

# Preparing Norfolk Area Students for America's Second Highest Sea Level Rise

## FINAL EVALUATION REPORT

Submitted to:

Robin Dunbar (PI), The Elizabeth River Project

November 25, 2019

Prepared by:

Professor Phoebe Crisman AIA, University of Virginia

One West Range B002, Charlottesville, VA 22904

[crisman@virginia.edu](mailto:crisman@virginia.edu)

## Executive Summary

The metropolitan region of Norfolk, Virginia is already experiencing sea level rise and other dramatic impacts of climate change. With the world's largest Navy base and frequent flooding, the situation in Norfolk is dire.<sup>1</sup> This NOAA-funded project, *Preparing Norfolk Area Students for America's Second Highest Sea Level Rise* (NOAA #NA16SEC0080002), sought to prepare area children for sea level rise. Today's children will be tomorrow's decision-makers and studies show that the overall climate literacy of youth in the United States is alarmingly low.<sup>2</sup> The Elizabeth River Project, a watershed protection NGO, along with many community collaborators, Youth Resilience Leaders from pilot schools, and lead science partner Old Dominion University, have developed a K-12 youth strategy on climate change resilience<sup>3</sup> to supplement the City of Norfolk's *Coastal Resilience Strategy* published in 2014.<sup>4</sup> This youth strategy for the Elizabeth River watershed is already serving as a model for how to creatively engage youth in resilience planning and educational programming. The NOAA-funded program has engaged 25,333 students and 2,586 teachers during the three year grant period, with the majority of students coming from underserved public schools in the neighboring cities of Norfolk and Portsmouth, Virginia. Students and their teachers participated in outdoor literacy experiences at two education platforms—onboard the floating Learning Barge and the forty-acre Paradise Creek Nature Park. They learned to make informed decisions about flooding and other climate change challenges.

## Findings

- The Elizabeth River Project staff demonstrated great skill and experience in the design and implementation of innovative environmental education curricula and programs. Students at both education platforms learned to use field investigation tools and resilience strategies.
- Effective and lasting collaborations were developed between the Elizabeth River Project and their project partners, including the City Schools of Norfolk and Portsmouth, Nauticus, the Chrysler Museum of Art, Old Dominion University, and others.

---

<sup>1</sup> Atkinson, L.P., T. Ezer, and E. Smith, 2013. "Sea level rise and flooding risk in Virginia," *Sea Grant Law and Policy Journal*, 5(2): 3–14.

<sup>2</sup> Flora, J., et.al., 2014. "Evaluation of a National High School Entertainment Education Program: The Alliance for Climate Education," *Climatic Change*, 127: 419–434.

<sup>3</sup> Elizabeth River Project, *Resilient Youth South Hampton Roads – A Pioneer Strategy for Hope and Action to Prepare Those Who Will Inherit Rising Seas*, 2019.

<sup>4</sup> City of Norfolk. *Coastal Resilience Strategy*, 2014. The strategy recommends ways to holistically plan, prepare, mitigate, and communicate to reduce the impacts of coastal flooding. Elevating future construction is also proposed as a mitigation measure.

## Findings

- Project programming primarily served diverse and disadvantaged youth—a population with limited access to environmental and climate change education via immersive outdoor experiences.
- Students engaged in age-appropriate Meaningful Watershed Education Experiences (MWEE) onboard the Learning Barge, at the Paradise Creek Nature Park, and during River Star Schools and Wetlands in the Classroom programs.
- Youth Resilience Leaders collaborated with diverse stakeholders to create the first Youth Resilience Strategy, *Resilient Youth – South Hampton Roads A Pioneer Strategy of Hope and Action to Prepare Those Who Will Inherit Rising Seas* (2019). This plan complements the City of Norfolk’s *Coastal Resilience Strategy* (2014) and calls on educators and community members to help youth prepare for the challenges of climate change.
- Youth Resilience Leaders learned about how art can powerfully represent and interpret physical environments during visits to the Chrysler Museum of Art and by painting landscapes with Elizabeth River water, creating mosaics about renewable resources, and drawings birds from the Park.
- As a result of this Youth Resilience Strategy process, the Elizabeth River Project will launch a Youth Resilient Educators webpage at [www.elizabethriver.org](http://www.elizabethriver.org) to serve as a clearing house for education resources, activities and curriculum related to resilience.
- The Learning Barge resilience curriculum and programming was very effective over the three-year grant period. Pre and post tests showed a 43% total average increase in student knowledge.
- Fast paced activities with educators at six learning stations on the Learning Barge worked well. Data books completed during fieldtrips produced clear evidence of student learning.
- The Paradise Creek Nature Park resilience curriculum and programming required the most changes and achieved significant improvements during the three-year grant period. Because of the physical size of Park, it was difficult to manage movement between several learning station and educators.
- Students engaged in hands-on service learning by planting native plants and edibles for wildlife at the Park. This approach was particularly effective and often referenced in students’ *Letters to the River*.

