MADE CLEAR—Maryland and Delaware Climate Change Education, Assessment and Research

Maryland Coastal Bays Program
STAC meeting
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Regional collaborative partnership seeking to build sustainable capacity for effective and relevant education across multiple aspects of climate change science within Maryland and Delaware.
Maryland and Delaware Climate Education Assessment and Research

- Comprehensive and Integrated in Scope Encompassing
  - Communities
    - Climate Scientists
    - Learning Scientists
    - Education Practitioners
  - Educational Delivery Mechanisms
    - Formal
    - Informal
  - Region that is a Microcosm for US
    - Socioeconomic Diversity
    - Urban to Rural Demographic
    - Conservative to Progressive Cultures
    - States with Different—but Supportive—Policies and Procedures
Our Partners

• **Alliances with State Educational Agencies**
  – Delaware Department of Education (DDE)
  – Delaware Science Coalition (DSC)
  – Maryland State Department of Education (MSDE)

• **Alliances with State/Federal Environmental Agencies**
  – Delaware Department of Natural Resources and Environmental Control (DNREC, especially the Division of Energy and Climate)
  – Maryland Department of the Environment (MDE)
  – Maryland Department of Natural Resources (MDNR)
  – Maryland Energy Administration (MEA)
  – NOAA Climate Program Office

• **Alliances with Climate Scientists**
  – University-based
  – Government-based (Federal and State)
  – NGO-based
GOAL 1: Embed climate change science into formal and informal education in the region.

GOAL 2: Build and sustain the capacity of educators to deepen student understanding of climate change.

GOAL 3: Utilize learning principles and the sociocultural diversity of the region to develop effective, scalable and transferable modes of climate change education.

GOAL 4: Advance policies and practices for climate change education in the region and beyond.

- Formative and Summative Assessment Process Aimed at Tracking Outcomes, Improving Effectiveness
Science Education

• Next Generation Science Standards have been finalized, and adopted by 7 states, including MD and DE

• What’s new for science education?
  – Inclusion of engineering
  – Practices...both science & engineering
  – Foundation built on learning progressions
Learning Progression

More sophisticated understanding over time.
Delaware Science Coalition provides a mechanism for state-wide adoption of approved curriculum.

- Advises the Delaware Department of Education on science curriculum state-wide.
- Provides process of science curriculum vetting, piloting, and classroom-data-based revision.
- Demonstrates the effectiveness of state-school district partnering and data-based deployment of new science curriculum.
- Delaware Department of Education provides training (PD) for science curricular materials.

Through DSC we:

- Have access to local classroom expertise and receive guidance on curriculum needs
- Maintain communication with both Dept. of Education and district curriculum directors
- Work to ensure MADE CLEAR can provide a relevant, sustainable, climate change curriculum for adoption by DSC that is NGSS-based.
Maryland Model for K-12 Science Education

• De-centralized, with district control of curriculum
• District science supervisors critical to curriculum testing and deployment to meet state-set standards
• Professional development handled at the district level
Build and sustain the capacity of educators to deepen student understanding of climate change

- How do goals and objectives of the NGSS inform pedagogy.
- Learning Progressions: Sea-Level Rise and Carbon TIME.
- Technology tools (i.e., computer modeling, authentic data, mobile devices) to visualize and to understand climate change.
- Local and global climate connections within learning activities.
- Teachers, researchers and scientists (Climate Science Advisors) develop classroom resources and form a Community of Practice.
- Implementation plans to field test classroom resources during the school year.
Figure 3. Example of student drawings representing the greenhouse effect as a “greenhouse”.

Make your drawing here:

Figure 2. Example of student drawings representing radiative forcing as “sun rays”.

Make your drawing here:

Extracted from Shepardson, Niyogi, Choi, Charusombat at Purdue University
2014 Climate Academies

Lewes, DE July 14-17
Focus on 8th Grade teachers
North Bay, Maryland July 28-31
Focus on Science Supervisors
Ongoing Activities

- MADE CLEAR Standing Committees
  - K-12 Education
  - Informal Education
  - Higher Education
  - Education Policy
- Development of Learning Progressions
- Professional Development—The Climate Academies
- Develop of Communities of Practice
- Engage Climate Scientists
- Meet with External and Internal Advisory Boards
- Develop Integrated Networks
- Ongoing Project Assessment and Evaluation
- Others?
Questions? Get Involved?

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Take Away

USM, UMCES, UD, Towson U., and DSU are engaged in a large interdisciplinary climate change education NSF research project that integrates learning science researchers, K-12 and informal educators, faculty, policy leaders, Departments of Education, and climate scientists to ensure climate change science education is effective, and teachers are supported, in MD and DE schools as NGSS implemented.

----MADE CLEAR
Goal 3

• Like Maryland, Delaware not only has a racially diverse population, but the rural counties, together with the urban centers, offer a microcosm that reflects the cultural diversity of the nation. *We consider this an important distinguishing feature of the MADE-CLEAR research approach.*

• Our team is collaborating with teachers and state departments of education to conduct teaching experiments in schools and communities that may share a state address, but very little beyond that.