

Times Standard

Not My Fault: Water, water everywhere with shaking sprinkled in

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Cattle seek refuge in the Eel River bottom in 1964.

Deluge and vibrations are a notable feature of late December on the North Coast. This week marks anniversaries – an earthquake on December 21, 1954, the floods of 1955 and 1964, and the December 20th temblors of 2021 and 2022. As another series of atmospheric rivers approach, I look at disasters of the water kind today, but first a quick update on the shaking front.

Aftershocks from the December 5 M7.0 on the Mendocino fault continue. Over 430 earthquakes have been recorded on or near the 40 miles of the fault that ruptured just over two weeks ago. That may sound like an impressive number but it's right in the normal ballpark for magnitude 7 earthquakes in California. The great majority went by unnoticed but last Saturday's 5.3 was felt by many in southern Humboldt and a few as far away as San Francisco and Smith River.

The 5.3 is now the largest aftershock to date. While larger aftershocks most often occur in the first hours and days after a major earthquake, it is not unusual for weeks to pass with activity declining and then a sudden uptick in activity. The USGS gives us an 8% chance of another aftershock in the magnitude 5 range over the next week and about fifty-fifty for some time in the next year.

Anything unusual about the aftershocks? It appears to be a somewhat more vigorous sequence than what past Mendocino fault earthquakes have exhibited, but our data window is limited. It has also triggered earthquake activity on other faults including in the southern part of the Gorda plate and onshore in the Cape Mendocino area and southern Humboldt.

A final earthquake note. On Tuesday a M7.3 earthquake occurred in the South Pacific nearly 6000 miles away from us. It was centered offshore of Vanuatu's most populated Island, only twenty miles from the capital Port Vila. The closer proximity to populated areas meant far more damage than our M7 earthquake and as I write, the death toll stands at 16, making it the third deadliest quake of 2024.

There are similarities between the Vanuatu and Mendocino fault earthquakes. Initial magnitude estimates were nearly the same, both were close to populated areas, and both triggered tsunami alerts issued five minutes after the earthquake. The National Tsunami Warning Center (NTWC) issued a Warning to our coast and the Pacific Tsunami Warning Center (PTWC) issued a tsunami Threat message to Vanuatu and other countries in the SW Pacific.

Warning and Threat sound very similar, but they differ in important ways. Warning means get out of low-lying areas NOW, Threat means that potentially hazardous waves may be arriving, but it is up to the foreign government to issue warnings or evacuation orders. PTWC is also able to qualify the level of threat. Their second bulletin issued a half hour later estimated surges on the order of three to four feet. The second NTWC bulletin made no clarification that our tsunami threat was relatively modest and only likely to affect harbors, beaches and the lowest adjacent coastal areas. Definitely a point to pursue further.

Got the earthquakes out of the way, now time to turn the clock back a few decades, I first moved to Humboldt in 1978 and found a whole new world of geology, tectonics, and surface processes. I focused mainly on wrapping my head around the earthquake story and keeping half a step ahead of my students, but it rained a lot that winter and I couldn't help hearing about past floods.

Of course, the 1964 flood was the main flood topic. This was the time of the Redwood National Park expansion, and I knew many people involved with monitoring and restoration efforts in Redwood Creek and tributaries. We used to joke that the North Coast had more geomorphologists (scientists who study surface processes) per capita than any other place in the world. But 1964 was not the only flood I heard mentioned. There were more recent ones like 1974 that resulted in disaster declarations for six northern California counties and murmurings of an earlier flood in 1955 that exceeded '64 water heights in some areas.

No flood or earthquake stands alone in terms of impacts. Ambient conditions, land use, and previous events are all interlinked. What happened during and after the 1964 flood was not only the result of an enormous amount of rain falling for several days, but in part modulated by river control efforts put in place after 1955, exacerbated by logging practices especially in the Redwood Creek basin, and the 1955 flood itself.

The 1955 flood deserves a little time in the limelight, especially after learning that it claimed more lives than the more widely known flood nine years later. It was also caused by an atmospheric river, the same phenomenon that caused the 1964 flood, what drenched us in November and what is in the forecast for this week.

Weather forecasting was a very different discipline in 1955, long before weather satellites, ocean monitoring buoys, real time data streaming, and numerical forecast models. It's pretty impressive what the meteorologists of the day were able to do with land-based observations, often telephoned or teletyped in from other areas, but they couldn't see storm systems developing offshore the way we can today.

Like 1964, November 1955 had been wetter than usual, and the ground was saturated when the rains began on December 15th. December 21 - 24 were the heaviest, bringing all Northern California rivers to flood stage and many areas remained flooded well into January. Newspapers contradictorily proclaimed it a 1000-year flood and the flood of the century, similar to headlines nine years later.

Damage photographs of communities along the Eel, Mad, and Klamath are hard to distinguish from 1964 and the impacts on the Trinity were greater. But the communities hardest hit in 1954 were to the east of us in Sutter County when just past midnight on Christmas day the Gum Tree Levee on the Feather River collapsed inundating Yuba City. Thirty-eight died in the Yuba City area, and an additional 36 succumbed in other areas of central and northern California.

After 1955, a number of flood control projects were put in place. Trinity Dam was completed in 1962, and Lewiston Dam a year later, and both reduced 1964 peak flows downstream, especially in the Hoopa Valley. The R.W. Matthews Dam that created Ruth Reservoir was constructed in 1962 and limited flows in the community of Mad River downstream to half the 1955 peak and reduced the flow at the Arcata rivergagge near Glendale to only 110% of the 1955 value.

The 1955 flood left a significant mark on the landscape, triggering landslides, downcutting channels in some places and depositing thick layers of loose sediment in others. Long time friend and colleague Harvey Kelsey who spent several years working in Redwood National Park supports a consensus view that 1955 exacerbated the impacts of 1964: "Steep slopes were weakened (tension cracks. small failures) in 55 and then the prolonged rainfall 9 years later triggered massive failures that would not have occurred without the 55-storm priming the tank."

Contrary to much popular belief, the 1964 in Humboldt and Del Norte County was not a rain on snow event. Nancy Dean, retired Meteorologist in Charge of the Eureka National Weather Service Office, carefully sifted through the weather reports of the 1964 to demonstrate that only a small amount of snow- on hillslopes before intense rains began. Snow was dumped in the region as the cold front moved in after the bulk of the rain, hampering response and rescue missions and imprinting a snowy landscape in many memories.

There are similarities and links between earthquakes and floods. Both create “isolated islands of humanity,” hindering our access to work, home, friends, and needed commodities. Both can damage infrastructure, making it difficult to access information or get help. And both can be weathered more successfully with preparedness ahead of time and working together with your neighbors.

Lori Dengler is an emeritus professor of geology at Cal Poly Humboldt, and an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times--Standard's. All Not My Fault columns are archived online at <https://kamome.humboldt.edu/taxonomy/term/5> and may be reused for educational purposes. Leave a message at (707) 826-6019 or email Kamome@humboldt.edu for questions and comments about this column or to request copies of the preparedness magazine “Living on Shaky Ground.”