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Book review

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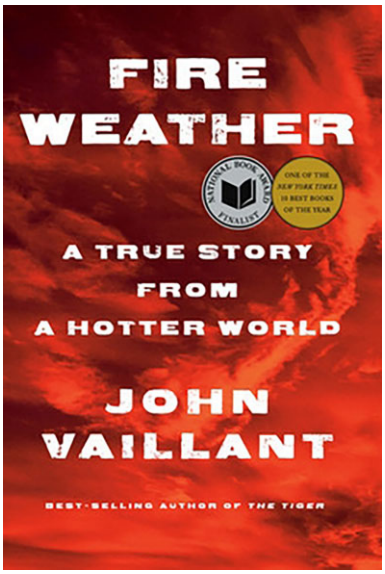
Fires in the Petrocene

Fire Weather: A True Story from a Hotter World. John Vaillant. Knopf Penguin Random House, 2023. 432 pp, illus. $32.50 (ISBN: 978-1524732851, hardcover).



Fire Weather tells the story of the 2016 Fort McMurray wildfire in Alberta, Canada. The fire burned approximately 600,000 hectares of boreal forest, swept through the oil and mining city of Fort McMurray, forced the evacuation of 88,000 people, and destroyed more than 3000 houses. However, the book goes far beyond this fire; it is essentially a reflection on the Petrocene—that is, the petroleum age defined by Vaillant as "the period of history (about the past 150 years) in which our pursuit of fire's energy, most notably crude oil, in conjunction with the internal combustion engine, transformed all aspects of our civilization and, with it, our atmosphere." In other words, the Petrocene is the period in which we filled the air with carbon dioxide, methane, and other greenhouse gases. Although the Fort McMurray fire may not have been the most severe in the world history, it serves as an illustrative and shocking example of the consequences of the Petrocene, including mainly climate change but also the widespread use of petroleum-derived products (plastics and laminates) in our homes. In that sense, the book delves into Pyne's pyric transition between fire and combustion (Pyne 2021). Through the book, Vaillant draws a parallel between the wildfire, which started by burning forest fuels, and the destruction of Fort McMurray—a city whose existence is rooted in extraction of fossil fuels. That is, a city living from fossil fuels (extinct), created a few millions of years ago, was destroyed by recent fuels (extant). Furthermore, the burning of these fossil fuels is the driver of the extreme fire weather conditions that allowed the wildfire to escalate into ferocious firestorm that destroyed the city. Vaillant makes it clear that these firestorms are no surprise; scientists, by the 1960s, had already predicted that drastic changes in climate and fire behavior would occur if we continued releasing tons of carbon dioxide into the atmosphere. However, many individuals, companies, and governments deliberately ignore (and discredit) those warnings to prioritize their economic gains from the oil industry. This behavior is having a profoundly negative impact on our lives today and, even more so, on future generations—a masterful example of the tragedy of the commons.

The book is divided into three distinct parts. The first sets the stage by exploring the socioeconomics of Canada and Alberta. Vaillant provides a historical account, from the European colonization by hunters of fur-bearing animals (especially beavers; to feed European markets) to the industrial revolution brought about by mining and the oil industry in Alberta. Specifically, we learn that, in Fort McMurray, the main fossil fuel product was not oil or gas but bitumen, which is excellent for tarring roofs and paving roads, but it is difficult to extract and produces more greenhouse gases than oil or gas. The exploitation of fossil fuels attracted many people and investors to Fort McMurray, leading to an economic boom and making it the fifth-largest city in Canada. Fort McMurray became a massive mining hub with the frenetic activity of hundred-tonne bulldozers and three-story trucks producing vast amounts of oil, gas, and bitumen; Alberta, as Vaillant describes, became "a petro-state." By 2016, Fort McMurray was a modern and prosperous industrial city, with wealthy suburbs, although their economy was tied to the ups and downs of the world oil prices.

