Floodplain damages affect long-term housing development in high-risk areas

February 20 2020, by Victoria M. Indivero

Extensive flooding in southeast Texas from Hurricane Harvey. Credit: U.S. Department Of Defense

Flooding is the costliest natural disaster, according to environmental economist Katherine Zipp, assistant professor of environmental and

resource economics and a faculty member in the Institutes of Energy and the Environment, at Penn State. She is part of a team that is studying how floodplain damages affect long-term housing development in high flood-risk areas. This includes a model that takes into consideration climate change and how that could impact flooding.

Over the last 20 years, flooding has caused $500 billion in global damages. In that same time period, flooding in the U.S. caused $60 billion in damages, $45 billion of which has occurred in the past five years.

As such, the National Flood Insurance Program (NFIP) was started more than 50 years ago to help mitigate these costs. Run by the Federal Emergency Management Agency, or FEMA, the insurance program is an attempt to help minimize the impact of flooding through an affordable insurance program and the promotion of community flood management best practices.

With the NFIP, FEMA designated areas of land as flood zones. Within flood zones are high-risk areas called 100-year floodplains.

"The 100-year floodplain term is a little bit difficult for people to understand," said Zipp. "It doesn't mean that if it floods this year, it won't flood again for 99 years. It just means there is a 1% chance each year. But I think it's challenging for many people to understand probabilities like that. They hear '1%' and it doesn't seem like a lot."

Perhaps for this reason, FEMA is now describing flood risk in terms of mortgages, said Zipp, whose research focuses in part on landscape-related environmental risks including floods.

"If you have a 30-year mortgage and your house is in a 100-year floodplain that means you have about a 25% chance—a one in four

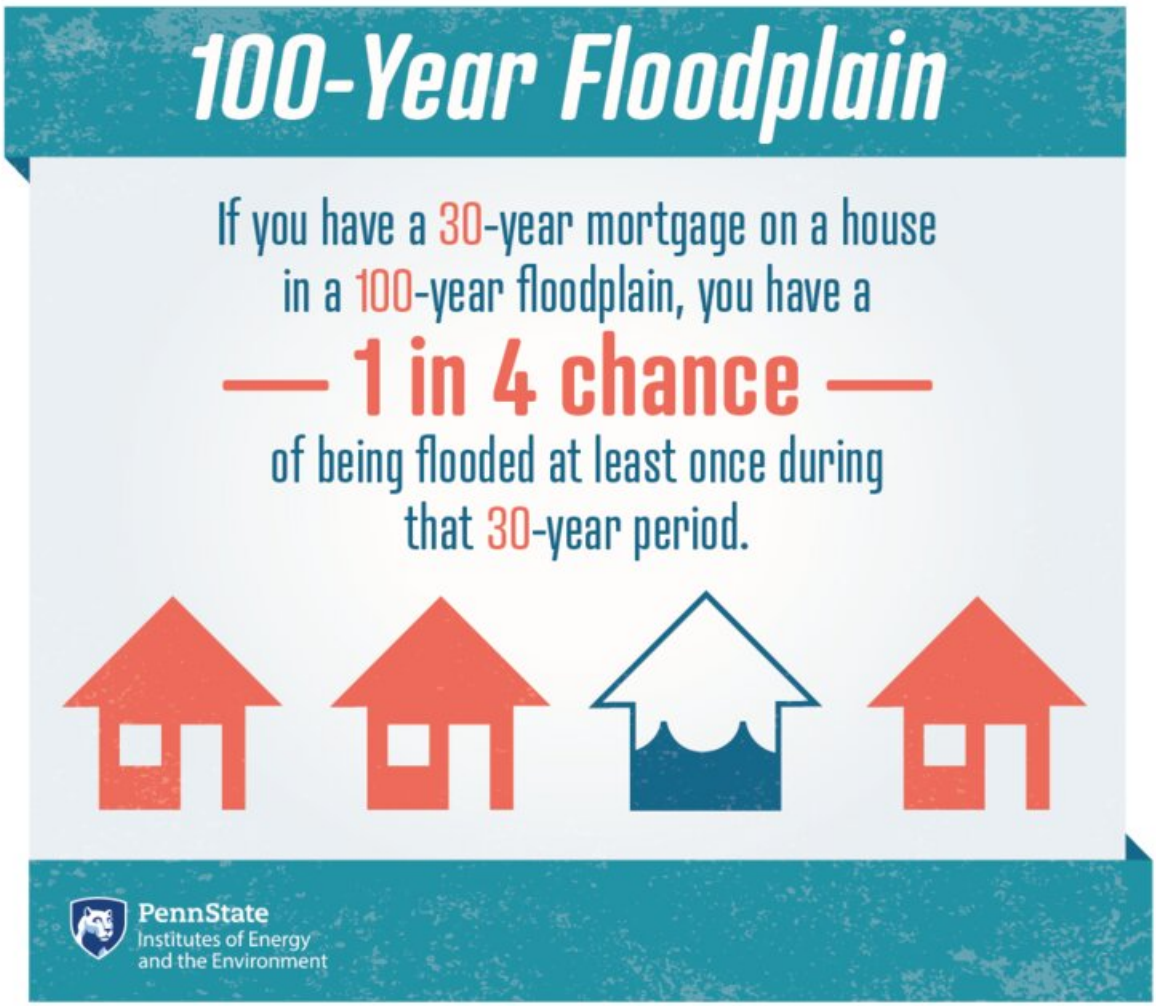
chance—of being flooded at some point during that 30-year mortgage," she said.

