CUNY CONFERENCE ON CLIMATE CHANGE EDUCATION (C4E)

Thursday, April 22 & Friday, April 23, 2021

Hosted by LaGuardia Community College
CUNY Conference on Climate Change Education (C4E)
https://www.laguardia.edu/c4e/

Overview

In January 2020, bill (S7341) was introduced to the New York State Senate to amend the education law. If enacted, this bill will require climate change curriculum in all elementary and secondary schools and make New York one of the few states in the nation mandating Climate Change Education (CCE).

The CUNY Conference on Climate Change Education (C4E), hosted by LaGuardia Community College, is the first conference focused solely on the teaching of climate change and is a necessary first step if mandatory CCE is introduced in the state of New York.

Conference participants will learn what other educators are teaching, how they are teaching it, discuss best practices, and will develop the network necessary to effectively provide CCE in New York.

Acknowledgements

The CUNY Conference on Climate Change Education was funded through a grant by the CUNY Interdisciplinary Climate Crisis Research Grant (ICCRG) Program. We would like to acknowledge the hard work of staff at LaGuardia Community College including Georgina Taraskewich and her team, Elizabeth Streich, Robert Jaffe, and Maritza Acero. We thank Veronica Martinez-Castro, our Climate Change Education Intern for her untiring dedication to this conference and Caitlyn Linehan for her exacting work on our poster gallery webpage. We thank our wonderful keynote speakers, Bill McKibben and Clayton Carnes. Finally, we would like to thank President Kenneth Adams for his leadership and support of this conference.

Team

The CUNY Conference on Climate Change Education is co-chaired by LaGuardia Environmental Sciences Professor Holly Porter-Morgan, and Queensborough Community College Physics Professor Paul Marchese. They are joined by a team of faculty from community colleges across CUNY and from the Lamont-Doherty Earth Observatory of Columbia University including Luis Gonzalez-Urbina, Anna Ivanova, Neal Phillip, Paramita Sen, Derek Tesser, Julie Trachman, Ingrid Veras, and Cassie Xu.
# Agenda  Friday, April 23rd

Virtual poster gallery:  [https://www.cunyc4ecclimatechange.com/](https://www.cunyc4ecclimatechange.com/)

## Session I: 9:00am - 11:00am

### Room 1A: Advances in Climate Science

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Topic</th>
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<tbody>
<tr>
<td>9:00 - 9:20</td>
<td>Maryam Karimi</td>
<td>Application of RayMan Model in Quantifying the Impacts of the Built Environment and Surface Properties on Surrounding Temperature</td>
</tr>
<tr>
<td>9:20 - 9:40</td>
<td>Beatriz Hansjosten</td>
<td>Plastics and climate change: synergy</td>
</tr>
<tr>
<td>9:40 - 10:00</td>
<td>Paramita Sen, Paul Marchese, Dereck Skeete, Ken Irish Bramble and Neal Phillip</td>
<td>Monitoring The Temporal Distribution of Greenhouse Gases at a Bronx, New York Site</td>
</tr>
<tr>
<td>10:00 - 10:20</td>
<td>Pyarimohan Maharana</td>
<td>The changing Indian Summer Monsoon dynamics under warming climate</td>
</tr>
<tr>
<td>10:40 - 11:00</td>
<td>Mishal Aditi V and Mulshine R</td>
<td>Experiential learning for Nextgen Sustainability Leadership: A case of computing environmental payback of Solar Power Plant at Govardhan Ecovillage, India with LCA methodology</td>
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### Room 1B: Trends in Sustainable Education and Policy

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<thead>
<tr>
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<th>Speaker(s)</th>
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<tbody>
<tr>
<td>9:00 - 9:20</td>
<td>Monika Sikand, Claudio Mazzatenta, Keith Wong, Joseph Bush, and Aaron M. Socha</td>
<td>A Truly Interdisciplinary Education Model on Environmental Sustainability and Life Cycle Analysis to Address the Climate Crisis</td>
</tr>
<tr>
<td>9:20 - 9:40</td>
<td>Itai Sneh</td>
<td>The Diverse Crabgrass Frontier: A Green Revolution?</td>
</tr>
<tr>
<td>9:40 - 10:00</td>
<td>Rebecca Boger</td>
<td>Urban Sustainability at Brooklyn College: Preparing Students for a Changing Climate</td>
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<tr>
<td>10:00 - 10:20</td>
<td>Leonard Rodberg</td>
<td>The Role of Nuclear Energy in Addressing Climate Change</td>
</tr>
<tr>
<td>10:20 - 10:40</td>
<td>Snehal Donde</td>
<td>Educating youth for river rejuvenation with river basin approach as an initiative to combat issues of Climate Change</td>
</tr>
<tr>
<td>10:40 - 11:00</td>
<td>Cheryl J. Fish</td>
<td>Teaching Climate Change: An Environmental and Food Justice Approach in Writing and Literature Classes</td>
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### Room 1C: Resources for Teaching Climate Science

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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>9:00 - 9:20</td>
<td>Michael Menser, Ryan Mann Hamilton, and Veronica Manlow</td>
<td>Teaching Climate Justice Using Participatory Budgeting Across Different Disciplines</td>
</tr>
<tr>
<td>9:20 - 9:40</td>
<td>Adrienne Marriott, Rosina Garcia, and Chenoa Musillo</td>
<td>Climate Champions: Collaborating to Create High School Climate Change Modules</td>
</tr>
<tr>
<td>9:40 - 10:00</td>
<td>Kevin Kolack</td>
<td>Moving an introductory environmental chemistry course online using the American Chemical Society's &quot;Chemistry in Context&quot;</td>
</tr>
<tr>
<td>10:00 - 10:20</td>
<td>Karen Florini</td>
<td>Make it local, make it real: localized, science-based visuals and backgrounders on climate impacts and solutions for every community in the U.S.</td>
</tr>
<tr>
<td>10:20 - 10:40</td>
<td>Sarah Slack</td>
<td>Investigating the Urban Heat Island Effect with Student Scientists</td>
</tr>
<tr>
<td>10:40 - 11:00</td>
<td>Alexey Kaplan, Andrew G. Jin, Irina Gladkova, and Michael D. Grossberg</td>
<td>Students' Projects Based on ICOADS Data: In Situ Sea Surface Temperature Observations and Their Errors</td>
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### Room 1D: Student Projects

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<tr>
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<tbody>
<tr>
<td>9:00 - 9:20</td>
<td>Adebayo Efunnuga and Abel Navarro</td>
<td>Elimination Of Organosulfur Compounds From Model Fuels With Biological Wastes: Tackling The Acid Rain</td>
</tr>
<tr>
<td>9:20 - 9:40</td>
<td>Ndao Souleymane and Christine Farias</td>
<td>The Impact of Climate Change on World Heritage: The Case of the Island of Saint Louis, in Senegal</td>
</tr>
<tr>
<td>9:40 - 10:00</td>
<td>Billie-Rae Johnson and Yamila Portorreal</td>
<td>Community FloodNet Project</td>
</tr>
<tr>
<td>10:00 - 10:20</td>
<td>Harry Aguillar, Jacob Centeno, and Sarah Durand</td>
<td>Building Floating Wetlands - a hands-on project for secondary and higher education</td>
</tr>
<tr>
<td>10:20 - 10:40</td>
<td>Veronica Martinez, Wesam Yousri, Harry Aguilar, and Ingrid Veras</td>
<td>Student’s perspective on climate change education: from classroom to activism.</td>
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<td>10:40 - 11:00</td>
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### Session II: 11:30am- 12:30pm

**Room 2A: Panel- Best Practices Post-Secondary**

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<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Presentation Title</th>
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<tbody>
<tr>
<td>11:30 - 12:30</td>
<td>Rebecca Fullan, Christina Katopodis, Catherine Engh, and Kaitlin Mondello</td>
<td>PANEL: Teaching Climate Through Literature</td>
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**Room 2B: Best Practices Post-Secondary**

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<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Presentation Title</th>
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</thead>
<tbody>
<tr>
<td>11:30 - 11:50</td>
<td>Kafui Attoh</td>
<td>Climate across the Curriculum, learning from the WAC model.</td>
</tr>
<tr>
<td>11:50 - 12:10</td>
<td>Richa Gupta</td>
<td>Bio-Cohort Model on Climate Change for Advancing Retention and Success</td>
</tr>
<tr>
<td>12:10 - 12:30</td>
<td>Yuliya Shneyderman and Mary-Andrée Ardouin-Guerrier</td>
<td>Exploring Effective Public Health Educational Strategies for Climate Change Awareness Among Public Health and Health Education Students</td>
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**Room 2C: Resources for Teaching Climate Science**

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<thead>
<tr>
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<th>Presentation Title</th>
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<tbody>
<tr>
<td>11:30 - 11:50</td>
<td>Paramita Sen and Neal Phillip</td>
<td>Monitoring the Progression and Intensity of the 2019 and 2020 Indian Monsoons with a CUNY Installed Solar Powered Weather Station in the Foothills of the Western Ghats, in Maharashtra, India</td>
</tr>
<tr>
<td>11:50 - 12:10</td>
<td>Jonathan Griffith</td>
<td>Wildfires, Drought, and the Future of Forests</td>
</tr>
<tr>
<td>12:10 - 12:30</td>
<td>Sonya Remington-Doucette and Heather Price</td>
<td>Climate Justice in Undergraduate STEM Education: Incorporating Civic Engagement (C-JUSTICE)</td>
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**Room 2D: Panel – Trends in Sustainability Education**

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<th>Time</th>
<th>Speaker(s)</th>
<th>Presentation Title</th>
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<tbody>
<tr>
<td>11:30 - 12:30</td>
<td>Radhika Iyengar, Ashwani Vasishth, Lauren Madden, Michael Heinz, Andrea Drewes, Allison Mulch, and Missy Holzer</td>
<td>PANEL: From Policy to Practice: New Jersey’s Climate Education integration into formal k-12 curriculum.</td>
</tr>
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</table>

**Lunch Break: 12:30pm- 1:30pm**
### Session III: 1:30pm - 3:50pm

#### Room 3A: Best Practices K-12

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Title</th>
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<tbody>
<tr>
<td>1:30 - 1:50</td>
<td>Deepti Tiwari</td>
<td>Shaping the Future of Generations for Climate Change</td>
</tr>
<tr>
<td>1:50 - 2:10</td>
<td>Tiffany Boyd and Lauren Beh</td>
<td>A Climate Education Model: Supporting Teachers and Promoting Student Agency</td>
</tr>
<tr>
<td>2:10 - 2:30</td>
<td>Beth Mowry and Claire Gottsegen</td>
<td>Teaching Climate Change in High Schools: Exploring an authentic, place-based, community-oriented climate change curriculum</td>
</tr>
<tr>
<td>2:30 - 2:50</td>
<td>Fred Nucifora</td>
<td>ReefED - Educate to keep it Great!</td>
</tr>
<tr>
<td>2:50 - 3:10</td>
<td>Manuela Zamora and Hannah Jaris</td>
<td>Connecting Humans, Technology, and the Environment to Understand Climate Change</td>
</tr>
<tr>
<td>3:10 - 3:30</td>
<td>Emily Fano and Heather Siouxs</td>
<td>The Resilient Schools Consortium (RiSC): Connecting Schools to Coastal Communities</td>
</tr>
<tr>
<td>3:30 - 3:50</td>
<td>Andrea Drewes</td>
<td>Avoiding Obstacles and Empowering Youth Action in Climate Change Education</td>
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#### Room 3B: Resources for Teaching Climate Science

<table>
<thead>
<tr>
<th>Time</th>
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<th>Title</th>
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</thead>
<tbody>
<tr>
<td>1:30 - 1:50</td>
<td>Snehal Donde</td>
<td>Exploring the implications of sedimentation and pollution of Ganges on rich Vaishnava culture of Panihati in West Bengal, India and mobilization of locals for restoration initiatives</td>
</tr>
<tr>
<td>1:50 - 2:10</td>
<td>Alexia Leclercq, Kiersten Blake, Genie Raven, Keely Nguyen, and Ava Corey-Gruenes</td>
<td>Including Food Justice in Climate Education</td>
</tr>
<tr>
<td>2:10 - 2:30</td>
<td>Beth Osnes</td>
<td>Drawdown Climate Solutions Adaptation and Spanish Translation for Accessibility to Grades 5-12</td>
</tr>
<tr>
<td>2:30 - 2:50</td>
<td>Carol Wang-Mondaca, Molly Dunton, Grant Pace, and Dorothy M Peteet</td>
<td>Blue Carbon: Bringing Field Research and ArcGIS Mapping into the High School Classroom</td>
</tr>
<tr>
<td>2:50 - 3:10</td>
<td>Jonathan Griffith and Lynne Harden</td>
<td>On board with MOSAiC: How a real Arctic research expedition can engage students in authentic climate and Earth systems learning</td>
</tr>
<tr>
<td>3:10 - 3:30</td>
<td>A. Lucia Fuentes and Maria Entezari</td>
<td>Incorporating research into the curriculum to promote an understanding of factors affecting climate change and ocean acidification</td>
</tr>
<tr>
<td>3:30 - 3:50</td>
<td>Daniel King, Jennifer E. Lewis, Karen Anderson, Douglas Latch, Susan Sutheimer, and Gail Webster</td>
<td>Using climate change context to engage students in general chemistry</td>
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### Room 3C: Resources for Teaching Climate Science

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<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>1:30 - 1:50</td>
<td>Henry N. N. Bulley</td>
<td>Why Place and Geography Matters in Promoting Environmental and Climate Change</td>
</tr>
<tr>
<td>1:50 - 2:10</td>
<td>Christopher A. Badurek</td>
<td>Challenges in Integrating Greenhouse Gas GIS Data into Climate Change Education</td>
</tr>
<tr>
<td>2:10 - 2:30</td>
<td>Jake Madelone and Maggie Flanagan</td>
<td>Teaching Coastal Resilience in the Face of Climate Change</td>
</tr>
<tr>
<td>2:30 - 2:50</td>
<td>Caroline Davock, Julia Herzfeld, Bosiljka Glumac, and Graeham Dodd</td>
<td>The Development of an Interdisciplinary Web-Based Resource Aimed at Improving Climate Literacy</td>
</tr>
<tr>
<td>2:50 - 3:10</td>
<td>Deb Morrison, Philip Bell, and Abby Rhinehart</td>
<td>STEM Teaching Tools: Free Resources to Support Equitable 3D Science Instruction</td>
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### Room 3D: Resources for Teaching Climate Science

