

METABOLIC RIFT

Insect Apocalypse in the Anthropocene, Part 2

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The world's insects are among the principal victims of capitalist agricultural concentration



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In the years following World War II, global capitalism went into overdrive, with devastating effects on the biosphere. Powered by fossil fuels and petrochemicals, the *Great Acceleration* ended 12,000 years of relative environmental and climate stability in the Holocene epoch, and began the Anthropocene epoch. As a synthesis report from the International Geosphere-Biosphere Programme concluded in 2004,

“The second half of the twentieth century is unique in the entire history of human existence on Earth. Many human activities reached take-off points sometime in the twentieth century and have accelerated sharply towards the end of the century. The last 50 years have without doubt seen the most rapid transformation of the human relationship with the natural world in the history of humankind.”[1]

The IGBP report included graphs that illustrated unprecedented increases in human activity and global environmental destruction, beginning about 1950.[2] One, labelled Global Biodiversity, tracked the rate of animal extinctions, which the authors estimated to be 100 to 1,000 times greater than past natural extinction rates.[3] It is a measure of the weakness of insect studies that the discussion of biodiversity decline mentioned mammals, fish, birds, amphibians, and reptiles, but not insects or any other invertebrates.[4]

As we've seen, recent research has decisively changed that picture. Not only are insect populations in decline, but they are shrinking much faster than other animals. Insects comprise half of the one million animal species that scientists believe face extinction in this century.[5] The world's insects are among the principal victims of the Great Acceleration. If it continues, their rapid decline will be among the most deadly features of the Anthropocene.

Concentration and simplification

The most important driver of insect decline is habitat destruction — in particular, the role of industrial agriculture in evicting uncountable species from their homes. Other insect habitats have

been disrupted and destroyed, but farmland is critical because of its unequalled scale — agriculture occupies 36% percent of the world's total land and 50% of the habitable land. Within that huge area, immense swaths are engaged in what can reasonably be described as a *war on insects*.

All farming disrupts local ecosystems and disturbs insect life, but, as ecologist Tony Weis explains, until recently successful farming required working as much as possible *with* natural environments, not *against* them:

"Throughout history the long-term viability of farm landscapes has depended upon the maintenance of functional diversity in soils, crop species (and seed germ plasm within species), trees, animals and insects to maintain ecological balance and nutrient cycles. To this end, agro-ecosystems were managed with a variety of different techniques, such as multi-cropping, rotational patterns, green manures (turning undecomposed plant tissue into soils, typically from nitrogen-rich legumes), fallowing, agro-forestry careful seed selection and the integration of small animal populations."[6]

The decades after World War II saw the agricultural equivalent of the nineteenth century industrial revolution — a shift from petty commodity production to large scale mass production, dependent on fossil fuels. While most farms were still family owned, decisions about what to grow and how to grow it were increasingly made in corporate boardrooms. Agricultural ecologists Ivette Perfecto, John Vandermeer, and Angus Wright describe the metabolic revolution in food production:

"The post-World War II capitalization of agriculture was accomplished primarily through the substitution of inputs that were generated from within the farm itself, with inputs that were manufactured outside the farm and needed to be purchased. Starting with the early mechanization of agriculture that substituted traction power for animal power, to the substitution of synthetic fertilizer for compost and manure, to the substitution of pesticides for cultural and biological control, the history of agricultural technological development has been a process of capitalization that has resulted in the reduction of the value added within the farm itself. In today's farms, the labor comes from Caterpillar or John Deere, the energy from Exxon/Mobil, the fertilizer from DuPont, and the pest management from Dow or Monsanto. Seeds, literally the germ that makes agriculture possible, have been patented and need to be bought."[7]

The postwar boom in agricultural production rested on a wide variety of new technologies, including mechanized equipment, mass-produced animal feeds, synthetic fertilizers, and proprietary seeds. The new inputs worked very well, but as agricultural historian Michelle Mart points out, "the technological revolution in agriculture was more accessible for some than for others."

"Many small family farmers could not afford the heavy investment needed for the new technologies, nor did they have the vast swaths of land that made the technologies economically feasible. By 1955, total operating costs for the average farm had tripled from just fifteen years before, precipitating a decline in the number of farms and in the number of people who worked on the land. From 1939 to 1950, the number of farms in the United States fell 40 percent, and the number dropped almost another 50 percent from 1960 to 1970, while the size of an average farm went up 2 acres each year."[8]

According to the U.S. Department of Agriculture, by 2012, "36 percent of all cropland was on farms with at least 2,000 acres of cropland, up from 15 percent in 1987." [9] While only about 12 percent of U.S. farms can be described as very large commercial operations, they reap 88% of annual net farm income. [10]

In North America and Europe, large farms have typically been created by merging smaller farms. In the global South, deforestation plays the primary role: about five million hectares of forest a year is

cleared and replaced with giant corporate-run farms and ranches.[11] Between 1980 and 2000, over half of the new agricultural land in the tropics was created by clearing forests. Between 2000 and 2010, the figure was 80 percent.”[12]

Profitable management of large farms with expensive machinery requires specialization. Each crop has its own particular requirements, so rather than buy multiple machines, farmers concentrated on single species: just corn, or just wheat, or just soy, and so on. The matrix of fields growing different crops that characterized traditional farming was replaced by immense areas of genetically-identical plants. Most fences, hedges, woodlots and wetlands —homes for small mammals, birds and insects — were removed to maximize production and to allow machines to easily cover the entire area.

