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Researchers Analyze the Evolving Human Relationship with Fire

Humanity's relationship to fire -- including wildfires, burning of fossil fuels, controlled burns, and human-caused fire -- is the focus of a report by an international team of scientists. The team was organized by UC Santa Barbara's National Center for Ecological Analysis and Synthesis (NCEAS).

Fire, both friend and foe, is a controversial force in the world. The team of 18 researchers analyzed the history and possible future of our ever-changing relationship with fire in an article published today in the *Journal of Biogeography*. The article is titled, "The Human Dimension of Fire Regimes on Earth."

"The value of this study is that it presents a critical assessment of the diversity of human uses of fire, from tamed landscape fire, to agricultural fire, to industrial fire," said Jennifer K. Balch, postdoctoral associate at NCEAS and second author on the paper. "Human use and misuse of fire has been so prevalent in our evolutionary history, and the evolution of cultures, that we've forgotten how dominant a force fire really is."

The research team noted that wildfires are often viewed as major disasters, and there is concern that climate change will increase their incidence. However, it is difficult to consider the true impact of past or future wildfires without understanding their place in natural and human history, about which much is unknown.

The researchers offer a historical framework to help other researchers, as well as managers, to develop a context for considering the relationships humans have with fire. This framework is key to planning for future fire risk and understanding the role of fire in natural ecosystems, according to David M. J. S. Bowman, lead author and professor at the School of Plant Science, University of Tasmania.

"There are often needless debates about whether or not fire has any place in flammable landscapes," Bowman said. "These debates are not helpful because of the intertwined relationships among humans, landscapes, and fire throughout human history, which blur any distinction between natural and human-set fires."

The researchers' analysis recognizes four fire phases:

Natural fires that occur without human influence.

Tame fire used by hunter-gatherers to manage landscapes for game and wild food production.

Agricultural fire used to clear land, grow food, and burn fallow.

Industrial fire to power modern societies that have switched from using living to fossilized plants as the primary fuel.

All these phases still occur today. The researchers explain that this remarkable diversity of human uses of fire, albeit imperfectly controlled, has powered all cultures. However, the problem is that the excessive combustion of fossil fuels is driving climate change. "Our fossil-fuel-dependent economy is yet another extension of our dependence on combustion," Balch said. "We have effectively put fire in a box." The result of massive dependence on this one use of fire may ultimately overwhelm human capacities to control landscape fire, given more extreme fire weather and more production of fuels, according to the researchers.

Considering Earth's fire history before human influence also offers great insights into the flammable planet we have inherited, according to the team. "Unraveling the nature of fire before any human influence is an important element of the current debate," said co-author Andrew C. Scott, professor in the Department of Earth Sciences, Royal Holloway, University of London. "Some only see fires in terms of human causation and impact. Understanding the ways that humans have and are altering natural wildfire systems has profound political and economic significance."

The research highlights the fact that understanding the relative influences of climate, human ignition sources, and cultural practices in particular environments is critical to the development of sustainable fire management to protect human health, property, ecosystems, and diminish greenhouse gas pollution. "Fire is such a defining feature of humans, and we are the only animals that use fire," Bowman said. "We could have been called Homo igniteus as much as Homo sapiens."

With future climate change all of us may have to confront wildfire -- even if we do not do so now -- so understanding human's relationship with fire will be important for all of us, according to Balch. "Companion with changing climate, human ignitions are also changing; therefore, it is imperative that we better understand the human relationship to fire," she said.

NCEAS is funded by the National Science Foundation.

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† Top photo: View of Canada's 2003 Okanagan Mountain Park Fire from McCulloch Road, with Harvest Golf Club in the foreground.

Credit: Wenda Pickles/ Library and Archives Canada

†† Middle photo: Smoke plume from a deforestation fire in the Amazon's expanding agricultural frontier.

Credit: Jennifer K. Balch, 2006

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