



Maryland and Delaware Climate Change
Education Assessment and Research

NARST Annual Conference, Puerto Rico, 2013

Symposium - The Policy, Practice, and Research Nexus of
Climate Change Education

Symposium Co-Presenters:

Dr. Carolyn Parker, Johns Hopkins University (NSF Award #1237992)

Anita Roychoudhury, Purdue University (NSF Grant Awardee)



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Researching Teacher Professional Development for Climate Change Education

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Project Overview

- Maryland and Delaware Climate Change Education, Assessment, and Research (MADE CLEAR)
- 5-year project supported by NSF Phase II Climate Change Education Partnership (CCEP) grant
- Partners include:
 - Core institutions in Delaware and the University System of Maryland
 - Maryland and Delaware Departments of Education
 - Maryland Public Television



University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE



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MARYLAND



Project Goal

Embed climate change science into formal and informal education in the region, while:

- Advancing learning sciences research in the areas of conceptual change and learning progressions
- Assessing new approaches to professional development that foster changes in teacher knowledge, skills, and dispositions



Teacher Professional Development

- Weeklong Summer Climate Academy in July 2013
- 40 middle and high school teachers from MD and DE
- University of Delaware's Virden Retreat Center



Teacher Professional Development

Teachers will:

- Engage with climate scientists and content experts
- Use and adapt climate change education resources
- Reflect on and discuss climate change pedagogy issues
- Learn about the use of learning progressions
- (During school year): Continue interacting through an online learning community and Saturday workshops

Professional Development Approach

- Address challenges teachers face in replicating and implementing learning from professional development
- Key challenges (City, Elmore, Fairman, & Teitel, 2009):
 - Lack of common instructional vision in schools and school systems
 - Sanctioned private practice; “siloes” culture of teaching
 - Lack of process for translating new knowledge to practice

Professional Development Approach

- Address challenges in Summer Climate Academy by including processes suggested by City et al. (2009):
 - Lesson examination
 - Science content study
 - Lesson refinement
 - Lesson delivery and observation
 - Individual reflection
 - Debrief and generalization to practice

Theoretical Perspectives Guiding our Study of the PD Experience

- 1. Interactionism and social constructivism (McGinnis, 2003)**
 - Constructing understandings of experiences is a socially mediated act (Bruffee, 1986; Gergen, 1985)
 - Individuals communicate meanings of experiences by inventing symbols within a cultural context (Cobb & Baursfeld, 1995)
 - Invented symbols include speech, talk, discourse or registers (Roth & Tobin, 1996)
 - Focus on documenting and sense-making of collaboration among different speech communities

Theoretical Perspectives Guiding our Study of the PD Experience

- Documenting teachers' sense-making in the Summer Climate Academy:
 - Videotaping group interactions
 - Teachers view videos, respond to interview questions
- Sample questions:
 - *During the video recorded segment, what were you thinking about in regards to climate change education?*
 - *How did your discussion with other teachers influence your thinking about climate change education?*

Theoretical Perspectives Guiding our Study of the PD Experience

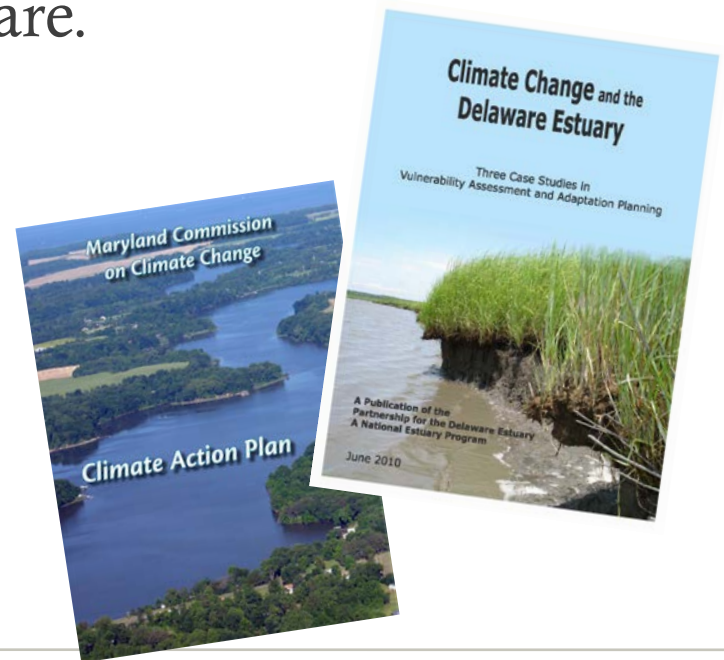
2. Socioscientific issues (SSI) perspective (Zeidler, Berkowitz & Bennett, in press)

- Climate change is a potentially sensitive socioscientific issue with economic, political, moral/ethical overlays
- Focus on teachers' views and practices related to addressing potentially sensitive topics

Theoretical Perspectives Guiding our Study of the PD Experience

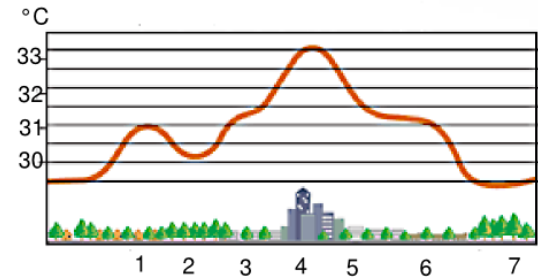
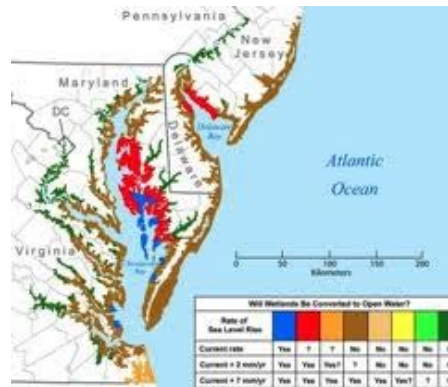
3. Sociocultural perspective

- Incorporate regionally-relevant impacts of climate change for Maryland and Delaware.
- Sample interview prompts:
 - *Please comment on the climate change topics listed below in regard to their relevance to your students.*
 - *How does your school's position on the rural-suburban-urban continuum affect the way that you would approach teaching climate change?*



Learning Progressions

- Test draft hypothesized* learning progressions on:
 - Extreme Weather
 - Sea Level Rise
 - Urban Heat Island Effect



* Based on our review of the NGSS. Still needs to be empirically validated.

