

# Succession Case Study: Impact of Geographic Position on Biodiversity in Mid-Atlantic Forest Communities

Natasha Woods

Moravian University

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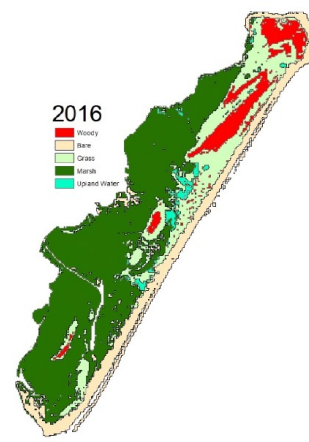
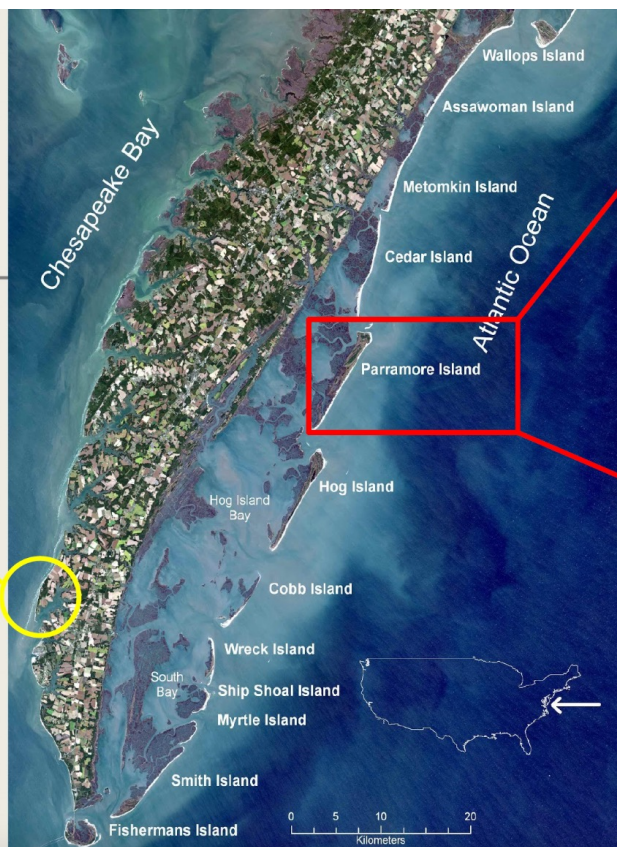
Article

# Long-Term Community Dynamics Reveal Different Trajectories for Two Mid-Atlantic Maritime Forests

Field Sites  
Eastern Shore,  
VA



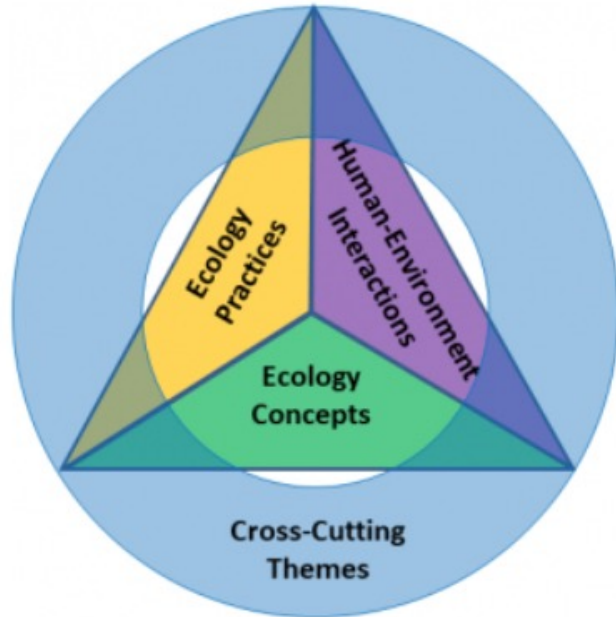
Savage Neck  
Dunes Nature  
Preserve, VA



Virginia Coast Reserve  
Long-Term Ecological  
Research site,  
Parramore Island, VA



