

Impacts of extreme weather on real estate

Compiled by Phil Nelson,
2017



That's what happened when Hurricane Sandy slammed into New York City in 2012.

Bruce Gellerman, *Bostonomix*, wbur.org, 19 April 2017



Streets around a Con Edison substation are flooded as the East River overflows in Brooklyn, as Hurricane Sandy moves through the area on Oct. 29, 2012. (Bebeto Matthews/AP). In order to prevent electrical fires, Con Ed[ison] makes a brutally tough call: The power company pulls the plug, plunging much of lower Manhattan, including Wall Street, into darkness.

'Scary' climate change may force zoning changes: planning chief

New York Post, 8 Sept 2016

Photo: Chad Bachman



Homes in Staten Island are flooded after Superstorm Sandy in 2012.

City Planning chief Carl Weisbrod said the changes his office are considering include new requirements to “help raise new buildings and existing buildings in flood prone areas.”

“We are further along than any other place in the country, but it’s a scary proposition,” Weisbrod told an Association for a Better New York breakfast in midtown.

“Sea levels are rising, and we are going to have to deal with that.”

De Blasio Admits More Than 1,000 Sandy-Ravaged Homes Won't Be Rebuilt On Schedule

By Emma Whitford in News, Oct 20, 2016



*Staten Island's Midland Beach a few days after Sandy
(Jessica Lehrman / Gothamist)*

Late Wednesday night, days before the four year anniversary of Hurricane Sandy, members of the City Council received Mayor de Blasio's formal admission that his office will not finish construction on hurricane-damaged homes in the Build It Back program by the end of 2016, as promised.

Build it Back leaders detailed snags the project has hit since its June 2013 inception. For one, the sandy terrain underneath many damaged buildings proved difficult to build on. "The original model assumed that over 90% of these houses could be lifted and set back down," said Build It Back Director Amy Peterson. "Certainly what we found with the architects, is that this is not what it takes." John Grathwol, budget director for the Office of Management and Budget, added that, in the midst of a construction boom, the program has "struggled to get enough architects."

Hurricane Matthew Took A Big Bite Out Of Southeastern States' Beaches

Greg Allen, NPR Morning Edition, Nov 1, 2016

September 6, 2014



October 14, 2016



Photos taken before Hurricane Matthew (Sept. 6, 2014) and after (Oct. 14, 2016) show that the storm washed away a 16-foot sand dune, destroying boardwalks and decks and exposing a seawall at Vilano Beach, Fla. USGS photo

Flooding ebbs in Arkansas' northeast

Arkansas Online, 6 May 2017



Flooding from the Black River has closed U.S. 67 near Elnora, south of Pocahontas, in Randolph County. Floodwaters are slowly receding in parts of Randolph and Lawrence counties, giving officials their first look at some of the damage.

