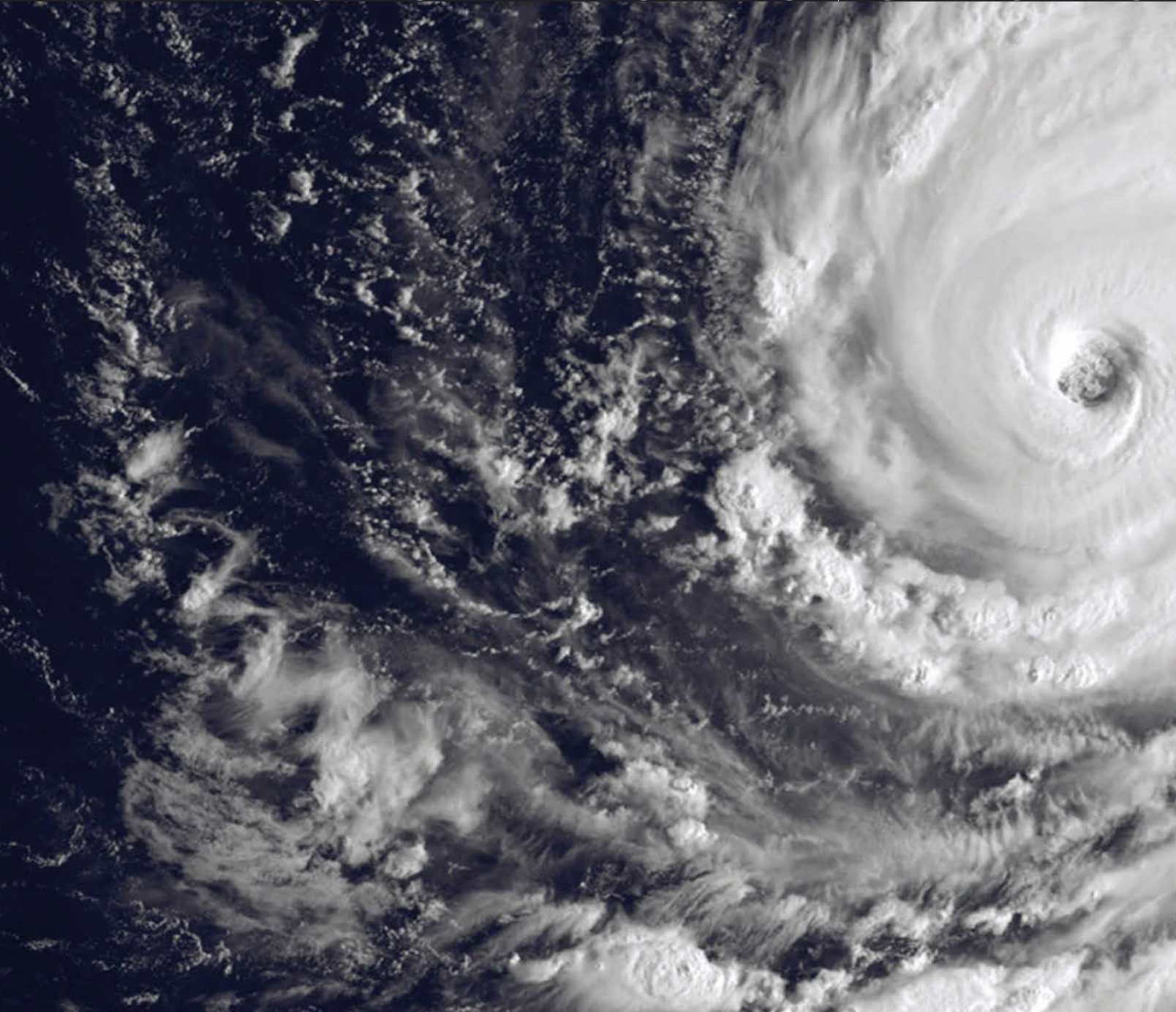




BY BOB WOODS

TERRAY SYLVESTER / GETTY IMAGES

PLANNING TODAY FOR TOMORROW'S



As weather-related events such as hurricanes multiply and intensify, states and municipalities are recognizing the urgent need to fund mitigation strategies. Because the occurrence and intensity of calamitous events have increased dramatically in recent years—largely due to climate change-related weather patterns and rising sea levels as well as increasing development in vulnerable areas—rebuilding and then waiting for the next disaster to strike, over and over again, is no longer a sustainable strategy.

