Brown Foundation Sea-Level Rise in the Classroom 2021 Educator Workshop Report

Report of activities, methods, and results from the

Sea-Level Rise in the Classroom Educator Workshop
April 16, 2021
INFINITY SCIENCE Center
1 Discovery Cir, Pearlington, MS 39572

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Report Outline

1. Report Summary
2. About the Project
    a. Project Goal
    b. Project Objectives
    c. Background
3. Workshop
    a. Date and Location
    b. Workshop Format
4. Workshop Results and Synthesis
5. Next Steps
6. Acknowledgements
7. Appendices
    a. Appendix A - Sample Agenda
    b. Appendix B - Workshop Evaluation Sample
    c. Appendix C - Workshop Pre/Post Test Sample

Sea-Level Rise in the Classroom Educator Workshop

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Program for Local Adaptation to Climate Effects: Sea-Level Rise

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Report Summary

This report documents the educator workshop hosted in Mississippi for coastal teachers for Joe W. and Dorothy Dorsett Brown Foundation SupportSTEM funded project "Sea-Level Rise in the Classroom." One workshop was hosted in coastal Mississippi and was open for educators in coastal Mississippi and neighboring Louisiana parishes. This workshop was targeted to science and social studies formal and non-formal educators to introduce them to the newly developed curriculum. Educators were provided an opportunity to explore lessons and activities. Workshop evaluation results indicate that on average participate strongly agreed that participating in this workshop was a good use of their time and that the content and format were very satisfying. Additionally, pre and post-test comparisons indicated educators' gained knowledge around sea-level rise science and resilience practices.

About the Project

Sea-Level Rise in the Classroom is a curriculum that was developed through the NAS Gulf Research Program funded project "Building Sea-Level Rise and Flood Resilience Capacity Through Students and Teachers." This project worked with researchers and educators to develop and refine a curriculum that educates students about coastal flooding and sea-level rise resilience. The goal of the NAS project was to build capacity among the next generation of coastal stewards to understand and address complex socio-environmental challenges. The curriculum includes 4 modules (Module 1: Sea-level rise and flooding basics, Module 2: Natural Solutions, Module 3: Ordinance and Policy Solutions, Module 4: Community Planning) each with lessons, activities, and corresponding field trips. The curriculum also includes a capstone project that presents two simulated towns to students for them to address future sea-level rise scenarios.

This Joe W. and Dorothy Dorsett Brown Foundation SupportSTEM project aims to support implementation of the Sea-Level Rise in the Classroom curriculum in classrooms across coastal Mississippi and neighboring Louisiana parishes by providing teacher development workshops and materials. Providing teachers with lesson supplies and financially assisting out of the classroom experiences, allows students to make deeper connection to the impacts of sea-level rise.

Workshop Goal

Instill confidence in educators employing Sea-Level Rise in the Classroom curriculum in their classrooms.

Workshop Objectives

- To introduce educators to the new sea-level rise curriculum
- To support educator exploration and application of the curriculum

Educator Workshop

The educator workshop was held in coastal Mississippi, at the INFINITY Science Center in Pearlington, Mississippi. The workshop was held on a Friday and attending educators were provided breakfast and lunch, and a $100 stipend to cover travel or substitute teacher expenses. Workshop advertising with informational fliers was sent to high school principals, science coordinators, education centers, workshop co-hosts' educator contacts, and educators supported by other Brown Foundation service learning projects. Advertisement for the workshop began three months before the date of the workshop, through fliers, emails, and phone calls. Workshop participants represented science and social studies educators from formal classrooms and informal science centers.

The Program for Local Adaptation to Climate Effects: Sea-Level Rise (PLACE: SLR) is the lead for this SupportSTEM project. The workshop was co-hosted by other environmental educational centers across Mississippi's Coast - the INFINITY Science Center, the University of Southern Mississippi's Gulf Coast Research Laboratory Marine Education Center, and the Grand Bay National Estuarine Research Reserve (NERR). Coming together with these facilities allowed us to reach a broad network of educators and synergize sea-level rise education along the Mississippi coast.

Date and Location

- April 16, 2021 at INFINITY Science Center in the Café.

