Outcomes of AGU Workshop - December 12, 2013

Preparing for Global Change: Education, Collaboration and Community Engagement to Enable a Science Savvy Society Workshop

Group 1: Collective Impact on the Local to Global Challenges Presented by Climate and Global Change Education, Literacy, Preparedness, Adaptation, and Mitigation

Facilitated by Tamara Ledley

The notes at the link below represent a synthesis of the conversation in this breakout group at the AGU Workshop. It is supplemented by conversations at the following two meetings

* Climate & Energy Literacy Summit hosted by the National Center for Science Education in December 2012 and summarized in a white paper titled “Toward a Climate and Energy Literate Society”

* Tri-Agency Climate Change Education PI meeting session “Creating a Climate Change 'Collaboratory’” in October 2013.

Synthesis of Collective Impact Breakout Discussion supplemented with outcomes of other meetings or go to this link http://tinyurl.com/mzy8v4w

Note: that this document will evolve with further discussions and broader input through CLEAN Network teleconferences and future face-to-face meetings. The next face-to-face discussion is scheduled for the National Council for Science and the Environment’s Building Climate Solutions meeting in Washington DC Jan 28-30, 2013.

Group 2: Education, Communication and Outreach and how to better integrate them

Facilitated by Mark McCaffrey

Started with idea of storytelling. Create (positive) emotional connection to the content.

Telling the story of a place. Landscapes have a story. Use local to tell the global story. (No landscape is untouched by humans.) What that implies about what it might look like in the future. Virtual field experiences to reveal the story of different places.

Continuum about ECO. Outreach is the hook…short and snappy (a tweet perhaps); draws them into a dialogue that may (or may not) lead to longer term education.
Marsha Tate’s advice (from Gail): Storytelling increases myelin sheath on an axon, the thicker the myelin sheath the more retention of memories. So we’re wired for storytelling. Also engages person through multiple senses. It also doesn’t matter what the story is about…just telling the anecdote gets the neurons firing.

**Important to have the story told from various perspectives and faces.** People more likely to listen if identify themselves with person telling the story. And keep it short.

Seattle times Sea Change site – multi-media article. Scott L uses it with his undergrads. Excellent example of a multi-media online site.

**Recognize that younger generation is used to receiving information in sound bites, using pinterest and Instagram.** So have to structure the way you teach/tell to engage in smaller chunks of time.

Map application service – ArcGIS online – Rusty used this tool to share her story of the CO floods with her students so they understood why she was cut off for 5 days. Can also do this in Google Earth.

Tweeting can be time-consuming. Easy way to do it is to share what is sent to you…Perhaps forward your nuggets of good information to people who regularly tweet to their followers.

_Place Intelligence_ book by Joseph Romm (Don D-H recommended it).

Tools for managing twitter feed so it doesn’t take up all your time: Buffer; Hoot suite.

Tweets as hook sends the learner to something more in depth. You follow organizations with constituencies you want to reach and then re-tweet their info and then they can recognize you.

Outreach is for building advocacy of your mission; Goal of tweeting is not education it’s outreach.

**Challenges and Solutions:**

Challenge – what motivates people to want to learn enough so that they can make an informed decisions; recognizing that emotion is informing those decisions as much as facts? There’s a hopelessness of being able to make changes adequate enough to address the magnitude of the problem.

One way to approach this issue – improve understanding of how science works so there is **trust in the scientific process.**

Focus on key influentials in your community – policy changes are needed. Don’t try to educate and inform everyone. Have to be able to show the connections between tiny changes and ultimate effects.
Change is more likely to come at the municipal and state governmental level (e.g., mayors for

**Use other issues to connect to key influentials** – public health, e.g.

Use Norway’s example: Each family household sent information kits, 12-month media blitz – resulted in passing their carbon tax.

ECO system – we don’t all have to do all these different activities (not all of us are born communicators, want to use twitter, etc. but you can feed useful information to those who are).

