

Ground Truth: Atmospheric River - "Pineapple Express"

Origin of Threat:

Atmospheric rivers have been an increasingly common threat to the inhabitants of the American West Coast. Created through what's essentially a jet stream of millions of gallons of water, they transport 7.5 to 15 times more water than the entire Mississippi River. With climate change "supercharging" these atmospheric highways, this meteorological phenomenon is becoming increasingly volatile.

A Pineapple Express, a variant of an atmospheric river, had built up from the Hawaiian islands and sent high speed winds and torrents of rain down on California. With little time to prepare, Northern California was left in ruins. Seeing its effect, Southern California scrambled to prepare. Initial confirmed casualties were able to remain in the double digits, but billions of dollars of critical infrastructure had been put out of commission. The lifelines in most danger of being damaged were those of transportation, power, and shelter; all factors that found themselves being terraformed by gallons of moving rain and mud.

Model Details:

In terms of scale, this particular atmospheric river is modeled after the 1955, 2021, and 2024 California atmospheric river events. In a span of 3 days, this disaster brought over six months worth of rain. Additionally, winds ranging from a Beaufort number of 6 to 12 (25 to 75+mph) battered urban and rural landscapes. From floods to mudslides to urban demolition, this initial meteorological threat had become a multitude of cascading events that would prove to be extremely difficult to recover from.

Hamlin County isn't a real county, but instead modeled off of my very own local counties and cities. The three counties in particular are; Los Angeles, San Diego, and Orange County. By combining traits of these three key Southern California counties, a county with a wide range of modularity and applicability to local regions is formulated.

With a modeled population of 3 million residents in Hamlin County, of which 83,000 live in the coastal town of Garden Beach, the potential for damage to both infrastructure and human life should not go underestimated.

Threat Timeline and Unfolding Response:

Sunday, December 10, 11:00am.

Since last night, Northern California had been under siege by 70+ mph winds and high levels of rain. Streets became flooded, and houses destroyed. The governor declares a state of emergency for many Northern Californian counties, and preemptively for a number of Southern California counties.

Southern California, seeing the devastation brought upon its sister regions, braces for impact. However, when the initial wave of rain arrived, its effects were greatly lower than what was predicted. Experiencing only .25 in/hr rain and 4-7 mph winds, the event was on par with the ordinary drizzle. Feeling that they overestimated the event, many SoCal residents return to their standard daily lives.

However, due to forecasts and metrics collected by the USGS and NOAA, government and voluntary organizations still followed through with mitigative measures to protect human life and infrastructure loss. Hamlin county, consolidating with their flood maps, enacted early by creating flood barriers and evacuation zones.

Sunday, December 10, 9:00pm.

The rain, which had been originally mellow, has now grown in intensity. With .5 in/hr rain and 13-18 mph winds, the threat of a flood has increased. Flood protection systems have been fully assembled, and response systems have been prepared. Municipalities inside Hamlin county have begun coordinating regional evacuations with the county's support.

Monday, December 11, 8:00am.

.75 in/hr rains and 25-31 mph winds start to create concern with the public. However, many private businesses and public institutions have forced employers and students alike to still attend as normal. Evacuations orders are finished, and various volunteer organizations like the Community Emergency Response Team (CERT) and the American Red Cross (ARC) begin managing shelter sites. Transportation routes, such as the I-5, become victims of mudslides and many vehicles become trapped on the road.

Monday, December 11, 10:00am.

Consistent +1.00 in/hr rain and 30+ mph winds have begun to plague the county. Transformers and power lines become downed due to the increasing water levels. Softer soil has led to mudslide washed buildings and displaced refugees. Emergency flood alerts have been released by the NOAA, encouraging people outside of flood zones to shelter in place.

Monday, December 11, 11:00am.

The same weather conditions have been maintained, if not worsened. Many Californians, underestimating the threat, find themselves in a precarious situation as the water starts to create impassable floods and hazardous mudslides. Community lifelines like energy and shelter are affected. Routes of transportation would soon grow to be impassable. Various cellular towers have been toppled by shifting terrain.

Monday, December 11, 12:00pm.

The Parada Dam, a local earth-fill dry dam, faces the risk of dam failure. Overseen by the Army's Corp of Engineers, the dam has been in need of "high urgency" repairs since 2019. Dam technicians wrangle with the increased water elevation as their spillways near breach.

With many densely populated areas becoming water locked, additional rescue teams for business and educational institutions have been mobilized.

Impacting Factors:

Canadian speaker Brian Tracy was famous for saying, "Every minute you spend in planning saves 10 minutes in execution".

The ability to prepare and respond to a disaster is greatly affected by one's local financial and technical ability to prepare. Garden Beach, being a smaller city, heavily relied on the county and volunteer organizations to be able to meet their disaster response needs. Additionally, the county's agencies became involved through their Emergency Operation Centers (EOCs) due to the governor's declaration of a State of Emergency.

Human emotions, especially emotional ties, can often also make people create irrational decisions that put their lives at risk. Mrs. Beckett was an example of someone many rescuers experience when performing evacuations; a person who doesn't want to leave their home because of their fear of what may be lost. Additionally, many institutions revolving around business would often prioritize the risk of financial loss over maintaining business resiliency.