



REPORT

2019 RESILIENT CITIES SUMMIT:

Using Data and Metrics to Build Resilience



September 16–17, 2019
Washington, D.C.





National League of Cities

The National League of Cities (NLC) is the nation's leading advocacy organization devoted to strengthening and promoting cities as centers of opportunity, leadership, and governance. Through its membership and partnerships with state municipal leagues, NLC serves as a resource and advocate for more than 19,000 cities and towns and more than 218 million Americans.

NLC's Center for City Solutions and Applied Research provides research and analysis on key topics and trends important to cities, creative solutions to improve the quality of life in communities, inspiration and ideas for local officials to use in tackling tough issues and opportunities for city leaders to connect with peers, share experiences, and learn about innovative approaches in cities.

nlc.org



U.S. Green Building Council

The U.S. Green Building Council (USGBC) is a nonprofit organization committed to transforming the way all buildings and communities are designed, built, and operated to support a sustainable, resilient, and prosperous environment for all. USGBC works toward its mission of market transformation through its LEED green building program, robust educational offerings, an international network of local community leaders, the annual Greenbuild International Conference & Expo, the Center for Green Schools, and advocacy supporting public policy that encourages and enables green buildings and communities. USGBC serves a diverse marketplace and its LEED green building program is the foremost program for green building in the world—saving money for families, businesses, and taxpayers; reducing carbon emissions; and contributing to a healthier environment.

usgbc.org



Urban Land Institute

The Urban Land Institute (ULI) is a nonprofit education and research institute supported by its members. Its mission is to provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide. Established in 1936, the Institute has more than 46,000 members worldwide representing all aspects of land use and development disciplines. It is through member involvement and information resources that ULI has been able to set standards of excellence in development practice.

The ULI Center for Sustainability and Economic Performance is dedicated to creating healthy, resilient, and high-performance communities around the world. Through the work of ULI's Greenprint Center for Building Performance and Urban Resilience Program, the Center for Sustainability and Economic Performance advances knowledge and catalyzes the adoption of transformative market practice and policies for resilient and sustainable communities.

uli.org

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We also want to thank our media partner for the 2019 Resilient Cities Summit, **CityLab**.

We are grateful for the leadership of this year's mayors and other local government leaders on this important and timely issue, and for this opportunity to elevate their outstanding work and to discuss solutions to implement strategies to build local resilience. We would also like to thank the following 2019 Resilient Cities Summit participants, listed on the following pages.

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Andreas Addison, Council Member, Richmond, Virginia

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Lindsey Constance, Council Member, Shawnee, Kansas

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Teri Johnston, Mayor, Key West, Florida

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Andria McClellan, Council Member, Norfolk, Virginia

Mark-Anthony Middleton, Council Member, Durham, North Carolina

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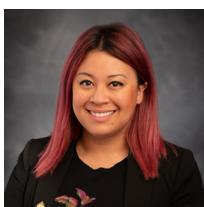
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Overview of the 2019 Resilient Cities Summit

Five Years in the Making: A Review of the Resilient Cities Summit

Each year, the summit's theme is informed by current city and regional challenges, resilience trends, and emerging areas of interest. The first summit in 2015 was a refreshing call to action for U.S. cities focused on how to prepare for large-scale disasters and overcome everyday stressors in cities. Since the inaugural RCS, summits have focused on specific aspects of this multifaceted and dynamic topic. The 2016 summit centered on the connection of resilience to land use and how development can be enhanced through zoning tools that city officials and staff already have as resources. In 2017, the RCS focused on how to identify funding sources and galvanize support for implementing resilient solutions, and in the following year, the summit examined the opportunity of using public-private partnerships to deliver resilient and sustainable infrastructure.

Welcome to the Resilient Cities Summit

The Resilient Cities Summit (RCS) is an annual, retreat-style conference for local elected officials and their staff who have expressed strong interest in learning about climate resilience issues, learning from peer cities and experts, and growing their networks. The event, hosted by the National League of Cities (NLC), Urban Land Institute (ULI), and U.S. Green Building Council (USGBC), offers leaders and staff the opportunity to engage with subject matter experts who provide knowledge, tools, and resources necessary to advance city resilience goals – particularly in the areas of sustainability, climate adaptation, social and racial equity, design, real estate, and community development.

By hosting a varied set of participants at the summit, the event is successful in providing multiple perspectives in approaching challenges related to city-level resilience. Because each city has its own unique obstacles and available resources, it is essential to have a variety of cities quite literally “at the table.”

