Local Actors' Perspectives about the Impacts of Drought on Coastal Resources and Communities

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Kirsten Lackstrom
Research Associate
Carolinas Integrated Sciences & Assessments
University of South Carolina, Department of Geography

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Why focus on drought impacts?

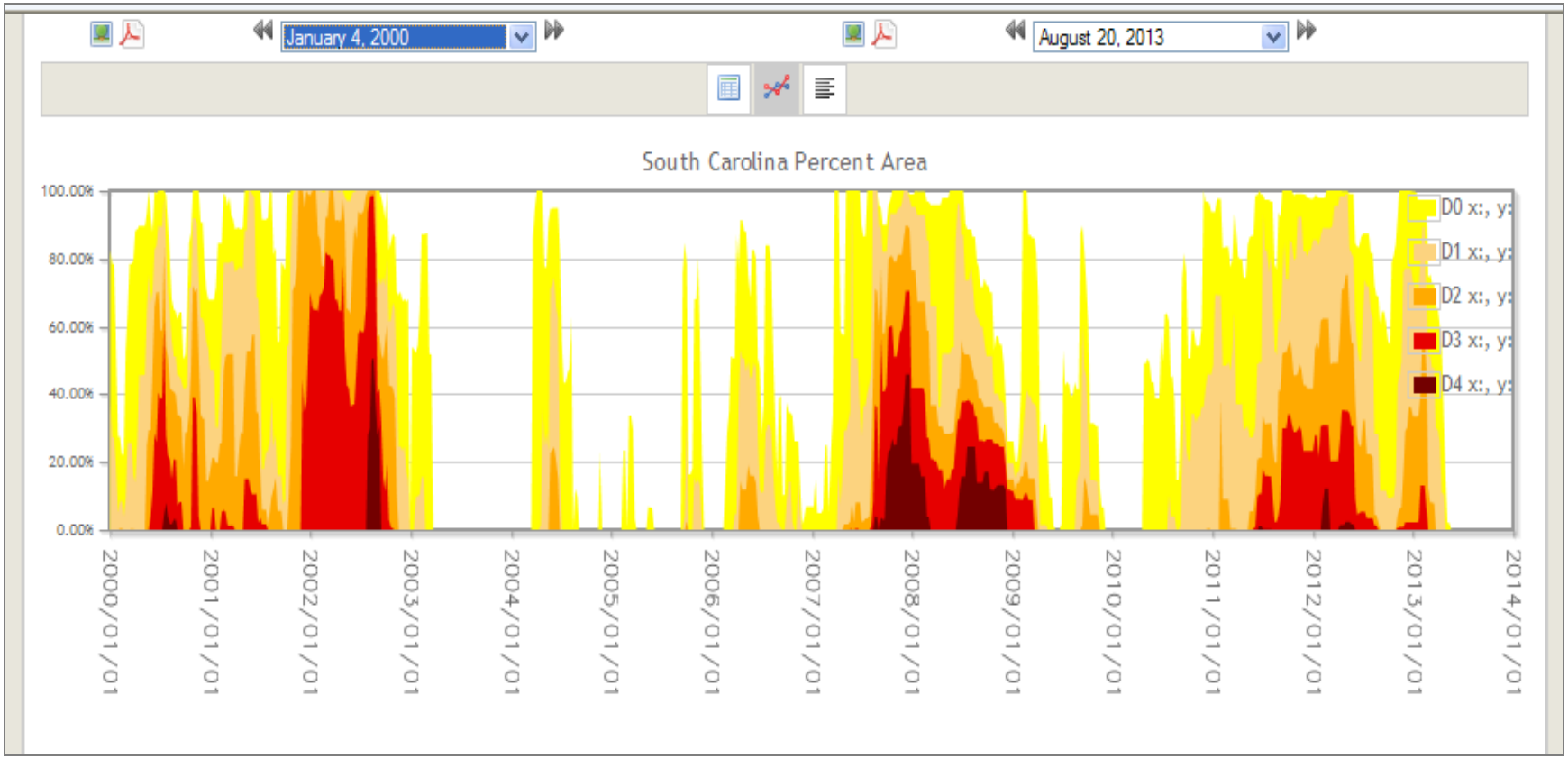
- Understanding of drought impacts and vulnerabilities can be used to:
  - develop and target drought mitigation strategies
  - support relief allocation decisions
  - inform policy and planning priorities