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<thead>
<tr>
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<tbody>
<tr>
<td>1:30 - 1:50</td>
<td>Dorothy Salinas, Samantha Gigliotti, John Soltes, and Jill Schennum</td>
<td>Educational Cross-Pollination: the importance of interdisciplinary climate change education</td>
</tr>
<tr>
<td>1:50 - 2:10</td>
<td>Tara Coleman</td>
<td>Developing a Voice on Climate Change through Writing</td>
</tr>
<tr>
<td>2:10 - 2:30</td>
<td>Lara Saguisag</td>
<td>Teaching Climate Justice Through Young Adult Literature</td>
</tr>
<tr>
<td>2:30 - 2:50</td>
<td>Tuli Chatterji</td>
<td>Humanitarian Intervention to Climate Change</td>
</tr>
<tr>
<td>2:50 - 3:10</td>
<td>Kimberley Ramirez</td>
<td>Creative and Non-fiction Ecocritical Texts in the English Composition Classroom</td>
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### Room 3E: Panel- Best Practices Post-Secondary

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<tr>
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<tbody>
<tr>
<td>1:30 - 2:30</td>
<td>Tomo Imamichi</td>
<td>PANEL: Environmental Psychology: Climate change education and beyond</td>
</tr>
<tr>
<td>2:30 - 3:30</td>
<td>Kafui Attoh and Alfred Friedland</td>
<td>PANEL: Climate Across the Curriculum: Learning from the WAC Model</td>
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### Room 4A: Best Practices – Informal

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Title</th>
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<tbody>
<tr>
<td>4:00 -</td>
<td>Julie Trachman</td>
<td>Potential Health Impacts of Global Climate Change</td>
</tr>
<tr>
<td>4:20</td>
<td>Rafeena Boyle and Vicky Hartill</td>
<td>Exploring Climate Change - How local government can teach by example</td>
</tr>
<tr>
<td>4:40</td>
<td>Laura Guertin</td>
<td>Using Your House Front Door for Climate Education During COVID</td>
</tr>
<tr>
<td>5:00 -</td>
<td>Javid Buchanan, Saros Hendrickson, Soriah</td>
<td>The Importance of Climate and Environmental Literacy in a Small Island</td>
</tr>
<tr>
<td>5:20</td>
<td>Williams, Rae Gean Jenkins, and Tyana Brookes</td>
<td>Developing State in the Eastern Caribbean (St. Kitts and Nevis)</td>
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### Room 4B: Resources for Teaching Climate Science

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<tr>
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<tbody>
<tr>
<td>4:00 -</td>
<td>Lindsey Kirkland</td>
<td>Teaching Social Justice-Oriented Climate Change Education</td>
</tr>
<tr>
<td>4:20</td>
<td>Iris Kuhnlein</td>
<td>The role of Nature Immersion Programs and Life Skills in climate change education in Brazil</td>
</tr>
<tr>
<td>4:40</td>
<td>Louise T. Huffman and Bill Grosser</td>
<td>Virtual Field Labs: not a 'virtual field trip,' but a data-driven exploration investigating a climate question led by climate scientists in labs and in the field</td>
</tr>
<tr>
<td>5:00</td>
<td>Jonathan Griffith and Lynne Harden</td>
<td>Data Puzzles: bringing authentic climate data into classrooms through inquiry-based instruction</td>
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### Room 4C: Education Research

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<tr>
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<tbody>
<tr>
<td>4:00 -</td>
<td>Rondi Davies, Jessica Wolk-Stanley, Victoria</td>
<td>Engaging diverse urban undergraduate and high school students in climate change science using a place-based unit on glacier landforms</td>
</tr>
<tr>
<td>4:20</td>
<td>Yuan, and Julie Contino</td>
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<tr>
<td>4:40</td>
<td>Elisabeth Barratt Hacking and Hannah Hogarth</td>
<td>Meet the trees: reframing climate change education for a posthuman world</td>
</tr>
<tr>
<td>4:40</td>
<td>Bethany Davies</td>
<td>Reimagining Climate Change Education in Formal School Settings</td>
</tr>
<tr>
<td>5:00</td>
<td>Dana Neacsu</td>
<td>Teaching Students. Teaching with Students. Creating Opportunities to Change the World.</td>
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### Room 4D: Panel – Student Projects

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<tbody>
<tr>
<td>4:00 -</td>
<td>Allyson Sheffield, Nicholas Russell, Preethi</td>
<td>Teaching Climate Change Using a Data-Driven Approach</td>
</tr>
<tr>
<td>5:00</td>
<td>Radhakrishnan, Vitoria Luong, Ingrid Veras and</td>
<td></td>
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<td></td>
<td>Veronica Martinez</td>
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Building Floating Wetlands - a hands-on project for secondary and higher education

Waterbodies associated with urban centers have been walled-in with bulkheads for the convenience of commercial traffic and their wetlands filled in for construction of built environments. What few oases of wetland ecosystems remain in urban areas are now threatened with rising waters and, concurrently, an absence of available space for this habitat to shift inland. And yet wetland is an essential interface of terrestrial and aquatic environments that supports the biodiversity of both. We have addressed the challenge of wetland loss by developing strategies for floating native wetland vegetation within the waterbody that normally supports this vegetation. Our approach enables students to use natural materials for building multiple small installations, so that post-construction loss, degradation or damage will not further contribute to pollution load. Some construction materials - e.g., discarded wood shipping pallets, glass bottles and corks - can even be obtained from the waste stream of the City. Educational advantages are multiple: 1) students are brought into direct engagement with their community’s wildlife; 2) environmental stewardship moves from abstraction to the experience of self-empowerment as an environmental steward; 3) the immediate visual impact of a wetland installation extends beyond the classroom, thereby instilling eagerness for additional accomplishment; 4) "making treasure from trash" can be designed so that obtaining the "trash" cooperatively engages public education and outreach divisions of City agencies such as the Departments of Environmental Protection and Sanitation, thereby educating students how to work with their own municipal government for a desired community outcome.

Addressing climate change and environmental injustice remains one of humanity’s central challenges. This fact ought to be reflected in the curriculum of the largest urban public university in the county. Drawing on the example of CUNY’s “Writing across the Curriculum” (WAC) program, we propose one model for the development of a CUNY wide initiative on the environment. In 1999, the CUNY Board of Trustees approved a Resolution to “intensify and expand” the University’s “efforts to strengthen the teaching of writing in courses across the curriculum.” As part of that same resolution, the Board also established the CUNY Writing Fellows Program -- a program whereby trained CUNY doctoral students are dispatched to each CUNY campus to assist faculty and staff in writing instruction. These “writing fellows” were paid a small stipend and were trained in writing instruction. Our presentation will explore how the CUNY WAC model may inform broader efforts to integrate environmental and climate concerns into the curriculum. In proposing a Climate-across-the-Curriculum (CAC) program, we hope to lay out both the content of the curriculum and the logistics of developing a corollary cohort of “climate fellows.” The presentation will draw on the history of WAC to map out the potential opportunities and barriers to the development of the aforementioned program. In developing CAC, the hope is not only to put environmentalism on the map of educators at CUNY but also to engender a broader discussion about other possible models (be they CUNY’s 2021 anti-racism across the curriculum initiative, or adding a Pathways course).

This presentation examines challenges in acquiring US and international greenhouse gas GIS and remotely sensed data for research and active learning activities focused on climate science. Acquisition and use of NASA data sources for mapping atmospheric concentrations of greenhouse gases and the extent of their data curation, discovery systems, and formal publication using persistent identifier are evaluated. A sample of data sets are examined to determine bottlenecks in reuse of these data sets as well as potential instances of inappropriate use by students with limited experience in GIS. The parameters of scale, resolution, atmospheric column type, lack of cartographic knowledge, and selection of covarying atmospheric variables are found to be areas for potential bottlenecks for novice and moderately experienced GIS users. These issues represent a significant challenge in guiding student projects using greenhouse gas data sets in a variety of courses ranging from introductory to advanced remote sensing course work. However, these can be mitigated by effective data information literacy trainings and support materials that complement GIS training.
Boger, Rebecca
Brooklyn College, CUNY
Urban Sustainability at Brooklyn College: Preparing Students for a Changing Climate
Sustainable solutions to the wicked problem of climate change require approaches that integrate social and environmental systems. Higher education plays an increasingly important role in preparing students for these complex challenges. At Brooklyn College, the interdisciplinary undergraduate program in Urban Sustainability (SUST) is designed around the three “pillars” of sustainability – environment, equity, and economics. All SUST students take a set of courses that give them a grounding in these disciplines. Students select a concentration in one of the pillars and take courses for their concentration area. Additionally, students take three SUST courses that are designed to promote interdisciplinary and systems thinking by examining environmental and societal problems through the three disciplinary lenses. Discussions of climate change science and impacts are woven through these courses and student internships. These courses are co-taught by faculty representing the pillars. The program is designed to leverage existing courses offered in departments since as a program, there are no designated faculty for SUST. The program is managed through a director and steering committee composed of faculty representing five departments in three schools. The program is very successful and growing which is exciting but also presents logistical challenges. This presentation will discuss program design elements, strategies for high-impact experiential learning through projects and internships that address climate change, and how both faculty and students are learning through interdisciplinary learning and practice.

Boyd, Tiffany
Classrooms for Climate Action
A Climate Education Model: Supporting Teachers and Promoting Student Agency
There has never been a more important time to support our local educators in teaching climate literacy and climate action. Connecting teachers and students to national climate policy through local/phenomenon based learning is work that teachers cannot do alone. Community partners can come together to create a constellation of support for local climate education. As educators seek to build back better, many models are available to offer teachers the support they need. This is one model that is working in Louisville, Colorado.

Boyle, Rafeena
City of Cockburn
Exploring Climate Change - How local government can teach by example
The City of Cockburn (pronounced Co-burn) is a local government area located within the metropolitan capital of Western Australian. Nearly 112,000 people live in the City, with this expected to grow to over 170,000 by 2036. Cockburn manages 92 bushland reserves, spanning 1,189 hectares, which includes coastal, wetland and upland habitats. Cockburn is already experiencing the effects of a changing climate with increased coastal erosion, higher summer temperatures, more severe heatwaves and a longer bushfire season. These impacts are predicted to increase in the future and pose risks to the natural environment, infrastructure and communities. Cockburn has a strong history in taking action on climate change, and education and collaboration are essential elements in the City’s response to climate change. Through education, the City can help the community understand the specific climate risks to the region, which can empower them to take action to reduce emissions and build resilience by being prepared to adapt to the impacts. As part of this commitment, the City has developed an education program to take schools to areas impacted by coastal erosion, fire and habitat loss, and show them the actions that the City is undertaking to mitigate and adapt to a changing climate. These educational experiences are designed for students to see and interact with the natural environment and include everything from tree planting to excursions, but are always in person and hands-on. In this presentation the City’s Environmental Education Officers will explain the environmental education program.

Buchanan, Javid
Holistic Education, Research & Conservation - HERC, CUNY; University of the West Indies - UWI
The Importance of Climate and Environmental Literacy in a Small Island Developing State in the Eastern Caribbean (St. Kitts and Nevis)
This presentation explores the use of a research-driven educational project that analyzes, explores and disseminates information about the effects of climate change impacts of disadvantaged/vulnerable populations in a small island developing state like St. Kitts-Nevis. The data driven educational project highlights ways that climate change impacts, whether high heat, water scarcity or extreme weather events are destructive to our local infrastructure as well as socially and financially disruptive to residents who
require a stability in their environment to both live and work. The drought of 2013 to 2016, per data collated by our organization, exemplifies an impact that contributed to social and solvency issues in our federation. Likewise, recent data collected by our organization reveals many social and environmental determinants of health as affected by climate change. As such, persons residing in Saint Kitts and Nevis (or elsewhere within the Eastern Caribbean) need to build adaptive capacity (herein sufficient knowledge and sustainable management activities to address the climate change impacts). Effective adaptive activities, when comprehensive, sustainable and without socioeconomic or technological constraints are health and safety protective, especially for vulnerable populations within our island communities. For reasons described above this research driven educational project explores climate change impacts within St. Kitts-Nevis as a means of contributing to generalizable knowledge and research regarding populations living within the region. Our educational project leverages climate change research as a means to create an educational framework towards setting standards/learning outcomes that defines content used for climate change and adaptive capacity education. Students from post-secondary institutions participated in a local climate research project, and were assigned outreach tasks so that they could (a) learn about research practice and methods, and (b) use climate-research to promote literacy within primary and secondary institutions in St. Kitts and Nevis.

Bulley, Henry N. N.
Borough of Manhattan Community College, CUNY
Why Place and Geography Matters in Promoting Environmental and Climate Change
We live in time of rapid geospatial innovation where location-enhanced technologies are integrated into our everyday lives and decision-making process. At the same time, the impacts of climate change are no longer issues of modeling or projections. Recent rare snowstorms in Southern United States, increasing frequency and intensity of Hurricane Seasons, melting and breakaway Glaciers, as well as intensifying drought and fire seasons in southwestern United States and Australia are all growing manifestations of our warming planet. However, there seems to be a disconnect between where people live and how they perceive Climate Change issues. It is vital for people to understanding basic geographic concepts in order to effectively employ spatial thinking into Environmental and Climate Change education. This presentation will highlight an initiative to integrate Geography and Spatial Thinking across the Curriculum (GeoSTAC) at BMCC. GeoSTAC aims at helping BMCC faculty to explore the “Importance of Place” and how we can use Web-based Mapping and GIS (Geographic Information Systems) to enrich Active and Experiential learning among students. Especially, this presentation will show how faculty can effectively turn spatial data into useful information to support environmental and climate change literacy efforts.

