Drying Sierra meadows could worsen drought

By Susan Suleiman, University of California

Carpeting the high valleys of Yosemite and other parts of the Sierra Nevada, mountain meadows are more than an iconic part of the California landscape. The roughly 17,000 high altitude meadows help regulate the release of Sierra snow melt into rivers and streams.

But climate change and California's severe drought threaten to permanently alter these fragile and important ecosystems, according to research by Chelsea Arnold, who was awarded a doctorate in environmental systems from UC Merced in May. Her findings reveal that soil changes already are taking place that could have long-term implications for California's water supply.

Arnold's research found that meadows in the Central Sierra near Yosemite are drying out as a result of several years of unusual variation in climate and snowfall.

"What we're seeing is that all kinds of extreme weather, including one dry winter like the one we just had, can totally change the structure of the soil," Arnold said. "Part of that is an irreversible change."

Under normal conditions, a mountain meadow acts like a sponge. Organic material in the soil allows the meadow to hold water, which is filtered and slowly released to mountain streams. Samples collected by Arnold and her colleagues found that the larger pores which trap and hold moisture are disappearing, to be replaced with smaller, more compact pores through which water doesn't easily flow.

As meadows dry out, flooding in wet years is likely to

increase. And in drought years, parched meadows could result in less snowmelt reaching streams, exacerbating the state’s already precarious water situation.

Arnold said that the changes won’t be easily remedied. Mountain meadows may act like sponges, but unlike a dry sponge, their ability to hold water isn’t reversed when the soil becomes re-saturated.

“It’s like with a raisin. You can add water, but all you’re going to get is a soggy raisin,” Arnold said.

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