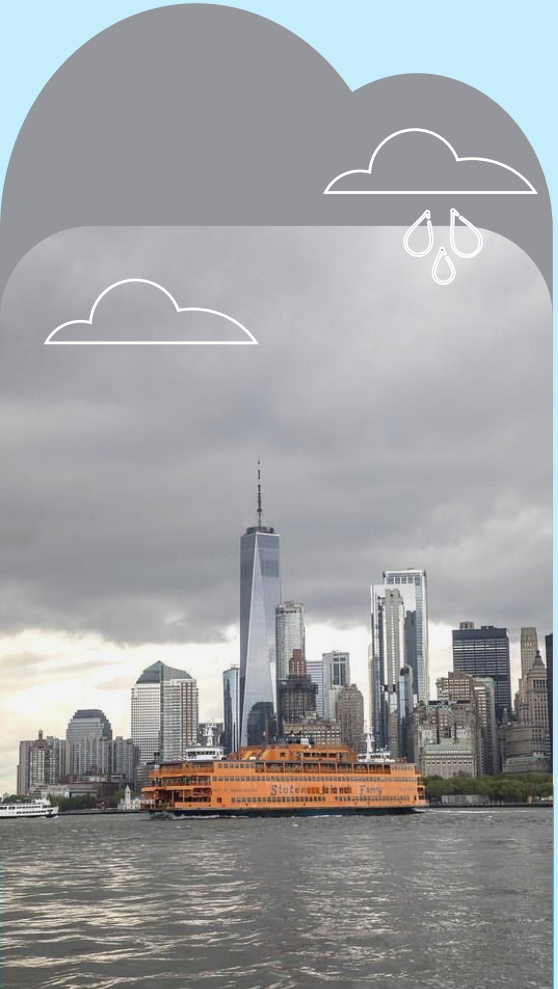

Developing and Evaluating K–12 Education Resources for New York City's Department of Environmental Protection

Dori Rathmell
Tori Velasquez
Shirley Fontanié

Advisor: Dr. Nicolette Cagle

“I think every agency, every organization, every non-profit has a [climate change] curriculum. There is enough curriculum to teach for 200 years. There needs to be something *low prep, high interest,* and *quick*.”

- NYC Educator, 2024

New York City Department of Environmental Protection (DEP)

- *One Water Initiative*
- Education Office
  - Climate Change Education Module
  - Climate Action Days

The New York Times

Reading, Writing, Math … and Climate Change?

New York may soon join a growing number of states seeking to incorporate climate change into school lesson plans.

Share full article 69

Kristy Neumeister was among 39 teachers this summer who took part in a four-day training that aimed to expose educators to the basics of climate change. Hiroko Masuike/The New York Times

Bill S278A/A1559A

- Status: in committee
- Mandates climate education in New York public school curriculum
  - Grades 1-12
  - Causes, impacts, & solutions
- Professional development
- Career and Technical Education (CTE) programs

Utilizing Place-based Pedagogy in Climate Education

Place-based education:
the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science and other concepts across the curriculum.[1]

1. Antioch University's Center for Place Based Education

DELIVERABLES

1

Curriculum Development

Create 10 new lesson plans using place-based pedagogy for DEP's Climate Change and Green Infrastructure curricula.

2

K-12 Water Challenges

Design classroom challenges to increase student engagement in water stewardship.

3

Program Evaluation

Design and conduct a program evaluation to understand the goals, experiences, and needs of educators using DEP education resources.

1 Curriculum Development

1. The Urban Water Cycle
2. Climate Resiliency in Action
3. Ecosystem Services Protected by One Water
4. Designing Cloudburst Infrastructure
5. Identifying Areas of Stormwater Risk
6. Investigating One Water outside of NYC
7. Green Infrastructure Public Forum
8. Historic Droughts in NYC
9. Visualizing NYC Water Data
10. Implementing a School-Wide PlaNYC

New York State EDUCATION DEPARTMENT
Knowledge › Skill › Opportunity

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Walking through a Lesson Plan

Description:

Droughts are a natural part of the climate cycle, occurring on a cyclical basis. However, as climate change worsens, it is possible droughts will become more frequent and severe for NYC communities. In this lesson, students will examine how droughts have impacted NYC in past years and contextualize how droughts may impact NYC communities currently and in the future.

