

Assessing Local Adaptive Capacity to Understand Corporate and Financial Climate Risks



Four Twenty Seven, January 2019

KEY TAKEAWAYS

- Corporate and real asset investments can be financially impacted by climate-driven weather events and chronic stresses, even with strong internal risk management systems in place, as climate events can affect the broader community and disrupt local infrastructure.
- Adaptive capacity, the ability to adjust to potential damage and leverage opportunities, will influence how local jurisdictions and infrastructure are affected by climate-driven weather events.
- Four Twenty Seven has developed a framework to assess the adaptive capacity of local jurisdictions to inform the private sector, examining a city's awareness of climate impacts, economic characteristics, and adaptation planning efforts.
- Understanding a local jurisdiction's adaptive capacity provides opportunities to engage with decision-makers and relevant institutions to support local efforts to build resilience.

INTRODUCTION: LOCAL ADAPTIVE CAPACITY AFFECTS INVESTMENT RISK

Every investment, from real assets to corporate initiatives, is inextricably connected to its surrounding community. From flooded or damaged public infrastructure hindering employee and customer commutes to competition for water resources threatening business operations and urban heat reducing public health, the impacts of climate change on a community will impact the businesses and real estate investors based in that community. Thus, evaluating how acute and chronic physical climate hazards will affect local communities and communities' responses enables investors and corporations to assess the full extent of the risks they face.

Understanding the adaptive capacity—or the ability to prepare for possible change and leverage opportunities¹—of the surrounding area can help a business determine how local risk exposure is likely to impact its assets and what the most strategic responses may be. While a community's adaptive capacity plays a key role in determining whether or not exposure to climate hazards will lead to damage and loss, cities are also likely to find that their resilience to climate impacts is an increasingly important factor in attracting business and financing, as adaptive capacity is more frequently integrated into credit ratings and screening processes.

It is valuable for both cities to understand how investors are interpreting adaptive capacity and for investors to understand which factors of local adaptive capacity translate into increased resilience and reduced financial loss for their assets.

Adaptive capacity captures a wide range of interacting factors, including the policy context within a community, the strength and financing of public infrastructure, the local jurisdiction's financial means and personnel capacity, and its ability to implement tangible change. Understanding these complex and dynamic characteristics provides an important indication of how a city may be able to manage its risks from climate change and how the assets within a community may be affected.



Figure 1. Hurricane Irma floods a parking garage and surrounding streets in Jacksonville, Florida. Infrastructure damaged during extreme weather events affects residents and businesses that rely either directly or indirectly on their services. Photo from iStock.

Four Twenty Seven has developed a framework to analyze a community's adaptive capacity in a way that's actionable for corporations seeking to understand the risk and resilience of their own facilities and for investors assessing risk in their portfolios or screening potential investments.

¹Intergovernmental Panel on Climate Change. October 8, 2018. Global Warming of 1.5°C, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. <http://www.ipcc.ch/report/sr15/>

FOUR TWENTY SEVEN'S FRAMEWORK FOR ASSESSING ADAPTIVE CAPACITY

Adaptive capacity is a well-researched topic in the social sciences, with respected research highlighting three main components of public agencies' adaptive capacity: awareness, planning, and action.²

Credit rating agencies are also actively considering the most effective ways to incorporate adaptive capacity into their ratings. S&P Global Ratings integrates climate considerations into its standard framework for municipal ratings: How will an extreme event affect the tax base? Are capital planning and long-term financial planning prepared for unexpected costs? Are risk mitigation capital projects undertaken wisely, or are risks deferred? What is the city's debt ratio, and how will it be affected by extreme events?³ Moody's lists economic disruption, physical damage, health and public safety, and population displacement as climate-driven risks for public sector issuers.⁴

Evaluating the elements of adaptive capacity across a portfolio of jurisdictions presents significant barriers in terms of obtaining comparable data that is informative across a set of communities characterized by different sizes, economies and demographics. Effective budget allocation, efficient community outreach and flood mitigation measures, for example, will depend on a city's size, physical characteristics and risk exposure. Comparing these numbers across a set of jurisdictions only provides an informative comparison of climate resilience if the analysis is sensitive to jurisdictions' unique contexts.

Building on the social sciences research and credit agencies' thinking as well as drawing on insights

gained from working directly with cities and investors, Four Twenty Seven has developed a framework for assessing local adaptive capacity from a private-sector perspective. Our analysis focuses on the three pillars of: 1) awareness; 2) economic and financial characteristics, and 3) the quality of adaptation planning and implementation. These provide a snapshot of the many facets of adaptive capacity. We leverage our data on exposure to climate hazards alongside our understanding of the policy landscape and the economic implications of local climate resilience to develop location-specific, actionable analyses.

