



Lessons Learned on Social Vulnerability: Disaster Risk Management and Climate Change

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Research

Main Research Projects

2003-2010 *Lead Graduate Research Assistant*, “National Science Foundation Engineering Research Center for Collaborative Adaptive Sensing of the Atmosphere (CASA)”.

End User Integration Thrust: Brenda Phillips, MBA (UMASS), Havidán Rodríguez Ph.D (UDEL), and Walter Díaz Rodríguez, Ph.D (UPRM).

2004-2006 *Lead Graduate Research Assistant*, “Population Composition, Geographic Distribution, and Natural Hazards: Vulnerability in the Coastal Regions of Puerto Rico” Disaster Research Center, University of Delaware, Physical Oceanography Laboratory (POL) and Center for Applied Social Research (CISA), University of Puerto Rico at Mayagüez.

Researchers: Havidán Rodríguez, Ph.D. (DRC), Aurelio Mercado, Ph.D. (POL) and Walter Díaz, Ph.D. (CISA)

Graduate Research Fellowship

2010-2012 *Research Associate*, Geographic Information Sciences and Technology Group (GIST), Climate Change Science Institute (CCSI), Oak Ridge National Laboratory (ORNL), U.S. Department of Energy (DOE), Oak Ridge, TN.

Dissertation

Santos-Hernández, J. 2013. Integrating Perspectives on Social Vulnerability and Emergency Management in Puerto Rico. Doctoral Dissertation. University of Delaware. Department of Sociology and Criminal Justice. Newark, DE.

Population Residing in Areas Exposed to Storm Surge by Municipality

Ongoing Research

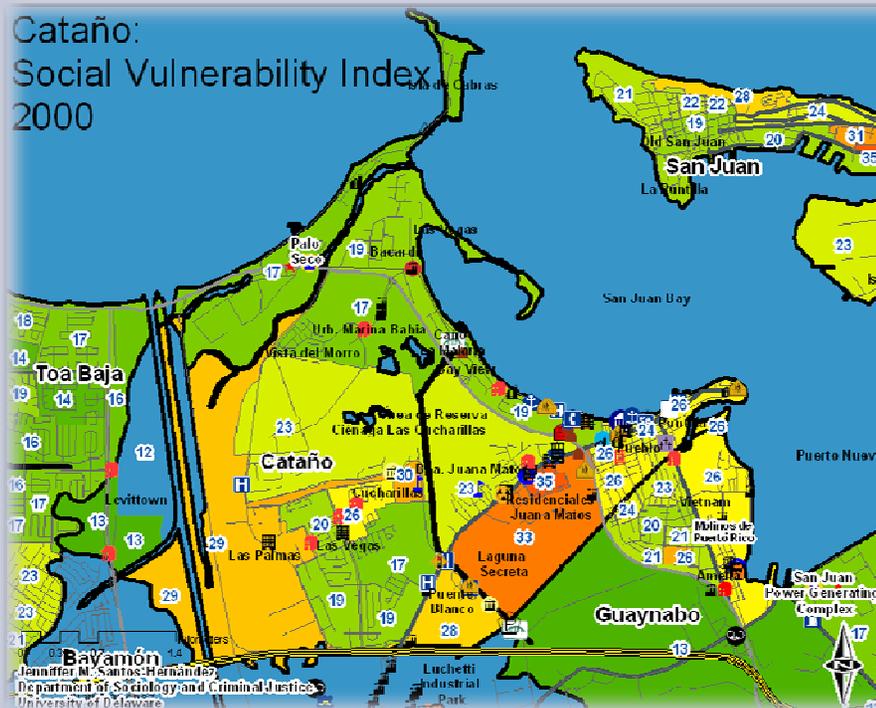
Municipality	2000*	2010 Preliminary Estimate
San Juan	74,541 (17.2%)	67,996
Toa Baja	42,656 (45.3%)	40,592
Carolina	40,097 (21.5%)	38,003
Mayaguez	24,778 (25.2%)	22,448
Cataño	22,157 (73.7%)	20,739
Loíza	16,387 (50.4%)	15,150

In 2000, 1.6 million people (46% of the total population) were residents of areas exposed to storm surge. A slight reduction is expected in 2010 because of the decrease in population from 2000 to 2010.

