

THE COMPOUNDING EFFECTS OF CLIMATE CHANGE

Climate change increases the intensity and frequency of disasters in California. It also heightens the impacts of subsequent disasters. The ongoing effects of the 2011-2016 drought – including massive landslides and wildfires – reflect this.

THE EFFECTS ON THE ENVIRONMENT:

The 2011-2016 drought included some of the driest years in recorded history and provoked a series of subsequent disasters throughout California. While droughts are part of the state’s regular weather patterns, the severity of this drought resulted from extremely warm and dry conditions that took place at the same time. A 2015 study suggests that climate change from *anthropogenic*, or human-caused, greenhouse gas emissions makes it more likely that similar simultaneous events will occur over the next few decades.

Just as dry drought years are a regular climate pattern in California, so too are the years of heavy rain that follow them. What is not normal is how extremely dry drought years then impact extremely wet years. **Heavy rainfall followed the 2011-2016 drought. But, due to the drought, much of the soil along the coast had lost its ability to retain this moisture.** Big Sur’s Mud Creek suffered a disastrous landslide when 15 acres of land slid down into the Pacific Ocean and wiped out a section of State Route 1. The landslide caused \$1 billion in damages. It took over a year to reopen the roadway.



The Mud Creek Landslide, southeast of the town of Gorda in Monterey County, covered part of State Route 1. This aerial photo was taken one week after the event. Photo courtesy US Geological Survey.

That same year – 2017 – the Thomas Fire blew through Southern California’s Santa Barbara and Ventura Counties (the state’s largest wildfire when it occurred). Fires burned through the vegetation holding the soil



U.S. Army First Sgt. Matthew Adams, of the 315th Vertical Construction Company, California Army National Guard, talks with a law enforcement representative, Jan. 13, 2018, in Montecito. Adams’ unit conducted debris-clearing operations to dig out homes and roadways. U.S. Air National Guard photo by Senior Airman Crystal Housman.

together, and left behind a deforested area with piles of burnt debris. January rainfall pushed the detritus down creeks and valleys into the town of Montecito, located near Santa Barbara. The mudslide caused 23 deaths and \$200 million in property damage and cleanup costs.

The drought’s warm and dry conditions also spurred an unlikely wildfire hazard: bark beetle infestations. These tiny, tree-mauling beetles thrive in warm climates, but are usually eliminated by cold winters. The intense warm seasons during this drought prolonged the bark beetles’ activity. By 2017, the beetles had killed 142 million trees in Central and Southern Sierra Nevada forests, creating a large fuel load of dead trees. When the Creek Fire broke out in the area in 2020, it burned 379,895 acres and became, at the time, the 4th largest fire in state history.

Bark beetle activity doesn’t always trigger larger wildfires; they can actually prevent fires in higher elevations. In the Sierra Nevada’s low-elevation forests, bark beetle infestations fueled the Creek Fire. Forests in the Pacific Northwest, however, are actually helped by bark beetle activity. In that region, fires typically burn through the high-up forest canopy layer. These fires are known as crown fires. Bark beetle outbreaks result in a sparser canopy, providing less fuel for active crown fires. **While the impact of bark beetles on forest fires varies across geographical locations, what is common amongst all forests is that climate change is changing the length of the fire season, the extremes of fire speeds, and the ease with which wildfires can spread.**



The California five-spined ips (*Ips paraconfusus*) bark beetle is the size of a grain of rice. Photo by Ben Smith. Courtesy USDA Forest Service, Region 6, State and Private Forestry, Forest Health Protection.