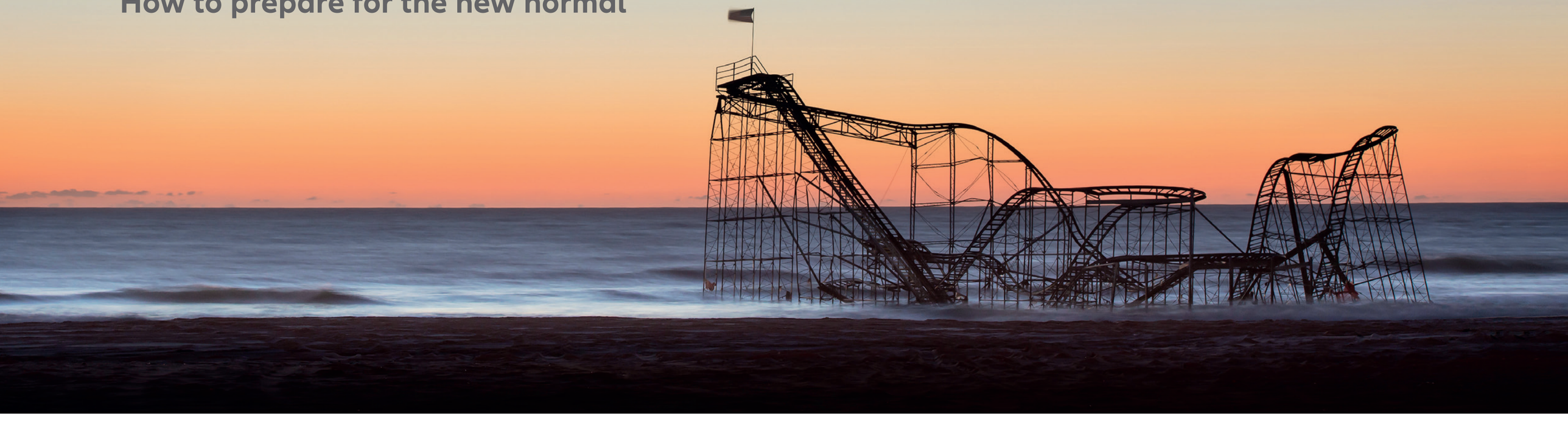
FROM SANDY TO MARIA

INCREASINGLY DESTRUCTIVE "PERFECT STORMS"

How to prepare for the new normal



HURRICANE SANDY FIVE-YEAR ANNIVERSARY REPORT

Allianz

On October 29, 2012, Hurricane Sandy made landfall on the East Coast of the United States after cutting a destructive path through the Caribbean.

To mark the five-year anniversary of Sandy, this report analyzes what made Sandy unique, the 2017 Atlantic hurricane season and what clients can do to prepare for the "new normal" of extreme weather events.

Storms are a global peril causing billions in losses, accounting for 40% of natural hazard insurance claims. They are the fifth top cause of loss for businesses, analysis shows[1]. The 2017 hurricane season is quickly becoming one of the most active seasons on record – and it may not be over yet. Today, more than ever before, businesses need to prepare for the "new normal" of weather events. This can be a laborious process. In light of lessons learned from Sandy and the recent hurricane season, Allianz has developed many tools to help our clients better prepare.

Some of the destructive weather totals since Sandy:
- Total economic losses from Sandy grew to $70bn
- Sandy ranked between Hurricanes Katrina ($160bn) and Andrew ($48bn) as the second costliest US hurricane, but has since been dwarfed by Hurricane Harvey ($70-108bn).[2]
- Total economic losses are still unfolding for Hurricanes Irma and Maria

