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Quality of Air? That's as Murky as Western Sky

By KIRK JOHNSON

DENVER — Oh say, can you see across the Grand Canyon? Not as well as you used to on some days.

The question of how clean the air is in the American West has never been an easy one to answer, strange to say. And now scientists say it is getting harder, with implications that ripple out in surprising ways, from the kitchen faucets of Los Angeles to public health clinics in canyon-land Utah to the economics of tourism.

It is at least partly about dust, something that has been entwined with Western life for a long time, and now appears to be getting worse.

In the 1800s, the high deserts stretching west and south of the Rockies became a famed destination for respiratory sufferers like "Doc" Holliday, the gunfighter-dentist (and tuberculosis patient), who came to take what was called the desert cure.

But cattle and sheep by the tens of thousands were at the same time trampling across those fragile landscapes, loosening once stable soils to the four winds and creating a kind of parallel — but equally true — Western mythology around the tumbleweed and the dusty trail.

The region's air quality, then as now, was partly pristine and partly poor depending on when and where you looked and which way the wind blew.

But now a new and even more complicated chapter appears to be unfolding, researchers in many different fields say. From off-road vehicle use, which has in some places replaced the clumping trod of the old cattle herds, to drought's impact on plants with their soil-anchoring roots, more dust appears to be up and moving.

And scientists say they are also understanding for the first time the deep connections between the

dust's main source — a vast high-desert region called the Colorado Plateau, which stretches through four states and is home to national parks like the Grand Canyon and Arches — and the economic, environmental and demographic life in cities and suburbs far removed.

"Changing conditions on the Colorado Plateau affect high-elevation water sources, commerce and population centers with tens of millions of people," said Richard L. Reynolds, a research geologist who has been studying dust at the United States Geological Survey. And with climate models suggesting a hotter, drier future in much of the West, potentially compounding dusty conditions, the dust is also opening a window on how the region is changing. "It's giving a glimpse of what we can expect," Dr. Reynolds said.

In the last few years, winter dust storms on the high peaks of the Rocky Mountains in Colorado have sharply increased in number, affecting the rate of melting snows into the Colorado River, a main source of water for agriculture and for the drinking supply for more than 20 million people. Of 65 so-called dust-on-snow events since 2003, when tracking began, 32 have struck in just the last three years, according to the Center for Snow and Avalanche Studies, a nonprofit research group based in Silverton, Colo. Dust can accelerate how fast snow melts because it absorbs heat.

"It's not a mysterious process," said Chris Landry, the organization's executive director. "Anybody who has thrown coal dust on their driveway or sidewalk to melt it down knows the theory."

Much of the dust carries a distinct chemical signature, too, heavy in iron oxides. The same rust-colored mineral that makes red-rock canyon country of Utah and Arizona can also absorb solar energy, again potentially accelerating the rate and timing of snow melt in crucial watersheds.

And perhaps most alarming are suggestions that asthma rates, though not definitively linked to dustier air, may be increasing.

The Utah Department of Health said in its most recent survey that asthma rates in the state's southeast corner, which is identified in other studies as a hot zone for dust deposition, had exceeded the statewide asthma prevalence for the first time in 2010 after gradually increasing over the previous few years.

The survey said that 13.6 percent of the adult residents in the deeply rural and mostly undeveloped region suffer from asthma, compared with about 7.5 percent nationally, according to federal figures.

A spokeswoman for the Department of Health said there was no clear explanation for the increase.

Scientists caution that links between asthma and dust are not certain. Other air problems in the West, like ground-level ozone in natural-gas drilling areas that has plagued some places in Wyoming and pollution from coal-fired power plants, complicate the air story as well. Asthma rates have also gone up in many other parts of the country.

But a study this year looking at dust generated by off-road vehicle use at the Nellis Dunes Recreation Area near Las Vegas found dust samples with naturally occurring arsenic and palygorskite, a mineral similar to asbestos, which could under certain circumstances pose potential health risks. The study, commissioned by the Federal Bureau of Land Management, said that four-wheelers and bikes stirred up as much of the mineral-laden dust as wind did.

In any event, scientists say the new dust studies are highlighting a disparity in how air is regulated.

Pollution research has mostly focused on urban areas, where air quality is historically worse, and on the tiniest of pollution particles from industrial sources, which are generally more dangerous because they can be inhaled more deeply into the lungs. The new dust problem in the West is flying under the radar: generally larger particles in areas with a lower population density involving mostly naturally occurring minerals from soil. And since dust is periodic, rather than constant — like, say, urban vehicle emissions — air quality standards rarely exceed the federal thresholds of compliance that can trigger action or an alert.

The “Doc” Holliday sort of air, pristine mostly, is what state and federal records tend to capture.

“There’s a mismatch between urban issues and what appears to be emerging in these rural areas,” said Jason C. Neff, an associate professor of geology and environmental studies at the University of Colorado, Boulder. “We’re not monitoring what we should be monitoring, and so we haven’t been able to put it together with the human health component.”

Dr. Thomas Painter, a scientist at the Jet Propulsion Laboratory at the California Institute of Technology who has written widely on dust in snow, said he could partly follow his own nose in chasing the story.

“I have horrible allergies when it comes to dust,” he said.

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