



Changes in climate foretell a hazy future for wildfires

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By *SHERRY DEVLIN* of the *Missoulian*

Climate changes expected within the next 50 years more than doubled the number of wildfires that escaped initial attack and became major conflagrations in a recent study by scientists at the U.S. Forest Service and the Lawrence Berkeley National Laboratory.

Even when they used the most conservative estimates of global warming and increased the response by firefighters, the number of escaped fires increased by 125 percent in computer models of California's Sierra Nevada.

The estimates "represent a minimum expected change, or best-case forecast," the scientists warned in a paper to be published this month in the journal "Climatic Change."

The reality could be far worse in other parts of the western United States that are hotter, drier and more prone to lightning.

In fact, the ever more intense wildfires seen throughout the West in recent years are likely "dress rehearsals for climate change," said Evan Mills, a scientist at Lawrence Berkeley and member of the global Intergovernmental Panel on Climate Change.

And the increasing subdivision and development of fire-prone forests and shrublands only compounds the danger.

"Two things are going on: increased exposure and increased hazard," Mills said in a telephone interview from his office in Berkeley, Calif. "Both things are working together, and that's even more concerning.

"The hazard itself is becoming greater, and we are making ourselves more vulnerable by pushing into these hazardous areas with our homes."

There is no longer any doubt that the earth's climate is warming, said Mills. Nor is there any question that in many parts of the world, global warming will increase the number and severity of wildfires.

"Climate change is already manifesting itself," he said. "It's got to be part of the wildfire discussion."

"If we take the more wholistic, the more realistic view, we've got to talk about climate change as we talk about wildfires," Mills said. "It's all connected. The leg bone is connected to the hip bone. The forests affect the climate; the climate affects the forests."

The new study was unusual because it connected climate change with wildfire severity - specifically with the ability of fires to escape aggressive initial attack and run across vast landscapes.

"We took actual fires and tried to put them out, just as we've been doing in the West for the past 100 years or so," said Jeremy Fried, a scientist at the Forest Service's Pacific Northwest Research

Station in Portland, Ore.

Fried, Mills and earth scientist Margaret Torn applied their Changed Climate Fire Modeling System to three areas of northern California - Santa Clara, southeast of San Francisco; Amador-El Dorado in the Sierra Nevada east of Sacramento; and Humboldt County, on California's wet northern coast.

Only the coastal redwood forest weathered global warming without a significant increase in the number of wildfires that escaped initial attack.

Going in, the researchers knew that wildfires rarely escape initial attack. In California, 0.03 percent to 0.5 percent of ignitions got the best of initial attack fire crews between 1961 and 1997.

When they did, though, the results were often spectacular. Over the past 40 years in California, one out of every 10 escaped wildfires led to injury, fatalities or lost buildings.

That's why the state spends \$250 million a year on initial attack fire crews.

Even with all those firefighting resources, the California Department of Forestry will not be able to hold its own as the climate warms over the next 50 years, the researchers found.

If the amount of carbon dioxide in the atmosphere doubles by 2040 or 2050 - the most conservative, accepted estimate - the associated climate changes will increase the annual number of wildfire escapes in northern California by 114.

Under current conditions, an average of 110 wildfires escape initial attack in northern California each year.

As the scientists created a new climate in their computers, the number of wildfires that escaped initial attack in Santa Clara increased by 53 percent in grass and 21 percent in brush.

In Amador, the annual number of escapes increased by 143 percent in grass and 121 percent in brush.

While the scientists did not look at other ecosystems in the West, Mills believes the findings are applicable to western Montana's low-elevation, dry pine forests.

"At first blush, there is a lot of applicability," he said. "A lot of the climate variables one worries about apply to Montana: drought, higher temperatures, higher rates of insect infestations, increased lightning."

"Montana and other Western states are much more like the areas in California where we saw increases than like the areas where we saw no increases," Mills said.

In fact, the consequences of global warming are likely to affect Montana sooner and more severely.

"Under climate change, the temperature will increase faster at the poles than at the equator," Mills explained. "The temperature is going up faster in Alaska, for example, than in Southern California."

Already, the climate has changed enough in some parts of Alaska to allow tree-killing beetles two reproductive cycles a year instead of one, he said. And insect infestations increase the wildfire danger by creating more downed and dead wood.

In most parts of the United States, climate change also will bring more rainfall or snow in the winter - and less in the summer, again increasing the risk of wildfire.

