

The Need for a Resiliency and Vulnerability Observatory Network: *RAVON*

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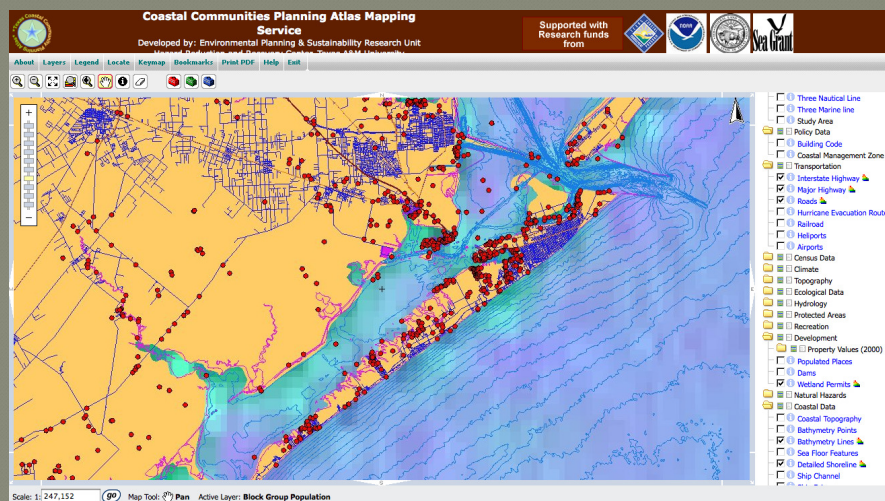
We have entered a “New Era of Catastrophes”

- Extraordinary growth in losses due to natural disasters over the last few decades
 - multi-billion dollar disasters have become the new norm
 - Hugo 7.6, Charley 8.8, Rita 10.7, Wilma 13.3, Ivan 14.1, Ike 16.0, Northridge 19.6, Andrew 23.7, Katrina 46.3
 - even have seen a very recent upswings in loss of life.
 - Katrina 1,836; Ike 358
- The notion of a mega-catastrophe is clearly in the realm of possibility

Disasters are still treated as acute not chronic issues

- The scientific consensus is that natural disasters, are not simply natural events....
 - They are an outcome of an interaction between biophysical systems, human systems and their built environment.
- Human action (or inaction) is in large measure driving these trends:
 - We continue to develop and expand into high hazard areas
 - Increasing hazard exposure
 - Destroying natural resources such as wetlands

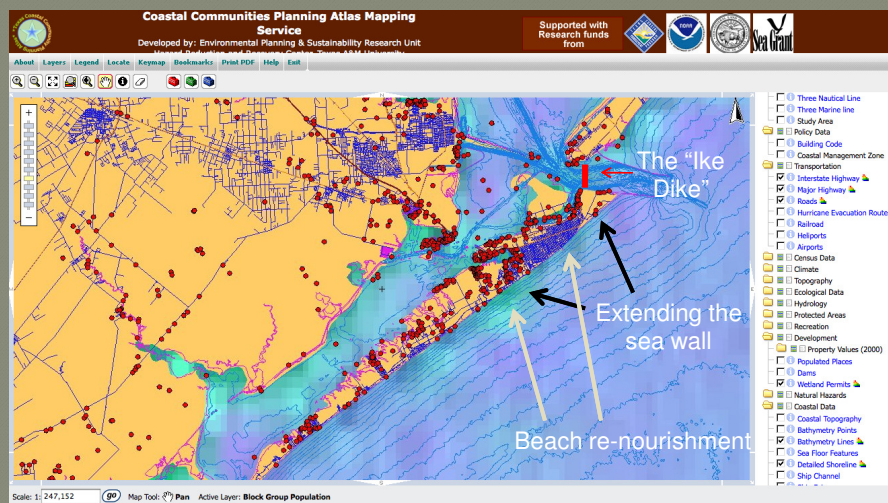
Wetland permits Galveston and Brazoria counties



...still counting on old solutions.

- And when disasters occur:
 - recovery requires massive infusions of external public and private resources, is highly uneven, and is likely to reproduce many preexisting vulnerabilities
- When vulnerabilities are addressed:
 - solutions focus on short term technological fixes such as levees, sea walls, and beach re-nourishment programs that can also have detrimental environmental consequences and promote increased development.

The Solution: to Galveston's Hurricane Vulnerability



In Short...

- ...many of our communities are becoming more vulnerable and less resilient.
- Despite gain and advances in hazards and disaster research, our current programs and approaches are not adequate for addressing fundamental and critical issues in resiliency and vulnerability science...

obstacles and constraints to vulnerability and resiliency science:

- Current funding mechanisms almost exclusively **support one-shot case studies of** limited duration
 - preclude the ability to monitor change in resiliency and vulnerability thereby hindering the development of models that explain change over time.
- Independent studies too often **fail to replicate measurement protocols** of common concepts
 - limit comparability across data collection efforts.
- Most studies only offer **partial views of place**
 - fail to capture the full complexity of coupled socio-ecological systems.
- Many independent data collection programs in the public and private sectors **are poorly coordinated and often inaccessible or difficult to access**
 - constraining data sharing among researchers and use by practitioners

Why RAVON?

