Researchers find that humans are cause of diminishing water flow in the West

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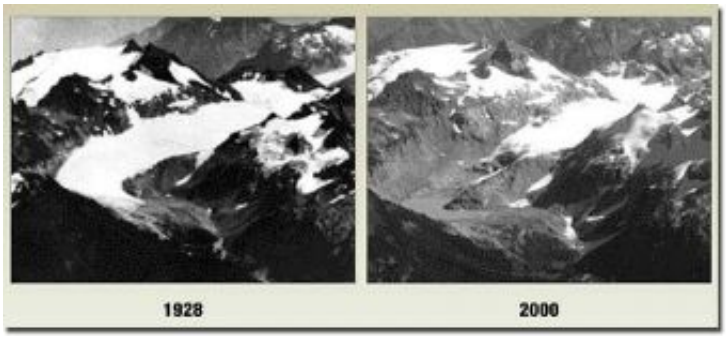

Mid-latitude glaciers respond quickly and dramatically to fluctuations in climate. Aerial views of South Cascade Glacier, Washington, in 1928 and 2000, illustrate the magnitude of glacier wastage (negative mass balance) and the terminus retreat that has been characteristic of glaciers in the region. Over this time span, the glacier has lost half its volume and retreated 1.5 km. Photo courtesy of USGS

The Rocky Mountains have warmed by 2 degrees Fahrenheit. The snowpack in the Sierras has dwindled by 20 percent and the temperatures there have heated up by 1.7 degrees Fahrenheit.

All could lead to dire consequences for the water supply in the Western United States, including California. Scientists have noted that water flow in the West has decreased for the last 20 to 30 years, but had never explained why it was happening.

Until now. Scientists from Lawrence Livermore National Laboratory's Program for Climate Model Diagnosis and Intercomparison in collaboration with Scripps Institution of Oceanography, have pinpointed the cause of that diminishing water flow on a regional scale: humans.

The research appears in the Jan. 31 online edition of Science Express. The findings also were presented at last year's annual fall meeting of the American Geophysical Union.

"We looked at whether there is a human-caused climate change where we live, and in aspects of our climate that we really care about," said Benjamin Santer of LLNL and co-author of the paper. "No matter what we did, we couldn't shake this robust conclusion that human-caused warming is affecting water resources here in the Western United States."

By looking at air temperatures, river flow and snowpack over the last 50 years, the team determined that the human-induced increase in greenhouse gases has seriously affected the water supply in the West. And the future brings more of the same.

"It's pretty much the same throughout all of the Western United States," said Tim Barnett of Scripps and a co-author of the paper. "The results are being driven by temperature change. And that temperature change is caused by us."

The team scaled down global climate models to the regional scale and compared the results to observations over the last 50 years. The results were solid, giving the team confidence that they could use the same models to predict the effects of the global scale increase in greenhouse gases on the Western United States in the future.

The projected consequences are bleak.

By 2040, most of the snowpack in the Sierras and Colorado Rockies would melt by April 1 of each year because of rising air temperatures. The earlier snow melt would lead to a shift in river flows.

The shift could lead to flooding in California's Central Valley. Currently, state reservoirs are filled during the rainy season. As the water is drawn down, the reservoirs are replenished with snow melt from the Sierras.

If that snow melts earlier, as predicted in the climate models, the reservoirs could overflow.

"We are headed for a water crisis in the Western United States that has already started," Barnett said. "A couple of decades ahead, we might not have that snowpack, making us more susceptible to flooding."

Santer said the increase in predicted river flow should be a wake- up call to officials that the water supply infrastructure needs to be updated now, as opposed to waiting until the situation is urgent.

As for the warming, with the existing greenhouse gas in the atmosphere, the Earth will continue to warm for the next 80-100 years.

"For someone who has seven grandchildren, that scares the hell out of me," Barnett said. "I've seen the future and I don't like it."

Source: Lawrence Livermore National Laboratory