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

Acknowledgements

- Brazil: São Paulo Research Foundation – (FAPESP)

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

- USA: National Science Foundation (NSF)

Our Team

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  - Stephanie Rademaker: MA, KCL, UK (additional students next year)

Co-design Partners

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

METROPOLE Objective

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 adaption 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?**

Integrated Approach

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**

Analysis Tools: COAST

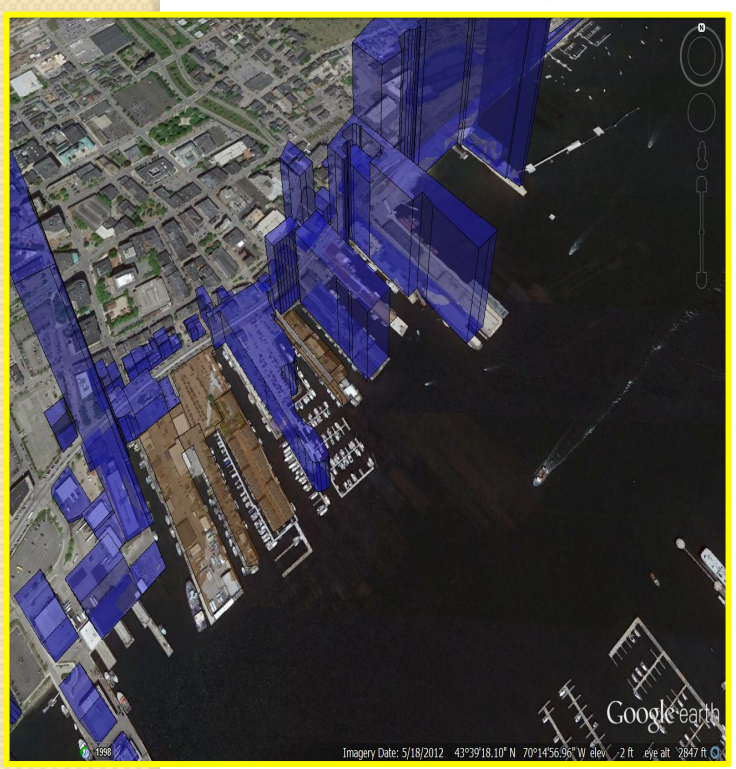
COastal Adaptation to Sea level rise Tool (COAST)