Data Source: U.S. Census of Population and Housing

* Santos-Hernández, J., Rodríguez, H. and Díaz, W. 2010. "Developing Social Vulnerability to Disasters in the Coastal Regions of Puerto Rico: Social, Political and Economic Processes." In Rivera and Demond (Eds) *How Ethnically Marginalized Americans Cope with Catastrophic Disasters: Studies in Suffering and Resiliency*. Edwin Mellen Press, Ltd.

PR Social Vulnerability Index



- Population density
- Presence of children under 18 years
- Family structure
- Poverty status
- Employed Labor Force
- Housing tenure
- Vehicle tenure
- Phone tenure
- Education
- Disability
- Elderly population

2010 Census Boundary Changes

1. Annexations to or detachments from legally established governmental units.
2. Mergers or consolidations of two or more governmental units.
3. Establishment of new governmental units.
4. Disincorporations or disorganizations of existing governmental units.
5. Changes in treaties or executive orders and governmental action placing additional lands in trust.
6. Decisions by federal, state, and local courts.
7. Redistricting for congressional districts and state legislative districts.
8. Ancillary changes to legal or statistical areas as a result of annexations or detachments; for example, reduction of territory for a census designated place as the result of an annexation by an adjacent incorporated place.
9. Changes to correct errors or more accurately place boundaries relative to visible features.
10. Changes to statistical areas as a result of concept or criteria changes.