- This observatory would address current obstacles by:
 - supporting development of **long term longitudinal data sets**;
 - Invest in the development of **data collection protocols to ensure comparable measurement** in multiple socio-political environmental settings and across multiple hazards;
 - **build on and complement existing data collection efforts and activities** in the public and private sectors; and
 - **Enhance the sharing of data** throughout research and practice communities

Call for RAVON consistent with:

- 1) The **Second Assessment** and its accompanying volumes which directly assessed the state of hazard and disaster research and research needs for addressing vulnerability and resiliency (Mileti 1999);
- 2) The **National Research Council's** assessment of social science research efforts funded by the NSF as part of NEHRP and future needs (NRC 2006);
- 3) The **National Science Board's** efforts addressing hurricane science research needs and the development of a new **National Hurricane Research Initiative** (NSB 2007);
- 4) The recent **Rising to the Challenge** report that focused on the critical failures to integrate social science research into the existing **national environmental observatories** (Vjajjhala, Krupnick, McCormick, Grove, McDowell, Redman, Shabman, Small 2007);
- 5) **NOAA's** efforts seeking to develop a social science research agenda related to hurricane forecast and warning (Gladwin, Lazo, Morrow, Peacock and Willoughby 2007); and
- 6) **USGS's efforts** to highlight national needs related to natural hazard risk reduction and management (Shapiro, Bernknopf, and Wachter 2007).

Resiliency and Vulnerability Observatory Network: RAVON

- Vision:

a future in which exemplary research builds the capacity of people and communities to withstand and rapidly recover from environmental extremes.

- Mission

...to provide the research community, policy makers, and society with the knowledge and predictive understanding necessary to reduce the vulnerability associated with natural hazards and enhance the resiliency of individuals and communities.

Working Definitions:

- **hazard vulnerability** is characterized as being a function of hazard exposure and physical characteristics
 - **Hazard** is generally defined in terms of the likelihood that events (earthquakes, hurricanes, etc.) of different magnitude and scope will impact a particular area.
 - **Vulnerability** is generally defined in terms of the damage to the built environment that will be sustained from each of the hazard events (NRC 2006:72-3).
 - Added critical dimension is - **social vulnerability**
 - capacity of individuals or social systems to anticipate, cope, resist and recover from the impacts of a hazard agent (Blakie et al. 1994; Heinz Center 2000).
 - SV is shaped by social structures and processes that determine access to scarce resources (income, wealth, social capital, power and housing), cultural factors (belief and customs), and driving forces such as urbanization and demographic change.

Working Definitions:

- **Resilience:** the ability of social systems, along with the bio-physical systems upon which they depend, to...
 - *resist or absorb* the impacts (deaths, damage, losses, etc.) of natural hazards,
 - to *rapidly recover* from those impacts and
 - to *reduce* future vulnerabilities through adaptive strategies.

The very nature of vulnerability and resiliency demands an observatory

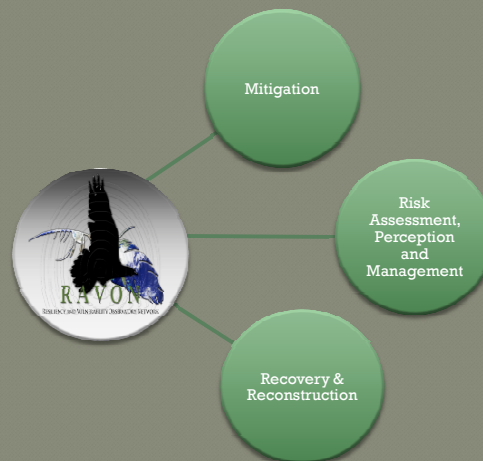
- NSF has undertaken major investments in establishing environmental observatories
 - focus on the structure and dynamics of the biophysical environment and its systems related to resiliency and sustainability issues
 - Long Term Ecological Research Network (LTER)
 - National Environmental Observatory Network (NEON)
- **What is lacking is an observatory that focuses on the nature and dynamics of the social systems and their built environments**
 - **which dramatically impact the bio-physical environment and its systems.**

Cross-Cutting Research Parameters for RAVON:

- Focus on natural disasters
- Enhance interdisciplinary research
- Promote comparative research
- Emphasize social vulnerability issues

RAVON's Research Agenda:

- Conceptual clarification
- Monitoring
- Modeling, evaluation
- Data sharing/dissemination
- Post-event research



three focus areas:

Mitigation

Mitigation generally refers to actions that are undertaken before hazard impact that limit or prevent loss at the time the impact occurs (NRC 2006:86).

- structural actions such as building levees and dams (Burby 1998).
- non-structural related to land use planning and building codes (Burby 1998).



Seaside, FL:
Smart growth in dumb locations?



Sacramento levee:
11,000 new dwelling units

three focus areas:

Risk assessment, perceptions, and management strategies

Risk assessment focuses on estimates by scientists and engineers on the likelihood and consequences of disasters.

Risk perception focuses on how individuals, groups and organizations view the risk and how they differ from experts.