Awareness

Awareness is the first pillar of Four Twenty Seven's adaptive capacity framework. While awareness of climate change issues is not essential for having a resilient economy or implementing hazard-specific resilience measures, approaching these actions through an informed climate change lens will ensure resilience-building actions are tailored to the current and future vulnerabilities of a specific city. We define awareness as the understanding that climate change is an immediate pressing concern and that adaptation is necessary.

This awareness is an important indication of how likely a city is to implement climate change adaptation policies and strategies, allocate meaningful budget and staff hours to adaptation planning, and leverage resources for resilience-building. Climate adaptation efforts are often cross-cutting, requiring resources across department lines and calling for shifts in resource allocation. Addressing climate risks strategically and systematically requires acknowl-

²Julia A. Ekstrom, Louise Bedsworth and Amanda Fencl score water utilities for each of these categories. They use interviews to obtain a detailed understanding of each agency's approach to adaptation and they emphasize that an important next step is assessing the quality of action in each phase of the adaptation spectrum. From Ekstrom, J. A., Bedsworth, L., & Fencl, A. (2017). Gauging climate preparedness to inform adaptation needs: local level adaptation in drinking water quality in CA, USA. *Climatic change*, 140(3-4), 467-481. <https://link.springer.com/article/10.1007/s10584-016-1870-3>

³Schroerer, Lisa. May, 2018. Assessing the Impacts of Climate Change on U.S. Municipal Ratings. Webinar: Building City-level Climate Resilience. Four Twenty Seven. Retrieved from: <http://427mt.com/2018/05/24/webinar-building-city-level-climate-resilience/>

⁴Moody's Investors Service. November 28, 2017. Environmental risks: Evaluating the impact of climate change on US state and local issuers.

edgement of climate change as an issue by all city departments, rather than just by a few climate or sustainability champions.

A city's participation in broad climate initiatives provides an indication of the degree to which a city is aware of and prioritizes climate issues. These initiatives vary widely in their regional scale and topical scope, from national organizations fostering sustainable communities to global pacts to act on climate. They are sometimes based on voluntary pledges, but are often member organizations that offer resources and networking benefits in return for dues. The nature of the organizations in which it participates provides insight into a city's level of commitment to climate adaptation and the resources it may have available.

For example, Miami Beach, FL is the second-most exposed city to sea level rise in the United States in [Four Twenty Seven's municipal risk dataset](#) and is also highly exposed to hurricanes and heat stress. However, the city is part of several climate initiatives, ranging from commitments to act on climate to membership in initiatives such as Rockefeller's 100 Resilient Cities, which provides extensive resources and capacity-building support for resilience. This indicates that while highly exposed, Miami Beach is aware of its risks and takes them seriously, differentiating it from other cities with high exposure that do not participate in similar initiatives.

Another important element of awareness is the communication of climate impacts to the public. When a large proportion of the population understands their climate risks, they are likely to provide an enabling environment for climate adaptation. Likewise, when there are ample public communications around applicable climate risks and when community members are engaged in adaptation planning, city residents are more likely to be prepared for extreme events and adaptation is more likely to address the needs of the community.

Economic & Funding Characteristics

The long-term economic consequences of climate-driven weather events may not manifest for many years into the future. However, there are many ways in which extreme weather events can threaten a city's tax base, affecting its ability to repay debt and attract financing. This is an important feedback cycle in which a city needs financing for adaptation but must show that its economy is robust enough to repay debt.

Considering how a city's economy may be affected by those hazards to which it is most exposed and examining the financial resources a city has available can help both cities and investors understand the potential risks posed by climate change and how best to prepare. A diversified economy, relying on several industries with different sensitivities to climate hazards is likely to be more resilient and less likely to be crippled by a single disaster than an economy centered on a single sensitive industry.

