

PRCST

**Pittsburgh Regional Center
For Science Teachers**



Volume 11 Online, Issue 2, Spring 2014

LOCAL ACCESS TO SCIENCE EDUCATION RESOURCES



CELEBRATE – 30 YEARS FOR PRCST

THE REALITY, RISKS AND RESPONSE TO CLIMATE CHANGE

Report/Paper from AAAS

The overwhelming evidence of human-caused climate change documents both current impacts with significant costs and extraordinary future risks to society and natural systems. The scientific community has convened conferences, published reports, spoken out at forums and proclaimed, through statements by virtually every national scientific academy and relevant major scientific organization — including the American Association for the Advancement of Science (AAAS) — that climate change puts the well-being of people of all nations at risk.

Surveys show that many Americans think climate change is still a topic of significant scientific disagreement.^[1] Thus, it is important and increasingly urgent for the public to know there is now a high degree of agreement among climate scientists that human-caused climate change is real. Moreover, while the public is becoming aware that climate change is increasing the likelihood of certain local disasters, many people do not yet understand that there is a small, but real chance of abrupt, unpredictable and potentially irreversible changes with highly damaging impacts on people in the United States and around the world.

It is not the purpose of this paper to explain why this disconnect between scientific knowledge and public perception has occurred. Nor are we seeking to provide yet another extensive review of the scientific evidence for climate change. Instead, we present key messages for every American about climate change:

- 1. Climate scientists agree: climate change is happening here and now.**
- 2. We are at risk of pushing our climate system toward abrupt, unpredictable, and potentially irreversible changes with highly damaging impacts.**
- 3. The sooner we act, the lower the risk and cost. And there is much we can do.**

By making informed choices now, we can reduce risks for future generations and ourselves, and help communities adapt to climate change. People have responded successfully to other major environmental challenges such as acid rain and the ozone hole with benefits greater than costs, and scientists working with economists believe there are ways to manage the risks of climate change while balancing current and future economic prosperity.

As scientists, it is not our role to tell people what they should do or must believe about the rising threat of climate change. But we consider it to be our responsibility as professionals to ensure, to the best of our ability, that people understand what we know: human-caused climate change is happening, we face risks of abrupt, unpredictable and potentially irreversible changes, and responding now will lower the risk and cost of taking action.

[Download the Full Document »](#)

^[i] Leiserowitz et al. (2013). "Climate change in the American mind: Americans' global warming beliefs. Yale Project on Climate Change Communication and the George Mason University Center for Climate Change Communication. <http://environment.yale.edu/climate-communication/files/Climate-Beliefs-April-2013.pdf>

^[ii] National Research Council (2013). *Abrupt Impacts of Climate Change: Anticipating Surprises*, Washington, DC: The National Academies Press.

Volume 92 Issue 19 | p. 7 | News of The Week
Issue Date: May 12, 2014 | Web Date: May 9, 2014

America's Changed Climate

Federal Report: National Climate Assessment finds widespread drought, sea-level rise, intensifying storms

By Jeff Johnson

Department: Government & Policy

News Channels: Environmental SCENE

Climate change is expected to bring more intense rainfall because of a warming atmosphere.

Credit: Shutterstock



Measurable changes in the U.S. climate are already occurring because of anthropogenic greenhouse gas emissions, and all regions of the country are being affected, according to a report released last week by a committee of leading U.S. scientists at a White House briefing. The U.S. National Climate Assessment states that climate-related changes will accelerate through the century.

Prior editions of this assessment were published in 2000 and 2009, but the difference between those reports and the latest one is that the observed impacts are clearer and more extreme, says Jerry M. Melillo, distinguished scientist at the Marine Biological Laboratory in Woods Hole, Mass., and chair of the advisory committee that prepared the assessment.

The report increases sea rise estimates, adds Thomas R. Karl, director of the National Oceanic & Atmospheric Administration's National Climatic Data Center.

"Back in 2000, we projected a 10- to 17-inch increase in sea level by 2100; now we estimate it to be between 12 and 48 inches," Karl says. The rise is driven by some 350 billion tons of ice sheets that have melted over the past 10 years, he says.

Sea-level rise, with its impact on coastal cities such as Miami; Norfolk, Va.; and Portsmouth, N.H., is one of three areas of greatest climate concern singled out by Melillo and Karl. The other two are persistent drought in the southwestern U.S., with the increasing likelihood of prolonged fire seasons, and extreme and intense precipitation events, which show a 70% increase in recent years in the northeastern U.S.

