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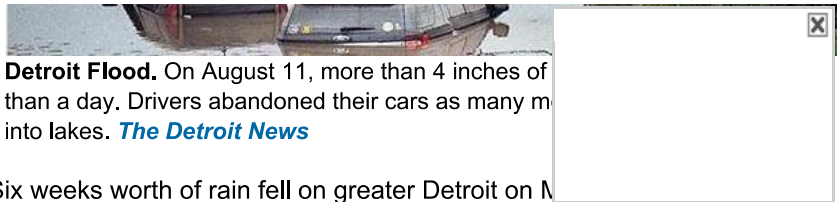
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## Extreme Rainfall Is The New Normal, And We're Not Ready For It

Heavy rains are flooding cities and towns from Nebraska to Michigan to Maine. Is the problem failing infrastructure, global warming...or both?

By [Emily Gertz](#) Posted 08.15.2014 at 11:30 am





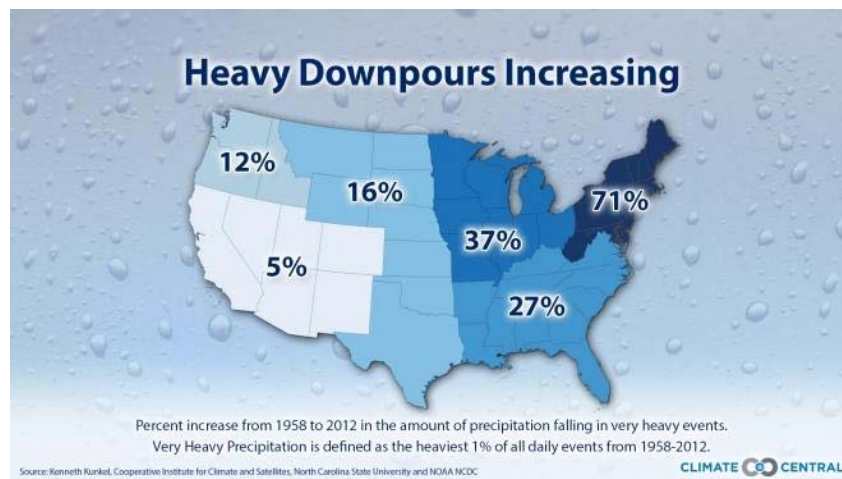
**Detroit Flood.** On August 11, more than 4 inches of rain fell in a matter of less than a day. Drivers abandoned their cars as many were pushed into lakes. [The Detroit News](#)

Six weeks worth of rain fell on greater Detroit on Monday afternoon rush hour. Local drainage systems quickly topped out, and the deluge transformed highways into lakes studded with hundreds of stranded drivers and submerged cars. [Flooded roads and highways in greater Detroit began to reopen on Wednesday](#), two days after the storm, according to *The Wall Street Journal*, but the cleanup and repair is likely to take months.

The flooding came about, most directly, due to very high humidity on Monday combined with a low pressure system from the southwest. The resulting storms moved so slowly (sometimes even reforming after initially raining themselves out) that the rain was concentrated across a small geographic area.

This is weather common to tropical regions of the world, not temperate Michigan. But it's in line with the [National Climate Assessment](#), which found that over the past six decades incidents of extreme precipitation have increased across the continental U.S. due to human-propelled climate change. Rising temperatures increase the evaporation of water into vapor, and warmer air can take on greater amounts of water vapor than cooler. When all that vapor finally condenses into rain (or snow), there's more of it to dump onto the communities below.

This new normal of extreme precipitation is hitting Northeastern states the hardest, followed by the upper Midwest, as this map from *Climate Central* shows:



**Extreme Precipitation in US Increasing** Data from the latest National Climate Assessment shows that brief, heavy downpours are increasing across the United States, with the Northeastern and Upper Midwestern states hardest hit. [Climate Central](#)

There's another thing that's changed since the 1950s: the built environment. There is a lot more of it.

