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Risk modellers take measured view of climate change impacts

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The impact of climate change is making headlines globally, but catastrophe modellers do not yet have the data set to bake any meaningful changes into their models, experts have said.

In October, the United Nations Intergovernmental Panel on Climate Change predicted that a climate crisis leading to widespread wildfires, mass food shortages and decaying coral reefs could grip the earth by 2040.

And according to a study released earlier this month, the planet's oceans are warming 40 percent faster than initially projected by a UN climate panel five years ago, leading to stronger hurricanes, dangerous floods and storm surge from rising sea levels.

But when it comes to modelling the risk of natural catastrophes, a process based on collecting both historical data and climate science information, experts like Karen Clark noted that the impact of climate change is difficult to detect or define.

"Catastrophe modellers always stay up on the latest science and latest research, but we really have to be conscious of being able to support whatever assumptions we build into our models with actual data," said Clark, president and CEO of Karen Clark & Company (KCC) and the credited inventor of catastrophe risk modelling.

Even though 2018 beat 2017 as the warmest year on record, climate change has yet to rock the world of catastrophe modelling – or (re)insurers and insureds.

"Ocean warming is very interesting but it's difficult to quantify how that should impact homeowners' premiums for example," Clark explained.

"If we build some assumption into our models that means real money to homeowners. Someone on the coast of Florida paying $1,000 [in premium], for example, may now have to pay $1,200," she added.

This is especially salient with hurricane modelling, Clark noted, as the peril is relatively infrequent. Between 2006 and 2015, according to data compiled by the Insurance Information Institute (III), less than one hurricane per year on average

Catastrophe-related insured losses 1970-2018

Source: Swiss Re Sigma
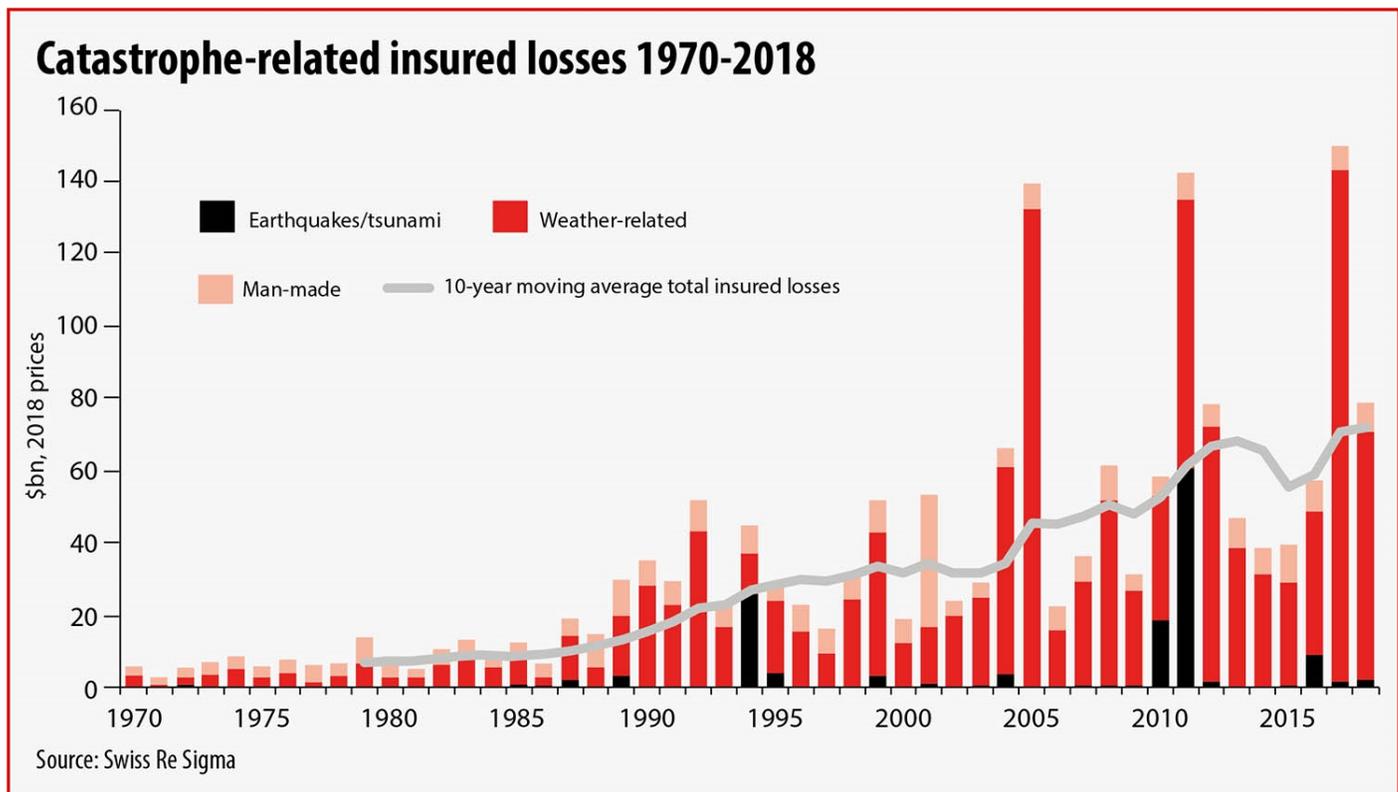
made landfall in the US.

Hurricanes have since picked up somewhat in frequency according to III data, and three of the top five costliest hurricanes in US history – Harvey, Irma and Maria – occurred in 2017.

Risk modellers at KCC, CoreLogic and RMS all noted that climate change reports predict a diminished frequency of land-falling hurricanes, but storms that do make landfall are expected to be more intense on average.

"In a statistical model like a hurricane model, it really will take some time to see fact-based evidence that there is a trend in frequency or severity," Clark said.

Similarly with wildfires, risk modellers must take a long-term view before determining a trend in scale or frequency of events, noted Tom Larsen, senior director of content strategy at risk modeller CoreLogic.

"We are just completing two phenomenal, record-breaking years on wildfire, but two points is not a trend," Larsen explained. "We need to continue to pay attention to it."

There is one area where the data is starting to show a shift, however. Severe convective storms such as tornadoes happen often enough that risk modellers can see a pattern that could potentially be linked to climate change.

"With hurricanes, you could never have a model based on just 10 years of data," Clark said. "But 10 years of data for severe convective storms could be, say, 400 events."

While some data might be suggestive, it's not quite conclusive. In each of the past 10 years, insurers have experienced above-average annual losses from severe convective storms, according to a paper published in April by KCC.

However, Clark noted in the paper that it was still uncertain whether climate change is definitely the root of this trend. It

is not yet clear whether climate change has had any observable impact on the atmospheric phenomena that foster those types of storms.

In the case of severe convective storms, the effects of climate change could be offset by the El Nino Southern Oscillation (Enso) cycle, a variation in winds and water surface temperatures in the eastern Pacific Ocean.

The Enso cycle is a prominent example of a teleconnection – a link in which perils that might be far apart spatially can influence one another.

Understanding teleconnections can help (re)insurers better assess risk in a changing climate, said Pete Dailey, vice president of model development at RMS. They also can guide carriers in developing their portfolios.

"They may actually choose to diversify because they believe climate is going to decrease the risk in one area even as it increases the risk in another," he noted.

According to Dailey, risk modellers can help insurance companies predict the impact of climate change on their portfolios by testing a wide range of predictive scenarios.

"We can sample or simulate different numbers of hurricanes at different intensities, run the model and get an estimate for the industry as a whole or for a particular portfolio or client," Dailey said.

"Catastrophe models are the perfect stress test for that," he added.

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