- Contribute to a Drought Early Warning System (DEWS)
  - Monitoring, forecasting, outlook tools
  - Management plans, response actions
  - Communications about conditions and impacts

(Dis)Connections between indicators and impacts

- Indicators and indices derived from hydrometeorological data are used by particular sectors:
  - Agriculture, Palmer Drought Severity Index (PDSI), Crop Moisture Index (CMI)
  - Water resources, Standardized Precipitation Index (SPI), Surface Water Supply Index (SWSI)
  - Fire, Keetch-Byram Drought Index (KBDI)
- Unique local and regional climates and conditions (and drought impacts) are not always fully captured by common drought indicators:
  - Arkansas, "flash drought" due to high evapotranspiration levels in 2012
  - Four Corners, complex semi-arid climate and topography, limited data collection systems
  - Florida, lack of large tropical storms ("drought busters")
  - Coastal Carolinas, sensitive to changes in salinity levels
- We lack understanding of the full range of drought impacts:
  - Water quality, public health, environmental resources, secondary impacts

Drought in South Carolina, 2000-2013



http://droughtmonitor.unl.edu/archive.html

Downloaded on 22 August 2013 from the Drought Monitor Archives

Drought impacts in coastal ecosystems

The project

To improve understanding of drought impacts in coastal ecosystems and connect with decision makers

Project Components:

- Citizen science 'condition monitoring' through the Community Collaborative Rain, Hail and Snow (CoCoRaHS) network

- Interviews with local business owners, commercial and recreation fishermen, and land/resource managers

