

Times Standard

Not My Fault: Another evacuation failure leads to tragedy in Texas

Lori Dengler for the Times-Standard

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Almost every year a story unfolds where a hazard becomes disastrous because people were not able to get out of harm's way. Many recent headlines have involved fires – 2018 in Paradise, Maui 2023, and this January in Southern California to name only a few. This week a flash flood has dominated the news, and the Texas Hill Country of central Texas joined that list.

Why is it so hard to get people to safety? Effective warning systems are complicated, involve a lot of moving pieces, and need continuous maintenance. First there's understanding the hazard and the areas likely to be impacted. Then there's gathering and processing reliable data. For short fuse events like wildfires, flash floods, and near-source tsunamis, assessments have to be extremely rapid. Third is getting the information to the thousands or millions of people at risk in a timely fashion. The fourth part may be the hardest – getting people to take the appropriate action to save themselves.

It's too early to break down all of the factors that led to the Fourth of July tragedy in Texas. There are plenty of accounts of unspeakable loss, hair-raising survivals, heroic actions, and finger pointing to agencies that may have failed. I'll attempt to put the floods in some historic

context and how the evacuation problem always boils down to a very difficult choice – how much effort and expense are we willing to expend for low probability high impact events.

What happened a week ago is not unprecedented. According to the USGS, 140 flood deaths are tallied on average every year in the U.S. Annual flood property losses are close to \$10 billion. Flood events fall into two categories: large regional ones like 1964 that develop over days affecting large areas, and highly concentrated flash floods with rapid onset and localized impacts. Both can be triggered by hurricanes and exacerbated by the failure of flood control devices such as dams and levees.

In late May of 1889, three days of intense rainfall caused a dam to fail in south central Pennsylvania, turning a regional flood event into a rapid onset one. The dam was only 14 miles upstream of the town of Johnstown and in ten minutes, 20 million tons of water began to hit the community. Over 2,200 people perished in what is still the worst U.S. rainfall-caused flood disaster. Clara Barton and her fledgling organization of medical personnel and tent hospitals responded, their efforts establishing the American Red Cross as the pre-eminent emergency relief organization in the Country.

At least 25 other U.S. flood events have claimed more than 100 lives. The most common from storm surge and flooding triggered by hurricanes. At the top is Galveston in 1900 with casualty estimates between 6 – 10 thousand, followed by the 1928 Okeechobee Hurricane in Florida (2,500), and Katrina (1,392.) Twenty-one other hurricanes have had death tolls in the hundreds.

Deadly flash flood events are far more frequent with nearly a dozen causing damage each year but affecting a far smaller area and most causing only a handful of deaths. But several have made it into the triple digit range. In 1972 15 inches of rain fell in the Black Hills of South Dakota claiming 238 lives in Rapid City. Four years later a similar deluge hit the Big Thompson River in Colorado killing 144 people.

Let's take a closer look at the Big Thompson flood because of similarities to what happened in Texas. Eve Gruntfest, a geography professor at Colorado State University and a good friend, spent years studying the flood and organized a ten-year post event symposium. The proceedings of that conference should be read by anyone in the flood hazard mitigation field (https://digitalcommons.usf.edu/fmhi_pub/61/).

The Big Thompson Flood occurred on July 31, a Saturday in the peak of the summer vacation season near Estes Park. It was a holiday weekend, coinciding with the centennial celebration of Colorado statehood. In addition to the 600 people living in Big Thompson Canyon, several thousand people packed motels and campsites for the statehood celebrations scheduled for August 1.

In the early evening hours, a stationary thunderstorm complex developed alongside the Rocky Mountain Front Range, dropping 12 – 14 inches of rain over the next four hours. The Big Thompson River quickly rose sending flood waters of 15 miles per hour and cresting at 30 feet. The night-time deluge made it difficult to see and impossible for any coordinated evacuation efforts.

There were stories of tragedy and heroic actions of individuals. Colorado State Trooper Willis Purdy is credited with racing down the canyon just ahead of the flood waters warning campers and residents, efforts commemorated in the Chuck Pyle song "Here Comes the Water." A flash flood warning was issued, but only several hours after the flooding began.

The ten-year post event symposium of the Big Thompson flood analyzed failures, successes, post event mitigation efforts, and a cautionary note for the future. The two big failures – no delineation of areas likely to be flooded and no effective warning. There were no National flood plain maps, and no pre-flood planning was in place locally and little at the state level. Summer flash flooding was commonplace in the Front Range, but previous events had produced far less impact.

Government response worked well once the flood began. Then governor Richard Lamm immediately deployed National Guard and State Troopers to the area. The Mayor of Rapid City who had dealt with the deadly South Dakota floods four years earlier was brought in as an advisor, and a task force including expert planners and academics was established in the first five days. Three weeks after the flood a detailed recovery plan was completed including goals, policies and agency responsibilities.

The most lasting result of the 1976 flood was a robust warning system. This included more stream gauge and weather sensors, signage and outreach programs. Over time reverse 911 calling was added and today Wireless Emergency Alerts (WEA) over cell phones. Flood plain maps were completed, and many more people have flood insurance. Most buildings destroyed in 1976 were not rebuilt. In September of 2013, these mitigation efforts were put to the test when the Colorado Front Range experienced a week of heavy rainfall and flooding occurred in Big Thompson Canyon and many other rivers. The 2013 floods affected a much larger area than 1976 and caused greater damage to structures but over 10,000 people were evacuated and only 8 deaths reported (<https://www.youtube.com/watch?v=EgqW8vGeO9U&t=2690s>).

With flood tragedy on people's minds right now it is likely that some measures will be taken to improve warning capabilities in the Texas after repeated public and legislature turn downs for support in the past. An effective system is not only technological but also needs sustained education and outreach efforts for residents and visitors.

Tourists were particularly vulnerable in the 1976 Colorado floods. Without local knowledge and hazard awareness, they are less likely to take quick action. Many visitors were enjoying the Guadalupe River in Texas last weekend including people from out of state. A vacation mindset and the leanness of the hospitality industry to mention hazards contributes to vulnerability. I had a taste of this in 2010 during a tsunami reconnaissance study in Chile (see Not My Fault 3/1/2020), when we stayed in a coastal hotel. We asked staff what to do if another tsunami came and they denied any hazard although we could clearly see debris from the window.

We will never have perfect warning systems. We will never be able to eliminate uncertainties in the level of threat. We will never be able to reach everyone in a timely manner and get them to take the right action. But we can do better, and it will take sustained support for instrumentation, research, planning, communication, and education to reduce losses before the next flood, fire, tsunami, or other disaster arrives.

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