

Constraints to implementing sea-level rise mitigation strategies in rural eastern North Carolina

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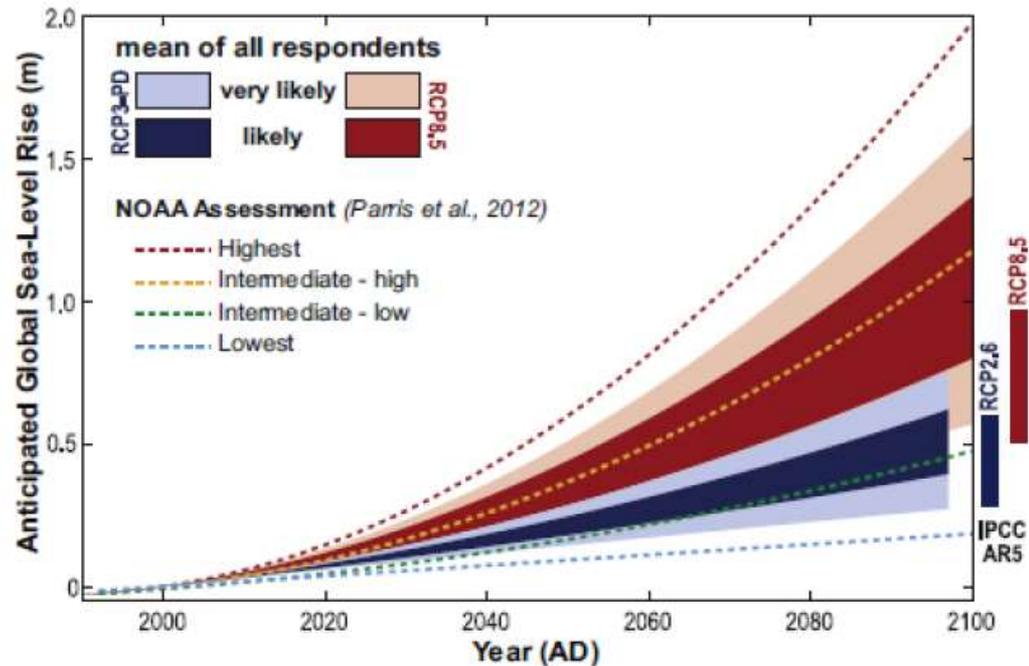


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The challenge

- Scientific insights about climate change and sea-level rise are widely available.
- But local communities are reluctant to address the pending changes.



(Horton, Rahmstorf, Engelhart and Kemp 2014)

Measuring reality

Sea-level rise increases the **frequency and magnitude of flooding in low-lying areas.**