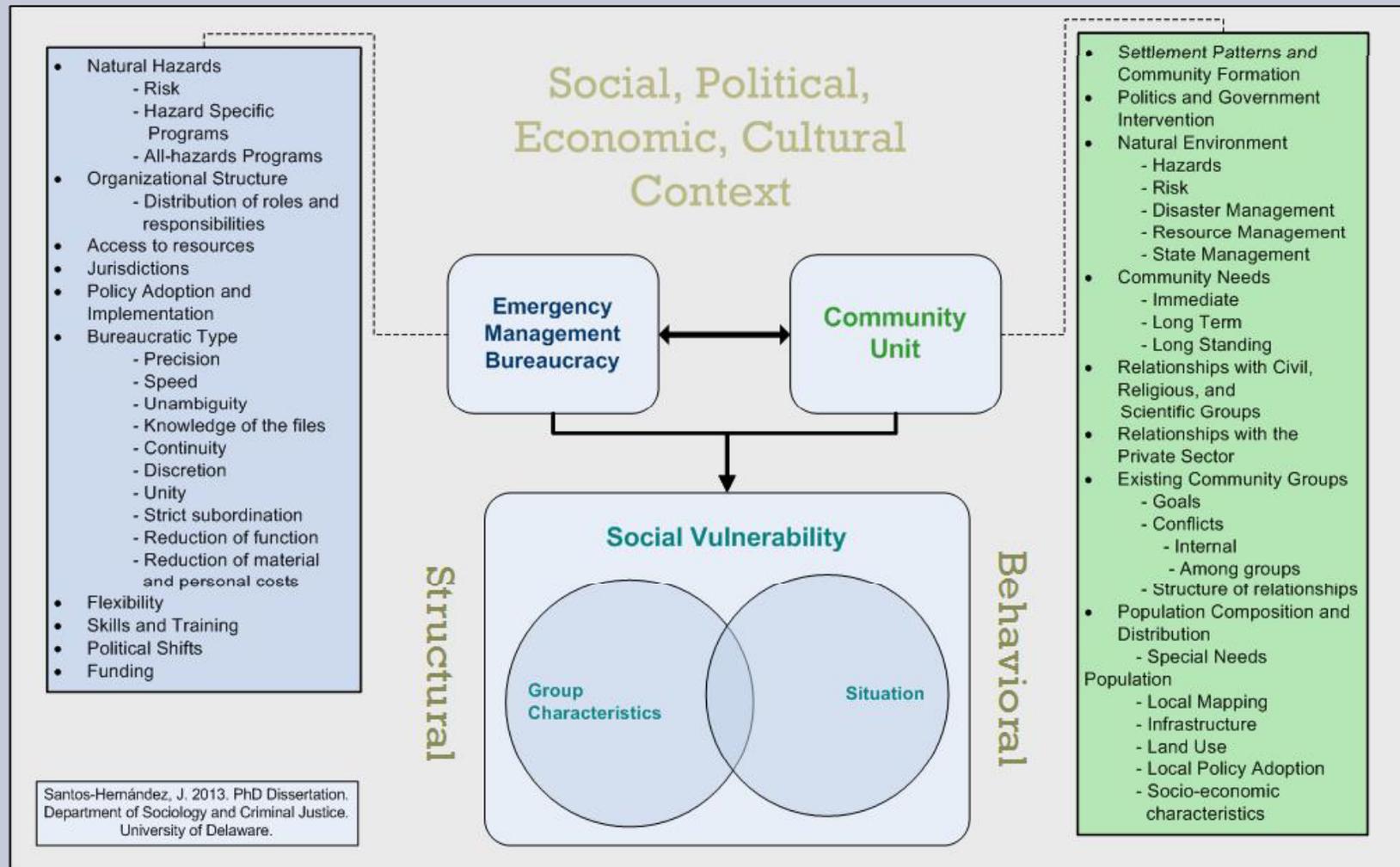
From Static to Dynamic Vulnerability

- “vulnerability... involves the totality of relationships in a given social situation producing a set of conditions that render a society unable to absorb the impacts of natural or social agents without significant disruption of its capacity to fulfill the basic needs of its members.” (Oliver-Smith, 2009)
- Social Vulnerability Indexes:
 - Often ignore the organizational features of disasters because they rely on demographic data
 - Fail to capture the essence of social relations which are vital to understand social vulnerability to disasters
 - Sensitivity to monitor change is a challenge