PHOTO BY BENJAMIN KRAIN

Wintertime flooding, Missouri, December 2015

“wintertime floods among costliest ever”
USA Today, January 9, 2016



Pacific, Missouri, Jeff Roberson, AP



Robert Cohen, St. Louis Post-Dispatch



Robert Cohen, St. Louis Post-Dispatch via AP

West Virginia 23 June 2016

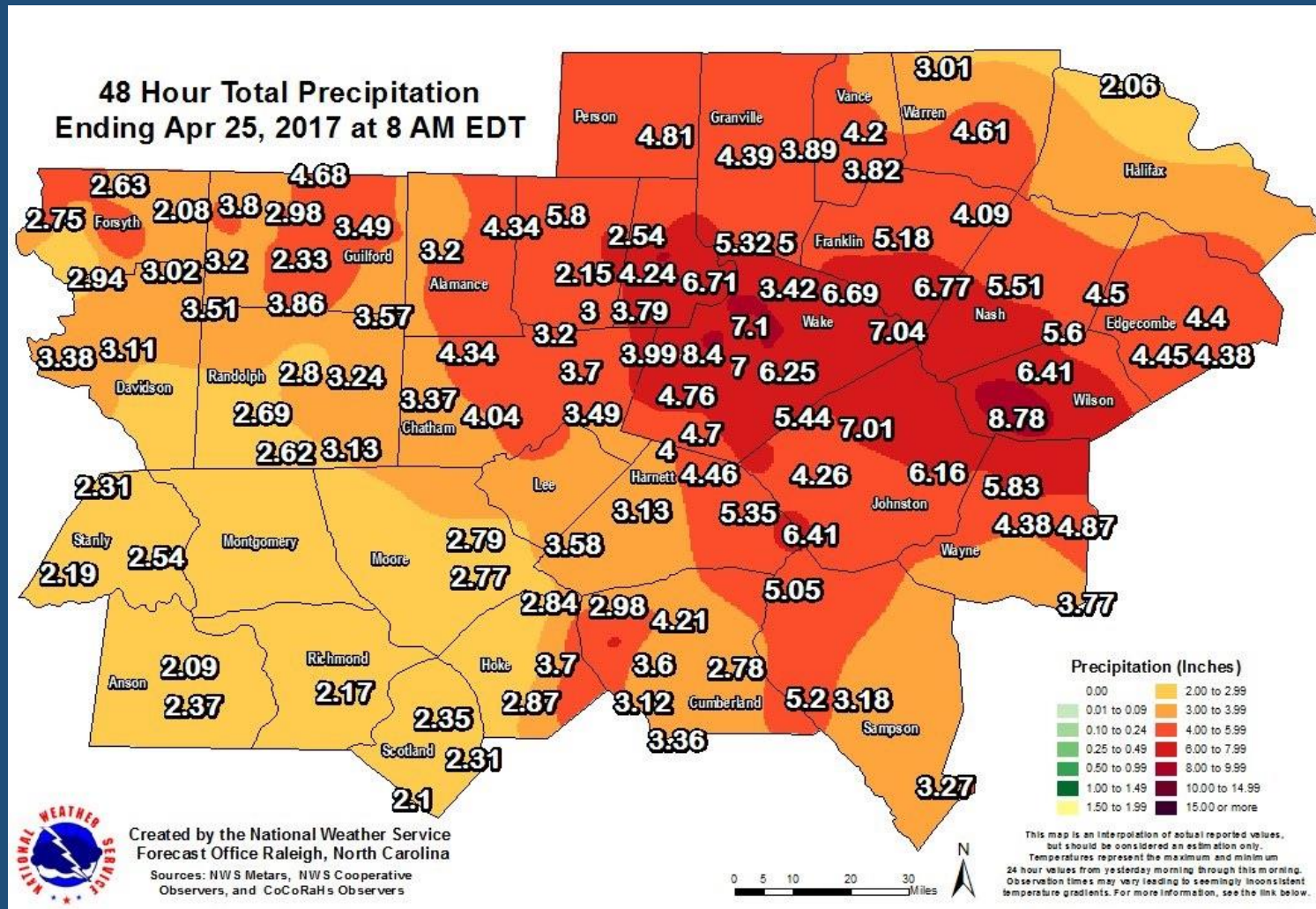
Man-made climate change may have added to the disaster. The part of the USA that includes West Virginia has seen a 71% increase in extreme precipitation since 1958, according to the National Climate Assessment. “One in 1,000-year event”.



The Climate Context for Raleigh's Rains Wxshift, 27 April 2017

A storm system has dumped several inches of rain across eastern North Carolina since Sunday, with some areas around Raleigh reporting 7 to 8 inches in the 48 hours ending at 8 a.m. on Tuesday. The 4.51 inches that fell at the airport beat the previous one-day April precipitation record of 3.37 inches.

“The number of heavy events has continued to be well above average over the last couple of years, maintaining the upward trend,” (Ken Kunkel, climate scientist)



Louisiana Flood of August 2016 resulted from '1,000-year' rain in 2 days

Ted Jackson/Nola.com | The Times-Picayune via AP



40,000 homes damaged.

20,000 rescued; 10,000 in shelters.

Largest Red Cross response since Superstorm Sandy

Travis Spradling/The Advocate via AP

Over 20 inches of rain in 72 hours
Governor's family evacuated in Baton Rouge.



Flooding in the South Looks a Lot Like Climate Change

By Jonah Engel Bromwich, New York Times AUG. 16, 2016

Max Becherer/FR 171354AP, via Associated Press



“Climate change is never going to announce itself by name. But this is what we should expect it to look like.”

David Grunfeld/The Times-Picayune, via Associated Press

“The flooding in Louisiana is the eighth event since May of last year in which the amount of rainfall in an area in a specified window of time matches or exceeds the NOAA predictions for an amount of precipitation that will occur once every five hundred years, or has a 0.2 percent chance of occurring in any given year.”



Louisiana flood price tag could hit \$15 billion

CBS News, 8 Sept 2016

The devastating floods that hit Louisiana and other parts of the Gulf Coast last month likely caused total economic losses of between \$10 billion and \$15 billion, according to reinsurer AON Benfield. That would make it one of the costliest natural disasters in U.S. history.

