

Stakeholder Perceptions of Economic Vulnerability and Resilience in Coastal New Jersey

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Research Objectives

- Assess critical economic vulnerabilities in the Barnegat Bay region of New Jersey
- Consider implications of climate change for emergency management and hazard mitigation and identify adaptation options
- Identify key options and barriers to enhancing resilience in the region
- Provide baseline for further research on economic resilience in coastal New Jersey

Background Literature

- Economic value at risk to SLR
- Regional costs of extreme events
- Spatial patterns and determinants population and community vulnerability and resilience

Contribution of this study

- Pays detailed attention to *economic* dimensions of vulnerability and resilience
- Incorporates local, stakeholder knowledge to assess economic risks
- Considers how climate change risks may intersect with other, on-going economic stresses

Review article:

Leichenko, R. and A. Thomas. 2012. Coastal Cities and Regions in a Changing Climate: Economic Impacts, Risks and Vulnerabilities. 2012. *Geography Compass* 6/6: 327–339, DOI 10.1111/j.1749-8198.2012.00495.x

Research Design

- **Task 1.** Identification of Climate and Hazard Risks
- **Task 2.** Description of Non-Climatic Stresses
- **Task 3.** Assessment of Economic Vulnerabilities and Options for Climate Hazard Mitigation and Climate Change Adaptation
- **Task 4.** Identification of Options and Barriers to Enhancing Resilience
- **Task 5.** Identification of Knowledge Gaps

Method for Stakeholder Interviews

- In-depth interviews with 29 stakeholders (individual and group interviews) (December 2011 – May 2012)
- Stakeholders selected to represent a broad cross section of public and private sectors
- Question areas:
 - Key present and future climate risks
 - Economic assets and activities at risk
 - Populations at risk
 - Implications for emergency management
 - Options to for adaptation of assets and activities
 - Options and barriers to enhance resilience of region

Interview Findings: Climate Stresses

Extreme Weather – General Increase in Extreme Weather

- Flooding, both riverine and coastal
- More hurricanes
- More snowstorms
- Droughts and heat waves
- Forest fires

Interview Findings: Climate Stresses

Gradual Changes

- Sea level rise
- Marsh die-back due to salt water intrusion
- Beach erosion
- Ocean acidification
- Decrease in ocean salinity
- Temperature increases
- Out-migration of fish
- Increase in pests and invasive species

Interview Findings: Non-climatic stresses

Demographic/Social Stresses

- Population increase & high proportion of senior citizens
- Decline in environmental/climate awareness