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DISASTERS

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Construction of the Sinclair Levee, a former Brownfield site in Cedar Rapids, Iowa.



The levee to floodwall transition located at a future closure gate for the Sinclair Levee in Cedar Rapids, Iowa.

As a result, more engineering firms—which play a critical role in the aftermath of catastrophes, helping restore dams, levees and other flood-protection systems; getting transportation systems back up and running; reconstructing residential and commercial buildings; and mending other types of broken infrastructure—are increasingly looking at disaster mitigation strategies that can reduce or even prevent the devastation.

“We are engineers and architects, but you have to morph, adjust and adapt to the marketplace,” says Ted Van Kirk, executive vice president of Dewberry.

Despite the shifting mindset on addressing mitigation of risks from major disasters, the federal government remains largely focused on post-disaster cleanup. That fact is reflected in the funding levels for disaster response efforts, which have not kept

pace with the increase in frequency and intensity of these events and, in some cases, has even been reduced. Of the \$277.6 billion the government obligated on disaster assistance from 2005 to 2014, very little went to reducing communities’ risks before hurricanes and floods hit.

Pre-disaster mitigation spending by the Federal Emergency Management Agency (FEMA) fell to \$19 million in 2014 from \$157 million in 2005. And funding is not the only hurdle to overcome. Various federal rules favor rebuilding rather than resilience. For example, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, which was signed into law in 1988 and amended in 2016, requires money be used to replace exactly what was there before a storm.

THE CASE FOR FUTURE RISK MITIGATION

With the rates of incidence, and associated cleanup costs, on the rise, more and more experts agree that the better solution is to develop plans and complete projects beforehand—in the vein of practicing preventive medicine today to avoid illnesses tomorrow.

“You can do mitigation and resiliency projects as part of disaster recovery, and certainly need to when rebuilding,” says Van Kirk. However, creating a strategy that allows communities to access funds for proactive resiliency gives those communities an opportunity to pre-emptively assess their vulnerabilities and prioritize projects to address them, he says.

There is already evidence that this sort of planning pays off.

For every \$1 spent on pre-event mitigation, both before and after disasters, U.S. taxpayers save an average of \$4 in future disaster recovery costs, according to The National Institute of Building Sciences (NIBS) findings in its “Natural Hazard Mitigation Saves: 2017 Interim Report.” Not only does it cost less,

but the 2017 interim report, which is an updated and expanded version of NIBS' 2005 study that only considered investments FEMA made through its Hazard Mitigation Grant Program, also found that the return on investment is considerably higher.

After the NIBS project team examined the results of 23 years of federally funded mitigation grants provided not only by FEMA but also the U.S. Economic Development Administration and the U.S. Department of Housing and Urban Development as well as private investments, it found that the nation saves \$6 in future disaster costs for every \$1 spent on hazard mitigation. Two addendums will be issued in the next few months.

These strategies are also paying off for engineering firms as states, municipalities and the private sector—tired of waiting on the powers that be in Washington, D.C.—are increasingly focusing on future risk mitigation.

HOLDING BACK THE CEDAR RIVER

In 2014, city officials in Cedar Rapids, Iowa, selected Stanley Consultants, which has planned and designed flood risk reduction systems for decades, to provide design services for a project to mitigate flooding caused by the Cedar River, which runs through the middle of the city. During a devastating flood in June 2008, the river crested at over 31 feet, surpassing the previous record of 20 feet, with waters inundating 10 square miles, or 14 percent of the city.

Until 2008 Stanley Consultants worked with the U.S. Army Corps of Engineers (USACE) on a variety of projects along the Mississippi River valley and the upper Midwest, from Minneapolis to New Orleans.

“Previously, there was not as much money going into the federal budget to execute systems,” says Dan Miller, senior project manager and principal water resources engineer at Stanley Consultants. “However, the supplemental funding bill has dramatically increased the funding for USACE flood risk management projects. For example, the Galveston District received \$3 billion as a response to Hurricane Harvey.”