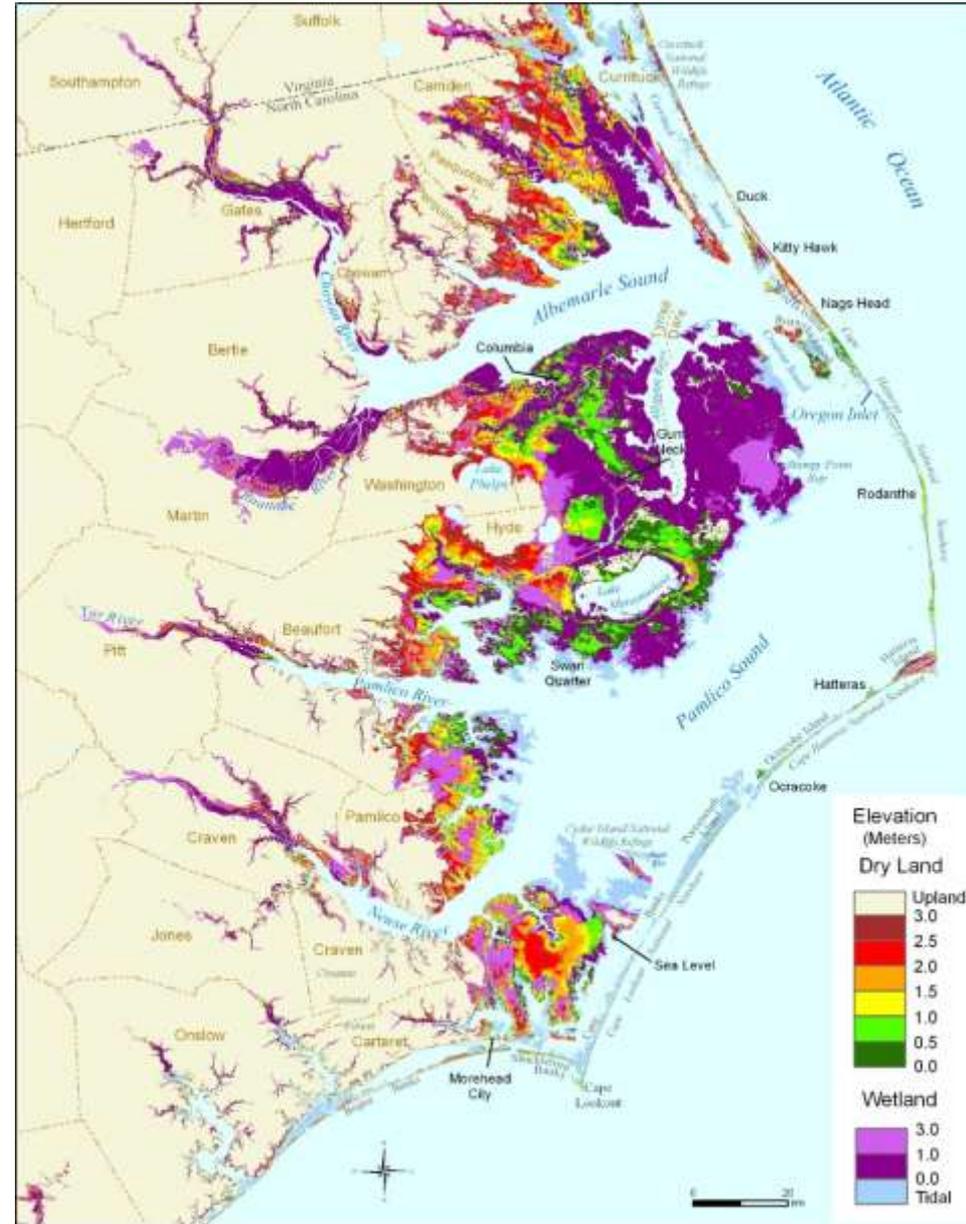


Example by Ezer and Atkinson (2014):
Wilmington, North Carolina
experienced nuisance flooding

2.5 days per year on average between 1938 and 1970
28 days per year between 1991 and 2013

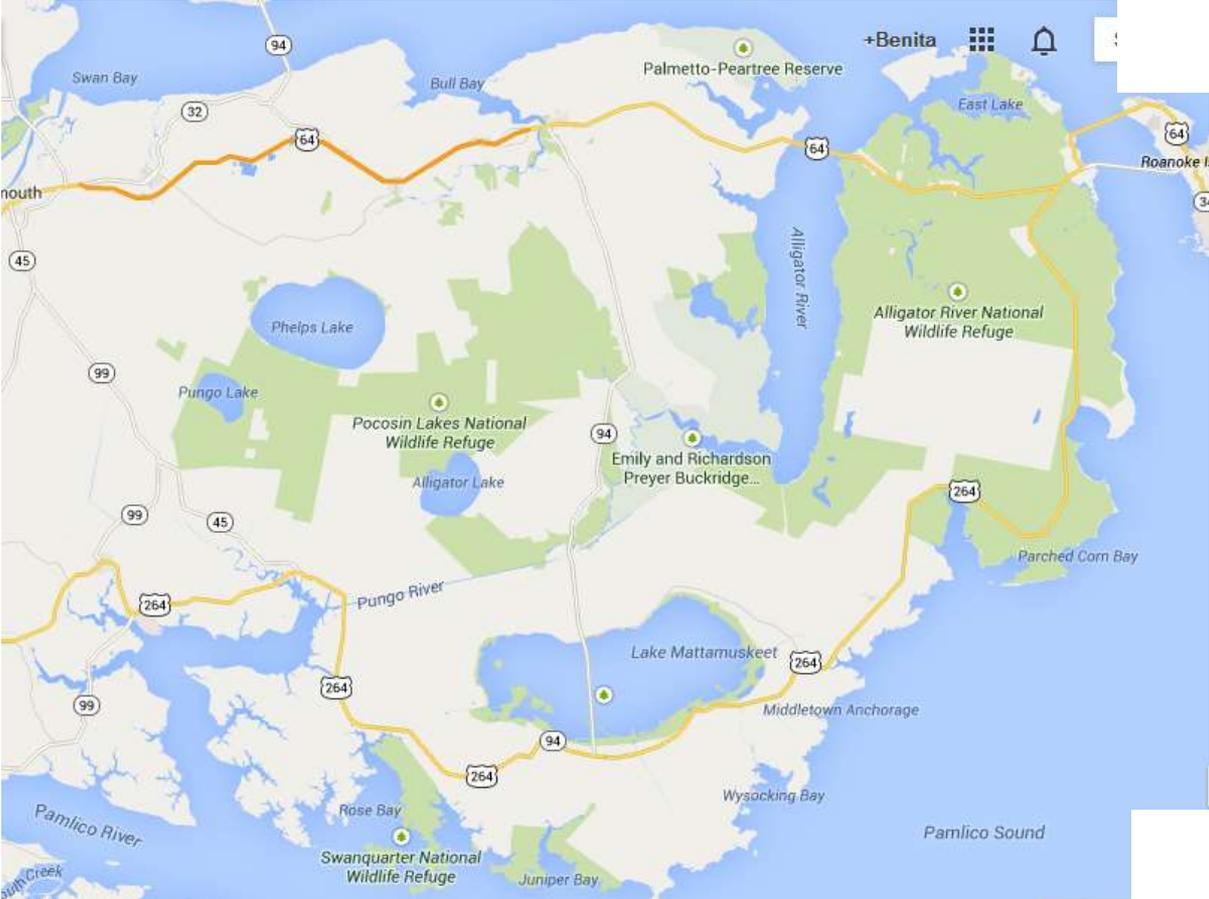
Sea-level rise predicament in NC

- Polarization of opinions about
 - the current state of the natural environment and
 - necessary remedies for coastal management
- Deep distrust in the objectivity of science:
 - North Carolina State House Bill 819



Elevations of Land Close to Sea Level
Elevations are above spring high water, which is the average high tide during new and full moons, and approximately the inland boundary of tidal wetlands. This map is a general graphical representation of elevations in the area depicted, not designed to estimate the precise elevations at specific locations. Actual elevations at specific locations may be 30 cm above or below the elevation shown.
Source: J.G. Titus and J.Wang, 2008. "Maps of Lands Close to Sea Level along the Mid-Atlantic Coast".
US Environmental Protection Agency.

