

Improving coastal water resources resilience to climate variability and change through participatory dialogue

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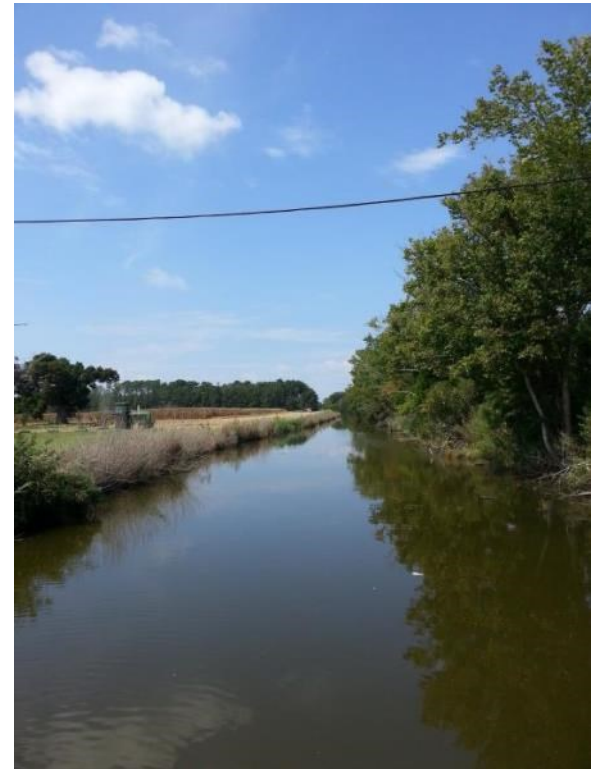
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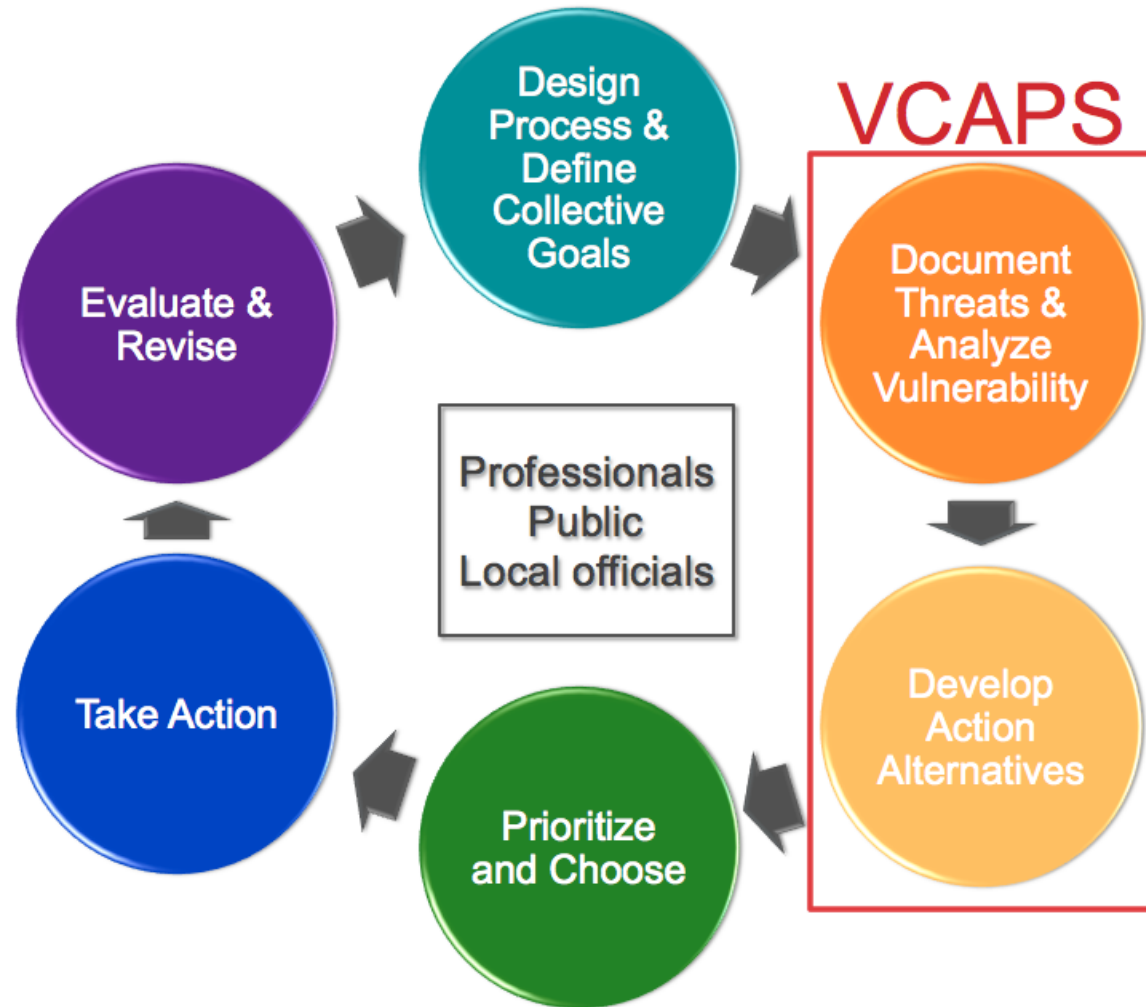
“Scientific” (decontextualized) knowledge	Local (contextualized) knowledge
SLR and rainfall estimates	Local hydrology and human modifications
Temperature estimates	Construction materials, grid and HVAC loadings
Planning processes Organizational DM	Local personalities and dynamics Local bylaws
Conflict management and public participation	Legacy of past conflicts, related issues
Climate and risk communication	Credible sources, appropriate media, etc.
Provision of social services, behaviors of marginalized and vulnerable populations	Local experiences and knowledge of local facilities and staff

VCAPS answers calls for better decision support

- Help local decision makers make sense of all those maps and models
- Facilitate local assessments that engage stakeholders
- Adopt risk-based approaches
- Integrate earth science and local knowledge