The 2019 Resilient Cities Summit: Using Data and Metrics to Build Resilience

While the theme of each year's summit has varied, some issues were nearly always visible, remaining an integral part of the conversation year after year. These topics include the prioritization of equity in resilience planning, the need for leadership and vision amongst decision makers to lead cities toward a more resilient future, and the overwhelming demand to acquire and leverage the right data to make positive, lasting change in communities.

Observing this recurring priority at the city level, the summit hosts, NLC, ULI, and USGBC adopted the theme of data and metrics as a natural fit for the 2019 summit. Discussions focused on the need to better recognize how to use metrics to understand how increased risk of flooding, heat and other peak events will impact cities, and how community data can help inform policymakers' resilience strategies.

In late summer 2019, 50 participants made up of elected officials, city staff, and nationally recognized resilience experts from the public and private sectors gathered in Washington, D.C. at Nationals Park for the fifth annual summit. The summit focused on how innovations in data and technology can support cities' resilience goals. For cities, addressing resilience challenges first requires access to the right data. Having the proper metrics can thereby inform what shortfalls to reaching resilience goals exist and to ensure that all citizens are protected from the impacts of climate change. During the one-day summit, attendees examined the role of metrics in assessing current challenges in cities, and also scanned data sets to determine what, if any, were lacking. Participants further discussed how to interpret this data, and how to form guidance to effectively instill improvements to overall city-level resilience. This year's summit saw significant references and concerns about the uneven distribution of risks on city residents, and a focus on how plans for city-level resilience can foster equity.

Summit participants sought to answer questions critical to their own cities:

- What are three things your city has done or is doing at the start of your resilience data journey?
 - How does your city put equity first in your resilience data efforts?
 - Does having resilience data make your city more efficient or impactful?
 - How does your city integrate resilience work into other elements of city leadership?
 - How are new data and measurement methods helping cities measure performance and reduce risk?
 - How could elected officials and their staff leverage these breakthroughs to advance their own resilience goals?

Takeaways and Trends from the 2019 Summit

As we reflect on the fifth Resilient Cities Summit, its presentations, discussions, and brainstorming sessions, several recurring themes stand out:

- **Metrics must be effectively measured and properly addressed when pursuing resilience goals**, specifically metrics related to demographics including race and ethnicity, health factors, economic mobility, displacement, etc.
 - **Social vulnerability and racial equity must be prioritized** for cities as they seek to ensure that investments in resilience, disaster recovery, and economic development serve all communities, including those with the greatest needs. Data should be disaggregated with sufficient detail to understand varying groups' circumstances.
 - **Data illuminates value of avoided loss** and there is an opportunity to gather data from communities that avoided a crisis due to resilience investment and/or planning. Capturing and sharing this information with communities may be challenging but critical to demonstrating the benefits of good planning efforts.
 - **Data can inform more equitable investment** in communities, especially when climate risks can influence credit ratings. Credit rating agencies are paying increased attention to climate vulnerabilities but also to cities' preparedness efforts and investments.

What is resilience?

According to NLC, ULI, and USGBC, **resilience** is defined as “the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.” Increasingly so, our organizations view this definition through a lens that is mindful of and committed to the effective and lasting mitigation of climate-related impacts.

Throughout the summit, presentations and discussions emphasized the integral role of racial equity considerations in resilience planning to ensure that all residents reap the benefits of resilience-related investments. This is particularly critical given that climate change will present the most risk to historically marginalized groups, including low-income communities and communities of color.

Discussion also centered on issues pertaining to sustainability, public health, and financing resilience on the city level.



- **Representation and championship are key**, whether that be the activism and inclusion of residents and community-based organizations from historically disadvantaged demographics, or the establishment of a permanent city staff position focused on community engagement.
- **Public-private partnerships are instrumental** in helping cities establish and discover the best ways to leverage data to track their progress and impact, as well as helping cities finance these advances.

Session Summaries

Welcome and Foundational Dialogue

The summit opened with interactive welcome remarks by **Joyce Coffee**, Founder and President of Climate Resilience Consulting, who has spent her career creating and implementing climate-related resilience and recovery strategies in city government, as well as in the private, nonprofit, philanthropic, and academic sectors. Coffee laid the foundation for the day's presentations by discussing the historic link between social equity and resilience, specifically in disaster recovery. She emphasized that access to and application of data is critical to understanding hazards and informing resilience solutions. In addition, conversations on climate-related resilience are increasingly tied to issues around social vulnerabilities and racial equity in cities.

