

November 2, 2018

Reducing vulnerability of cities to extreme weather

Researchers from Northwestern University, the University of Illinois, and Argonne National Laboratory are working together to mitigate the effects of extreme weather events on cities across the globe. The team recently received a grant to initiate their project, Systems Approaches for Vulnerable Evaluation and Urban Resilience (SAVEUR), which aims to more accurately predict extreme weather events and reduce impacts at the neighborhood level.

SAVEUR will combine natural science, social science, data science and engineering to not only more accurately predict weather events such as heat waves, air quality and flooding, but also assess vulnerabilities within neighborhoods and cities and propose sustainable, adaptive infrastructure changes. The City of Chicago, Metropolitan Water Reclamation District of Greater Chicago (MWRD), The Nature Conservancy, and Chicago Park District are all partners in this work.

The project involves five main tasks: improving resolution of extreme weather, improving prediction of air quality at a neighborhood scale, improving prediction of flooding at a neighborhood scale, assessing social and economic impacts, and developing a new convergence framework to reduce vulnerability to extreme weather events. By implementing these processes, researchers also hope to facilitate public discussion and better prepare community members for extreme weather events.

“The project will provide improved assessments of the likelihood of extreme weather impacts in neighborhoods across the city, which can be used to direct resources to help those most at risk,” said Aaron Packman, the project lead and a professor of civil and environmental engineering at Northwestern University. “In addition, the project will identify how green infrastructure such as parks, gardens and nature preserves can be used by local communities to reduce their vulnerability to extreme weather.”

The idea was borne from a series of discussions between the project team and partners about how to best use data from the “Array of Things,” a sensor network that gathers information on infrastructure, environment, and air quality in Chicago. The Array of Things project is deploying 500 “Waggle” sensor boxes across the city of Chicago. Of those, 100 have been placed and 100 more are currently being placed, while the rest are scheduled to go out over the next year. Northwestern and Argonne researchers adapted Waggle boxes to include water sensors, which provide more information on flooding in communities throughout Chicago.

The SAVEUR project team will use this information in conjunction with historical water records to learn how different levels of rainfall interact with existing stormwater infrastructure. Assessments of links between air temperature, air quality, and urban development will help to reduce health impacts of heat waves, and these new results will support green infrastructure recommendations to reduce extreme weather vulnerability in Chicago communities.

“By forming vital research partnerships with Northwestern University, the University of Illinois, Argonne National Laboratory and The Nature Conservancy, we have taken a step toward building a resilient Chicago region that is more prepared for future extreme weather events,” said MWRD President Mariyana Spyropoulos. “When we can race ahead of storms through this groundbreaking research, we are not only protecting our communities from flooding but also benefiting our quality of life, our water environment and our health.”

Array of Things data are publically available through the Plenario data archive and the Chicago Data Portal, making project data a resource for the public, community organizations, and city management agencies. While the current project focuses on the Chicago area, it has the potential to expand to cities across the globe.

For more information: Northwestern Center for Water Research, water@northwestern.edu