AON Benfield also expects insured losses to be in the low single-digit billions because more than 80 percent of the homes in the affected region lacked flood insurance. At least 13 people were killed in the floods that left parts of Baton Rouge underwater, destroyed 150,000 homes and left thousands homeless.

Hurricane Katrina: \$49 billion in 2015 dollars.

Sept 11, 2001: \$24.6 billion.

Superstorm Sandy: \$65 billion.

“The global warming signal is present in these numbers,” study lead Karin van der Wiel of NOAA and Princeton University recently told the Associated Press. “For a precipitation event of this size to occur on the central Gulf Coast, the odds have increased by at least 40 percent and most likely doubled.”

Poor, Displaced and Anxious in North Carolina as Floods Climb After Hurricane Matthew

By Jess Bidgood, New

York Times Oct 13, 2016



“The poorest of the poor in North Carolina are the ones who are being hurt the most by these floods,” Gov. Pat McCrory said at an otherwise upbeat news conference on Thursday. “These people have nothing,” he added, urging people to donate to a state disaster fund.

Ryan Christian and Delores Miller canoed down a street Tuesday in Lumberton, N.C., where a third of residents live in poverty. Credit Travis Long/The News & Observer, via Associated Press

1 in 1,000 year rainfall caused Missouri floods

By Doyle Rice, USA Today 12 May 2017



Photo: Michael B. Thomas, Getty Images

Most of the “once-in-a-millennium” rainfall from late April to early May occurred in southern Missouri, NOAA said. Some areas picked up over a foot of rain within a few hours April 29.

Louisiana floods of August 2016 – comments

"Yet people were cooking huge pots of jambalaya and passing out servings. Local residents from Baton Rouge and Zachary cooked large batches of red beans to feed sheriffs in Ascension Parish. Restaurant owners from New Orleans drove more than 50 miles to flooded areas to serve chicken fricassee, cornbread and bread pudding.

"Even through disaster, God has shown us how strong love truly is," Richardson said. "There is no end to the kindness that our people have right now. Our community is saving each other."

As the scope of the devastation sunk in, many Louisiana residents took to social media to rail against news outlets for what they believed was their lack of coverage. Why, some wondered, was the displacement of thousands of people less deserving of attention than the Olympics or Donald Trump?

"Why isn't national media covering the floods in Louisiana?" tweeted Amy Crowe Duhe, a Baton Rouge nursing student. "This is like nothing we've ever seen before."

<http://www.latimes.com/nation/>

The map shows the percent increase in very heavy events (heaviest 1% of all daily events) from 1958 to 2012



South Florida continues prep for sea level rise

Brittany Wallard, Broward Sun Sentinel 27 Feb 2017

Fort Lauderdale raised the required height of sea walls & home site elevations.

Delray Beach added valves to keep salt water out of city drainage system.

Broward County ordered new flood maps to be drawn.



Flooding from seasonal king tides has worsened in Fort Lauderdale as a result of sea-level rise.

Joe Cavaretta/SunSentinal

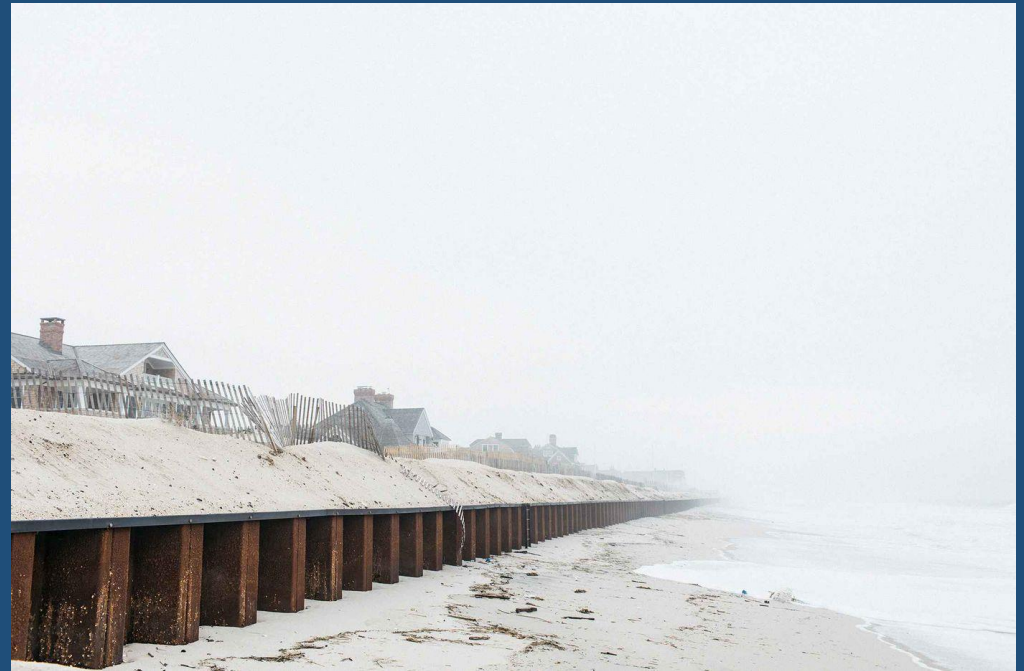
The Jersey Shore Would Rather Fight Flooding With Walls Than Retreat