The report's findings underscore the need to take action to cut greenhouse gas emissions and reduce the environmental threats of climate change, the two scientists stress.

Chemical & Engineering News
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DATABASE

The Sixth Extinction by Elizabeth Kolbert – review

Up to half the world's species will be gone by 2050. Prepare to be appalled

[Caspar Henderson](#)

[The Guardian](#), Friday 14 February 2014 10.30 GMT

One day around 66m years ago – it was in June or July [if the evidence from fossilised pollen traces has been interpreted correctly](#) – an asteroid somewhat larger than Manhattan ploughed into the

Earth near what is now Chicxulub in the Yucatán Peninsula, Mexico at 45,000 mph. As it hit with a force equivalent to more than 100m megatons of TNT, or about [1,500 times the total content of the world's present nuclear arsenals](#), the asteroid sent a vast cloud of scalding vapour thousands of miles in all directions, and blasted more than 50 times its own mass of pulverised rock high into the sky where, as tiny particles, it incandesced and heated the entire atmosphere to several hundred degrees centigrade, killing almost everything unprotected by soil, rock or deep water. Many scientists believe that about three-quarters of [animals](#), including the pterosaurs, the mosasaurs and, as every child now knows, the non-avian dinosaurs were wiped out as a result. It took millions of years for life to recover and surpass its previous diversity, this time with a new ensemble of species that included our distant ancestors. This event, known as the Cretaceous-Paleogene (and formerly as the Cretaceous-Tertiary) extinction, is counted as one of five mass extinctions over the last 500m years or so, where a mass extinction is defined as an event in which a significant proportion of life is eliminated in a geologically insignificant amount of time.

At first glance, the footprint of industrialised humanity on the biosphere may look small compared with that of the Chicxulub asteroid. The additional input of heat into the world's oceans resulting from greenhouse gases put there by the combustion of fossil fuels, for example, is equivalent to only about four atomic bomb detonations, or well [under a tenth of a megaton per second](#). But first glances are sometimes misleading. Humans are affecting the Earth system in many ways, and have been doing so every moment for decades and indeed centuries. It may seem like a diffuse, drawn-out affair to us as individuals but compared with many natural processes (for which animals and plants are, in Jacob Bronowski's phrase, equipped with "exact and beautiful adaptations"), it is virtually instantaneous. Perhaps the current transformation will turn out to be more like the end-Permian 252m years ago, the third of the "big five" extinctions, which is thought to have been kicked off by massive pulses of carbon dioxide to the atmosphere, each of which lasted only a few decades, but which together resulted in the death of up to 95% of all life.

Or not. A lot is uncertain. What is beyond reasonable doubt is that something big is under way. The best estimates are that the Earth is losing species at many times the background rate (the natural churn in which a few species go extinct every year while new ones evolve), [and that 30% to 50% will be functionally extinct by 2050](#).

in *The Sixth Extinction*, Elizabeth Kolbert, a staff writer for the New Yorker, offers well-composed snapshots of history, theory and observation that will fascinate, enlighten and appal many readers.

It seems that some of the most important decisions are being taken by those individuals who are spending hundreds of millions of dollars to keep people in the dark about [climate change and who are blocking moves to a green economy](#). We need to decide otherwise.

The extinction crisis is so vast and complex that it is almost repels thought. It is what the cultural critic [Timothy Morton](#) calls a hyperobject. We need a lot more imaginative thinking about the choices we can make and what comes next, whether it be the "Rambunctious Garden" of [environment writer Emma Marris](#), the feral landscape of [George Monbiot](#) or a world utterly transformed by synthetic biology as envisaged by [Craig Venter](#). We need new big stories. Is it too much to ask that we should alter Earth with compassion for the other creatures with whom we share it, and in celebration of their endless forms?

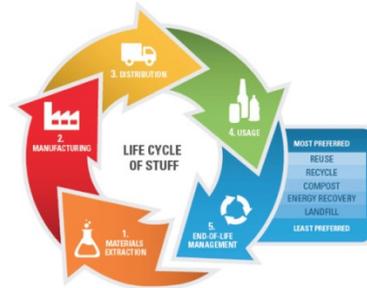
• [The Book of Barely Imagined Beings](#) by Caspar Henderson is published by Granta.

- [EPA Home](#)

Climate and life cycle of stuff

Making smart choices about what we buy, how we use it, and how we dispose of it can make a big difference in the amount of waste we produce and the greenhouse gas emissions associated with our consumption. The manufacture, distribution and use of the goods and food we rely on in our daily lives—as well as management of the resulting waste—all require energy. This energy mostly comes from fossil fuels, which are the largest global source of heat-trapping **greenhouse gas (GHG) emissions**.

