



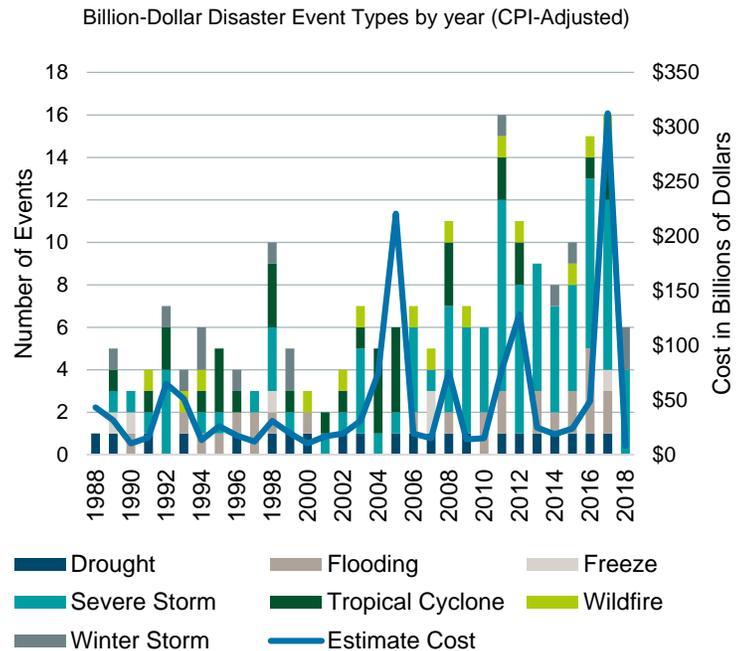
Thought Leadership Paper | September 2018 | Jessica Elengical – Head of ESG Research, Alternatives

# FROM THE FRONT LINES OF REAL ESTATE

## A practitioner’s perspective on physical climate risk

Many of the coastal real estate markets that have commanded the most interest from institutional investors are now increasingly the focus of discussion when it comes to physical climate risk. And while the topic of natural disaster risk is intrinsic to the way real estate is managed, the risks management tools of the past, such as flood insurance or disaster recovery plans may not consider the long-term impact of climate change and how that could fundamentally change the landscape of real estate investment. Recent disasters have further catalyzed the conversation as the frequency and intensity of these events have grown. In 2017, the U.S. faced a record breaking year, one of the most expensive on record in terms of insured losses, and, according to Munich Reinsurance, the costliest hurricane season in history.<sup>1</sup>

Alongside these acute disasters already occurring is future implications of potential sea level rise, which could permanently redraw flood maps. For instance, according to a 2017 study published in the journal Scientific Reports, the occurrence of a once in 50 year flood could double in frequency in the next few decades due to sea level rise.<sup>2</sup> Over time, the amount of property that is below mean sea level could increase significantly, with much of the risk prevalent in coastal markets. The below chart plots the percentage of the population of each city living in areas that would be locked into a long-term future below sea level based on a two or three degree temperature rise v. the current value of NCREIF institutional investment in that market.



Source: National Oceanic and Atmospheric Administration, July 2018.

While there is a growth in acceptance of the physical risk aspect of climate change, the challenge has been to understand what the implications of climate risk are within real estate and how to translate a risk assessment into actionable intelligence for an investor. To do so, we need to break down the components of real estate value and develop specific solutions to address them.

**% of Population Below Median Locked-in Sea Level v. NCREIF market value (in billions)<sup>3</sup>**



<sup>1</sup>Munich Re, "Hurricanes cause record losses in 2017 - The year in figures," April 2018

<sup>2</sup>Vitousek, et al., "Doubling of coastal flooding frequency within decades due to sea-level rise," Scientific Reports, May 2018 <sup>3</sup>DWS, NCREIF based on latest data available as of August 2018), and Strauss, B. H., Kulp, S. and Levermann, A. 2015. Mapping Choices: Carbon, Climate, and Rising Seas, Our Global Legacy. Climate Central Research Report. pp. 1-38. The information herein reflects our current views only, are subject to change, and are not intended to be promissory or relied upon by the reader. There can be no certainty that events will turn out as we have opined herein. No assurance can be given that any forecast, target or opinion will materialize. Forecasts are based on assumptions, estimates, or analyses, which might prove incorrect.

## Climate risk and the drivers of real estate value

At its essence, real estate valuation is driven by three components (revenues, expenses and cap rates), and the impact of physical climate risk appears in all three.

On the revenue side, the potential of persistent flooding or increased natural disasters could affect tenant demand, heightening occupancy risk and impairing rental growth prospects. These two issues have a risk and relative value implication where a portion of a city or even a specific building is more exposed to flooding than another. A recent study by professors at Harvard University found that within Miami, the rates of appreciation of single-family homes in low lying areas has lagged those in high elevation areas, supporting the thesis that property values can be impacted where persistent flooding is an issue.<sup>3</sup>

The impacts on the expense side of the ledger could include higher insurance costs, greater deductibles, and greater operating expenses where repairs are not covered by insurance. In addition, significant capital investments could be needed to mitigate risk (e.g. flood walls) or to address long-term damage such as mold remediation.

Finally, while a real estate owner may not hold a property forever, long-term changes due to climate risk are still embedded into the components of the valuation via the terminal value or the cap rate. As long-term migration impacts cities or cities face significant economic deterioration, there could be implications to the value of a potential sale of properties in that city. In Puerto Rico, where long-term emigration has persisted in the city for more than a decade, the government projects that Hurricane Maria could result in an additional 200,000 residents permanently leaving the territory by the end of 2018.<sup>4</sup>

## The myths and realities of climate change

One impediment to taking action on climate change is the prevalence of common myths around how to assess and manage risk.