Case Study: Inner Banks, NC

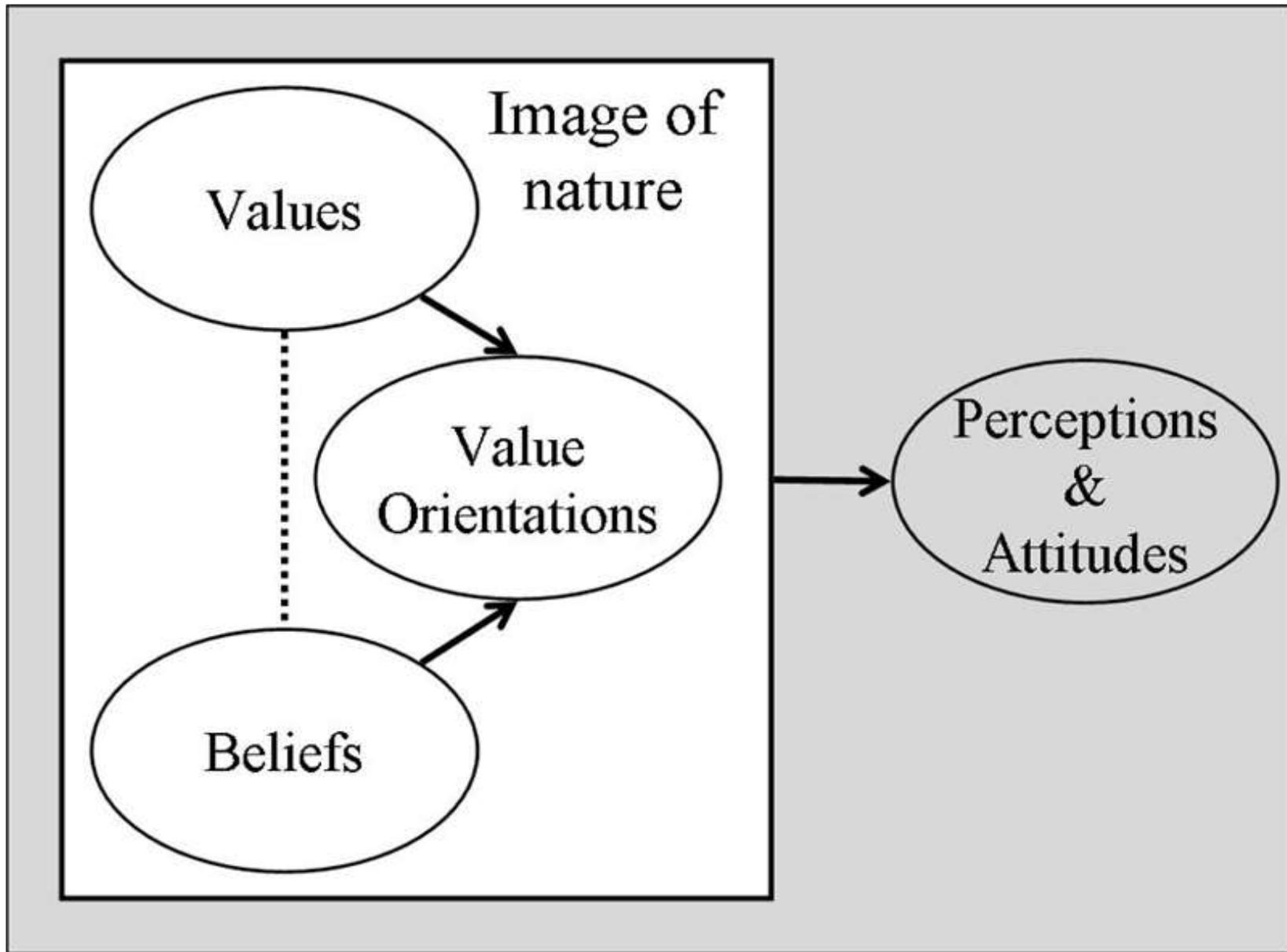


Hyde County, North Carolina

Research Question

- What explains the reluctance to address pending sea-level rise in rural communities of Eastern North Carolina?