In every stage of the life cycle, we can **reduce** our impact. Click on the Life Cycle of Stuff to learn about the greenhouse gas emissions that result from each step in a product's life cycle. Find out what you can do to reduce your carbon footprint.



Rethink: Think Beyond Waste doesn't just mean making good decisions about the end of a product's life cycle (recycling, composting, energy recovery, and landfilling). It refers to sustainable materials management – the use and reuse of materials in the most productive and sustainable way across their entire life cycle. Sustainable materials management conserves resources, reduces waste, and slows climate change. [Learn more.](#)

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THE TREASURE TROVE OF BRAIN TRIVIA (from Nanoscience for Kids)

- A. Otto Loewi, winner of the Nobel prize and discoverer of acetylcholine, was born on June 3, 1873.
- B. Using special hairs on its pincers, a scorpion can detect air moving at a speed of only 0.072 km/hr.
- C. The total amount of caffeine in a can or bottle of an energy drink varies from about 80 to more than 500 milligrams (mg). A 5-ounce cup of coffee has about 100 mg of caffeine and a 12-ounce cola has about 50 mg of caffeine. (Source: The DAWN Report, SAMHSA, January 10, 2013.)
- D. Wild beluga whales can hear frequencies between 4 kHz and 150 kHz (Castellote, M., et al., Baseline hearing abilities and variability in wild beluga whales (*Delphinapterus leucas*), J. Exper. Biology, 217:

1682-1691, 2014.)

E. A tonometer is an instrument used by eye care professionals to measure the intraocular pressure of the eye.

[The beautiful brain cells you don't know about](#)

06/03/2014 03:22 AM EDT

The number of nerve cells in the human brain sounds impressive: 100 billion. And it is.

But neurons may make up as little as 15 percent of cells in the brain. The other cells are called [glial cells](#), or glia.

Glia are the rising stars of the neuroscience universe. Once delegated to simply a supporting role for neurons, these ...

More at

http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=131637&WT.mc_id=USNSF_51&WT.mc_ev=click

Virtual Chicken

3-D animation produced by poultry scientists at Auburn University's Food Science Institute – traces the process of egg. www.afsi.auburn.edu/virtual-chicken

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TechXite: Discover Engineering

Bionic arms? Rainwater harvester? Solar cars? These are diverse technologies but all involve engineering. For middle level students. Instructor's guide, student handouts, video training and resources.

<http://bit.ly.1ffev8>

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Whaddya Know About H₂O?

Website for elementary and middle level students. Water pollution and conservation tips; illustrated timeline. www.drinctap.org/kids.aspx

[Spider venom may save the bees.](#) Venom from one of the world's most poisonous spiders may help save the world's honeybees, providing a biopesticide that kills pests but spares the precious pollinators, a study said Wednesday. [Agence France-Presse](#)

SCIENCE

Climate change becomes a rapid, unplanned survival experiment for animal species

Elizabeth Harball, E&E reporter

In the 1993 blockbuster movie "Jurassic Park," a sleazy scientist played by Jeff Goldblum quips that "life finds a way." For real biologists, climate change is like a massive, unplanned experiment, one that may be too fast and strange for some species to survive it.

Some animals are already in the middle of it. As Arctic ice shelves melt, polar bears are ransacking seabird nests to sustain themselves. Migrating geese are exploring valuable but previously unseen real estate, due to melting permafrost.

But whether these adaptation attempts will succeed remains a big question, researchers say. As temperatures rise, entirely new environments are forming, changing how species interact with each other and their surroundings in often unexpected ways.

"We're likely to see different habitats form than what we see now," said T. Douglas Beard Jr., who heads the U.S. Geological Survey's National Climate Change and Wildlife Science Center. "What we don't understand is how these new communities will be assembled. So if you get a whole new type of flora, a whole new type of forest that no one's ever seen before ... it's pretty unknown which species are going to be able to flourish and those that will struggle."

At best, scientists can say that the way species react to climate change will be nuanced, but learning how to manage unpredictable animal shifts in the face of climate change is a tall order. For millions of years, species have been subjected to weather extremes and shifts in climate, but the rapid onset of global warming today is a novelty -- and, likely, a huge challenge. One recent study predicted that about a third of animals could lose more than half their present range by the 2080s ([ClimateWire](#), May 13, 2013).

