Work Unit 4.2
Integration of Multiple Monitoring Systems Targeting Coastal Zones – Mid-Hudson and Upstate New York

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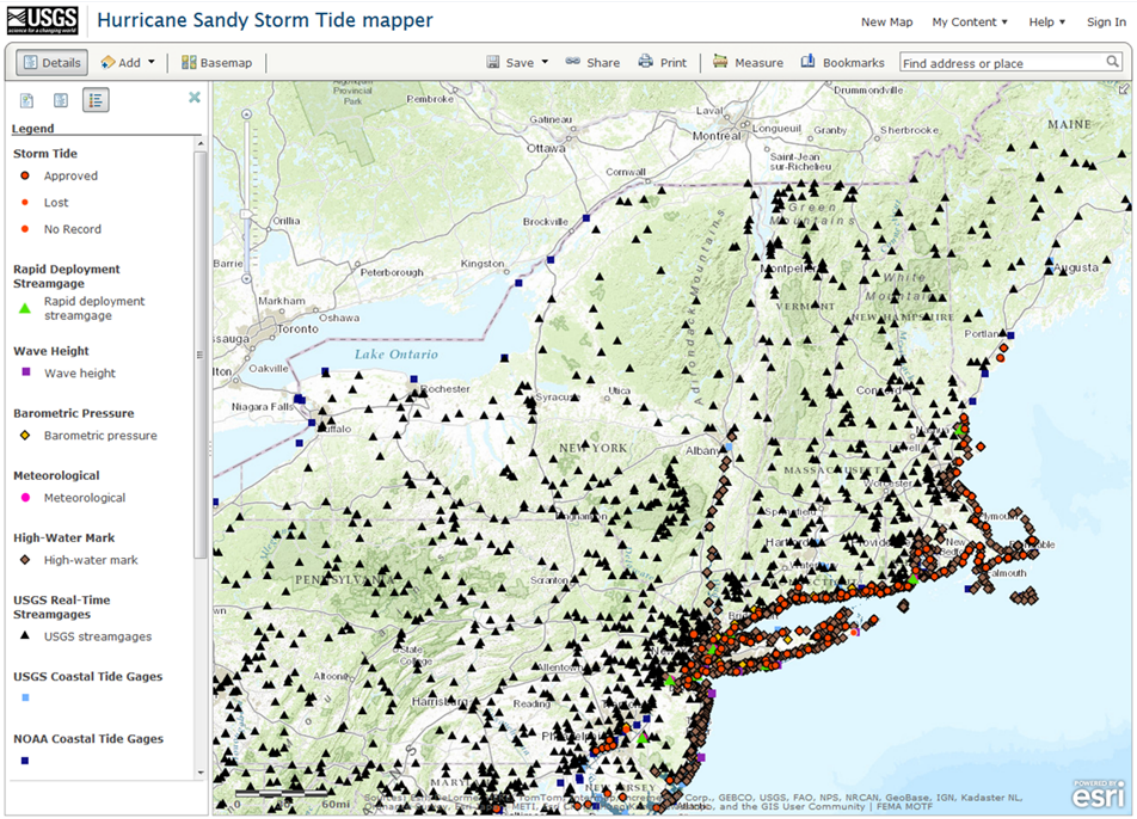
BACKGROUND

- A number of water quality and water level environmental monitoring networks are currently in operation in NYS
- These systems can provide critical information to communities about water safety and the risks of flooding
- The monitoring networks are also subject to damage during extreme weather events and this can limit their effectiveness
- The spatial distribution of these monitors should reflect their potential use to provide timely information to communities at risk for flooding and other environmental risks



Source: Hurricane Sandy Storm Tide Mapper https://water.usgs.gov/floods/events/2012/sandy/sandymapper.html

Note: This presentation is drawn from work conducted by C.E. Restrepo, R. Zimmerman and H.B. Kates for Work Unit 4.2, "Integration of Multiple Monitoring Systems Targeting Coastal Zones: Mid-Hudson and Upstate New York," New York State Resiliency Institute for Storms & Emergencies.

Project Scope

- As part of WU 4.2 the NYU team conducted the following tasks:
  - Identify and Describe Environmental Monitoring Efforts and Databases
  - Evaluate the Spatial Distribution of Monitoring Efforts and Databases
  - Identify Threats to Current Monitoring Efforts
  - Recommend Improved Monitoring to Support Storm and Emergency Management

METHODOLOGY

- Single- and multiple-predictor negative binomial regression models were used to assess whether there is a statistically significant association between number of stream gages and physical and demographic characteristics for New York State at the county level. The physical variables include measures of land area and surface water area. Data about the location of stream gages was obtained from the U.S. Geological Survey (USGS).
- Geographic Information Systems (GIS) were used to combine available data from the National Flood Hazard Layer (NFHL) and other sources of information produced by the Federal Emergency Management Agency (FEMA) and the location of stream gages.

DATA

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Number of USGS Stream Gages	62	Title	25.0	6.290	4.64
Land Area in Square Miles	62	22.76	2,680.38	760.09	490.83
Water Area in Square Miles	62	2.37	1,461.29	119.83	248.69
Population (2013 estimate)	62	4,773.00	2,592,149.0	316,953.66	546,120.44
Population Density	62	2.78	71,776.09	3,106.03	11,175.80
Black or African American alone, percent, 2013	62	.9	43.3	6.90	7.76
Hispanic or Latino, percent, 2013	62	1.2	54.6	7.37	8.97
White alone, not Hispanic or Latino, percent, 2013	62	10.5	96.0	81.99	17.13
Per capita money income in past 12 months (2012 dollars), 2008-2012	62	18,048.0	61,951.0	27,260.26	7,080.47
Median household income, 2008-2012	62	34,300.0	97,049.0	54,246.18	12,992.61
Persons below poverty level, percent, 2008-2012	62	5.8	29.3	13.64	4.07

Source: U.S. Census Bureau Gazetteer Files and State and County Quickfacts; Data are defined at the county levels. .

RESULTS

- There is evidence of a statistically significant association between the number of stream gages and total land area but the same is not true for the water area variable.
- There is little evidence of statistically significant associations between number of stream gages and demographic variables, although there is evidence for an association with total population and percent Hispanic.
- The results of the GIS analyses indicate that a significant number of counties are missing data on flood risk. is producing and making publicly available. This work is limited by the availability of data since only 26 counties out of a total of 62 have complete and current NFHL information. For counties that have complete or partial flood risk data the distribution of stream gages located within the 100-year or 500-year flood plain varies significantly

Conclusions

- The results obtained as part of this work suggest that the location of stream gages depends more on local decisions and the availability of resources than on statewide planning that takes into consideration environmental risks.
- The methodologies presented as part of this work unit could be used as inputs to future environmental planning efforts that address concerns about flood risks and vulnerable populations.
- In addition, the methodologies used as part of this work unit could be extended and applied to smaller geographical units such as municipalities. This is a proposed future research direction and the results could provide inputs to local decisions about where to site environmental monitors.