The state's \$300 million fund to get coastal homeowners to relocate inland isn't working.

by Christopher Flavelle May 4, 2017

Stafford Township --

The berm project would cost as much as \$100 million, money the town doesn't have. Spodofora is hoping the federal or state government will fund it, even though most of the 5,000 homes the berm would protect will likely be underwater in a few decades with or without it. Still, Spodofora is committed. "There's no areas of my town that I can say aren't worth protecting," he says..



New Jersey built this 3.5-mile, \$23 million steel wall in Mantoloking after Hurricane Sandy. The state initially closed that section of the beach, amid worries somebody would fall off.

Photographer: Katrina d'Autremont for Bloomberg Businessweek

IN TIDE'S WAY: SOUTHEAST FLORIDA'S SEPTEMBER 2015 SUNNY-DAY FLOOD

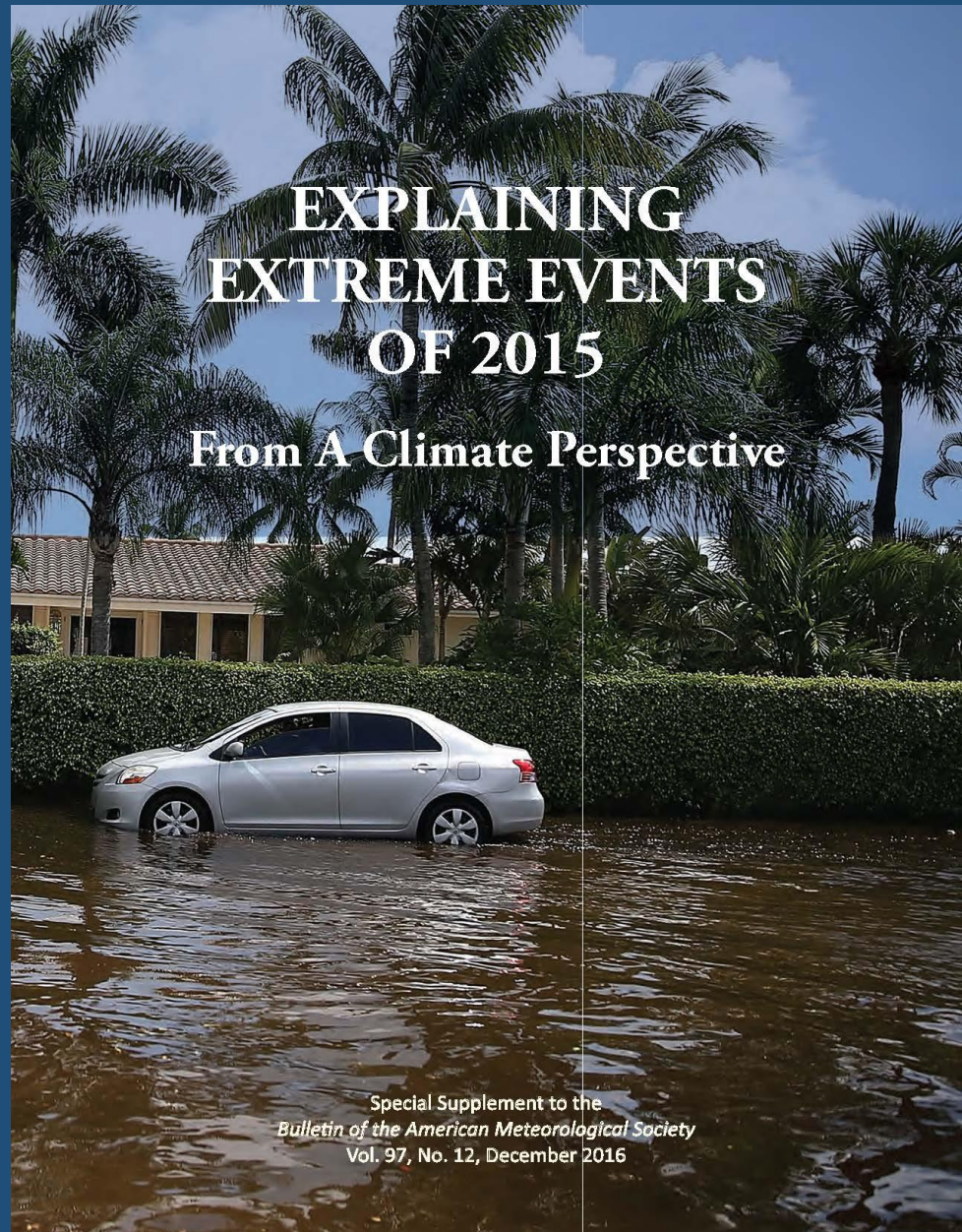
...flooding on 27 September inundated 0.57 m of normally dry land (~2 feet) and capped a weeklong event in which daily high tides exceeded the local nuisance flood threshold. Tidal floods of this magnitude occur only every few years now but will become commonplace in the coming decades.