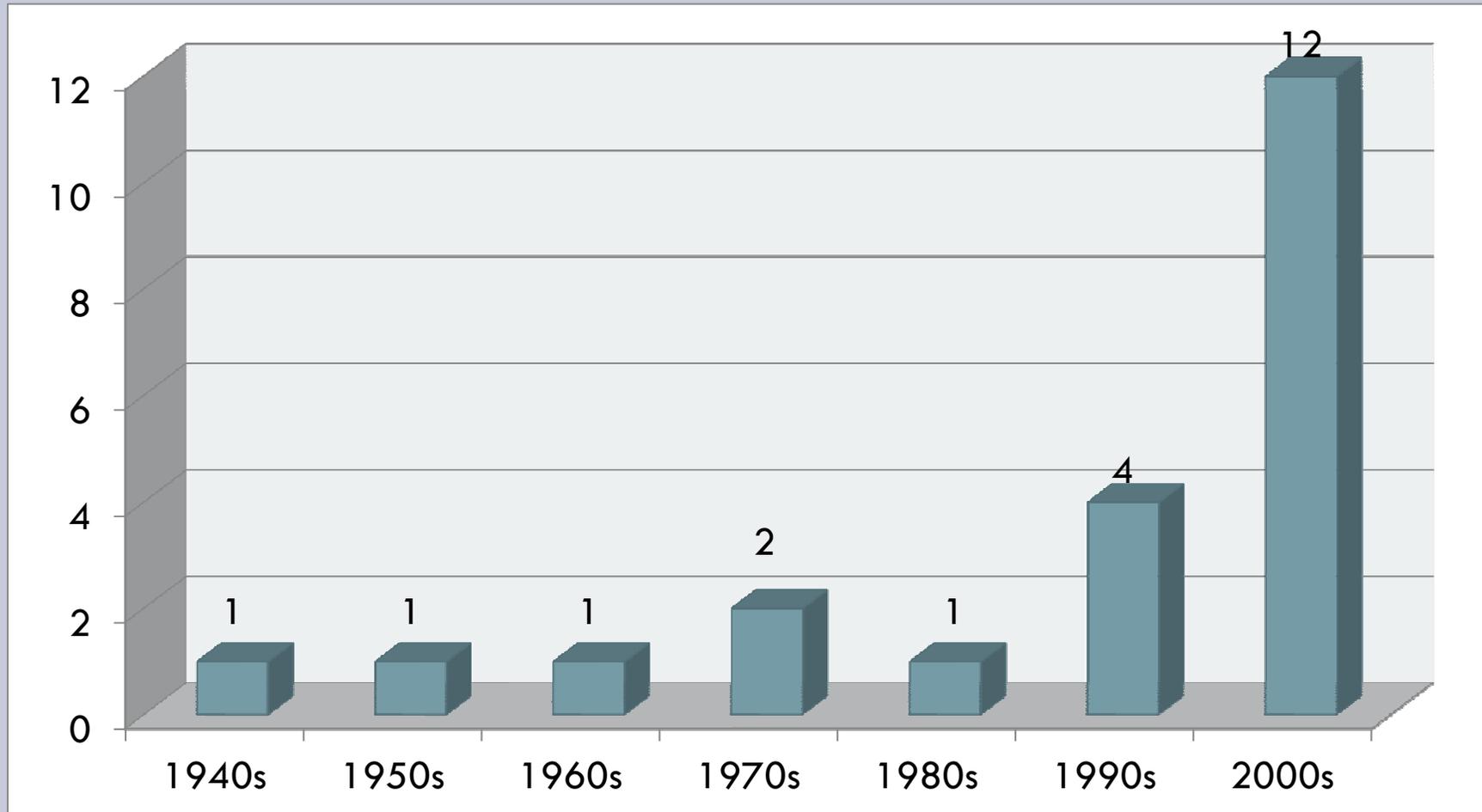
Contribution

- This research moves the discussion of social vulnerability to disaster in Puerto Rico from one focused on “indicators”, to one focused on interactions and dynamics among emergency managers and communities in a pre-existing condition of vulnerability.

Situational Approach to Social Vulnerability



Number of EM Policies 1940-2011



Policy Imports

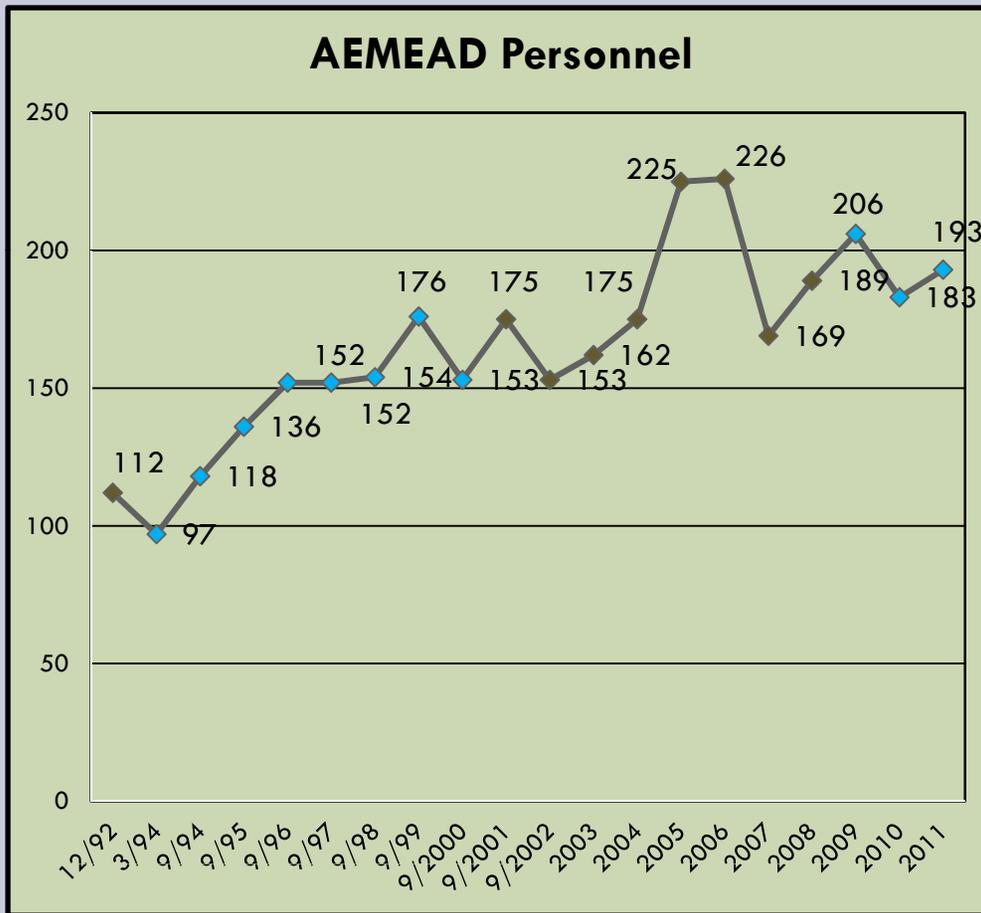
2012 Lantex Exercise



As part of the Tsunami Ready program sirens are installed in coastal communities. The warning emitted through the siren system at this specific location was for a shooting. Students in the school continued the evacuation although the recommended protective action in the message was to shelter in place.