National Partners

National Integrated Drought Information System Pilot Programs

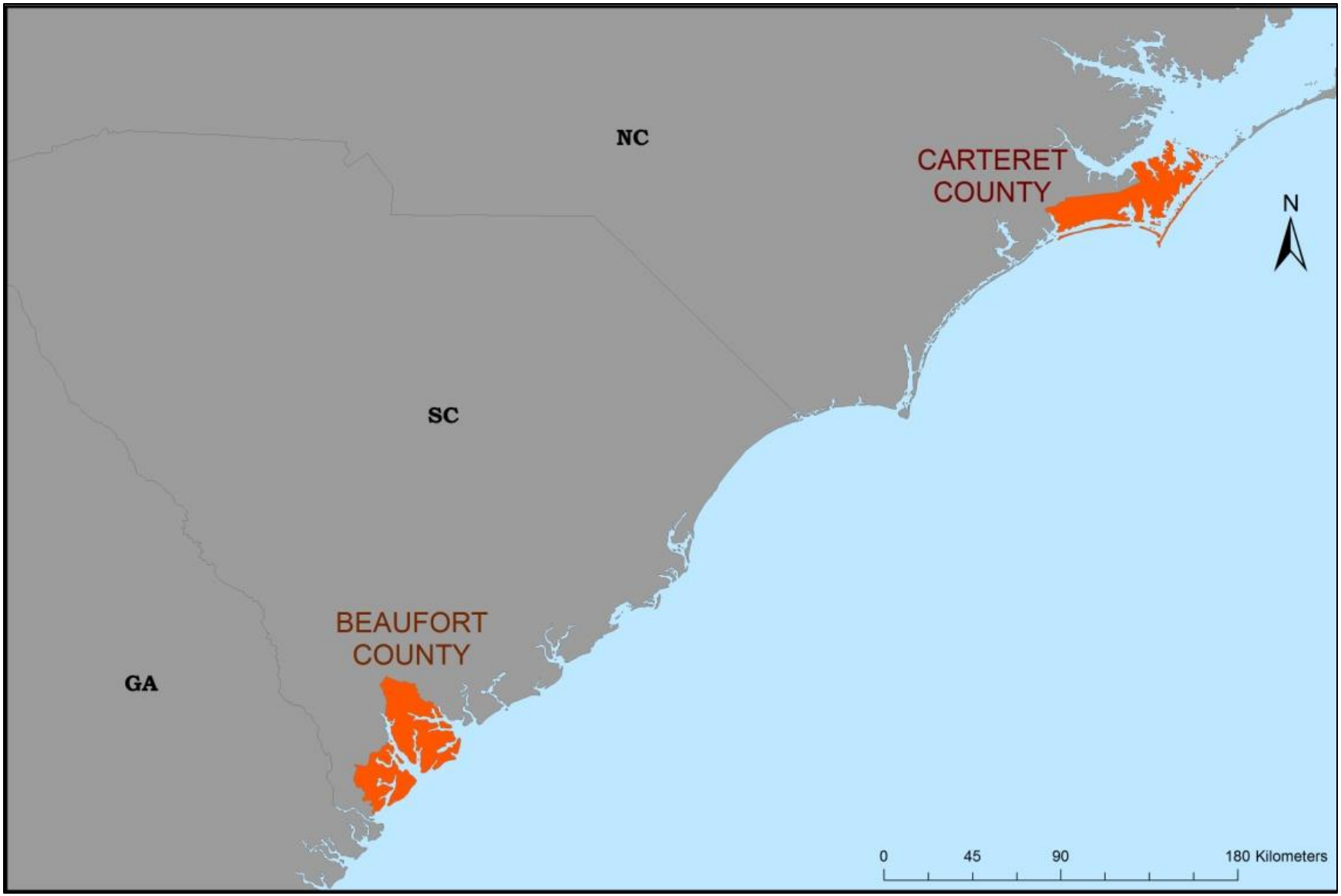
National Drought Mitigation Center

Drought impacts interviews

- Purpose: to learn first-hand about
  - On-the-ground drought impacts in coastal regions of the Carolinas
  - Mechanisms for coping with drought impacts
  - Drought information use and needs
  - Other stressors

- Locations
  - Beaufort County, SC
  - Carteret County, NC

Study area


NC
SC
GA
CARTERET
COUNTY
BEAUFORT
COUNTY
N
0
45
90
180 Kilometers

Who we interviewed

- Commercial fisheries businesses (n=14)
  - Shrimpers, crabbers, other commercial fishermen
  - Seafood houses
  - Researchers/regulators of commercial industry
- Outdoor recreational businesses (n=16)
  - Kayakers/ecotourism companies
  - Recreational fishing/charter boats
- Land/resource managers (n=14)
  - National Wildlife Refuges
  - Public and private parks and preserves
  - National Estuarine Research Reserves

Documenting drought impacts: What are we looking at/for?

What we are learning:

Drought influences on coastal species & habitats

Direct

- Decreased water supply – surface and groundwater
- Saltwater intrusion impacts to infrastructure and riverine systems
- Salinity changes which impact inshore estuaries and marsh systems
- Changes in fire regimes and risks to maritime forests

Indirect

- Reduced catch and quality of stock
- Increased business/management costs
- Broader economic, social and environmental influences
- Local economies: restaurants, processing facilities, markets
- Influence of adaptations (e.g. more pressure on species less sensitive to salinity changes)

What we are learning: compounding impacts

- Drought compounds other existing stressors, especially with regard to water quality
- Compared to these variables, drought alone is not a major concern among study participants
- However, given the vulnerability of these industries/areas due to other factors, the impacts of droughts may be intensified

What we are learning: coping with drought

Four major coping strategies emerging from interview data

- Hope & A Prayer
- (Non)Rainy Day Fund
- Redfish, Bluefish, Greenfish
- Strategic Shift

What we are learning: coping with drought

- **Hope & A Prayer**
  - Adopt a wait-and-see approach, hope for better conditions
    - Reactive temporary adaptations
    - Focus on reducing potential loss
    - More common when major adaptive limitations exist
    - For fisheries, may supplement income with work outside of industry