Advocacy – Federal agencies can advocate for positions supported by the Administration and can advocate for their mission. Some agencies have stewardship as a component of their mission which allows them to support behavior change, but not advocate which behavior changes are needed. That is left up to the grant recipients to figure out and promote.

Climate Literacy framework – guidance for informed decisions

**Key point:** start from another avenue than climate change to reach people about the impact of climate change.

Look at the results from University of San Diego’s CCEP project – targeting climate change message under “retaining their quality of life for themselves and future generations”. Having success with this. Everything has to be related to their community – can’t be abstract. Certain words are deeply affecting – coastal flooding instead of sea level rise. Re-framing the conversation is critical.

Changing lightbulbs and recycling are not enough… good place to start but needs to go beyond that.

Telecommuting policies, facilitating use of bicycling with public transportation, use of natural gas (in lieu of coal/oil)… this is a stopgap while we figure out other renewable energy.

Youth as advocates for changes … inform them of the options and pros and cons.

Ecosystem of Climate Change Education – who is doing what? Who is able to take on which pieces? This is (hopefully) what Tamara’s group on collective impact tackled.

Other books to inspire: *Eco Barons* by Edward Humes

**Group 3: How can the Next Generation Science Standards be leveraged for greater climate literacy?**
Facilitated by Minda Berbeco

Group Members: Bonnie Murray (NICE project), Scott Carley (College of Exploration), Nick Haddad (Project director for EarthLabs), Art Sussman (West-Ed), Lisa White (UC Berkeley), Jeff
Lockwood (TERC), Heather Miller (teach pre-service teachers in Michigan), Alan Gould (Lawrence Hall of Science), Juliette Rooney-Varga (UMass), Cherilynn Morrow (Aspen Global Change Institute), Kristen Poppleton (Will Steger Foundation)

The Next Generation Science Standards are both an opportunity and challenge for educating about climate change. With the inclusion of climate change specifically in the earth sciences (and implicitly under “human impacts” in the life sciences), there are many opportunities for educators to start to teach climate change throughout their curriculum. Many educators though do not have the significant background necessary to understand climate change: what we know, how we know it and what the different engineering and policy options are. Moreover, through the implementation of argumentation in the science classroom, educators may accidentally confuse students as to the science of climate change by attempting to bring argumentation into the classroom in the form of “debate”. In our breakout group we addressed many of these issues and came up with four concrete steps forward to further climate literacy in the K-16 curriculum. Ideally with a strong push forward from the climate education community, we can prepare both educators and students with the scientific understanding to be informed citizens in a drastically changed future.

In our discussions on climate literacy and the Next Generation Science Standards, four common ideas arose: (1) Retrofitting established projects and filling the gaps (2) Making NGSS more accessible to educators (3) Helping all educators (from science to art) see their work through the lens of climate change (4) Focusing on high impact groups to leverage climate literacy.

(1) Retrofitting established projects and filling the gaps.
There are many projects that have already been developed and should not be lost with the new NGSS standards, however integrating them into the NGSS may require more than just aligning them with the standards. Many of the curricular materials and lesson plans will need to be updated, particularly to include ideas of both engineering and the nature of science.

Before the materials are rewritten completely though, developers should consider looking at the teacher instructions and guidelines to see if the presentation of the materials to the educators and how the ideas are framed can be updated to better fit NGSS. This would require preparing the teachers to ask the right questions and what to look for in their students’ understanding, as well as adding more comprehensive teacher guides for the more in depth knowledge of climate change.

We will also need to address the gaps in the lesson plans on climate in general and climate change in particular. One area that is currently lacking is in elementary education. It would be useful to provide both materials and professional development to those educators, as they are natural integrators of science with other subjects, such as art, music and literature. With this strong foundation in climate at an early stage, teaching about climate change in the latter years will become easier.
(2) Making NGSS more accessible to educators

Professional development can provide pre- and post-service educators with the support they need to feel comfortable teaching about climate change. One way to do this is to make the connections to NGSS for everything we do as clear as possible. Another way is to create a clean version of NGSS for educators, as is being done by NSTA.

