



The Annihilation of Nature: Human Extinction of Birds and Mammals

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Book review

The Annihilation of Nature: Human Extinction of Birds and Mammals by Gerardo Ceballos, Anne H. Ehrlich and Paul R. Ehrlich. 2015. Baltimore, MD, Johns Hopkins University Press. Price: \$29.95. Pp. 191. 83 colour photographs. ISBN 978 1 421417189.

As was succinctly expressed by Edward O. Wilson – the biologist who introduced the word biodiversity so firmly into our repertoire, the world's ant expert, the Darwin of our time – 'I have been a happy man in a terrible century'. He was speaking of the 20th century, with its two World Wars and a Cold War, and a human population explosion from 2 to 6 billion from 1930 to 1999 with its massive impact on everything around us.

In a similar vein, with *The Annihilation of Nature* Ceballos and the Ehrlichs have produced a beautifully written and illustrated book about a 'terrible subject'. And like E.O. Wilson, they are leaders in their field and deserve our fullest attention. Gerardo Ceballos, of the Institute of Ecology, National Autonomous University of Mexico, is the author of *Mammals of Mexico* and *Mexican Diversity of Fauna*. Anne and Paul Ehrlich, both of Stanford University, CA, USA, are between them, the authors of many influential books, including *The Causes and Consequences of the Disappearance of Species*, *The Population Bomb* and *Human Natures: Genes, cultures, and the human prospect*.

In the 20th century we humans truly fanned the flames of the Sixth extinction, the fuse of which we lit some 60 000 years ago when we first made it out of Africa to colonise the world. Now in the early 21st century, we have a choice. As this book explains, as a global community, we can either combine our efforts to stem and reverse the extinction process, or we can let it run its course with ultimately perhaps 95 per cent of all species, ourselves included (our souls at least), gone from the Earth. As the authors sadly reflect, we appear, until now, to be settling for the second option.

The book opens with the chapter 'Legacy', giving an outline of the 'truly astounding' biodiversity that has evolved on our planet since its origin 4.6 billion years ago. Though some 1.8 million extant species of plants, animals and microorganisms have been described and named to date, the total number of species may be anything from a few million to over 100 million. New species are regularly being found and described. Remarkably, some 10 per cent of all known mammals have been described only since 1993. There follows chapters on 'Natural Extinctions', from mass global events to localised background extinction; and on the 'Anthropocene', the age of humans and the Sixth extinction.

The plight of birds and mammals is the focus of the book. Through the heart of their work – in four chapters – the authors track the decline to extinction, or to the edge of extinction, of a wide range of iconic and not quite so iconic species, first the birds, then the mammals. Herewith a small sample of their selection, all of them well known: the dodo; elephant bird; passenger pigeon; lion; tiger; chimpanzee and gorilla.

The dodo of Mauritius. This most symbolic of all the extinct birds, the 'awkward looking' flightless dodo was first recorded by a European (a Netherlander) in 1598. He noted how delicious parts of it were as an item of food. Indeed, the birds were very easy meat for hungry sailors as they had evolved for millions of years in the absence of predators. They were defenceless. Their demise was hastened by the predation on their eggs by introduced species including rats, pigs, goats and macaques. The dodo disappeared quickly, the 'last confirmed sighting' being in 1662, less than 70 years after their first sighting by anyone from the West.

The elephant bird of Madagascar. The island was first settled by humans of multi-ethnic origin around 300 BC and the invasion by Europeans began in the 1500s. Elephant birds had evolved on the island through some 60 million years and there were around 6 to 12 species when humans first inhabited Madagascar. This ground-dwelling avian group included the largest species of bird in the world at the time, reaching a height of 3 m tall and whose eggs were up to 34 cm long. It is recorded that just 'One of their huge eggs could supply omelettes to an entire family group, so it is no wonder that invading modern humans quickly wiped them out'. Like the dodo, they too had vanished by the late 1600s.

Passenger pigeon of North America. In the early 1800s there existed an estimated 5 billion individual birds. A passing flock was observed by the ornithologist and renowned bird illustrator John James Audubon over three days with some 300 million birds flying by every hour. Apparently, nesting colonies could stretch for 23 km. With the clearing of the North American forests, with ongoing 'relentless slaughter' by professional market hunters and with birds being captured for target shooting, their end was inevitable. The last known member of the species died in the Cincinnati Zoo in 1914.

African lion. Since as recently as around 1950, the estimated population of 1 million lions of various subspecies in Africa – ranging from the Cape of Good Hope to the Mediterranean – has shrunk to something like 23 000 today. The more isolated subspecies have fared especially badly: the West African lion of Nigeria and a few other countries is on the brink of extinction with *ca* 250 individuals remaining; the Barbary lion, which ranged from Morocco to Egypt, became extinct in the 1950s; the Cape lion, abundant in the early 19th century was exterminated by 1861. The only wild lion outside Africa, the Asiatic lion – now restricted to the Gir Forest of Western India – is down to a population of around 400 individuals.