Cultural Anthropology

- conduct participant observation as a framework for learning about others
 - understand others from their point of view
- Understand why people do what they do

Assumptions

- Residents of Eastern North Carolina have a thorough understanding of the environmental changes around them.
- (divergent) values rather than lack of knowledge are responsible for the avoidance of conversations about sea-level rise.
- Ethnographic research methods can make a useful contribution to the debate about suitable mitigation strategies.
 - Collecting Voices
 - Comparing Voices
 - Returning Voices

Ethnographic research methods

Participant observation and conversations

- Volunteer in the community
- Long time involvement (more than 3 months)
- Listening, learning
- Systematic data collection based on semi-structured interview instruments



Finding conversation partners

- At Rotary clubs, Lions clubs, American legion, voluntary fire fighter meetings, etc.
 - At bible study meetings, church gatherings
 - By volunteering at community events and in schools
 - By “hanging out” at gas stations and convenience stores
- Building a **quota sample** to capture diversity by gender, age, ethnicity, occupation, location



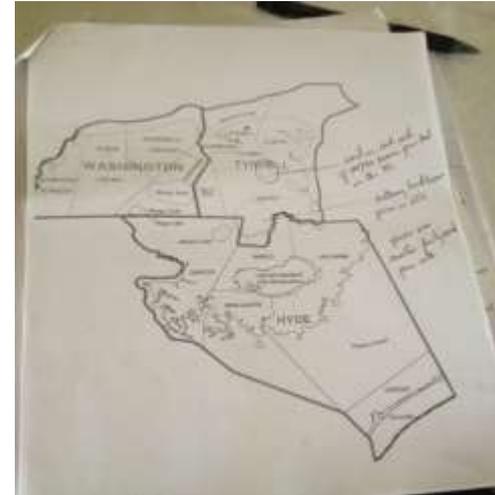
2013: Outer Banks residents in Dare County
(N=210)

2014: Inner Banks residents in Tyrrell and
Hyde County (N=156)

Collecting voices

Mixed method data collection

- average length of conversation: > 60 minutes
- open ended questions (no prompts): descriptions about observed environmental changes since childhood
- sorting task: allocation of tax money to a set of projects
- sentence completion: evaluation of alternative energy projects
- ranking tasks: attitudes towards nature