Leadership from the Region: Integrating Data into Resilience Strategies

Summit attendees heard from city resilience experts in the Washington, D.C. and central Virginia region on past successes, challenges, and future plans for using innovative data approaches in resilience planning. Experts included **Doug Beaver**, Chief Resilience Officer for the City of Norfolk, **Kate Johnson**, Branch Chief of Urban Sustainability with the D.C. Department of Energy and Environment, and **Brianne Mullen**, Coordinator with the Office of Sustainability of the City of Richmond.

NORFOLK, VIRGINIA

Beaver shared an update on his office's coastal [resilience](#) work in Norfolk, the third largest cargo port on the east coast and site of the largest naval base in the world, including the city's new zoning ordinance to enhance flood resilience. Adopted in 2019, the city's [ordinance](#) established the Coastal Resilience Overlay (CRO) zone to require resilient development strategies, and formed the **Resilience Quotient System**, allowing developers to earn points for including resilience measures that strengthen different aspects of a project. Under the system, all development must undergo a site plan review process and earn points in categories including flood risk reduction, stormwater management, and energy resilience. By requiring all projects to meet minimum standards in all categories, the city of Norfolk ensures that developers properly assess projects' resilience to a variety of risk factors.

WASHINGTON, D.C.

Johnson discussed the progress of D.C.'s [Climate Ready Plan](#), which targets neighborhoods most at risk for conditions like flooding, heat stress, and displacement for infrastructure investments. She highlighted one of the plan's goal in particular: to strengthen community, social, and economic resilience by making communities and neighborhoods safer and more prepared for disasters and emergencies. The District acknowledges that disruptive events do not impact all neighborhoods equally, and that any city-wide plan for climate resilience must address these inherent inequities. For example, neighborhoods with large areas of impermeable surfaces and smaller areas of green space are more [vulnerable](#) to extreme heat – and these communities are often under-resourced. By investing in parks and permeable surfaces in these target areas, D.C. has been able to better serve the needs of its frontline communities, thus lifting up the quality of life across all neighborhoods and reducing risk.

Also a priority in D.C. is flood risk, as Johnson discussed the city's [Flood Inundation Mapping Tool developed](#) by the U.S. Army Corps of Engineers, the National Weather Service, and the U.S. Geological Survey, that allows emergency managers, government leaders, and the public to view potential flood impacts during high water events along the river shores. Johnson also presented on an [interagency](#) initiative to build climate resilience in Watts Branch communities, focused on assessing and mitigating flood risks in these neighborhoods adjacent to the Anacostia River tributary.

RICHMOND, VIRGINIA

Mullen explained that heat has become the most prominent city-wide resilience issue, prompting a local [study](#) on urban heat vulnerability. During a summer heat wave, teams of citizen scientists and volunteers periodically measured and recorded air temperature across the city at different times of day in the **Heat Mapping project**. [Data](#) obtained from these activities helped generate a map of temperatures along city routes, revealing stark inequities across Richmond's neighborhoods. In some lower-income areas, the city identified temperature differences of up to 16 degrees Fahrenheit, mostly due to varying amounts of shade cover and dark, impermeable surfaces. This low-budget study also factored in how residents handle intense heat, including access to central cooling and whether residents worked outdoors. With this information, Richmond was able to assess city-wide vulnerability to urban heat, factoring in risks like heat-related illness for each census block group in Richmond. Using these overlaid, data-rich maps, the city has been able to identify which areas should be prioritized, particularly as plans to mitigate heat impacts throughout the city are advanced.

Keynote Conversation: What's New in Risk and Resilience

Summit keynote speaker **Simone Brody**, Executive Director of Bloomberg Philanthropies [What Works Cities](#), sat down with moderator Joyce Coffee for a discussion of her work with mayors and city leaders to improve effectiveness in government through effective data use. Following her work with 150 cities over the previous four years, Brody acknowledged that factors like public health and economic mobility are linked to climate resilience in a city, and cities need access to the right data to make effective and lasting improvements for their residents. Brody spoke on her organization's efforts in cities including Syracuse, a city saddled with much deteriorating housing. The city used data to shift its approach from reactive to proactive – significantly improving the quality, and thus the overall resilience of the city's housing. Another example of the power of data was in New York City, where city officials noticed that increases in high school graduation rates were uneven and varied across city demographics, neighborhoods, and schools. Notably, lower-income areas were not seeing the same level of improvements, thus prompting the city to take a more targeted, customized approach than previously followed. Brody noted that as local officials become more comfortable using data, cities can better identify gaps and can make informed decisions on how to bridge them.

