Place, community, and biosphere: An overview of the TERC Life Science Initiative's climate education work

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Introduction

• Practicing scientists in Ecology
• Ecological perspective
• Training and assumptions about ecosystems, systems thinking, complexity, etc.
Early work 1

• The Global Lab
  - The first network of schools using “telecommunication”
  - Making and sharing environmental measurements
  - Included a unit on measurements related to climate change
Early work 2

- Ecology: A systems approach
  - Adopted a systems approach to studying ecosystems
  - Placed issue of carbon cycling and climate change in the broad context of ecology and evolution
Biocomplexity and the habitable planet

- Year long capstone high school course
- Built around cases local-to-global, focused on land use, resource use and conservation
- Introduces new science
Biocomplexity

NATURAL SYSTEMS

SOCIAL CONTEXT

Ecosystem Services
- Ecosystem processes on which humans depend

Landscapes
- Spatial context and its structure and patterns

Coupled natural & human (CNH) systems
- Considering humans, their social institutions and behaviors as part of all ecosystems
Experiencing research first hand...
Use Real Data as Evidence

Existing Site vs. the 3 Scenarios
Arctic Global Unit

GIS Analysis of Arctic Sea Ice Extent over Time
New approaches? The problem

- Science of climate change is complex
- Learning about it is difficult
  - Results from Yale study group
  - Research findings from the classroom
  - Public discourse about climate change
New approach? A conjecture

- Learning about climate change is difficult because:
  - Science is abstract
  - Complex, diffuse and probabilistic causality (Grotzer)
  - Effects seem distant in space and time (Leiserowitz)
  - Science practices are unfamiliar (Osborne, Krajcik)
  - Learning is also influenced by emotional dimension (Saunders, Moser)

- Therefore, we conjecture that a place-based approach can counter these difficulties
New approaches?

• Stories

• Local (New England) examples

• The importance of Place
Collaborating to Teach the Ecology of Climate Change in New England

Mammalian responses to climate change

Abe Drayton posted on Jul 08, 2014

In our last post, we reported on a study of how lungless salamanders are responding to climate change. This week, we’re reading a literature review of mammal studies in North America.

Christy McCain and Sarah King examined 1050 papers that took a look at the ways in which human-caused climate change is affecting mammals in North America. They took pains to include only works that could exclude other factors that might be causing changes, such as habitat destruction.

The first thing to note about this study is that the authors sought, and found no publication bias. Science deniers often claim that there is a bias toward “popular” results, that is, studies that seem tilted to support mainstream opinion... McCain
GECCo
Girls
• Learn about energy conservation
• Learn about climate change and their own connection to it
• Take action by saving energy
• “Tell the world” about why conservation is important
Theoretical framework:

- Social norms
- Conservation psychology
- Theories of behavior change
Current projects

• **Place identity** – A component of personal identity, a process by which, through interaction with places, people describe themselves in terms of belonging to a specific place.

• **Environmental identity** – A sense of identity that transcends the individual and encompasses one’s place in an ecosystem
Climate Conversations

• Communities as the agents of climate change education

• Coordinated vision of climate change
• Skills and insights of each sector
Climate Conversations

- Cross-sector Climate Conversations
- Work with communities with nature centers as “anchors” or “trusted messengers”
  - Build knowledge of climate change
  - Build educational capacity
  - Build social capital for community action
- Conduct research on mechanisms and effectiveness via a focus on the microgenesis of ideas
The Climate Lab
https://www.manomet.org/climatelab

The impacts of climate change are already becoming apparent, and part of our response must be to prepare our children—the next generation of decision makers—to understand and deal with this altered landscape. Manomet Center for Conservation Sciences has partnered with curriculum experts at TERC to address this need through Climate Lab, a program through which students collect data on biological indicators of climate change.
Innovate to Mitigate
http://innovatetomitigate.org

Climate Change Challenge
Innovate to Mitigate invites students to come up with ideas to reduce greenhouse gases.

In this competition, students send in a brief statement describing one or more ideas (up to 250 words for each idea) for mitigating climate change. The deadline for the first round is MONDAY MARCH 9.

The most promising ideas qualify for a second round. Round 2 participants expand on how and why their idea(s) will work in a 2-minute video and a paper (max 1200 words). Prizes for Round 2 finalists: 1st prize $4,000. 2nd prize $2,500. Public choice award $500.

Check it out at http://innovatetomitigate.org

Please forward this to anyone you know who might be interested, like us on Facebook and follow us on Twitter. (If you click on the social media toolbox link on the website, you'll find samples to post on Twitter or your own Facebook page.)

What's Your Idea?

Energy Generated By TIDES
WIND For Cooking & Lighting
Food Made From CRICKETS
Innovate to Mitigate

FILTER:

BY KEYWORD
- biofuel
- phytoplankton
- green roof
- carbon sink
- sequestration
- soil enrichment
- cell phone charger
- crank generator

BY INSTITUTION

NAME/TEXT SEARCH

SHOWING ALL 5 PRESENTATIONS

- Colored Lights and Algae to Generate Biofuels
  The Dry Ice Cubes

- Renewable Energy Using Crank Generators
  F=I^2

- Phytoplankton Behavior Through The Meticulous Introduction of Intelligent Life Forms

- Biochar For Soil Enrichment and Carbon Sequestration
  FOCIS

- Carbon Sequestration Using the Green Roof
  The Carboneers
Building systems from Scratch

- Affordances of student game design to learn about climate change
- Early evidence: Students are
  - Motivated
  - Persistent
  - Learn about aspects of climate change
Building systems from Scratch

- Making games
- Systems thinking
- Climate change
Results:

– Young people (YP) pick up programming quickly
– YP focus on subsystems in their game designs
– YP articulate tacit knowledge about larger Earth systems when asked
## Conclusion

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