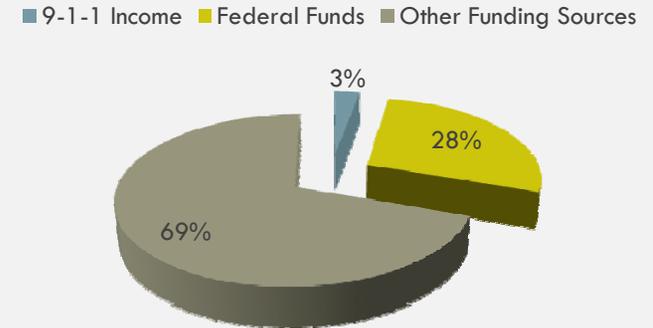
Even though English is an official language in Puerto Rico, the majority of the population communicates in Spanish, the main language of instruction.

Organizational Learning, Personnel and Funding Sources

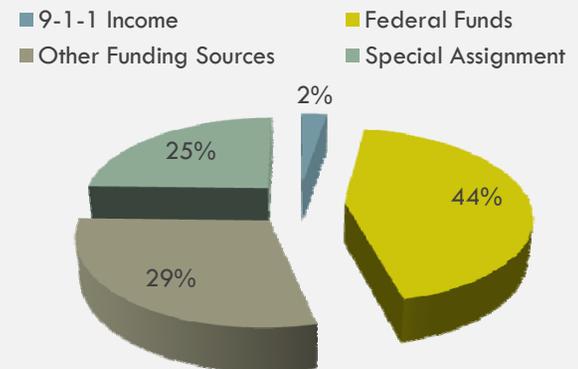


Political Party in Power
 Blue – Pro-Statehood Party
 Brown – Commonwealth Party

Funding Sources, 2002



Funding Sources, 2010



Case Study: Puerto Nuevo

Contradiction between most frequent, most dangerous hazard perceived, and preparedness efforts.



Case Study: Dorado, Puerto Rico

- Dorado, Puerto Rico
- Precipitation Event - May 31, 2010



Case Study: October 2009 Explosion

- October 23, 2009 at 12:14AM
- Explosion and subsequent fire
- Energy released comparable to a micro-seism of magnitude 2.8 in the Richter scale.
- Residents describe the explosion as a loud roar that woke them up.
- At the time, it was not clear what had happened. The possibility of a terrorist attack or of an airplane crash became rumors.
- Over 600 residents evacuated.
- EM State Office took over the management of the event.



Emergency Management/ Community Interactions and Dynamics

- Residents noted the absence of local officials.
- Local officials were often serving as information providers to State officials.
- State officials as the “experts”.
- Trust –
 - Government officials felt unwelcome.
 - Lack of trust in government officials.
 - Residents perceived that political leaders treated the situation as an opportunity to appear on the media.
- Residents are hesitant to allow outsiders in their communities.
- Inter-agency collaboration: Multiple agencies requesting similar information.
- Outdated maps and housing information
- Conflicts among community groups
- Drug dealing activity benefits other communities and users come from other areas.
- Reconstruction of homes
 - Residents required weekly, and sometimes daily, meetings with the government officials to understand the activities that were to be completed in the community.
- Change of administration
 - The company is now PUMA
- Meetings with PUMA
 - Lack of scientific advise
- Persisting social problems
- Need for emergency response/evacuation plans, training, and exercises.



Concluding Remarks

- Emergency management in Puerto Rico should be seen in a prism, in which federal programs are often performed ritualistically even as more pressing problems are not managed.
- There is a need to review emergency management and disaster policies:
 - Promote individual awareness and responsibility in a context of competing priorities and limited resources,
 - Develop assessment capabilities,
 - Training to maximize the use of the technology available and reduce unnecessary costs,
 - Promote organizational learning,
 - Collaborate with and provide support community organizations,
 - Reduce/eliminate patronage
 - Adopt and enforce a land use plan
 - Provide residents with a worst case scenario to facilitate preparedness and create awareness (Right to Know Act, 1986).
- There is a need to develop and implement programs that increase awareness , promote engagement, and mitigate hazards that more frequently affect communities.

