Islands in the ice: patterns in and threats to the unique terrestrial biodiversity of the Antarctic

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Abstract

Antarctica may not conjure up pictures of islands, although clearly this description applies well to the remote sub-Antarctic and Southern Ocean islands. However, its terrestrial biodiversity is in large part restricted to tiny islands of ice-free habitat surrounded by vast expanses of inhospitable ice. Recent advances in understanding of Antarctica's terrestrial diversity have emphasised that it is characterised by much stronger regionalisation and palaeoendemism than previously suspected. In an era of recent and predicted future regional climate change, this generates important new threats to the native biodiversity of the ice-fee 'islands' of this still largely pristine continent. This presentation will briefly introduce the form, distribution and regionalisation of terrestrial diversity within and around Antarctica, along with recent modelling studies of future climate, and the effects this will have on the distribution and extent of ice-free ground, and the distribution of both native and non-native biota. The potential role of direct human activity as a driver of changing distributions will be emphasised. The study integrates the outcomes of recent research modelling current and future native and non-native species distributions in Antarctica with published models of future predicted climatic changes and associated changes in the extent of ice-free ground. The intensity of human activity providing linkages between otherwise biogeographically isolated regions is also superimposed to identify areas at particular risk of human-assisted biological invasions. Focusing on the Antarctic Peninsula region, the decades to the end of the 21st Century will see a rapid increase in the extent of ice-free ground, but the coalescing of currently isolated areas increases the risks of genetic diversity loss through homogenisation. Rapid southwards movement of both native and current and future invasive species is likely due to increasing environmental suitability. Some distinct biogeographic regions of the Antarctic Peninsula and continental coastline have overall sufficiently similar climates that human connectivity between them risks facilitating the inadvertent movement and establishment of biota. The study emphasises the urgent need for establishment of robust and practical biosecurity measures for both entry to and movement within the Antarctic region, backed by strong survey and monitoring effort.

Keywords: bioregionalisation, climate change, distribution modelling, connectivity, invasions, human assistance

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