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TITLE: Biodiversity dynamics in isolated island communities: interaction between natural and human-mediated processes

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ABSTRACT:

The flora and fauna of oceanic islands have inspired research since the early scientific explorations. Islands can be considered 'nature's test tubes'- simple systems with multiple replicates. Our research has used the simplicity of island systems to understand ecological community dynamics and to compare the properties of island communities with those in more complex mainland systems. Here, we present three topics: (i) current patterns of biodiversity on isolated islands of the Pacific; (ii) current patterns of disturbance and invasion on islands; and (iii) future trajectories inferred from these patterns. We examine features of islands (in particular, topography and isolation) that have allowed for given levels and distribution of endemism. The extent to which island communities are impacted by, resist or accommodate disturbance and/or invasions by nonindigenous species appears to be dictated to a large extent by properties of the native communities and how these communities were originally assembled. Accordingly, patterns of disturbance and invasion are very different for high (montane) islands that are extremely isolated compared to those that are nearer to a source of natural migrants. As with all biotas, those on islands are dynamic entities. However, the unique aspect of islands is their isolation, and extreme isolation has largely been lost over the course of the last few centuries due to the development of transportation routes. We argue that such a modified dynamic will affect the future of the biota and the processes that gave rise to the biota. Specifically for isolated habitats, ecological processes will become increasingly more likely to generate biodiversity than evolutionary processes which have been relatively more important in the past. In the short term, island biotas and other similar biotas that occur in montane habitats may fare well as species are often abundant locally in the habitat to which they are indigenous, and may demonstrate considerable resistance and resilience to invasion. However, island biotas - and other biotas that show high local endemism - will likely not fare well in the face of prolonged disturbance. The biotas in these areas generally display a relatively low dispersal capacity; therefore, under conditions of long-term habitat modification, isolated biotas are likely to be swamped by non-natives, which - simply because of random processes and higher propagule pressure - will move more readily into available habitats. Thus, despite the importance of incorporating the evolutionary process into conservation efforts, we must also be careful to evaluate the likely form that the processes will take when the context (specifically, extent of isolation) has been highly modified.

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