"There's no doubt there's going to be winners and losers," said Beard of the USGS. "Sitting here trying to divine the winners and losers."

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Synthetic biology entering consumer products

Wait till this stuff enters the groundwater and aquifers and begins contaminating irrigation water and public water supplies. I'm reflecting on the late Barry Commoner's second and third law of ecology:

2. **Everything must go somewhere.** There is no waste in nature and there is no away to which things

can be thrown.

3. **Nature knows best.** Humankind has fashioned technology to improve upon nature, but *such change in a natural system is, likely to be detrimental to that system.*

Anthony

On May 30, 2014, at 3:43 PM, michael lerner <mlerner108@gmail.com> wrote:
This is an important story. Synthetic biology entering consumer products and being described as "natural" and "sustainable." George Orwell would be proud.

Michael

On Fri, May 30, 2014 at 11:37 AM, ted schettler <tschettler@igc.org> wrote:

BUSINESS DAY

[HTTP://WWW.NYTIMES.COM/2014/05/31/BUSINESS/BIOFUEL-TOOLS-APPLIED-TO-HOUSEHOLD-SOAPS.HTML?_R=1](http://www.nytimes.com/2014/05/31/business/biofuel-tools-applied-to-household-soaps.html?_R=1)

Biofuel Tools Applied to Household Soaps

By **STEPHANIE STROM** MAY 30, 2014

Consumer products containing ingredients made using an advanced form of engineering known as synthetic biology are beginning to show up more often on grocery and department store shelves.

In November last year, an eight-year-old girl became China's youngest person to get lung cancer. The cause, according to her doctor, was fine particulate matter that accumulated in her lungs and led to malignant changes in her cells. Air pollution has been enveloping Chinese cities in smog, periodically closing schools and businesses, and drastically reducing visibility.

Air of danger

Carcinogens are all around us, so scientists are broadening their ideas of environmental risk.

The IARC has evaluated a total of 970 natural and artificial agents and identified 464 as having some level of carcinogenicity to humans. With some overlap, a catalogue by the US National Toxicology Program lists 240 substances as 'known' or 'reasonably anticipated' human carcinogens. Some cancer-causing agents occur naturally, such as aflatoxins — poisonous compounds produced by moulds that grow in nuts, seeds and legumes. Others are man-made, such as ionizing radiation from medical imaging and various commercial chemicals. Yet of the 80,000 chemicals in commerce, only a tiny fraction has been tested for carcinogenicity.

The proportion of cancers attributable to environmental carcinogens is subject to debate. The most widely cited estimate, made in 1981, attributes 2% of US cancer deaths to pollution

NATURE.COM

To read more about pollution's link to cancer, see:

go.nature.com/srjaod

[Planes' exhaust could be harming communities up to 10 miles from LAX.](#)

By Dan Weikel, Tony Barboza Los Angeles Times 29 May 2014

High levels of potentially harmful exhaust particles from jets using Los Angeles International Airport have been detected in a broad swath of densely populated communities up to 10 miles east of the runways, a new air quality study reported Thursday.

The research, believed to be the most comprehensive of its type, found that takeoffs and landings at LAX are a major source of ultrafine particles. They are being emitted over a larger area than previously thought, the study states, and in amounts about equal in magnitude to those from a large portion of the county's freeways.

It further concludes that areas affected by aircraft exhaust at major airports in the U.S. and other parts of the world might have been seriously underestimated.

EDUCATION

MAYA ANGELOU

[Remembering America's "Phenomenal Woman"](#)

QUOTE TO NOTE

“Maya Angelou was not just a phenomenal writer and artist. She was a teacher and mentor whose words will live on for generations. She once wrote, ‘When you learn, teach. When you get, give.’ Dr. Angelou certainly lived by that wisdom throughout her amazing life, and the world is a better place because of her.”

-- Secretary of Education Arne Duncan (5/28/14), in a [statement](#) on the passing of Maya Angelou

Celebrated poet and author **Maya Angelou** has long been a favorite of the teachers at ED. To honor her contributions to literature, education, and combating poverty, racism and ignorance, we've included some resources for teaching about the woman and her work, including a link to one of our favorite poems, ["Phenomenal Woman."](#)

- Readwritethink.org provides biographical detail about Angelou and resources for classroom activities for grades 7-12. Check out their strategies to help students to analyze the speaker's feelings and meaning through a well-known Maya Angelou poem.
- Tolerance.org offers lesson ideas to help students think, analyze and act in the classroom and community. This page uses Maya Angelou's history and writing to get students to examine their own lives and communities and to consider ways they can improve their interaction. The plans not only build students' appreciation for the literary elements at play in her work, but they examine the effects of Angelou's words on society.
- Betterlesson.com offers questions and answer keys to make for quick and easy lesson plans on Maya Angelou. This link includes a brief biography, a poem, discussion or short answer questions, and multiple choice questions.
- *Educational Leadership* published an interview with Angelou discussing resilience in education. Read the [interview \(Azzam\)](#).
- ASCD's *Whole Child* blog posted a reflection on Angelou's recent inspirational speech at their annual conference. Read the [blog](#).

