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IN THE ARENA

Harvey Is What Climate Change Looks Like

It's time to open our eyes and prepare for the world that's coming.

By ERIC HOLTHAUS | August 28, 2017

In all of U.S. history, there's never been a storm like Hurricane Harvey. That fact is increasingly clear, even though the rains are still falling and the water levels in Houston are still rising.

But there's an uncomfortable point that, so far, everyone is skating around: We knew this would happen, decades ago. We knew this would happen, and we didn't care. Now is the time to say it as loudly as possible: Harvey is what climate change looks like. More specifically, Harvey is what climate change looks like in a world that has decided, over and over, that it doesn't want to take climate change seriously.

Houston has been sprawling out into the swamp for decades, largely unplanned and unzoned. Now, all that pavement has transformed the bayous into surging torrents and shunted Harvey's floodwaters toward homes and businesses. Individually, each of these subdivisions or strip malls might have seemed like a good idea at the time, but in aggregate, they've converted the metro area into a flood factory. Houston, as it was before Harvey, will never be the same again.

Harvey is the third 500-year flood to hit the Houston area in the past three years, but Harvey is in a class by itself. By the time the storm leaves the region on Wednesday, an estimated 40 to 60 inches of rain will have fallen on parts of Houston. So much rain has fallen already that the National Weather Service had to add additional colors to its maps to account for the extreme totals.

Harvey is infusing new meaning into meteorologists' favorite superlatives: There are simply no words to describe what has happened in the past few days. In just the first three days since landfall, Harvey has already doubled Houston's previous record for the wettest *month* in city history, set during the previous benchmark flood, Tropical Storm Allison in June 2001. For most of the Houston area, in a stable climate, a rainstorm like Harvey is not expected to happen more than once in a millennium.

In fact, Harvey is likely already the worst rainstorm in U.S. history. An initial analysis by John Nielsen-Gammon, the Texas state climatologist, compared Harvey's rainfall intensity to the worst storms in the most downpour-prone region of the United States, the Gulf Coast. Harvey ranks at the top of the list, with a total rainwater output equivalent to 3.6 times the flow of the Mississippi River. (And this is likely an underestimate, because there are still two days of rains left.) That much water—20 trillion gallons over five days—is about one-sixth the volume of Lake Erie. According to a preliminary and informal estimate by disaster economist Kevin Simmons of Austin College, Harvey's economic toll "will likely exceed Katrina"—the most expensive disaster in U.S. history. Harvey is now the benchmark disaster of record in the United States.

As with Katrina, Harvey gives us an opportunity for an inflection point as a society. The people of Houston didn't choose this to happen to them, but what happens next is critically important for all of us.

Climate change is making rainstorms everywhere worse, but particularly on the Gulf Coast. Since the 1950s, Houston has seen a 167 percent increase in the frequency of the most intense downpours. Climate scientist Kevin Trenberth thinks that as much as 30 percent of the rainfall from Harvey is attributable to human-caused global warming. That means Harvey is a storm decades in the making.

While Harvey's rains are unique in U.S. history, heavy rainstorms are increasing in frequency and intensity worldwide. One recent study showed that by mid-century, up to 450 million people worldwide will be exposed to a doubling of flood frequency. This isn't just a Houston problem. This is happening all over.

A warmer atmosphere enhances evaporation rates and increases the carrying capacity of rainstorms. Harvey drew its energy from a warmer-than-usual Gulf of Mexico, which will only grow warmer in the decades to come. At its peak, on Saturday night, Harvey produced rainfall rates exceeding six inches per hour in Houston, and its multiday rainfall total is close to the theoretical maximum expected for anywhere in the United States.

Weather patterns are also getting "stuck" more often, boosting the chances that a storm like Harvey would stall out. Some scientists have linked this to melting Arctic sea ice, which reduces the strength of the polar jet stream and weakens atmospheric steering currents that can otherwise dip down and kick a storm like Harvey on its way. To be sure, a storm like Harvey might have been possible in the absence of climate change, but there are many factors at play that almost assuredly made it more likely.

POLITICS

How Washington Made Harvey Worse

By **MICHAEL GRUNWALD**

Adapting to a future in which a millennium-scale flood can wipe out a major city is much harder than preventing that flood in the first place. By and large, the built world we have right now wasn't constructed with climate change in mind. By continuing to pretend that we can engineer our way out of the worsening flooding problem with bigger dams, more levees and higher-powered pumping equipment, we're fooling ourselves into a more dangerous future.

It's possible to imagine something else: a hopeful future that diverges from climate dystopia and embraces the scenario in which our culture inevitably shifts toward building cities that work with the storms that are coming, instead of Sisyphean efforts to hold them back. That will require abandoning buildings and concepts we currently hold dear, but we'll be rewarded with a safer, richer, more enduring world in the end. There were many people in Houston already working on making that world a reality even before Harvey came.

If we don't talk about the climate context of Harvey, we won't be able to prevent future disasters and get to work on that better future. Those of us who know this need to say it loudly. As long as our leaders, in words, and the rest of us, in actions, are OK with incremental solutions to a civilization-defining, global-scale problem, we will continue to stumble toward future catastrophes. Climate change requires us to rethink old systems that we've assumed will last forever. Putting off radical change—what futurist Alex Steffen calls "predatory delay"—just adds inevitable risk to the system. It's up to the rest of us to identify this behavior and make it morally repugnant.

Insisting on a world that doesn't knowingly condemn entire cities to a watery, terrifying future isn't "politicizing" a tragedy—it's our moral duty. The weather has always been political. If random whims of atmospheric turbulence devastate one neighborhood and spare another, it's our job as a civilized society to equalize that burden. The choices of how to do that, by definition, are political ones.

LETTER FROM LOUISIANA

Why America Still Hasn't Learned the Lessons of Katrina

By **ANNIE SNIDER**

Climate change hits the vulnerable in a community hardest. It is no different in Houston with Hurricane Harvey, where even if an evacuation would have been ordered, countless thousands of people wouldn't have had the means or ability to act. There is simply no way to safely evacuate a metro area the size of Houston—6.5 million people spread across an area roughly the size of Massachusetts.

The symbolism of the worst flooding disaster in U.S. history hitting the sprawled-out capital city of America's oil industry is likely not lost on many. Institutionalized climate denial in our political system and climate denial by inaction by the rest of us have real consequences. They look like Houston.

Once Harvey's floodwaters recede, the process will begin to imagine a New Houston, and that city will inevitably endure future mega-rainstorms as the world warms. The rebuilding process provides an opportunity to chart a new path. The choice isn't between left and right, or denier and believer. The choice is between success and failure.