## Findings

- After the first formative evaluation, the Elizabeth River Project replaced pre/post evaluation questions at the Park with student *Letters to the River*. The initial open letter approach was improved by three prompts that encouraged more specific student responses. In their letters an average of 87% of students showed cognitive knowledge of how the Park demonstrates resilience. They committed to stewardship actions such as litter clean-ups, recycling, reducing energy and single-use plastics, using solar energy, collecting rain water and biking. See Appendix B for a sample of student letters.
- While implementing the programs at Paradise Creek Nature Park, the Elizabeth River Project identified the unique value of the Park learning platform for at-risk high schooler students in need of mentoring and career skills. They piloted a Youth Conservation Intern program in Summer 2019. Five Portsmouth Public School high school students learned landscape, environmental stewardship and leadership skills during this eight-week paid internship, and they became ERP's first Park Ambassadors.
- The Elizabeth River Project held several public programs during the grant period, including three annual RIVERFest events that engaged 3,750 adults and youths in climate change education.
- A new public outreach event, the Youth Resilience Expo, was piloted in February 2019 at Nauticus in Norfolk, Virginia. Thirteen schools shared fifteen resilient projects and National Geographic photojournalist Tom Clynes gave an inspiring keynote talk. Based on the success of the first year, the Elizabeth River Project and partners have committed to host the Youth Resilience Expo annually.
- The Elizabeth River Project expanded their River Star School program to include Resilient River Star Schools, which will implement a project that addresses flooding, rising seas and carbon footprint reduction. Resilient River Star Schools will annually showcase their results at the Youth Resilience Expo.
- In recognition of her success as an Environmental Educator, Robin Dunbar, Elizabeth River Project Deputy Director of Education and NOAA grant PI, was selected to receive a 2019 Presidential Award of Excellence for Science, Mathematics, Engineering & Mentoring from the National Science Foundation.
- Ben Carson, Secretary of the U.S. Department of Housing & Urban Development, visited the Learning Barge on April 5, 2018 to discover how urban students are learning how to create a resilient community.

## Recommendations

- The differing opportunities and constraints of land-based or water-based environmental education have a specific impact on educational design and learning outcomes. Distinct curricula, programs and assessments should continue to be designed for the Learning Barge and Paradise Creek Nature Park.
- While confronting the difficult and often overwhelming problems of climate change and sea level rise, the educational programs should offer a hopeful message through direct sensory engagement with the beauty and scientific complexity of the physical environment. We recommend that a hopeful approach should be continued in future resilience education programming.
- The oral method of delivering pre and post questions was particularly effective on the Learning Barge. This fun and interactive approach is well suited to getting kids out of the classroom and onto the River without reverting to traditional classroom assessment techniques. We recommend that this oral delivery method be continued.
- Because of the size and spatial complexity of the Paradise Creek Nature Park, we recommend that students move together through the Park with the same educator for their entire visit. This approach emphasizes careful observation and a deeper understanding the interconnected Park ecosystem.
- All future educational programs at the Paradise Creek Nature Park should incorporate a hands-on service learning project and especially integrate the Wetlands in the Classroom program. As evident in their *Letters to the River*, students were enthusiastic and felt empowered by removing invasive species and planting native plants.
- Future Park programs should include birding and bird education. Over 160 bird species have been identified at the Park and students expressed particular interest in this aspect of the program.
- The Paradise Creek Nature Park is a unique site surrounded by heavy industry with a compelling story to tell about coastal resilience. We recommend that the Park curriculum continue to convey the delicate balance of maintaining both a living river and a working river for future generations.