ARkStorm@Tahoe

Addressing social and ecological impacts of extreme winter storm events in the Lake Tahoe region

What is an ARkStorm?

Atmospheric rivers (ARs) are large flows of water vapor that typically occur in fall and winter, bringing huge amounts of moisture over the Pacific to the U.S. West Coast. Landfalling ARs are storm events with the potential to deliver extreme amounts of precipitation to the West Coast, including California and Nevada, over a just a few days. The name "ARkStorm" was coined to describe large AR storm sequences, which, for instance, can produce precipitation in California that in places can exceed totals experienced only once every several hundred to 1,000 years. Scientists with the U.S. Geological Survey (USGS) Multi Hazards Demonstration Project (MHDP) designed a scientifically-plausible winter ARkStorm scenario for California emergency managers, stitching together historical AR storms from 1969 and 1986, separated by only 4 days. This hypothetical ARkStorm would rival but not exceed the intense California winter storms of 1861 and 1862 that left the Central Valley of California flooded and the state's economy destroyed. It was designed to exceed any single storm in the 20th Century.

How will an ARkStorm affect the Lake Tahoe region of California and Nevada?

In the Lake Tahoe region, ARkStorm events often yield rain-on-snow (with warm temperatures and heavy rains following cold temperatures with lowered snowlines), although often their real threat is the large areas that receive rain rather than snow during these storms. ARkStorms also bring hurricane-force winds. Hazards associated with such storms include widespread flooding and erosion, avalanches, landslides, debris flows, and tree falls. These hazards can damage and disrupt infrastructure (e.g., roads, power supplies, water supplies, and homes), resulting in significant short- and long-term social and economic impacts. An ARkStorm in the Tahoe Region would also have short- and long-term ecological impacts (e.g., changes in vegetation, increased fire risk, increased sediment delivery to streams, and lake clarity and chemistry changes).

Flooding of downtown Reno by the Truckee River following a 10-day atmospheric river in 1955 that brought 45 inches of precipitation. Courtesy Nevada Historical Society.

What is ARkStorm@Tahoe?

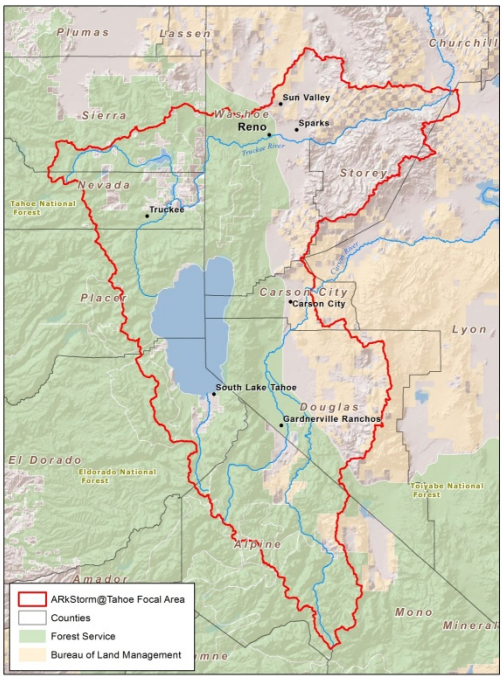
ARkStorm@Tahoe is an exercise to explore the likely impacts of an ARkStorm in the Lake Tahoe region, including the Tahoe Basin, Truckee, Reno, Sparks, and Carson City. The exercise will be the first time that the scenario has been explored in a region that includes mountainous terrain with precipitation in the form of snow and large areas of non-urban land. In addition, it will be the first time the scenario has been used to assess both near- and long-term impacts, and impacts to ecological systems. Previous ARkStorm scenarios have primarily focused on impacts to (lowland) urban areas and the built environment and the social and economic consequences of those impacts.

Ward Creek pouring sediment into Lake Tahoe following a four-day atmospheric river (with rain-on-snow) in 1997 that brought 28 inches of precipitation. Courtesy UC Davis.

TSC TAHOE SCIENCE CONSORTIUM

What activities will ARkStorm@Tahoe include?

Over the next two years, the Tahoe Science Consortium (TSC), together with USGS, will convene a series of workshops with stakeholders and interested communities such as federal, state, and local agencies, tribal representatives, natural resource managers, non-governmental organizations, business leaders, and scientists to discuss impacts of an ARkStorm in the Tahoe region. These workshops will aim to incorporate ARkStorm threats into emergency response exercises and planning in the region and to identify social and environmental vulnerabilities. The community will be encouraged (and facilitated) to discuss preparations that can reduce these vulnerabilities. Overall, the ARkStorm@Tahoe exercise will help the communities of Tahoe and surrounding areas to better prepare for extreme storms, increasing both social and ecological resilience to AR storms (including ARkStorms).



Lake Tahoe region and communities of interest for ARkStorm@Tahoe winter storm scenario

A torrent of water flowing from the Oroville Spillway during the 1997 flood. Courtesy California WaterBlog.

Additional information regarding the ARkStorm scenario can be found at:

http://pubs.usgs.gov/of/2010/1312/
http://www.scientificamerican.com/article.cfm?id=megastorms-could-down-massive-portions-of-california
http://link.springer.com/content/pdf/10.1007%2Fs11069-011-9894-5

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