[The Condition of Education 2014](#)

05/29/2014 12:00 AM EDT

The Condition of Education 2014 summarizes important developments and trends in education using the latest available data. The report presents 42 indicators on the status and condition of education. The indicators represent a consensus of professional judgment on the most significant national measures of the condition and progress of education for which accurate data are available.

[Thomas Edison, Chemist" Designated a 2014 National Historic Chemical Landmark](#)

[Thomas Edison's work in chemistry](#)—from carbon filaments in light bulbs to rechargeable electrical storage batteries, research on domestic sources of rubber and the invention of the modern research laboratory—will be recognized by ACS as a National Historic Chemical Landmark throughout the year.

Ceremonies will be held at the Edison & Ford Winter Estates in Fort Myers, FL, on May 25; at Thomas Edison National Historical Park in West Orange, NJ, on June 6; and at The Henry Ford, Greenfield Village, in Dearborn, MI, on Sept. 20.

Learn more online at www.acs.org/landmarks.

DIRECTIONS

June 12, 2014 – PRCST STEM in Action Meeting - FREE

Carnegie Science Center 9:00-noon

 [capstone-invitation-2014.pdf \(230 KB\)](#) [[Open as Web Page](#)]

August 14, 2014

FREE

**A PRCST Professional Development workshop for formal and non-formal educators.
A DEP Education Grant Program**

“Watersheds – the basis for pure water”

**Aug.14, 2014 Six Act 48 hours Lunch included
Beechwood Farms Nature Reserve – Audubon Society of W. PA
8:30am-3:00pm**

Fresh water is one of the most precious resources on Earth, essential for the survival of all living things. In developed countries like the United States, it is easy for us to take water for granted. Americans use more water per capita than anywhere else in the world, up to 100 gal a day. As the U.S. population grows, we may use water faster than it can be replenished. Current curricula seems to focus on specific areas of water supply and use (rivers, lakes, wetlands etc.). And many activities involve students in the study of these areas. However, there is a dearth of understanding about global water systems.

**Where does clean water begin its journey?
What is a Watershed?**

Join us for an exciting day and explore the components of clean water.

- Source
- Pollutants
- Solutions
- Water Systems

Speakers, demonstrations, field work, water quality testing, hands-on activities.
Time to explore the Shop at Beechwood Farms (discount available).

To reserve a space and receive a registration form, please send an email to:
[Mills, Christine \[phyblog@yahoo.com\]](mailto:phyblog@yahoo.com)

(Note: Space is limited. If you reserve a space and cannot attend, there will be a cancellation fee.)

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Note: Save the dates: Oct. 17-18 for potential sustained learning workshops:

“Water – A Critical Issue” A PRCST workshop.

The Ocean

<http://www.surfnetkids.com/resources/ocean/>

The Ocean Printable(** for Premium Members only)

<http://www.surfnetkids.com/printables/ocean.pdf>

Although it covers nearly three-quarters of Earth, scientists call the ocean our planet's last frontier, and say that we know more about the moon than we do the sea floor. While oceanographers are racing to learn more about the deep secrets of the ocean floor, you can start your ocean journey at the following sites.

AMNH: OLogy: Marine Biology

"OLOGY means 'the study of.' And here on the American Museum of Natural History's OLOGY website, you can study and explore many cool OLOGIES." This particular section is all about Marine Biology at an elementary and middle-school level. For an introduction to oceans, start at "What's the Big Idea." To explore related concepts, follow the little red asterisks that pop open multimedia lessons. Free registration allows you to collect cards from each station, and to submit projects for possible publication.

Monterey Aquarium: Animals & Experiences

This page is a fabulous collection of the best Monterey Aquarium pages for both kids and grownups. My favorites are the live web cams (keep in mind that these operate on Pacific Standard Time), activities and games (from K to 12), and the animal guides (sea otters, penguins, jellies and more.) Another great find is the 168-page printable Sea Searcher's Handbook (

http://montereyaquarium.org/PDF_files/activities/seasearchers/aquarium_ss_full.pdf) chock full of articles and hands-on activities.

