

Vast Peat Fires Threaten Health and Boost Global Warming

Largest blazes on Earth smolder for months in Canada and Indonesia

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Peat fires smolder slowly at a low temperature and spread underground, making them difficult to detect, locate and extinguish.

Credit: Brad Lidell/USFWS via Flickr

June 28, 2016 — As forest fires devastated Fort McMurray, Alberta, last month, a different sort of fire may have started beneath the ground. Peat, a carbon-rich soil created from partially decomposed, waterlogged vegetation accumulated over several millennia and the stuff that fueled Indonesia's megafires last fall, also appears in the boreal forests that span Canada, Alaska and Siberia. With the intense heat from the Fort McMurray fires, "there's a good chance the soil in the area could have been ignited," says Adam Watts, a fire ecologist at Desert Research Institute in Nevada.

Unlike the dramatic wildfires near Fort McMurray, peat fires smolder slowly at a low temperature and spread underground, making them difficult to detect, locate and extinguish. They produce little flame and much

smoke, which can become a threat to public health as the smoke creeps along the land and chokes nearby villages and cities.

Although they look nothing like it, peat fires are the “largest fires on earth,” says Guillermo Rein, a peat fire researcher at Imperial College in the United Kingdom. Since the 1990s, Indonesia’s slash-and-burn practices that clear forests for agriculture have often led to fires that grow out of control because of peat. Indonesia has over 200,000 square kilometers (77,000 square miles) of peatland that is on average 5.5 meters (18 feet) deep and in some places up to 20 meters (66 feet) deep. “They’re very difficult to put out because they’re deep,” says Robert Gray, an independent fire ecologist based in Chilliwack, British Columbia.

The boreal forests are thought to contain some 30 times more peat than Indonesia. Because they can smolder for weeks and months, sometimes even staying active underground throughout cold northern winters, peat fires emit on average the equivalent of 15 percent of anthropogenic greenhouse gas emissions per year, according to Rein — carbon that took thousands of years to sequester.

Peat fires also destroy crucial habitat for endangered species such as orangutans; the haze they create has consequences for surface temperatures because it can block sunlight, and for rainfall patterns because it can disrupt cloud formation. Such negative impacts from peat fires and their persistence call for modern technologies to better detect and battle them.

WHEN NATURE’S SOLUTION DOESN’T COME

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Pristine peat is protected from fire because it is saturated with water. “In a normal year,” Gray says of the peat underneath the boreal forest, “it’s too wet to burn.” But when peat dries out, either because of inadequate snow from the previous winter or from decades of deforestation and, in Indonesia, peatland draining to make it suitable for agriculture, it becomes flammable.

Nature’s solution to this problem is torrential rains that can completely flood the peatland. When they don’t come, putting out peat fires still requires massive quantities of water that can be difficult to transport deep into a forest. One manmade strategy for this is to stimulate rain through cloud seeding, a technique used in the U.S. to produce snow on mountains to ensure adequate water supply, says Watts. Guided by meteorological forecasts, pilots fly planes into clouds near storm fronts and spray solutions of silver iodide that act as dust particles for water vapor to cling to and turn into rain. Sometimes, as in Indonesia last fall, cloud seeding fails because there’s not enough moisture in the atmosphere. But with the right combination of forecasting, seeding and a little bit of luck, says Watts, cloud seeding can be effective in fighting peat fires because it can deliver the necessary amount of water.

Detecting and acting on peat fires early is “overwhelmingly important” because if they become too big no other no water supply other than rain is sufficient to

fight them. Another approach to fighting peat fires is to tackle the network of narrow tunnels that deliver nutrients in waterlogged peat, but also allow oxygen to reach underground fires. Rein says some have proposed making peat less vulnerable to fire by destroying the tunnels through compression — as in Malaysia where the peatlands do not burn as much as in nearby Indonesia — but that also means destroying the ecological integrity of the peatland, creating a situation in which they lose their ability to support the forest above.

ADDING FIRE RETARDANTS

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Once found, one problem to putting out peat fires is that peat soil repels water when it gets very dry, says Watts. Think of how water pools on top of the soil in a potted plant that has been neglected for too long. Water has to be able to break through the soil's surface to get to the underground fires.

Adding a fire retardant to the water might help make water more effective at this. One example is Peat FireX, a plant-based powder developed in 2012 by Steve Sinunu, CEO of Texas-based EnvironX Solutions. When dissolved in water, it disrupts the strong hydrogen bonds between water molecules, making it easier for the water to penetrate soil. As the solution moves into the soil, it coats the peat to protect it from fire. When it reaches the fires, a chemical reaction is triggered within the solution that quickly absorbs heat from the fires, cooling and extinguishing them. In 2014, tests in Malaysia by EnvironX showed that peat fires in one area treated with Peat FireX were put out and were still extinguished eight days later, while adjacent, untreated areas continued to smolder.

After use, Sinunu says, Peat FireX breaks down in the soil to become a fertilizer; the Louisiana Office of Agriculture and Forestry's Fire Protection Branch, which uses Peat FireX in firefighting, has written that a "factor that should be noted is its environmentally friendly base. The by-product remaining from the usage of the product is basically a 'nitrogen' fertilizer." Earlier this year, the Indonesian government adopted Peat FireX as a weapon against peat fires, according to Steve Sinunu and an independent company in Singapore who helped connect EnvironX with the Indonesian government.

While such efforts may prove to be promising solutions once peat fires have started, they do not get to the root of the problem, especially in places such as Indonesia. There, economic solutions will be needed to provide residents with alternatives to using fire to clear land for agriculture. But in a future where climate change will continue to create conditions better suited for fire, it will likely take a combination of improved prevention measures, detection and firefighting activities to combat these unseen fires.

Learn more about Peat FireX at www.ENVIRONXSOLUTIONS.COM