Information in this paper is current as of 10-24-2017

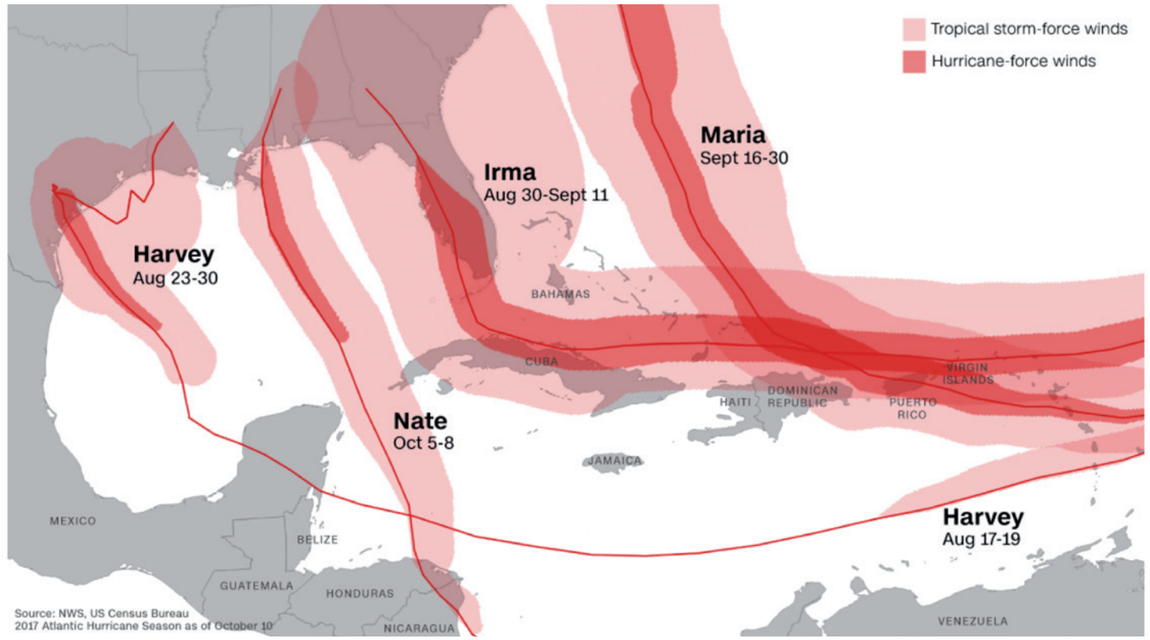
WHAT MADE SANDY UNIQUE?

- Sandy hit the New York Metro area during high tide, which dramatically increased the height of the storm surge
- The full moon also made the storm surge worse, since high tides along the Eastern Seaboard rise about 20% during a full moon phase[3]
- Sandy approached the area from the East; this unusual path maximized the winds and storm surge directed at the shores of Long Island, Connecticut and New Jersey
- It was a slow-moving storm, resulting in more sustained damage
- Sandy was massive in terms of geographic area, with a diameter of gale force winds reaching over 1,000 miles

Hurricane Sandy
NYC subway flooding
Source: Shutterstock

THE 2017 ATLANTIC HURRICANE SEASON

To date, three Category 4 hurricanes made US landfall in a little less than a month, causing billions of dollars in damage and likely leading to the retirement of the names Harvey, Irma and Maria from use in future hurricane seasons.[4] In the five years since Hurricane Sandy the cost of US weather disasters is increasing. The main reason: populations and industry are booming in vulnerable areas, such as along coastlines. As property values increase, so does risk. And as the atmosphere warms, scientists expect destructive weather to become more common.



1 Allianz Global Corporate & Specialty, Global Claims Review, 2014.
2 Business Insider, September 8, 2017, "Mapped: The 10 costliest hurricanes in US history", Umair Irfan.
3 Allianz Global Corporate & Specialty, "Superstorm Sandy Lessons Learned: A Risk Management Perspective," 2013.
4 Three Category 4 Hurricanes Have Made a U.S. Landfall in 2017, Hurricane News, The Weather Channel, Chris Dolce, September 20, 2017.

According to NOAA's National Centers for Environmental Information, the US has suffered 212 weather and climate disasters since 1980 that have cost more than $1 bn, totaling **$1.2 trillion**.

THE "NEW NORMAL" OF EXTREME WEATHER EVENTS

The global average sea level has risen by some 8-9 inches since 1880. "The cause is attributed to glacier melt and thermal expansion and is likely to result in an increase in the severity of storm surge along the coastlines of the US", says **Thomas Varney**, Regional Manager, Americas, Allianz Risk Consulting. "The losses from Sandy and the 2017 hurricane season illustrate this point." Lloyds' report titled Catastrophe Modeling and Climate Change (2014) states: "The approximately 20 centimeters of sea-level rise at the southern tip of Manhattan Island increased Sandy's ground-up surge losses by 30% in New York alone." Sea level rise is occurring and should be considered by companies that have a presence along the coastlines of the US.

