



Is the rate of human-induced arthropod extinction comparable with diversity changes during the FIVE BIG mass extinctions?

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Human-induced biodiversity decline (“the sixth mass extinction”) is often compared with the five big mass extinctions on Earth in the past 540 million years. It is thus surprising that arthropod biomass and biodiversity loss has only recently become a widely discussed topic based on the dramatic decline of insects, with no data being available presently for terrestrial arthropod groups other than insects (i.e. arachnids, millipedes). Assessment of diversity decline in arthropods is based on zoological collections, but these only span the last 200 years and the period in which ecosystems were already affected by human activity. We suggest that by comparing pre-Holocene change in arthropod diversity with current change, it will be possible to gain some insights into the rate of anthropogenic impact compared to background extinction rates, and on the extent of the current mass extinction compared to previous ones.

We discuss factors that may hamper the comparison of present-day insect diversity decline and extinction with past changes in insect diversity, i.e. hiatuses and gaps in the fossil record, imprecise dating methods, divergent fossilization potential of different groups. Moreover, we present case studies providing guidelines on how to avoid some of these effects and summarize ideas for future research projects allowing a comparison of present-day and fossil terrestrial arthropod diversity. These approaches comprise studies on groups with high fossilization potential and high taxonomical resolution, indirect indications for presence of taxa, e.g. via presence of trace fossils or specific parasites, and better interdisciplinary collaboration.