

# **The Anthropocene extinction event: magnitude, phylogeography, geography, causes, consequences, and responses**

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The dominance of human influence on planet Earth has been argued to have initiated a new geological epoch, the Anthropocene. One of the central features of the Anthropocene is a looming extinction event, with extinction rates three orders of magnitude above background and on par with the five catastrophic mass extinctions of Earth's history. The IUCN Red List provides the most comprehensive dataset through which to assess this extinction event; all species of mammals, birds, amphibians, and corals have now been assessed. Its effects are highly clustered taxonomically and phylogenetically, with the effect that disproportionate amounts of evolutionary history and hence option value are being lost. They are also clustered geographically into hotspots of high irreplaceability (endemism) and vulnerability (threat). The predominant cause of the extinction crisis is the destruction of natural habitats, but disease, invasive species, overharvest, and climate change are growing in importance as threats. The crisis represents an irreversible erosion of natural capital, reduction in option value, and loss of intrinsic value. Prevention of the Anthropocene extinction event is both essential and possible: it will require strategic expansion of protected areas, wise management of the wider landscape and seascape, and targeted conservation for particularly vulnerable species. Genomic analysis has the potential to support our understanding of and response to the Anthropocene extinction event in each of these five dimensions, for example, refining estimates of background extinction rates; understanding the taxonomy and distribution of extinction; diagnosing other stressors on biodiversity; measuring option value and its rate of loss; and supporting species conservation legislation.