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CLIMATE CHANGE

Severe weather droughts, floods predicted by new report

Feast or famine future for state's rainfall may be coming, scientists say

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The extreme weather swings experienced by Californians the past six years — a historic drought followed by drenching winter storms that caused $100 million in damage to San Jose and wrecked the spillway at Oroville Dam — will become the norm over coming generations, a new study has found.

Those types of extremes are not new, but because of climate change, they can be expected to occur more frequently, as hotter global temperatures and warming oceans are putting more water vapor into the air, concluded the study, which was published Monday in the scientific journal Nature Climate Change.

And perhaps most ominous, the odds are rising that a megastorm — like the one that famously flooded California in 1862, forcing Leland Stanford to take a rowboat through the streets of Sacramento to his inauguration as governor — will strike again. Such a storm "is more likely than not" to hit the state at least once in the next 40 years and twice in the next 80, the study found. The 1862 event, the largest recorded flood in California history, saw 43 days of continuous rainfall that washed whole towns away and forced the state capital to be temporarily moved to San Francisco.

"All of our wet winters and big flood events are due to atmospheric rivers," said Daniel Swain, a climate scientist at UCLA and lead author of the study. "What are they but big plumes of water vapor moving toward the coast? As we increase the amount of water vapor, the intensity increases."

Monday's study is the first to estimate the number of wild

Ben Lomond Firefighters rescue Rachel Turner and her dogs from their flooded home on Old Covered Bridge Raod in Felton in February 2017when the San Lorenzo River flooded Felton Grove and the surrounding neighborhood.

DAN COYRO – SANTA CRUZ SENTINEL FILE

drought-to-flood swings facing California in the decades ahead and to estimate the growing risks of another mega storm hitting the state. It notes that major drought-to-flood swings have occurred on average four times a century in the state, but are expected to grow to eight times this century in Southern California and six times in Northern California.

An 1862-level storm today would cause more than $725 billion in damage statewide, forcing the evacuation of 1.5 million people, according to a study by 117 scientists, insurance industry officials and disaster response experts that was published by the U.S. Geological Survey in 2011.

It would prompt hundreds of landslides and road washouts, as well as levee collapses on Delta islands, major floods in the Bay Area, Central Valley and Los Angeles, and damage up to a quarter of the homes in the state, while turning 300 miles of the Central Valley into an inland sea 20 miles wide, the USGS study concluded.

Potentially worse than a monster earthquake, such a storm system would bring weeks of drenching rain and hurricane-force winds the likes that no living Californian has ever seen.

"Basically you just want to get out of the way in a storm like that. It's a matter of flood warning and evacuation. That's about all you can do," said Jay Lund, an engineer and director of the Center for Watershed Sciences at UC Davis.

Storms of that magnitude have happened six other times in California in the past 1,800 years, the 2011 USGS study noted. Scientists studying sediment layers off Santa Barbara and San Francisco Bay found evidence that such mega-storms occurred in the years 212, 440, 603, 1029, 1418, and 1605.

Even if a massive storm like that doesn't happen anytime soon, the increasing swings in extreme weather — called "precipitation whiplash events" by the researchers — are already starting to pose major challenges for California, experts say.

The water systems that provide 40 million residents with drinking water and irrigate millions of acres of crops were built generations ago in a different climate. By relying on huge amounts of snow to accumulate in the Sierra Nevada mountains, state water planners had a natural reservoir that would slowly melt each spring, sending water down rivers in a relatively orderly way. By damming those rivers, state, federal and local officials created reservoirs to store water for the dry summer months and years.

But that model won't work as well in the future. As the climate continues to warm, the computer models analyzed by Swain and his colleagues found that while there won't be much change in the amount of precipitation overall in California, it will come in more violent, and rare bursts. That means more Sierra snow will melt or fall as rain, and the state will need ways to store more water for long dry spells before the next deluge comes.

"It's the climate that California already has had, but on steroids," said Ellen Hanak, director of the Water Policy Center at the Public Policy Institute of California, a non-profit think tank in San Francisco.

Some new off-stream reservoirs will need to be built, said Lund. But another cheaper solution lies in better managing groundwater, he said. In wet years, Lund and Hanak said, farmers and other landowners can be paid to allow rivers to pour onto their fields and open spaces. That water seeps into the ground and recharges underground aquifers for use later. Reservoir owners also can retool their systems to move water out of full reservoirs and into underground water banks, Lund added.

Some areas, like the Santa Clara Valley Water District, which serves 2 million people in Silicon Valley, already do that.