### Myth 1: Property and/or flood insurance will protect my building against physical climate risk.

While insurance is an important tool to manage losses, it is only one piece of the puzzle to mitigate exposure. Additionally, premiums can rise after a natural disaster. Finally, as climate models change so do risk models, which could affect the insurance requirements and insurability of the property. For example, after the 2016 California wildfires, insurance premiums on residential homes rose, and more than 10,000 policies were not renewed in fire hazard areas. A year later, insured losses from wildfires rose to \$12 billion and, this year, the state experienced the largest fire in its history. Accordingly, there is a potential risk to home owners for further coverage losses or significant premium increases.

### Myth 2: A climate assessment is a ranking of cities most at risk for natural disaster, mainly those cities in coastal markets.

From an infrastructure perspective, city risk and preparedness are two sides of the same coin, and real estate investors should consider the net risk of the city when thinking of the impact of physical climate risk. How is the city investing in mitigation, and what are their plans on protecting and recovering key infrastructure? In the wake of Hurricane Sandy, the City of New York announced a \$20

## Physical Risks



Extreme Precipitation



Sea Level Rise



Heat Stress



Wildfires



Water Stress



Hurricanes & Typhoons

<sup>3</sup>Keenan, et al., "Climate gentrification: from theory to empiricism in Miami-Dade County, Florida," Environmental Research Letters, April 2018

<sup>4</sup>Hernandes, Arelis. "Exodus from Puerto Rico grows as island struggles to rebound from Hurricane Maria," The Washington Post, March 2018. The information herein reflects our current views only, are subject to change, and are not intended to be promissory or relied upon by the reader. There can be no certainty that events will turn out as we have opined herein. No assurance can be given that any forecast, target or opinion will materialize. Forecasts are based on assumptions, estimates or analyses, which might prove inaccurate or incorrect.

billion plan to invest in resilience projects across the New York City coastline. Key projects include the East Side Coastal Resiliency Project, which will strengthen 2.2 miles of coastline against flooding through a series of levees or berms and other structures designed to protect against storm surge and rising sea levels. While the long-term projects in city budgets today may be difficult for a real estate investor to underwrite, they can be an indicator of relative preparedness and demonstrate a municipality's intent to address climate risk.

### Myth 3: You can understand flood risk by looking at a flood map.

While flood maps are important, they do not tell the whole story of physical climate risk and do not look at the potential for developing mitigation and resilience. A building level assessment requires an understand of how well your building is susceptible to hazards now and in the future and what are the specific vulnerabilities in the property. What does a flood map look like today versus 10 or 20 years from now? Where is the building situated relative to the street, and are there protective features such as a curb wall or elevated first floor? Where are the mechanicals? What is the back-up generation? Outside of the building, what type of wetlands or other features at the property can help with stormwater management? How prepared is the local infrastructure to cope with the storm surges?

### Addressing climate risk and resilience – a holistic approach

In order for us to understand the impact of physical climate risk on our properties we need get past the pre-conceived notions to take a holistic approach to evaluating properties.

Within DWS, we believe that a framework for integrating Environmental, Social, and Governance (ESG) considerations should touch all parts of the investment process, and we are taking a similar approach to addressing physical climate risk within real estate. At portfolio construction, the goal is to look at exposures today and in the future to develop a picture of portfolio exposure to physical climate risk over the investment horizon. However, we believe this process should be the start and not the end of a climate risk analysis, and it is only beneficial if it leads to actionable intelligence or influences decision-making.



Description: Planned design for the East Side Coastal Resiliency Project<sup>6</sup>

For instance, a portfolio level assessment can also be a tool to help better inform insurance requirements and can help identify and prioritize properties for further investigation.

At the property level, a climate risk and resilience assessment can provide capital and operational recommendations, allowing a manager to improve preparedness and develop a resiliency plan tailored to the building. Perhaps the key challenge is defining the costs and benefits of an investment in resiliency as some of those benefits may not directly accrue to the landlord in terms of operational savings. However, there is anecdotal evidence that resilient design can help to make a property more attractive to current and prospective tenants. In a recent case study published by the Urban Land Institute for a property in south Florida, the developer found that features such as the inclusion of a second back-up generator to maintain operations allowed the building to realize faster lease-up rates versus comparable properties coming to market at the time.<sup>5</sup>

### Moving beyond the risk: advocacy and stewardship

While the discussion on climate risk and resiliency often focuses on the impacts to the investor, real estate also plays a role in assisting tenants, the local community and the city itself. As a practical example, a property located on high ground can become a staging area for first responders during a disaster or a resource to the local community in the aftermath of a disaster. It is important for an asset manager to define and provide directions to their local property teams to empower those teams to become stewards of their communities during these events. More broadly, as investors evolve their views on preparing for physical climate risk, they can play a larger role in shaping cities and local infrastructure for the challenges to come.

<sup>5</sup>Urban Land Institute: Returns on Resilience: The Business Case. ULI Center for Sustainability. Washington, D.C.: the Urban Land Institute, 2015

<sup>6</sup>Photo courtesy of the Office of the Mayor The information herein reflects our current views only, are subject to change, and are not intended to be promissory or relied upon by the reader. There can be no certainty that events will turn out as we have opined herein. No assurance can be given that any forecast, target or opinion will materialize. Forecasts are based on assumptions, estimates or analyses, which might prove inaccurate or incorrect.

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- \_ Adverse changes in law and regulation including environmental laws and regulations, zoning laws and other governmental rules and fiscal policies;
- \_ Environmental claims arising in respect of real estate acquired with undisclosed or unknown environmental problems or as to which inadequate reserves have been established;
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- \_ Risks and operating problems arising out of the presence of certain construction materials; and
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