

NAAEE Proposal 2011

Strand Choices

- 1st Choice: Climate Change
- 2nd Choice: Environmental Issues in EE
- 3rd Choice: Conservation Education

Conference Threads:

- 1. Innovative Programs and Practices
- 2. Sustainability Education

Presentation Format

1st Choice – full day workshop

2nd and 3rd choice for Presentation Format

- Second choice Symposium (1hr 20 min)
- 3rd Choice Hand-on presentation (1hr 20 min)

10 word title (in uppercase)

CLIMATE CHANGE EDUCATION: SCIENCE, SOLUTIONS, ENERGY LITERACY, INSPIRATION AND EMPOWERMENT

40-word Summary

We will present basic climate science, how we know what we know, why there is resistance to believing the science, and how we can better communicate; and then demonstrate the best climate change educational materials and how to find them.

250-word Description

This full day workshop will give educators access to the best, most compelling and engaging climate literacy resource collection created by members of the Climate Literacy Network (CLN, <http://cleanet.org/cln>). We will also demonstrate how to find relevant reviewed climate and energy literacy educational resources from the Climate Literacy and Energy Awareness Network (CLEAN) Pathway collection (<http://cleanet.org>). These resources are reviewed for scientific accuracy, pedagogical effectiveness, and technical quality, and are aligned with the *Climate Literacy Essential Principles for Climate Science*, science standards, and the *NAAEE Guidelines for Excellence in Environmental Education*.

The first part of the workshop will provide climate science content information to the participants as well as address common misconceptions and how to address them. The participants will also get to learn how climate scientists work and see them as individuals through film. We will then demonstrate educational materials, developed by members of the Climate Literacy Network that educators can use to integrate climate education into curriculum & professional development programs, while teaching to the required standards. We'll help educators overcome resistance to teaching about climate change and explore the psychology of climate denial. We will also present resources that can help educators introduce to their students exciting climate solutions, citizen-science, and CO₂-reduction projects, and

empowering youth-created films, and films featuring youth-led initiatives to reduce greenhouse gases. The resources shared in this workshop will increase students' environmental literacy about Earth system and climate science and engage them to apply that knowledge to tackle climate change issues.

NAAEE Guidelines for Excellence addressed:

The proposed session will address the NAAEE Guidelines for Excellence by:

- * Enabling participants to learn about a new digital source for teaching/learning resources aligned to the K-12 Learner Guidelines – and ways to contribute high quality instructional materials to the digital library.
- * Modeling themes and guidelines for Preparation and Professional Development of Educators and demonstrating
 - how this network of people, organizations, and activities will enable a broad increase in climate literacy, and
 - cutting-edge ways of using a mix of virtual interactions (with the digital library) and in-person, local/regional interactions to promote professional development.

NAAEE Strategic Plan Goals addressed:

The proposed presentation will aid NAAEE in addressing the following strategic initiatives:

- * Providing the highest quality research-based programs, products, and services for diverse individuals and organizations engaged in environmental education.
- * Increasing NAAEE's presence and partnerships with organizations that train, employ, and support environmental educators in Canada, the United States, and Mexico.

Schedule

Part 1 Basic Climate Science 101 – Understanding Science and Scientists

Because children and educators are exposed to a great deal of discrediting of climate change information, the morning session will focus on how we know what we know about our changing climate. The focus will be on teacher and student “CQ” – Climate IQ and how to “inoculate” them against denial and misinformation through accurate scientific information and good intelligible science.

8:30- 8:45 Introduction:

CQ (Climate IQ) and Misconceptions

8:45-9:15 Administer the CQ quiz (from NASA's Education website)

9:00 Climate Literacy 101 Laura Tenenbaum, NASA

9:15 – 10:00: Misconceptions: We will Introduce the **Union of Concerned Scientists realclimate.org**” We will present these real misconceptions and answers for educators. Educators are on the Front lines with parents asking, “How can you be teaching this? This workshop will prepare educators with how to respond to the climate science misconceptions that people are coming to them with.

