An Integrated Framework to Analyze Local Decision Making and Adaptive Capacity to Large-Scale Environmental Change: Community Case Studies in Brazil, the UK and the US
• Brazil: São Paulo Research Foundation – (FAPESP)

• UK: Natural Environment Research Council (NERC) and Economic and Social Research Council (ESRC)

• USA: National Science Foundation (NSF)
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Community Partners

- **Municipalities**
  - City of Santos (São Paulo, Brazil)
  - Broward County (Florida, USA)
  - Town of Selsey (Chichester District, West Sussex, UK)

- **End-user Partners and Advisors**
  - American Planning Association-Florida (APA)
  - Climate Southeast UK
  - NOAA Risk Communications
  - Florida Department of Economic Opportunity
Objective

Better understand barriers to adaptation planning

1. How do values/demographics and cultural factors influence stakeholder receptivity?
2. Do locally-specific scientific/economic data help co-design adaptation options and governance?
3. What are decision making tradeoffs about costs, risk and public good for defined adaptation options?
4. Is there willingness to support actions?
5. Can we compare “adaptive capacity” of communities in different cultures? What are the institutional factors that support ability to adapt and mobilize change?
Collaboration with Municipal Partners:

- **Public engagement meetings**
  - Assessments of vulnerability and cost-benefit of adaptation options (COAST Model)
  - Pre/Post meeting surveys
  - Decision intercepts during meetings

- **Assessment of stakeholders:**
  - Adaptive Capacity Index (ACI) interviews with local decision/policy makers

- **Dissemination of results and follow-up**
**COastal Adaptation to Sea level rise Tool (COAST)**

- Software / visualization tool
- \{Sam Merrill et al. (Catalysis Adaptation Partners, LLC)\}
  - Used in US, will be first deployment in UK and Brazil
  - Integrates:
    - Natural science data
    - Social and economic data

- Two, 1-day public workshops:
  - #1 looks at environmental impacts,
  - #2 looks at adaptation strategies and compares costs/benefits
COAST Model Inputs

- SLR
- Extreme storm impacts
- Subsidence
- Digital Elevation Models from LiDAR,
- Surge Heights/ Occurrence (10, 50, 100, 500 year Storms)
- Flood zone locations
- Depth Damage Function (USACE)
- Local Tax Parcels with Unique Identifier Linked to Building Values
City of Portland: Commercial Street East COAST Model Results, 100 Year Storm

Total Elevation of Flooding – 13.5 Feet (NAVD 88)

One-Time Storm Damage for This Event: $26.4 Million
Cumulative Damage (SLR THROUGH 2010): $111.5 Million
Value of Buildings Lost to Sea Level Rise: $46.4 Million
Co-selection of Possible Adaptation Actions:

- Revetments
- Sea walls
- Jetties
- Levees
- Subway tunnel plugs
- Automatic floodgates
- Geotextile tubes
- Beach nourishment
- Dry flood-proofing
- Wet flood-proofing
- Increasing freeboard (now or later)
- Zoning changes
- Rolling easements
- Buyouts

COAST Model is re-run with new cost and resiliency measures
Social Research

1. **Pre- and post-COAST assessment surveys:**
   - Collect data on demographics, values, and beliefs regarding governance and climate risk
   - Focus on risk to household and community, preferences for specific adaptation actions, and willingness to support funding mechanisms

2. **“Decision Intercept” Handouts:**
   - At key points, have individuals record WHY they chose specific options
Adaptive Capacity Index (ACI)

- Examines existing management priorities, organisational structures and governance
- Self-critique of risk management practice, and capacity to change values, behaviour and outcomes

**Designed to:**
- Create a multi-stakeholder interaction space for horizontal and vertical social learning
- Draw out differences in viewpoints and their interaction (resistance, production, etc.) with institutions of governance
- Compare capacity between social units
  - Performance of different organisational forms (centralised, polycentric, decentralised) and relationships (networks, communities, hierarchies)
ACI Model

**Structure**
- External Resources
- Social and Human Capital
- Organisational Structure
- Organisational culture and mandate
- Adaptive Potential
- Broad organisational landscape
- Enabling legislation

**Agency**
- Science and best practices
- Governance mechanisms
- Support for experiments
- Available resources
- Adaptive Capacity
- Horizon scanning
- Deployment and configuration
- Learning mechanisms
- External drivers
- Information exchange

**Critical Self-reflection**
Metropole ACI

- 1-to-1 structured interviews with 30 people per community
- Local/Regional responsibility (county councils, city authorities, business organizations, planning partnerships, etc.)
- Multiple views from within the same organisation
  - Minimises bias and provides greater overview
• Insights on adaptation planning
  ◦ links between socio-cultural/demographic factors AND willingness to support adaptation actions in municipalities

• Sharing tools and insights with end users
  ◦ Climate UK: inform UK local government
  ◦ APA-FL: professional development for planners
  ◦ City of Santos residential/commercial infrastr.

• Academic:
  ◦ Knowledge sharing across disciplines
  ◦ Formal Graduate Education
Questions?

Fotos from Team meetings at USF CMS, St. Petersburg, Florida, July 2014
BACKUP
Input Elevation and Asset Layers: LiDAR DEM and Tax Assessment Data by Parcel
100 yr storm, 2060, high SLR

COAST ASSET DATA

Flood Depth = 11.2 ft

Estimated Damage = $140,813

bldgvalue = $251,900