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# Cricket communities monitoring as an innovative approach to evaluate tropical island biodiversity. Insights from the New Caledonian biodiversity hotspot.

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## Abstract

In insular tropical ecosystems, crickets (Grylloidea) are among the most diverse and abundant insects in forests, from ground to canopy levels. Crickets contribute to various ecosystems processes, representing a significant part of the food resources in the food web. Most of cricket species are soniferous and can be monitored using acoustic sensors. These properties appear to be highly relevant to foster research on proxy of ecosystem state of tropical islands, which are facing high rate of habitat destruction and invasive species spread. To improve biodiversity monitoring and habitat assessment, we propose an innovative approach based on cricket communities monitoring in the New Caledonian biodiversity hotspot. In the context of a rich and highly endemic cricket fauna (> 190 taxa, > 90% endemism), we characterized cricket communities through a standardized taxonomic and acoustic census effort. We considered an ecological gradient including shrubland, pre-forest, and forest, in the context of the spread of a major invasive ant (*Wasmannia auropunctata*). We monitored 24 sites (4800 m<sup>2</sup>) representative of the three gradient stages (shrubland, pre-forest, forest) and the two invasion modality (invaded and non-invaded). Results show a clear signature in term of cricket community for each stage, with a complete species turnover from shrubland to forest. Cricket communities also respond to the invasive ant spread showing a significant decrease in species number, abundance and acoustic activity. Furthermore, passive recording at night showed a high contribution of crickets to the ambient sound, and these changes in cricket acoustic communities revealed underlying community changes in response to habitat gradient and invasion status. These results highlight a promising field of research based on non-invasive, innovative and fast monitoring of specific, abundant and rich insect fauna. As crickets are present in virtually every island ecosystem, they could be widely assessed as indicator to improve management of tropical island ecosystems.

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