Asian tiger. This handsome creature was once one of the most widespread big cats in the world. At the beginning of the 20th century the various subspecies occupied a vast territory across Asia. Currently, just pockets of small populations remain and the total number is down from some 100 000 around 1900, to 3200 wild tigers today (a mere 5 per cent). Their state is precarious and there might be none left in the wild within just two decades.

The decline of the chimpanzee and gorilla – closest cousins to *Homo sapiens* – is equally chilling. Some would regard their extinction as genocide. As recently as the mid-1800s,

gorillas were known in the western world only through rumours. Two species, each with two subspecies, are presently recognised. Current census estimates read as dismally as they do for the chimpanzees and bonobos. Population sizes of African apes in the mid-1800s are, of course, not at all clear. Nonetheless, the decline is frightening and our natural world is impoverished by the fact that fewer than 300 Western gorillas are alive today (probably an 80 per cent decline), around 500 Eastern gorillas (perhaps a 90 per cent decline), and only – the figures vary – 100 000 chimpanzees and 50 000 bonobos (optimistically) remain. Thus, as the authors of this book explain, the future is bleak for all the African great apes. While Africa supports 1 billion humans, there are probably fewer than 1 million apes. Ever-increasing deforestation and conversion of land to agriculture, hunting for bush-meat and even outbreaks of disease such as ebola, render them critically endangered.

And here follows but a few of the mammals whose stories the authors tell, that have actually gone extinct in the last 240 years or so, from around 1770 to 2007. They are listed starkly below in the sequence of their disappearance, but each is a tale of tragic woe in the book.

- Steller's sea cow (Bering Sea), discovered in 1741, these 8 m giants were hunted to extinction by 1770.
- Mauritian flying fox, 'a victim of hunting and habitat destruction'; last seen in 1873.
- Falkland Island fox, found and collected by Darwin 1834; last individual killed *ca* 1876.
- Quagga (southern Africa), extinct since the late 19th century.
- Toolache wallaby (Australia), last seen in 1924.
- Tasmanian tiger (thylacine), last captive individual died in 1936.
- Caribbean monk seal discovered by Christopher Columbus in 1494 and relentlessly hunted to extinction. The last record was in 1952.
- Baiji, freshwater dolphin (Yangtze River, China), extinct *ca* 2007.

Naturally, as is made abundantly clear, the unravelling of nature is not just about the disappearance of high-profile species. Cascading 'ecological meltdown' is everywhere, and involves all species, large and small, described or still unknown. Remove the large predators and the herbivore populations soar, with dramatic shifts in the pattern of vegetation and the penetration of invasive plants and animals. 'Anthropocene defaunation' is a rapidly spreading condition throughout the tropical forests of the world. To the eye the

forest may still appear magnificent, but it is empty, silent; the medium to large mammals gone, the birds almost gone, the ecological processes in tatters, pollination, seed predation and dispersal 'reduced or eliminated'.

As this book explains, the litany is endless and the authors relate an infinitely painful story, page after page, species after species. The book is about the part that humans have played in this narrative. There are many factors. They include our exploding numbers, the conversion of wilderness to farmland, increasing industrialisation and global warming. The authors present the argument that all these impacts have begun to mimic the giant asteroid that ended the reign of the dinosaurs 66 million years ago. The Anthropocene, the age of man, is nothing to be proud of.

The authors do not mince their words. The first sentence of their preface reads, 'Humanity has unleashed a massive assault on all living things on this planet.' In the last sentence of their concluding chapter they retain some hope, if only just: 'Above all, let's all work to make that possibility a reality'. Their hope is that 'humanity will reverse course' towards a love for and respect of the wonder and richness of nature. The concluding three chapters address the questions why? and how?

Given that 'overpopulation and overconsumption' are the 'key drivers' of the assault on nature, the authors believe the only real solution is a 'rescaling of the human enterprise' – and that, for them, ultimately means a 'shrinkage of Earth's human population' (humanely, of course) and an overall reduction of 'material consumption'. This will require profound global commitment; the political will to give 'full rights, education, and opportunities to women', for instance, along with ready access to 'effective birth control' for all.

This book on the *Annihilation of Nature*, by three of the world's leading, most respected and prolific ecologists, is vitally important. It can be no exaggeration to say that it and other top books of its kind should be found and debated regularly in every classroom across the world. This would be one very practical way for all children, teachers, parents and grandparents everywhere to get a hands-on sense of the catastrophe that is the Anthropocene.

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