Objectives:

- Explore data to identify periods of historic drought in New York
- Use critical thinking skills to evaluate why extreme droughts have occurred and how adaptations have reduced the occurrence of droughts in recent decades

Vocabulary:

Drought, adaptations, precipitation, reservoir

Materials:

- Device with internet access
- Access to the National Integrated Drought Information System, New York
- Digital copies or print versions of DEP Archival Images
- Poster paper
- Coloring utensils

Background Information:

Under normal conditions, water travels from reservoirs, through aqueducts, and is delivered to our sinks consistently without too many issues– however what happens under dry conditions when reservoirs run low and water is not easily available? Droughts are an often feared part of the water cycle, however DEP and other governmental agencies have experience managing water shortages.

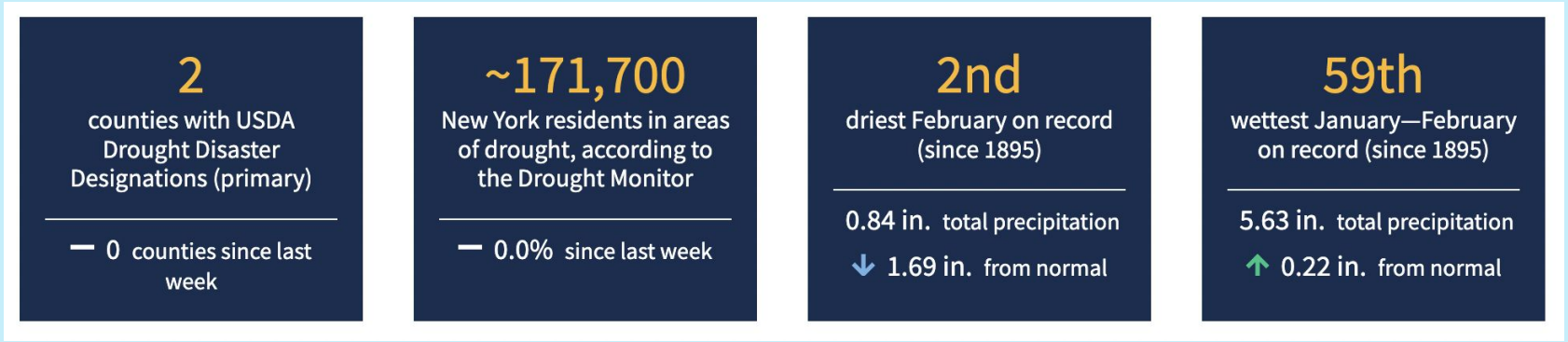
Method:

- Ask students leading questions such as, *"What happens to our water resources when we don't get rain?" "How could dry conditions impact our communities and ecosystems?" "Can anyone define a drought or what they think may constitute drought conditions?"*
    - To provide background on how the water supply system in NYC operates, direct students to the NYC Watershed Storymap. Allow students several minutes to explore, ask questions, and clarify any confusion about where water travels to and from before arriving at our taps.

Discussion:

- What factors could contribute to a drought in NYC?
- How do droughts fit in the natural water cycle?
- How will droughts change as climate change impacts typical precipitation patterns?
- What adaptations did communities and local governments make to reduce the impacts of drought? Can you think of how today's communities may adapt in times of drought?

Walking through a Lesson Plan



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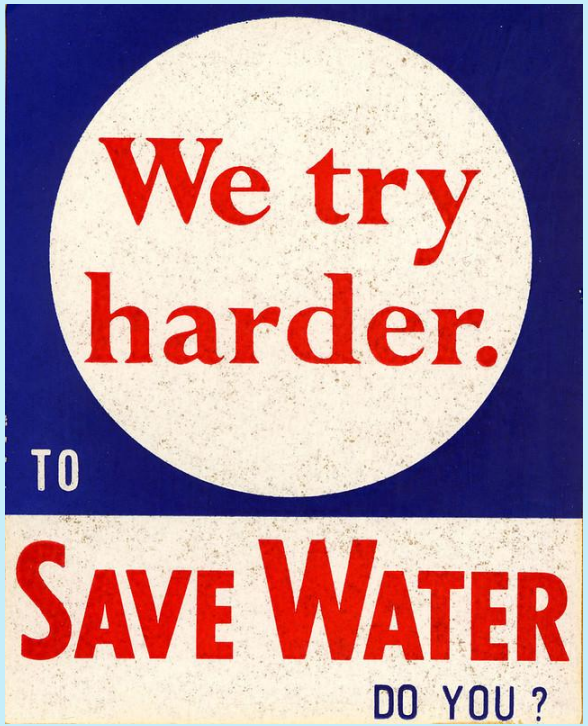

