



Desert dust causes early snowmelt and water loss



Researchers say dirt hurts already-low snowpack

By Jonathan Romeo County & environment reporter

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Phil Straub, a researcher with the Center for Snow & Avalanche Studies, shows the layer of snow that is covered in dust below freshly fallen snow earlier this month on Red Mountain Pass. The center has tracked seven dust storms already this year.

Jerry McBride/Durango Herald



RED MOUNTAIN PASS – The snowpack of the San Juan Mountains face an increasingly alarming problem that may further vex water issues in the West: dust.

As more demands are placed on water, more scientific research has been done to understand the effects of windborne dust from nearby deserts settling on the snowpack on the Southwest Colorado high

country.

Early findings aren't good.

In 2003, water districts throughout Colorado, concerned about the issue, put funding toward the creation of the **Center for Snow & Avalanche Studies**, which among other tasks, researches the effects of dust on snow.

While the impacts of dust deposited on snowpack can be found in other parts of Colorado, the southwest part of the state – and the San Juan Mountains in particular – are by far the most troubled by the issue.

“This is really ground zero,” Phil Straub, a researcher with the Center for Snow & Avalanche Studies, said last week from atop Red Mountain Pass. “It’s a growing concern that’s gaining more attention.”

In Southwest Colorado, here’s how it works:

Windstorms out of the southwest pick up dust from deserts in parts of the Navajo Nation in northern Arizona and New Mexico and carry it to the mountain snowpack in the high country of the San Juan Mountains.

When dust lands on snowpack, it speeds up the rate snow melts – think how much hotter a black car is than a white car, Straub said.

On average, this process causes snowpack to melt off 25 to 50 days earlier than normal based on about 100 years worth of data. And, runoff can decrease by 5 percent because of water evaporating through plants and soils as well as snow turning to water vapor.

Naturally, this causes issues for water districts in timing dam releases for ranchers, and it causes the loss of water supply for the Colorado River basin, which supports more than 40 million people and millions of acres of agriculture.

In a study published in October 2010 for the Pacific Institute for Studies in Development, Environment and Security, researchers painted a grim outlook if the issue went unchecked.

“Climate-change studies suggest that earlier runoff and a reduction in flow will cause management challenges, including uncertainty in timing of reservoir release, large reservoir fluctuations and regular shortages,” the study said.

Causes of dust, and why now?

Increasing issues with climate change, overpopulation, overgrazing, agricultural practices and drought – to name a few – have caused a massive desertification in the American Southwest, particularly on the Navajo Nation.

It is from these areas that dust is kicked up and can travel more than 300 miles to the mountains of Southwest Colorado. It's a self-perpetuating issue: early runoff causes these areas to dry out sooner.

Lisa Bryant, spokeswoman for the Bureau of Land Management's Canyon County district, said erosion and soil disturbance, which leads to loose dust being kicked up, is on the agency's radar as a significant problem to be addressed.

"The BLM uses site-specific analyses, including specific soil types and vegetation conditions, to assess potential impacts of decisions and develop appropriate mitigation to minimize impacts," she said.

If aggressive reductions in greenhouse gas emissions don't occur, the risk of mega-drought in the Southwest could exceed 99 percent, according to [a 2016 study in Science Advances](#).

Historically, mega droughts have occurred in the Southwest, but studies have shown they are more likely to occur in greater frequency, imposing stress on water resources, because of climate change.

"This will be worse than anything seen during the last 2,000 years and would pose unprecedented challenges to water resources in the region," says Toby Ault, a professor of earth science at Cornell University and one of the authors of the study, told The Atlantic in 2016.

History of dust

Historical evidence of dust reaching the mountains of Southwest Colorado exists.

[Researchers from the University of Northern Arizona published a paper](#) in 2016 that looked back on periods of dust over the last 3,000 years. Medieval times, for instance, were associated with high levels of dust.

"These records indicate the Southwest is naturally prone to dustiness," according to the study.

Add human-caused factors like climate change, overgrazing and poor water management, and the situation enters the realm of unprecedented.

"These new records confirm anomalous dustiness in the 19th and 20th centuries, associated with recent land disturbance, drought and livestock grazing," the report said. "As global and regional temperatures rise ... the Southwest will likely become dustier, driving negative impacts on snowpack and water availability, as well as human health."

Since 2003, researchers at the Center for Snow & Avalanche studies have noted this increase. It is likely that the San Juan Mountains have the longest and most comprehensive study on the dust-on-snow effect in the country, Straub said.

This year, for instance, the region has already tracked seven dust storms that left a layer of dirt on snow in the San Juan Mountains, and the season for dust storms isn't over yet. The average amount of dust storms in a full season, which can last until late June, is about seven, data indicates.

"We're still learning the impacts," Straub said. "And dust is only one part in understanding the changes to snow hydrology."

Bruce Whitehead, executive director for the Southwest Water Conservation District, which manages the waters of nine counties in Southwest Colorado, said there's a consensus about the need to see how dust affects water in the West.

"It's just one more tool we have to look and plan for runoff, or in this case, maybe how it's going to impact drought conditions," Whitehead said. "We really are on the front lines."

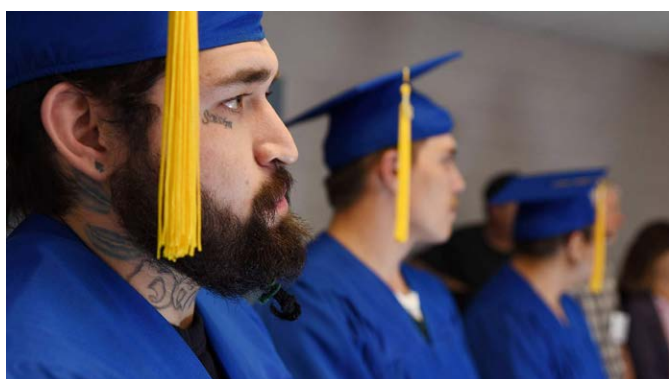
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