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National

# A massive storm flooded Houston. Experts say California's state capital could be next.

By **Tim Craig** October 29

SACRAMENTO — Even living here on the West Coast, Marion Townsend decided to act as floods ravaged Texas and hurricanes pounded the Caribbean in recent weeks.

Her Sacramento neighborhood slopes downward from a levee that separates it from the American River, in an area that officials concede never should have been settled but is home to 100,000 residents.

After seeing images of boat rescues in Houston and frantic evacuations in Miami, Townsend began repositioning important documents, photographs, jewelry and her sentimental quilts up onto shelves.

“I am just trying to imagine what three feet of water in my house would look like, and based on that, I moved things higher,” said Townsend, 53. “And if the evacuation order comes, I want to know what I should grab.”

Townsend needs to be reaching even higher.

Models show a levee failure could submerge parts of this inland metropolis under as much as 20 feet of water. As Northern Californians are recovering from wildfires and sifting through homes reduced to ash, officials in the state's capital are struggling to prevent another type of natural disaster. Sacramento is more

vulnerable to catastrophic flooding than any other major city in the United States except New Orleans, according to federal officials, a threat created by the city's sunken geography.

Levees and other flood defenses here and in the surrounding Central Valley have amassed up to \$21 billion in needed repairs and upgrades, while Sacramento's population has continued to grow. Just days before Hurricane Harvey slammed into Texas and flooded Houston, a report from the California Department of Water Resources warned that "many flood facilities" in the Central Valley "face an unacceptably high chance of failure."

Upgrading the systems has been a challenge. Competition has stiffened for federal dollars to shore up American cities and towns against the threats of extreme weather, leaving 1.3 million residents and \$80 billion in property located on the flood plain here at risk.

The population of California's mid- and upper Central Valley is projected to increase by 70 percent over the next 50 years, the August report notes. And some experts fear preparing the city for even a 200-year storm will prove insufficient.

"The 'Big Ones' are still out there for California, and a major storm certainly has the potential to be our next big one," said Dale Cox, a risk reduction manager for the U.S. Geological Service in Sacramento.

Although Sacramento averages just 18 inches of rain annually, large Pacific Ocean storms known as "atmospheric rivers" periodically strike the coast and settle over the nearby Sierra Nevada Mountains.

The storms can carry water vapor equal to "25 Mississippi Rivers," leading to torrential rain that can fall over snow-packed mountains, said F. Martin Ralph, director of the Center for Western Weather and Weather Extremes at the Scripps Institution for Oceanography.

In Sacramento, where the American River flows into the Sacramento River, 180,000 structures are at risk of flooding. In neighboring West Sacramento, population 50,000, every home and business is in a levee-protected flood plain.

"It's in our blood and in our history," said Peter Ghelfi, director of engineering for the Sacramento Area Flood Control Agency. "We settled on the banks of the Sacramento River during the Gold Rush era, and we have been defending ourselves ever since."

## **The 'Inland Sea'**

The consequences of misjudging the future potency of Mother Nature here are enormous.

If a levee were to break along the American River, which empties into the Sacramento River near downtown, water would start flowing into the city.

Although floodgates could be quickly deployed to protect downtown Sacramento from a life-threatening deluge, the water would eventually seep in from other directions, covering much of the area in several feet of water, said Roger Ince, a Sacramento emergency coordinator.

The water would continue flowing south and deposit more than 20 feet of water in the Pocket neighborhood, where about 20,000 people live in one- and two-story homes.

“You are not going to see a wall of water coming into Sacramento, but you will see rapid flooding and people not able to get out of their homes, out of care facilities. They are trapped,” said Stephen Cantelme, chief of Sacramento County’s Emergency Services. “I am much more confident in our levees holding up than I was 10 years ago. . . . But I am concerned 200-year [flood protection] is not enough.”

A state “life loss” formula — which predicts how many people could die as a result of flooding when the threat is averaged over 50 years — estimates 66 deaths annually in the Sacramento River Basin. That number could be lowered to 43 by 2067 if aggressive investment in flood control systems continues.

“It doesn’t mean it will happen every year,” said Mike Mierzwa, chief of flood planning for California’s Water Resources Department in Sacramento. But with climate change and a growing population, “we will have one big flood that will lead to thousands of lives lost.”