Workshop Format

The workshop was hosted on a weekday for a full day with catered lunch. Direct instruction was 7 hours, allowing educators to receive 0.7 Continuing Education Units (CEUs). The workshop space was set up indoors but with mask requirements and distancing. Tables with two chairs were spread in the center of the room for educators to sit, and additional tables were positioned on the outside of the room for educators to engage in the activities.

The workshop followed the agenda, shown in Appendix A. Sonia Vedral, the Education Coordinator, started the workshop by welcoming participants, leading an ice breaker introduction, and describing the project. The ice breaker used Poll Everywhere software and participants responded by using their phone. A one-page pre-assessment was given to the participants to see their existing knowledge.

Following the introduction, the participants worked through each of the four modules of the curriculum. The pattern for each module was to first have an introduction of the background information for the module and an overview of each lesson, then have educators select two or more of the activities to work through in small groups. This allowed the educators to see the whole picture of the curriculum and dive deeper into the activities they were most interested in or had the most questions about. All workshop participants had a full copy of all the modules in a binder. A workshop facilitator was present with each of the small groups to engage the educators and answer questions. Each module introduction took no more than 20 minutes and was followed by 35 minutes of free exploration for the educators. Some lessons were broken down into smaller activities and some lessons were a whole activity.

Module 1: Sea-Level Rise and Flooding Basics

- 1.1 Frozen in Time: Ice Cores and Earth's Recent Climate Changes – connect-it
- 1.1 Frozen in Time: Ice Cores and Earth's Recent Climate Changes – ice core data graphing
- 1.2 Rising Waters: The Ocean Is Getting Too Big for Its Beaches – melting land and sea ice

- 1.2 Rising Waters: The Ocean Is Getting Too Big for Its Beaches – thermal expansion
- 1.3 High Tide Flooding: Rainboots Required Even on Sunny Days? – high tide flooding worksheet
- 1.4 Climate Change Anomalies and Suffering Economies – modeling graphing

Module 2: Natural Solutions

- 2.1 Tides and Wetlands – tide chart creation
- 2.1 Tides and Wetlands – wetlands plants and SLR
- 2.2 Living with Living Shorelines – water pans
- 2.3 Puddles to Gardens – rain garden calculations

Module 3: Ordinances and Policy Solutions

- 3.1 Whose Law Is It Anyways? – local government research
- 3.1 Whose Law Is It Anyways? – storm water research
- 3.2 Community Assets at Risk – community assessment
- 3.3 Flooding Pains and Dream House Gains – gomsurge.org
- 3.3 Flooding Pains and Dream House Gains – house quiz

Module 4: Community Planning

- 4.1 Sea-Level Rise Risk & Reward – dice game
- 4.2 Stakeholder Roll Call – stakeholder identification role play
- 4.3 Kingtown – Planning with a Purpose

During lunch the workshop participants listened to presentations from the INFINITY Science Center, the Marine Education Center, and the Grand Bay NERR about their educator opportunities and field trips connected to sea-level rise.

The final portion of the day was a guided exploration of the capstone project consisting of two simulated towns vulnerable to sea-level rise depicted on interactive ArcGIS StoryMaps. These towns provide an opportunity to explore real data and vulnerabilities. During the workshop participants worked through a lesson plan version for informal classrooms.

The workshop wrapped up with Sonia Vedral summarizing what had been reviewed in the curriculum. Workshop participants completed a post-assessment that was compared to their pre-assessment to gauge knowledge gained through workshop participation. Participants also completed a workshop evaluation. Educators interested in being supported with a classroom stipend and using the curriculum with their students were invited to sign up on a flip chart by the exit.

Participation and Demographics

Ten educators from 9 educational institutes participated in the workshop. The representative from the Marine Education Center also participated in the lessons. Educators represented formal education in private schools, public schools, and non-formal educators from research reserves (Table 1).

Table 1. Total Workshop Attendance

Educator's State	**Participants**	**Formal Education (Private School)**	**Formal Education (Public School)**	**Non-Formal Education**
Mississippi	7	2	4	1
Louisiana	3	1	2	0

Workshop Results

Pre- and Post- test knowledge change was demonstrated with an average increase of 14% on the post-test compared to the pre-test. Five out of 10 educators improved their scores, and 4 educators scored the same on the pre- and post-test.