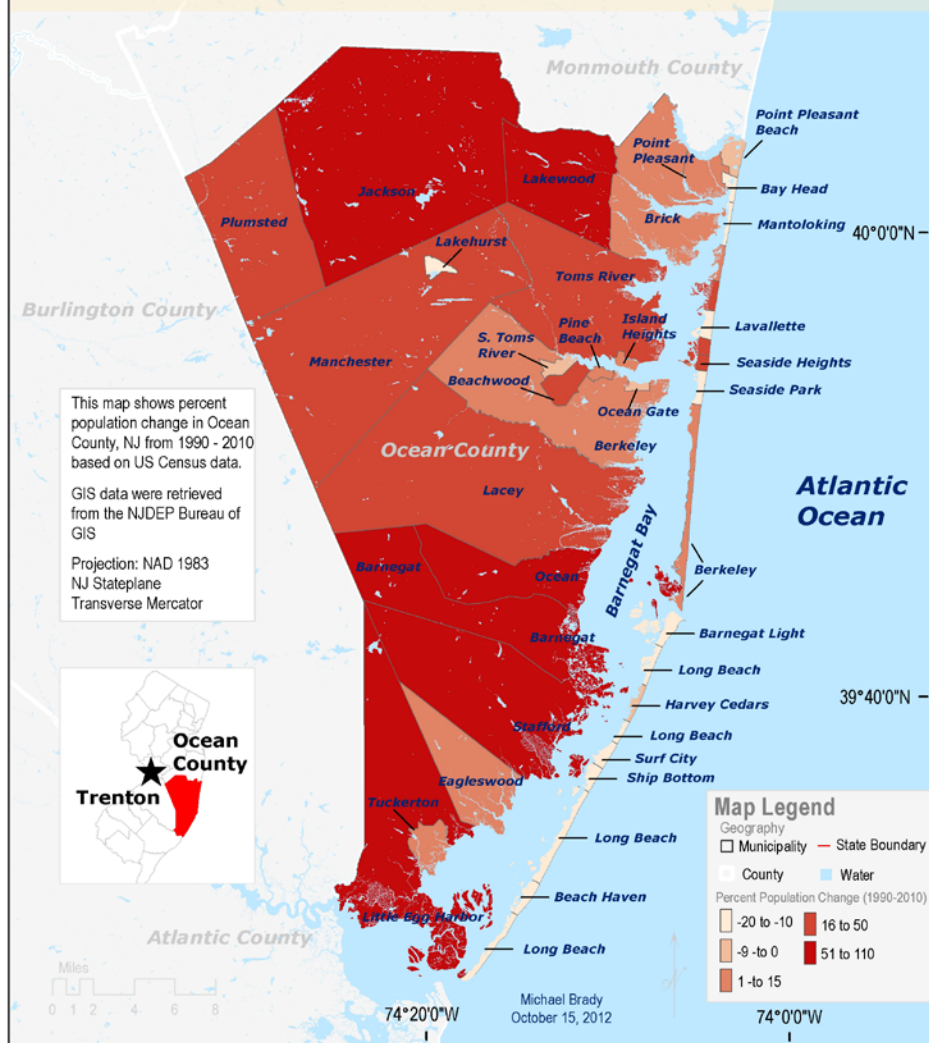
Economic Stresses

- Recession, Budget cuts
- Dependency on development and construction
- Lack of public transit
- Increased global and local demand for seafood

