forest patches. Low diversity in tea plantations could be attributed to pesticide and fertilizer usage, as beetles are highly sensitive to these chemicals. Pinus plantations showed low rates of dung removal because resource availability in those habitats is less due to the fewer mammals. These findings indicate that replacing forests and forest areas with simplified human residential areas and agricultural systems can result in shifts towards less specialized dung beetle communities with altered proportions to other animal groups.

Keywords: Scarabaeinae, Dung removal, Species richness, Species abundance, Dominance index