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Coastal Zones

Practitioner Insights: Coastal Resilience and Access to Credit: Preparing for the Future

Four months after Hurricanes Irma and Maria devastated the Florida Keys, Puerto Rico, and other parts of the Caribbean, the U.S. is still experiencing its longest electrical blackout ever. About 1.5 million people in Puerto Rico were without power for two months, and the Army Corps of Engineers estimates full return of electricity won't happen until May 2018.

These hurricanes, coupled with Hurricane Harvey, demonstrate all too clearly two alarming conditions: We as a nation have not done nearly enough to proactively lessen the devastation caused by storms and flooding, which will only worsen with climate change, and our ability to bounce back—our resilience—needs vast improvement.

That more property in Florida was not destroyed by Irma's winds illustrates, however, that taking measures well in advance of storms—such as implementing hurricane-risk informed building codes—will lessen the impacts of such climate shocks and aid faster recovery. But it takes real motivation, investment, and long-term commitment. Moody's Investor Service may have just provided the kick-start necessary with its November report highlighting how climate change is a driver of credit risk.

Moody's report indicates how the company's credit worthiness rating methodology accounts for the effects of climate change on communities' economic strength and resilience. This provides a clear signal that communities wishing to keep or achieve high bond ratings need to both reduce their vulnerability to climate change and worsening natural disasters and enhance their ability to respond and cope better when disasters occur.

Vulnerability can be reduced by establishing risk-informed zoning, relocating key assets away from eroding areas and out of flood or fire-prone areas, and enforcing zoning. Communities with climate risk-informed building codes will have more housing stock capable of coping when soaring temperatures, fires, or floods occur. When local building codes offer enhanced protection against the threats of flood disasters, the Department of Homeland Security finds that communities recover faster. Plus, if communities did more to press every business—large and small—to have and test their continuity of operations and disaster recovery plans, the impacts of a disaster would be felt less harshly.

The climate change credit risks for public issuers are real and include the obvious physical threats, such as flooding and wind damage. Replacing damaged buildings and infrastructure can increase an issuer's current capital expenses or long-term debt burden. But the risks go far beyond.

The Moody's report summarizes three additional major types of climate change credit risks, including economic disruption, health and public safety concerns, and post-disaster population shifts. Economic disruption can occur from property loss and disruption of supply chains that weaken the revenue base. Responding to health and public safety concerns—such as providing emergency access to medical care, food, water, shelter, and power—can add significant and unanticipated stress on an issuer's budget. Short- and long-term population shifts that can occur after major storms or more frequent intense weather can create unanticipated changes in labor markets and lower productivity to undermine local economies and reduce the local revenue base.

Communities ignoring these implications do so at their own peril. Downplaying climate change over fears it will hurt property values won't avoid these disruptions. For states like Florida and North Carolina, Moody's report should serve as a warning shot across the bow: failing to take actions now to seriously address the threat of climate change will affect bond ratings and, therefore, the ability to get low interest loans.

Let's hope that Moody's report will help reframe the conversation to one of acting now to build resiliency rather than responding to the next storm when it inevitably hits.

Risks and Vulnerabilities U.S. coastal areas are responsible for 42 percent of national economic output, according to the National Oceanic and Atmospheric Administration. They also contribute 51 million jobs and \$2.8 trillion in wages, according to a 2014 National Academy of Sciences study. So it stands to reason we should all care about promoting the resiliency of our coasts.

In the U.S., floods are the most common and costly natural disaster. Munich Re, a German reinsurance company based in Munich, reports that worldwide approximately one-third of the economic losses from natural catastrophes are attributable to floods. Climate change will only increase flood damage. Even under the most optimistic scenarios for reducing global greenhouse gas emissions, the world is already committed to a substantial amount of the sea level rise by the year 2100. The Federal Emergency Management Agency (FEMA) estimates that by 2100, 70 percent of the increases in the nation's flood damages will be attribut-

able to more intense precipitation, sea level rise, and tidal surges driven by increasingly powerful storms—all a result of climate change.

More intense precipitation events are already occurring. Last month a paper by the Royal Netherlands Meteorological Institute found that the precipitation experienced during Hurricane Harvey was about 15 percent more intense than it would have been in the past and about three times more likely than in pre-industrial times.

Moody's regional breakdown of climate threats and economic vulnerabilities provides some guideposts for adaptation. Virtually the entire U.S. coast is experiencing rising sea levels to varying extents, and no area of the country is immune to more intense precipitation and flood events. The Northeast and Southeast are especially vulnerable to the effects of rising seas on coastal infrastructure. Increased sea levels mean that storm surges can penetrate further inland. Moody's notes that in the Northeast, coastal counties account for 68 percent of the region's GDP and house 88 percent of the region's population.