VCAPS Role in Adaptive Management



What VCAPS does

- Help people think about hazards...
 - Structure discussions using conceptual frameworks
 - Analytic-deliberative process
 - Causal structure of hazards
 - Vulnerability (sensitivity, adaptive capacity, resilience)
 - Utilize visualization techniques
 - AKA “influence diagrams” or “causal pathway diagrams”

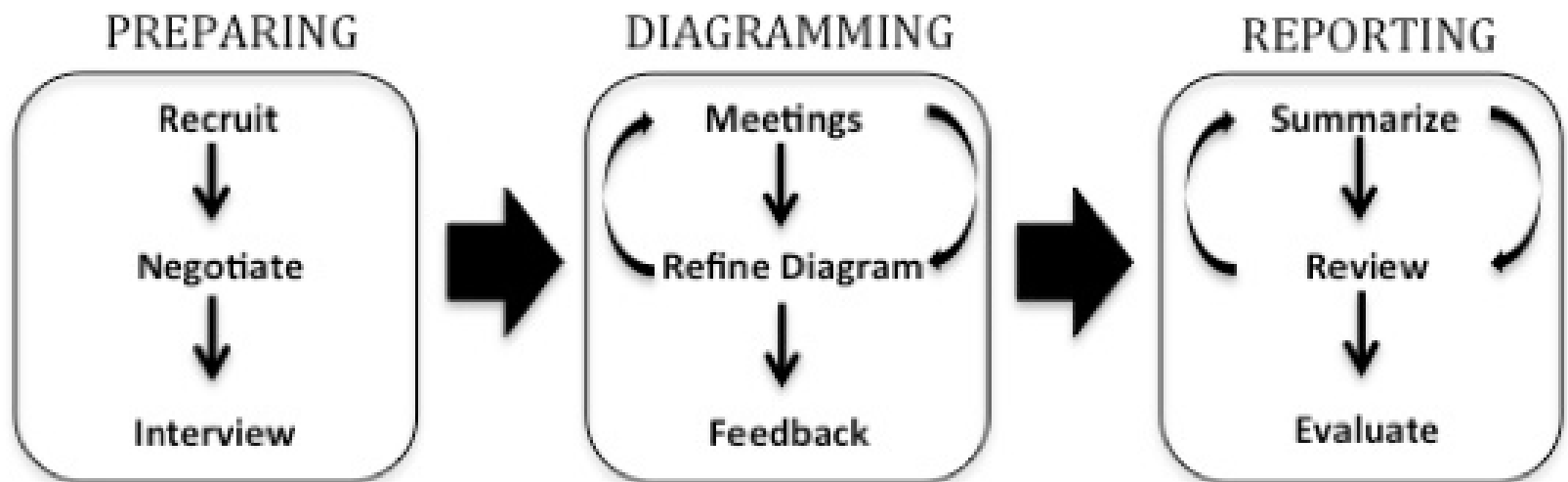


What VCAPS does

- Efficiently...
 - Reasonable (and flexible) demands on time and resources
- To produce “useable knowledge.”
 - Focus on what is relevant to participants and decisions
 - Co-construction of scenarios
 - Allow exploration of (local) complexities and uncertainties



VCAPS Workflow

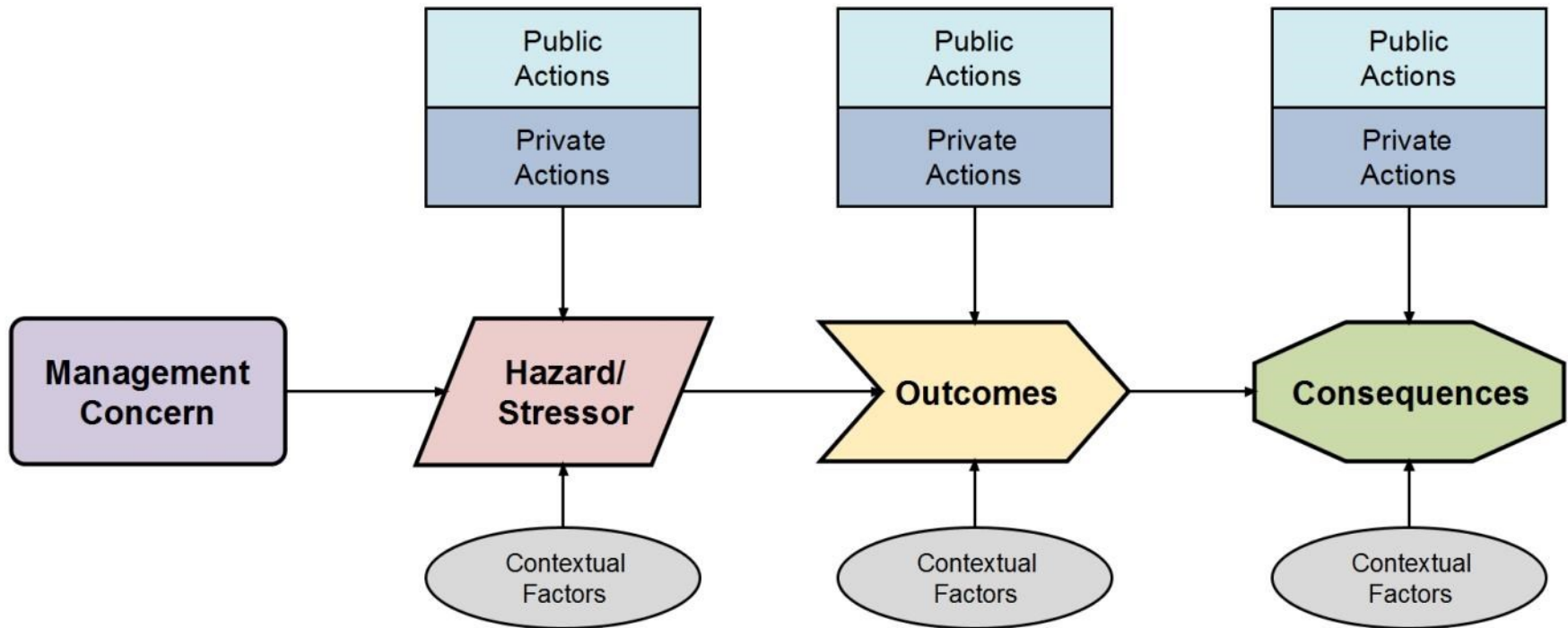


Probing questions, integrative discussion

- What impacts do hazards have in your community?
- Why do you care about the impacts? What is the result?
- What makes these impacts better, worse, larger, smaller?
- What can you do to prevent or mitigate this?