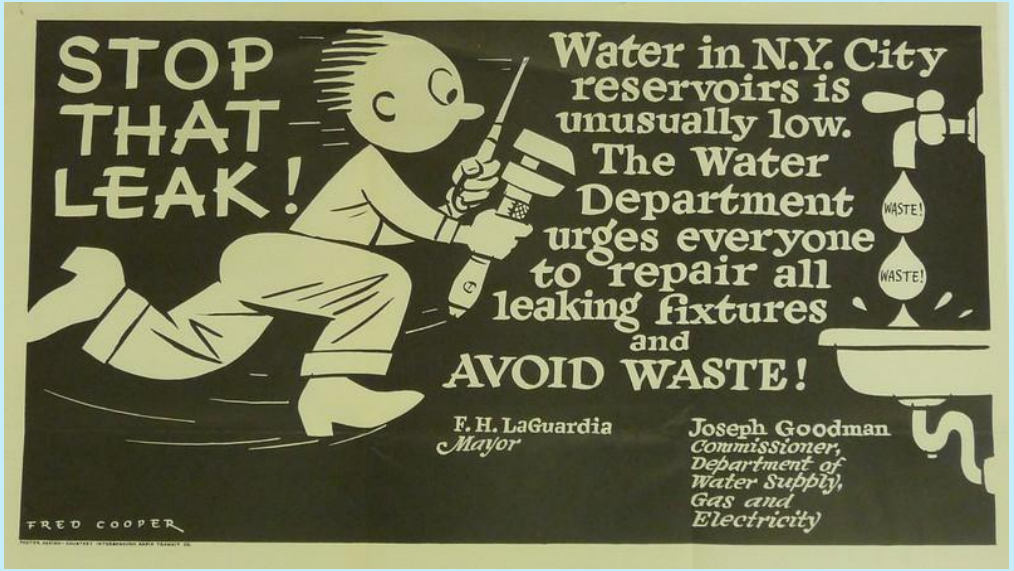

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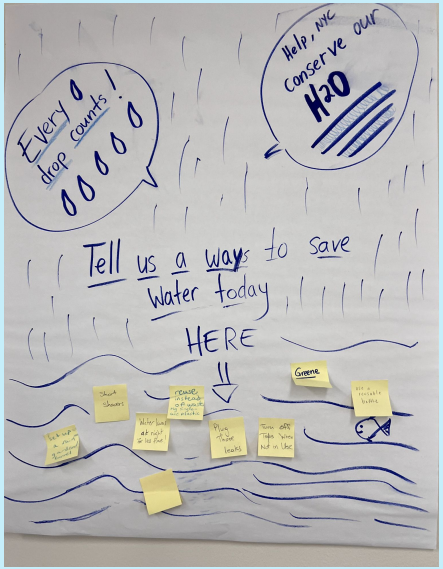

