

Article: Mass Extinctions

We are in the midst of the Holocene period, and if scientists are correct, we are now living through one of the [largest extinctions of species](#) in history. While this is alarming, it appears that mass extinctions are a particularly unpleasant occurrence on Earth; since its formation over 4 billion years ago, our planet has undergone a series of catastrophes large and small, ranging from dramatic climate changes to impacts by asteroids. Not all of these events spelled complete disaster for the living things existing at the time, but a few such events — dubbed “The Big Five” — had devastating consequences for the planet’s inhabitants.

The End of the Cretaceous

The best known and most studied of the five events was also the most recent, occurring a mere 65 million years ago, marking the end of the Cretaceous period and the beginning of the Tertiary. Some amount of species decline, possibly due to climate changes, had been happening for a few million years, but the impact of a six-mile-wide asteroid wreaked unimaginable havoc on an already fragile ecosystem. Smashing into the planet just off the coast of the Yucatan Peninsula, the asteroid’s shock wave killed every living thing within hundreds of miles around it, and spurred global fires whose gases caused acid rain and whose smoke blotted out the sun, sending temperatures plunging. Today, a thin layer of soot in the rock fossils, and an enormous crater that can be seen from space, are the chilling reminders of this space invader that wiped out about three-quarters of species on Earth, including, most famously, the dinosaurs. Ironically, we humans may have the Chicxulub asteroid to thank for our own existence; the destruction of the dinosaurs left many ecological niches that in time were filled by quickly diversifying mammals.

The End of the Triassic

Occurring about 205 million years ago, the event marking the boundary between the Triassic and the Jurassic was not as sudden or horrific as an asteroid impact, and in fact may have happened as a result of several different factors working together. The base cause may have been largely increased volcanic activity, which might have contributed directly or indirectly to acid rain, global warming, a drop in sea levels, and the rise of toxic waters from the deep ocean to the shallows. More than half of all marine species were wiped out in this event, along with all large amphibians and about 48% of species overall.

The End of the Permian

The transition between the Permian and the Triassic, 251 million years ago, was the largest of all the mass extinctions, bringing death to a terrifying 83% of all species (including 96% of all marine species). The exact causes of this nearly complete destruction are unknown, though dramatic climate change, methane eruptions, seas poisoned by hydrogen sulfide, and even an impact from space have all been put forward as partial explanations. One root cause that is often proposed is the upheaval caused by the formation of the supercontinent Pangaea. This huge land mass could have contributed to a decline in area of species-rich shallow seas, and its vast, dry interior spaces may have caused drastic seasonal weather patterns.

The Late Devonian

This somewhat prolonged extinction event occurred over a period perhaps as long as 20 million years, beginning near the Devonian-Carboniferous transition, about 375 million years ago. Evidence appears to show a series of extinction "pulses" which eventually resulted in the disappearance of about half of all species. As with most other mass extinctions, several factors seemed to have contributed, including a period of global cooling, falls in sea levels, and the rise of oxygen-free water from the deep oceans.

The End of the Ordovician

Occurring around 450 million years ago, the event marking the boundary between the Ordovician and Silurian periods is thought to be the second largest extinction after the End Permian (57% of species wiped out), and is possibly another event caused by an unwelcome visitor from space. Some scientists have suggested that a [sudden burst of gamma rays](#), possibly from a nearby supernova (death of a star), might have produced enough radiation to kill many species outright, as well as damage the ozone layer, causing problems for species that survived. Evidence for this proposal is still vague, and the vast amount of time elapsed since the event may mean that the exact causes may never be completely known.

The 6th Great Mass Extinction Occurring Now!

There is little doubt left in the minds of professional biologists that Earth is currently faced with a mounting loss of species that threatens to rival the five great mass extinctions of the geological past. It is estimated that Earth is currently losing something around 30,000 species per year -- which breaks down to the even more daunting statistic of some three species per hour. Some biologists have begun to feel that this biodiversity crisis -- this "Sixth Extinction" -- is even more severe, and more imminent, than first proposed.

With the human population expected to reach 9-10 billion by the end of the century and the planet in the middle of its sixth mass extinction — this time due to human activity — the next few years are critical in conserving Earth's precious biodiversity. The cause of the Sixth Extinction, *Homo sapiens*, means we can continue on the path to our own extinction, or, preferably, we change our behavior toward the global ecosystem of which we are still very much a part of, Earth.

At a casual glance, the physically caused extinction events of the past might seem to have little or nothing to tell us about the current Sixth Extinction, which is a human-caused event. For there is little doubt that humans are the direct cause of ecosystem stress and species destruction in the modern world through transformation of the landscape, overexploitation of species, pollution, and the introduction of alien species. The Sixth Extinction can be characterized as the first recorded global extinction event that has a biotic, rather than a physical cause.

"The comparison I make between these big extinction events, prehistoric meteorite-caused or natural event-caused extinctions and the present one," says E.O. Wilson, "is parallel to the difference between a heart attack and cancer. We understand that what we are doing is a slow but insidious destruction, and can only be seen when you lay it out over the whole world over a period of decades. The hopeful thing about it is that this cancer can be treated. A lot of damage has been done, and it can be dangerous to us if we really just go on until half the species of organisms are extinct forever. Or we can halt the hemorrhaging, and change.