Background:
In October 2012, Superstorm Sandy rocked several US states. New Jersey arguably suffered the most extreme damage, with over 161,000 families displaced following the Superstorm (IDMC 2015). Two counties within New Jersey that experienced heavy damage were Monmouth and Ocean counties (FEMA 2015). To demonstrate the long-lasting economic consequences of disaster, this project uses two American Community Surveys, one before Superstorm Sandy and one after, to analyze changes Monmouth and Ocean counties suffered as a result of the Superstorm.

After the Superstorm
Ander Pierce, May 9th, GIS 101

Methods:
I started by gathering block group level ACS data from the 2006-2010 (pre-Sandy) and 2011-2015 (post-Sandy) 5-year surveys. Data was selected to include demographic information, as well as data on median income, gross rent, and owner occupancy. Data was spliced together on a separate excel sheet, and differences in owner occupancy (OO), gross rent (GR), and median income between each survey were calculated. This data was spliced onto a basemap that used US census tracts at the block group level.

A series of points representing Household Damage inspections carried out by FEMA were added to the map. These points were joined to the polygons and used to estimate the total household damages each county suffered, using guidelines for $ cost of damages included in a FEMA read-me file. For this, the field calculator tool was used.

From there, I converted data on economic change into a series of rasters. Then, I reclassified these rasters creating abstract visual charts of economic change in Monmouth and Ocean counties. Each raster had 7 categories, higher values represented more significant negative changes in economic status for a block group. This means a ‘Change in Gross Rent’ value of 7 represents a massive drop in dollar cost for gross rent.

After this, I decided to use the raster calculator tool to try and find block groups that were beleaguered by economic depression, or that suffered from an intense affordability crisis. To do this, I constructed two scenarios (see map below):

- Scenario 1: Rent increases while median income decreases provoking an Affordability Crisis

  oFormula: Change in Median Income (a value from 1-7) – Change in Gross Rent (a value from 1-7)

  oExample: 5 MI (significant drop in median income) and 3 rent (significant increase in mean rent) results in a score of 2

- Scenario 2: Rent decreases as does median income resulting in Economic Depression

  oFormula: Change in Median Income + Change in Gross Rent / 2

The STATA tables demonstrate the massive changes in economic status suffered by counties affected by the storm. Even though the results of these analyses clearly demonstrate economic change associated with the Superstorm, they do not even begin to hit at some of the brutal effects of the storm. They make no account of displaced individuals. It does not track infrastructure damage, only household damage. It totally fails to account for mental health damage incurred by disaster. If we truly wish to comprehend and combat the suffering caused by disasters such as Superstorm Sandy, we must develop new modes of data gathering that seek to meet the needs of displaced and traumatized people.

Results:

I converted the rasters generated by these calculations into polygons, used them to select polygons from the original block groups joined to the census. These polygons had data on both estimated dollar cost of damages and change in economic conditions. I used the table to excel tool to convert the tables of these maps into excel documents.

Finally, I imported these excel documents into STATA. From there, I compared the mean change in median income, gross rent, and owner occupancy between 2006-2011 FEMA and 2011-2015 FEMA by levels of damage between counties with and without Superstorm damage. These analyses allowed me to indicate association between the Superstorm and long lasting changes in quality of life (figures 1-4).

Sources:


Global Estimates 2015

The mean change in Income in Monmouth and Ocean counties tracts, for all tracts and just for tracts with at least $5000 in damages. Note that tracts with at least $5000 in damages had an average reduction in mean income of more than $2,100 between the 2010 and 2015 ACS 5-year surveys.