10:00- 11:00 *Environmental Literacy with a Focus on Climate Change—Transferring Climate Science to the Classroom.* Where does climate science fit in the curriculum? What are the most important concepts that should be taught? ANDRILL (ANTarctic geological DRILLing, a National Science Foundation research project) educators will introduce essential principles for teaching climate change and provide exciting new resources for teaching those concepts based on an earth systems approach. Louise Huffman

11:00 – 11:30 Introducing Films to help introduce Climate Science and Citizen-Science: Youth Working with Scientists to Collect Data and Understand Climate Science. Screening of a 3-minute Young Voices on Climate Change film Anya: Citizen Science in Siberia. CIRES film (NOAA funded) of Scientists. (3 minutes) Films made by middle school students about their NOAA mentor scientists. (3 minutes) “Dr. Ryan” science adventure films. (3 minutes) and Hand-Outs of Resources to Use With These Films Lynne Cherry/Ryan Vachon

11:30 – 12:30 LUNCH

PART II Part II Overcoming the Challenges of Climate Illiteracy: Programs that Work, Engage, Empower

1:00 - 1:45 Making sense of graphic data. We’ll select a few concepts that are major misconceptions and Teaching resources that address and debunk them i.e. ‘It’s snowing more so climate change isn’t happening.’ We will discuss how educators and the public may misunderstand graphic representation of data introducing basic physical principles of the earth—long term climate data graphed over time. (ice core and mud core data/ global temperature/ Keeling curve) Participants will learn to read graphic representation over time, understand models and learn how to foster students' abilities to interpret data and draw their own conclusions collectively from a body of data. Roberta Burnes

1:45 – 2:30 Exploring content - What’s Already Out There/ Introduce CLEANET.ORG Directory CLEAN Project leaders will introduce some of the most compelling and engaging climate literacy resource collection created by members of the Climate Literacy Network (CLN, <http://cleanet.org/cln>). We will also demonstrate how to find relevant reviewed climate and energy literacy educational resources from the Climate Literacy and Energy Awareness Network (CLEAN) Pathway collection (<http://cleanet.org>). Roberta will show off some CLN - Climate Literacy Network teaching resources necessary to develop important skills. Karen Hollweg

2:30 – 3:00 Climate Change Solutions and Civic Engagement. The Will Steger Foundation’s Citizen Climate curriculum focuses on climate change solutions and civic engagement. Activities represent materials that are relevant and effective at teaching multiple skills across multiple learning styles. Kristen Poppleton

3:00- 4:00

III. Hands-on Activities SHARE-A-THON/ Inspiring Projects that Work (Tables all around the Room so Educators can graze)

- Museums, websites, games, competition, hands-on projects
- NOAA/NASA Computer Terminals
- Carbon cycle materials and a neat little activity called "How Science Works".
- How to engage community through goal-driven projects
- Creating leaders through speakers bureaus
- The power of rewarding and competing
- Build a solar car
- Hands-on workshop in clean tech solutions
- Projects that offers solutions:
 - Build a little straw bale house
 - See how pv panels teach physics and chemistry
 - Make race cars with PV and aluminum cans (NEED kits)
 - Use ice cubes and thermometers to test insulation
 - Using a density tube to learn about ocean currents
 - Making anemometers & thermometers – lessons from the Weather Rats
 - Modeling long-term trends—graphing climate trends and learning the difference between weather and climate
- How to find, work with, make films about local climate scientists:
 - How to make short films in class
 - Film making on iphones
 - Books that teach Climate Science
 - ANDRILL activities—drill model, etc.

How well does this presentation proposal deliver positive/solution-oriented outcomes supported by research and/or program evaluation?

The resources and activities introduced in this workshop have been reviewed for scientific accuracy, pedagogical effectiveness, and technical quality by some of the most eminent scientists and science educators from NOAA, NASA, TERC and many other eminent institutions. The resources and are aligned with the *Climate Literacy Essential Principles for Climate Science*, science standards, and the *NAAEE Guidelines for Excellence in Environmental Education*.

This workshop addresses the following NAAEE Guidelines for Excellence for K-12 Learners:

- A) Questioning: Learners are able to develop, modify, clarify, and explain questions that guide environmental investigations of various types. They understand factors that influence the questions they pose.
- B) Collecting Information: Learners are able to locate and collect reliable information for environmental investigations of many types. They know how to use sophisticated technology to collect information, including computer programs that access, gather, store, and display data.

