

Analyzing, Modeling, and Mapping the Impact of Hurricanes Katrina and Rita on the Spatial and Temporal Distribution of Crime in Houston, TX

Leitner Michael
Department of Geography and Anthropology, Louisiana State University
mleitne@lsu.edu
Estados Unidos

The application of Geographic Information Systems (GIS) in the analysis, modeling and mapping of crime has gained much interest among law enforcement agencies in the US since the 1990s. This interest has mainly focused on the development of methods to identify spatial crime hot spots, the analysis of spatial relationships between crime incident locations and socio-economic variables of the population or the physical and structural characteristics of the urban landscape, the prediction of future crime locations, and reasons for crime displacement as a result of natural disasters and urban development projects.

The impact that a natural disaster, such as a hurricane, an earthquake, or a Tsunami has on crime is not well understood. Almost unknown are also the consequences that new international agreements, such as the abolition of systematic border controls (Schengen Agreement) or large sporting events, such as international soccer tournaments (e.g., EURO 2008 or the upcoming FIFA 2010 World Cup) that also attract many hooligans, have on crime.

While Cohen and Felson (1979) discuss how changes in routine activity patterns have increased crime rates over a long period of time (almost three decades), several recent studies have tested the impact that sudden or short-term changes in the routine activity approach (such as a hurricane event) have on crime rates. For example, Cromwell et al. (1995) conclude from their study in the aftermath of Hurricane Andrew in 1992 that crime actually went down in the hardest hit areas (South Dade County, FL) in the weeks after the storm. The authors interpret their findings by stating that while the supply of motivated offenders and vulnerable targets increased, the level of guardianship also increased, especially through informal guardianship, which maintained order and control of deviance by families, friendship groups, neighborhoods, and other primary and secondary groups in the community.

A second study by Leitner et al. (under review) investigated the impact massive population displacements following Hurricanes Katrina and Rita had on crime rates in Louisiana. Similar to the study by Cromwell et al. (1995) results showed a decline in post-hurricane crime rates. One prominent exception from this trend was Orleans Parish, including the City of New Orleans, where crime rates originally went down, but rapidly “recovered” to pre-Katrina levels after a few months. The same study also noted that while local spatial analysis found a consistent cluster of low violent and non-violent crime rates for both pre- and post-hurricane time periods in east-central Louisiana, no consistent hot spot was identified for both crime categories during the same time periods in any parts of the state.

This research analyses, models and maps the impacts that two consecutive disaster events – Hurricanes Katrina and Rita – had on the temporal and spatial distribution of reported crimes in the city of Houston, TX. Crime data were downloaded from the Houston Police Department (HPD) website (<http://www.houstontx.gov/police/cs/stats2.htm>) and included the offense date and time, the offense type, police beat, and the street address (by block), where the offense happened. Crime data were subsequently geocoded and aggregated by offense type and day. The time period

analyzed covered several weeks before, during, and after the landfall of both hurricanes. The modeling part of this research included both hot spot techniques (kernel density and nearest neighbor hierarchical clustering) as well as time series (ARIMA models) analyses. Modeling results were visualized and conclusions were drawn about spatial and/or temporal changes of crime hot spots during the observed time period.

Preliminary results show a significant increase in burglaries from September 21st through September 24th 2005, (temporarily) coinciding with the largest ever evacuation in Houston history caused by the approaching Hurricane Rita (it eventually made landfall on September 24th). Similar significant increases were not found among any of the other crime types for the same time period. Similarly, Lawton (2007) reported a significant short-term increase in burglaries in high minority population super-neighborhoods (either Hispanic or African-American) in Houston, TX following Hurricane Rita. He explained his findings that the city police was needed to handle and oversee the evacuation of its population and only responded to the most important emergencies. According to the routine activity approach, this led to an absence of capable guardians (i.e., city police) in some neighborhoods of the city and to an increase in opportunity-driven crime, such as burglaries.

References

Cohen, L. E., and M. Felson. 1979. Social change and crime rate trends: A routine activities approach. *American Sociological Review* 44: 588-608.

Lawton, B.A. 2007. Assessing the impact of Hurricane Katrina on space-time clusters of crime patterns in Houston. Ninth Crime Mapping Research Conference, Pittsburgh, PA, March 28-31 2007.

Leitner, M., Barnett, M., Kent, J., and T. Barnett. The impacts of Hurricanes Katrina and Rita on public safety in Louisiana - A spatial and temporal analysis of reported crimes. *The Professional Geographer* (under review).