"A wetter growing season increases the potential for a worse fire season by creating more fuel," Mills said. "It's a very known phenomenon."

"Personally, I do think we are already seeing the effects of climate change on wildfires," he said. "But one can never attribute a particular fire or windstorm to climate change, because climate is the long-term average of the weather."

"It's a statistical thing like the relationship between cigarette smoking and lung cancer. You don't know which cigarette gave you the cancer, but you know statistically that there is a rate of cancer and a change in that rate."

So, too, goes climate change.

Scientists know carbon dioxide levels have increased by 50 percent because of the burning of fossil fuels. They agree that carbon dioxide and other so-called greenhouse gases act like an insulating blanket in the earth's atmosphere.

The greenhouse effect itself is not "bad," Mills said. "It's what makes life possible on Earth. It allows heat to accumulate and warm the planet."

But as the blanket becomes thicker - as carbon dioxide levels increase - the earth grows warmer and warmer, and natural systems begin to change.

Already, scientists have documented global increases in precipitation, temperature, insect infestations in agriculture and forests, and wildfires.

Climate change also speeds up the hydrologic cycle. Water evaporates more quickly from the earth, producing more rainfall, producing more floods and erosion, producing more vegetation and on and on.

Mills is studying not only the effects of climate change on wildfire severity, but also on infectious diseases. Warmer temperatures and greater precipitation, he said, are already causing increases in certain types of diseases, including malaria and other mosquito-borne diseases.

"We are definitely seeing a lot of changes in ecological indicators that are negative," he said. "The ranges of some plant and animal species are becoming smaller, some species are disappearing, some are being forced to move from one altitude to another."

"Climate change certainly seems to exacerbate the already difficult conditions we have because of the buildup of fuels in Western forests," said Fried, the Forest Service scientist. "We've ended up in a situation where fuel loads have steadily gotten worse because of successful fire suppression, and now because of climate change."

"It would be nice to have an opposite trend on the weather side - so they'd cancel each other out," he said. "But in the areas we've studied, the weather is making things worse."

There are parts of the world where global warming may increase the rainfall so much that it alleviates the wildfire danger, according to Fried. "But I don't think that's true for the West."

"Not to consider climate change in the wildfire discussion would be unwise," he said.

Yes, Fried said, communities and governments could add fire engines or air tankers or other firefighting resources to compensate for the increased likelihood of high-severity wildfires.

But it would cost hundreds of millions - or billions - of dollars.

"And given that there is broad consensus that more suppression does not solve the problem, as you end up with more fuels which push us to an even more unstable situation, I don't think firefighting is the answer," Fried said.

Mills advocates a two-pronged response - one focused on slowing the rate of global warming, the other on adapting to the already inevitable consequences.

"I used to pooh-pooh the adaptation community," he said. "I thought all our efforts should be put into reducing emissions. But it's not an either-or choice. You want to do both. You want to be maximally prepared so you can minimize the consequences."

Reducing the rate of deforestation would help to curb carbon dioxide emissions, as trees were once able to keep the global greenhouse in balance.

Reducing carbon dioxide emissions - primarily by burning less fossil fuels - would slow the rate of warming as well.

"The consensus is very strongly that it is not too late to do something about global warming," Mills said. "It's not a runaway train."

But it is too late to stop some of the consequences of climate change, he added. They're already here and more are on the way.

"There are consequences that have yet to manifest themselves - that will manifest themselves no matter what we do, even if we stop burning fossil fuels tomorrow morning," Mills said.

The oceans are a "big battery for heat," he explained. They store up the planet's warmth and release it over time, thus delaying the consequences of climate change.

Delaying, though, not stopping the consequences, Mills said.

"The earth will continue to get warmer over a very long time frame - no matter what we do," he said. "There are consequences already coming that we can do nothing to stop."

"And the reality, of course, is that carbon dioxide emissions are not going to zero, so we are putting new consequences into play every day," Mills said.

"It's important not to do the ostrich imitation," he said. "Whether or not this past wildfire season was a result of climate change, it gave us a glimpse into the future. It's important to take stock.

"What did it cost? What were the consequences? What was our ability to cope? To adapt? If there is any silver lining to these fires we're seeing, it's as dress rehearsals for the future. For a very predictable, but not entirely unstoppable, future."

Reporter Sherry Devlin can be reached at 523-5268 or at sdevlin@missoulian.com