Workshop Evaluations

Evaluation Question	**Average Response**
1. Participating in this workshop was a good use of my time	Strongly Agree
2. This workshop increased by understanding of the Sea-Level Rise in the Classroom curriculum	Strongly Agree
3. I was provided with opportunities to provide input on the lessons, activities, and overall curriculum.	Strongly Agree
4. I learned something that I will apply in my work, either now or in the next academic year.	Strongly Agree
5. Do you intend to apply the complete modules in your teaching?	80% responded "Yes"
6. Did your awareness of local community resilience practices increase as a result of this workshop?	90% responded "Yes"
Workshop Content	Very Satisfied
Workshop Format	Very Satisfied
Workshop Pace	Very Satisfied
Workshop Time Length	Very Satisfied
Level of Detail Provided	Very Satisfied
Workshop Location	Very Satisfied
Opportunities provided for networking	Very Satisfied
Knowledge and Communication Skills of Presenters	Very Satisfied
Overall Workshop Experience	Very Satisfied

Workshop participants self-ranked themselves at the start and end of the workshop with a 5-point Likert scale for the question “I can explain the difference between climate and weather.” There was a slight positive increase in the understanding of the difference between climate and weather.

8. What did you like most about the workshop?
Workshop participants commented that their favorite aspect of the workshop was the organization and hands-on exploration of the activities. The flow of the workshop also allowed teachers to strengthen their knowledge of the curriculum by working through the lessons instead of just reading them.

9. What aspect of this workshop was least useful to you?
Only a four of the workshop participants responded to this evaluation question. These responses indicated that Modules 3 and 4 and the capstone project are not as easily incorporated into science courses.

10. What improvements would you recommend in this workshop?
Some participants indicated that the lessons in Modules 1 and 2 took longer than Modules 3 and 4, so workshop timing should be adjusted.

11. What questions, if any, do you have as a result of participating in this workshop?
Questions that educators asked at the conclusion of the workshop centered on bringing in Sonia Vedral to their classes or further collaborating with the curriculum.

Next Steps

Five of the workshop educators will be selected to receive an $800 stipend to support their use of the curriculum in their classroom. These teachers will be selected in May 2021 and the stipend will be paid to them at the start of the 2021-2022 school year in August 2021. These educators will use the curriculum through December 2021 and students will take pre- and post-tests to evaluate knowledge change. Educators can continue using the curriculum beyond that point without any additional stipend.

Acknowledgements

The Education Coordinator would like to thank INFINITY Science Center for hosting the workshop, the GCRL Marine Education Center and Grand Bay NERR for their assistance facilitating the workshop, and all the workshop participants who interacted with the lessons.

Appendices

Appendix A Sample Agenda

Sea-Level Rise in the Classroom Workshop

Mod 1 page:	**Module 1: Sea-Level Rise and Flooding Basics**
6	1.1 Frozen in Time: Ice Cores and Earth's Recent Climate Changes – connect-it *Engage*
6	1.1 Frozen in Time: Ice Cores and Earth's Recent Climate Changes – ice core graphing *Explore, Explain, Elaborate, Evaluate*
20	1.2 Rising Waters: The Ocean Is Getting Too Big for Its Beaches – melting land and sea ice *Explore, Explain, Evaluate*
22	1.2 Rising Waters: The Ocean Is Getting Too Big for Its Beaches – thermal expansion *Elaborate*
32	1.3 High Tide Flooding: Rainboots Required Even on Sunny Days? – high tide flooding *Explore*
49	1.4 Climate Change Anomalies and Suffering Economies – modeling graphing *Elaborate, Evaluate*
Mod 2 page:	**Module 2: Natural Solutions**
9	2.1 Tides and Wetlands – tide chart creation *Explore*
11	2.1 Tides and Wetlands – wetlands plants and SLR *Explain, Elaborate*
23	2.2 Living with Living Shorelines – water pans *Explore, Explain*
40	2.3 Puddles to Gardens – rain garden calculations *Explain*
Mod 3 page:	**Module 3: Ordinance and Policy Solutions**
5	3.1 Whose Law Is It Anyways? – local government research *Explore*
7	3.1 Whose Law Is It Anyways? – storm water research *Elaborate*
19	3.2 Community Assets at Risk – community assessment *Explore, Explain, Elaborate*
35	3.3 Flooding Pains and Dream House Gains – gomsurge.org *Explore*
36	3.3 Flooding Pains and Dream House Gains – house quiz *Elaborate, Evaluate*
Mod 4 page:	**Module 4: Community Planning**
7	4.1 Sea-Level Rise Risk & Reward – dice game *Explore, Explain*
19	4.2 Stakeholder Roll Call – stakeholder identification role play *Engage, Explore, Explain, Elaborate*
29	4.3 Kingtown – Planning with a Purpose *Engage, Explore, Explain*

