UCLA climate study predicts dramatic loss in local snowfall

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By midcentury, snowfall on Los Angeles–area mountains will be 30 to 40 percent less than it was at the end of the 20th century, according to a UCLA study released today and led by UCLA climate expert Alex Hall.

The projected snow loss, a result of climate change, could get even worse by the end of the 21st century, depending on how the world reacts. Sustained action to reduce global greenhouse gas emissions could keep annual average snowfall levels steady after mid-century, but if emissions continue unabated, the study predicts that snowfall in Southern California mountains will be two-thirds less by the year 2100 than it was in the years leading up to 2000.

"Climate change has become inevitable, and we're going to lose a substantial amount of snow by midcentury," said Hall, a professor in UCLA's Department of Atmospheric and Oceanic Sciences and UCLA's Institute of the Environment and Sustainability. "But our choices matter. By the end of the century, there will be stark differences in how much snowfall remains, depending on whether we begin to mitigate greenhouse gas emissions."

"This science is clear and compelling: Los Angeles must begin today to prepare for climate change," said Los Angeles Mayor Antonio Villaraigosa. "We invested in this study and created the AdaptLA framework to craft innovative solutions and preserve our quality of life for the next generation of Angelenos."

Less snowfall in general and a complete loss of snow at some lower elevations doesn't just have implications for snow enthusiasts who enjoy skiing and sledding in the local mountains; it also could mean sizeable economic losses for snow-dependent businesses and communities. Less snow could also mean changes in the seasonal timing of local water resources, greater difficulty controlling floods, and damage to mountain and river ecosystems.

The impact to actual snow on the ground may be even greater because the researchers quantified snowfall but not snow melt, said Hall, whose previous research found the region will warm 4 to 5 degrees by midcentury. By then, researchers estimate, the snowpack could melt an average of 16 days sooner than it did in 2000. "We won't reach the 32-degree threshold for snow as often, so a greater percentage of precipitation will fall as rain instead of snow, particularly at lower elevations," Hall said. "Increased flooding is possible from the more frequent rains, and springtime runoff from melting snowpack will happen sooner."

"As a California resident, I spend my winters snowboarding in mountains throughout our amazing state," said Jeremy Jones, founder of Protect Our Winters, an environmental nonprofit composed of winter sports enthusiasts. "It breaks my heart to see America's great natural resources harmed by climate change. We must, immediately, begin to reduce greenhouse gas emissions. There is no choice."

The UCLA study, "Mid- and End-of-Century Snowfall in the Los Angeles Region," is the most detailed research yet examining how climate change will affect snowfall in the Southern California mountains. The report was produced by UCLA with funding from the city of Los Angeles, and in partnership with the Los Angeles Regional Collaborative for Climate Action and Sustainability at UCLA's Institute of the Environment and Sustainability. The complete report, maps and

graphics are available online at C-CHANGE.LA/snowfall, including a password-protected media site.

The study examined snowfall in the San Gabriel Mountains, San Bernardino Mountains, San Emigdio/Tehachapi Mountains and San Jacinto Mountains. The research team scaled down low-resolution global climate models to create high-resolution models with data specific to towns such as Lake Arrowhead, Big Bear, Wrightwood and Idyllwild. Hall's team included UCLA researchers Fengpeng Sun and Scott Capps, graduate student Daniel Walton and research associate Katharine Davis Reich.

The researchers used baseline snowfall amounts from 1981 to 2000 and predicted snow amounts for midcentury (2041 to 2060) and the end of the century (2081 to 2100) under a "business as usual" scenario, in which greenhouse gas emissions increase unchecked, and a "mitigation" scenario, in which the world significantly reduces emissions. By the end of the century, the contrast between the scenarios would be dramatic. In the mitigation scenario, midcentury snow levels would be 31 percent lower than baseline, but would remain relatively steady at only 33 percent below baseline by the end of the century.

In the business-as-usual scenario, 42 percent of the snow is expected to disappear by mid-century before dwindling dramatically to a 67 percent loss of snow by the end of the century.

"The mountains won't receive nearly as much snow as they used to, and the snow they do get will not last as long," Hall said.

More information: The complete study, "Mid- and End-of-Century Snowfall in the Los Angeles Region," along with interactive maps and ways to get involved, is available online at www.C-CHANGE.LA.

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