Dawn Lemke
Alabama A&M University
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Highly developed, implemented multiple times in a classroom, lecture or laboratory
Title: Integration of real world environmental data in computer skill courses
General education programs often do not integrate environmental and ecological concepts and also ignore the roll large data now plays in many disciplines. By integrating large environmental data into general education computer courses students not only gain the require computer skills but are exposed to understanding of the relevance of data and environmental science. A general skill freshman computer course (word, excel, powerpoint) was redeveloped with activities based on climate and climate change data. Assignments not only build upon each other in technical skill but also environmental knowledge, culminating presentation of knowledge. The course will be first taught in Fall 2016. Grade assessment will be focused on technical skills however the course goal are much boarder and will be assessed through non grade based matrix. This will allow the continued development of the course.

David Grisé
Del Mar College
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Highly developed, implemented multiple times in a classroom, lecture or laboratory
Title: TIEEing together past and future climate change
We taught the TIEE phenology module (by Calinger) with the TIEE global temperature change (by Taub and Graham) to help introductory biology students better understand the impact of global climate change on earth's biota. We implemented a slightly modified, but full, version of phenology module followed by a somewhat scaled down version of the global change module. Students worked in groups at computers in the lab for both modules. Our implementation of the latter module included only latitudes 63 N, 40N, and 27 N representing Fairbanks, New York/Chicago, and our locale, Corpus Christi, TX. We also discussed model predictions in light of what was learned in the phenology module by adding a few additional questions for group and class discussion. This pair of modules was implemented in both a long and a summer session semester in an introductory biology course intended for majors but open to non-majors.

Concepción Rodríguez Fourquet
University of Puerto Rico Bayamon
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Highly developed, implemented multiple times in a classroom, lecture or laboratory
Title: How the BioBlitz boost the Zoology course.
The BioBlitz provides a hands-on opportunity, for the Zoology students, to learn more about insects. I use the BioBlitz to teach insect taxonomy, collection and mounting. Group of students prepare a collection of insects from campus. The insects are mounted and identified during the BioBlitz. Students get experience in taxonomy and mounting techniques and the identified insects become part of the organisms counts for the BioBlitz. I provide instructions on insect collection and a short workshop on collection and mounting techniques. So far, all collections have been over average and students enjoy the experience.

Catherine Hulshof De La Peña
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Highly developed, implemented multiple times in a classroom, lecture or laboratory
Title: Spatio-temporal climate change in Puerto Rico using NOAA climate data
The main objectives of this exercise are to: access publicly available climate data using online tools, analyze annual and monthly climatic trends, and distinguish patterns of climate change over space and time. The pre-exercise includes a discussion of global climate, climate warming heterogeneity (spatio-temporal), and phenomena that influence climate in Puerto Rico. Students developed hypotheses relating climate trends in Puerto Rico and how these may or may not compare to global trends. Each student was assigned a climate station (either coastal or montane) and were required to download climate data from the NOAA website. Classroom discussion emphasized R code to analyze climatic trends across time and to produce graphical outputs. Students shared results and summarized trends for all stations across the island. Feedback is sought for how to extend local trends to those seen globally in a more quantitative manner and how to incorporate robust statistical analyses into the exercise.

Rachel Collins
Roanoke College
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Newly developed, implemented once or twice in a classroom, lecture or laboratory
Title: Using multi-site, student-collected data to explore forest species composition and dynamics: a computer lab exercise.
Researchers at several PUIs across the USA have been collecting forest plot data using the same protocols since 2010 as participants of the Permanent Forest Plot Project [PFPP] of the Ecology Research as Education Network (EREN). This computer lab exercise has students explore tree species composition and forest dynamics at three sites (Roanoke College, Virginia; Macalester College, Minnesota; and Colby College, Maine). Instructors can choose from three different theoretical frameworks from which students generate research questions or hypotheses. Students then analyze the data using either BioRadiant via QUBES (www.qubeshub.org) or EXCEL. Students will generate species composition figures for three size classes of trees at each site. Using these figures students will be able to evaluate the similarities and differences among species composition across sites and extrapolate as to possible future tree species compositions at these sites.