Vaillant describes the 2016 firestorm in part 2. It was May (spring), after 2 drought years; the maximum temperatures were about 33 degrees Celsius (i.e., above previous records for those dates), and the relative humidity reached as low as 12% with no shortage of wind (up to 72 kilometers per hour). In such extremely extreme conditions, everything burns, as was demonstrated in Fort McMurray. The fire started in the boreal forest and moved toward the city, "an island of industry in an ocean of trees." It produced fire tornadoes and colossal pyrocumulonimbus clouds that reached the stratosphere, generating lightning that ignited even more fires. Vaillant provides a vivid and captivating account of the what happened from within the fire itself. The narrative, based on interviews with locals who confronted the fire, convey a powerful sense of realism and of the panic when facing an out of control

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inferno. We learn how firefighters and city authorities were caught off guard, failing to predict the fire's advance into the city when it was in the surrounding forests, despite the weather conditions. The late evacuation became the largest and fastest in the history of American wildfires—remarkably, with a minimal loss of human life. Firefighters and volunteers were utterly overwhelmed by the fire's ferocity and faced impossible decisions as they witnessed their own homes and those of their families and friends consumed (not just burned but vaporized, says Vaillant) in a matter of 5–6 minutes per house. The unstoppable firestorm swept through the city like a wave, destroying properties "at an estimated cost of a million dollars per minute" Vaillant asserts.

The third part of the book delves into climate change, providing a historical perspective about the relationship between carbon dioxide and temperature. The foundational insights, developed in the nineteenth century by researchers such as Eunice Foote, John Tyndall, Svante Arrhenius, and Arvid Högbom, became well established and widely accepted by the early twentieth century through the work of scientists like Guy Callendar. In addition, the continuous rise in atmospheric carbon dioxide levels became evident by 1960s, as was captured by the now-famous Keeling curve. The speed of the carbon dioxide increase, from less than 280 parts per million (preindustrial) to 423 parts per million (2024), is unprecedented in geological history. "What is clear is that the capitalist world has been bingeing on fossil-fueled combustion for a century.… We are gassing the planet to death," Vaillant writes. He then describe how the oil industry was initially well aware of the severe environmental consequences of its activities and even invested in searching for solutions. However, around 1984 (345 parts per million), the industry shifted strategies, choosing instead to cast doubt on climate science. It allocated significant resources to think tanks, lobbyists, pseudoscientific studies, opinion pieces, political campaigns, and advertising, all aimed at obfuscating and minimizing the issue. This ultimately spurred the creation of the Intergovernmental Panel on Climate Change in 1988 (352 parts per million), to provide science-based assessments of climate change. Currently, science is unambiguous on this topic and has little more to say apart from carefully documenting the environmental changes and the biodiversity losses (Pausas 2024); what is really needed are social and policy changes. Vaillant ends the book with examples signaling the beginning of the end of the Petrocene Age, such as major enterprises such as insurance companies and banks announcing plans to cease investments in high-emissions fossil fuel projects, environmental groups filing lawsuits against large oil companies, or the European Union's commitment to achieve net-zero emissions by 2050. These are welcome, but they seem to be too slow and too late.

The reader needs to be careful not to conclude that all large and intense fires are solely the result of climate change. Although this is true in many cases, particularly in more northern latitudes (the focus of the book), it is not universally applicable. Some fire regime changes are climate independent but driven by management policies and land-use decisions (Pausas and Keeley 2014). For instance, in many temperate coniferous forests, including the giant sequoia forests mentioned in the book, fire suppression has disrupted the natural regime of frequent surface fires, leading to fuel accumulation and the occurrence of high-intensity fires that kill trees. Similarly, many peat fires, particularly in tropical ecosystems, result more from draining peatlands (e.g., to irrigate nearby crops) than from climate change. Large, dense, and homogeneous afforestations are the fuel of many firestorms in different continents. And fires in the Amazon are often tied to deforestation rather than directly to climate factors. Although climate change may exacerbate fire activity in all these situations, it is not the primary driver. But the book makes a very important point: The novel anthropogenic climate is giving rise to a new era of large and intense firestorms in many parts of the world, and this requires humanity's full attention. Overall, Vaillant makes a critique of the oil industry and associated lobbies, as well as the capitalism that sustains it.

Vaillant has crafted a book that appeals to a broad audience interested in climate change and its impacts, with part 2 being particularly valuable for firefighters, fire managers, and other fire freaks. The book is easy to read and based on scientific information and trusted sources. Some quasimystical discourse also finds its place in the book, such as when Vaillant questions whether fire is alive because it breathes (i.e., consumes oxygen), grows, and dies, or when he describes the fire entering the city: "The beast behaves capriciously and mercilessly, inciting terror and wreaking havoc as it comes and goes at will." It is also a book that raises awareness on climate change and fire issues, and therefore, it is a must-read for those living in the wildland–urban interface of fire-prone ecosystems. The book ends with a few pictures of the destruction by firestorms, with the very last picture showing some tulips emerging from the ashes and flowering just a month after the start of the Fort McMurray fire (revirescence). This picture reminds us that what is catastrophic for a complex society may not necessarily be so for nature.

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