Most scientists agree that due to the warming seas, the severity of windstorms will change in future. Based on Allianz's experience, the severity of losses from weather events, including windstorms, is already increasing. The average amount paid for extreme weather events, including windstorms, by insurers between 1980 and 1989 totaled $15bn a year. **Between 2010 and 2013 this rose to an average of $70bn a year.**[1]

The 2017 Atlantic hurricane season is set apart by the number of intense storms that formed, and how many of those powerful systems made landfall. Hurricane activity exploded in the late summer and there were eight consecutive hurricanes in a six-week period. The frenzy began with Hurricane Franklin in early August, and continued through Hurricane Nate in October. Since hurricanes thrive on warm ocean water, it's likely that rising ocean temperatures connected to climate change will provide more opportunities for storms to rapidly intensify like 2017's hurricanes.

1 Allianz Global Corporate & Specialty, "Hurricane Katrina 10: Catastrophe Management and Global Windstorm Peril Review," 2015.

Hurricane Maria left a trail of devastation

"Climate change can no longer be considered a scare story but reality."

said **Richard Quill**, Senior Risk Research Analyst at Allianz Global Corporate & Specialty

"It is clear that parts of the world will experience temperature shifts which will alter the trend globally in hurricane formations."

KEY FACTORS IN THE "NEW NORMAL" OF HIGHER COASTAL RISKS

- **WARMING CLIMATE** (REGIONAL TEMP CHANGES)
- **RISING SEA LEVELS**
- **COASTAL PROPERTY PRICE INCREASES**
- **COASTAL POPULATION INCREASES**
- **SUPPLY CHAIN ECONOMICS**

WHAT CAN ALLIANZ AND CLIENTS DO TO PREPARE?

Allianz Claims Adjuster in Sebring, Florida inspects roof damage caused by Hurricane Irma
Source: AGCS

One of the biggest loss factors from Sandy was that the storm changed from a wind event to a high water event. In the Ocean Marine area, preparation was focused on unstacking containers and placing boxes lower, which resulted in more flood losses. Allianz is now more concerned with storm surges and can help clients prepare accordingly by advising them to:

- Redesign container layout, raise tarmacs and add drainage systems
- Calculate accumulation in play at any given port at any time
- Monitor the National Weather Service's new Storm Surge Watch/Warning Map for Atlantic tropical cyclones. (The new warning system will be issued for all life-threatening storm surges or flooding that is forecast for the Gulf States and east coast of the US)
- Monitor the Federal Emergency Management Agency's (FEMA) revised flood studies and mapping in the areas affected by Sandy – driven by changes in methodology and political forces – and help them plan accordingly
- Develop and maintain a formal flood emergency plan if located in or close to a flood zone
- Consider installing emergency generators that can operate a portion, if not all, of the critical equipment if the facility should experience a flood loss
- Depending on the construction and design of the building, use flood gates and flood doors to greatly reduce the amount of flood water that enters a building during a flood event
- Raise all equipment critical to the operation of the building, like electrical switchgear, transformers, generators, fire pumps, etc., to a level above the 1,000-year flood elevation

FLOOD MAPS

As part of the Biggert-Waters Flood Insurance Reform Act, which was passed by Congress in 2012, FEMA is now required to factor future climate risks such as sea level rise into the development of flood maps and studies. Flood maps in effect during Sandy were mapped outside of the 100- or 500-year flood plains and did not consider the impact of future sea level rise.

Later in 2012, FEMA released revised advisory maps for both New Jersey and New York City, expanding those areas subject to flooding; however, this resulted in a backlash from city government officials, because of the increase in the number of property owners which would be forced to purchase flood insurance. Government officials have argued that the new models are too conservative. As a result, FEMA revised their Advisory Base Flood Maps in June of 2013 for the Sandy-affected counties of New Jersey, reducing the areas affected by the changes in flood zones.