Chatterji, Tuli
LaGuardia Community College, CUNY
Humanitarian Intervention to Climate Change
Climate change leads to water crisis in some of the most needed areas in the world. In this presentation I will discuss a pedagogy-based community outreach project addressing global water crisis that I developed at LaGuardia Community College. Over 160 students participated in the common reading of Linda Sue Park’s novel A Long Walk to Water (2010) to then fundraise for Water for South Sudan, a non-profit organization, thereby leading to sponsoring the rehabilitation of a water well and three hygiene and sanitation workshops at the Marial Ajieth Primary Health Care Unit (PHCU) in Wau State, South Sudan. While the contribution helped 500 villagers receive access to clean water in one of the most drought stricken places in the world in addition to receiving hygiene, and sanitation to combat COVID-19, the project provided a platform for students, staff, and faculty to gain awareness of the global water crisis, collaboratively inquire about the relationship between climate change and water crisis, address social and gender inequality, and offer humanitarian intervention to a global community. In response, LaGuardia Humanitarian Initiative was formed.

Continuing with the above conversation and drawing on the work of climate change writers and activists—Christiana Figueres, Tom Rivett-Carnac, Greta Thunberg—I will also share my current pedagogical focus on climate refugees in my First year Writing course. I aim to develop interdisciplinary modules of raising greater awareness about climate change and assist students in translating their classroom experiences to combat climate crisis, locally, nationally, and/or globally.

Coleman, Tara
LaGuardia Community College, CUNY
Developing a Voice on Climate Change through Writing
The global scope and the massive scale of the climate crisis makes it hard for individuals to know how to respond. The students I teach in a first-semester composition course at LaGuardia Community College report learning about climate change at least once in high school, but they are less aware of what they can do about it, beyond small lifestyle changes. How do we connect individual
action to systemic change? Part of the issue, from the perspective of a writing instructor, is that students often don’t feel that their voice, what they think about the issue, really matters.

In this presentation, I will share a writing project focused on the Green New Deal, in which I guide my students towards exploring potential policy changes that could put the United States on track for a carbon-neutral future. Students select one project or policy goal within the broad framework of the Green New Deal and research how it would impact them. They then write an open letter to one of their representatives in Congress, urging him/her to take a particular action, whether supporting the Green New Deal and this particular project, rejecting the Green New Deal in favor of other legislative solutions, or something in between. This writing project helps students reflect on how climate change, and our efforts to respond to it, will impact their lives and careers. It also provides students with the experience of drawing on their lived experiences, and using research-based inquiry, to develop and share potential solutions.

Davock, Caroline
STRIDE Program, Department of Sociology, Department of Geosciences, Smith College
The Development of an Interdisciplinary Web-Based Resource Aimed at Improving Climate Literacy
This presentation gives an update on the development of an open resource aimed at improving climate literacy across disciplines. This website, found at www.science.smith.edu/climatelit/, documents the impacts of climate throughout Earth’s history by connecting various aspects of human society and culture to specific climate events and explaining the science behind them. Currently, we are compiling, researching, formatting and posting information on climate-related topics in the subject areas of literature, art, language, history and music. Each topic has its own webpage where it is briefly described, its connection to climate is

Davies, Rondi
Queensborough Community College, Riverdale Kingsbridge Academy, Franklin D. Roosevelt High School, American Museum of Natural History
Engaging diverse urban undergraduate and high school students in climate change science using a place-based unit on glacier landforms
A place-based 5E unit on climate change with a focus on New York’s glacial history was developed for a diverse, urban population of undergraduate and high school students. Focusing on local and regional environments is a key tenant of place-based learning, as it has been shown to boost engagement, make content more relevant for students, and attract underrepresented groups to science. The goal of this unit was to increase students’ science knowledge of landforms that shape their local environment and changes that have occurred and will occur due to climate change.

We aimed to make the content accessible to students from a variety of cultural and educational backgrounds while stimulating their interest in science and further developing their science identities. In order to provide students with equitable ways of learning and demonstrating knowledge, we incorporated strategies such as sketching and analogies to describe glacial landforms and processes. Doing so validates students’ identities and experiences and communicates an asset-based view of the value of their input in the learning environment. This unit was developed for high-needs public high school students from the Bronx and Brooklyn, and undergraduates at community college in Queens who face similar barriers such as limited science literacy, learning remotely, and/or being newcomers acquiring English skills. The lessons were developed for synchronous remote learning but could be adapted for in-person learning.

Davies, Bethany
University of Cambridge
Reimagining Climate Change Education in Formal School Settings
Climate Change Education (CCE) is a fundamental tool that young people will need as they are forced to deal with the ‘1000 year clean up’ left by industrial civilisations. Positioned as future leaders, children and young people are being expected to overcome the legacies of environmental action brought forward by these previous generations. But are we giving children all of the responsibility of fixing this but none of the knowledge nor power needed to do it?

Climate change education remains relatively under theorised in formal school settings. In schools, CCE is often narrowly defined as climate literacy. This stems from the belief children have limited or erroneous knowledge about climate change, reducing their capacity to respond to it or behave pro-environmentally. This has led to the ‘STEMification’ of CCE where children learn the ‘what’ and ‘how’ of climate change. This has not translated, however, into transformative learning surrounding climate change.

In this research paper I present a critical analysis of the literature in which I explore, What is a meaningful conceptualisation of Climate Change Education? Through the process I find that epistemic injustices against Indigenous peoples and young people have led to a knowledge imbalance preventing this domain from being truly transformative.

Davock, Caroline
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issues along with restoring religious sentiments of the devotees and worshippers practicing Vaishnavism. This social sustainable
action is designed with the sole purpose to make combined efforts for restoration of Dandamahotsavtala, Gauragna Ghat and other
places and to build social capital for saving river Ganges as an action plan to tackle climate change issues.

Dondre, Snehal
Bhaktivedanta Vidyapeeth Research Centre, Goverdhan Ecovillage, Palghar Maharashtra, India
Educating youth for river rejuvenation with river basin approach as an initiative to combat issues of Climate Change
Father of Nation Mahatma Gandhi had said “Be the change you want to see”. Hence, keeping in view the serious issues of water
crisis across the globe, with the principle of climate change, adaptation and mitigation in mind the regular undergraduate students
and NSS (National Service Scheme) volunteers of affiliated colleges of universities are encouraged to participate in community work
to become solutionaries. In India Hindi translation of Climate is ‘Jalvayu’ Jal-water and Vayu-air, both are affected adversely. Lack of
skill and lack of will is a major hindrance and cause of overall ignorance towards the environment and waterbodies. We believe,
Indian culture ‘Bharatvya Sanskriti’ is living ground ‘jee ne ka aadhaar’. We teach ‘Jal Sanskriti’ (water culture) to nurture Jal Sanskar
(Jal Sacrament) among the students. Community based learning with river walks is arranged from source of river to her confluence,
as so to conduct survey for understanding the current status of river by identifying the point and non-point sources of pollution,
encroachments and exploitation. The main objective is to create the culture of ownership to save the waterbodies. Combined
capacity building orientation and training programmes are organized along with government to build a cadre of taskforce. This way
we continue to offer in the climate change initiatives in the nation through the production of skilled change agents and sensitive
human resources that could catalyze enrichment of physical and human environment. River basin rejuvenation model is adopted
with a focus on catchment areas with environmental responsibilities and accountability for environmental sustainability.

Dondre, Snehal
Vaishnava Seva Dham Panihati
Exploring the implications of sedimentation and pollution of Ganges on rich Vaishnava culture of Panihati in West Bengal, India
and mobilization of locals for restoration initiatives
In India on the bank of holy river Ganga, many temple, hermitage, garden & “Ghat” were constructed during the long past. Similarly,
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places and to build social capital for saving river Ganges as an action plan to tackle climate change issues.

Drewes, Andrea
Rider University
Avoiding Obstacles and Empowering Youth Action in Climate Change Education
Climate change is an environmental issue that is a “defining challenge of our time” and a “common concern of humankind” as
described by the United Nations. Compounding the scientific complexity, the facts are often twisted in political debate leading to an
even grander social controversy. Some obstacles for teaching and learning about climate change deal with this surrounding
controversy and a heavy emphasis on understanding the abstract underlying scientific phenomena. One approach is to utilize a
socioscientific issues perspective which aims to consider the scientific and the moral, civic, or social aspects to develop content
understanding in meaningful contexts and to improve critical thinking skills as educators work to encourage scientific literacy and
Efunnuga, Adebayo and Abel Navarro  
**Borough of Manhattan Community College, CUNY**

**Elimination of Organosulfur Compounds From Model Fuels With Biological Wastes: Tackling The Acid Rain**

The prevalence of organosulfur compounds compounds in fuels has been an important concern since the XIX century as an environmental risk due to the increase of greenhouse gases in the atmosphere and accentuation of acid rain. This project evaluates the potential of solid waste such as fruit peels as adsorbents for the removal dibenzothiophene (DBT). The adsorption on the fruit peels of orange (OG), lime (LM) and pineapple (PN) was investigated in a batch and continuous- flow systems with synthetic fuels (gasoline and diesel) as a function of type of adsorbent, adsorbent dosage, initial concentration of DBT and column experiments. DBT adsorption follows this trend in gasoline: LM (12.3%) > PN (8.8%) > OG (6.9%) with 50mg, 125mg, and 50mg, respectively. On the other hand, the adsorption of DBT in diesel followed the trend: LM (14.6%) > OG (4.2%) > PN (3.5%) with 50mg, 75mg, and 75mg, respectively. Instrumental analyses propose a polar-drive mechanism by the interaction of carboxyl and hydroxyl groups of the adsorbent and the sulfur atom of DBT. Thermal analysis also suggest that these materials have good thermal and mechanical properties. Column experiments indicate that this approach can be used in continuous-flow system for the treatment of larger volumes of fuels. This work highlights the potential use of fruit peels for the elimination of organosulfur compounds from model fuels as a low-cost and environmentally friendly purification technique.

Fano, Emily  
**National Wildlife Federation**

**The Resilient Schools Consortium (RiSC): Connecting Schools to Coastal Communities**

Coastal populations, including New York City’s with its 520 miles of coastline, are particularly vulnerable to current and future impacts of sea level rise and associated flooding. Communities of color are more vulnerable to those impacts, including through racist housing policies and inequitable allocation of resources for mitigation and adaptation. Of all U.S. cities, New York has the highest number of residents - 400,000 - living in a floodplain. Blue sky or sunny day flooding is already becoming more common in certain neighborhoods. Families are experiencing this without understanding the problem’s source or its solutions.

It's vital that students have a chance to learn about these issues in school. The National Wildlife Federation's Resilient Schools Consortium (RiSC) program educates NYC’s middle and high school youth about climate change science and current and future climate impacts, as well as strategies being proposed for mitigation and adaptation. RiSC provides access to hands-on projects - like tree planting and dune restoration - that mitigate the impacts of extreme weather in communities. The program also creates opportunities for meaningful inter-generational interactions by connecting students with local experts, resilience practitioners and decision makers.

From 2020-2023, RiSC will be working in the frontline community of Coney Island. Working with teachers and student teams from eight public middle and high schools, and several community partners, the program will seek to increase inter-generational awareness of climate change, climate justice and resilience solutions in Coney Island through local field trips, community science, oral history, and shoreline restoration projects.

Fish, Cheryl J.  
**Borough of Manhattan Community College, CUNY**

**Teaching Climate Change: An Environmental and Food Justice Approach in Writing and Literature Classes**

As an environmental humanities scholar and professor who developed an interdisciplinary elective course at BMCC in Environmental Literature and Film, I recently incorporated into my online synchronous composition courses a food and environmental justice curriculum. In this session, I will discuss how I raise the connection between the methods of raising animals for meat in the U.S. industrial farming system and some causes of climate change. In addition, the COVID-19 pandemic throws into question the
struggles around food justice, workers’ rights, and which communities have access to healthy food. Climate change is connected to a carbon footprint that can be traced in part through the story of the meal on our plate. Students respond with great passion and enthusiasm when gaining an understanding of these connections and to alternatives that are catching on. I will discuss how action and reflection through reading, film, discussion and writing based on interdisciplinary research required in humanities classes increases the depth and emotional complexity of interconnected causes and effects of climate change, such as industrial agriculture, and how we can consider making changes that affect the well-being of humans, animals and the planet. I will also mention my research on film, photography and activist art that addresses the effects of extraction and climate change on the indigenous Sami population of Northern Scandinavia.

Florini, Karen
Climate Central
Make it local, make it real: localized, science-based visuals and backgrounders on climate impacts and solutions for every community in the U.S.
With funding from the National Science Foundation, Climate Central created the Climate Matters program to develop and distribute highly localized visuals, data and backgrounders on climate impacts throughout the U.S., initially for use by TV meteorologists. All Climate Matters weekly bulletins are available online, free of charge, in both Spanish and English, and are suitable for educational use. This presentation will provide an overview of the Climate Matters program, and show how to access the Climate Matters media library by location, topic and keyword. It will also cover Climate Central’s other tools, including: WeatherPower - Downloadable graphics on wind and solar energy production by combining local installed-capacity data with yesterday’s actual weather and today/tomorrow forecasts, for all U.S. states, counties, and congressional districts. Coastal Risk Screening Tool - Interactive mapping tool allowing users to explore coastal flood risk and sea level rise projections by decadal year or specific water levels for anywhere in the world, and under multiple pollution scenarios. The tool provides downloadable Google-style maps that can zoom in down to the street level, and (for the U.S.) shows affordable housing units vulnerable to coastal flooding. RiskFinder - Provides local sea level rise and flood risk analysis, fact sheets and data downloads for zip codes, municipalities, counties, and other areas within the United States. Shows coastal flood risks for over 100 demographic, economic, infrastructure, and environmental variables using data drawn mainly from federal sources, including NOAA, USGS, FEMA, DOT, DOE, DOI, EPA, FCC, and the Census.