Demographics of participants in IBX counties: Tyrrell and Hyde

Gender distribution

53% women

47% men

Ethnic distribution

European American: 64%

African American: 30%

Hispanic American: 4%

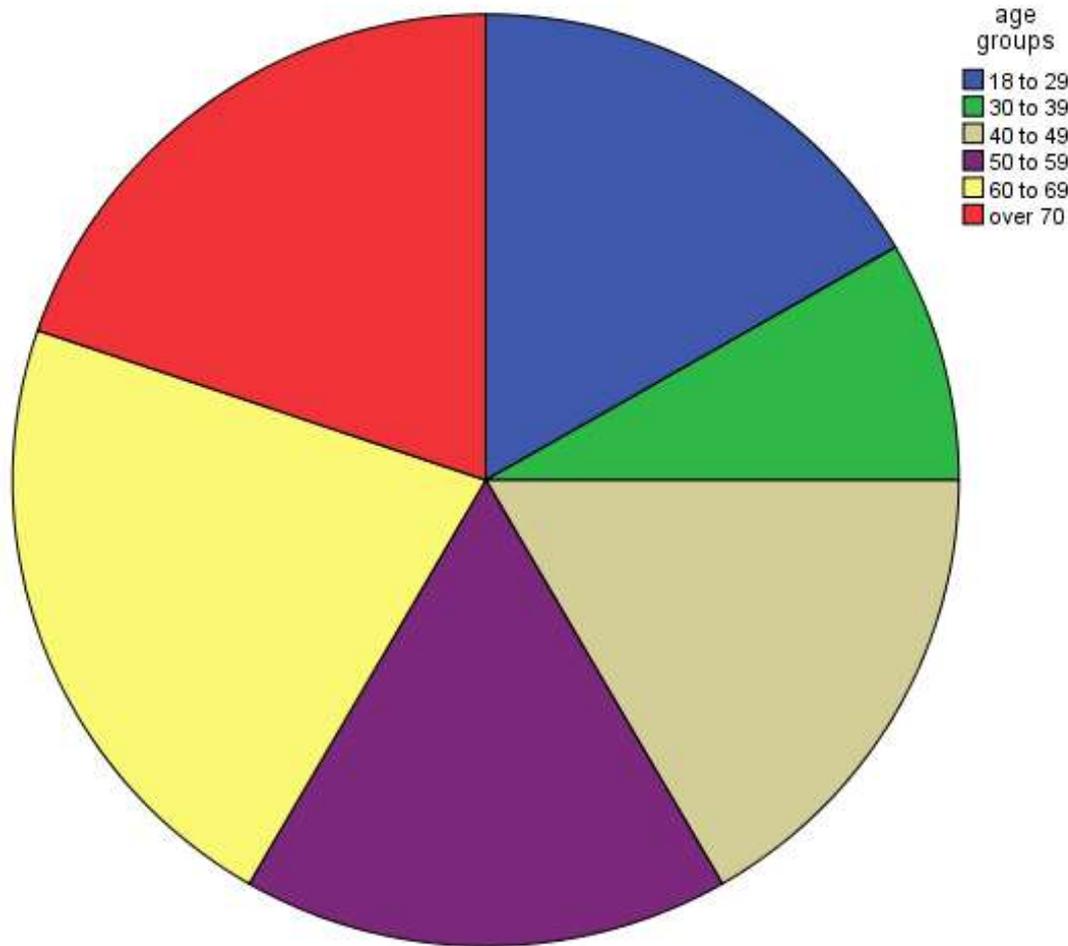
Asian American: 2%*

* only in Tyrrell County

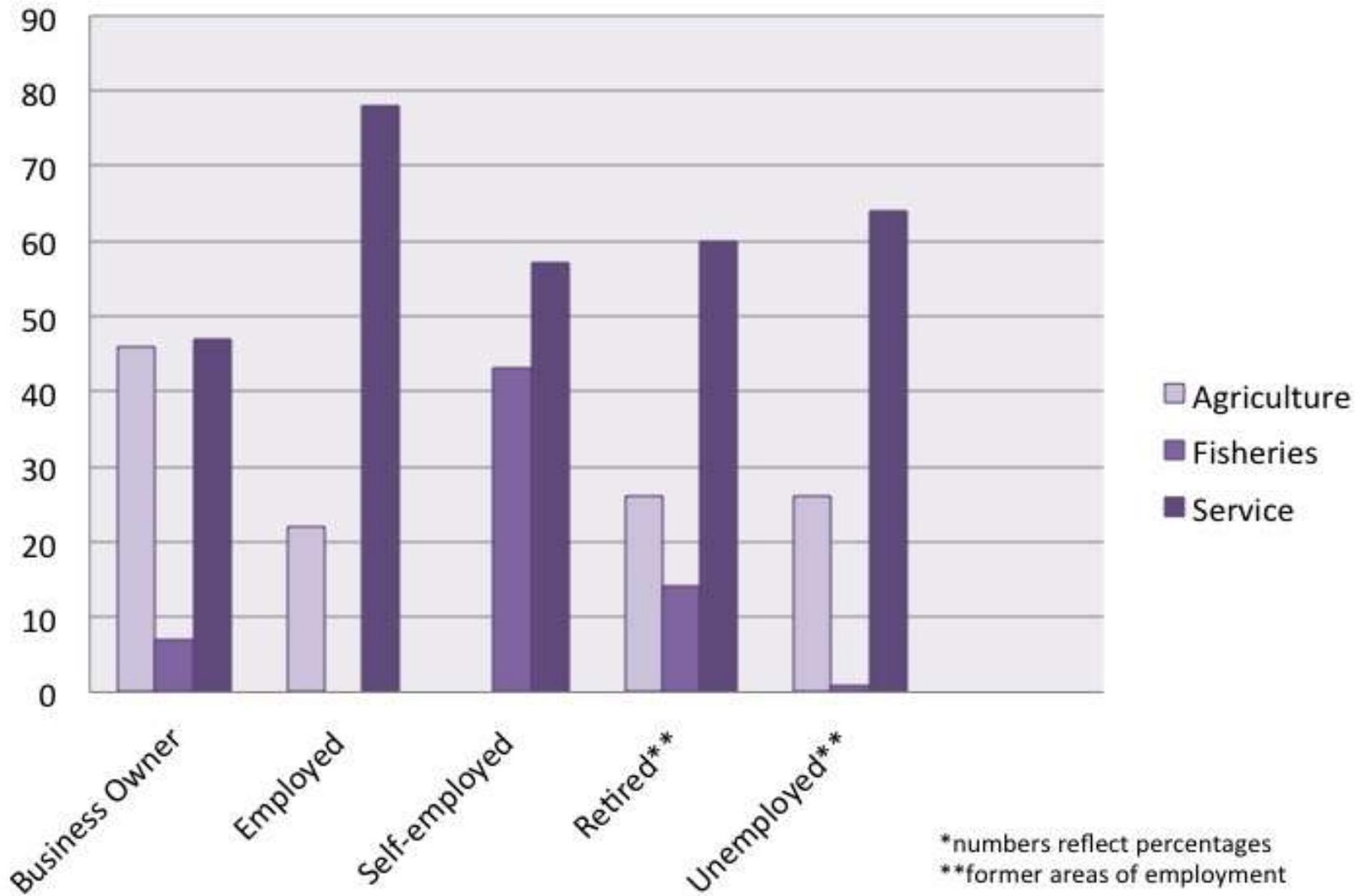
total population in Tyrrell County:

4070 people in 2015.

Age distribution among Tyrrell and Hyde County participants



Occupation by Industry*



How do we know that we know something about opinions and attitudes?

Coding interview texts for:

- Similarities and differences in content
 - Computing frequencies (descriptive statistics)
 - Computing co-occurrences of codes
- Identifying exemplary “quotes”

What are current adaptation strategies?

- Elevation of houses
- Rebuilding
- Pumping water
- Young people:
 - moving away



'Sea-level rise' anyone?

Only 7% of participants along the Outer Banks, in Dare County, mention it explicitly.

Yet 25% of participants in the Inner Banks Counties Tyrrell and Hyde mention it without being prompted.



“Stand-ins” for sea-level rise observations in Dare County

Erosion

- 80% of participants mention erosion

“It’s natural erosion. Water comes in and the island moves back. But with the houses and roads there is now nowhere for the beach to move. Water will eventually swallow up the houses.”



“Stand-ins” for sea-level rise observations in Tyrrell and Hyde County

Drainage problems, flooding, and erosion

- 90% of participants mention drainage

*Drainage canals are not cleaned like they used to be
and it floods more often.*



... in Hyde and Tyrrell County people who don't talk about sea-level rise...