National Geographic: The Ocean

Gotta love those big, beautiful National Geographic photos! Best clicks are the Photo Galleries, Ocean Quizzes, along with any of the articles or videos. "Ninety percent of the large predators in the ocean are

gone and their populations have collapsed. The reason for this is that we have taken too many fish out of the sea, and we keep taking more before the remaining populations are able to reproduce. Watch this video [Weird Fish Marine Reserve] where Mel, the 'very weird' fish, will show you how marine reserves can help fish populations recover, and why we need many more."

... Click to continue to [The Ocean](#)

Printables Club Members Also Get ...

Surfnetskids Printables Club Members also get the following printables to use in the classroom, the computer lab, the school library, or to send home with students:

The Ocean Printable

Ocean Wikipedia Printable

Dolphins Printable

Whales Printable

Shark Quiz and Worksheet

*** Are you curious? Get your own ten-day trial membership:

<http://www.surfnetskids.com/printables-club.htm>

Related Games

[The Ocean](#)

[Ocean Word Search](#)

[Ocean Puzzle](#)

[Shark Quiz](#)

[Something Fishy](#)

Quote of the Week

"I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel." ~~ Maya Angelou ~~ (b. Apr 4, 1928) American poet, dancer, playwright, director, author. Read more Maya Angelou quotes at: <http://www.lightfire.com/quotations/authors/maya-angelou/>



SSP Scholarships and Grants

SSP is dedicated to educating members of the scientific community, students, and teachers about spectroscopy and science. We achieve this goal by providing schools in need with equipment necessary to educate students on science. Below is a list of grants we are currently offering.

Each grant has its own set of application guidelines, so make sure to review the application instructions. Check back often, as new grants will be continuously posted throughout the year.

SSP sponsors the following the grants:

 [Elementary School Science Olympiad Program \(ESSOP\)](#)

 [High School Equipment Grants \(HSEG\)](#)

 [Pittsburgh Conference Memorial National College Grants Program \(PCMNCG\)](#)

 [College Equipment Grant Program \(CEGP\)](#)



Scholarships & Grants

The SACP is dedicated to educating members of the scientific community, students, and teachers about spectroscopy and science. We achieve this goal by providing schools in need with equipment necessary to educate students on science. Below is a list of grants we are currently offering.

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SACP sponsors the following the grants:

 [ES/MS Equipment Grants Program](#)

 [Pittsburgh Conference Memorial National College Grant \(PCMNCG\)](#)

 [Elementary School Science Olympiad Program \(ESSOP\)](#)

 [Starter Grant](#)

CALENDAR OF EVENTS

NSTA Regional Conferences on Science Education 2014

Oct. 1-18 Richmond, VA

Nov. 6-8 Orlando, FL

Dec. 4-6 Long Beach, CA

Contact: www.nsta.org/conferences 1-800-722-6782 June 14, 2014

June 12, 2014 –PRCST STEM Meeting

Carnegie Science Center 9:00-noon FREE

March 21–23, 2015

70th ASCD Annual Conference and Exhibit Show

Houston, Tex.

June 27-29 ASCD Conference on Teaching Excellence – Dallas, TX

More than 150 sessions on assessment, college and career readiness, STEM, and instructional practices.
[Click here](#) for more information and to register.

August 14, 2014 – FREE Water Workshop: “Watersheds – the basis for pure water”

Beechwood Farms Nature Reserve: W. PA Audubon Society

Oct. 17-18 – “Water A Critical Issue” = A PRCST workshop for sustained learning

Fern Hollow Nature Center – Sewickley, PA

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National Energy Technology Laboratory (NETL)

PAEE

PDE Office for Environment/Ecology

PA Resources Council

PA Society for Biomedical research

Phipps Conservatory and Botanical Gardens

Pittsburgh Geological Survey

Pittsburgh Tissue Engineering Initiative

McGowan Institute for Regenerative Medicine

Moretti Consulting Group

PA NASA Educator Resource Center (ERC)

Spectroscopy Society of Pittsburgh (SSP)

Society for Analytical Chemists of Pittsburgh (SACP)

The Pittsburgh Foundation – Nancy Hannon Gordon Fund

University of Pittsburgh – School of Education

Western PA Unit – Herb Society of America – Gardens workshops

Women in Chemistry