Fuentes, A. Lucia and Maria Entezari
LaGuardia Community College, CUNY
Incorporating research into the curriculum to promote an understanding of factors affecting climate change and ocean acidification
Research experiences provide a path for community-college students to understand the process of scientific inquiry and the relevance of science to their communities. We developed laboratories, for first semester General Biology, to integrate an authentic research project investigating the physical, chemical, and biological characteristics of water samples from Oyster Bay and the East River. Throughout the semester, students perform experiments, gather information, and analyze data about the characteristics of their samples. In preparation for the labs, students engage in readings which include accounts of the use of these waterways during different historical periods. Specific aspects relating to effects of pollutants on water quality and biodiversity are also a focus of the labs. When quantifying carbon dioxide in their samples, students learn about ocean acidification and its effects on coral reefs. While measuring amounts of dissolved oxygen (DO), students learn about the effect of ocean warming on DO and consequently, on aerobic aquatic organisms. The labs are designed so students collect information contributing to their final project, while building knowledge related to climate change. Four consecutive assignments, crafted to promote best practices for communicating scientific findings, enable students to gradually build toward the final presentation of their results. These labs incorporate research into the quality of water bodies close to the communities where students live, work and study, drawing a connection between their direct lived experiences and the realities of climate change. Importantly, students are asked to propose avenues for promoting change, providing them with insight into possibilities for civic engagement.
Fullan, Rebecca, Katopodis, Christina, Engh, Catherine, and Kaitlin Mondello
Macaulay Honors College, Transformative Learning in the Humanities, and Hunter College, CUNY; Millersville University
Panel: Teaching Climate Change Through Literature

Climate change is not a niche issue, but one that touches a range of environmental, social, political, and cultural concerns; therefore, it is necessary to think across disciplines to teach climate change. We propose a synchronous panel in which we discuss how we have successfully used literature to engage students from a variety of backgrounds and interests across CUNY on the pressing, interdisciplinary issue of climate change. Starting in 2018, the four panelists and others from the Ecocriticism Public Working Group at the Graduate Center, CUNY, as well as colleagues from across NYC, created the website Teaching Climate Change in the Humanities as a resource for college and high school educators across disciplines who want to use literary texts in their climate-related classes. The site includes reading lists organized around literary and expository writing related to climate change. First, we will introduce this site and suggest ways that educators from all disciplines can use it to include climate literature as they create syllabi and teach their courses. Then, individual panelists will present short talks based on our own experiences teaching climate change and literature in an array of different courses across CUNY.

Griffith, Jonathan and Lynne Harden
Cooperative Institute for Research in Environmental Sciences at the University of Colorado Boulder
On board with MOSAiC: How a real Arctic research expedition can engage students in authentic climate and Earth systems learning

The Arctic is warming twice as fast as the rest of the globe, and Arctic climatic processes impact weather and climate around the globe. The Arctic should thus be a key component of climate education, but this is tricky given that there are much less data and educational resources available around the Arctic compared to other regions. The MOSAiC (Multidisciplinary drifting Observatory for the Study of Arctic Climate) research expedition of 2019-2020 is a new and compelling avenue for engaging students in Arctic—and global—climate education and systems thinking. We will present a curriculum we’ve developed for middle and high school classrooms designed to teach students about the Arctic climate system and its impacts on global climate through the lens of the MOSAiC Arctic research expedition. The curriculum was designed using a collaborative design process involving educators, scientists, and more, and challenges students to think critically about the Arctic climate system like Arctic scientists. The lessons are built around anchoring phenomena and driving questions and students develop and refine explanatory models as they explore authentic scientific data, field evidence, and immersive learning experiences. Connect your students directly to the Arctic—take home a set of engaging and peer-reviewed lesson plans and materials.

Griffith, Jonathan and Lynne Harden
Cooperative Institute for Research in Environmental Sciences at the University of Colorado Boulder
Data Puzzles: bringing authentic climate data into classrooms through inquiry-based instruction

Teachers across the country have expressed a desire to incorporate authentic scientific data into their curricula, but struggle to find accessible and meaningful datasets that can be easily integrated into modern teaching practices (e.g., inquiry-based learning). In response to this problem, climate scientists and instructional specialists from the University of Colorado Boulder have collaborated to create "Data Puzzles", a free resource that utilizes instructional practices as outlined by Ambitious Science Teaching to engage students in data analysis in the context of important and relevant scientific research. Data Puzzles challenge students to analyze and interpret climate datasets to create explanatory models for important questions like, "How might declining sea ice impact the Arctic's albedo?" or "What can the amount of energy coming to and going from the Arctic tell us about Arctic amplification?" In this session, participants will be introduced with Ambitious Science Teaching practices and authentic climate datasets as they engage with a Data Puzzle and leave skills to not only facilitate Data Puzzle resources but to also design their own data-driven inquiry activities.

Griffith, Jonathan
Cooperative Institute for Research in Environmental Sciences at the University of Colorado Boulder
Wildfires, Drought, and the Future of Forests

Across the western United States, wildfires are burning more and more of the landscape. What happens to these landscapes after a wildfire? Do they return to pre-fire conditions or transition to a new landscape (vegetation-type) all together? In the NASA-funded "Future of Forests" curriculum, students engage with virtual mapping tools, online NASA interactives, and authentic datasets to construct explanatory models. Participants will also be introduced to the Globe Observer Land Cover app in which students can monitor changes to the landscapes in their area as part of a larger citizen science project!
Guertin, Laura  
Penn State Brandywine  
Using Your House Front Door for Climate Education During COVID  
The front door of a house can serve as a medium for science communication. When the pandemic hit, many of us shifted to being at home 24/7 for work and school. Neighborhood walks to break up the time spent on the computer became very popular and frequent in my area. I decided to take advantage of having my front door located so close to the sidewalk and the bonus of having our house on an official Pennsylvania WalkWorks path by engaging in informal science education. In March 2020, I began posting “Fun Science Facts”, quick science-themed notes with a new topic each week. Neighbors quickly started bringing their kids by and calling my house their science field trip site, as school trips had been cancelled for the year. This continued throughout the summer, with most topics featuring ocean and climate content. The Fun Science Facts door restated in January 2021 with a row on a temperature blanket added each day to compare temperature data from 50 years ago and the present to talk about weather and climate. The current theme for the door is the creation and sharing of mini-quilts that relate to Project Drawdown solutions for global warming, along with action items for individuals to make a difference for our climate. The pandemic has provided us an opportunity to think outside of traditional structures for sharing science, and I have found a new way to engage literally right at my front door.

Gupta, Richa  
LaGuardia Community College, CUNY  
Bio-Cohort Model on Climate Change for Advancing Retention and Success  
An interdisciplinary STEM Learning Community on “Climate Change” was piloted in the Fall of 2020 with a vision to provide more effective education towards graduation of our Biology-majoring students. This paradigm involves a thoughtful inclusion of program-core (Science) and required-core (English/Mathematics) courses with specific flexible-core courses to create new instructional frameworks that provide a community experience with a much greater focus on “shared and connected learning” throughout the entire program, from the first semester to capstone. Students are motivated by a group setting, faculty from different disciplines guiding them on linked assignments targeting the common theme, and a collaborative in-class learning environment. The model is envisioned to improve students’ retention and success in the Biology program by providing both academic and social support. For instance, the classes taken together in the first semester (carefully interwoven to target a common theme) will help students to grasp all the required learning and STEM skills they will need to be successful in the more advanced classes of their major and ultimately their Biology-related careers. The content of the linked assignments, class activities, and co-curricular activities designed on Climate Change in this initiative will be presented.

Hacking, Elisabeth Barratt  
University of Bath, Department of Education, Bath, UK  
Meet the trees: reframing climate change education for a posthuman world  
There can be little doubt that humans need to alter our ways of being and becoming with the world, and that transforming education is fundamental to this endeavour. This presentation will advance a relational approach to climate change education (CCE), drawing on posthuman theory which “offers a creative and critical means to decentre anthropocentricism and its damaging effects on our lives, institutions and the planet” (Barratt Hacking and Taylor, 2020 p.136). We argue it is imperative to shift to more relational and ecological ways of understanding and acting with the world. Our research draws on the posthuman concepts of ‘childhoodnature’ (Cutter-Mackenzie-Knowles et al, 2020) and ‘relational becoming’ (Barratt Hacking and Taylor, 2020). These concepts reject the separation of children and young people from nature, and offer a frame for reconsidering what matters in education.
To illuminate our view of CCE we draw on Hannah’s research investigating children’s play in and with more-than-human nature in an outdoor nursery in South-East England. This qualitative participatory case study used a relational approach where mutual, embodied childhoodnature experiences were explored. We share three methods that emerged during these encounters, named by the children as ‘meet the trees’, ‘shared play’ and ‘precious objects’. We use this research to show that opportunities to engage with the natural world should be at the heart of any education system in order to develop a transformative CCE for all learners.
Plastics and climate change: synergy

Plastics are around since the beginning of the 20th century, and became a mass production good in the 1940s. And while having many social benefits (Andrady and Neal, 2009) their harm is becoming more and more prominent. In 2019 worldwide 368 million of tons were produced and the majority corresponds to packaging plastics (PlasticsEurope, 2020). Plastic is a product derived from oil, and about 8% of the global oil production is invested in plastic (Thomson et al., 2009). The fate of plastics is diverse, and not always ideal. It is estimated that 10% of the produced plastic ends up in the ocean (Thomson, 2006), but also rivers and freshwater environments are affected (Li et al., 2016 and Xu et al., 2020). Once in the ocean, the impact of plastics upon marine biota is most known by images of turtles, seals or marine birds entangled in plastic waste. But plastic can also serve as a surface for other organism to live on and become a medium to spread these species across different habitats and worsening the problem of invasive species. With changing water temperatures and climate events, these invasive species are able to spread to larger areas where they might displace native and, even worse, endemic species, causing a loss in biodiversity and affecting the trophic web.

Virtual Field Labs: not a 'virtual field trip,' but a data-driven exploration investigating a climate question led by climate scientists in labs and in the field

In a Covid-19 World, it is difficult to think about climate change, but the urgency to educate students and future citizens about it has not gone away—if anything, it has become even more urgent. Virtual Field Labs (VFL’s) offer the opportunity for students to join leading climate scientists investigating climate questions that provide insight into our climate future. Each VFL consists of three video episodes that can fit into two classroom periods. VFLs are designed to be used either asynchronously, as virtual assignments completed by students independently online, or synchronously in a teacher-led classroom or virtual classroom. All the Virtual Field Labs have been field-tested in high school and college classes. Lessons from the VFLs are aligned to the NGSS and can be extended with related lab activities found at icedrill-education.org. VFLs are a project of the US Ice Drilling Program, an NSF-funded project supporting the ice science research community while providing freely accessible educational resources for educators.

Panel: From Policy to Practice: New Jersey’s Climate Education integration into formal k-12 curriculum.

New Jersey is the first state in The United States of America which has announced that Climate Change Education is an integral part of school curricula. This is a huge step in the right direction, all thanks to the First Lady, Ms. Tammy Murphy. This panel will talk about the nuts and bolts and the how to. How is this policy being planned to be implemented, what is the timeline, what is your role as a parent, what should students expect, how should students take the leadership? This roundtable will include many different stakeholders to hear from each one how they are gearing up for this mammoth task. Here are some specific questions that the panelists will attempt to address:

How is New Jersey’s Climate Change Education plan integrated to the Sustainable Development Goals –SDG 4.7 in particular?
How is the curriculum ensuring that local examples are included in the curriculum?
How are you ensure teachers are trained in this new scope?
Climate education should lead to climate action, are there any best practices for ensuring this?
How can communities, PTO Boards and Green Teams be given a more concrete role rather than being on the fringe.
What are some challenges in this integration and where are we in this process?

Community FloodNet Project

The FloodNet Community Project is an interdisciplinary pilot program that uses community engagement and flood sensors to analyze and extrapolate how flooding will look in the future in response to the effects of climate change. Volunteers in the community participate in the collection of flooding data by documenting the depth and location of each flood event in Hamilton Beach, Coney Island and City Island in New York City. Through a CUNY Interdisciplinary Climate Crisis Research Grant (ICCRG), we became student interns and participated in all aspects of the project. An important pillar of our research is constructed through community engagement. Our project works collaboratively with community members to address flooding, with goals of achieving...
long-term sustainable outcomes, relationships, education, discourse, decision-making, and implementation. Community engagement takes place through meetings, workshops, events, programs, and projects. However, due to the current circumstances caused by COVID-19, the way community engagement is being accomplished is changing. A major hurdle we had to overcome during our research was determining how to encourage community engagement virtually, so we created a guide showcasing the best practices for virtual community engagement. It also became important to use the appropriate terminology that accurately describe the roles of various stakeholders (e.g., scientists, community members, students), the type of research (e.g., participatory citizen science, or community-based) and our relationship to the community. We will discuss our experiences and the findings of our research.

Kaplan, Alexey, Jin, Andrew G., Gladkova, Irina, and Michael D. Grossberg
Lamont-Doherty Earth Observatory, The Fu Foundation School of Engineering and Applied Science, Columbia University; City College, CUNY

Students' Projects Based on ICOADS Data: In Situ Sea Surface Temperature Observations and Their Errors
Sea Surface temperature (SST) is a critical variable for analyses of climate variability and trends, for seasonal climate prediction, for understanding the impact of climate and environmental conditions on marine life, and for many other applications. SST is monitored from satellites but it is important to validate observations with in situ temperature measurements. Most of in situ SST observations come from commercial and research ships (SH), drifting buoys (DB), and moored buoys (MB). In situ observations are assembled in the International Comprehensive Ocean-Atmosphere Data Set (ICOADS). European Space Agency, within its Climate Change Initiative (CCI), has recently re-processed in a consistent way major global streams of satellite SST data, deliberately avoiding any dependencies of the product on the concurrent in situ observations. Based on these data, daily globally-complete gridded fields of SST with 6 km spatial resolution were produced for 1981-2016. Based on these advances, a system was developed that extracts ICOADS data for individual SH, DB, or MB platforms, matches them by their dates and locations with the CCI SST values and their uncertainties, and outputs the results. Visualization, exploration, and statistical analyses of such data, aimed at analyses of SST observations and their error for a given platform, constitute students’ projects, which can be made suitable, depending on the expected sophistication of statistical analysis, to a range of educational levels. The projects were used in summer internships for high school students and in master-level statistics class in City University of New York.