The Future of Measuring Your Resilient City: Tools, Frameworks, and Approaches

The summit's closing panel focused on tools for analyzing risk and employing data-driven strategies to enhance city resilience. The panel both introduced tools which are freely available through federal government resources and other tools available from the private sector and non-profit organizations. **Christian Braneon**, Remote Sensing Specialist from the NASA Goddard Institute for Space Studies was joined by **Matt Stein**, Vice President of Business Development of Jupiter Intelligence, and **Hilari Varnadore**, Director of LEED for Cities and Communities, USGBC led this session focused on metrics-based solutions, free resources, and innovative programs.

What's Your Headline? Break-Out Discussions

Attendees flexed their creative muscles through an exercise that asked mayors and councilmembers to generate their best future newspaper "headline." This exercise encouraged participants to brainstorm potential paths to resilience success through the use of data and technology, and report that success back to residents via a brainstormed story in their hometown newspaper. Among the top headlines generated by attendees were "Tree Program Produces Unexpected Health Benefits" and "Tech Giant Sees Green in Relocation to our City."



NASA DEVELOP

Braneon presented in part on NASA DEVELOP, an [initiative](#) of NASA's Applied Sciences Program that addresses environmental and policy issues in communities around the world through a unique NASA Earth lens. By highlighting the applications of NASA Earth observations, the agency can help cities take "transformative action" towards greater climate resilience. DEVELOP partners with outside organizations to examine each one of the Applied Sciences Program's thematic application areas of importance, including disasters, health and air quality, energy, agriculture and food security, ecological forecasting, urban development, water resources, and transportation and infrastructure. DEVELOP interdisciplinary teams devise deliverables including a technical report, shapefiles, and imagery to support communities in addressing real-world environmental issues including enhanced climate resilience.

URBAN DESIGN CLIMATE WORKSHOP

As part of his presentation, Braneon discussed his involvement in the Urban Design Climate Workshop (UDCW) [series](#), aimed at assisting technical and community experts as they develop responses to climate change. The UDCW series supports project teams' efforts in combating climate-related challenges, while taking into account governmental, developmental, socio-economic, and ecological conditions. These workshops are currently held on a biannual basis, and pull the involvement of academia, urban design and planning, and relevant think tanks.

JUPITER INTELLIGENCE

Stein, who represents climate data provider Jupiter Intelligence, focused on how cities need to obtain a variety of data attributes to properly assess risk in a non-stationary climate. Data points like spatial-temporal resolution, modelled metrics, climate scenarios, and uncertainty quantification can help inform cities' responses to perils such as flood, fire, heat, drought, wind, and hail. Stein argued that these metrics can effectively inform a wide swath of data users in their quest for comprehensive risk assessment, including appropriately timed and scaled resilience investments. Stein also shared how such data points can point decision makers in the right direction, like when it comes to investigating insurance risk, consumer costs, and how to support more vulnerable neighborhoods.

LEED FOR CITIES AND COMMUNITIES

Varnadore discussed how the [LEED for Cities and Communities](#) rating system works to measure, assess and support more sustainable, equitable, and resilient communities around the world. To do so, the system measures how cities incorporate strategies like the sustainable, regenerative use of resources, access to quality transit, grid harmonization, smart waste management systems, and resilience planning. LEED recognizes that resilience cannot be properly strengthened without addressing equity. Thus, LEED for Cities addresses social and equity concerns through a focus on quality of life, which includes city and community-level requirements for a demographic assessment, and credits offered for exemplary incorporation of environmental justice, housing affordability, civic and community engagement, and more.

- [LEED v4.1 for Cities and Communities](#): additional tools and resources on LEED v4.1 for cities
- [Measuring Resilience guide](#): guide to measuring community resilience with LEED v4.1 for Cities and Communities

For a full list of presenter resources, please refer to the [Resources](#) section in this report.

Resources

Compiled here are relevant resources from the summit's panelists and host organizations, including links to additional information.

Host Organizations

National League of Cities

[Leadership in Community Resilience 2019](#) Grant Program: Opportunities for cities including grants, technical assistance, staff support, and professional development opportunities for community leaders.