Appendix B Workshop Evaluation Sample

Sea-Level Rise Education in the Classroom
Workshop Evaluation Form

April 16, 2021

Pearlington, MS

Content area (please check best fit)

____ Science

____ Social Studies

____ Other: _____

Teaching location (please check best fit)

___ Classroom teacher/homeschool

___ Administration

___ Non-formal education

1) **Participating in this workshop was a good use of my time. (circle one)**
   Strongly Disagree 1 2 3 4 5 Strongly Agree

2) **This workshop increased my understanding of the Sea-Level Rise in the Classroom Curriculum. (circle one)**
   Strongly Disagree 1 2 3 4 5 Strongly Agree

3) **I learned something that I will apply in my work, either now or in the next academic year. (circle one)**
   Strongly Disagree 1 2 3 4 5 Strongly Agree

4) **Do you intend to apply the modules in your teaching?**
   Yes ☐ Some lessons☐ No ☐

5) **Did your awareness of local community resilience practices increase as a result of this workshop?**
   Yes ☐ No ☐ Cannot Rate ☐

Continued on back ->

6) Please note your feelings about the following aspects of today's workshop:

	Dissatisfied				**Very Satisfied**
Workshop Content	1	2	3	4	5
Workshop Format	1	2	3	4	5
Workshop Pace	1	2	3	4	5
Workshop Time Length	1	2	3	4	5
Level of Detail Provided	1	2	3	4	5
Workshop Location	1	2	3	4	5
Opportunities provided for networking	1	2	3	4	5
Knowledge and Communication skills of presenters	1	2	3	4	5
Overall workshop experience	1	2	3	4	5

7) What did you like most about the workshop? Please explain.

8) What aspect of this workshop was least useful to you? Please explain.

9) What improvements would you recommend in this workshop?

10) What questions, if any, do you have as a result of participating in this workshop?

Appendix C Workshop Pre/Post Test Sample

Sea-Level Rise in the Classroom Workshop Pre-Test

Subject Area:_____

Teaching location (please check best fit)

___ Classroom teacher/homeschool ___ Administration ___ Non-formal education

Directions: Please circle the answer that best fits the question.

1. I can explain the difference between climate and weather:
    a. Strongly agree
    b. Agree
    c. Unsure
    d. Disagree
    e. Strongly disagree
2. Sea level is the same everywhere on Earth:
    a. True
    b. False
3. Land-ice melting is one of two main causes of sea-level rise. What is the other?
    a. Sea-ice melting
    b. Thermal expansion of water
    c. Addition of sediment and rocks
    d. Increased precipitation over the ocean
4. What is NOT a benefit that wetlands provide our coastal communities?
    a. Prevent fires
    b. Act as a speed bump for storms
    c. Provide habitat for birds and fish
    d. They filter water before it enters the Gulf of Mexico
5. Why do scientists have a large range of sea-level rise scenarios?
    a. The amount of carbon in the atmosphere may change based on human policies
    b. Sea-level rise and temperature remain constant throughout Earth's history
    c. Ice sheet melt has no effect on the rate of future sea-level rise
    d. Scientists are unable to create sea-level rise models because they do not know what causes it
6. For every $1 spent on mitigation funding how much does the nation save on future disaster costs?
    a. Protecting locations now saves 10 times as much money as it would to replace or repair disaster damage
    b. Protecting locations now costs the same amount as it would to replace or repair disaster damage
    c. Protecting locations now saves twice as much money as it would to replace or repair disaster damage

d. Protecting locations now saves 6 times as much money as it would to replace or repair disaster damage