Karimi, Maryam
UAB

Application of RayMan Model in Quantifying the Impacts of the Built Environment and Surface Properties on Surrounding Temperature
Introduction: Understanding thermal distribution in micro-urban climate has now been necessary for urban planners or designers due to impact of complex micro-scale features of Urban Heat Island (UHI) on built environment and public health. Hence, understanding interrelation between urban components and thermal pattern can assist planners in proper addition of vegetation to build-environment which can minimize the UHI impact. To characterize the need for Urban Green Infrastructure (UGI) through better urban planning, this study proposes the use of RayMan model to measure the impact of air quality and increased temperature based on urban morphology in the selected metropolitan cities. This project will measure the impact of build environment for urban and regional planning using human biometeorological evaluations (Tmrt).

Methods: We utilized the RayMan model to estimate the Tmrt in an urban environment incorporating location and height of buildings and trees as a supplemental tool in urban planning and street design. The estimated Tmrt value will be compared with existing surface and air temperature data to find the actual temperature felt by pedestrians.

Results: Our current results suggest a strong relationship between Sky-view factor (SVF) and increased surface temperature in mega cities based on current urban morphology.

Conclusion: This study will help with Quantifying the impacts of the built environment and surface properties on surrounding temperature, Identifying priority urban neighborhoods by analyzing Tmrt and air quality data at the pedestrian level, and Characterizing the need for urban green infrastructure cooling potential.
King, Daniel
Drexel University; University of South Florida, Madison College; Seattle University; Green Mountain College; Guilford College
Using climate change context to engage students in general chemistry.
Climate change is a topic that generates interest and discussion among people of all ages. Discussing climate change in undergraduate chemistry courses, such as general chemistry, can serve two purposes: it can create interest in the chemistry content and it can help students learn the science behind an issue that will have an impact on their lives for the foreseeable future. However, it is important to ensure that arguments about human influence on climate change do not sidetrack the lesson. As part of an NSF-funded project, twelve in-class activities have been created that use climate change context to teach general chemistry topics. These activities use the Process Oriented Guided Inquiry Learning (POGIL) methodology, in which a set of models and a series of critical thinking questions are used to guide students through the introduction to or application of course content. Students complete the activities in groups, with the faculty member as a facilitator of learning. Through assigned group roles and intentionally designed activity structure, process skills, such as communication, and information processing, are developed while students learn the content. Within these activities, the climate change topics are used as the models. The controversial aspects of the issues are generally avoided, and the activities do not promote a point of view related to the impact of human activities on climate change. In some activities, students are asked to make a policy-related decision. In these situations, they must use data to support their choice. Key components of one activity will be presented.

Kirkland, Lindsey
Climate Generation: A Will Steger Legacy
Teaching Social Justice-Oriented Climate Change Education
This year, more than ever before, we have seen the need for blending STEM and social justice education, as well as increased awareness of the need for professional learning opportunities that focus on social justice-oriented educational practices in STEM. Using learnings from the field of Climate Change Education and Climate Generation's sixteen years of practical experience engaging educators and developing resources, attendees at this session will explore how justice-oriented STEM education can: (1) add real-world context for STEM education through social justice, (2) build momentum for societal change by supporting students bearing the impacts of intersecting injustices, and (3) inspire just connection, engagement, and education that span home, school, and public based learning environments. Attendees will leave with activities and resources for teaching social justice-oriented STEM education specifically around climate change.

Kolack, Kevin
Queensborough Community College - CUNY
Moving an introductory environmental chemistry course online using the American Chemical Society's "Chemistry in Context"
Due to low enrollment, QCC's introductory, non-majors Chemistry and the Environment course was marked for cancellation until 3 days before classes began, when a registration surge occurred and it was assigned to Dr. Kolack. The course, which Dr. Kolack taught previously at Indiana University in the late 1990s using an earlier edition of the same text, had not been offered online at QCC in the past. McGraw-Hill now publishes the American Chemical Society's "Chemistry in Context," offering a wealth of electronic resources to students. With chapters covering climate change, ozone depletion, acid rain, etc. non-major students are introduced to a broad range of general chemistry concepts, in the context of the environment in which we live. Dr. Kolack is a tenured Lecturer at Queensborough Community College – CUNY, was the 2015-2019 Chair of the QCC Committee on e-Learning, and was the only person in the QCC chemistry department to teach online prior to March 2019. He posted pre-recorded lecture videos and other materials for his colleagues’ use in two-thirds of the chemistry courses offered by QCC.

Kuhnlein, Iris
Partha Foundation, Orissa, India
The role of Nature Immersion Programs and Life Skills in climate change education in Brazil
Case studies of the benefits of including Nature Immersion Programs and Life Skills in education for climate change as formative experiences, which can shape a positive psychological, emotional and professional attitude in students.
Leclercq, Alexia

Start: Empowerment

Including Food Justice in Climate Education

The Food Justice Education Project’s goal is to bring food justice and climate education into New York City public schools. This project aims to educate BIPOC and all youth on the ways in which the climate crisis is driven by, affects, and exacerbates the issues within the American and global food systems. The curriculum maintains a unique emphasis on the connections between civil and human rights, climate education, and environmental justice (EJ) in order to encourage students to meaningfully engage with these issues in both the classroom and in their communities. Food insecurity, food apartheid, environmentally and socially exploitative farming practices,, and food monopolies impact 40 million people in the U.S and over 850 million people worldwide. Food justice education is a rich opportunity for students to think globally and act locally as informed and empowered young changemakers. The food justice lessons are a 7 story map and project-based learning activities, which go over some key ideas, themes, issues, and solutions regarding food justice. The lessons are designed to be implemented in remote, in-person, or hybrid classrooms, as well as to be incorporated throughout core subject areas.

Madelone, Jake

Waterfront Alliance

Teaching Coastal Resilience in the Face of Climate Change

As temperatures and sea levels rise, it is becoming increasingly important to educate students of all ages on not only what climate change is, but how to adapt to it. The Coastal Resilience Education Toolkit is a seven-part curriculum that helps to build students’ understanding of an urban estuary, the effects of climate change, and what can be done to keep our waterfronts healthy.

The toolkit consists of detailed lesson plans, interactive activities, curated links to multimedia resources, pre-recorded content, and tips for adapting these resources across grades 3 through 12. Each lesson in the toolkit consists of pre- and post-activities, detailed procedures, and extension resources for teachers. The activities range from an interactive card game to instill the basics of what an estuary is, to building a model shoreline in a tray, and contacting political representatives to see how green infrastructure is being incorporated into waterfront designs in the students’ own community.

There’s versatility when teaching from the toolkit as well. Many of the activities build off the curricula introduced in a previous lesson plan. However, each lesson plan can also stand on its own to meet the needs of a particular class or group of students. Pushing education of coastal resilience to young people is a key step in addressing the climate crisis. When students understand that what they know can be applied to making real change in their communities, then thoughtful and effective solutions to rising seas and heatwaves are developed.

Maharana, Pyarimohan

Sri Sri University

The changing Indian Summer Monsoon dynamics under warming climate

The rainfall during the Indian summer monsoon (ISM) meets the water demand of one-sixth of the global population living in the Indian subcontinent. The recent Paris climate agreement determined to keep the global mean temperature rise well below 2 °C and pursue efforts to limit it within 1.5 °C. This gradual rising temperature would influence the underlying atmospheric dynamics of ISM. This study examines the possible changes in ISM characteristics at different (1.5 and 2 °C) specific warming levels (SWLs) with respect to the historical period. Twelve regional climate simulations under Coordinated Regional Climate Downscaling Experiments-South Asia (CORDEX-SA) are employed for the analysis. The global warming leading to the increase in the land and Ocean temperature, while the warming over land supersedes the same over Ocean. The rising global temperature to 1.5 °C (2 °C) SWL leads to an earlier onset of ISM over India by 7 (11) days in the model experiments. The increasing land-sea temperature contrast gradually escalates the magnitude of the Findlater jet (by 0.5–0.9 m/s) leading to enhanced moisture transport towards land and causes higher rainfall (increase by 2–10%) over India. The study reported an augmentation of ISM rainfall under a higher SWL of 2 °C with respect to 1.5 °C. However, the study reported a higher uncertainty especially for the duration of ISM and the spatial distribution of rainfall at different SWLs.

Marriott, Adrienne, Garcia, Rosina, and Chenoa Musillo

Sweetwater Union High School District, San Diego Unified School District, University of California, San Diego

Climate Champions: Collaborating to Create High School Climate Change Modules

Climate Champions has produced 3 NGSS aligned High School climate change curriculum modules. The Oceans module is focused on impacts of ocean warming on biodiversity, sea level, and extreme weather. The Land module is focused on land warming, drought, and wildfire. The Bending the Curve module is focused on solutions to climate change and is framed with the solutions proposed by
the “Bending the Curve” publication. Each module addresses NGSS life science, earth science, and engineering design standards. The modules each consist of about 5 lessons and were designed to be regionally relevant to Southern California, but broad enough to be useful in any location. They were designed to be utilized for in-person or distance instruction, and to be easily differentiated to appeal to a wide audience of learners. The modules were created collaboratively by University of California experts in climate and education and San Diego teacher leaders representing public and private schools in the region, and were informed by visiting experts on literacy, math, and indigenous viewpoints. A group of youth leaders have curated learning resources focused on climate justice, aligned with standards in Humanities, History, and Social Sciences. This pilot project creates a framework for ongoing curriculum development and professional development for teachers.

Martinez, Veronica, Yousri, Wesam, Aguilar, Harry, and Ingrid Veras
LaGuardia Community College, CUNY
Student’s perspective on climate change education: from classroom to activism.
This presentation explores how students’ involvement in course materials and extracurricular activities related to climate change and environmental justice has influenced their perspective on social justice, community awareness, and their scientific identity. From doing volunteer work, to studying the water quality of an urban waterfront as part of the natural sciences curriculum, to doing research on the effects of water and air pollution on public health. Students will share their experience with conducting research and applying their academic knowledge to approach environmental issues that affect their community: like studying the relationship between combined sewer overflow discharge, the bacterial diversity, water and air quality in Newtown Creek, and exploring the implications of high PM 2.5 levels in minority communities related to COVID-19. They will advocate for the importance of climate change and sustainability education in inspiring college students to become environmental activists.

Menser, Michael, Mann Hamilton, Ryan, and Veronica Manlow
Brooklyn College, LAGCC, CUNY
Teaching Climate Justice Using Participatory Budgeting Across Different Disciplines
The goal of this session is to promote and seek participants and advocates for “Resilience PB”: a grant funded project that aims to collaboratively construct a teaching module that can fit into existing courses in the humanities, business and sciences that explains the basic parameters of resilience and principles of climate justice in a way that enables students to formulate (or evaluate) community based proposals for the city-wide participatory budgeting (PB) process that begins in the summer of 2021. (PB is a multi month process that has operated at the City Council level since 2012 where community members make proposals on how to spend a portion of the City budget. Next year it will be City wide.) Resilience PB is a way to enable faculty to integrate resilience thinking into an existing class in a way that makes it tangible for students to think about equity enhancing projects for their campus, neighborhood and/or NYC. Building upon 3 PB processes at Brooklyn College that integrated class participation from multiple disciplines and work done at the Science and Resilience Institute at Jamaica Bay, Resilience PB will collaboratively develop teaching materials (e.g. readings, assignments, rubrics ) and webinars over the course of the next year for different subjects and classes. This event is the kick off for the project which will continue through Spring 2022. At this session we will discuss modules for the humanities, social science, and business classes.

Morrison, Deb
University of Washington College of Education
STEM Teaching Tools: Free Resources to Support Equitable 3D Science Instruction
In this session, participants will learn about and use STEM Teaching Tools, a suite of accessible, bite-sized practice briefs aimed at specific aspects of science education with research- and practice- based ideas and actionable advice. The STEM Teaching Tools initiative (http://stemteachingtools.org/ [stemteachingtools.org]) includes free learning resources for teachers to help them implement the vision of the NRC Framework for K-12 Science Education. Co-written by teachers and researchers, these accessible, strategy-packed tools are great conversation starters and tools for extended professional learning. Most recently, the collection has been developing resources to support climate justice through place-based science education and community-centered responses to a changing climate. In this session, we’ll explore the suite of tools and explore how to use them to dive into various topics in science education, including justice-centered climate change teaching and learning.
Mowry, Beth  
Brooklyn Collaborative Studies  
Teaching Climate Change in High Schools: Exploring an authentic, place-based, community-oriented climate change curriculum  
In this session, you will hear an overview of a full-year climate change course taught in a public high school in Brooklyn NY as the core Earth Science class. Though a public school, the school is part of the New York State Performance Assessment Consortium, allowing the teachers to develop their own standards-based curriculum instead of being tied to the full spectrum of Regents expectations. This flexibility leads to a more relevant and a deeper look into the science of climate change, as well as the human impacts of this crisis. Additionally, because of the nature of the school, this course also examines climate change from a historical perspective, addresses the issues of equity and environmental justice and both national and international policy, mitigation and adaptation strategies.  
During this session, participants will review the course syllabus, understanding the thru-line of authentic, place-based, community-oriented learning. Participants will also have the opportunity to view student work that results from this curriculum. Join us to learn more about where to find experts, make connections with the local community and integrate field work into your course.

Neacsu, Dana  
Teaching Students. Teaching with Students. Creating Opportunities to Change the World.  
Since COVID-19 has disturbed our daily lives and changed our way of teaching, one thing has become obvious: the old ways of teaching have become obsolete. Lecturing is not acceptable anymore. Grilling, if ever used, has lived out its usefulness. Nowadays, our students need to learn theory and skills at the same time. In my class, students learn about environmental law, policy, research, and the skills necessary to succeed as environmentally engaged citizens. If there are no opportunities yet, my students will imagine them. For this conference, I am submitting the research externship I have created with 6 of my students. While half of my class initially wanted to participate, during the first few weeks only 1/5 of the students remained committed to the extra work. Our aim is to fund it through summer grants, thus creating opportunities for those who have proved dedication, knowledge, and civic interest in environmental justice, including climate change impact on vulnerable communities.  
Project Goal. Disadvantaged communities tend to be disproportionately affected by a wide variety of environmental, social and economic ills. Many studies look at particular examples of these disparities -- e.g., air pollution levels, COVID deaths, housing characteristics. However, taking a holistic view of a community’s vulnerability is difficult in view of the disparate sources available. This project aims to address this problem by compiling in one user-friendly place a very large array of sources about many different kinds of impacts and conditions.