Currently, Stanley Consultants is working on the \$550 million flood mitigation project in Cedar Rapids, which is expected to take up to 20 years to complete and features a system of flood

barriers made up of levees, floodwalls and pump stations, as well as numerous gates to close streets and railroads that pass through the lines of protection. In July, the Corps of Engineers approved \$117 million in funding, and the state of Iowa will contribute \$267 million. The city has pledged \$110 million for the project, on top of the \$10 million it has already invested.

“It is a good time to be in this business,” says Van Kirk. “The critical issue is finding qualified people who understand disasters. There are not enough people out there for all the firms who want them.”

The urgency to mitigate future risks of flooding has increased alongside growing evidence that climate change is intensifying weather-related events. Those unprecedented weather events, such as Hurricane Harvey, which dumped 4-plus feet of rain in and around Houston last year, mean astronomical financial costs for relief, recovery and rebuilding operations. Case in point, 2017 was the most expensive year ever in the U.S. for weather and climate-related disasters, totaling \$306 billion, according to the National Oceanic and Atmospheric Administration (NOAA). And the cleanup efforts in Puerto Rico after Hurricane Maria, one of three Category 4 hurricanes that made landfall in the U.S. and its territories, are estimated at \$139 billion—15 times that of the island's \$9 million annual budget. The first quarter of 2018 saw three nor'easters, followed by historic wildfires that ravaged California. All that before Hurricane Florence hit the East Coast in September.

The costs are not limited to weather events. Climate change is also causing rising sea levels, including a new phenomenon known as “sunny day” flooding in coastal cities, especially along the East Coast, on days when it is not even raining.

A University of Florida study published in 2017 found that from 2011 to 2015, sea level rose up to 5 inches—an inch per year—in some locales from North Carolina to Florida. That includes Virginia Beach, Virginia, where sea levels in the Hampton Roads region—home to the world's largest naval base—have risen nearly 12 inches since 1960, according to NOAA. The result is frequent flooding of low-lying coastal areas and a storm water system often unable to drain the overflow. A study by the

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DEWBERRY**



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DAVE MULHOLLAND
VHB

Hampton Roads Planning District Commission estimated that the region could face direct economic costs of \$12 billion to \$87 billion due to rising seas by the end of the century.

**LETTING COMMUNITIES
DEFINE RESILIENCE**

Dewberry was hired by the city of Virginia Beach in 2015 to evaluate the impact of long-term sea level rise on the built environment throughout the community, assess vulnerabilities and develop mitigation approaches.

“We have proposed solutions to hold back the water and protect five watersheds,” says Michael Walsh, executive vice president of Dewberry and resilience solutions group manager. “We are working with the community and having them define a resiliency plan.” Toward those efforts, the Virginia Beach City Council has allocated \$3 million from its capital-improvement funds, while NOAA has provided a Coastal Resilience Grant of more than \$844,000.

And disaster mitigation can extend beyond hardening physical infrastructure to include pre-emptive planning to efficiently move people and assets during major events. VHB continues to work with the Florida Department of Transportation to improve traffic flow, which became an issue when Hurricane Irma struck the state last year.

“As a result of Irma, many of the traffic signals in Central Florida were found not to be working,” says Dave Mulholland, senior vice president and southeast regional manager at VHB’s

Orlando office. That may sound trivial, but in the midst of storm-related power failures, crews needed to bring in generators to operate signals and keep traffic moving safely. In some areas of the state, cellphone service was out, so workers had limited ways of talking to each other.

The firm has since developed a mobile application that uses satellite technology to better coordinate communications among emergency responders.

“Our app can see where repair trucks are located, helping to quickly mobilize equipment and keep it operating,” says Mulholland. “The satellite technology will reduce response times in order to improve efficiency in responding to the impacts of an event.”

To take on such mitigation projects, VHB employs technology experts, environmental scientists and other professional staff members in addition to its traditional response teams.

“We look to have full integrated services and diverse skill sets to take event management to the next level,” Mulholland says.

As a result, engineering firms specializing in disaster mitigation are hiring experts in finance, grant applications and government relations.

“If you do not have employees who understand the political and financial landscape of how you get local projects funded, you only bring part of the solution,” says Van Kirk. ■

Bob Woods is a technology and business writer based in Madison, Connecticut.

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Dewberry worked with FEMA to develop Advisory Base Flood Elevation data to inform communities and homeowners of their current hazards resulting from Superstorm Sandy.