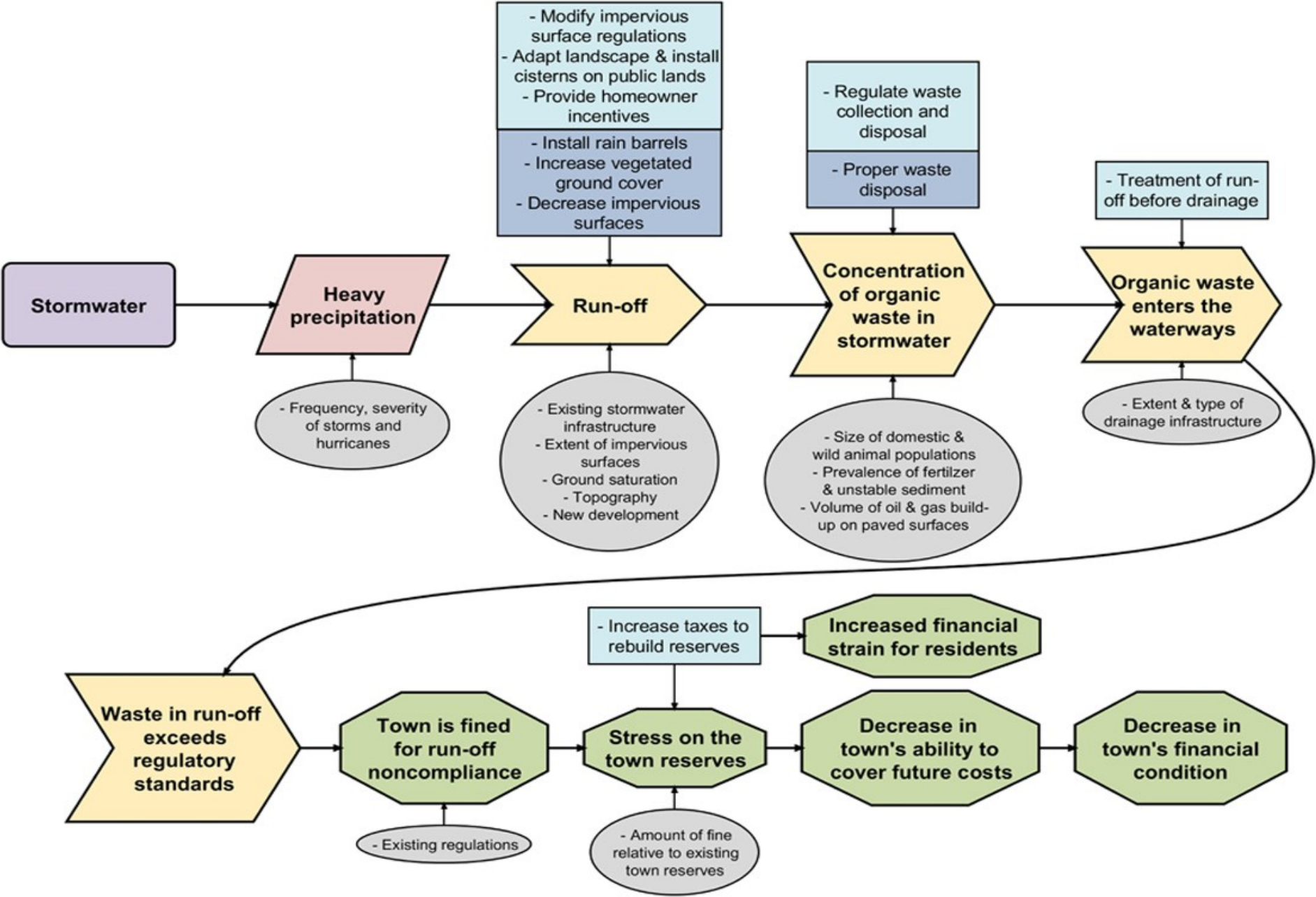
VCAPS diagrams: Building blocks





How to create a diagram

- Start simple; make the diagram more complex gradually.
- Begin with a **management category** and/or a **hazard stressor**.
- Start with the **outcome** that follows most immediately from the **stressor**.
- Focus on **outcomes** and **consequences** that can be modified by **public actions** or **private actions**.





