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EPA's Sustainable and Healthy Communities Research Update

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U.S. EPA Sustainable and Healthy Communities Research Program:

The Fermata: A Sustained Note

June 30, 2016

A Note from Michael Slimak, Ph.D

National Program Director

Welcome to *The Fermata*, the "new and improved" update of the latest news and accomplishments from EPA's Sustainable and Healthy Communities (SHC) national research program. For those unfamiliar with the term, "Fermata" (also known as a hold, pause, or grand pause) is a symbol used on musical scores indicating that a particular passage should be prolonged—a sustained note. Such small changes in time and perception can make all the difference, impacting an entire composition for the better.

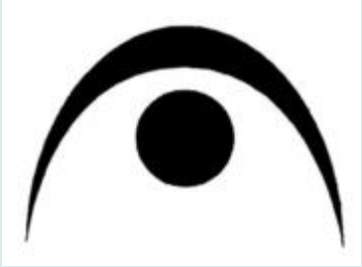
Impact and sustainability are the hallmarks of SHC's research, making *The Fermata* a perfect symbolic representation of our work.

SHC scientists are embracing a truly cross-disciplinary research portfolio to deliver the knowledge, data, and tools needed to meet the most pressing environmental challenges of the day.

Communication is key. We continually engage with our partners and stakeholders working on the front lines protecting the environment and public health: EPA program and regional offices, state environmental management agencies, local and state public health officials, community decision-makers, Superfund clean-up technicians, and the scientific community. Together, we have cultivated an open and transparent atmosphere

of exchange and feedback. This, in turn, helps SHC remain responsive and nimble, delivering research results as we advance a new paradigm of environmental and related public health research that advances holistic, long-term solutions.

Our new *Fermata* will regularly highlight ongoing work, research achievements, and opportunities to join us in partnership and dialogue.



SHC is the largest and most diverse national program in EPA's Office of Research and Development, so we have a lot to share. This newly-named program update represents our commitment to doing just that—keeping news about our program flowing to so that it can be immediately applicable and make impact. Please read and enjoy, as well as take advantage of our webinars and conference calls where you can interact directly with our dedicated experts. We are eager to hear from you, too. What we achieve together will continue to add up to big impacts, and a healthier, prosperous future. That's a note we are eager to sustain.

Strategic Research Action Plan Released

SHC's research program is the result of a multi-year effort explicitly designed to cultivate and engage partnerships with EPA program offices, other federal and state organizations, public health officials, and community decision makers across the nation to identify their highest priorities and build a nimble, efficient research portfolio that provides them with the tools, data, and knowledge to meet them. In addition, the program strives to usher in a new paradigm of innovative, systems-based research that provides the solutions needed to advance a healthy, prosperous, and sustainable future for all Americans. The results of those efforts are presented in *Sustainable and Healthy Communities Strategic Research Action Plan, 2016-2019*.

The plan outlines an ambitious research portfolio designed to meet the highest priority science needs of our partners and the Agency's objectives for cleaning up communities, making a visible difference in communities, and working toward a sustainable future. It presents a blueprint for conducting research and development that will generate and provide access to environmental science on health, human well-being, and the environment, and to deliver results from that work in accessible, useful forms that inform and support the critical decisions facing America's communities.

To download the *Sustainable and Healthy Communities Strategic Research Action Plan*, 2016-2019, please visit: https://www.epa.gov/research/sustainable-and-healthy-communities-strategic-research-action-plan-2016-2019.

SHC Science Supports Environmental Justice

EPA recently released the draft EJ 2020 Action Agenda, the Agency's next environmental justice (EJ) strategic plan for the years 2016 through 2020, for public comment. The strategy provides a blueprint to advance environmental justice through EPA's programs, policies, and activities, and will support the cross-agency strategy "making a visible difference in environmentally overburdened, underserved, and economically-distressed communities."

"EJ 2020 will build on the foundation established by EPA's Plan EJ 2014, where we were able to improve on EJ in permitting, support community-based programs and develop science tools to access and facilitate grants,"

said Mustafa Santiago Ali, Senior Advisor to EPA Administrator Gina McCarthy on Environmental Justice.

Much of that foundation was laid with the help of SHC research, which continues to play a critical role informing the new strategy and in developing the next generation of science tools designed to help researchers and local communities explore environmental conditions and build a strong basis for action on environmental justice concerns.