Science H.3 Through researching and creating films, learners document scientist's investigations of the natural world by a systematic process that includes proposing a testable question or hypothesis and developing procedures for questioning, collecting, analyzing, and interpreting multiple forms of accurate and relevant data to produce justifiable evidence-based explanations and new explorations.

- C) H.3S.3 Analyze data and identify uncertainties. Draw a valid conclusion, explain how it is supported by the evidence, and communicate the findings of a scientific investigation. Social Sciences Acquire and organize materials from primary and secondary sources.
- D) SS.05.SA.02 Gather, use, and document information from multiple sources (e.g. print, electronic, human, primary, secondary)
- E) D) Evaluating accuracy and reliability_ Learners can apply basic logic and reasoning skills to evaluate completeness and reliability in a variety of information sources.
- F) H.3S.3 Analyze data and identify uncertainties. Draw a valid conclusion, explain how it is supported by the evidence, and communicate the findings of a scientific investigation. E) Organizing Information: Learners are able to organize and display information in ways appropriate to different types of environmental investigations and purposes.
- G) Math H.1S Analysis: Analyze and interpret empirical data.
- H) H.1S.5 Construct, analyze, and interpret tables, scatter plots, frequency distributions, and histograms of data sets. And describe this to their peers through film
- I) Working with models and simulations. Learners are able to create, use, and evaluate models to understand environmental phenomena. **Social Sciences** Use maps and other geographic tools and technologies to acquire, process, and report information from a spatial perspective. SS.HS.GE.02 Interpret and evaluate information using complex geographic representations. **Educational Technology** 1 Creativity and Innovation: Students demonstrate creative thinking and problem solving skills to develop innovative products and processes using (digital) technology. ET.1.A Apply existing knowledge to forecast possibilities and generate new ideas, products or processes. ET.1.B Create original works as a means of personal or group expression.
Processes that shape the Earth_ Learners understand the major physical processes that shape the Earth. They can relate these processes, especially those that are
- Science** 6.1 Structure and Function: Living and non-living systems are organized groups of related parts that function together and have characteristics and properties.
- J) **Science** 8.2 Interaction and Change: Systems interact with other systems.
- K) **Science** H.2 Interaction and Change: The components in a system can interact in dynamic ways that may result in change. In systems, changes occur with a flow of energy and/or transfer of matter.
- L) **Science** 6.1 Structure and Function: Living and non-living systems are organized groups of related parts that function together and have characteristics and properties.
- M) Global connections_ Learners are able to analyze global, social, cultural, political, economic, and environmental linkages.
- N) Human/environment interactions. Learners understand that humans are able to alter the physical environment to meet their needs and that there are limits to the ability of the environment to absorb impacts or meet human needs.
- O) **Social Sciences** Understand how people and the environment are interrelated. Environmental issues. Learners are familiar with a range of environmental issues at scales that range from local to national to global. They understand that these scales and issues are often linked.
- P) Identifying and investigating issues. Learners apply their research and analytical skills to investigate environmental issues ranging from local issues to those that are regional or global in scope.
Sorting out the consequences of issues_ Learners are able to evaluate the consequences of

- specific environmental changes, conditions, and issues for human and
- Science 8.4 Engineering Design:** Engineering design is a process of identifying needs, defining problems, identifying design criteria and constraints, developing solutions, and evaluating proposed solutions.
- Social Sciences** Identify and analyze an issue. SS.HS.SA.05 Analyze an event, issue, problem, or phenomenon, identifying characteristics, influences, causes, and both short- and long-term effects on ecological systems.
- Q) **Art** Express ideas, moods and feelings through the arts and evaluate how well a work of art expresses
AR.HS.CP.03 Create, present and/or perform a work of art by controlling essential elements and organizational principles and describe how well the work expresses an intended idea, mood or feeling.
- R) **Educational Technology .2 Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, across the global community, to support individual learning and contribute to the learning of others.
- S) **3.2: Decision-making and Citizenship Skills**
- T) Forming and evaluating personal views. Students are able to communicate, evaluate, and justify their own views on environmental issues and alternative ways to address them.
- U) Planning and taking action_ Learners know how to plan for action based on their research and analysis of an environmental issue. If appropriate, they take actions that are within the scope of their rights and consistent with their abilities and responsibilities as citizens.
- V) **Strand 4: Personal and Civic Responsibility Rights and responsibilities. Learners understand the importance of exercising the rights and responsibilities of citizenship.**
- W) Recognizing efficacy. Learners possess a realistic self-confidence in their effectiveness as citizens.
- X) Accepting personal responsibility. Learners understand that their actions can have broad consequences and accept responsibility for recognizing those effects and changing their actions when necessary.
- Y) ET.5.C Demonstrate personal responsibility for lifelong learning.