The probability of a 0.57-m tidal flood within the Miami region has increased by >500% since 1994 from a 10.9-cm sea level rise (SLR)-related trend in monthly highest tides.

Special Supplement to the Bulletin of
the American Meteorological Society
Vol 97, no. 12, December 2016

EXPLAINING EXTREME EVENTS OF 2015

From A Climate Perspective



Special Supplement to the
Bulletin of the American Meteorological Society
Vol. 97, No. 12, December 2016

©Photo by Joe Raedle/Getty Images—Sept 30,
2015, Fort Lauderdale, FL.

South Florida Company Uses Data to Predict Whether Your House Will Be Underwater in 30 Years

For \$99, a person can look up any address in four counties in south Florida and determine its risk of flooding from sea-level rise over the next 30 years. Broward-Palm Beach New Times, Jan 18, 2016



Photo by Dave vis Flickr Creative Commons

Flooding of Coast, Caused by Global Warming, Has Already Begun

Scientists' warnings that the rise of the sea would eventually imperil the United States' coastline are no longer theoretical

Huge vertical rulers are sprouting beside low spots in the streets here, so people can judge if the tidal floods that increasingly inundate their roads are too deep to drive through.

Highway 80, road to Tybee Island, Georgia.



Justin Gillis, NY Times, 9/3/2016
Photo by Stephen B. Morton for NY Times

Rising seas spurred record number of 'high-tide' floods in U.S. last year

Doyle Rice, USA Today, 16 June 2017

Across the USA, coastal cities and towns racked up a combined 520 days with high-tide floods, far above the annual average of 275 days over the past couple decades, NOAA oceanographer William Sweet said.

The report only examined coastal flooding, not inundation brought on by sudden, heavy rain or overflowing rivers. As sea levels rise, it no longer takes a strong storm or hurricane to cause coastal flooding. It now occurs with high tides in many locations.

Charleston, S.C., with 50 days, and Savannah, Ga., with 38 days, both broke their records in 2016 for number of days in a year with high-tide flooding. Key West, Fla., with 14 days, tied its record.



Nick Trace drives through a flooded parking lot to put his boat in at a boat ramp on Nov. 14, 2016, in North Miami, Fla. (Photo: Joe Raedle, Getty Images)

First US climate refugees get \$48 million to move

Federal grant aims to move the entire community of the sinking Isle de Jean Charles, La., to a drier place. Christian Science Monitor, May 3, 2016



Lake Bistineau, Louisiana, March 14, 2016, Therese Apel/Reuters

Isle de Jean Charles. Since 1955, the island has lost 98 percent of its land.
Island Road, pictured, frequently washes out.
National Geographic, May 25, 2016



The island...is located deep in the southern bayous of Louisiana, about 75 miles (120 kilometers) south of New Orleans and 15 miles (24 kilometers) from the Gulf of Mexico.

Isle de Jean Charles. National Geographic, May 25, 2016



“We don’t have time,” tribal chief Albert Naquin, who spent the last 15 years advocating to relocate his people, said. “The longer we wait, the more hurricane season we have to go through. We hate to let the island go, but we have to. It is like losing a family member. We know we are going to lose it. We just don’t know when.”