Nucifora, Fred  
Great Barrier Reef Marine Park Authority  
ReefED - Educate to keep it Great!  
The Great Barrier Reef is a global icon and an integral part of Australia’s national identity. The Great Barrier Reef is a vast and spectacular ecosystem and one of the most complex natural systems on Earth. This World Heritage Area with Outstanding Universal Value is an economic powerhouse, contributing $6.4 billion to Australia’s national economy annually as well as supporting some 64,000 jobs.  
As the world’s largest coral reef ecosystem, it is bigger in size than Italy, and spans 2300 kilometres of Australia’s north-east coast. It comprises almost 3000 individual reefs, about 10 per cent of the world’s coral reefs. However, the Great Barrier Reef, like all coral reefs globally is under pressure and actions taken now will matter.  
Great Barrier Reef Outlook Report 2019 highlights the urgent need for our continued and accelerated action to improve the long-term outlook for the Reef. As identified in the report, the greatest threat to the Reef is climate change. The other main threats are associated with coastal development, land-based run-off, and threats from direct human use of the Reef (such as illegal fishing).  
The Great Barrier Reef Marine Park Authority and its national education centre for the Great Barrier Reef, Reef HQ Aquarium, offer an extensive range of educational resources and programs "ReefED" focused on the enquiry approach to learning. Educating and working in partnership with reef-dependent industries and communities is a critical component in protecting the Reef for future generations. The Authority’s commitment to education and partnering with Reef-dependent industries and communities is targeted at encouraging reef stewardship action, creating lifelong ambassadors for the Reef and enabling inter-generational change.
Oses, Beth
University of Colorado

Drawdown Climate Solutions Adaptation and Spanish Translation for Accessibility to Grades 5-12
K-12 students need access to the most impactful climate solutions to act on reversing global warming. Top climate solutions identified by leading climate experts are now available in a lively format accessible to K-12 students (the top 20 available in Spanish too). Young people all over the world are calling for the right to a survivable future. This resource provides reliable and up-to-date information in one source to guide education and action towards that aim. This Open Educational Resource (OER) is an adaptation of top climate solutions from Project Drawdown that lists and describes the top 81 most impactful solutions for reversing global warming. This adaptation is adjusted to target a 5th grade reading level, but students younger and older will enjoy the engaging writing, descriptive illustrations, and vibrant photos. Each solution has its own 1-2-page entry that provides a written description and story of the solution, illustrations to help students visualize this solution in context, and data relevant to each solution, along with further research sources. This resource is created by a team at the University of Colorado led by Patrick Chandler, an experienced environmental educator and PhD candidate in Environmental Studies, and Beth Oses, an associate professor of Theatre and Environmental Studies. With three undergraduate interns and two experienced bilingual PhD graduate students in Education. These solutions are classroom-ready to support education and to inspire meaningful climate action.

Ramírez, Kimberly
LaGuardia Community College, CUNY

Creative and Non-fiction Ecocritical Texts in the English Composition Classroom
Informed by an unlikely pairing of credentials—an M.F.A in writing, a Ph.D in Theatre, and a Certification in Food & Sustainability—I will share how I help community college composition students explore ecocritical texts to contemplate productive ways that we might respectfully tread upon and preserve our planet.
We investigate diverse literary fiction and nonfiction publications by Upton Sinclair, Gabriel García Márquez, J.M. Coetzee, Lynn Nottage, Jonathan Safran Foer, Jane Goodall, Friends of the Earth. We learn about the Standard American Diet (appropriately acronymed SAD) and local plant-based initiatives, dialoguing directly with representatives from NYC Health + Hospitals, the office of Brooklyn Borough President Eric Adams, Elmhurst Dairy, and Plant Powered Metro New York. We read reports from the United Nations and International Panel for Sustainable Resource Management warning “How the world is fed and fueled will in large part define development in the 21st century.” As contemporary consumers, students consider evidence that food production and fossil fuels cause significant pollution, greenhouse gas emissions, disease, and deforestation.
We think about where our food comes from, research local agricultural methods, inquire which local farms utilize drip irrigation, crop rotation, cover crops vs. CAFOs, monocropping, GMOs. Students project the fate of our integrated ecosystem, realizing that it is in our hands to restore naturally biodiverse soil, waterways, oceans, forests, air, plants and pollinators, habitats and migration patterns of our planet’s wildlife. They learn to appeal to logos, ethos, pathos while composing essays arguing readers to make simple, smart choices/innovations to produce and consume in ways that avoid harm, simultaneously generating extraordinary collateral benefits for all.

Remington-Doucette, Sonya and Heather Price
Bellevue College; North Seattle College

Climate Justice in Undergraduate STEM Education: Incorporating Civic Engagement (C-JUSTICE)
A partnership between two Washington state community colleges resulted in the NSF-funded C-JUSTICE project, which seeks to improve STEM education by supporting community college faculty in creating course modules that teach complex problem solving through disciplinary practice, civic engagement, equity, and systems thinking. This presentation will describe the project and how it came to be. Co-PIs Dr. Remington-Doucette and Dr. Price are community college STEM faculty, both with chemistry research backgrounds in climate science-related fields. In their teaching, they’ve moved beyond climate science toward integrating climate justice and civic engagement into their courses. In 2018, Sonya created and implemented the Climate Justice Across the Curriculum project at Bellevue College (BC). A year later, Heather attended a Climate Justice Summer Institute at BC and brought the project to North Seattle College. The project is focused on faculty professional development that provides intellectual and financial support, and space and time, for faculty to create and implement climate justice lessons in their courses. The climate justice lessons include civic engagement components. The project is ongoing at both colleges. The two colleges have collectively archived the climate justice lessons of over 50 faculty. C-JUSTICE will build on this work by expanding lessons into larger course modules, and assessing the effect of the modules on faculty teaching practices and student learning and on the participation of women and systemically nondominant groups.
Rodberg, Leonard  
Urban Studies Department, Queens College/CUNY

The Role of Nuclear Energy in Addressing Climate Change

Carbon-free nuclear power will be an important component of our future clean energy mix. Today's students know little about it, and what they do hear is often mixed with misinformation. This talk will suggest a teaching module, appropriate for the education level. It will include topics such as (1) an overview of how we produce and use energy today, (2) why nuclear energy will have an important role in replacing fossil fuels, including how nuclear energy differs from other sources of carbon-free power, (3) the basics of how nuclear reactors work, including a description of current and future nuclear power plants, (4) an explanation of ionizing and background radiation, and (5) a review of various safety, cost, and environmental issues related to nuclear power.

Saguisag, Lara  
College of Staten Island, CUNY

Teaching Climate Justice Through Young Adult Literature

This paper discusses how young adult titles such as Cherie Dimaline's The Marrow Thieves and Sherri L. Smith's Orleans can be used to engage college students in discussions of climate justice. While Dimaline's and Smith's novels are dystopic fantasies set in the near future, both books also deliberately reference historical and current events. The Marrow Thieves alludes to the traumatic and destructive practice of separating First Nations children from their families and communities to place them in boarding schools; Orleans is a fantasy that explicitly references Hurricane Katrina and the various forms of injustices that caused and resulted from the superstorm. As such, both novels encourage readers to recognize how past traumas shape the present and future, to grasp how anthropogenic climate change is rooted in colonialism, racism, and capitalism. Moreover, the books do not simply mean to prove the resilience of Indigenous peoples and Black peoples in the face of environmental injustice and apocalyptic scenarios; they arguably urge readers to disrupt the inequitable systems that have long degraded and polluted natural and human communities.

Salinas, Dorothy  
County College of Morris

Educational Cross-Pollination: the importance of interdisciplinary climate change education

Resolving global environmental issues, such as climate change, requires the simultaneous deployment of the natural and social sciences. An interdisciplinary approach to climate change education bridges the gap between identifying an environmental concern and implementing a societal resolution. This presentation aims to highlight collaborative work achieved by educators from varying disciplines within the classroom, outside of the classroom, and institutionally.

Sen, Parmita, Marchese, Paul, Skeete, Dereck, Bramble, Ken Irish, and Neal Phillip  
Bronx Community College, Queensborough Community College and Medgar Evers College, CUNY

Monitoring The Temporal Distribution of Greenhouse Gases at a Bronx, New York Site

Greenhouse gases have been shown by researchers to be positively correlated with average global temperature. This presentation describes the monitoring of the temporal distribution of greenhouse gases (GHG) at a Bronx, New York site using a Picarro Model G2301 greenhouse gas monitoring system. There are several major highways that are close to the GHG monitoring site. There is also a small scale powerplant within 1,000 ft and in line of sight of the monitoring site. The results show average atmospheric levels of carbon dioxide and methane that are above 400 ppm and 2.0 ppm by volume respectively and water vapor levels that fluctuate between 0.20 and 1.10% as weather systems pass over the installation site. Daily emission peaks for carbon dioxide and methane are found in the early morning hours before sunrise when plant photosynthetic activity is at a minimum and during the day during periods corresponding to peak traffic times. This indicates that there are common sources for both gases. Daily water vapor fluxes are not as predictable.

Sen, Paramita and Neal Phillip  
Bronx Community College, Queensborough Community College and Medgar Evers College, CUNY

Monitoring the Progression and Intensity of the 2019 and 2020 Indian Monsoons with a CUNY Installed Solar Powered Weather Station in the Foothills of the Western Ghats, in Maharashtra, India

This research describes the progression and intensity of the Indian Monsoon during 2019 and 2020 in the foothills of the Western Ghats range in Palghar, Maharashtra, India, an important rainfall catchment area for the state. The research was facilitated through
the installation of a Davis Vantage Pro 2 Plus solar powered weather station by a CUNY team comprising of faculty and students during their 2019 CUNY India Study Abroad Program. The 2020 monsoon was found to be of shorter duration and of less intensity than the 2019 monsoon, even though the 2019 monsoon monitoring only began in mid-August when the weather station was first installed. The CUNY team personally experienced the high monsoon rainfall intensity in 2019 and was stuck in a local village for two days because of flooding and had their trip to Goa cancelled because of severe flooding in that state. The rainfall intensity and total rainfall data for the two years were compared with various weather parameters including temperature, dew point temperature, barometric pressure, wind speed and wind direction to determine any correlations. All data came from the same weather station. A study by the Indian National Institute of Oceanography in Goa in a peer-reviewed journal postulates that warming of the Bay of Bengal and the Indian Ocean is likely to weaken the India monsoon further in the near future. This possible explanation as well as wind direction trajectory analysis is currently being investigated to account for the difference in monsoon intensity between the two years.

Sheffield, Allyson, Russell, Nicholas, Radhakrishnan, Preethi, Luong, Vitoria, Veras, Ingrid, and Veronica Martinez
LaGuardia Community College, CUNY
Teaching Climate Change Using A Data-Driven Approach
To support students’ transition to college, LaGuardia employs the use of discipline-based first-year seminars (FYS) that integrate an introduction to the major with college success content and advisement. Data from 2017 show that Natural Science First Year Seminar (NSF101) has already proven to be effective in increasing retention (11 points higher than non-NSF classes) and credit accumulation (2.38 credits more than non-NSF) within Biology and Environmental Science program majors (Battle et al., 2017). The success of NSF101 is in its use of High-Impact Practices (HIPs) such as experiential learning, citizen science, community-based learning, and signature assignments. In this panel discussion, panelists constituting faculty and students will describe a scaffolded series of low stake assignments which evolve into a high stakes research paper based on citizen science data collected by students and faculty. These data constitute various measures of air quality in and around LAGCC. Global climate change is a multidisciplinary topic that is addressed in NSF101 at many different levels by connecting various disciplines, such as science, mathematics, literacy, and social justice. In the panel, faculty will describe the evolution of the project and how climate change curriculum is deeply embedded into the first-year seminar and students will discuss their learning around their final term papers and oral projects.

Shneyderman, Yuliya and Mary-Andrée Ardouin-Guerrier
Borough of Manhattan Community College, York College
Exploring Effective Public Health Educational Strategies for Climate Change Awareness Among Public Health and Health Education Students
According to the World Health Organization (WHO), 24% of all global deaths are associated with environmental challenges, specifically with modifiable environmental factors – this includes 28% of deaths in children under the age of 5. Students studying Public Health and Health Education must understand the implications of global climate change, environmental pollutants, and occupational exposures on human health. This presentation will discuss key topics incorporated within the curricula of two courses, an environmental and occupational health and a public health course at York College and BMCC. We will present epidemiologic data and methods of implementation within the classroom to illustrate environmental health challenges. We will explore assessment methods implemented within the curricula, such as the analysis of published peer-reviewed studies and policy briefs that seek to address and explore an existing environmental or occupational health issue. Lastly, we will discuss how to include and integrate student perspectives, many of whom have diverse experiences and backgrounds that may enrich the conceptualization of public health topics.

Sikand, Monika, Mazzatenta, Claudio, Wong, Keith, Bush, Joseph, and Aaron M. Socha
Bronx Community College, CUNY; Queens University of Charlotte; Battery Resourcers in Worcester, MA.
A Truly Interdisciplinary Education Model on Environmental Sustainability and Life Cycle Analysis to Address the Climate Crisis
The debate on environmental issues and the emphasis on teaching solution-oriented approaches in our education system to address real-world problems become compelling every day. A unique interdisciplinary education model developed from the synergy of three natural sciences disciplines—physics, chemistry, and biology encourages us to understand sustainability concepts from oceanography, geography, mathematics, anthropology, history, sociology, and politics. The interdisciplinary education model’s conceptual framework in sustainability, energy, and the green economy was applied in a research-driven project, a life cycle analysis (LCA) of a simple consumer product such as tea bag, coffee, or paperclip. The LCA project evaluated the environmental impact of the product over its life cycle and helped students understand the importance of earth’s carbon footprint. The study reflects on the student performance and engagement data and the notable experiences and lessons learned in this unique team-teaching format to
translate the complex real-world problems into classroom learning for non-STEM students. The National Science Teachers Association (NSTA) published an article about this unique interdisciplinary course on environmental sustainability and the life cycle analysis in the Jan/Feb 2021 issue of the Journal of College Science Teaching.

