Are humans decreasing species diversity or only phylogenetic diversity in mammals on islands?

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Abstract

837 out of the 5750 non-marine mammalian species that have existed within the last 130,000 years are (or were) endemic to isolated islands. Due to human actions 127 of the island endemic species, along with 225 other species are sadly now extinct. Based on their IUCN categories we can expect that another 202 island endemics and 461 other species are expected to go extinct in the next 100 years under a status quo model. The total diversity of island endemic mammals in 100 years may thus only be 61% of the species that could have been. The question is however if we also could at the same time have increased speciation rates. I.e. if we in 100 years manage to reduce extinction rates to background levels, would the geological consequences of humans be a reduction in diversity or rather an increase in species turnover? To understand this we mined the literature to get full lists of all introduced mammals to both continents and to isolated large and environmentally stable islands. We found a total of 68 such introductions to continents and 1129 to 173 islands, altogether representing 130 currently accepted species from 13 different orders. Some islands may be too small to contain stable populations of some of the species, but an estimated 925 island introductions have been to islands which plausible can maintain viable populations (estimated carrying capacity $>$ 500 individuals). These introductions are not currently given species rank, but represents isolated populations without current gene flow and without any plausible potential for future non-human-mediated gene flow. If we were to treat these as species, which they all else equal likely will develop into, our results therefore suggest that humans may not decrease species diversity globally and in particular not on isolated islands. Considering phylogenetic diversity, in contrast simulations show that human extinctions have dramatically reduced global phylogenetic and that this reduction likely will take millions of years to recover. I.e. over geological time, the persistent signal of humans may be a reduced phylogenetic diversity and an increased species turnover, but not a reduced (mammalian) species diversity.

Keywords: mammals, introduced species, extinctions, phylogenetic diversity

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