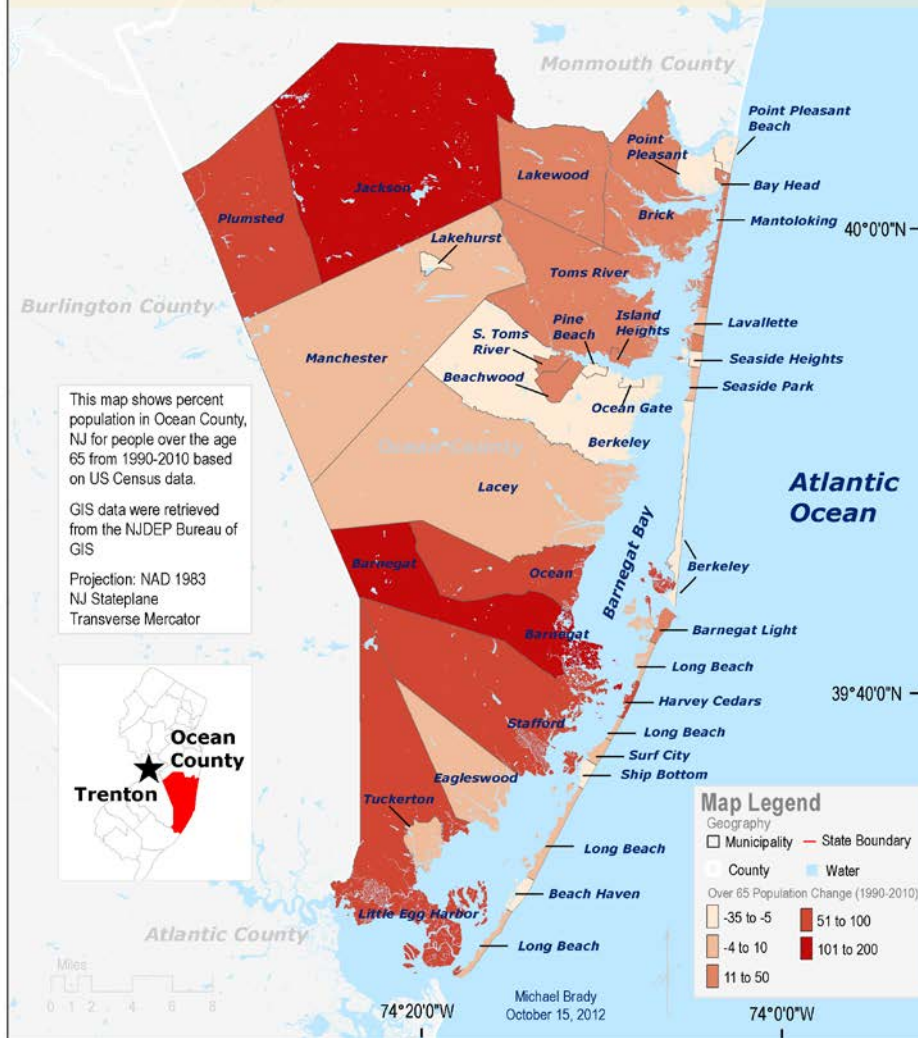
Environmental Stresses

- Development
- Pollution of Barnegat Bay
- Marsh die-off and alteration of sedimentation activity

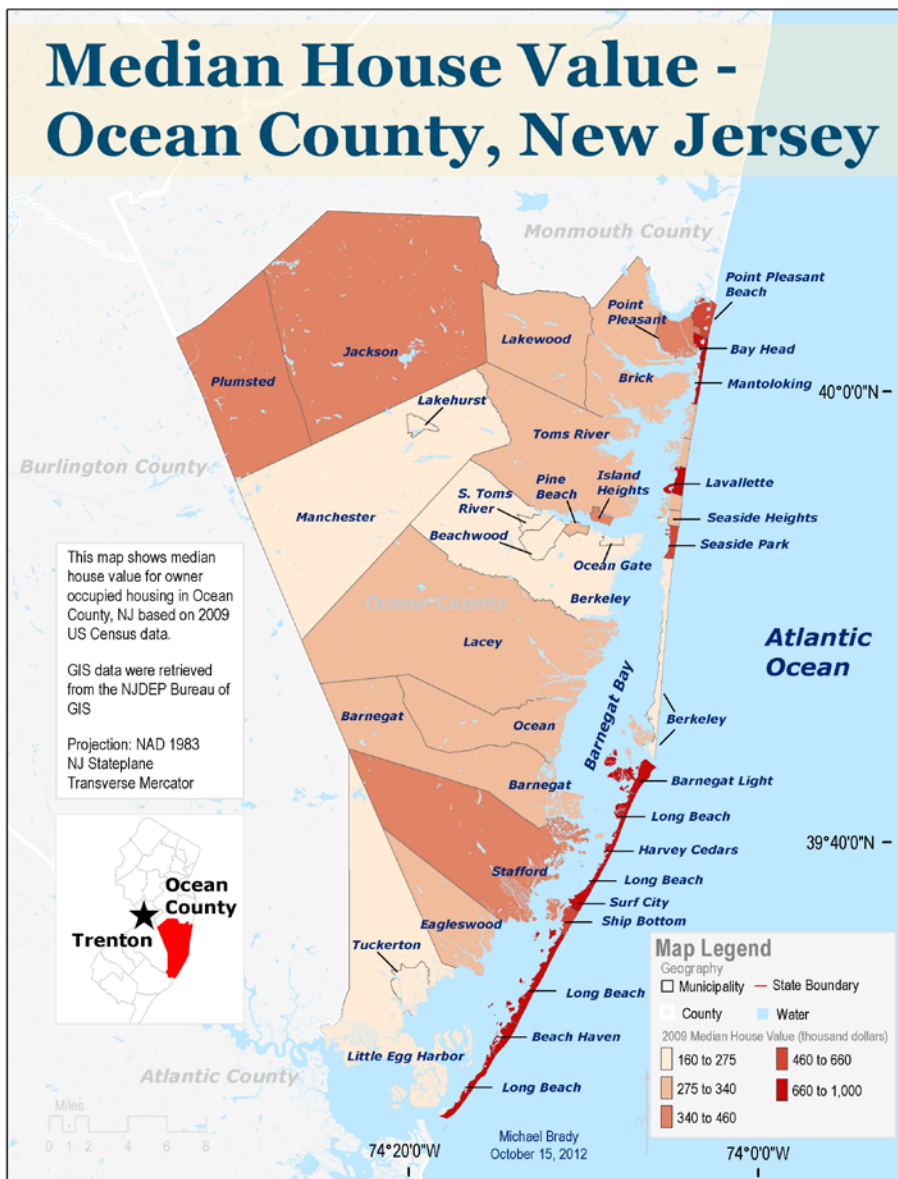
Percent Population Change - Ocean County, New Jersey