David Grise
Del Mar College
dgrise@delmar.edu
Newly developed, implemented once or twice in a classroom, lecture or laboratory
Title: TIEEing together past and future climate change
We taught the TIEE phenology module (by Calinger) with the TIEE global temperature change (by Taub and Graham) to help introductory biology students better understand the impact of global climate change on earth's biota. We implemented a slightly modified, but full, version of phenology module followed by a somewhat scaled down version of the global change module. Students worked in groups

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Anna Monfils
Central Michigan University
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In development, has not been implemented in a classroom, lecture or laboratory
Title: Plant Pollinator Co-Evolution: Using Digitized Collections Data in the Classroom
In this educational module students will use digitized publicly available data from natural history collections to analyze spatial co-occurrence data for pollinators and the plants they pollinate. In the module, students are asked to use specimen based data from the iDigBio portal (iDigBio.org) to map the distribution of agave, long nosed bats and vampire bats. Using various data layers and digital resources, students explore the global patterns of species occurrence in a geographic context and form hypotheses related to the interdependence of bats and agaves. Specific questions are asked regarding the ecology, distribution and conservation of both the plant and animal species. Students are asked to work in groups to build Story Maps (https://storymaps.arcgis.com/en/) that use geography to illustrate bat and agave co-evolution, outline growing conservation concerns, and propose research questions in a geographic context.

Carolyn L. Thomas and Bob R. Pohlad
Ferrum College
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Highly developed, implemented multiple times in a classroom, lecture or laboratory
Title: Teaching an Ecology/Environmental Science Study Abroad Travel Course.
Each summer in Ferrum College's Experiential Term (e-term in May) we teach an environmental sciences course overseas and out of country. In even years we teach a course titled "The Natural and Cultural History of Ireland" and in odd years we teach a course titled "Tropical Marine Biology and Ecology in the US Virgin Islands". We will discuss how we have found the resources, both people and information, to enable our participating science and non-science majors to learn about the ecology and environmental characteristics of these diverse habitats. We will share our assignments and student management lessons and techniques we have learned after may years of teaching these travel abroad classes. We will describe how we combine of both natural history and cultural history in these two countries/territories.

Megan Stine
HHMI BioInteractive
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Highly developed, implemented multiple times in a classroom, lecture or laboratory

Title: WildCam Lab
The WildCam Lab is a part of WildCam Gorongosa, an online citizen science platform where users identify animals in trail camera photos from Gorongosa National Park, Mozambique. Using the WildCam Lab, students can investigate ecological questions by exploring trail camera data using an interactive map. They can filter and download data to perform analyses and test hypotheses. As an educator, you can set up private classrooms and invite your students to join. Curate data sets or let your students explore on their own. Guided activities and supporting educational resources are available on the "resources" tab of the WildCam Lab.

Sara Schaffer
USA-NPN
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Highly developed, implemented multiple times in a classroom, lecture or laboratory
Title: Nature's Notebook in the Classroom- https://www.usanpn.org/2016_ESA_EcoEd
https://www.usanpn.org/2016_ESA_EcoEd

Kim Bjorgo-Thorne
West Virginia Wesleyan College
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Highly developed, implemented multiple times in a classroom, lecture or laboratory
Title: Painting a picture of a watershed- students and citizen scientists provide valuable data
Undergraduate students and high school students can collaborate with local watershed groups to collect data useful for determining watershed health. This tip describes an easily adaptable technique involving sampling basic water quality parameters on campus. Undergraduate students work to set up the experiment, high school students collect water samples from near their homes, and together they analyze the samples. The undergraduate students work with the professor to create maps and graphs to report back to the high school students. This successful and popular project has occurred during most spring semesters since 2009.

Cailin Huyck Orr
Science Education Resource Center at Carleton College
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Highly developed, implemented multiple times in a classroom, lecture or laboratory
Title: Sustainability and Societal Issues from the InTeGrate STEP Center
The NSF STEM Talent Expansion Program (STEP) Center 'InTeGrate' has 20+ 2-week teaching modules that bring together topics of sustainability and learning about the Earth in the context of compelling societal issues. They are built to encourage active learning classroom techniques and are all free and openly available to anyone. Each module was built by a team of 3-4 faculty members at different institutions, tested in their classrooms, and then revised to improve student learning outcomes. As these modules are being implemented at additional institutions, adaptions to new settings are being documented on the InTeGrate website. http://serc.carleton.edu/integrate/index.html. I will be running a workshop on Sunday at ESA on finding and using the InTeGrate modules.