McClellanville, SC – exploratory case

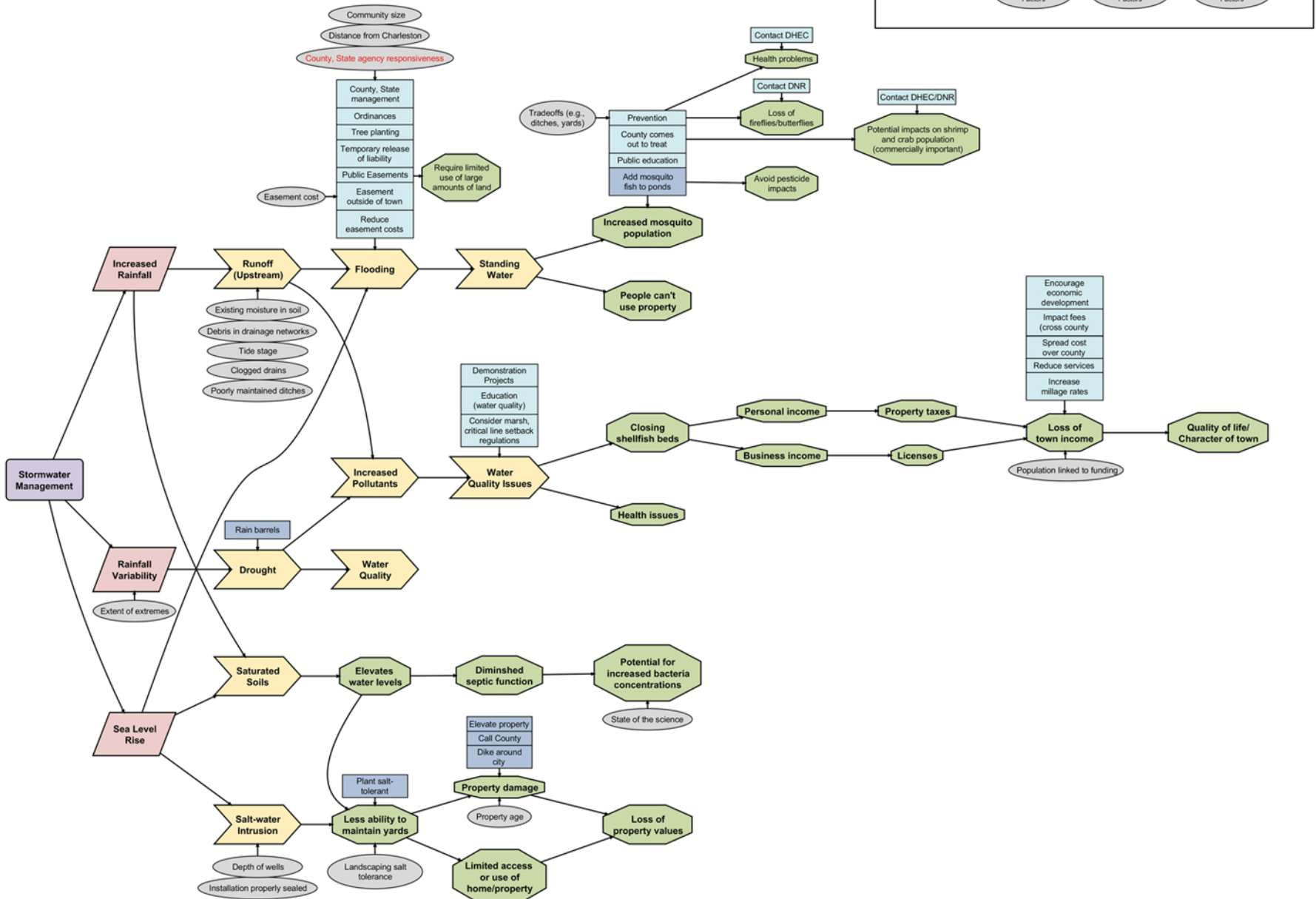
- Water quality
 - Shellfish industry impacts
 - Septic function
- Water quantity
 - Standing water and mosquitoes
 - Salinity intrusion in irrigation wells



(Bath & Wood 2013)