Waldo Canyon wildfire, Colorado Springs, June 2012

32,000 people evacuated

\$454 million in insurance claims

346 homes destroyed

Record temp of 101 F June 26



Human caused

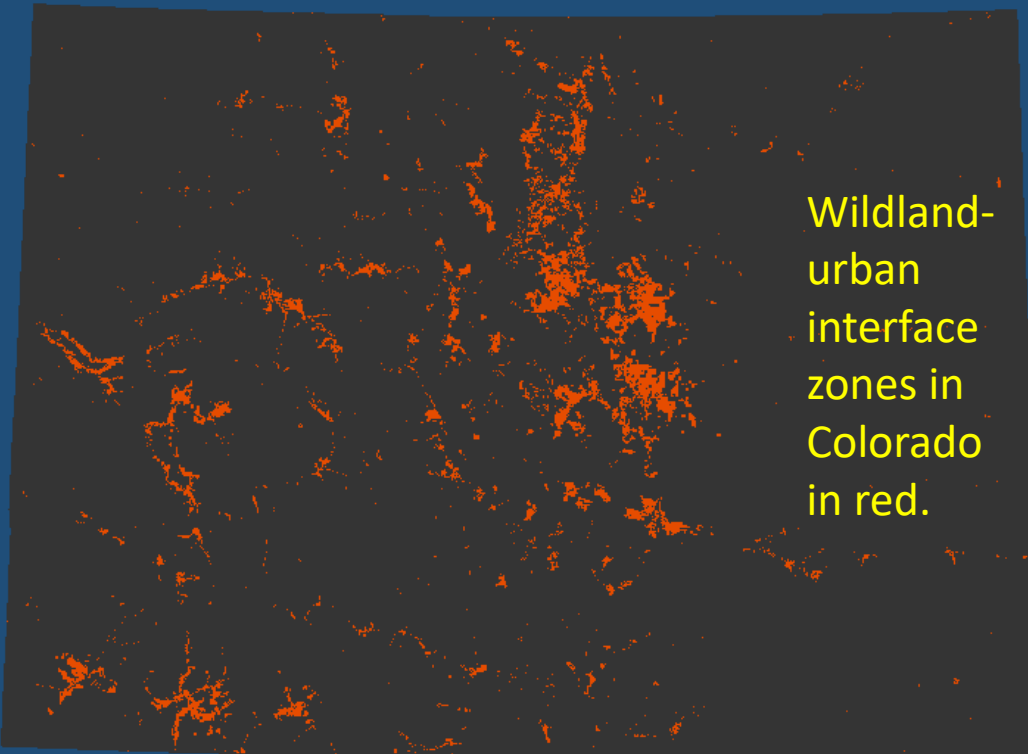
18,250 acres burned (29 sq mi)

65 mph wind gusts

Fire moved at 2 miles per hour

41% of Coloradans live in the wildland-urban interface

Reveal News.org 8 Oct 2016

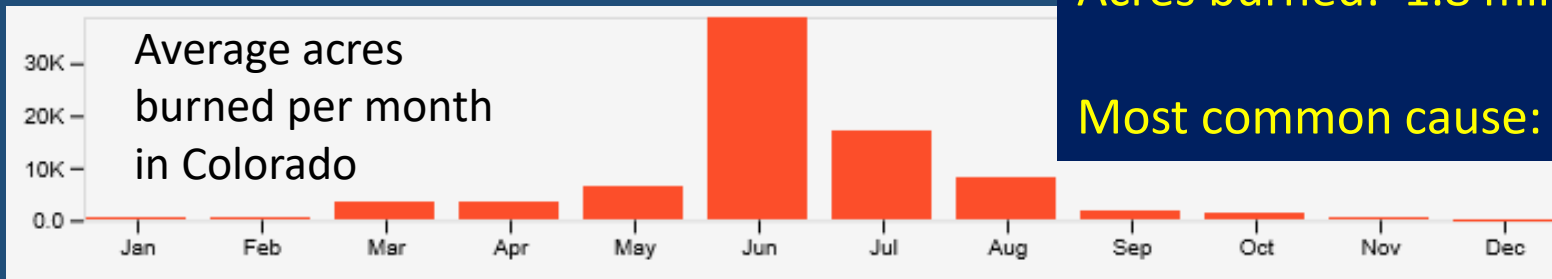


Wildfires, long considered a problem exclusive to the West, now threaten many other parts of the country as extreme weather becomes more commonplace and more people live in areas at risk for wildfire.

Total wildfires in Colorado (1999-2013): 33,033

Acres burned: 1.8 million

Most common cause: lightning



Climate change has been making western forest fires worse for decades, study says

Washington Post, 11 Oct 2016



Bluecut Fire in the San Bernardino National Forest
(Reuters/Gene Blevins)

Many scientists have predicted that climate change could cause wildfires to increase in the future. And a new study, just out on Monday, demonstrates just how much it's already been making them worse. ...