- mention erosion instead:
20% of participants

... but because of soil erosion the swamps are rising. See all those stumps? The water is rising. We don't have a shoreline anymore because of erosion.



The 'sea-level mentions' in Tyrrell and Hyde County

We are right at sea level.

We're below sea level.

We are under sea level as it is.





... the dredging and outlets aren't being maintained.

And ever since the intercoastal opened up, the water level has been 11-14 inches higher than before...

When it comes to sea-level rise and the idea of flooding, you are stupid if you don't agree it's a problem and let me tell you why...

Farmers can't deny sea-level rise because its taking their fields. It's saltwater intrusion.



Note: Hyde County residents are particularly aware of salt water intrusion

Who notices the salinity connection?

- 42% of European American informants in IBX
- 33% of African Americans informants in IBX



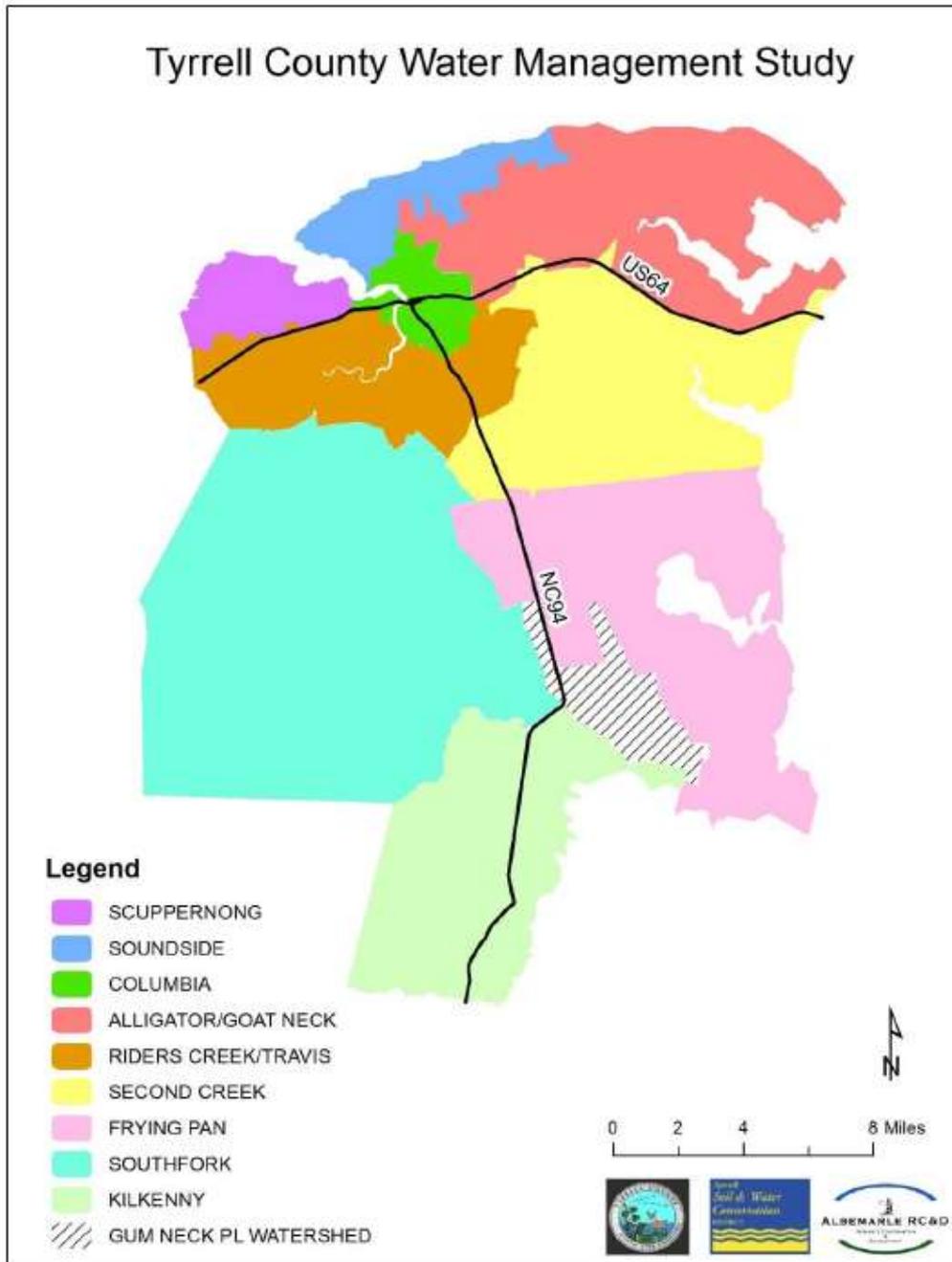
Drainage issues: specific to Tyrrell County



Everywhere needs to be drained out. Gum Neck has pumps. Columbia has always been sunk. There's no help for it.

I think a lot of people will have to move, or do something as far as drainage, but it's hard to block water. Dams work, but maybe not around here.