PARTICIPANTS

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Roberta M. Burnes

Lynne Cherry is the author and illustrator of over thirty award-winning books for children including *The Great Kapok Tree* and *A River Ran Wild*. She is the producer of the **Young Voices on Climate Change** project and film series that feature youth who have reduced the carbon footprint of their homes, schools, and communities. The films have been screened at museums and conferences including the American Museum of Natural History, the UN, the COP Climate Talks and such annual conferences as ASTC, NSTA, and ABA.

Jenn Paul Glaser is the creator and program director for the Trail Ridge MESA/Earth Explorers project in which 52 middle school students created 12 films about NOAA, NCAR

and NEON earth and atmospheric scientists in Boulder, Colorado. She works for the Centro Latinoamericano para Las Artes, Ciencia y Educación (CLACE), 4850 Arapahoe Ave., Boulder, Co. 80303. Office: 303-499-5881; Direct: 303-332-6974; Email: jglaser@clace.us

Karen S. Hollweg is a consultant to several national science and environmental education projects and 2008-2009 President of the North American Association for Environmental Education. Much of her 40-year career, which began as a classroom teacher in public middle schools and senior high schools, has been dedicated to bringing together the resources and expertise of schools, community-based organizations, scientists and higher education institutions to support teachers, students, and citizens of all ages in pursuing inquiry-based learning and addressing real-world issues. khollweg@stanfordalumni.org"

Louise Huffman is ANDRILL's Coordinator of Education and Public Outreach <http://www.andrill.org>. ANDRILL is a multinational collaboration comprised of more than 200 scientists, students, and educators from four nations (Germany, Italy, New Zealand, and the United States) to recover stratigraphic records from the Antarctic margin using drilling technology. The chief objective is to drill back in time to recover a history of paleoenvironmental changes that will guide our understanding of how fast, how large, and how frequent were glacial and interglacial changes in the Antarctica region. Future scenarios of global warming require knowledge of past history. lhuffman@andrill.org

Margaret Mooney is an outreach specialist with the Cooperative Institute for Meteorological Satellite Studies (CIMSS) at the UW-Madison, a former National Weather Service meteorologist, certified GLOBE trainer and currently serving as education vice-chair for the Federation of Earth Science Information Partners (ESIP). margaret.mooney@ssec.wisc.edu

Kristen Poppleton is the Education Program Manager at the Will Steger Foundation, an environmental non-profit established by Polar explorer Will Steger and focused on climate change education, policy and outreach. Kristen's past work experience includes teaching Pre-K through graduate students and training formal and informal educators in environmental education and STEM; grant writing; youth development; and curriculum development. kristen@willstegerfoundation.org

Elizabeth Sims, 8th grade science teacher and MESA advisor, helped to develop the Trail Ridge MESA/Earth Explorers project in which 52 middle school students created 52 middle school students created 12 films about NOAA, NCAR and NEON earth and atmospheric scientists in Boulder, Colorado. She works for Trail Ridge Middle School, 1000 Button Rock Dr., Longmont, Colorado 80504 Office: 720-494-3820 sims_Elizabeth@stvrain.k12.co.us

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Ryan Vachon is a professor at University of Colorado who has traveled worldwide to produce a series of educational adventure science videos documenting climate scientists. His film Drilling, featuring venturing an Andean ice core drilling expedition, has been shown on

60 Minutes, the Discovery Channel, the History Channel, National Geographic Channel and the Learning. His virtual field trips” series hae reached thousands of students augmented by a Jon Wiley and Sons Publication. Ryan’s adventure-science webisodes, bolster standards-based classroom curriculum. ryan.vachon@colorado.edu