And in the last three decades, the study finds climate change played a role in nearly doubling the area hit by forest fires since 1984.

The researchers then applied a climate model to investigate how big a hand human-caused climate change has had in these changes, comparing what the fires look like when climate change is factored in versus what they look like when the effects of such climate changes are excluded. Overall, the researchers found that anthropogenic climate change was responsible for just over half of the total observed increase in fuel dryness since 1979. In turn, this influence has added more than 16,000 square miles of forest fire area to the western United States since 1984 — an area larger than the state of Maryland — nearly doubling the area scientists might have expected without the influence of similar climate change.

Fort McMurray, Alberta, Canada, May 2016

Residential neighborhoods, May 5 and 6



NBC News online.
Scott Olson / Getty Images



2,400 homes destroyed....\$3.58 billion in losses....1.4 million
acres burned....temperatures in early May in the low
90s....paltry snowpack after a warm winter

NBC News online. Photo by RCMP, Alberta

U.S. had more floods in 2016 than any year on record

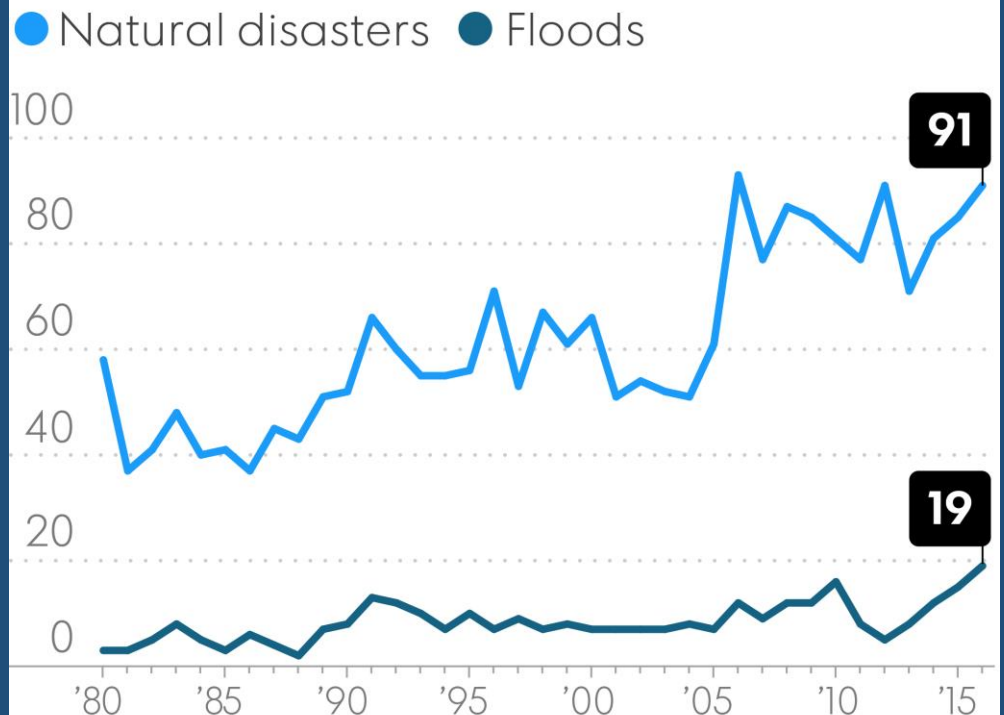
USA Today 4 Jan 2017

Overall, there were 91 weather, climate or geological disasters in the U.S. in 2016, the second-most on record, Munich Re said. This includes severe storms, hurricanes, wildfires, earthquakes, heat waves and droughts.

To qualify as one of Munich Re's disasters, or "loss events" as the firm calls them, the event must cause at least one death or at least \$3 million in damage.

NATURAL CATASTROPHES IN THE U.S.

In 2016, there were 91 weather disasters in the U.S., tied for second-most on record. The number of floods, 19, was a record high.