Officially, Monday's rainfall in Detroit totaled 4.57 inches (some areas saw up

Officially Monday's rainfall in Detroit totaled 4.57 inches (some areas saw up to 6 inches), just missing the one-day rainfall record of 4.75 inches set in 1925. "But as bad as that Prohibition-era deluge must have been," wrote [WXYZ's Chris Edwards](#), "it fell on a city with a lot less paved area than we have now."

The large amount of pavement in Detroit, or any large urban area, allows less rainfall to soak into the ground and creates more runoff during intense storms. So when considering how the metro area has changed since 1925, this may have been the most serious flooding event ever recorded in Detroit.

Much of U.S. highway system was planned and built in the mid-20th century with historical rain and snow conditions in mind. Now these same systems are decades-old, under-maintained, and failing under the new normal we've created of extreme precipitation.

Much of Detroit's infrastructure is [due for major renovation](#), replacement, or re-imagining. While many civic leaders and engineering visionaries imagine a bright future for the Motor City, in the present the city's near-bankruptcy has meant [tens of millions of dollars in neglected maintenance on basic urban necessities like water mains](#), as Michigan Radio reported in February.

But it's unfair to single out Detroit. Failing infrastructure and flash flooding are big problems across the U.S.

A day after the Michigan floods, these factors came together again in Tuesday's torrential downpours along the East Coast. A low pressure storm system crawling up the mid-Atlantic seaboard dropped several inches of rainfall within 24 hours on communities from Maryland to New York. [A near-record 6.3 inches of rain fell at Baltimore-Washington International Airport](#) – trumped only by the amount of rain that fell during a 1933 hurricane, *Climate Central* reports. Some parts of greater Baltimore saw over 10 inches of rain before the storms moved off.



**Baltimore Flooding** Sudden heavy rains swamped parts of the Baltimore area on August 12, including this parking lot at BWI Airport. [@1stChoiceWeathr on Twitter](#)

By 9:30 am Wednesday, the system was moving over the New York City metro area. [Long Island recorded 13.26 inches of rainfall in less than a](#)

**day**, according to the National Weather Service, breaking the New York state record set during Hurricane Irene in 2011. Severe roadway flooding trapped many drivers, and cut off parts of eastern Long Island from the rest of the state.



**Flooding on Long Island** On August 13, 2014, torrential early morning rainfall flooded roads and highways in Long Island, New York, turning this parking lot at the Long Island Rail Road station in Islip into a lake. Water quickly rose in many areas, closing roads and highways and breaking the state's record for rainfall in a 24-hour period. *MTA*

By Wednesday night the storm system was hovering over southeastern Maine. Over 4 inches of rain fell on Portland between 9 and 11pm; by midnight the deluge officially hit a record-setting 6.44 inches, [according to the \*Portland Press Herald\*](#). (By some unofficial weather radar estimates, it topped 8 inches.) Thousands lost power as streets and basements flooded all over southeastern Maine.

And just so the U.S. heartland doesn't feel left out, this video of flash-flooding in Kearney, Nebraska shows a 9-foot-high wall of storm water breaking through tall glass doors to engulf a hospital dining room:



Kearny historically has averaged barely two inches of precipitation per month. But from Friday into Saturday, as nearly 4 inches of rain poured down on Kearney over just a few hours, spurring floods that "overwhelmed the city's storm sewer system and broke through the two-story ground-to-ceiling windows of the dining room at Good Samaritan's Central Cafe," [reported the Omaha World-Herald](#). "The hospital basement flooded, and there was water damage in other portions of the main building."

[On Facebook the hospital expressed relief](#) that no one was injured in the flash flood:

It's hard to put into words exactly what Saturday's conditions were like and just how seriously our facility was impacted. And to say that we're emotional about the whole situation is a bit of an understatement. This security camera footage is just a glimpse into the series of events that unfolded Saturday.



97

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