Figure 1. Proposed Special Use Water Management Districts



Tyrrell County Water Management Study 2014

→ Suggestion to establish 9 drainage districts commissioned by Ty Fleming



Figure 3. Soundside SUWMD

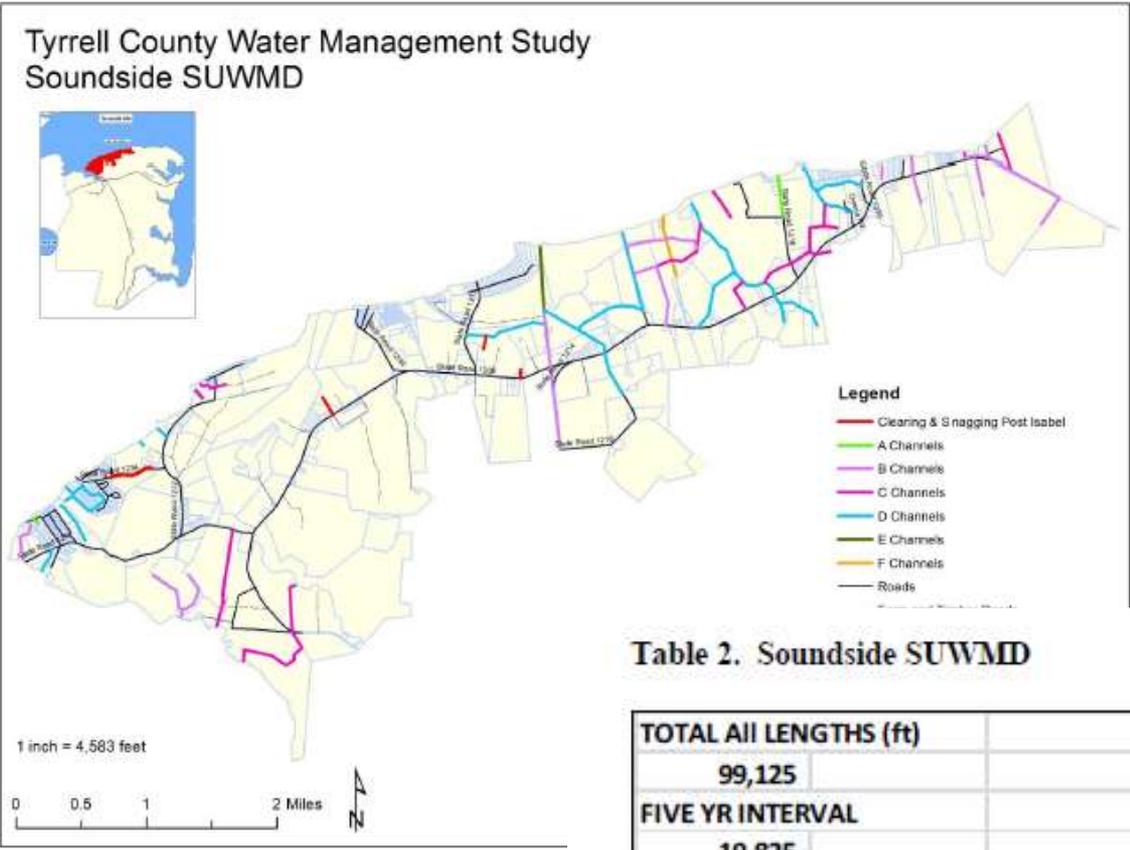


Table 2. Soundside SUWMD

TOTAL ALL LENGTHS (ft)					
99,125					
FIVE YR INTERVAL					
19,825					
Soundside Assessed Parcel Value					
\$ 102,733,902					
Per \$100/Value \$ 1,027,339					
Average Cost to Maintain 99,125 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
	\$1.00	\$1.25	\$1.50	\$1.75	\$2.00
\$	19,825	\$ 24,781	\$ 29,737	\$ 34,694	\$ 39,650
Cost per \$100					
	\$0.02	\$0.03	\$0.03	\$0.04	\$0.04
\$	20,547	\$ 25,683	\$ 30,820	\$ 35,957	\$ 41,094

Response to the drainage district proposal in Tyrrell county

Purposive sample of properties (excluding absentee land owners) :

- Second Creek: 9 houses/ 3 informants
- Soundside: 29 houses/ 9 informants
- Alligator: 13 houses/ 4 informants
- Frying Pan: 7 houses/ 6 informants
- Columbia: 18 houses/ 8 informants
- Riders Cr/Travis: 20 houses/ 8 informants
- Kilkenny: 13 houses/ 2 informants
- South Fork: 13 houses/ 4 informants
- Scuppernong: 15 houses/ 4 informants



→ 48 participants, 14 women, 34 men
16 African Americans and 32 European Americans

Reactions

- About 70% are supportive



I'm on board with it.

Something needs to be done.

If Ty thinks it's a good idea, I'd be behind it. It is his job after all.

I agree, it might be the only way.

I'll hear any ideas that are going to try and fix this.

Historically, districts have always been around, people are very interested in the idea.

Who supports a drainage tax proposal in Tyrrell County?

- European American residents
 - 1/4 are against it
 - 3/4 are in favor
- African American residents
 - 1/3 are against it
 - 2/3 are in favor



Sound familiar?

What constraints?