The strength of a city's economy and its ability to fund and/or finance adaptation are inextricably linked. For example, after extensive subway flooding during Hurricane Sandy, New York MTA issued a catastrophe bond to obtain \$200 million in insur-

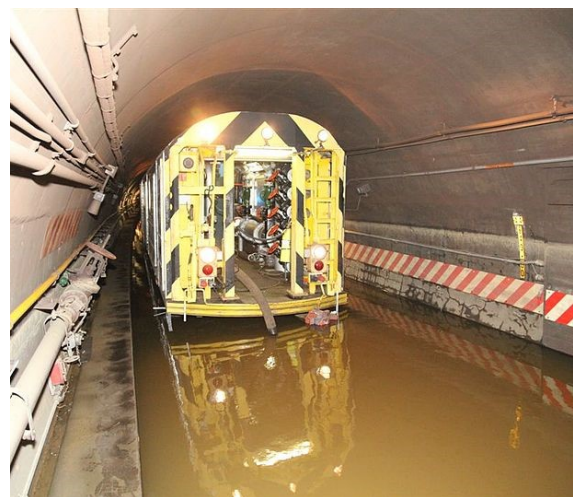


Figure 2. New York MTA employees pump out a subway tunnel after Hurricane Sandy. Image from Wikimedia, by Metropolitan Transportation Authority of the State of New York used with a CCA 2.0 Generic license.

ance coverage for future storm surge-induced flooding, while also improving emergency plans and implementing other adaptation measures.⁵ While insurance alone will not reduce the loss incurred by businesses due to transit shutdowns that result in employee and customer travel disruptions, it does indicate that New York City has an important financial safety net that will help limit the long-term financial losses of future storm surge-induced flooding. Maintaining a robust economy despite enduring extreme weather events will help a city continue to attract finance, which in turn can help it to build resilience and incur fewer losses during these events.

It is important for a city to budget resources for risk assessment, as well as adaptation planning and implementation. A city's budget allocation for adaptation, its access to state and national grants for resilience-building, and its ability to attract financing, are all important elements of its ability to implement adaptation.

Adaptation Planning & Action

The most informative component of assessing adaptive capacity and resilience is information about direct, tangible actions that cities or their counties have taken to either plan for or implement adaptation. Understanding a municipality's awareness, funding and adaptation efforts targeted at the climate impacts it faces is critical for assessing a jurisdiction's adaptive capacity. For example, if a community has low awareness, but has implemented adaptation for several climate hazards, that may indicate that it is overcoming political barriers to adaptation. Likewise, if a city has high awareness but has limited access to funding or has not yet implemented adaptation measures, this is a valuable entry point for investors and businesses striving to engage to build local resilience.

Pairing resilience-building efforts with risk exposure adds an important layer of insight into how cities will be impacted by climate hazards and why adaptation to certain hazards may be more meaningful. For example, a city in the Midwestern United States will not have implemented adaptation for sea level rise as it is not exposed to this hazard, but investors may look for an indication of robust adaptation to drought and heat stress since these are pertinent hazards for cities in that region. Four Twenty Seven's adaptive capacity analyses focus on the same hazards that are scored in our risk assessments: hurricanes/typhoons, sea level rise, extreme rainfall, heat stress, water stress and wildfires.⁶ Together, this information provides users with insight into which hazards pose the greatest threats and how well positioned a city may be to address these threats.

We look for climate-related and other planning documents that both assess a city's vulnerability and detail adaptation plans. The cities with the highest adaptive capacity have thorough plans for their most relevant hazards, with regular updates and monitoring and evaluation built into the planning process. Evidence that a city has begun implementing the actions cited in its plans adds credibly to the city's planning process and indicates increased resilience.

Columbus, Ohio, for example, is the city second-most exposed to extreme rainfall in Four Twenty Seven's analysis of U.S. municipalities. The three adaptation actions it reported to CDP in 2017 all focus on storm or surface flooding, including maintaining water infrastructure to minimize leaks and preparing a watershed management plan and an updated emergency response plan.⁷ This indicates that Columbus is actively building its resilience to mitigate its risk to rainfall-induced flooding. This may provide some degree of comfort for corporations and investors with assets in this city, or looking to invest

⁵Re:focus Partners. A Guide for Public-Sector Resilience Bond Sponsorship. September 2017. <http://www.refocuspartners.com/wp-content/uploads/pdf/RE.bound-Program-Report-September-2017.pdf>

⁶Forthcoming

⁷2017 - Cities Adaptation Actions. CDP: <https://data.cdp.net/Adaptation-Actions/2017-Cities-Adaptation-Actions/9ajb-rnye>

in that location.

A city's adaptation planning and implementation can include becoming prepared to respond to public health hazards in case of an extreme event, insurance coverage, and alterations to the built environment through investments like sea walls and urban trees. It is important to assess these indicators while considering nuanced information about distribution of adaptation efforts across a community, stakeholder engagement, and funding. Whether or not

adaptation efforts align with regional vulnerabilities and exposure across a city, the ways in which plans build in community engagement, monitoring and evaluation of efforts, and the city's budget to implement its plans are all critical. Four Twenty Seven's analysis aims to incorporate an understanding of these elements of a city's social, political, and economic contexts to provide a thorough picture of its adaptive capacity to climate impacts.

