Steps to Sustainability
Part 36 of a Series:
The Sixth Extinction?

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"We should really thank our lucky stars," wrote world-famous Alexander Agassiz Professor of Zoology at Harvard University, the late Stephen Jay Gould, when discussing the K-T mass extinction of the dinosaurs that took place about 66 million years ago. [The K-T name derives from the German words for its geological time slot.] Acknowledging the current theory of a monster asteroid slamming into the earth and generating a massive dust cloud that blocked out photosynthesis in plants and plankton – or had some as yet unknown effects – Gould explains: "Dinosaurs and mammals had shared the earth for more than 130 million years." Without "this ultimate random bolt from the blue, dinosaurs would still dominate the habitats of large terrestrial vertebrates, and mammals would still be rat-size creatures living in the ecological interstices of their world" (2002:1320).

Lucky for us this asteroid hit at such an opportune geological moment, too. Lucky, that it cleared away 75% of species existing at the time, so that as the dust cloud dissipated and the sun's rays could reinvigorate the earth's surface, there was space for the branching out of new species, but still something around for those rat-size mammals to eat.

The Five Great Die Offs Across Geological Time

After the emergence of life on earth, at least five times great die-offs led to mass extinctions. We shall refer to three of them. After 3.2 billion years of development, life on earth came almost to an end. About 570 million years ago a major climatic event – possibly a mass icing over of the earth was possibly responsible for what is called the Cambrian extinction. (Swimme and Barry 1992:111). Another theory for the Cambrian extinction is a sudden loss of oxygen in the earth's oceans. Around 85% of all species of living beings are thought to have perished, but after this die-off life re-emerged and branched out again with new forms. On three other occasions now known from the fossil record, at least 75% of species were exterminated. The Permian mass extinction of about 252 million years ago is thought to be the greatest of all the die-offs – with estimates of species loss possibly as high as 96%. The great Permian die off might have been caused by massive volcanic eruptions with lava flows igniting huge coal deposits – filling the earth's atmosphere with CO_2, methane, sulfur and acid rain (Guterl 2012:40; Erwin 2006:40 -43 and 190-217; Nuccitelli 2018). It has also been noted that many of the great die offs may have been associated with significant declines in sea level (Gould 1985:238–39). Why this might be so remains unclear. Studies including smaller die offs in between the five big ones suggest a possible 26 million years cycle corresponding to certain comet or meteor clouds in the solar system that might be hurling objects close to earth on a 26- million-year schedule (Gould 1985:238, 441–442). These cycles remain controversial. We are apparently 13 million years from the next one (Gould 1985:443).

A Sixth Extinction – Caused by…US?

Do we really owe the existence of intelligent life on a big space accident? If so, perhaps we should do more than thank our lucky stars.

Unfortunately, a lot of evidence suggests we humans could be facing a sixth mass extinction – and we may be the main cause.

The paleontological and archaeological records indicate that the extinctions of non-human life forms is strongly correlated with the presence of humans. As earth's climate warmed about 15,000 years ago, human hunters and gatherers began migrating out of Asia and into North, Central and South America. As the hunters spread down the continent, populations of large mammals disappeared: mastodons, the wooly mammoth, the short-faced bear, the American lion, the Aztlan rabbit – in all 29 genera (the evolutionary unit ~~made up~~ of species). On the island of Hawaii another natural experiment connecting humans and die-offs took place. Of a pre-human 145 species of birds (some of them flightless and easy to hunt down and kill), only 35 remain, and 24 of those are endangered (Guterl 2012: 46-49).

Human-connected animal die-offs occur for two main reasons. One is direct killing. The most famous case is probably that of the passenger pigeon. From a population estimated at 5 billion in 19th century North America, the birds were killed and eaten except the last one – Martha – who died in 1914. Another means is appropriation of the animal food source when humans take over an area. A 1986 study by biologists Peter Vitousek and colleagues estimated how much humans might be appropriating the sun's energy and photosynthesis in three ways:

- directly eaten, fed to domesticated animals, or used in construction or for firewood;
- human use of land for agriculture and similar purposes that deprives other species of this use, and;
- loss when forest is taken over for farming, plantations, pasture, habitation, desertification.

They concluded that humans appropriate 38.8% of land-impacted solar energy (Vitousek *et al* 1986:372). If we are among 5 - 30 million species (less than 5 thousandths of a percent) but appropriate as much as 38.8% of all land-based energy, it is likely that humans are pushing other species down to smaller percents and – eventually – to endangered status or extinction. At what point will our energy-greedy

species disturb the various ecosystem balances on which our own existence or comforts depend? Is it already happening?

In 2014 journalist Elizabeth Kolbert came out with *The Sixth Extinction: An Unnatural History*, which explores many ways human behavior is leading to the extinction of particular species of frogs, the great auk, the Sumatran rhino, the Hawaiian crow and numerous ocean creatures. It's a frightening and depressing narrative. Equally dramatic but more quantitative is the report printed in the *Proceedings of the National Academy of Science of the United States of America* on July 10, 2017 and summarized in *The* [U.S. online] *Guardian* of that same date As summarized by the authors: "Using a sample of 27,600 terrestrial vertebrate species, and a more detailed analysis of 177 mammal species, we show the extremely high degree of population decay in vertebrates…" Population decay was found to be that all 177 mammal species had lost 30% or more of their ranges and in 40% of the species more than 80% range shrinkage occurred between 1900 and 2015(Ceballos *et al* 2017:E6089). Extrapolating their particular findings, the authors estimate that "as much as 50% of the number of animal individuals that once shared Earth with us are already gone…"

It may be time to do more than count on our lucky stars.

1085 words

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