Goals with Learning Progressions

To investigate:

1. How teaching a particular climate change impact helps students in a particular geographic region to learn about climate change science.
2. How teachers can use these learning progressions to teach about climate change science.
3. Growth over time of students' knowledge of climate change.

Next steps: Research Activities

- Assess outcomes of PD activities through quasi-experimental design, case studies, and survey research.
- Engage participants as colleagues in refining research tools for use in teacher education
- Use online sea level rise module to test draft hypothesized sea level rise learning progression with undergraduate teacher candidates



Sample Activity

- Locally-relevant Sea Level Rise module
- Research tool to help test draft hypothesized sea level rise learning progression while engaging teachers in locally relevant content related to climate change
- Pilot and refine with teachers in Summer Climate Academy; use with undergraduate pre-service teachers in Fall Elementary Science Methods Course

Sample Activity

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

Search by City, State, or Zip

Maps Basics Research Responses Activate News

Share view: Like 0 Send

List: [Cities](#) | [Counties](#)

Water level +1ft

Things below +1ft in

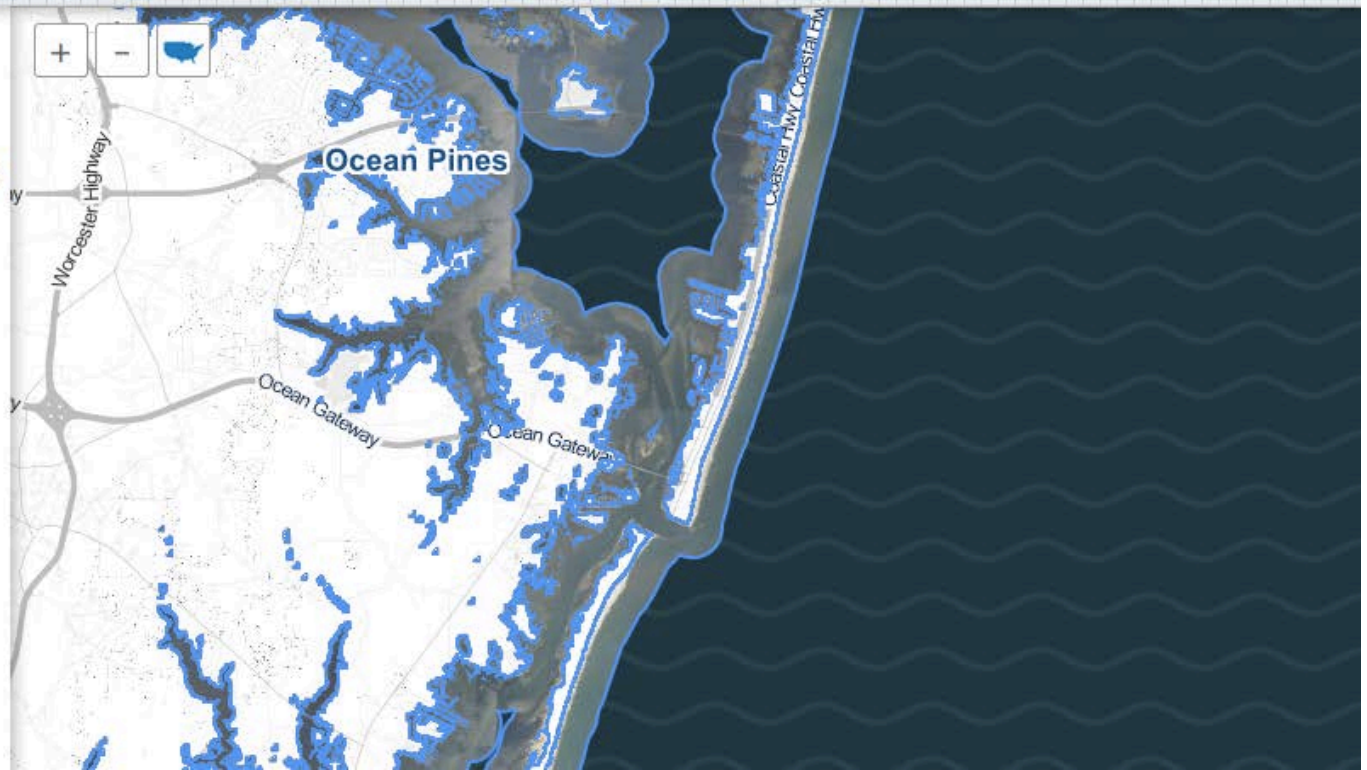
Ocean City, Maryland

Population	69	1.0%
Homes	206	0.7%
Acres	38	1.8%

Over 1 in 6 chance sea level rise + storm surge + tide will overtop +1ft by 2020 at nearest flood risk indicator site: [Lewes - Ft. Miles](#), 27.7 miles away.

Learn more:

- [Ocean City data download](#)
- [Maryland map](#) | [facts](#) | [plans](#)
- [Surging Seas report](#)





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