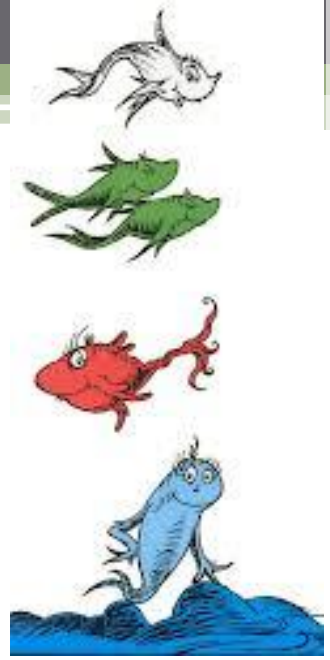
"I've learned through the years you take what you can get and be thankful for it and hopefully you're still around for next year and maybe it'll be better. Which I mean, I'm sure a lot of other people have that same outlook. Gotta wait on mother nature to give me something. And I'm sure she will. They'll be back." (Recreational Fisherman)

What we are learning: coping with drought

- **(Non)Rainy Day Fund**
  - Approaches designed in anticipation of drought to blunt degree of impact
    - Proactive adaptations
    - For fisheries, an option only when a small "cushion" exists

"I knew in October something was going on 'cause my guys were like, "Woah" so I was taking everything I could get. I was even going to Charleston and getting shrimp, I was going to Brunswick and, I was getting as much as I could to help me compensate. Do my customers like it? No. But again, this is gonna be the only product you can get. And they come to me because they know when I freeze them I flash freeze them. There's no chemicals, there's no pesticides, there's not preservatives. And they're flash frozen." (Commercial Fisherman)

What we are learning: coping with drought



- **Redfish, Bluefish, Greenfish**
  - Short - to long-term adaptations
  - Expand the types and diversity of species of interest
  - Shift focus from one impacted species to another less impacted species

"I mean for us we've diversified what we do. For 20 years I was a shrimper and that's what I did. We went from clamming in the wintertime, we'd trawl for conch for a few winters, to full time oyster harvesting from September to May, which is the bulk of our time. So we still have shrimp boats but we have a fleet of shellfish boats and guys that work for us and with us. This is our third year of crabbing full time. We do a lot of stuff and for us it's not just one thing we do that we make a living on." (Commercial Fisherman)

What we are learning: coping with drought

- **Strategic Shift**
  - Shift in long-term strategies to manage under a "new normal"
    - Prescribed burning in maritime forests
    - Find new resource sources or advocate for regulatory changes
    - Adjusting infrastructure or systems to deal with drought impacts

"But the soil is not wet anymore, and the question comes up, do we allow natural fire to just progress on the island given the fact that the islands are a lot drier. So that brings all the fuel reduction prescribed thing to it, back into the whole thing. But then again if you burn it, you're burning maritime forest on a regular schedule. And that's not natural. If you look at the literature, it says the natural fire return for coastal barrier islands in Georgia, in our area, is somewhere around ten to thirty years, so it's a pretty wide spread." (Land Manager)

Limits to coping strategies

- Fuel costs
- Human and financial resources
- Policies and regulations
- Available technology
- Infrastructure/equipment availability and condition

What we are learning: broad themes

- Scale Matters
  - As scale of the activity increases (commercial fishing), the ability to cope with drought is often limited in the short term and more costly in the long term.
- Interaction Matters
  - Drought can facilitate greater user conflict between groups (commercial vs. recreational fishing).
- Information Matters???
  - Well, at least not formal drought information anyway. With the exception of land management professionals, study participants indicated little use or need for formal drought information/reports.
- Geography Matters
  - The impact of drought can vary greatly based on location of the land, resource, or fishery of interest.
- Temporal Cycles Matter
  - The impact of drought can vary greatly based on the time of year in which it occurs.

Next steps

- Connections to drought decision making
  - State climatology offices
  - State drought response committees
  - Local water and resource managers and planners
  - Local National Weather Service offices
  - National partners
    - National Integrated Drought Information System (NIDIS)
    - National Drought Mitigation Center

Thank you to interviewees, NIDIS, and CISA team members: Amanda Brennan, Janae Davis, Kirstin Dow, Ben Haywood, Aashka Patel, Kim Rodgers

Questions?

Kirsten Lackstrom
Research Associate, Carolinas Integrated Sciences & Assessments
Department of Geography, University of South Carolina
Columbia, SC

(803) 777-3463
Lackstro@mailbox.sc.edu
www.cisa.sc.edu

cisa
carolinas integrated sciences & assessments