Did risk assessments account for social vulnerability of different population groups?

three focus areas:

Recovery and Reconstruction

- Recovery and reconstruction remains the most understudied area in disaster research.
- Without a more complete understanding of recovery and reconstruction key dimensions of resiliency will remain missing.



Does the recovery process differ by type of housing and tenure?
What are the impacts of housing aid programs?

Guiding principles for data collection activities:

- Time dimension
- Standardization
- Comprehensive & representative views of place
- Building on existing efforts
- Data sharing

Structure and Governance:

• Many examples:

- National Center for Ecological Analysis and Synthesis (NCEAS, <http://www.nceas.ucsb.edu/>);
- the Long Term Ecological Research Network (LTER, <http://www.lternet.edu/sites/lna/> or <http://lna.lternet.edu/>);
- National Environmental Observatory Network (NEON, www.neoninc.org)

• RAVON

- Network of nodes: Regional, Thematic, Living laboratories
- National Executive Committee
- Technical directorate
- Advisory committee
- Technical sub-Committees

Structure and Governance:

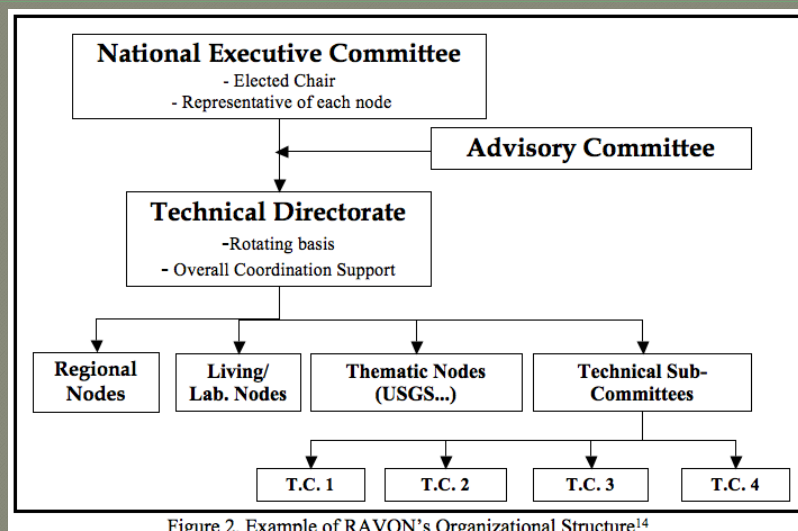


Figure 2. Example of RAVON's Organizational Structure¹⁴

Nodes:

- **Regional**
 - will carry out coordinated data collection activities
 - degree of autonomy to engaged in unique research activities.
 - core set of research activities, coordinated across the network.
 - Hubs coordinating researchers at a number of universities/Centers
- **Thematic**
 - existing centers or mission based agencies such as the USGS that are currently engaged in activities that can directly support the mission of RAVON.
- **Living Laboratories**
 - nodes established in areas impacted by a natural disaster -- undertaken and agreed upon by the entire network

Criteria for Regional Nodes:

- **A resident group of researchers**
 - a track record
 - links with the practice community
 - commitment that the research will be robust and sustained over a period of decades
- **Some regional distribution**
 - bio-physical environmental characteristics
 - including hazard types,
 - areas with chronic low level disasters,
 - past experience with high impact disasters,
 - and relatively high likelihood of high impact, low probability events;
 - socio-political environments (legal, political, socio-economic, cultural, and demographic characteristics)

Where do things stand?

- **RAVON is at the conceptual stage**
 - NSF and USGS have funded initial conceptual development
 - Robert O'Conner (NSF-SBE), Dennis Wenger (SBE-ENG), Carl Shapiro (USGS)
 - Workshop to more fully develop the concept is being planned
 - Funding of the "Living Laboratory: Galveston and Ike Recovery"
 - National Academies
 - Round table on Science & Technology for Sustainability
 - <http://www.nationalacademies.org/racon/racon.htm>
 - Xavier de Souza Briggs, Associate Director for General Government Programs, Office of Management and Budget
 - Adolfo Carrion, Director, White House Office of Urban Policy
 - National Research Council: NEHRP's roadmap
- **Will require multi-Agency participation and Coordination**

Summary

- RAVON offers the possibility of transforming the nature of research on natural hazard vulnerability and disaster resiliency.
- It provides a mechanism for dramatically altering the nature of the resiliency and vulnerability science by
 - providing the opportunities to develop comprehensive long term data sets in multiple locations
 - that will make possible temporal and comparative investigations that researcher will never be able to undertake given normal funding opportunities and structures.

Summary

- RAVON offers a necessary and fundamentally important complement to our nations' existing environmental observatories
 - But the focus will be the human and social structures and dynamics driving anthropomorphic environmental changes.
- The Science of resiliency and vulnerability will undoubtedly progress without RAVON
 - progress will be slow, fitful and, given ever accelerating losses, painful.
 - RAVON provides the possibility of generating solid science that can better inform and promote more resilient communities in the future.

Thank you!



Doug Spenser, USGS

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