Slack, Sarah  
JHS 223 - The Montauk School (NYCDOE), Climate Change Research Initiative (NASA)  
Investigating the Urban Heat Island Effect with Student Scientists  
The highly-developed environments of urban areas tend to be significantly warmer than adjoining rural areas, a phenomenon known as the Urban Heat Island (UHI) effect. UHIs have the potential of increasing both the frequency and severity of extreme heat events in cities, thereby adversely impacting the health and welfare of urban residents, particularly as average global temperatures continue to rise. Although the UHI effect has been studied closely on citywide scales, there is much that can be learned by exploring differences in temperature within and across neighborhoods at the local level. This important research provides an engaging and meaningful avenue to get students involved in the work of citizen scientists. Data on land surface and air temperature is easy to collect, reveals consequential contrasts at the hyperlocal scale, and can contribute to the larger understanding of how communities can reduce vulnerability to extreme heat. Using the Next Generation Science Standards (NGSS) as a guide, we will discuss strategies to engage students in the design of an investigation that reveals how temperature varies in the area surrounding your school, in the use of data to identify neighborhoods at risk, in the evaluation of the effectiveness of different mitigation strategies, and in designing ways to present on newly-acquired knowledge with community residents and decision-makers. I’ll share lesson plans, recommended online resources, and materials to get started on an investigation of the UHI effect in your neighborhood.

Sneh, Itai  
John Jay College, CUNY  
The Diverse Crabgrass Frontier: A Green Revolution?  
The biggest challenge of policy-makers in (sub)urban areas is to provide thriving conditions and professional training to poor, underprivileged, disenfranchised, ill-prepared children who frequently come from dysfunctional families and harsh living circumstances in neighborhoods inhabited primarily by people of color. (One of the biggest challenges of policy-makers in suburban areas is to provide thriving conditions and professional training to children who frequently come from families who are not sensitive to environmental issues). Combining the above issues as a clarion call for informal activists and aspiring politicians to inform families and inform adolescents about positive demands for clean environment and adequate products is an alternative to the negative collective experiences of crime and gangs (waste and disregard). Particular examples could blend sports and conversations, meals and community outreach, story-telling and project making. The presenter will provide specific details about his own experience teaching at CUNY and living at various times of his life near Washington Heights and Harlem (traveling and visiting suburban communities in the U.S. and Canada) (in Brooklyn).

Souleymane, Ndao, and Farias, Christine  
Institut Superieur de Management ISM-Dakar, Senegal; Borough of Manhattan Community College, CUNY  
The Impact of Climate Change on World Heritage: The Case of the Island of Saint Louis, in Senegal  
Founded by French colonialists in the 17th century and became urbanized in the middle of the 19th century, Saint Louis was the capital of Senegal from 1872 to 1957, and played a major cultural and economic role in all of West Africa. The material features of this city bear witness to the colonialists’ territorial governance. The colonial buildings and facilities which have given this Island all its letters of nobility and its place in the golden list of a UNESCO world heritage site are in danger. A good record of Senegal’s history is inscribed in this patrimony, the sustainability of which is threatened by the danger of being swept away by the rising sea level. In this paper, we address the broad issue of the impact of climate change on world heritage from the social, cultural, environmental and economic perspectives. The history of Saint Louis and the need to preserve its heritage provides an excellent learning laboratory where students can relate to these multiple perspectives with deeper connection. Students from Senegal and New York engaging in a dialogue using Saint Louis as a backdrop will enable them to develop a mutual understanding of the interconnectedness and interdependence of human activity. This approach will bring a sense of reality to the often abstract consequences of climate change like sea level rise.
Tiwari, Deepti  
Central Board of Secondary Education, India  
**Shaping the Future of Generations for Climate Change**

Heritage International Public School is located in the Steel City of India. It is a K -12 school affiliated to the Central Board of Secondary Education. Understanding the humongous task of nurturing minds, instilling in them the ability and conviction to realize their full potential and to excel in their chosen field, the School believes in overall development. The School’s curriculum is designed to not only develop students in academics but create responsible citizens of tomorrow. The students are encouraged to participate in life situations to enhance their critical thinking, logical reasoning, and problem-solving skills. It has been a paradigm shift for the school from rote learning to experiential learning in the past three years.

Students have engaged in various projects to understand the impact of anthropogenic activities on climate change. This presentation will demonstrate how the webinars arranged by BCC/CUNY have helped in developing lesson plans to teach issues in climate change and how to revile it. Kindergarten to Grade XII has had the opportunity to be part of these webinars, from live underwater Great Barrier Reef sessions to the Antarctica expeditions. They embarked on these virtual journeys to understand the impact of climate change in the era of the Anthropocene. Climate Change Education in classroom learning mode has created awareness in the young minds. Students went online and door-to-door signature campaigning for implementing the 3Rs of Reduce- Reuse- Recycle. All students from Grade VI to XII participated and collected more than 5000 signatures pledging informed use and disposal of electronics. They also dramatized street plays in various public places. Students have time and again involved themselves with plantation drives and keeping the environment clean.

Trachman, Julie  
Hostos Community College, CUNY  
**Potential Health Impacts of Global Climate Change**

Global Climate Change (GCC) and its associated impacts on our planet Earth and human health has increasingly become topics of conversation in the college classroom and the focus of course assignments. In this presentation, I will discuss assignments that I have incorporated into the curriculum of an Anatomy and Physiology 1 course and a microbiology course. With some assignments, relevant readings including newspaper / journal articles or information from reputable websites may be provided to give students some background information and context.

GCC can have many impacts on human health, some more obvious than others. In the microbiology course, students are usually writing about infectious disease agents but some occasionally choose to write about coral reefs or about other roles microorganisms can play in our ecosystem. One A&P1 assignment is designed to get students thinking about the myriad impacts GCC can have on the human cardiovascular, the respiratory and the immune systems as well as its potential association with cancer. Many of these health impacts are less often mentioned in the news but important for students to begin considering. A second A&P1 assignment asks students to correlate course information with their own lived experiences in relation to the impact of GCC on their lives. Additionally, during the semester, GCC sometimes comes up in conversation as a result of current events and often there is a dedicated time for some conversation on environmental issues during our Science Day and Earth Day celebrations.

Aditi V, Mishal and Mulshine R  
Govardhan Ecovillage, Notre Dame University  
**Experiential learning for Nextgen Sustainability Leadership: A case of computing environmental payback of Solar Power Plant at Govardhan Ecovillage, India with LCA methodology**

Govardhan Ecovillage (GEV) is sustainability hub modeling diverse sustainability technological interventions and action models for climate change mitigation and environmental sustainability. GEV partners with Universities globally including CUNY to impart experiential learning for developing Nextgen sustainability leadership. As part of virtual Global Professional Experience program of Notre Dame University, CSO of GEV and student from NDU collaborated to calculate environmental payback of newly commissioned Solar Power Plant at GEV using LCA methodology.

Environmental impact with cradle to cradle approach have been compared for solar power plant vis-à-vis traditional coal sourced energy in India. The payback for Solar power plant at GEV with 220 Kwh capacity is found to be 8 months. At 8 months from commissioning and operationalization the solar power plant at GEV becomes environmentally positive. With an average life cycle of 25 years and average life cycle of solar power cells of 10 years, solar energy is a preferred source of renewable clean energy at GEV with 40% of its present electricity demands being fulfilled with this source.

GEV is serving as living lab to train the national and international Nextgen sustainability leadership advocating innovatively for improving climatic and environmental conditions. Solar energy we recommend should become preferred renewable source of energy in India and other tropical countries to balance aspirations of development with sustainability. The caution however is
operational maintenance with regular water based cleaning to sustain productivity and end of life adoption of scientific recycling processes for solar power plant as responsibility towards circular economy.

Aditi V, Mishal and Gauranga Das
Govardhan Ecovillage, Notre Dame University
An alternative sustainable model of the World? : A critical perspective of systems design thinking from micro level case of Govardhan Ecovillage

Geoscientists fear 'Humans are altering Earth planet, especially the global geologic processes at a scale which have substantially modified carbon, nitrogen and phosphorous cycles'. Rising carbon emissions- sea levels, altered climate cycles, depleting groundwater tables, imbalanced rising energy demands are some of the top sustainability challenges. Sustainability, however, poses multi-dimensional complex challenges unable to be resolved with the reductionists approach.

Systems design thinking approach is argued as effective approach to build resilient and sustainable systems built upon characteristics of diversity, adaptability, efficiency and cohesion of sub-elements of system. Govardhan Ecovillage (GEV) is sustainability hub modeling diverse sustainability technological interventions and action models towards building an alternative sustainable world view with systems design thinking approach.

Current paper reflects upon GEV’s SSDM built upon founding principle of circularity observing events and patterns to alter systemic structures and mental models. GEV’s sustainability team designed systemic structures considering deeper level interactions between farming methods, water and waste ecosystem, biodiversity, green habitats, etc.

Impact indicators as 10 million ltrs of RWH pond - equal amount recycled with soil biotechnology plant, organic farming resulting into improved soil quality, 78% of energy demand is fulfilled through renewable and conserved energy, green habitats made of compressed stabilized earth blocks with large green canopy, improved biodiversity with thousands of dancing butterflies giving clue of a healthy ecosystem poses strong evidence-based argument towards a micro model of alternative sustainable world. The model also serves as a bridge between rural aspirations and urban challenges as recognized by UNWTO in 2017.

Wang-Mondaca, Carol
Martin Van Buren High School; Goddard Institute for Space Studies; Columbia University
Blue Carbon: Bringing Field Research and ArcGIS Mapping into the High School Classroom

Wetlands are valuable because they protect our coasts, serve as natural water filtration systems, are a source of great biodiversity, and serve as nurseries to fish and other organisms. They are threatened by agriculture, drainage, commercial development, and climate change. Coastal wetlands, such as salt marshes, mangroves, and tidal freshwater wetlands serve as a major sink of greenhouse gases because they preserve carbon in anoxic, cold conditions. This unit provides students with background on the importance of tidal marsh ecosystems and takes them into a deeper look at blue carbon, the carbon that is stored largely in sediment linked to coastal waters. Literature and data review give students firsthand experience reading, analyzing actual scientific research. Students create their own methods and protocols to design an experiment to probe for depth at a local saltmarsh or tidal freshwater marsh. The culmination of this unit utilizes ArcGIS to map local wetlands, compare and contrast wetland loss over time, and to conduct computational and applied mathematics. Students then take data collected in the field and with ArcGIS, and calculate carbon storage of the local wetland. An alternative capstone project is included for a virtual environment where students develop their own ArcGIS Blue Carbon Story Map, researching and mapping a wetland from their home country. This project emphasizes the global importance of wetlands, the impact of climate change on wetlands, and celebrates student diversity and inclusion. This unit plan, developed under GISS’s Climate Change Research Initiative, has successfully passed NASA SMD Independent Product Review.

Zamora, Manuela
New York Sun Works
Connecting Humans, Technology, and the Environment to Understand Climate Change

NY Sun Works brings hydroponic technology into the New York City public school classroom to teach Sustainability Science through the lens of urban agriculture. We define sustainability science as the study of the interactions between and the interconnectedness of humans, technology and the environment. Our program puts students at the center of the learning process so they can better understand the role of human action that led to current ecological, socio-geographical, and climate change. We cultivate farmer scientists and farmer scientist teachers to use sustainability science to address those challenges and design solutions for a more just, sustainable, and healthy future. NY Sun Works science labs are equipped with hydroponic farming technology in order to provide year round hands-on, project-based sustainability science education. Our curriculum is designed to easily integrate into science classrooms and the content, conveyed through the lens of urban farming, addresses topics in plant biology, ecology, human
interaction with the environment, and human impacts on the environment. Students participate in choosing growth media; selecting and planting seeds; combining plant-nutrients and water; monitoring plant growth; harvesting; monitoring NFT, vine crop, Tower Garden and aquaponic systems, composting, controlling pests, and more. This integration of hands-on and student driven learning in formal science classroom settings brings innovation to the classroom and is particularly effective for exploring modern-day issues of global concern like energy and resources that go into transporting food, efficient use of water, use of pesticides, and the importance of local food production.

**Poster Abstracts**

**View the posters on our virtual poster gallery:** [https://www.cunyc4eclimatetechchange.com/](/https://www.cunyc4eclimatetechchange.com/)

**Bonfiglio, Bettina and Christopher Badurek**
Department of Geography, SUNY Cortland
**Student Poster:** Analysis of Impact of COVID-19 on Nitrogen Dioxide and Sulfur Dioxide Concentrations Across the Northeastern United States, 2019-2021

The COVID-19 pandemic has been called a ‘natural experiment’ in which to analyze the relationship between anthropogenic activities and emissions from fossil fuels. Preliminary studies from NASA satellite monitoring show a decline in commuting for work and reduced electrical consumption are related to a decline in air pollution as evidenced by atmospheric measures of sulfur dioxide (SO2) and nitrogen dioxide (NO2). This study explores this relationship further by comparing rates of SO2 and NO2 using data from NASA’s Ozone Monitoring Instrument (OMI) and second Modern-Era Retrospective Analysis for Research and Applications (MERRA-2) Model, gathered from NASA’s GIOVANNI web GIS application. The data are collected at 0.25 by 0.25 degree (OMI) and 0.5 by 0.625 degrees (MERRA-2) spatial resolution. Preliminary results indicate substantial differences in measures of both tropospheric column SO2 and NO2 in the New York City metro area, along the I-95 corridor, and across the state of Pennsylvania.

