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Influence of Settlements and Human Activities on Beetle Diversity and Assemblage Structure at Small Islands of the Kepulauan Seribu Marine National Park and Nearby Java

Authors : Shinta Holdsworth, Jan Axmacher, Darren J. Mann

Abstract : Beetles represent the most diverse insect taxon, and they contribute significantly to a wide range of vital ecological functions. Examples include decomposition by bark beetles, nitrogen recycling and dung processing by dung beetles or pest control by predatory ground beetles. Nonetheless, research into the distribution patterns, species richness and functional diversity of beetles particularly from tropical regions remains extremely limited. In our research, we aim to investigate the distribution and diversity patterns of beetles and the roles they play in small tropical island ecosystems in the Kepulauan Seribu Marine National Park and on Java. Our research furthermore provides insights into the effects anthropogenic activities have on the assemblage composition and diversity of beetles on the small islands. We recorded a substantial number of highly abundant small island species, including a substantial number of unique small island species across the study area, highlighting these islands' potential importance for the regional conservation of genetic resources. The highly varied patterns observed in relation to the use of different trapping types - pitfall traps and flight interception traps (FITs) - underscores the need for complementary trapping strategies that combine multiple methods for beetle community surveys in tropical islands. The significant impacts of human activities have on the small island beetle faunas were also highlighted in our research. More island beetle species encountered in settlement than forest areas shows clear trend of positive links between anthropogenic activities and the overall beetle species richness. However, undisturbed forests harboured a high number of unique species, also in comparison to disturbed forests. Finally, our study suggests that, with regards to different feeding guilds, the diversity of herbivorous beetles on islands is strongly affected by the different levels of forest cover encountered.

Keywords : beetle diversity, forest disturbance, island biogeography, island settlement
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