There are still millions of small farms growing multiple crops, but production and sales everywhere are dominated by a small number of very large farms, each raising just one or two species of plants or animals. Worldwide, about 75% of plant crop varieties have effectively vanished from agricultural markets, leaving just nine plant species that now comprise close to two-thirds of all crops. As Michael Pollen comments, this has important implications for human diets: “the great edifice of variety and choice that is an American supermarket turns out to rest on a remarkably narrow biological foundation comprised of a tiny group of plants that is dominated by a single species: *Zea mays*, the giant tropical grass that most Americans know as corn.”[13]

Ecological historian Donald Worster writes describes the twentieth century transformation of farming as a “radical simplification of the natural ecological order.”

“What had once been a biological community of plants and animals so complex that scientists can hardly comprehend it, that had been changed by traditional agriculturists into a still highly diversified system for growing local foodstuffs and other materials, now increasingly became a rigidly contrived apparatus competing in widespread markets for economic success. In today’s parlance we call this new kind of agroecosystem a monoculture, meaning a part of nature that has been reconstituted to the point that it yields a single species, which is growing on the land only because somewhere there is strong market demand for it.”[14]

This “disconnection of natural processes from each other and their extreme simplification” is, as John Bellamy Foster writes, “an inherent tendency of capitalist development.”[15] For an economic system that constantly drives towards the simplification and commodification of all things, the millions of species of insects are an unneeded and unwanted complication.



Monoculture. For most insects, this wheat field is a nutrient desert. (Source: Wikimedia Commons, CC BY-SA 4.0)

All by itself, the shift to monocrop farming has substantially reduced insect diversity. Some insects have evolved to live just about anywhere but many cannot survive without access to specific plants. Monarch butterflies, for example can only eat milkweed leaves, and their eggs will not hatch if laid on any other plant. The simplification of millions of hectares has radically reduced the number of monarchs, along with many other habitat specialists. For them, thousands of hectares devoted to corn, or soy, or wheat might just as well be deserts, for all the nutrition and life support they provide.

But industrial agriculture doesn't just passively withdraw support for insects: it aggressively attacks them.

[*\(Continued in Part 3\)*](#)

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Notes

[1] Will Steffen et al., *Global Change and the Earth System: A Planet Under Pressure* (Springer, 2004), 231.

[2] For the 2015 update of the Great Acceleration see Ian Angus, When Did the Anthropocene Begin...and Why Does It Matter?, *Monthly Review*, September 2015; and Ian Angus, *Facing the Anthropocene: Fossil Capitalism and the Crisis of the Earth System*, (Monthly Review Press, 2016) 44-5.

[3] Will Steffen et al., *Global Change and the Earth System: A Planet Under Pressure* (Springer, 2004), 218.

[4] Will Steffen et al., *Global Change and the Earth System: A Planet Under Pressure* (Springer, 2004), 118-9. In fact, in the *entire report* the word insect appears just once!

[5] Pedro Cardoso et al., "Scientists' Warning to Humanity on Insect Extinctions," *Biological Conservation* 242 (2020).

[6] Tony Weis, *The Global Food Economy: The Battle for the Future of Farming* (Fernwood Publishing, 2007), 29.

[7] Ivette Perfecto, John Vandermeer, and Angus Wright, *Nature's Matrix: Linking Agriculture, Conservation and Food Sovereignty* (Earthscan, 2009), 50-1.

[8] Michelle Mart, *Pesticides, A Love Story* (University Press of Kansas, 2015), 13. (After checking the sources Mart cites. I have corrected typographical errors in the dates.)

[9] James M. MacDonald, Robert A. Hoppe, and Doris Newton, *Three Decades of Consolidation in U.S. Agriculture* (USDA Economic Research Service, 2018), iii.

[10] Timothy Wise, "Still Waiting for the Farm Boom: Family Farmers Worse Off Despite High Prices" (Tufts University Global Development and Environment Institute, 2011), 5.

[11] Erik Stokstad, "New Global Study Reveals the 'Staggering' Loss of Forests Caused by Industrial Agriculture," *Science*, September 13, 2018.

[12] Christine Chemnitz, "Global Insect Deaths: A Crisis Without Numbers," in *Insect Atlas 2020*, ed. Paul Mundy (Friends of the Earth Europe, 2020), 15.

[13] Michael Pollan, *The Omnivore's Dilemma: A Natural History of Four Meals* (Penguin Books, 2006), 18.

[14] Donald Worster, *The Wealth of Nature: Environmental History and the Ecological Imagination*

(Oxford University Press, 1993), 58, 59.

[15] John Bellamy Foster, *The Vulnerable Planet: A Short Economic History of the Environment* (Monthly Review Press, 1999), 121.

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- [L'apocalypse des insectes dans l'anthropocène - Partie 1](#)
 - [L'apocalypse des insectes dans l'anthropocène - Partie 2](#)
 - [Insect Apocalypse in the Anthropocene – Part 3](#)
 - [Insect Apocalypse in the Anthropocene, Part 4](#)
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P.S.

- CLIMATE & CAPITALISM. March 5, 2023:
<https://climateandcapitalism.com/2023/03/05/insect-apocalypse-in-the-anthropocene-part-ii/>