Urban Land Institute

[Urban Resilience Program](#): Program provides ULI members, public, and U.S. communities with technical assistance and information on how cities and built environment can be more climate resilient.

[ULI Advisory Services](#): Panels bring together ULI member experts in the real estate/development to propose resilient solutions for complex local land use scenarios. The process includes a 5-day workshop with community stakeholders.

[Scorched: Extreme Heat and Real Estate](#): Overview of extreme heat impacts on real estate/land use sectors. Highlights positive impacts of implementing "heat-resilient" building designs and land uses; in-depth discussion of heat mitigation, adaptation strategies related built environment & design.

[Developing Urban Resilience \(DUR\)](#): Growing online case study library showcasing best practices in resilient development/design/urban policies that proactively address climate shocks, stresses. [Nominate a policy or project for inclusion](#).

U.S. Green Building Council

[USGBC's Center for Resilience](#): USGBC's growing resource destination for organizational work on resilience.

[Greenbuild](#) and [Greenbuild Resilience Summit](#): USGBC brings enhanced focus on resilience to Greenbuild.

[Resilient by Design: USGBC Offers Sustainability Tools for Enhanced Resilience](#): Brief on how USGBC works to promote resilience through various tools and rating systems.

[Profiles in Resilience: LEED in Practice](#): Brief outlining examples of LEED-certified projects that have been tested and have demonstrated exceptional resilience.

[Social Equity in Green Building Policy and Practice](#): Brief examining the social impacts of green buildings.

[Resilient Cities: Municipal Policy Options](#): Resources documenting options for municipalities to assess risk and enhance resilience.

For more information on USGBC's work on resilience contact resilience@usgbc.org.

Panelist Recommended Resources

Doug Beaver, Norfolk, VA

[Norfolk Resilient City](#): The City of Norfolk's Office of Resilience.

Tidewater [Film](#) and [Trailer](#): Documentary starring Norfolk Councilmember Andria McClellan and the City of Norfolk.

Kate Johnson, Washington, D.C.

[Climate Ready D.C.](#): Washington, D.C.'s plan to adapt to a changing climate, and related technical reports.

Brianne Mullen, Richmond, VA

[Throwing Shade in Richmond, VA](#): Additional visuals and maps on Richmond heat island study.

[Where Do We Need Shade?](#): More project details on shade study via Climate Resilience Toolkit.

Christian Braneon, NASA

[Case Study Docking Station Overview](#): More on NASA's city case studies and workshops held worldwide.

[City Tech Collaborative](#): An example of how the city of Chicago is using NASA data to curb the urban heat island effect.

[NASA DEVELOP](#): NASA's initiative using a team of graduate students to build on existing work in cities.

[MERRA](#): Modern-Era Retrospective analysis for Research and Applications (MERRA), reanalysis dataset production completed in 2016, with version 2 currently in production.

[NEX-GDDP](#): NASA Earth Exchange Global Daily Downscaled Projections (NEX-GDDP) dataset is made up of downscaled climate scenarios from 1950 to 2100, for long term resilience planning.

[Landsat](#): Fine resolution data, down to 30 meters in detail, for monitoring and forecasting.

[MODIS](#): Moderate Resolution Imaging Spectroradiometer (MODIS) provides daily imagery, usable for short term response during extreme events.

[Urban Design Climate Workshop](#) and [Urban Climate Change Research Network](#).

Hilari Varnadore, LEED for Cities and Communities

[LEED for Cities and Communities](#): How LEED provides cities and communities with a blueprint to measure and communicate performance a variety of critical factors.

[LEED v4.1 for Cities and Communities](#): Additional resources and tools related to LEED v4.1 for Cities and Communities.

[Guide to Measuring Resilience](#): Resource designed for local leaders that provides guidance on how to use LEED v4.1 to measure and improve existing community resilience, including how to recognize connections among community systems, learn from best practices, and how to become a more resilient and sustainable community.

Additional City-Level Resources Discussed during the 2019 Resilient Cities Summit

[U.S. Climate Resilience toolkit](#): City actions on climate vulnerability and risk assessment, including Richmond case study.

[ICLEI Preparing for Climate Change Guidebook](#): Guidebook for local, regional, and state governments.

Related case studies: [Somerville, MA](#), [Washington, D.C.](#), [Minneapolis, MN](#).

Examining social vulnerability to climate change via the Centers for Disease Control and Prevention:

- [CDC Social Vulnerability Index](#)

- [CDC 500 Cities Project](#)