**Buchanan, Joleen, Grant, Emoyen, Greene, Netanya, and Nadaycia Vallet**
Holistic Education Research & Conservation (HERC)
**Student Poster:** TUNNEL VISION: A Photographic-Narrative Exploring Ecological Landscapes Vulnerable to Climate Change Impacts in St. Kitts and Nevis

TUNNEL VISION: A Photographic-Narrative Exploring Ecological Landscapes Vulnerable to Climate Change Impacts in St. Kitts and Nevis is a photographic-narrative exploration that draws on current scientific information about our warming climate, the global and local consequences, and how persons and places most vulnerable to climate change in the Eastern Caribbean might prepare for its effects. This presentation serves as a basic and introductory exploration of environmental impacts (and related health effects) of climate-driven landscape change. The photographic exploration uses images of ecological landscapes in St. Kitts and Nevis to explore some observable and/or visible signs of climate change in the country, while framing discussions about climate change vulnerability within the region. The presentation uses photographs taken/curated specifically by an all-female student-research group participating in a climate change research-education and public outreach project with HERC (Holistic Education, Research & Conservation), a local community-based organization in the federation of St. Kitts and Nevis. The primary purpose of this project is to encourage and promote climate literacy by re-contextualizing basic aspects of climate science into palatable mediums.

**Cime, Schidza, Nassar, Mohamadia, and Abel Navarro**
Borough of Manhattan Community College, Science Department
**Student Poster:** Uptake of Co(II) ions from aqueous solutions by low-cost biopolymers and their hybrid

Alginate hydrogel beads (AB), spent peppermint leaf (PM) and a hybrid adsorbent of these two materials (ABPM) were studied as potential biosorbents of Cobalt (II) ions from aqueous solutions. Cobalt ion is a commonly underestimated pollutant that is responsible for several health problems. Discontinuous batch experiments were conducted at room temperature to evaluate the effect of solution acidity and mass of adsorbent on the adsorption of Co(II) ions. The interfering effect of salinity, presence of surfactants, an organic dye, and Pb(II) ions were also studied to resemble the application of these adsorbents in real wastewater. Equilibrium results indicate that Co(II) uptake is maximized at pH values higher than 5, with adsorbent doses of 200 mg, 200 mg, and 120 mg for AB, PM and ABPM, respectively. Co(II) adsorption followed the trend AB > ABPM > PM with adsorption percentages of...
77%, 71% and 64%, respectively. Salts had a strong negative effect on the adsorption due to the increase of the ionic strength and the competition for adsorption sites. Presence of Pb(II) ions, surfactant and dye BY57 had a slightly negative effect on the adsorption, apparently due to their interaction with different adsorption sites that do not interfere with the removal of Co(II). These experimental results revealed that AB, PM and ABPM are promising adsorbents for the elimination of Co(II) ions from aqueous solutions under different experimental conditions. These biopolymers are proposed as eco-friendly alternatives for the removal of heavy metal ions at lower costs than conventional techniques.

Charalambous, Mikaela
CUNY Queens College, HSI-STEM: Bridges Across Eastern Queens, CUNY Research Foundation
Virtual experiential learning and immersive roleplay for climate change education
Climate change and its myriad environmental, social, and economic consequences have become increasingly unavoidable. This is especially so for young people, who are aware of their increased susceptibility yet often feel they lack the enfranchisement and authority to enact tangible political or legislative change. Climate change science education is therefore necessary to build confidence in young people to meaningfully tackle these issues.

The Climate Change Summit is an immersive virtual town-hall game that allows student participants to roleplay townspeople to decide how to use $100,000 to fund a climate initiative in their community. The five proposals—disaster preparation, education, solar panels, reforestation, and floodwater management—are supported by characters with varying backgrounds and concerns that students take on as their own. They consider multiple data to help them take a stance on the best proposal. Previous data of past summits demonstrate a consensus for the education proposal, though students were eager to collaborate and compromise on the budget rather than selecting a “winner”. Future iterations of CCS, however, may display a shift to other proposals, i.e. students may opt for a disaster preparation proposal to incorporate a public health budget in response to the COVID-19 pandemic. Climate Change Summit appears to be a successful endeavor for effective and engaging climate change education, including the incentive of extra credit for the winning proposal. Participants broaden their perception of climate change solutions, learn to disseminate data, and use these tools to make decisions. Ultimately, CCS empowers young people to effect positive change.

Gillis, Alexandra, Adams, Jennifer, and Brett Branco
Brooklyn College CUNY, University of Calgary, NOAA
The Resilient Schools Consortium (RiSC): Student Agency in Climate Change Education
Youth will be disproportionately affected by climate-related disasters but lack the salience to influence those in government who can take action. The Resilient Schools Consortium (RiSC) funded by NOAA’s Environmental Literacy Program is a climate and resiliency program for middle and high school students. The curriculum was designed to educate students on how to design and manage resiliency projects and become climate advocates.

In 2012, Hurricane Sandy left 1.1 million children unable to attend school for a week, approximately 200 schools sustaining damage, forcing the relocation of tens of thousands of students. In light of these impacts, part of the goal of RiSC was to empower students to become change makers in their schools and communities around climate resiliency. RiSC’s initial cohort consisted of six classrooms at schools impacted by Hurricane Sandy. Students learned about global climate change as well as the local impacts of extreme weather. We interviewed and surveyed teachers and students to document student motivation levels and learning throughout the program. This study provides a compelling example of youth empowerment and collective action. We found that young people engaged in authentic science learning that is relevant to their lived experiences motivating, and having a platform to share their knowledge with relevant stakeholders potentially transformative. However, stakeholders in positions of power can also truncate students’ levels of motivation. An important consideration is how to engage students at multiple levels of community, school, and policy in ways that maintain motivation and allow them to enact change.

Henry, Catherine and Kate Carter
Michigan State University; National Center for Science Education
Communicating climate change content in small and mid-sized museums: challenges and opportunities
Informal education and outreach can be highly effective at shifting public opinion and action on climate change, particularly in rural areas where climate change may be avoided in regular curriculum. Small and mid-sized museums in more rural areas can serve as important sources of climate change content, even for museums which are not primarily a science museum. However, there are perceived and actual barriers that museums must overcome in order to incorporate this content. In this study, we interviewed small to mid-sized museums in rural Michigan to learn more about attitudes and experiences with climate change. We present a summary of common challenges to incorporating climate change in rural museums, along with an overview of how partnerships can overcome these barriers using theory-based science communication approaches.
Kao, Bob
Heritage University; Northwest Partnership for Undergraduate Life Science Education (PULSE)
From Climate Cycles to Plant Stem Cells: Integrating Environment and Health in Undergraduate General Biology
The development of inclusive and equitable approaches in linking climate cycles and plant cell adaptation is an important dimension in life science education. Over the past four years, we have utilized both in-person course-based undergraduate research settings and remote/online approaches to link topics of climate cycles with function of plant stem cells in an undergraduate general biology course through process of inquiry. In addition, the themes of climate cycles and plant stem cell homeostasis are also linked to Dr. Robin Kimmerer's "Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants". The combination of both in-person and remote approaches provide a framework for undergraduates to explore and develop important research questions on how cell structure and function are integrated with adaptation to climate cycles.

Bartlett, Paul, Popov, Milena, and Pekar, Stephen
John Jay College, Queens College, Graduate Center CUNY, Lamont-Doherty, Columbia University
Learning from Polar Observations: Sea Level Rise, Forever Chemicals, Indigenous Knowledge
The greater climate warming experiences in the polar regions foretell disruptions and disasters to come to the rest of the planet. The Arctic has experienced up to 5o average temperature change with extreme anomalies and accelerating feedbacks causing successively earlier snow and sea ice melts, coastal erosion, ecosystems and food web disruptions, forcing early Inuit community adaptations. Toxic chemical fallout from fossil fuel, consumer products and pesticides are additional stressors to Arctic ecosystems and indigenous health and well-being, but preventable (POPs and Chemicals of Emerging Arctic Concern: Influence of Climate Change, AMAP.no, forthcoming 2021).

The consequences of Polar climate warming not only directly affect Arctic peoples, but also the future of the rest of the planet with rising sea levels of up to one to two meters within the lifetime of our students. The trifecta of climate, biodiversity, and pollution emergencies are not unique to the Arctic peoples, but will soon affect us all (Making Peace with Nature, UNEP, 2021).

To help students understand and make use of the latest climate observations, research, adaptation case studies, eco-art, eco-design, and experiential teaching methods, in our experiential classrooms we combine field trips, guest speaker visits, inter- and intra-institutional collaborations, as well as a variety of creative assignments, such as environmental mapping, cli-fi writing, and sustainable city re-design projects.

We provide educational resources in our poster and a companion CUNY Commons site and repository. The authors offer faculty development environmental and climate justice workshops and talks at other campuses.

Stoeth, Annie and Kate Carter
The Graduate Center, Queens College, National Center for Science Education
The influence of role-playing games on student engagement with scientific data and decision making processes
Decision making around climate change happens at the intersection of knowledge, values and experience and often requires making decisions without full content knowledge. Despite this, much of climate change education remains focused on improving gaps in knowledge. Here we provide the results of a randomized control trial to assess how values impact decision-making around climate change in an educational setting.

The roleplaying game Climate Change Summit provides a town-hall forum roleplaying game that asks participants to take on the viewpoint of one of 25 characters to advocate for one of five potential climate-related proposals for improving the community. For this study, half of the sections (N=5) of a large introductory environmental science class at CUNY were given the ability to choose their character and were encouraged to choose one that aligned with their own values. The other sections were randomly assigned a character and were encouraged to identify with that character’s point of view.

Ritchie, Lauren, Keisling, Benjamin, and Kailani Acosta
The Earth Institute of Columbia University, Lamont-Doherty Earth Observatory
Student Poster: Establishing an Earth Institute Platform for centering perspectives of people of color in climate and environmental spaces through Columbia Climate Conversations
A broad spectrum of perspectives, experiences and ideas is necessary for rising to the challenges posed by the climate crisis. However, the earth and climate sciences, and the environmental and sustainability movements more generally, lack diversity. The lack of diversity in these spaces is a barrier to creating solutions that are just, equitable, and meet the needs of communities that face oppression along multiple axes of marginalization. To address this gap within our own community, we created the Columbia Climate Conversations (CCC) initiative within the Earth Institute at Columbia University. CCC is a panel series that highlights people
and perspectives that are often overlooked in geoscience, climate change, and environmental spaces. Through dynamic and engaging programming, CCC aims to introduce practitioners of science to perspectives they aren’t regularly exposed to, and to provide a platform for rising leaders and visionaries who are charting bold ways forward for the world. Our three goals for CCC were increasing knowledge of, and participation in, Lamont-Doherty Earth Observatory (LDEO) and Earth Institute (EI) events among Columbia undergraduate students from diverse groups via targeted collaboration and engagement with student groups that serve diverse populations; partnering with student groups within CU to co-create programming of mutual interest to diverse students and LDEO/EI communities; and expanding the reach of LDEO and its name recognition among undergrad students from diverse groups. From Fall 2020 through Spring 2021, we ran three CCC events which were attended by over 250 people. We were able to raise more than $5,000 to support CCC and used novel social media strategies to engage members of the next generation in the conversation. In this presentation, we share what we have learned through CCC and our vision for making the program sustainable into the future.

Wilson, Grant, Kayman, Lindsey, Bartlett, Paul, and Milena Popov
John Jay College of Criminal Justice, Earth Law Center, Environmental Education Fund
Forget doom and gloom. Let’s educate students about the Rights of Nature, an inspiring, evolving legal development which is gaining traction in the US and around the world, and which can promote the cultural shift needed to address our overlapping intersecting environmental crises — climate change, accelerating species extinction, and ecosystem collapse. The Rights of Nature is one aspect of Earth Law. Some of the other specific movements falling under the banner of Earth law are nonhuman rights for animals, defining ecocide as a crime, rights of future generations, legal guardianship for nature, and Indigenous legalities.

In most countries, Nature has the legal status of mere property. The Rights of Nature recognizes that humans and Nature are in a relationship, rather than Nature merely providing a hoard of natural resources for indiscriminate human use. The legal structures discussed in Rights of Nature literature codifies the details of this restored relationship, rather than actually creating it. Nature becomes a legal entity with basic rights: the right to exist, flourish, thrive and regenerate. The Rights of Nature can also complement Indigenous rights by empowering Indigenous peoples to serve as legal guardians of their traditional territories.

This poster and a companion open access CUNY Commons webpage and repository will provide links to curated video clips, films, case studies, a course book, a graduate level course syllabus, mock trial workshops, and written materials that can be used for incorporating the Rights of Nature and complimentary legal movements concepts into curricula.

Ulay, Reem and Abel Navarro
Borough of Manhattan Community College
Student Poster: Adsorption of Heavy Metals Using Chemically-Modified Tea Leaves
Copper is perhaps the most prevalent heavy metal used in the manufacturing industries, from food additives to metal-mechanic factories. Common methodologies to remove copper are expensive and produce undesired substances that need to be taken care of. A good decontaminating candidate should be environment-friendly, inexpensive, and capable of eliminate low concentration of the metal. This can be achieved by chemically-modifying known adsorbents to enhance their adsorption properties. This work suggests the use of a chemically-modified spent tea leaves of chamomile, peppermint and green tea under their thiolated, sulfonated and carboxylated forms as candidates for the removal of copper from solutions. Batch experiments were carried out to maximize the adsorption of copper (II) ions. Effects such as acidity, salinity, adsorbent dose, metal concentration, and presence of surfactant were explored. Experimental data shows that the maximum adsorption is reached at neutral pH. The results indicate that Cu(II) can be removed up to 53%, 22% and 19% with the thiolated, carboxylated and sulfonated adsorbents, respectively. The maximum adsorption of copper on TPM (53%) is achieved with 150mg and decreases with the presence of salts, and surfactants. Conversely, sulfonated and carboxylated adsorbent show a better adsorption in the presence of surfactants. Time dependent experiments show that adsorption is reached in less than 25 min for TCM and 5 min for SCM. Instrumental analyses were used to determine the presence of active functional groups, thermal resistance, and scanning electron microscopy; indicating that both adsorbents are promising cost-efficient materials for the selective recovery and treatment of metal ions from wastewaters. Finally, columns were prepared with these adsorbents to explore their application in scaled-up processes, with very positive results. A long-term goal involves the recycling of the exhausted adsorbent and/or their use in the preparation of biofuels due to changes in materials’ structures.