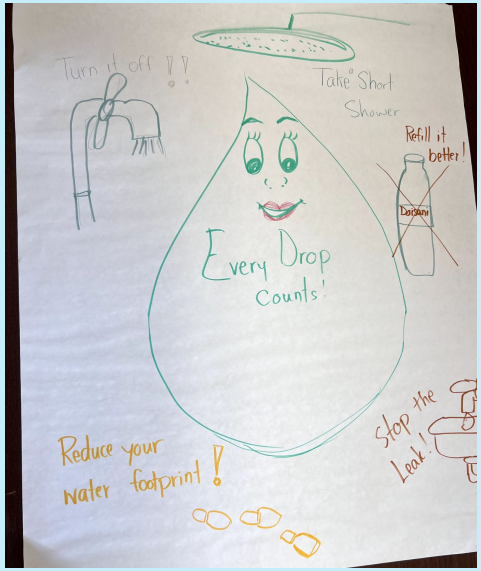

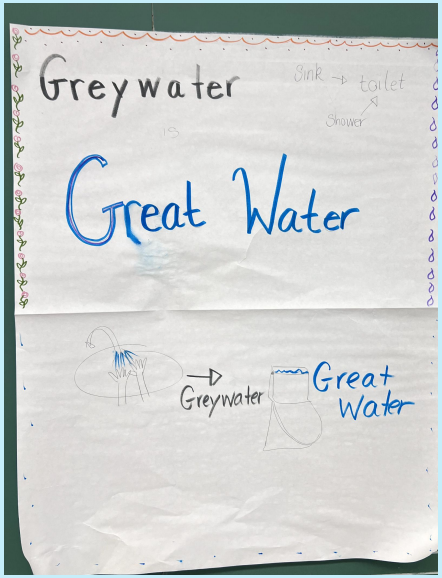

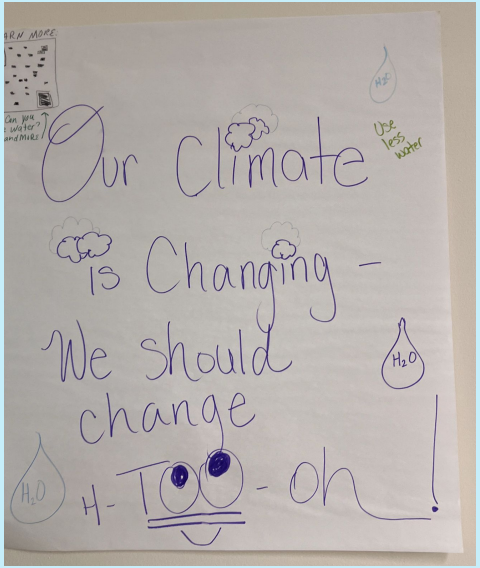

***Posters made by NYC educators during evaluation workshop.**

2 Classroom Challenges

Map Art Challenge
Audience: K-5

- Expand awareness
- Introduce complexity of NYC water
- Art as education→ kinetic & visual

Water Bingo Challenge
Audience: Middle School

- Pro-environmental behavior
- Spur action → daily habits
- Accessibility and resources

Video Contest Challenge
Audience: High School

- Climate advocacy
- Using voice for change
- Connecting with communities

NYC Environmental Protection

WATER BINGO

Use a refillable water bottle every day this week	Walk around the Central Park Reservoir	Investigate a catch basin for litter before a storm (call 311 to report a dirty basin to DEP)	Bring and use a reusable bag when shopping	Explore a NYC waterway: Go hiking, kayaking, or fishing!
Calculate your water footprint (watercalculator.org)	Read a water-related book in the library	Spot local wildlife in a nearby park or greenspace	Dispose of your leftover cooking grease properly	Visit the Newton Creek Nature Walk
Pick up trash from a nearby storm drain	Visit your favorite watery body (pond, lake, river, creek, or beach) in the city		Research where your tap water comes from!	Shorten your shower time to 5 minutes or less!
Visit the High Bridge in Northern Manhattan	Snap a selfie with water infrastructure (sampling station, water tank, sewer cover)	Watch "Thirsty for Justice" (ejcw.com/thirsty)	Remember to turn off the lights when you leave the room!	Discover which wastewater resource recovery facility your used water goes to
Visit DEP's Wastewater Resource Recovery facility with your class	Watch an episode of Blue Planet (on Netflix)	Bring a reusable water bottle to school!	Spot wildlife at Rockaway Beach or another shoreline at NY harbor	Snap a selfie in the rain!

NYC Department of Environmental Protection
educationoffice@dep.nyc.gov
For more information visit www.nyc.gov/dep