However, it is important to recognize that flood damage can occur without a river, or any other body of water, overflowing its banks or shoreline. Often, flood damage will happen in the form of water seeping through walls of a basement after (or during) a time when there is a lot of rain—causing damage to walls, floors, and other parts of the house, as well as whatever belongings happen to be in the path of the water.

This type of flooding doesn't generally make the news, though, and homeowners don't tend to consider this when deciding whether or not to purchase flood insurance, noted Zipp's colleague, Scott Colby.

Colby, assistant professor of applied economics at SUNY Morrisville, pointed out that people think of flooding as "movie-worthy, ultra-rare events," and therefore are ignoring the "boring flood damage risk" such as water seeping into a basement.

Zipp and Colby have worked collaboratively on a project that studies how floodplain damages affect long-term housing development in high flood risk areas. They say that "the model can be used to predict how climate change as well as scheduled increases in flood insurance premiums will re-arrange where people live."



If you have a 30-year mortgage on a house in a 100-year floodplain, you have a 1 in 4 chance of being flooded at least once during that 30-year period. Credit: Brenna Buck

Designating floodplains

For FEMA to create flood maps and designate 100-year floodplains, the agency works with hydrologists who use models to look at what kinds of events need to occur for waterways to overflow. How much rain needs to fall? Over what period of time? How far will the water go past the

banks? And what are the odds of any of this happening?

Hydrologists and the U.S. Geological Service have about 8,000 gauges on streams and rivers throughout the country, measuring depth and flow over time. They use the data collected to monitor things like how often the water is flowing at a certain speed and how often the water reaches a certain depth.

FEMA also works with communities and property owners to help create and update flood zone maps, receiving flood hazard information from the community. There are several reasons an area might be remapped, including population growth and development, improved science, and changing conditions such as climate and weather patterns.

If a person owns a house located in a 100-year floodplain and has a federally backed mortgage—which most are—that person is required by law to purchase flood insurance. The federal government ensures this before a mortgage is approved, but there is no system in place to make sure the homeowner continues to carry flood insurance afterwards.

Flood zone mapping also helps determine land-use regulations and building codes, as well as zoning laws. These include questions such as: Should a house have a basement or not? How tall should it be? What is the maximum density of houses allowed within a floodplain?

More information: For more information about flood zone mapping and the National Flood Insurance Program, visit www.fema.gov/national-flood-in … flood-hazard-mapping

Provided by Pennsylvania State University