# 4DEE Learning Objectives



## FOUR DIMENSIONAL ECOLOGY EDUCATION (4DEE) FRAMEWORK

Core Ecological Concept	Community <ul style="list-style-type: none"> <li>•Species diversity-biodiversity dominance</li> <li>•Succession</li> </ul>
Human-Environment Interactions	Ecosystem services
Ecological Practices	Natural History <ul style="list-style-type: none"> <li>•Making observations and connections</li> <li>•Quantitative reasoning and computational thinking</li> </ul>
Cross-cutting Themes CCT	Spatial & Temporal <ul style="list-style-type: none"> <li>•Stability and Change</li> <li>•Biogeography</li> </ul>

# Student Active Approaches (Pre-Lab)

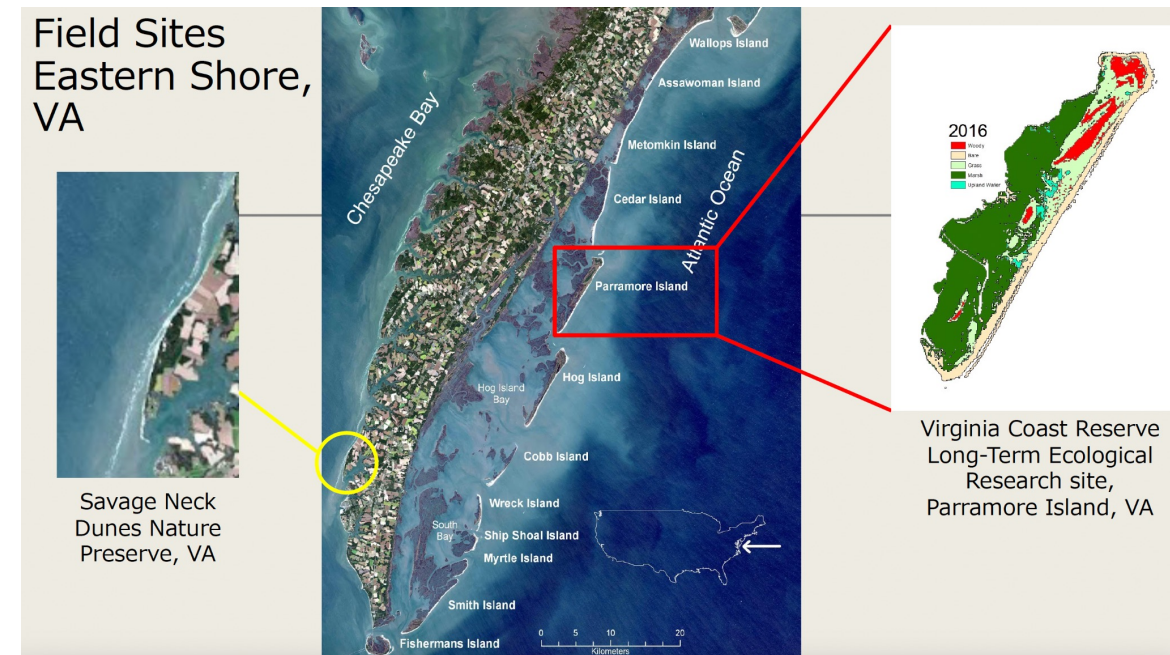
- Jigsaw activity: Group of three students teach one another
- Student 1: Biodiversity
- Student 2: Biogeography
- Student 3: Barrier islands

Purpose: To get students talking about the components of biodiversity in the geographically diverse ecosystems they are about to study



# Goal

- Have students compare successional trajectories after over a decade of recovery
  - Savage Neck Nature Preserve, Virginia
  - Parramore Island, Virginia