McClellanville VCAPS Diagram

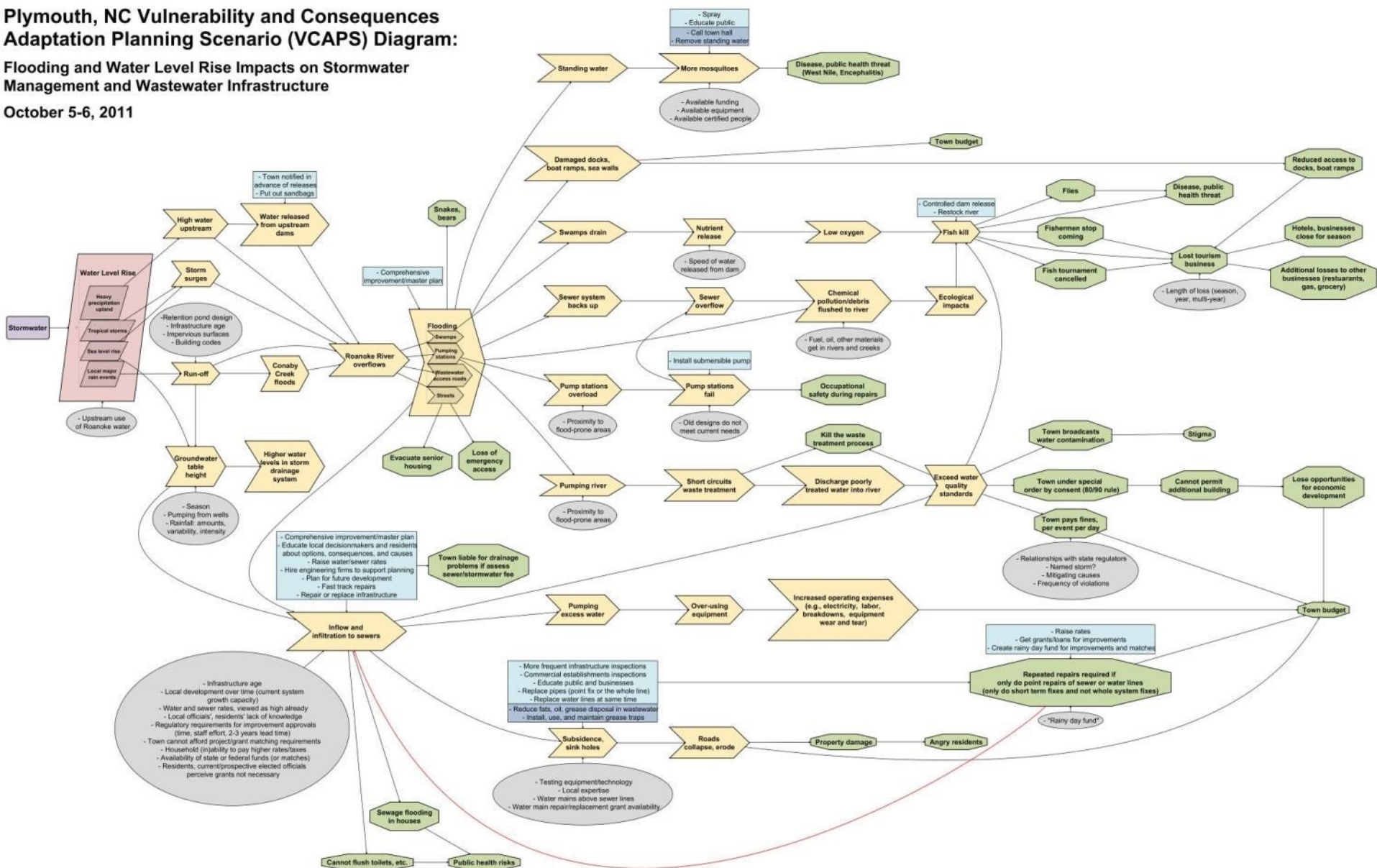
April 1, 2011



Plymouth, NC Vulnerability and Consequences Adaptation Planning Scenario (VCAPS) Diagram:

Flooding and Water Level Rise Impacts on Stormwater Management and Wastewater Infrastructure

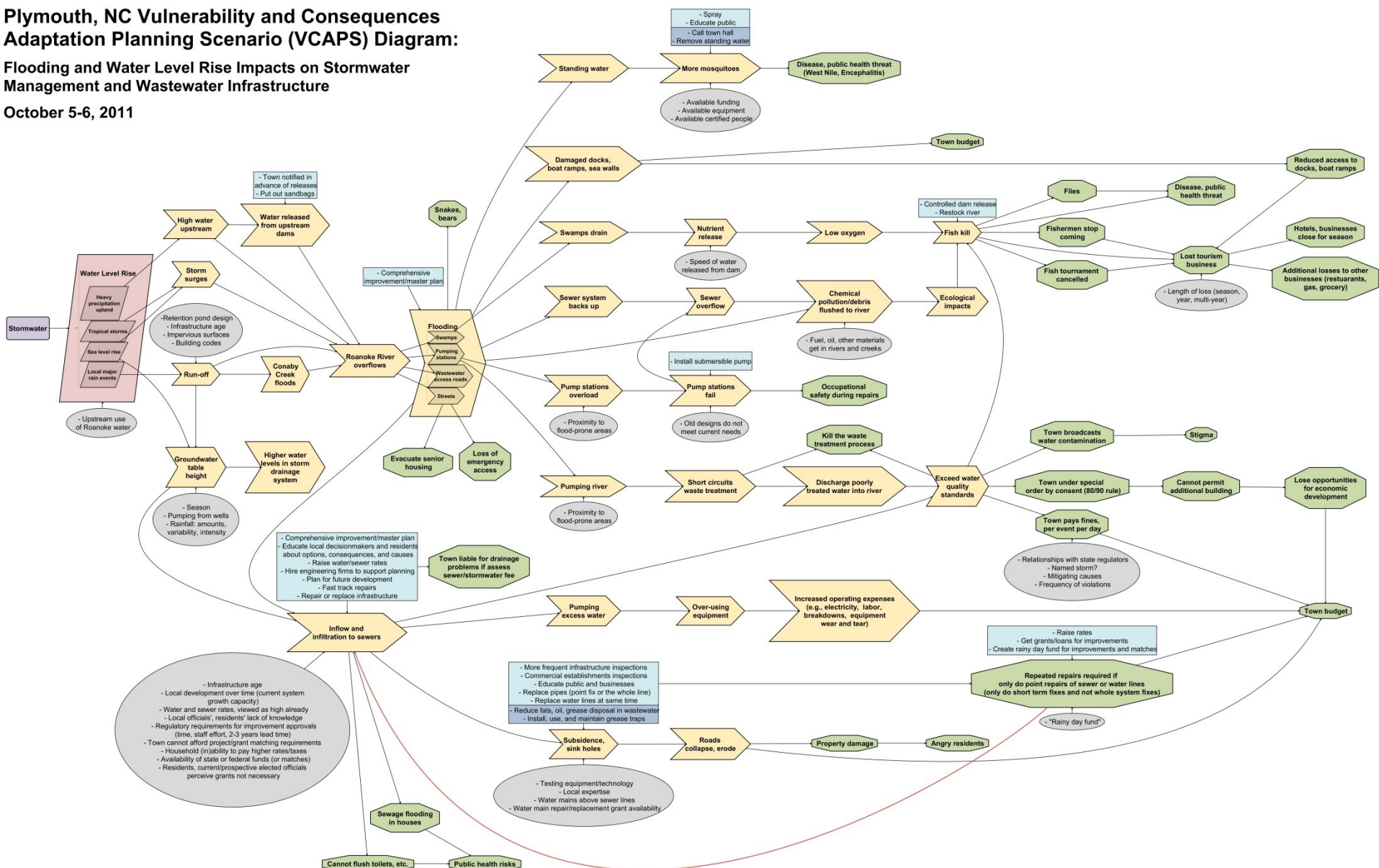
October 5-6, 2011



Plymouth, NC Flooding and Infrastructure

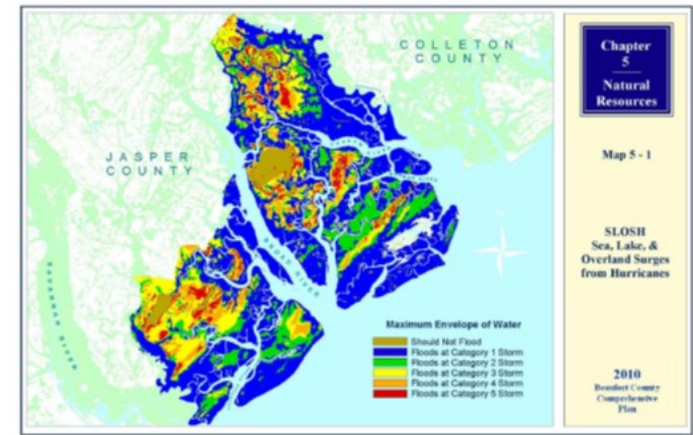
- Public infrastructure stresses from higher groundwater table, flooding
 - Education, planning, and better engineering
 - Replacement and repair may require increased rates, rainy day fund
- Flooding of swamps lead to low DO
 - Fish kill post-Irene
 - Controlled dam releases possible?