7

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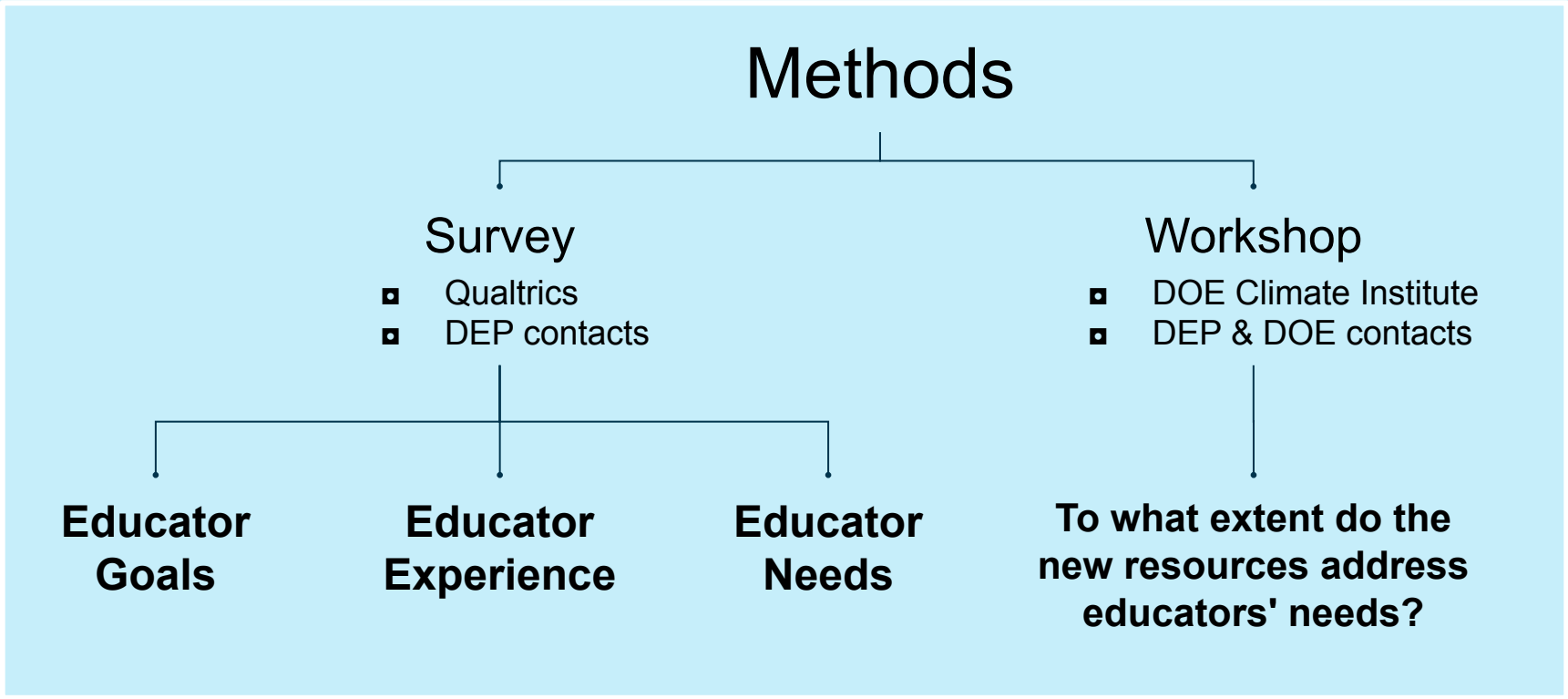
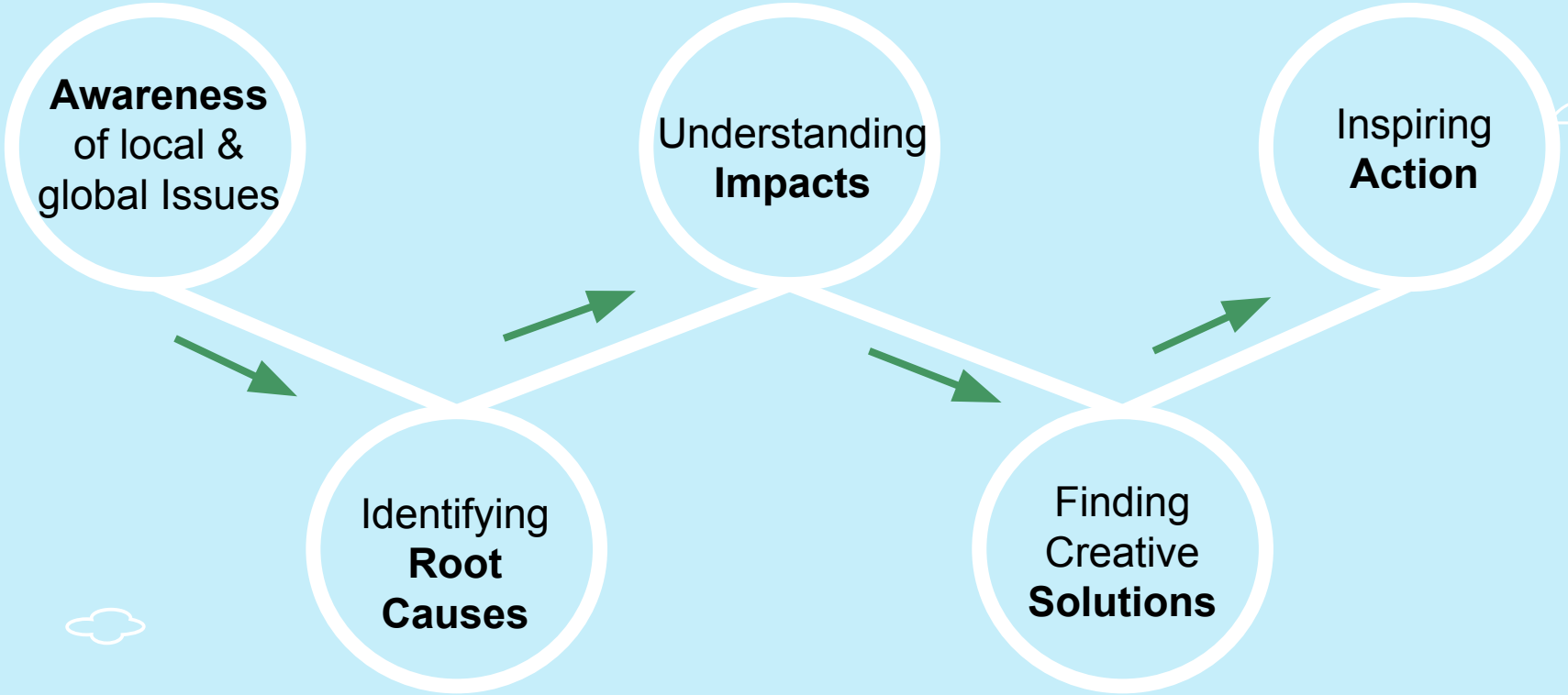
3 Program Evaluation