In addition to professional development on the NGSS and content knowledge of climate change, educators would benefit from more direct information on how to assess their students’ understanding of climate change. This could involve developing rubrics for educators to use that are more specific than the climate literacy frameworks. This would include clear examples of what a good understanding of climate change looks like and what good practices include.

(3) Helping all educators (from science to art) see their work through the lens of climate change.

Historically climate change has been sprinkled throughout the curriculum, appearing in different science courses and occasionally in the social sciences as well as a single lesson of many. As a cross-disciplinary topic though, climate change could be the groundwork from which all courses could be taught in a collaborative and thoughtful manner – from chemistry and biology to the social sciences and the arts.

As educators often naturally gravitate to their specific silos, it is up those in professional and curriculum development to encourage them to move away from business as usual. One method would be to encourage science educators to bring their colleagues from other fields to professional development workshops in an effort to create more team teaching among the subject areas. For example, a Biology teacher could bring the English teacher from their school to professional development to collaborate on scientific literacy and evidence-based argumentation. This would allow the science teacher to focus on content, while the English teacher could highlight the methods of argumentation and writing. This would also make for an easy connection to the Common Core standards (Math and English), which many states are adopting as well.

Another method is to train science teachers to integrate more topics into their science classrooms, such as emphasizing reading comprehension of scientific arguments and writing skills for scientific ideas. Many students perceive science and math outside the realm of reading and writing skills, but of course as any scientist knows, good reading and writing skills are key to communicating your scientific ideas. The sooner we can support science educators to implement these ideas, the faster they will be able to connect to the requirements of the NGSS.

(4) Focusing on high impact groups to leverage climate literacy.

There are many ways to spread climate literacy across education, however we are a small
group with limited time and funding. As a result, we must consider trying to connect with the highest impact groups that will disseminate knowledge widely to push for greater climate literacy in the educational community. This will also require us to look outside of our typical group of highly energized high school and college professors, who are already teaching climate change to their students. It requires us to look to new groups to spread the net wider.

One group that has been overlooked in the past is elementary educators, as they are natural integrators of science into other areas such as art and music. This group also often does not have the strong scientific background required to understand climate and weather, therefore would benefit greatly from additional support to lay the groundwork for climate change education in later years.

Many educators attempt to start teaching about human impacts on natural systems, including climate change in middle school. This is an ideal time to start talking about climate change as students are starting to connect their actions to the world at large. Ideally though, it would not be something that was just addressed once in 8th grade, but rather something that was built throughout middle school, starting in 6th grade, building from the ideas laid in elementary school about weather and climate, to 8th grade when human impacts can be widely addressed. A closer integration throughout the middle school will allow students to understand the connection between the ideas each year, rather than seeing them as separate issues.

Professional development for educators K-16 is key to a better understanding of climate change science, but also the pedagogical practices necessary to teach about it. Working with both pre- and post-service teachers to help them understand how to teach this complex and potentially disturbing concept will benefit both the educators and students greatly.

Assessment is a further area of leverage, as how the students will be assessed on all scientific concepts will form how educators teach the topic and how much time is devoted to it. As a community, we must ensure that climate change science is included in the assessments, and that we have a strong concept about what key ideas students should be assessed on. By having the climate literacy community track and review the assessments using common criteria, we can ensure that students will be assessed on skills that will be important to them as adults.

Last, as a community we should make sure that state science and STEM supervisors know that we are available as a resource for them. As a knowledge bank on resources and curriculum, as well as the ideas and current thinking about climate change, these supervisors should know that they can come to us for help. A quick note let them know that we are available as a resource could go a long way in ensuring that climate literacy is considered central to every student’s education in the future.