Has the Earth’s Sixth Mass Extinction Already Arrived?

This paper is a review of research on the current human-driven decline in biodiversity, and a critical examination of scientific and media claims that it ranks as a mass extinction. The authors decided to compare modern biodiversity trends to the ‘Big Five’ mass extinctions as a way to place the present in its context. The paper discusses the problems inherent in comparing modern and paleontological data, then proceeds to outline statistical methods to work around these issues. Modern biodiversity data differ from the fossil record in terms of magnitude (the percentage amount of species lost) and rate (historical records cover a much briefer timespan, which can distort rates). The authors then used a series of hypothetical scenarios to explore the direness of potential futures. When comparing modern rates with Big Five rates scaled to a five-hundred-year interval, they found that modern taxa fared better; however, when “threatened” species were treated as guaranteed extinct, the modern rates approached Big Five levels. I interpreted this as a worst-case scenario, which was certainly sobering. To better project their predictions, the authors calculated lengths of time over which losses would accumulate to Big Five Magnitudes at present rates. From these theoretical experiments, the authors found that the sixth mass extinction is not currently underway, but could easily be initiated if the world continues its “business as usual.”

I really liked this article, and found it easy to read, stimulating and thorough without being overloaded. This topic is a buzzy one now, and solid science (even if it’s theoretically-based) can impress urgency on policymakers and help them prioritize finding solutions. The section discussing problems of comparing modern and fossil data was especially relevant to this course, and I learned a lot by reading it. I felt that their methods were well-considered and watertight, and that they designed their hypotheticals for the most relevant results. I also found their discussion of extinction selectivity interesting, and I wish they had gone to greater length on it. The idea that human activity mimics mass extinction selectivity is a review unto itself, though, so I understand why they bypassed it. From a style standpoint, the paper flowed easily from background information into research obstacles into methods, results and conclusions. Their final section is particularly well-written, serving as a summary of the paper’s findings as well as outlining practical next-steps for both researchers and decisionmakers.

There wasn’t much about this paper that I didn’t like! I didn’t see any gaping holes in their methods, their results are clear and reasonable, and their writing is commendable, I do wish they had made some effort to bring in some concrete support for some of their claims; for example, they could have identified specific selectivity trends in modern extinctions that parallel those of the fossil record. Of the modern taxa known to have gone extinct in historical times, what were some common threads? Do we indeed see greater risk among larger animals or those with large ranges? As I said previously, I wouldn’t usually expect this level of detail even from a review, but this paper has a clearly-stated intent to influence policy, so I think some concrete examples could help nonscientists decide how to properly distribute their time and effort. For example, should the emphasis be placed first on preserving habitat (selection against a certain niche), or preventing poaching (selecting against body size, presumably)? I also wish they had elaborated more on the problem of comparing extinction magnitudes

The figures were effective summaries of the paper’s findings, although their captions were unnecessary recaps of the figures’ content and also exhaustingly long. Figure 1 shows how interval length can distort extinction rate, making studying modern extinction in their geological context a challenge. It also shows the elevated mammalian extinction rates over the past few thousand years, appearing almost as a linear continuation of a trend begun in the Pleistocene. Figure 2 was simpler and encompassed the extinction magnitude data for all taxa relative to the 75% benchmark used to define the Big Five. This image was not a great summary fo the findings, since it did not account for rate, but it was an effective depiction of which groups are more at-risk. Figure 3 for me was the best image, as it properly summarized all the data (not just Cenozoic mammalian data) on the two axes the researchers defined. It was a graphical depiction of their first hypothetical scenario, comparing modern extinctions to the Big Five scaled down to modern time intervals. It was, frankly, scary to see how smooth the trajectory toward a mass extinction is expected to be.