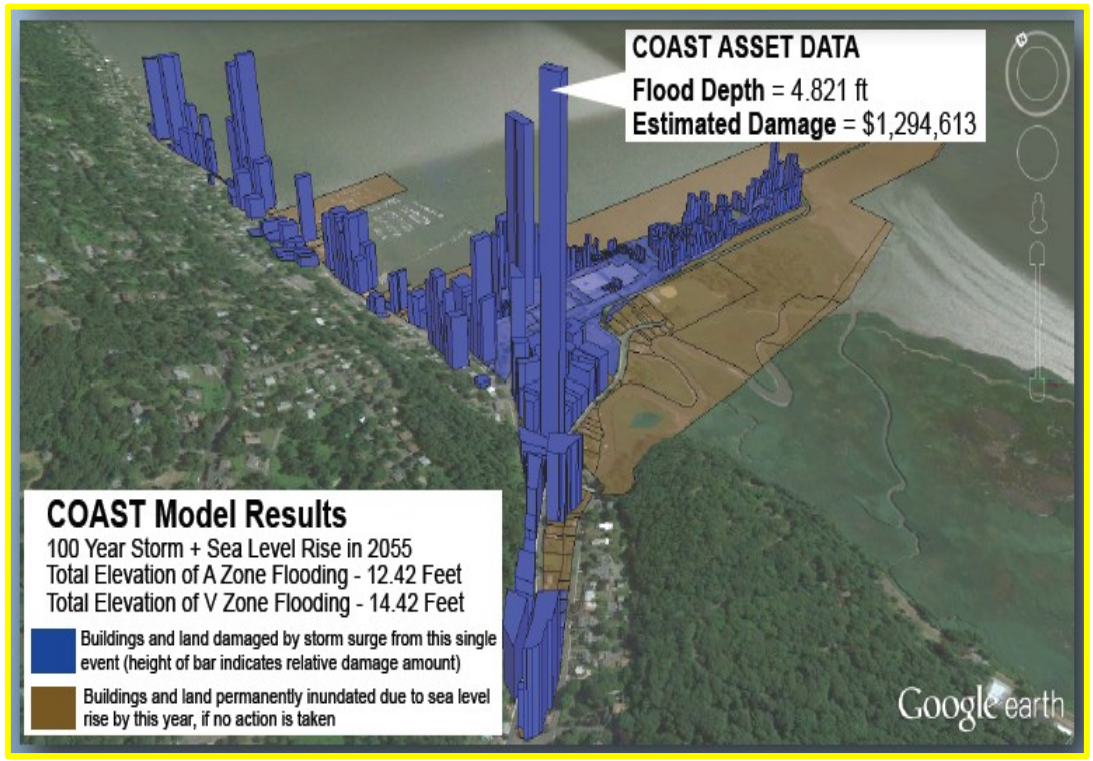
- Software / visualization tool
- {Sam Merrill et al. (Catalysis Adaptation Partners, LLC)}
  - Used in US, will be first deployment in UK and Brazil
  - Integrates:
    - Natural science data
    - Social and economic data
  - Two, 1-day public workshops:
    - #1 looks at environmental impacts,
    - #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

Portland, Maine, USA





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

Analysis Tools

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

Analysis Tools: ACI

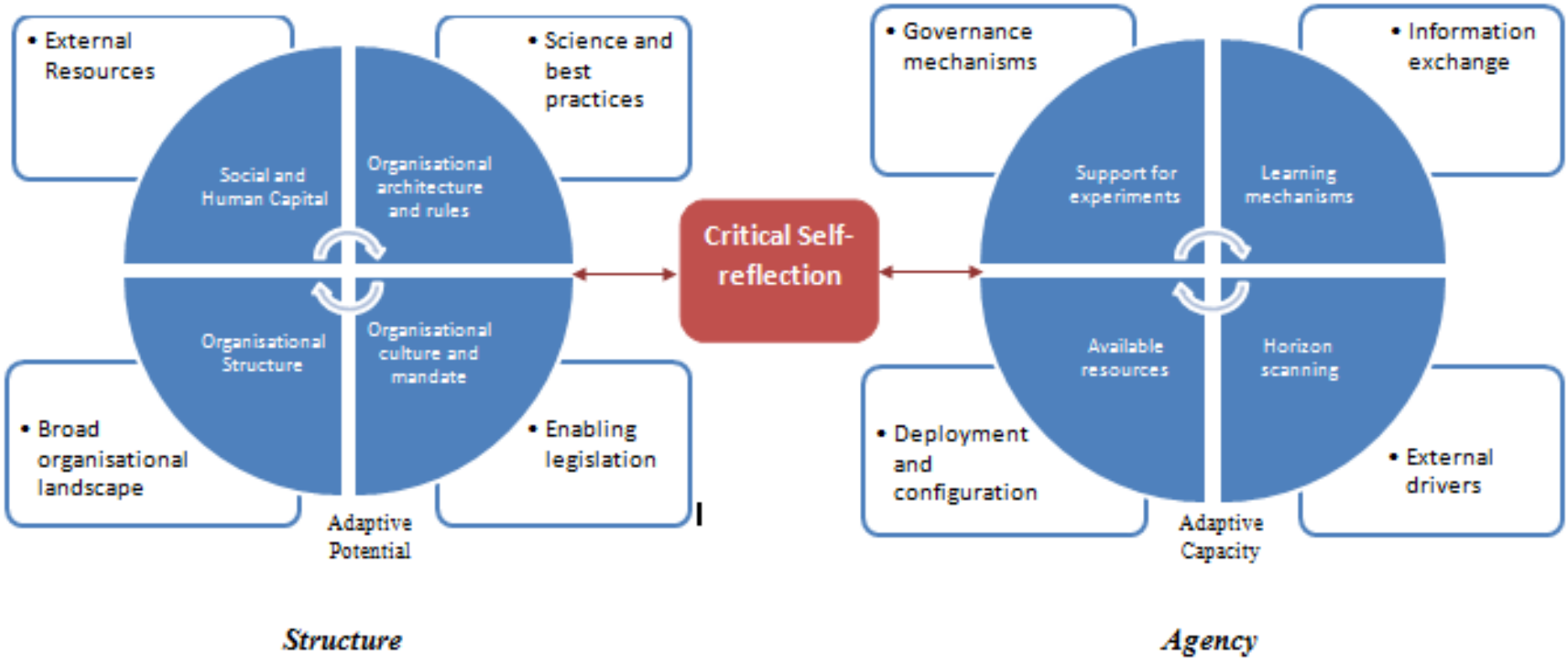
Adaptive Capacity Index (ACI)

