City of Dallas Leverages Analytics to Inform Resilience Strategy

CASE STUDY

The Challenge: In 2015, the City of Dallas joined the 100 Resilient Cities initiative and appointed its first Chief Resilience Officer (CRO). Tasked with creating a resilience vision for the city and minimizing the impact of unforeseen events, Dallas's CRO needed to have a strong understanding of potential economic losses due to natural disasters and what measures are most effective at mitigating those losses.

Flooding was a particular area of concern for city officials. About 19 inches of rain fell on Dallas in May 2015, making that month the wettest in the city's history. The annual rainfall record for the City of Dallas would eventually be broken later that year, with a total of more than 62 inches recorded. While flooding was top of mind, given the recent experience, could the city leverage data and analytics to develop a holistic view of risk and an appropriate resilience strategy?

City of Dallas

The Solution

AIR is a 100 Resilient Cities platform partner and offers consulting services informed by catastrophe modeling. This risk assessment can evaluate the damage potential of natural disasters and determine the benefits of risk mitigation measures. The City of Dallas selected AIR to perform this analysis because they needed the following:

1. **A comprehensive assessment of risk.** AIR can assess and quantify the risk from a wide range of threats, including flood, earthquake, hurricane, and wildfire. AIR models leverage the most current scientific understanding of extreme events and how the built environment responds to them.
2. **A fast and efficient solution.** AIR maintains databases of commercial and residential properties across the globe that enable near real-time risk modeling without on-site inspections or requiring additional data from the city.
3. **A trusted expert they could depend on.** AIR founded the catastrophe modeling industry and has a proven track record of helping private and public organizations understand the risk they are exposed to and interpreting analysis results to inform decision-making.

The first stage of this engagement was to determine which perils were the most pertinent to Dallas from a damage and loss perspective. Although the city's primary concern was inland flooding, AIR's analysis in fact revealed that the city's most economically significant hazard is severe thunderstorm and the hailstorms, tornadoes, and straight-line winds that those storm systems spawn. Figure 1 shows the contribution by peril to average annual expected losses for the City of Dallas based on the AIR models.

Peril	Proportion of Expected Losses
Severe thunderstorm	58%
Inland flood	38%
Winter storm	2%
Hurricane	1%
Earthquake	0%

Figure 1: Contribution to expected losses by peril for Dallas County. (Source: AIR analysis)

AIR

While city officials expressed interest in exploring next steps toward a severe thunderstorm resilience strategy, their immediate concern remained the flood peril. AIR's initial flood analysis results highlighted impacts to business districts and residential areas with potentially vulnerable populations, so in the next stage of the engagement, AIR performed a targeted analysis of specific critical buildings across the city.

In particular, Dallas was interested in hospitals and the potential economic benefit of investment in flood mitigation measures. For these locations, a detailed flood damage assessment was performed and different risk mitigation options were evaluated. For example, the analysis found that protecting mechanical, electrical, and/or plumbing service equipment in the floodable parts of a hospital's basement by elevating the equipment could reduce repair and replacement expenses by more than 15%. AIR also determined the extent to which exterior flood walls around a local warehouse could help reduce water damage and quantified how the damage would be reduced as the height of the protection system was increased.

The Benefits

The engagement brought various city agencies together, including the Building Code Department, Public Works Department, and the Environmental Planning and Emergency Planning Department, to inform Dallas's resilience strategy. Using the data and analytics that AIR provided, the city can now create more effective emergency plans and prioritize the resilience investments that have the greatest return. For example, in the case of severe thunderstorms, Dallas could consider an insurance policy that would protect uninsured properties that are exposed to damage from hailstorms, tornadoes, and straight-line winds.

The potential use cases for the City of Dallas to leverage analytics are not limited to those in this initial study. Opportunities include studying how changes to building codes improve a community's ability to withstand the effects of disasters or even developing financial instruments that disburse emergency funds in the case of unexpected events.

Summary

AIR's consulting service helps public and private organizations develop resilience strategies by providing unique insights derived from data and analytics. These organizations benefit from having a data-driven view of the risk that is unbiased and reflects the most up-to-date scientific knowledge. With the help of AIR, the City of Dallas was able to gain a new appreciation of the potential economic losses their communities are exposed to and begin the process of developing better informed risk mitigation plans.