Without climate adaptation, the projected economic effects of forecast storm surges are significant, with average annual property losses estimated to increase by between \$6 billion and \$11 billion by 2100. In the Gulf coast region alone, 72 percent of ports, 27 percent of major roads, and 9 percent of rail lines exist less than 4 feet above sea level. A storm surge of 23 feet—about the size of Hurricane Katrina's—could inundate 67 percent of the Gulf's interstate highways, 57 percent of arterials, almost half of existing rail miles, 29 airports, and virtually all ports. That is the definition of economic exposure. Around the country, and globally, this picture of asset concentration close to or at sea level is similar and, therefore, the risk profiles are unfortunately similar as well.

Rising Cost of Disasters We are on an unsustainable path. Moody's used the EM-DAT International Disaster Database to highlight clearly that natural disasters are already becoming more frequent. From 1978-2016, FEMA paid out more than \$59 trillion (in 2016 dollars) for losses associated with significant floods, with 76 percent of those payments occurring after 2004. Even after accounting for inflation, the average paid loss increased by almost 2.5 times since 1978, which is one reason that even before Hurricanes Harvey, Irma, and Maria, the National Flood Insurance Program was \$25 billion in debt.

Recognition of the rising costs of disaster spending, and the increasing debt of the National Flood Insurance Program, signal that we need to do better. These concerns, regionally amplified by Moody's report, may trigger greater resolve by every level of government to take actions to reduce the impact of storms and increase the speed of recovery.

Only by recognizing climate trends, can we begin to assess impacts and take actions to lessen impacts. In a future characterized by greater risks of natural disasters, businesses, cities, and states need to begin now to build economic resilience to climate change. This may be the best bet for coastal businesses to remain viable and communities vibrant. Only by taking actions now can they continue to attract investment and have access to low-cost credit.

Being proactive about climate resiliency also means looking to the future rather than the past. Typically, there are three main types of floods: storm surge, river flooding, and flash floods. To date, most of the nation's focus has been on protecting against extreme flood events, or those with a 1 percent annual probability of occurring. But a new type of flooding is growing in significance: sea level rise.

Already sea level rise is causing sunny day or nuisance flooding in coastal areas, which occurs during the highest high tides or as a result of wind waves in combination with high tides. While not as noticeable as a single catastrophic event, Moody's notes that as nuisance flooding events become more frequent, they could become increasingly costly over time. This is due to the cumulative effect of multiple inundations that erode soils, damage roads, buildings and other infrastructure. Nuisance flooding may even generate property-value exposure comparable to or larger than extreme events. In considering how to build business and community resiliency, we now need to consider the costs of these cumulative, smaller hazards.

Adapting to New and Changing Conditions Moody's report recognizes the importance of local preparation and adaptation. As a nation, we do not invest nearly enough to help communities mitigate the effects of disasters before they happen. FEMA's Disaster Relief Fund on average spent \$37 billion in fiscal years 2012 through 2015; yet FEMA's annual average pre-disaster protection and preparation spending was less than \$850 million during the same time period.

Of course FEMA isn't the only source of federal funding for reducing flood hazards. The U.S. Army Corps of Engineers also has this function—and a backlog of over \$60 billion in authorized water resources projects. Relying solely on federal resilience funding is not going to get communities very far along.

But communities can take significant low-cost actions to reduce their climate change credit risks. Besides implementing and strictly enforcing risk-informed zoning and building codes, they can also jump-start their resilience efforts by reviewing and aligning their myriad local plans, including economic development, transportation, fire and safety, public health, natural resources, and hazard plans. By connecting often isolated branches of government, technical expertise is integrated, plans become better informed by risks, and synergies are identified. Then funding from various departments can be blended to accomplish projects that simultaneously address multiple community objectives, including building resilience.

The destruction wrought by each disaster offers lessons about vulnerability. Each disaster poses an opportunity for communities to rebuild smarter to lessen the impact of the inevitable next disaster. Rebuilding energy-efficient structures that use renewable power sources has the added benefit of reducing carbon emissions and thus helps to reduce the likelihood of more intense natural disasters in the future.

Because building codes, zoning, and plan implementation can take decades to reach maximum effect, local or state governments need to start down that path now to realize more sustainable and resilient infrastructure. Taking actions now to reduce the future risks from climate change will provide immediate benefits—safer neighborhoods, more jobs, lowered insurance rates,

and peace of mind. All of which shore up property values, strengthen revenues, and keep community access to low-cost credit strong. Over the long-term, continued attention to mitigating the risks posed by climate change will help ensure our coasts continue to drive the nation's economy and provide resilient, vibrant communities.

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ronmental policy. At EDF she is working on strategies to enhance community capacity for take charge of their futures through risk-informed planning and plan implementation. Those strategies include finding ways to expand financing for flood resilience projects and increasing rewards for those that pursue projects that include protection and restoration of natural infrastructure.

The opinions expressed here do not represent those of Bloomberg Environment, which welcomes other points of view.