Based on technical analysis and data submitted to FEMA by New York City officials during the appeal period in 2015, FEMA announced in 2016 an agreement to revise New York City's preliminary flood maps. Until the new flood maps are issued for New York City, existing flood insurance rates will be assessed on the prior effective Flood Insurance Rate Maps. These maps are available on the FEMA website and outline flood zones and actual heights based on sea level of locations in various flood zones.[1] For new construction, New York City's building code still refers to the 2015 preliminary FIRM. FEMA and the City will be working together to create a new model that will incorporate the effects of climate change and sea level rise into flood maps and studies.

"Always when there is a hurricane, you have compounding effects of ocean flooding – surge – and terrestrial flooding,"

said **Amir AghaKouchak**, an associate professor of hydrology and remote sensing at the University of California at Irvine. He states that Harvey is a prime example of how these two factors work together to create the perfect storm, producing catastrophic coastal flooding when they occur at once. And now, says AghaKouchak, we need to pay more attention to the way these factors work together when we're estimating flood risks for coastal regions — before disaster actually strikes.[2]

Source: iStock

1 www.FEMA.gov
2 Washington Post, August 29, 2017, "Hurricane Harvey shows how we underestimate flooding risks in coastal cities," Chelsea Harvey.

PREPAREDNESS IS CRUCIAL TO MITIGATE INCREASING LOSSES IN THE FUTURE

The insurance industry is getting much better at assessing the risk of extreme weather. FEMA has been updating its guidelines to approve state disaster plans only if they describe how the likelihood and intensity of natural hazards could be affected by the increase in greenhouse gas emissions. The study of climate and weather patterns through history is helping scientists build better models to help us foresee what's in store in time to lessen the impacts.

"If we really want to be more effective in preventing disasters, we have to learn to understand what the risks are before the events happen," said **Adam Sobel**, an atmospheric scientist who directs Columbia University's Initiative on Extreme Weather and Climate. "And not only understand them, but act on them."

AGCS Regional General Adjuster, Jim Byrne, meets with Stephen White, Chief Operating Officer of Global Blue Technologies. GBT endured losses to its shrimp farm when Hurricane Harvey hit Texas. Source: AGCS

Today, more than ever before, businesses need to prepare for the "new normal" of weather events, and this can be a laborious process. For many companies it takes time – in some cases years – to appropriate funding and actually make the much-needed changes. However, a commitment to active prevention minimizes risk and protects the bottom line.

"We have seen huge development along the coastline in the US northeast corridor," says **Andrew Higgins**, Technical Manager, Americas, Allianz Risk Consulting. "The ability of [the natural] coastline to absorb storm surge has really been reduced." As commercial property values and population grow in coastal regions, clients are increasingly vulnerable to hurricane losses. In addition, vital supply chain losses occur due to business interruption. Hurricane Maria's post-loss amplifying effects of business interruption include severely affected power supplies, outages that will last months, and limited fuel for electricity generators.

In light of lessons learned from Sandy and the 2017 hurricane season, are businesses adequately prepared? Our research says no. But Allianz has developed many tools to help them get there.

We routinely notify clients of approaching storms and provide guidance on how best to prepare. Through a series of risk bulletins, windstorm and flood checklists, and loss prevention kits, we outline what businesses need to do now to protect their property and worksites. After all, it is our value pledge to be there for them when they need us most – before and after the storm.

$17 TRILLION

VALUE OF INSURED PROPERTY WITHIN THE UNITED STATES LOCATED IN A COASTAL COUNTY

Source: AIR Worldwide

Guides include:

- **The Calm Before the Storm: Construction Site Hurricane Protection:** A comprehensive informational packet prepared by Allianz Risk Consulting (ARC) which provides construction managers with information about how to secure property against hurricanes or other wind events, as well as recommendations for crisis communication/business continuity activities afterwards. It is designed for managers of any construction project – big or small.
- **Windstorm Checklist:** Prepared by ARC, tells what to do before, during and after a windstorm to minimize potential damage.
- **Water Damage during Construction:** A Contractor's Loss Prevention Guide: ARC white paper offering best practices for preventing and mitigating water damage to protect project profitability, enforce quality of subcontractor work and ensure client satisfaction.
- **Water Damage Checklist:** ARC checklist about what to do to minimize potential water damage.