The draft agenda outlines four key objectives the Agency is pursuing to strengthen the scientific foundation for considering environmental justice in decision-making:

1. Develop decision support tools for identifying and prioritizing environmental concerns, assessing cumulative impacts and evaluating mitigation options;
2. Increase the understanding of the factors that influence environmental health disparities, and develop methods and data to assess cumulative risks;
3. Develop innovative monitoring tools and technological solutions to environmental problems; and
4. Conduct highly-focused work to (a) promote tribal sustainability and well-being; and (b) advance efforts to mitigate the effects of climate change in vulnerable communities.

Public Comments should be submitted in writing to: ejstrategy@epa.gov, or via mail to:

Charles Lee
Deputy Associate Assistant Administrator for Environmental Justice
USEPA, Office of Environmental Justice (2201-A)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Advancing Environmental Health Disparities Research

EPA, in partnership with the National Institutes of Health, recently awarded $25.5 million to five universities to establish Centers of Excellence on Environmental Health Disparities Research. Over the next five years, the centers will conduct research to understand environmentally driven health disparities and improve environmental conditions surrounding disadvantaged communities.

Read more in the blog *Supporting Research to Address Environmental Health Disparities*

EPA Report Provides Innovative Approach for Linking Ecosystem "Goods and Services" with Human Well Being

Coastal wetlands yield billions of dollars' worth of natural flood protection to the low-lying City of New Orleans. The forests of the Catskill Mountains provide the natural filtration responsible for New York City's famously clean drinking water. A combination of shaded rivers and stable soils are key components sustaining the water quality and habitats that support abundant salmon – a cultural and economic staple of the Oregon and Washington economies.

A White House blog post used the above examples when announcing a Presidential Memorandum that directs Federal Agencies to factor the value of ecosystem services into Federal planning and decision-making. *Ecosystem services* are flows from nature to humans and the economy, but flows that do not involve an exchange of money in return. Humans rely on ecosystem services in critical ways, but they have no prices, so have unfortunately and often been ignored when weighing costs against benefits of a policy. The Presidential

Memorandum notes that ecosystem services "...contribute to our economic prosperity, protect the health and safety of vulnerable populations, and help build more resilient communities."

Identifying ecosystem services and accurately quantifying their value to local communities is a top priority for SHC researchers. Recent results and publications from SHC studies are now poised to support President Obama's directive, as well as to provide new and innovative ways to support local decisions that more fully consider the value of natural ecosystems to human well-being.

The Agency's report, *National Ecosystem Services Classification System (NESCS): Framework Design and Policy Application*, presents for the first time a way to trace ecosystem services from a specific natural ecosystem, like a wetland, to specific economic users, even broken down to households or type of industry (as classified in national economic accounting systems). NESCS (for ease, pronounced "nexus") outlines a standard framework for systematically identifying the components of nature that are directly beneficial to people, specifically flows of "final ecosystem goods and services" from local environments into economies or directly to people.

By dovetailing natural and human systems under one classification structure, NESCS researchers developed a seamless method for supporting environmental decisions and policies that impact both the environment and humans. For example, expecting that an economic practice or policy will affect ecological processes that will then yield a different set of ecosystem services (industrial pollution, for example, might shrink the set) that people value, NESCS can tightly describe the links between specific environments, the range of ecosystem services that are affected, and the uses and users within the economy that are impacted by the original change. In a sense, NESCS is a tool that allows users to easily and reproducibly trace potential flows of value from the environment to people. It "maps" potential transactions between the ecological "supply side" of nature, and the human "demand side," in a new and uniquely specific way.

The report is another significant milestone in SHC's effort to move ecosystems services from concept to implementation. It complements a 2013 Agency report, *Final Ecosystems Goods and Services Classification System (FEGS-CS)*, as well as ongoing research focused on developing standard, scalable techniques for measuring, mapping, and quantifying the value of natural ecosystems and their support of human activities and well-being.

National Ecosystem Services Classification System (NESCS): Framework Design and Policy Application is available for download at: http://go.usa.gov/xqEVJ.

Everybody Wins! EPA's People, Prosperity and the Planet (P3) Competition

Since 2004, the Sustainable and Healthy Communities national research program has supported the next generation of environmental scientists and engineers through the People, Prosperity, and the Planet (P3) student design competition for sustainability.

The competition consists of two phases. In Phase 1, student teams and their faculty advisors submit a research and design proposal for an innovative, marketable solution to an environmental and/or related public health challenge. Selected teams receive up to $15,000 in "seed" money to advance their solutions and are invited to present their results and prototypes to a panel of judges in Washington, DC.

This year the student teams displayed their research posters and prototypes to the judges and some 350,000 visitors who took advantage of the free admission at the 4th USA Science & Engineering Festival, "a national grassroots effort to advance STEM education and inspire the next generation of scientists and engineers." The

Festival was held at the cavernous Walter E. Convention Center in Washington, DC., April 16 and 17.