... yet there was hedging:

- *It takes a long time to change anything around here.*
- *People won't go for it if the county manages the money.*
- *I'd be surprised if this works, you won't have people who will commit.*
- *Some people don't want things done, they won't pay this tax levy or want it.*
- *It'll be hard to get home owners to pay, they don't think it affects them.*
- *I think farmers should pay double what homeowners do, and maybe people who live closer to the pumps as well.*

Specific frustrations

- *So hard to get a permit to do anything.*
- *If you can't get the environmentalist folks and wildlife folks on board, you can forget it, nothing will be fixed.*



Lack of trust

- lack of trust in the county government
- lack of trust in the success of any political initiative
- lack of ties between groups
- lack of personal investment: “others should do it...”



Not in favor of water management districts

I've seen too much money wasted around here. NC has a history of taxing and the money going away.

I think we pay enough taxes where this should already be done.

I can't afford it.

Not beneficial for people on the water like us fishermen.

Trying to fix the water issues is pointless.



US and THEM



Great idea but I won't do it if they don't...

The locals that have a decent source of income don't want much change.

About the only way to solve the issue is to get the land owners together.

Summary of findings

- Majority of residents is **aware** of changes.
- Opinions are assumed to be different by ethnicity, but are actually **ethnically heterogeneous**.
- **Uncertainty** about economic future is more “real” than uncertainties about sea-level rise.
- **The small total number of residents (4070 as of 2015)** seems not to be advantageous to the introduction of changed practices.

Constraints to change (agency)

- Cultural constraints (perpetuated assumptions)
 - self-reliance
 - attitudes towards government
 - ethnic divide
 - church affiliations
 - farming vs. fishing views
 - landowners vs. laborers
- Structural constraints
 - low tax revenue: lack of resources
 - low population density
 - not enough “bridge ties” between local groups
 - infrastructure: long “commutes”...
 - complicated permit process

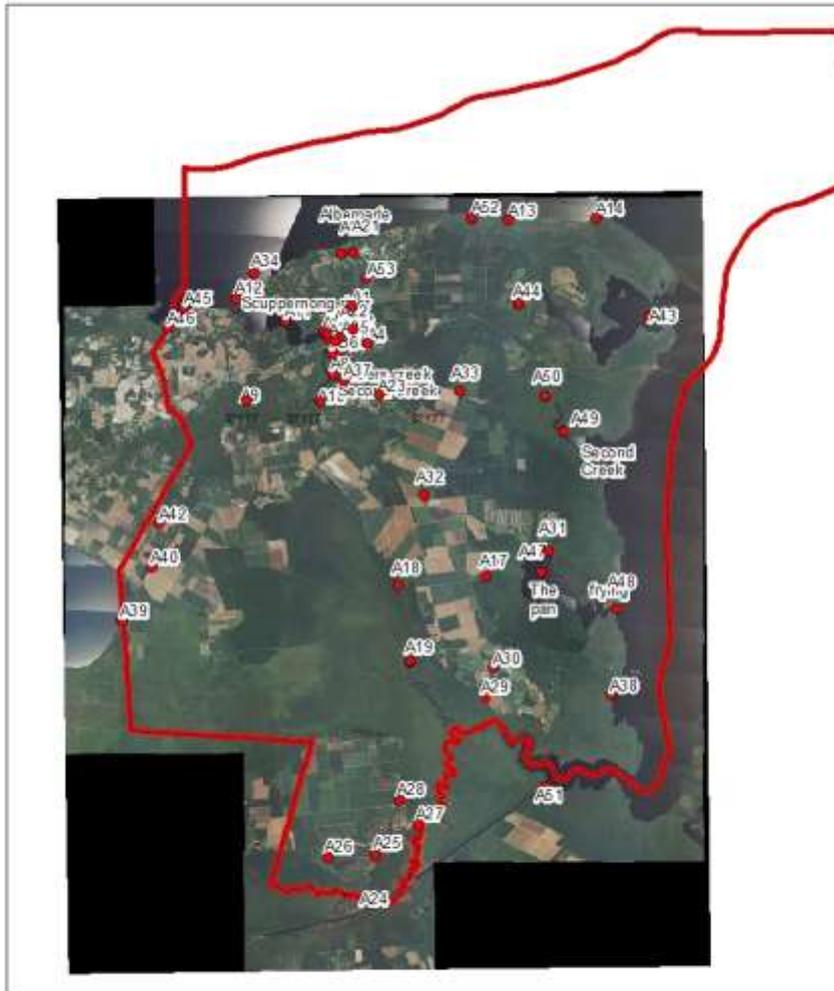


Suggestions...

Where to go from here?

- Find the “informal leader” in each local group
- Bring groups together: develop communication networks and partnerships among residents that reach beyond existing social groups, e.g. church groups, use of Facebook
- “Being there...” fund a community action worker to stay
- Initiate a citizen science project: local discoveries, individual connections to change observations
- Connect university researchers and local agencies: example ECU/SECU public service fellowships

Current project: measuring salinity



ECU Public service fellow Eva Gallardo, undergraduate biology student, worked with Ty Fleming on collecting water samples to test for salinity (2016).

Plan for 2017: measuring conductivity in soil samples.

Your suggestions for action?