Download these tools at
www.agcs.allianz.com/insights

Estimated value of insured[1] coastal properties vulnerable to hurricanes by state (USD $bns) 2012 and 2015 Comparison

State	Coastal Exposure		Total Exposure[2]		Coastal as percent of total	
	2015	2012	2015	2012	2015	2012
New York	3,365	2,923	5,571	4,724	68%	62%
Florida	3,200	2,862	4,058	3,640	79%	79%
Texas	1,363	1,175	5,358	4,581	28%	26%
Massachusetts	953	850	1,765	1,561	54%	54%
New Jersey	795	714	2,453	2,130	32%	34%
Connecticut	675	568	1,025	879	64%	65%
Virginia	198	182	2,078	1,762	10%	10%
North Carolina	178	164	2,014	1,795	8%	9%
Georgia	109	107	2,171	1,932	5%	6%
Maryland	18	17	1,476	1,293	1%	1%

1 Includes residential and commercial properties, as of December 31, 2015. Ranked by value of insured coastal property. Source: AIR Worldwide.
2 Total exposure is an estimate of the actual total value of all property in the state that is insured or can be insured, including the full replacement value of structures and their contents, additional living expenses and the time value of business interruption coverage. Source: AIR Worldwide.

68%

OF NEW YORK STATE'S TOTAL INSURANCE EXPOSURE IS IN COASTAL COUNTIES

Source: iStock

THERE WITH OUR CLIENTS WHEN THEY NEED US MOST

Although climate change has unfortunately become as much of a political issue as a scientific one, it is a certainty that as the value of property in coastal areas increases, the financial impact of storm events becomes more substantial. For Allianz, the positive aspect of dramatic storm events in our recent memory is that, many of our Builder's Risk insureds who would previously resist discussions concerning high wind, flooding and storm surge events impacting their construction projects, are now paying much more attention. Many of our insureds are more receptive to the prevention guides that we provide and the recommendations that we make.

In 2011, ARC Senior Risk Consulting Engineer, **Jay Siegel**, who conceived and wrote The Calm Before the Storm, visited a municipal project site in New York City for a routine survey and asked the site manager how the site survived Hurricane Irene a month earlier. He said, "The document was used exactly as envisioned. The checklists assisted the site's preparation in advance of a potentially damaging hurricane." He added, "The document was extremely helpful in securing the site from wind and water. When a storm is looming, preparations have to be made quickly and efficiently to secure the site. Our manager found the information useful and straightforward. He was easily able to follow the recommendations and as a result we suffered no loss."

In addition, Allianz set a high standard by delivering outstanding claims service for Sandy. In less than six months, more than 80% of the claims attributed to Sandy were paid. Altogether, Allianz paid close to 1,400 claims totaling $337mn in payouts.

$337mn

OVERALL COST OF AGCS PAYOUTS FROM SANDY

1,356

NUMBER OF CLAIMS FILED WITH AGCS, RANGING FROM DAMAGED CARGO TO FLOODED PREMISES

"Our regional adjusting team was deployed before the storm so they could be on site and adjust the first clients' claims the day after Sandy," says **Terry Campbell**, Head of North America Claims. "In one of those claims, a particularly large loss, we made the first advance payment of $2mn within 48 hours."

Notable of the losses processed by Allianz Claims was the flood loss to a seaside pier and roller coaster in Seaside Heights, New Jersey (the infamous image of the roller coaster sitting in the Atlantic Ocean is pictured above). Given the unique nature of the property damaged, including piers, pilings (70 feet deep below water) and amusement rides, Allianz formed a team of internal and external experts from across the nation to evaluate the loss. With this team, Allianz brought the loss to a favorable and prompt resolution, allowing much of the boardwalk to be ready for opening day the following Spring.

Final Hurricane Sandy claims were filed with FEMA's Sandy Claims Review Division as late as September 2017. This illustrates the long-range effects of a weather event of this magnitude and why preparedness is crucial. After catastrophes like Sandy, customers may relocate and the business base evaporates until recovery progresses. The key to recovery is to establish a plan in advance that identifies crucial operations so a company can be up and running before the competition. It is in this spirit that Allianz designs specific business continuity and business interruption solutions for our clients.

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