CONCLUSION: ENGAGING WITH CITIES TO PROMOTE RESILIENCE

A community's awareness of climate impacts, financial resources, and adaptation efforts are all important components of its ability to manage the impacts of climate hazards on public and private assets. Assessing comparable components of adaptive capacity is critical for understanding the risks that physical climate hazards pose to investments.

While understanding the adaptive capacity of an area surrounding an asset is an important layer of understanding the asset's risk, it also provides tools for building resilience to that risk. It lays the groundwork for effective public-private collaboration to build climate resilience and reduce loss. Investors and corporations armed with a nuanced understanding of local adaptation efforts can leverage this knowledge to identify effective entry points for collaboration with cities and to improve resilience to climate hazards for all.

Corporations can leverage an understanding of local adaptive capacity to drive their development plans and guide their adaptation efforts, strategically en-

gaging the surrounding community when they have similar exposure and shared resilience needs.

Likewise, infrastructure and real estate investors can use an analysis of adaptive capacity to foster resilience by engaging with communities and property managers around planning for the duration of an asset's life cycle. Leveraging an understanding of local adaptive capacity allows members of the private sector to reduce their own financial risk while both incentivizing and promoting local adaptation that builds resilient communities and economies.

Continued research on the effectiveness of local adaptation efforts will help inform analysis on adaptive capacity and perhaps, over time, lead to quantitative assessments of adaptation efforts. Today, however, qualitative, context-specific analysis remains the most reliable way to capture the nuance of local vulnerabilities and the adequacy of local policies to address current and future risks.



Four Twenty Seven

AUTHORS

Author: Natalie Ambrosio • nambrosio@427mt.com

Editor: Yoon Kim • ykim@427mt.com

ABOUT FOUR TWENTY SEVEN

Four Twenty Seven (427mt.com) is the leading provider of market intelligence on the impacts of climate change for financial markets. We tackle physical risk head on by identifying the locations of corporate production and retail sites around the world and their exposure to climate change hazards such as sea level rise, droughts, floods and tropical storms, which pose an immediate threat to investment portfolios.

Four Twenty Seven's ever-growing database now includes one million corporate sites and covers over 2000 publicly-traded companies. We offer [subscription products and advisory ser-](#)

[vices](#) to access this unique dataset. Options include data licenses, an interactive analytics platform, and company scorecards, as well as reporting services, scenario analysis, and real asset portfolio risk assessments.

Four Twenty Seven has won multiple awards for its innovative work on climate risk and resilience and our work has been featured by Bloomberg, the Financial Times and the UNFCCC. Four Twenty Seven was founded in 2012 and is headquartered in Berkeley, California with offices in Washington, DC and Paris, France.

DISCLAIMER

The information provided in this report was collated by Four Twenty Seven. Publications of Four Twenty Seven are for information purposes only. Other than disclosures relating to Four Twenty Seven, the information contained in this publication has been obtained from sources that Four Twenty Seven believes to be reliable, but no representation or warranty, express or implied, is made as to the accuracy, completeness, reliability or timeliness of any of the content or information contained herein. As such, the information is provided 'as-is,' 'with all faults' and 'as available.' The opinions and views expressed in this publication are those of Four Twenty Seven and are subject to change without notice, and Four Twenty Seven has no obligation to update the information contained in this publication. Further, neither Four Twenty Seven nor its directors, officers, employees or agents

shall be held liable for any improper or incorrect use of the information described and/or contained herein, nor does Four Twenty Seven assume responsibility for anyone's use of the information. Under no circumstances shall Four Twenty Seven or any of its directors, officers, employees or agents be liable for any direct, indirect, incidental special, exemplary or consequential damages (including, but not limited to: procurement of substitute goods or services; loss of use, data or profits; or business interruption) related to the content and/or to the user's subsequent use of the information contained herein, however caused and on any theory of liability. User agrees to defend, indemnify, and hold harmless Four Twenty Seven and its directors, officers, employees and agents from and against all claims and expenses, including attorneys' fees, arising out of the use of information herein provided.

CONTACT INFORMATION

San Francisco Bay Area, CA
2000 Hearst Ave, Ste 304
Berkeley, CA 94709
Tel: +1.415.930.9090

Washington, D.C.
1875 K Street NW
Washington, D.C. 20006
Tel: +1. 202.897.4020

Paris, France
2, rue du Helder
75009 Paris, France
Tel: +33. 01.53.34.11.87