- 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


• External Resources
• Science and best practices
Social and Human Capital
Organisational architecture and rules
Organisational Structure
Organisational culture and mandate
• Broad organisational landscape
• Enabling legislation
Adaptive Potential
Structure
Critical Self-reflection
• Governance mechanisms
• Information exchange
Support for experiments
Learning mechanisms
Available resources
Horizon scanning
• Deployment and configuration
• External drivers
Adaptive Capacity
Agency

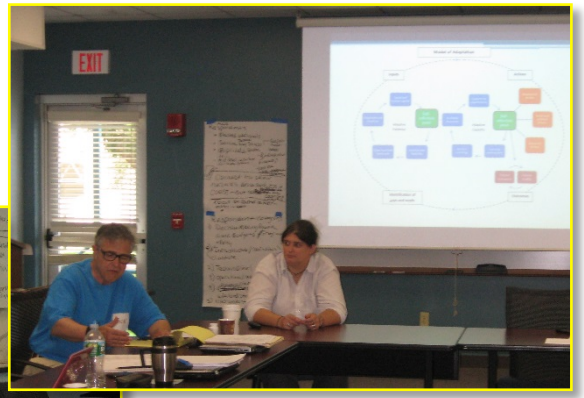
Metropole ACI

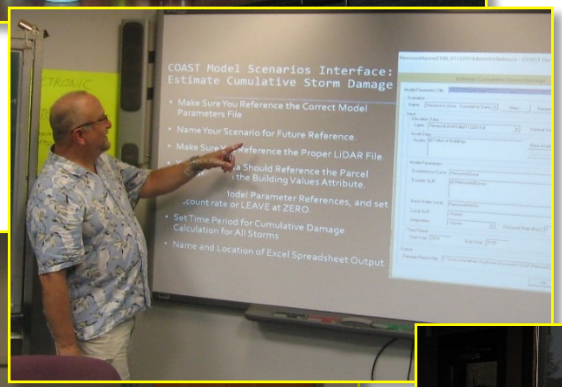
- 1-to-1 structured interviews with 30 people per community
- Local/Regional responsibility (county councils, city authorities, business organizations, planning partnerships, etc.)
- Multiple views from within the same organisation
  - Minimises bias and provides greater overview

Broader Impacts

- *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 ?