Over 65 Population Change - Ocean County, New Jersey



Median House Value - Ocean County, New Jersey



Interview Findings: Assets at Risk

- **Natural Assets at Risk**

- Beaches
- Fresh water
- Marshes
- Forests
- Marine life

- **Built Assets at Risk**

- Roads, bridges and mass transit
- Waterfront property
- Recreational infrastructure - e.g. boardwalks
- Tax-base of municipalities
- Municipal facilities

Interview Findings: Activities at Risk

- Tourism
- Commercial fishing
- Recreational fishing
- Wildlife watching and park visitation
- Construction and real estate
- Insurance
- Agricultural production

Interview Findings: People and Groups at Risk (as a result of damage to assets or activities)

- Small business owners and their employees
- Commercial fishermen
- Farmers
- Low-income residents
- Low-income property owners
- Users of public amenities and parks
- Municipalities

Interview Findings: Emergency management (lessons of Irene)

- The value of preparedness
- The importance of lead time
- Cooperation of the public
- Need for vigilance in the future re: evacuations
- Difficulty of attribution of damage because Irene and Lee were so closely spaced

Interview Findings: Adaptation of Assets

- Beach replenishment/nourishment
- Shore armoring.
- Retrofitting existing infrastructure and building new houses to code and raising the standards.
- New infrastructure, such as bridges, roads, floodgates and desalination plants
- Restoration of marshes, dunes, and living shorelines
- Relocation/retreat/rolling easements
- Land use planning and control.
- Insurance.
- Research.

Interview Findings: Adaptation of Activities

- Diversification across the economy
- Alternative tourism such as environmental tourism, non-beach activities, and agro-tourism
- Diversifying into multiple fisheries and aquaculture
- Infrastructural adaptations that minimize activity disruptions e.g. more indoor venues and air conditioning.
- Protecting ecosystem services

Interview Findings: Barriers to Enhancing Resilience

- **Physical and technological barriers**
 - Slow progress of SLR
 - Density of settlement
 - Limitations of engineering solutions – e.g. sea walls, bulk heads, beach nourishment
- **Political and cultural barriers**
 - Short term thinking
 - Denial of climate change
 - Lack of regional planning
 - Lack of government funding
 - Unequal sharing of burdens and benefits
 - Decreasing exposure of people to nature

Findings: Barriers to Enhancing Resilience

- **Policy and regulatory barriers**
 - Inflexible and inappropriate regulations
 - Expenses and delays in permitting
 - Too lax or laxly enforced regulations in some areas (e.g. building codes)
 - Perverse incentives and misguided policies (e.g. CAFRA as amended)
 - Assertion of private property rights to the detriment of the community
 - Difficulty in qualifying for federal disaster declaration

Findings: Options for Enhancing Resilience

- **Policy reform**
 - Change how development is regulated
 - Better enforcement of existing regulations and exercise of authority to regulate
 - Better planning, communication, regional coordination
- **Better research and information**
- **Take advantage of openings offered by catastrophic events**
- **Education** of the public about risks of climate change
- Role for civil society –public outreach, foster behavioral change

Next Steps:

1. Return to stakeholders for follow-up interviews:
 - What did Sandy reveal about vulnerabilities of assets, activities, populations; what did Sandy reveal about options to enhance resilience?
2. In-depth case studies and training with two Ocean County communities – local vulnerability and resilience, and identification of training needs
3. Web-based survey of stakeholders in coastal NJ
4. Development of index of economic resilience for communities
5. Enhancement of NJ SLR mapper with economic information

Project Team Members

Barnegat Bay Team

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Sea Grant Team

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