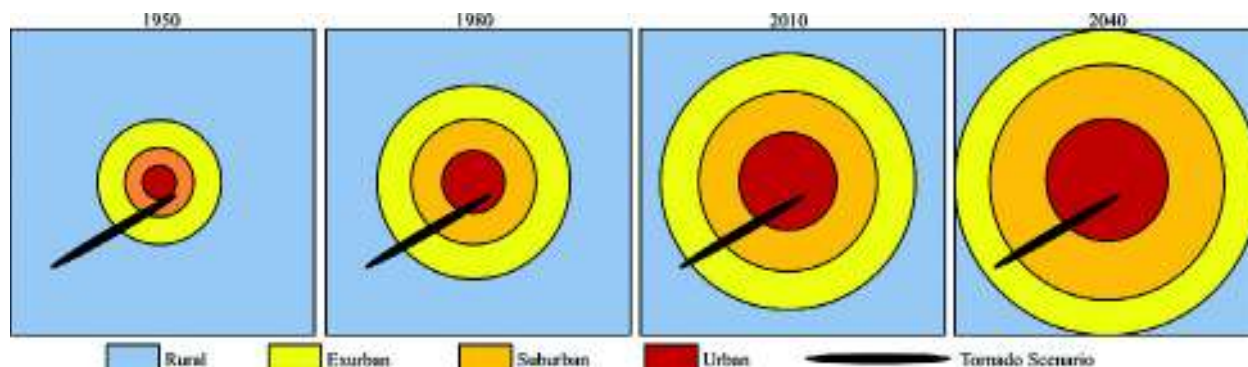


the subject manually, from journal to journal and from report to report, through hundreds or thou-

sands of sources,” says Santiago Pujol, a Purdue civil engineering professor. “Without the general-

ized use of tools like DataStore, we [were] losing data, time, and effort.” (SOURCE: Purdue University)

## PAPERS OF NOTE



**A conceptual model of the “expanding bull’s-eye effect” for a hypothetical metropolitan region that is characterized by increasing development spreading from an urban core over time. A sample tornado scenario is overlaid to show how expanding development creates larger areas of potential impacts from hazards.**

### IS THE EXPANDING BULL’S-EYE EFFECT LEADING TO GREATER AND MORE FREQUENT WEATHER DISASTERS?

Despite decades of improvement in activities aimed at reducing impacts from extreme events, the rapid increase in disaster losses and people affected suggests that swelling populations, development trends, and vulnerabilities are outpacing mitigation, leading to greater event frequencies and amplified impacts. Due to data, computational, and methodological restrictions, research quantifying changes in human exposure to hazards has been relatively limited. Our research attempts to rectify this deficiency, advancing a framework for future work exploring how exposure and vulnerability contribute to disasters.

Our investigation employs historical exposure data on a uniform grid to appraise how transformations in Chicago’s land use have led to greater potential for tornado

disasters. Chicago is an ideal example of the enormous growth that metropolitan regions have witnessed during the last century. The area is characterized by a dense urban core and has experienced extensive, spatially fragmented suburban growth, or sprawl. We argue that this development pattern leads to an “expanding bull’s-eye effect”—that is, people, their possessions, and infrastructure are

increasingly exposed to geophysical hazards as populations grow and spread. Accordingly, it is not solely the population magnitude that is important in creating disaster potential; it is how the population is distributed across the landscape that determines how the underlying disaster components of risk and vulnerability are realized.

We couple synthetic tornado events and event-derived (Joplin,

## ECHOES

“**Novel and optimistic though these submissions are, they are unconvincing and must fail.**”

—New Zealand High Court Judge JOHN PRIESTLEY, in his ruling against a Pacific islander who was attempting to become the first climate change refugee. A native of Kiribati, Ioane Teitiota had sought to remain in New Zealand after his visa expired because his island home was threatened by rising water levels. His lawyers claimed he was being “persecuted passively” by the environment and that the Kiribati government was unable to rectify the situation. While the judge agreed that Kiribati and its residents suffered environmental hardships, he rejected Teitiota’s claim of persecution, also noting that millions of other residents of low-lying countries face similar environmental threats to their homes.

(SOURCES: Agence France-Presse; Phys.org)


Missouri EF5) damage context with a spatial modeling approach to evaluate the expanding bull's-eye effect using the superposition of hypothetical tornado events atop varying development morphologies. Results show that the number of people and their housing continue to geographically expand, confirming that more people and their possessions are potential targets for tornadoes. We illustrate how differing development types lead to varying exposure rates that contribute to the unevenness of potential weather-related disasters across the region. For instance, a sprawl type of suburban development has led to the greatest change in hazard exposure setting. Conversely, while population loss along the periphery of the urban

core has decreased the number of people potentially affected, those that remain may be highly vulnerable due to enhanced sensitivity/susceptibility and reduced adaptive capacity caused by poverty. More recently, inward migration to the central business district has promoted a very dense exposure in the urban core with concentrated catastrophic disaster potential that could potentially overwhelm critical infrastructure.

While climate change may amplify the risk of certain hazards, the root cause of escalating disasters is not necessarily event frequency, or risk, related. Rather, our research confirms that the upward trend in disasters is predicated on increasing exposure and vulnerability of populations.

We recommend a worst-case hazard scenario approach using representative hazard models on high spatial resolution datasets of vulnerability as the basis for mitigation planning and action. Communities need to understand how local exposure landscapes have transformed spatiotemporally and how those changes may influence the tasks of warning, rescue, and recovery should a catastrophic scenario come to fruition.—WALKER S. ASHLEY (NORTHERN ILLINOIS UNIVERSITY), S. STRADER, T. ROSENCRANTS, AND A. KRMENEC. “Spatiotemporal Changes in Tornado Hazard Exposure: The Case Of the Expanding Bull’s Eye Effect in Chicago, IL,” in a forthcoming issue of *Weather, Climate, and Society*.

## Remote Weather Data, Versatile Integration




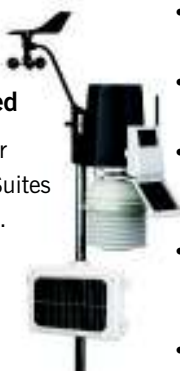
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