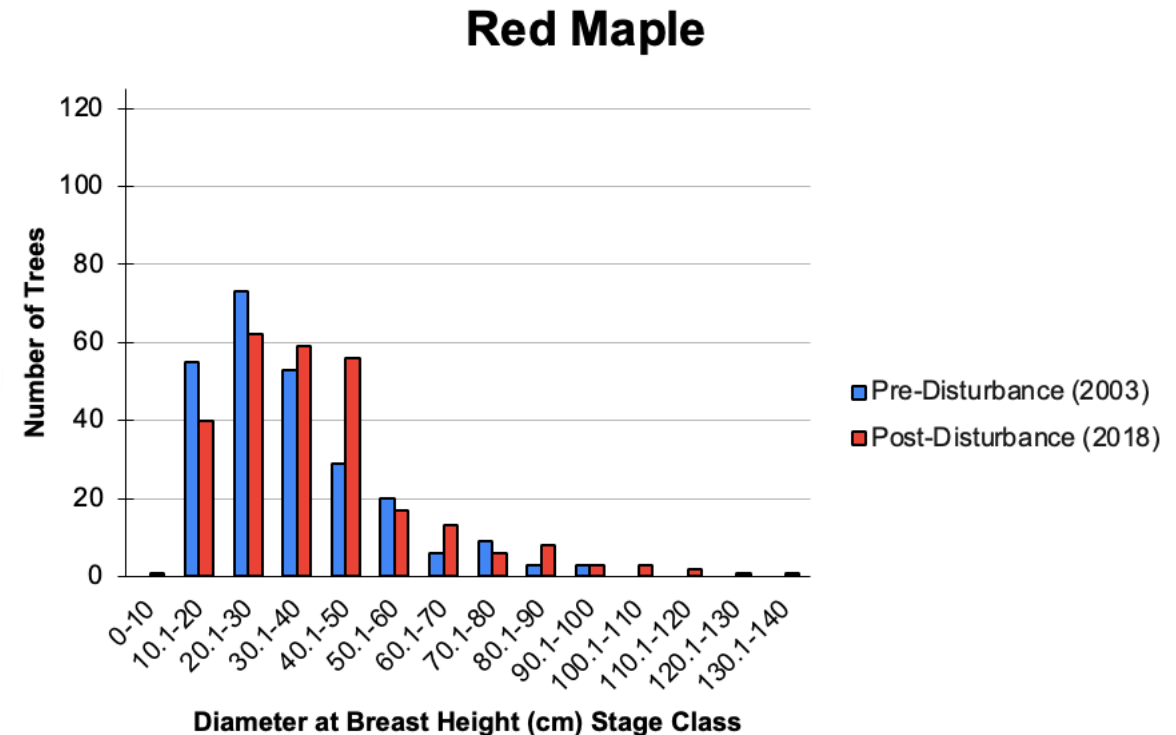
# What Students Do:

- **Develop** hypotheses about which coastal forest community will recover biodiversity of plant species due to the combined effects of storms and sea-level rise
- **Interpret** tree dominance tables to identify which community maintained biodiversity after disturbance



# What Students Do:

- **Produce and analyze** graphs comparing the different size class of individual tree species at two timepoints with an emphasis on understanding the importance of species size for community dominance
- **Calculate** Shannon diversity index to see if the plant communities maintained diversity after disturbance



# What Students Do:

- **Connect** differences in community recovery back to the geographic location of the forests





# Student Assessments

- Pre and Post Lab Assessments
- Calculation and Interpretation of Species Shannon Diversity Index
- Accurate graphing of stage class data
- Written interpretation of figures from stage class data

## TIEE

Teaching Issues and Experiments in Ecology - Volume 19, August 2023

### STUDENT INSTRUCTIONS

**Pre-lab questions:** The purpose of the prelab questions is to understand how salt intolerant species obtain freshwater on barrier islands (even though they are surrounded by saltwater), to determine the impact of climate change (i.e., sea level rise) on the capacity for salt intolerant species to obtain freshwater, and to think about the impact a lack of freshwater may have on salt intolerant species.

- 1) What are barrier islands?
- 2) Trees on barrier islands are surrounded by saltwater. How do trees on barrier islands obtain freshwater?
- 3) Research studies show that freshwater on barrier islands is becoming contaminated with saltwater. Why is this happening?
  - 4a) What do you think would happen to trees if they could no longer take up freshwater through their roots?
  - 4b) Would the result you mentioned be the same for all plants? Why or why not?
- 5) What is the connection between forests on barrier islands and forests on the mainland when hurricanes travel along the Atlantic Ocean of the US?

# Faculty Resources

- Student Handout
- Faculty Notes
- Contains full and partial answers to questions in the handout
- Contains links to Google sheets with answers to calculations and graphs that are already created
- Pre and Post Lab Assessments

Link to access module: [https://tiee.esa.org/vol/v19/issues/data\\_sets/woods/abstract.html](https://tiee.esa.org/vol/v19/issues/data_sets/woods/abstract.html)