

THE SIXTH EXTINCTION

In 100 million years, says Elizabeth Kolbert in *The Sixth Extinction: An Unnatural History* (2014), all humanity's works – everything – will be compressed into a sediment layer as thick as a cigarette paper. Our legacy will be a worldwide redistribution and extinction of species.

Her title alludes to earth's historical "big five" extinctions, and to a sixth, ongoing extinction, for which homo sapiens is almost entirely responsible.

Each of the big five seems to have had a different cause, though all resulted in profound losses of biodiversity. The oldest, in the Ordovician, 450 million years ago, occurred when most creatures still lived in the oceans, and its cause seems to have been glaciation.

The most devastating, at the end of the Permian, 250 million years ago, which wiped out nearly 90 percent of earth's creatures, was probably caused by massive carbon releases - resulting in rapid global warming and ocean acidification. Ocean acidification seems to have played a role in as many as three of the big die-offs, when coral reefs disappeared for millions of years afterwards.

The most famous of the extinctions, because it wiped out the dinosaurs, occurred at the end of the Cretaceous, 66 million

years ago, and was caused by a 10 kilometer wide asteroid travelling at 70,000 kilometers an hour, which struck the Yucatan peninsula. The impact equaled the explosion of a million H-bombs, and blasted a crater 150 kilometers wide – the Chicxulub crater.

The entire surface of North America was instantly fried, including all the dinosaurs, every other creature larger than a cat, and almost everything in the oceans. Following the impact, heat, darkness, cold and changed ocean chemistry continued to kill for eons.

Such events simply cancel the rules of survival of the fittest. No living thing is equipped to deal with such extremes. Whole ecosystems are destroyed worldwide, and precisely those few survivors of the great die-offs determine what can live thereafter.

Human beings are so preeminent among those survivors that the current age has more and more been called the Anthropocene.

We've transformed between 1/3 and 1/2 of the planet's land surface, dammed most major rivers, produced more nitrogen than natural systems do, removed more than 1/3 of the oceans' productivity and degraded its chemistry, used more than 1/2 of the world's fresh water, and altered the atmosphere with CO₂ and methane.

Scientists talk of “background” – i.e. normal – and “panic” extinction rates. Thanks to us, the extinction rate of amphibians is 45,000 times normal. Also headed toward extinction are 1/3 of reef-building corals, freshwater mollusks, sharks and rays, 1/4 of all mammals, 1/5 of all reptiles and 1/6 of all birds.

Because glaciations last much longer than inter-glaciations, all species are adapted to the cold. And since global warming is happening 10 times faster now than after the last glaciation, we need to ask, will species be able to adapt if it gets warmer than it was, say, 50 million years ago?

In any 24 hours, 10,000 species are shuffled around the world in ballast water alone. Most don't survive. A few wreak havoc.

The oceans are 30% more acidic than in 1800. By the 21st century's end they're predicted to be 150% more acidic, thanks to our pumping 2 ½ billion tons of CO₂ into them annually. Of burning fossil fuels, Kolbert says, it's like running geologic history in reverse – at warp speed.

And our ancient ancestors no more lived in harmony with nature than we. Extinctions and human migrations mirror each other.

It seems then, that we ourselves are the Serpent in the Garden. In trying to control nature for our own sakes, to

“transform the ecological landscape” - we’ve become responsible for the sixth extinction.