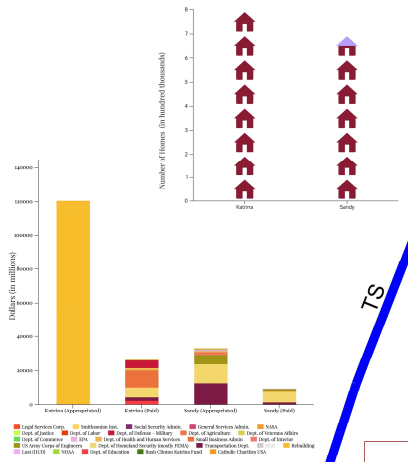
Social Vulnerability: A Comparative Analysis of New Orleans and New York City

How can social vulnerability predict who will potentially be most impacted by future storms given our analysis of Hurricanes Katrina and Sandy?

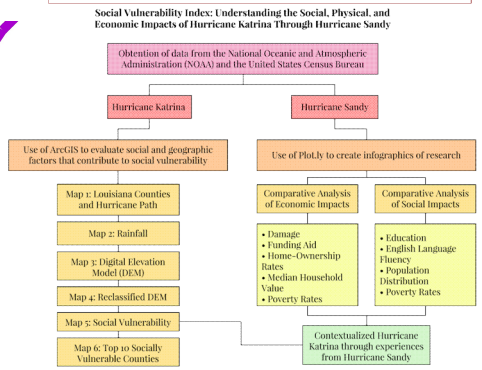
Abstract

Hurricanes Katrina and Sandy disproportionately impacted minority and low-income residents; the social vulnerability index uses this lens to analyze severe weather events. While the affluent lost more nominally, the poor lost relatively more. Katrina and Sandy were the two most costly hurricanes in US history, amounting to $153.8 and $67.6 billion in damages. Each storm's aftermath had wide-ranging social and economic ramifications: nearly 80% of New Orleans was inundated and New York lost $25 billion in unrecoverable business activity. In addition, we are investigating how both metropolitan areas continue to feel the effects of both cyclones.

The social vulnerability index assesses susceptibility to natural disasters, and uses factors such as English language-proficiency, disabilities, and median household income to do so. We visualized demographic data from the U.S. Census Bureau on maps of each affected state. Geospatial techniques and the social vulnerability index furthered our analysis of the distinct social and physical conditions in each city. The social vulnerability index could be used as a policy tool to better predict who will be most impacted by future storms and to more equitably distribute disaster relief efforts.



Methodology

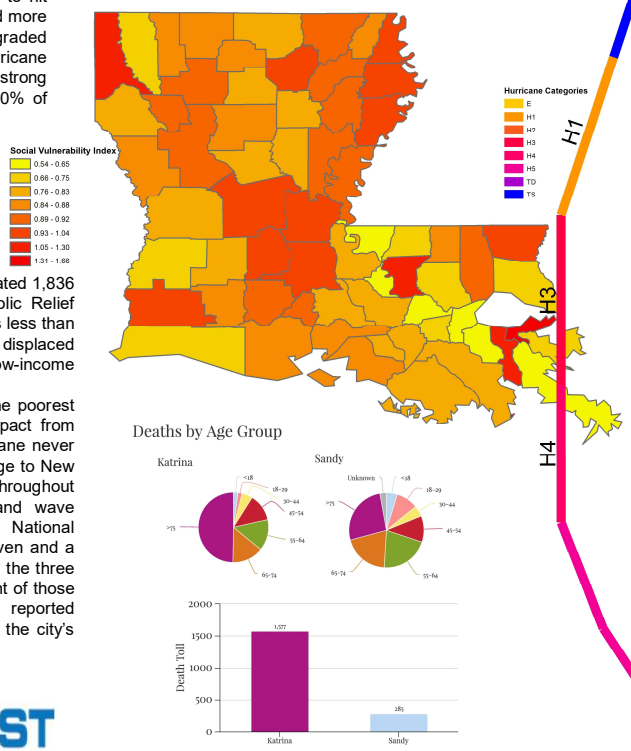


Background

On August 29, 2005, the costliest hurricane ever to hit the United States swept through New Orleans and inflicted more than $135 billion in damages. Though Katrina was downgraded from Category 5 to Category 3 on the Saffir-Simpson Hurricane Scale, by the time it made landfall in the Gulf Coast, strong winds and storm surge caused flooding in more than 80% of New Orleans.

While Katrina could not have been prevented, New Orleans and its surrounding areas could have been better protected from damage. As New Orleans is below sea level, the city is already susceptible to flooding. Most of the damage from the storm was a result of the failure of the city's primary flood protection systems. When over 50 levees of the floodwall failed, most of the city was flooded and an estimated 1,836 people lost their lives; more still were displaced. Catholic Relief Services estimated that 30% of the displaced had incomes less than one and a half times the poverty line. Ninety percent of displaced persons came back to the city, yet only 30% of low-income neighborhoods' residents had returned as of 2013.

As in New Orleans seven years earlier, some of the poorest residents of New York City beared the brunt of the impact from Hurricane Sandy on October 22, 2012, though the hurricane never actually hit the city itself. The storm caused severe damage to New York City's subway and transit system, affecting workers throughout the city. The pure kinetic energy for storm surge and wave destruction potential reached a 5.8 out of 6 on the National Oceanographic and Atmospheric Association's scale. Seven and a half million people lost power, and about 20,254 flights to the three New York area airports were canceled. Forty-three percent of those seeking federal aid for losses in Superstorm Sandy reported incomes below $30,000 per year and one out of five of the city's public housing units were in buildings damaged by Sandy.



Data & Results

Uneven distribution of wealth was common in New Orleans and New York long before Katrina and Sandy hit. Rather than create new wealth inequities, Katrina and Sandy exacerbated pre-existing divides. Our social vulnerability map of Louisiana shows the areas whose residents were most susceptible to natural disasters like these. While relief response to Katrina was highly disorganized, disaster relief funding after Sandy was more effectively spent. Katrina destroyed more homes and killed more people than Sandy as can be seen in Graphics 1 and 2.

Analysis & Conclusion

Should a hurricane hit New York City, we can prepare for the potential damage it may cause by looking at previous storms, including Katrina and Sandy. In the analysis of the geographic conditions in Louisiana, and, more specifically, in New Orleans, we have determined that elevation, tidal patterns, and rainfall play a large role in the physical damage done to areas hit by hurricanes. After examining demographic features of New Orleans and New York City, we can conclude that characteristics such as median household income, disabilities, single parents, English fluency, and age, factor into social vulnerability. In Map 5, which illustrates social vulnerability, we can see that New Orleans had a low median income and a high density of disabled persons, single parents, and elderly individuals, and therefore it should not have come as a surprise that the city was hit hard. Had someone examined the social vulnerability of the city, perhaps the susceptible areas would have had a more accurate picture of the coming storm.

If we look closer to home, at Hurricane Sandy's effects, we can see that in addition to the destruction of property, one of the largest effects of the storm was on the city's economy. With the fine-tuning of the Social Vulnerability Index, we will be able to assess the potential damage on residential and commercial areas and to prepare efficient evacuation plans as well as disaster relief distribution.

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