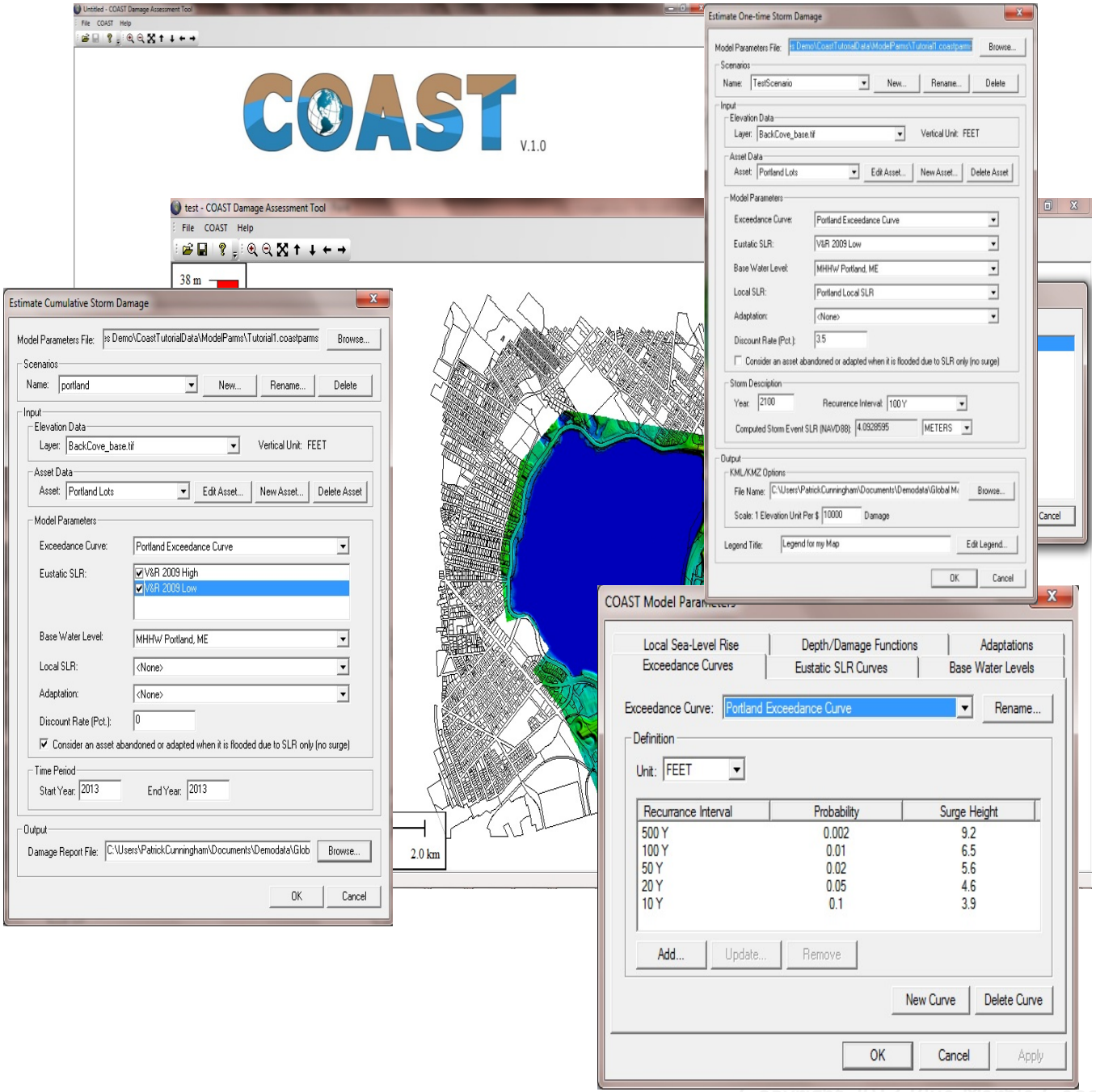




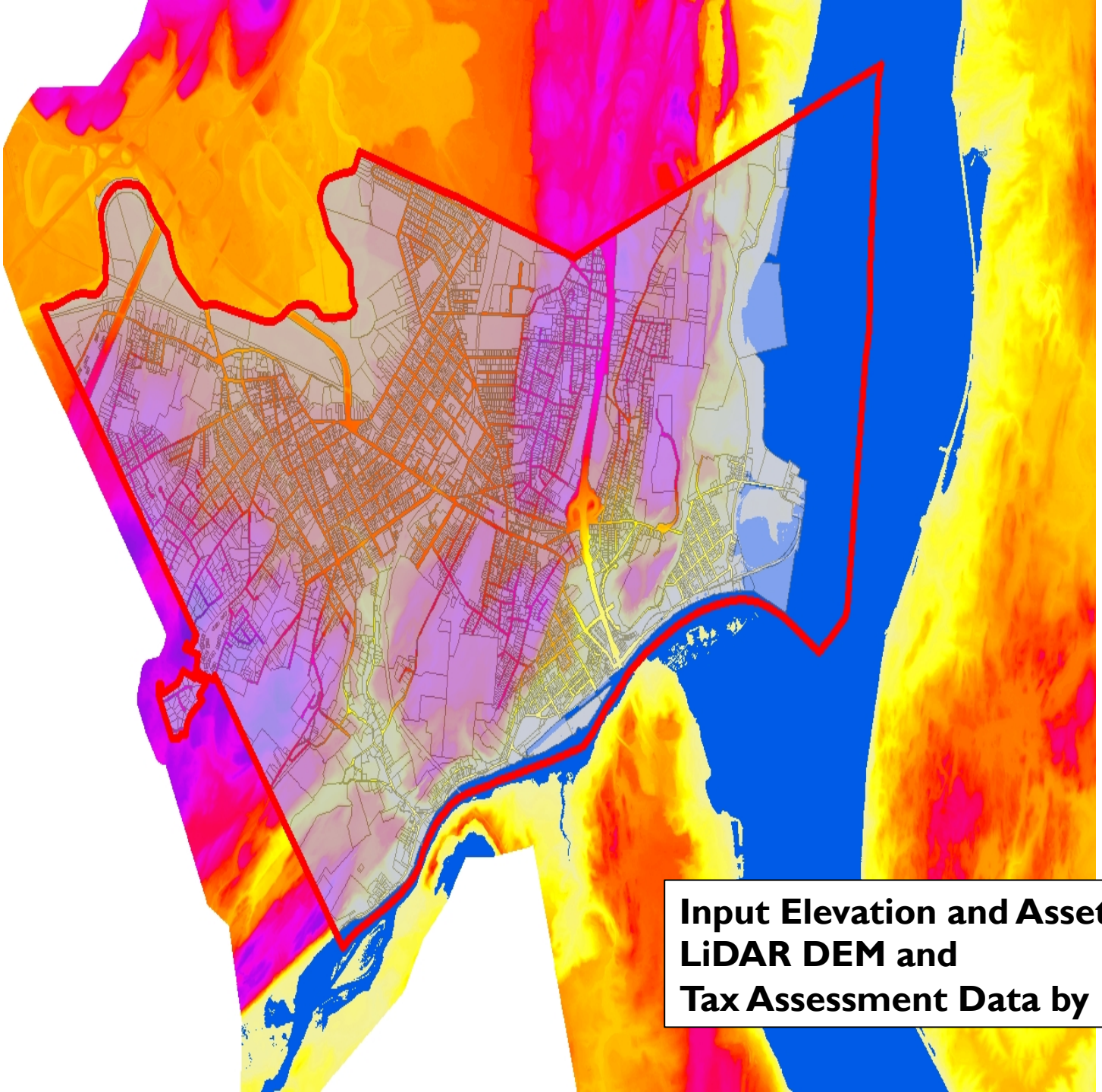
Fotos from Team meetings at USF CMS, St. Petersburg, Florida, July 2014

BACKUP

COAST: Example



Kingston, NY, USA



Input Elevation and Asset Layers:
LiDAR DEM and
Tax Assessment Data by Parcel

Kingston, NY, USA