The best, most promising designs will be awarded EPA's P3 Award, the second phase of the competition which includes up to $75,000 in additional funding to bring their designs to market. Those awards will be announced later this summer.

Over the years, 645 funding awards have been made to 217 institutions in all 50 states and Puerto Rico, involving more than 4000 students. Twenty-six winning teams have gone on to start companies or commercialize their designs, and funded research has led to 186 publications and 16 patents.

For more information, including descriptions of past winning projects and how to apply, please visit: www.epa.gov/P3.

Advancing Health Impact Assessments to Help Communities

Supporting community planners and others to make informed decisions that protect and improve public health is a top priority for EPA. A powerful new process to achieve that priority is the Health Impact Assessment (HIA), which can be used to bring together scientific expertise, stakeholder input and local knowledge to highlight the connections between the proposed decision and public health. Decision makers can then consider adopting those recommendations from the HIA that maximize health benefits while simultaneously minimizing risks.

SHC researchers have been leading HIAs working with communities in Springfield, MA and Atlanta, GA., which have both received recent media attention:

- MassLive, an online news outlet recently published an article covering a community meeting where SHC researchers presented their findings from the Gerena Health Impact Assessment Final Report. The article summarizes how EPA research is being used by city officials and community activists to inform efforts to improve the school's air quality.
- EPA's work on the Proctor Creek Boone Boulevard in Atlanta, GA was featured in the Saporta Report. The article highlights efforts to incorporate innovative green infrastructure techniques to simultaneously reduce flooding, improve stormwater management, and address public health concerns in the Proctor Creek neighborhood—a traditionally disadvantaged community of Atlanta.

For more information about EPA Health Impact Assessments, and download final reports for both Gerena School and Proctor Creek, please visit: https://www.epa.gov/healthresearch/health-impact-assessments.

Recent SHC Scientific Publications

A paper by SHC researcher Robert M. Burgess, Ph.D. and co-authors entitled "The Gellyfish: An in situ equilibrium-based sampler for determining multiple free metal ion concentrations in marine ecosystems" was honored as one of 2015's "Exceptional Papers" by *Environmental Toxicology and Chemistry*.

In their paper, Burgess and partners present results from testing an innovative new version of the "Gellyfish," an environmental sampler for monitoring free metal ion concentrations—typically the most bioavailable and toxic to aquatic organism—in marine ecosystems. Using their design in field sites across five different locations in New England and then

validating sampling results in the laboratory, they confirmed the efficacy of the new samplers. Their Gellyfish now offers an easy-to-use, faster, and less expensive sampler for monitoring coastal waters and other marine ecosystems for metals.

"Compared with other commonly used free ion sampling techniques, it is an easy-to-use and inexpensive equilibrium-based passive sampler that can be useful for large-scale monitoring of metal speciation in marine systems," the study concludes.

The paper appeared in the April, 2015 edition of *Environmental Toxicology and Chemistry*

Other recent SHC publications include the following:

- Diamond, G. L., Bradham, K. D., Brattin, W. J., Burgess, M., Griffin, S., Hawkins, C. A., & Scheckel, K. G. (2016). Predicting oral relative bioavailability of arsenic in soil from in vitro bioaccessibility. *Journal of Toxicology and Environmental Health, Part A, 79*(4), 165-173. Abstract available at (subscription required for full article download) http://www.tandfonline.com/doi/abs/10.1080/15287394.2015.1134038
- Snow, S. J., Gordon, C. J., Bass, V. L., Schladweiler, M. C., Ledbetter, A. D., Jarema, K. A., & Kodavanti, U. P. (2016). Age-related differences in pulmonary effects of acute and subchronic episodic ozone exposures in Brown Norway rats. *Inhalation toxicology*, 28(7), 313-323. Abstract available at (subscription required for full article download) http://www.tandfonline.com/doi/abs/10.3109/08958378.2016.1170910#.V2v2m5MrJsM
- Humphries, A. T., Ayvazian, S. G., Carey, J. C., Hancock, B. T., Grabbert, S., Cobb, D., & Fulweiler, R. W. (2016). Directly Measured Denitrification Reveals Oyster Aquaculture and Restored Oyster Reefs Remove Nitrogen at Comparable High Rates. *Frontiers in Marine Science, 3*, 74. Available at: http://journal.frontiersin.org/article/10.3389/fmars.2016.00074/full.

If you have any questions about the SHC research update please contact Diane Simunek (simunek.diane@epa.gov)

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