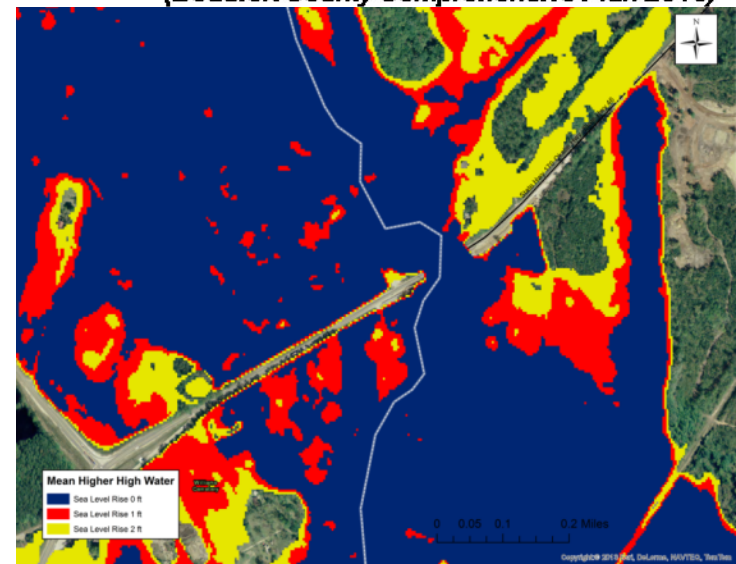
October 5-6, 2011

Sea level rise adaptation planning in Beaufort County, SC

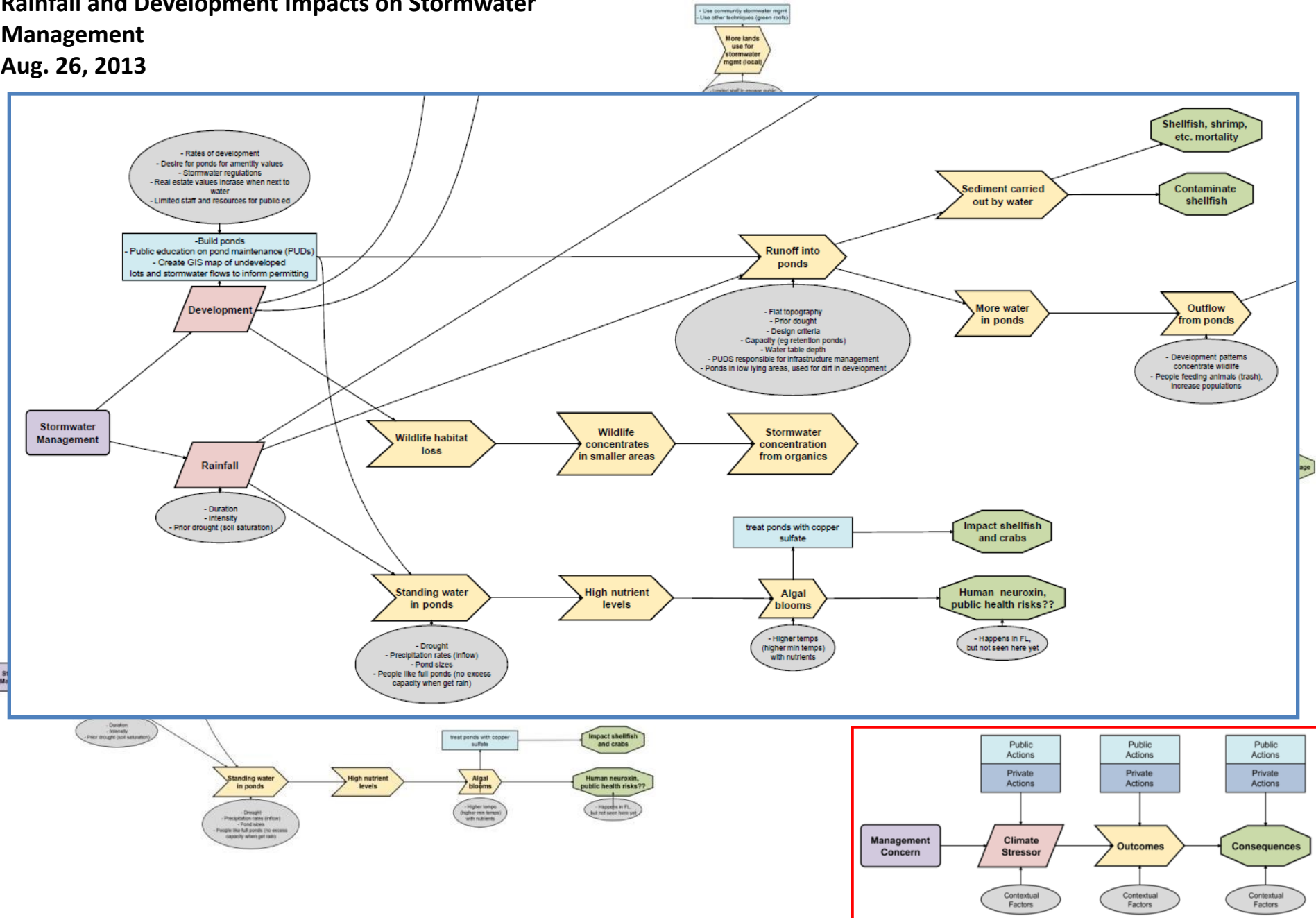
- Rainfall, development, and stormwater management
 - Public education
 - Retrofit infrastructure
 - Strategic, efficient low impact development
- Sea level rise: permanent inundation and higher storm surges
 - Identify vulnerable causeways, school transportation routes
 - Expand existing programs
 - Real estate disclosure about County service maintenance under SLR
- Public workshops Aug. 25-26, 2014