SURVEY: Teaching Objectives



Workshop: *Demonstrating Place-based K-12 Climate Change Curricula*

- Department of Education (DOE) Winter Climate Institute workshop
- February 21, Columbia University Teachers College
- 90 minutes, 45 participants

Themes	Sub-Themes	Feedback	Adaptation
Subject Matter	**Relevance**	Curriculum alignment	Review and identify curriculum alignment
	Importance	Locally pertinent issues and examples	Keep local examples

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	Adaptability	Adaptable to different grade levels	Provide suggested adaptations for different grade levels
	Feasibility	Some lessons are too long for one lesson	Break longer lessons into multiple lessons

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	Difficulty	Lessons may be difficult for younger or less-advanced learners	Include more visuals, graphics, and vocabulary

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TAKEAWAYS

Feasibility

The most common barriers are **time**, then **lack of training**, and **limited access to natural outdoor spaces**.

Accessibility

Teaching resources must be **accessible for all students**.

Action-oriented

Kinesthetic learning, collaboration, and creative problem-solving engage students and **alleviates eco-anxiety**.

Place-based

Focusing on **hyperlocal** concerns encourages students to **connect to their environments and communities**.

ACKNOWLEDGEMENTS

Thank you to our clients at NYCDEP, **Robin Sanchez** and **Sam Ayala**, for their collaboration and dedication,

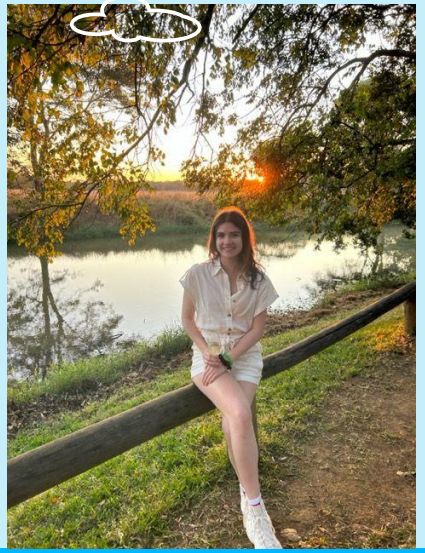
our advisor, **Dr. Nicki Cagle,** for her generous guidance and support,

and to **Noelle Wyman-Roth** for support with the evaluation, to **Laura Martinez** for sharing her expertise as a former teacher, and to **Dr. Tim Johnson** and the **Nicholas School of the Environment** for funding the workshop at the Climate Institute.

Thank you! Any Questions?

Shirley Fontanié

MEM - WRM/MBA ‘24



Dori Rathmell

MEM - WRM ‘24

Tori Velasquez

MEM - EEP ‘24

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