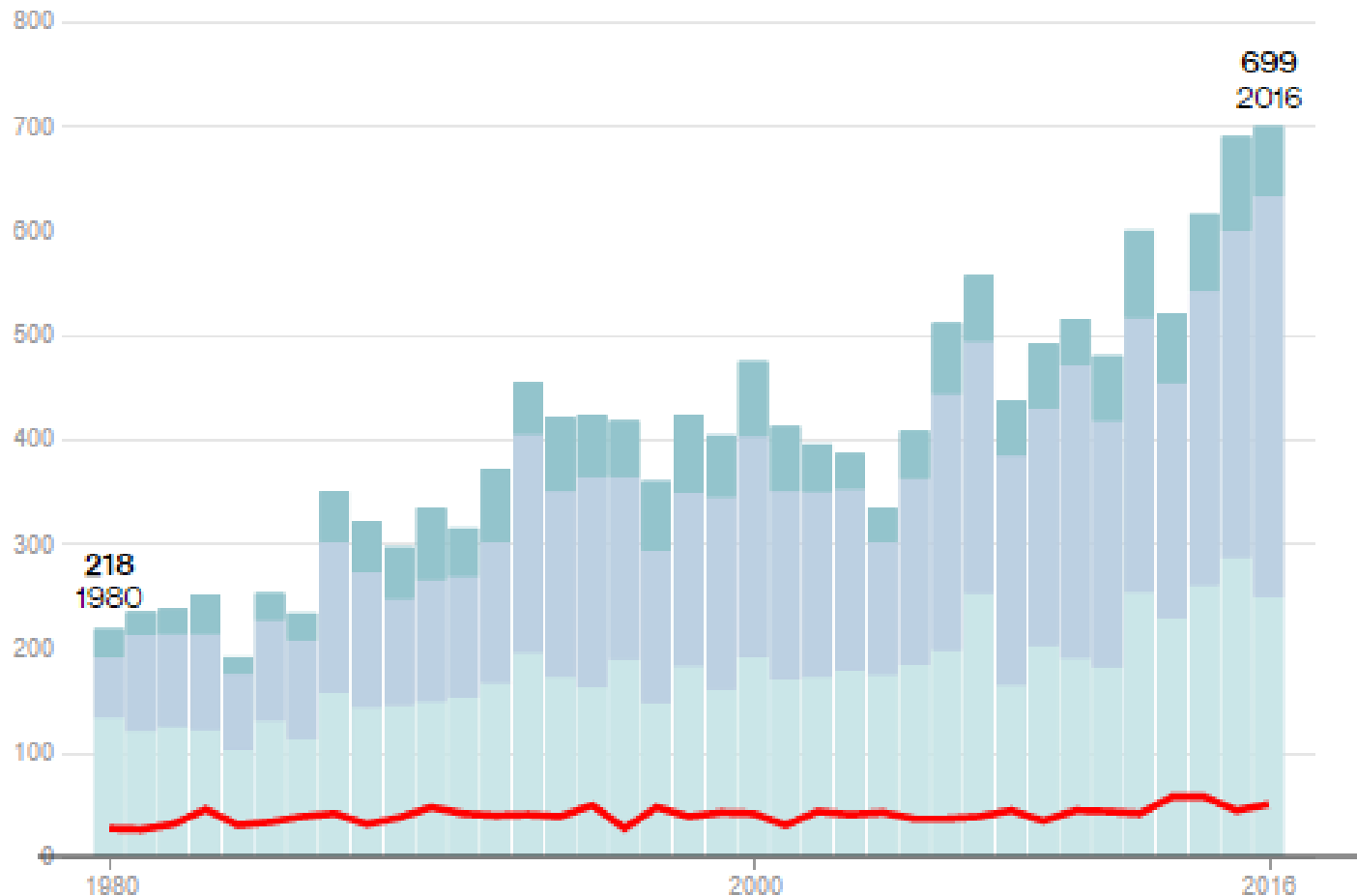


SOURCE Münchener Rückversicherungs-Gesellschaft,
Geo Risks Research, NatCatSERVICE
George Petras, USA TODAY



GLOBAL NATURAL DISASTERS, 1980-2016

- EARTHQUAKES, TSUNAMIS, VOLCANIC ACTIVITY
- STORMS
- FLOODS AND LANDSLIDES
- DROUGHTS, HEAT WAVES, AND FOREST FIRES



Worldwide, the number of climate-related disasters has more than tripled since 1980

National Geographic.com April 2017 Source: Munich Re

INSURANCE JOURNAL

\$880 Billion of Homes in Danger of Being Underwater, Literally

By Patrick Clark | August 2, 2016

Rising sea levels could soak homeowners for \$882 billion, according to a new report from real estate website Zillow. The research takes its initial cue from the journal *Nature*, which in March found sea levels could rise more than 6 feet by the end of the century. In that scenario, Florida could lose close to 1 million homes, or 13 percent of the state's current stock. That comes out to \$400 billion in value—a figure that doesn't include losses to commercial buildings or public infrastructure or account for future appreciation in home value.