(Beaufort County Comprehensive Plan 2010)



**Beaufort County, SC VCAPS
Rainfall and Development Impacts on Stormwater
Management
Aug. 26, 2013**



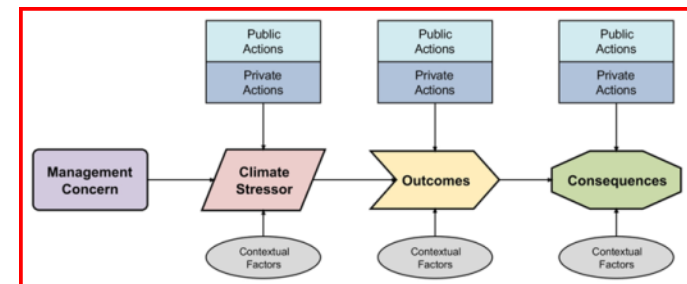
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Figure 2
Beaufort County, SC
Sea Level Rise and Planning VCAPS
August 26, 2013
Version revised by J. Whitehead
September 20, 2013

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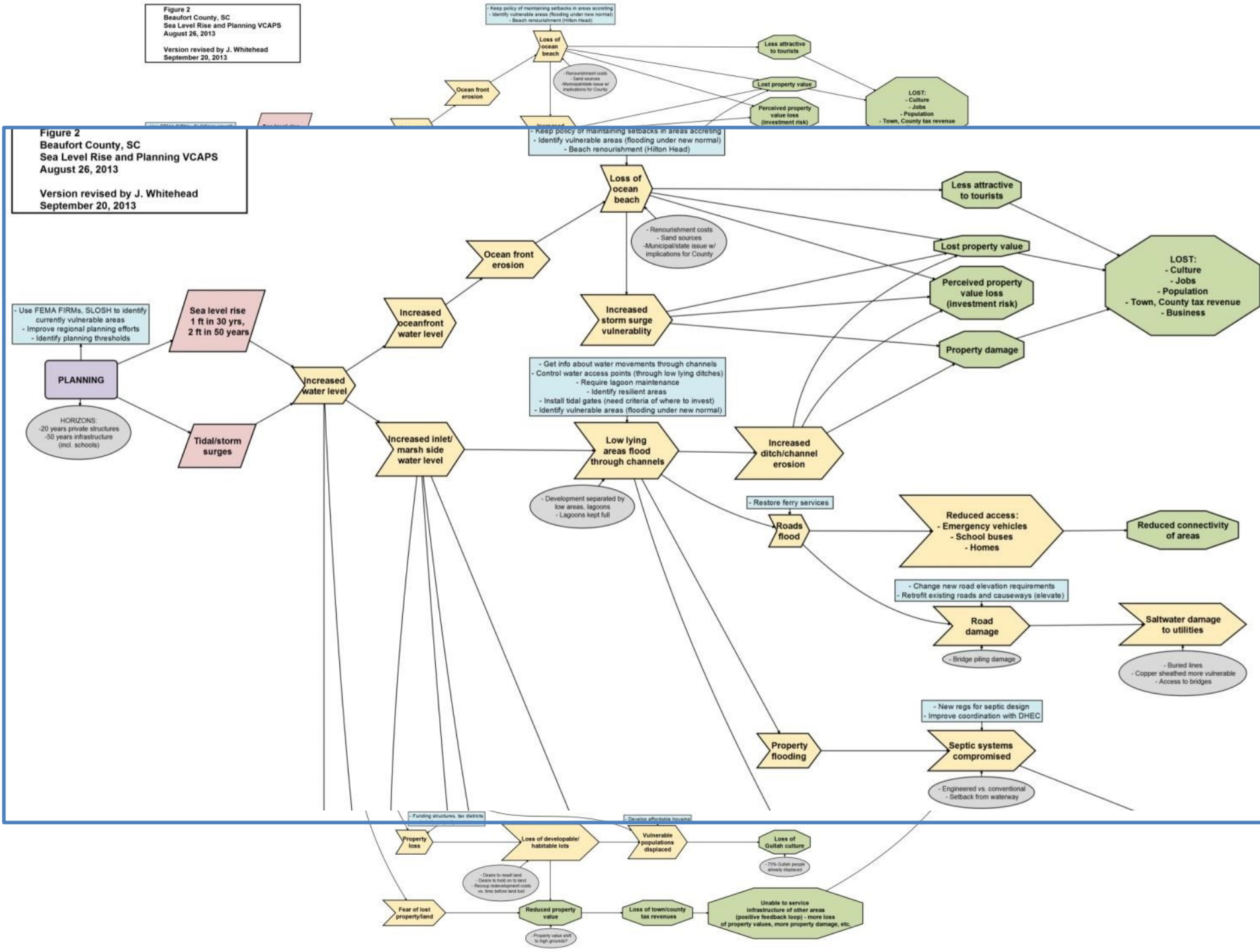
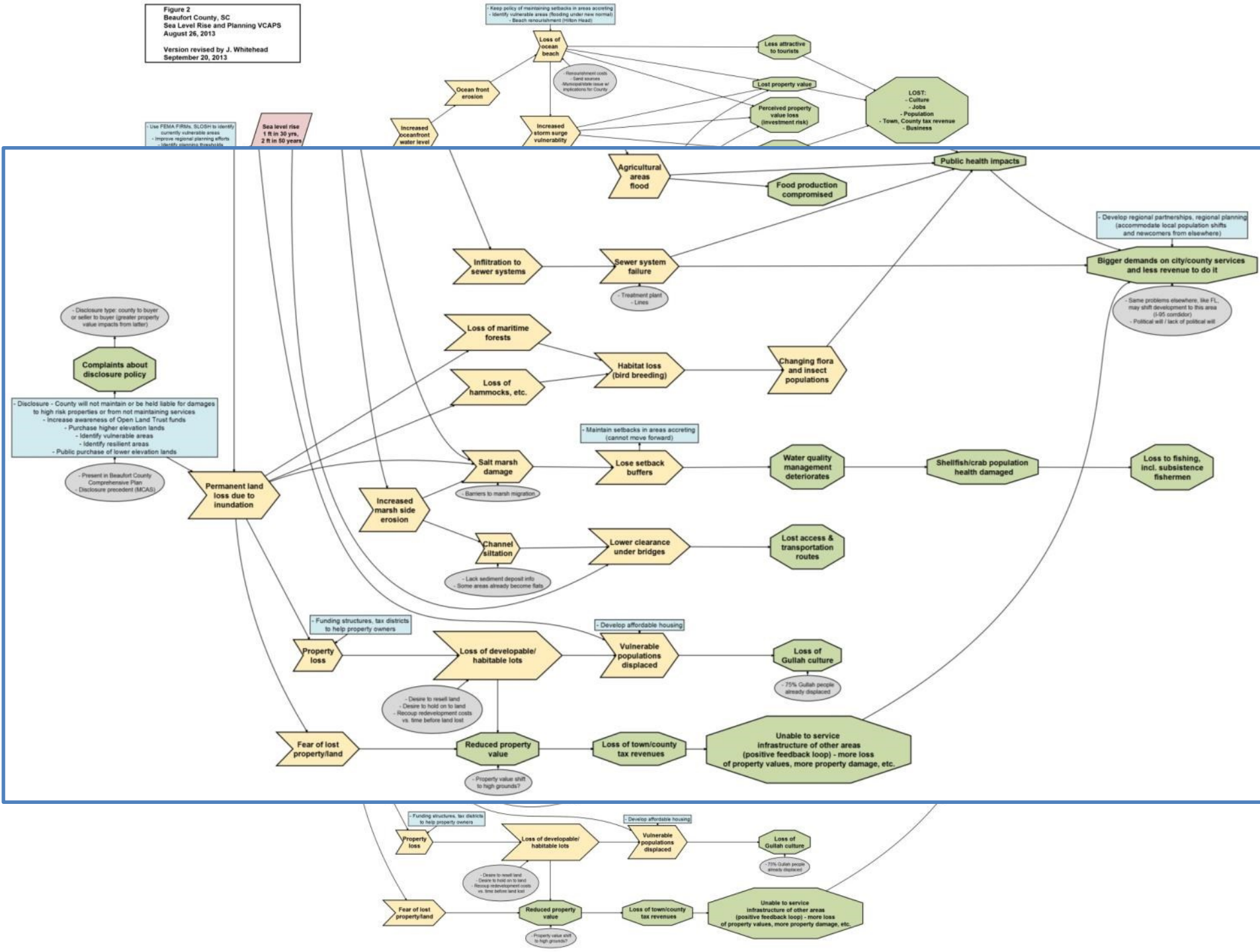
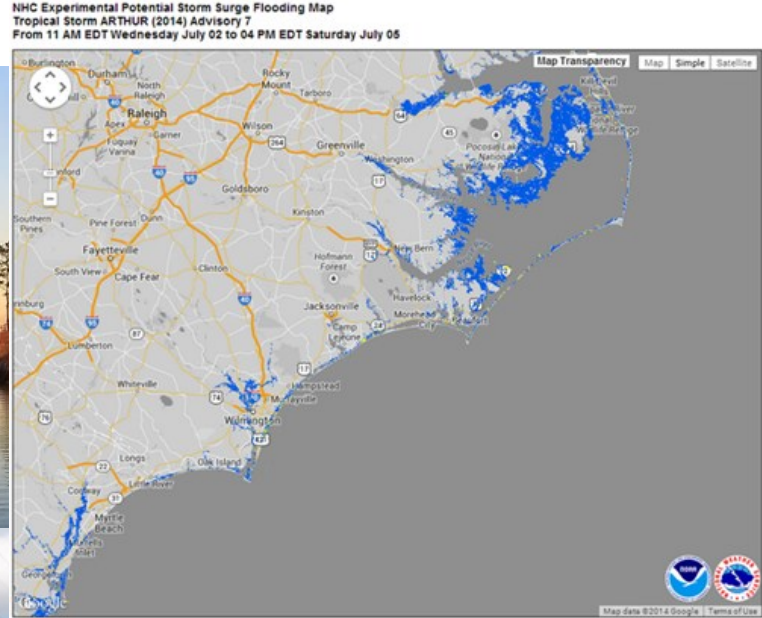


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Hyde County, NC Flood Resiliency Project

- Mainly focused on structures
- Water resource issues still appear
 - Agriculture and salinity intrusion (too much)
 - Seafood industry (water quality)
- Adaptations require transformation
 - Tailwater recovery
 - Regulatory flexibility and coordination
 - Improve grant applications for wastewater engineering assistance



(NC Dept. of
Agriculture &
Consumer
Services 2014)



Lessons learned about water resources planning

- Recurring concerns
 - Public health, seafood industry concerns
 - Stormwater links to wastewater/septic issues
 - NOT many with *lack of* water!
- Identify both high-dollar *and* low-regrets strategies
- Funding mechanisms needed for proactive adaptation
- Some adaptations will require tradeoffs



Summary

- VCAPS conceptual framework structures thinking, discussions
 - Local planners interested in hazards, can't always discuss it
 - Real-time diagramming supports understanding, info-sharing
 - Self-generated scenarios more credible
- Water resource issues raised frequently, mainly in stormwater management and water quality contexts
 - Public options range from education to major capital improvements
 - Private options include increased responsibility for maintenance and on-site management





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www.vcapsforplanning.org