In 1862, a flood submerged hundreds of miles of the region for weeks. In Sacramento, California’s governor at the time had to be rowed to his inauguration in a boat, leading to a new nickname for the region: “Inland Sea.”

After those floods, local residents pushed dirt and sediment into mounds to form a crude network of levees. In the early 1900s, the 91-square-mile Yolo Bypass was built to divert excess water away from Sacramento and onto farms and marshlands.

But serious deficiencies in Sacramento’s flood control systems were identified in the 1980s and again in 2005 after Hurricane Katrina swamped much of New Orleans. At the time, officials concluded that

Sacramento-area levees probably couldn't withstand even a 100-year flood, an event that has a 1 percent chance of occurring each year.

## **Competition for funding**

With a growing number of communities reevaluating their flood vulnerabilities, Army Corps of Engineers resources are stretched.

In 2017, the total appropriation for its Flood and Storm Damage Reduction Program, which funds construction of levees, was just \$1.2 billion. Yet hundreds of billions of dollars probably are needed to adequately bolster all of the nation's defenses against flooding, said Chad Berginnis, executive director of the Association of State Floodplain Managers.

As it cleans up from Hurricane Harvey, Houston's mayor is calling on Congress to spend \$12 billion on a "storm surge barrier" that would separate that city from Galveston Bay during hurricanes. The city, which is also seeking \$400 million for a new flood control reservoir, has hired former senator Mary Landrieu as its lobbyist.

"The competition is high, and the competition will increase in the future because as a nation, our flood risk is getting worse," said Berginnis, whose organization represents 17,000 flood plain managers. "Whether it's climate change or whether it's development, it's all leading to worsening damage trends."

Mindful that federal resources are limited, residents in Sacramento and several other communities in the Central Valley have repeatedly approved tax increases to help finance levee repairs. But even here in a flood-aware region, local governments are struggling to keep up with the costs of so many people living on a flood plain.

Mierzwa said a recent survey found that Central Valley localities were only funding \$30 million of the estimated \$100 million in annual maintenance needs for flood-protection systems.

Even when all local repairs and maintenance are completed, those systems are slated to provide only 200-year flood protection in Sacramento and other urban areas. Less-populated areas have 100-year protection, meaning there is a 1-in-4 chance that a house would flood during the life of a 30-year mortgage.

## **Taking the risk**

Many residents seem oblivious to the risk.

In Sacramento's Pocket neighborhood, Lee Johnson's house is located just a few hundred yards from the levee.

Although he concedes his "house probably should have never been built," Johnson doubts authorities would allow his neighborhood, where home prices range from \$400,000 to \$1 million, to flood.

"This is the good part of town, and that is why people live here," said Johnson, 35. "Older people say it won't flood because there are too many nice homes to let it flood."

But meteorologists and hydrologists note the Sacramento region has had numerous encounters with severe flooding.

A 1986 flood — which killed 13 people and caused \$400 million worth of damage — could have been even more devastating because the Folsom Dam, located along the American River 25 miles upstream from Sacramento, nearly failed, according to the Army Corps of Engineers and local officials.

In a 2010 report called "Overview of the ARkStorm Scenario," more than two dozen scientists concluded that two back-to-back storms of similar strength could slam into California and submerge 25 percent of the state underwater.

"This isn't science fiction," said one of the authors, Keith Porter, a research professor at the University of Colorado at Boulder. "It's a very realistic scenario, and it could happen at any time."

Jeffrey Mount, a senior fellow and water resources specialist at the Public Policy Institute of California, said such projections raise serious questions about continued development in California's flood plain, a debate that has been playing out in Sacramento's Natomas neighborhood, where thousands of new homes are planned.

In 2008, the Federal Emergency Management Agency, worried about the area's levees, issued a moratorium on most new construction in that area.


In 2015, at the urging of local officials, FEMA relaxed those restrictions after an initial round of levee repairs were completed and both Congress and local officials signaled that they would pay to upgrade all 41 miles of the Natomas area's levees.

The Army Corps of Engineers plans to begin work on the remaining levees next spring, but the project is not expected to be finished until 2025.

For Townsend, who lives in Natomas, that may mean she will be shopping for “an inflatable raft.”

“I want something to float on to get out of here,” she said.

 **218 Comments**

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