

2017 Distinguished Scientist Seminar
Semester in Environmental Science
MBL ECOSYSTEMS CENTER, WOODS HOLE, MA

Dr. Heidi Sosik

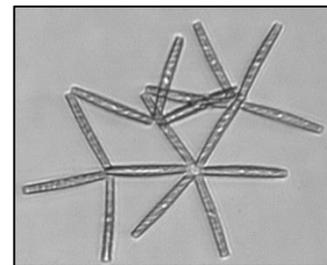
Senior Scientist, Biology Department
Woods Hole Oceanographic Institution



Life in the Plankton, Stories from
Automated Submersible Microscopy and Flow Cytometry

September 15th — 3:00 PM
Lillie Auditorium, MBL

Heidi Sosik is a Senior Scientist at the Woods Hole Oceanographic Institution, where she has been on the faculty and staff since 1994. A biological oceanographer and inventor, Sosik and her co-workers have developed automated underwater analyzers that dramatically enhance scientists' and resource managers' ability to study microscopic organisms that fuel ocean food chains, interact with Earth's climate, and sometimes produce harmful algal blooms that threaten ecosystem and human health.



Sosik's research and leadership have been recognized through numerous honors and awards including a Presidential Early Career Award for Scientists and Engineers; The Stanley W. Watson Chair for Excellence in Oceanography; The Arons Award for Excellence in Teaching, Advising and Mentoring; a NOAA/ CINAR Fellowship in Quantitative Fisheries and Ecosystem Science; a NASA Agency Honor Award for Group Achievement; and a Senior Scientist Leadership Prize.

Sosik serves as Director of WHOI's Center for Ocean, Marine, and Seafloor Observing Systems, Chief Scientist of the Martha's Vineyard Coastal Observatory, and Lead Investigator for the Northeast US Shelf Long Term Ecological Research Program. She is active in many national and international roles including Associate Editor for leading journals, serves on strategic planning and scientific steering committees, and is an elected officer of the American Geophysical Union.

Sosik holds S.B. and S.M. Degrees in Civil Engineering from the Massachusetts Institute of Technology and a Ph.D. in Oceanography from Scripps Institution of Oceanography at the University of California, San Diego.

For more information: <https://www2.whoi.edu/staff/hsosik/>

Suggested readings:

Peacock E.E., R.J. Olson, H.M. Sosik. 2014. Parasitic infection of the diatom *Guinardia delicatula*, a recurrent and ecologically important phenomenon on the New England Shelf. *MEPS* 503: 1–10.

Hunter-Cevera K.R., M.G. Neubert, R.J. Olson, A.R. Solow, A. Shalapyonok, and H. M. Sosik. Physiological and ecological drivers of early spring blooms of a coastal phytoplankton. *Science*, 354:6310.

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Shahid Naeem

Professor of Ecology and Chair,
Dept. of Ecology, Evolution, & Environmental Biology
Director, Earth Institute Center for
Environmental Sustainability
Columbia University



***The multiple dimensions of biodiversity loss:
Examples from a temperate forest, Alaskan tundra, and the avifauna of
the Solomon Islands.***

September 29th — 3:00 PM – Speck Auditorium, Rowe Lab, MBL

Dr. Naeem and his students study how changes in biodiversity affect ecosystems and the services they provide. They have neither an organismal or system bias. They have worked on plants, animals and microbes in marine, terrestrial, and freshwater habitats. Naeem and his colleagues believe that declines in biodiversity, either through local extinction or biological invasions, are the single most important and dramatic problem in contemporary ecology. Their laboratory motto is “ecology with no apology.”

This integration of population and community ecology with biogeochemistry is cross-cutting and yields unique and important insights into the role of biodiversity in ecosystem function. Naeem’s current fieldwork is focused on American northeastern deciduous forests, Inner Mongolian grasslands in China and African agro-ecosystems. He is actively involved in using the scientific findings about biodiversity and ecosystem function to help formulate policies for conservation and restoration.

Dr. Naeem received both his undergraduate training and his Ph.D. from the University of California, Berkeley; and completed postdoctoral fellowships at the Imperial College of London, the University of Copenhagen and the University of Michigan. He served on the faculties of the University of Washington and the University of Minnesota before coming to Columbia in 2003. He is author, co-author and editor of over 100 scientific publications and co-chaired the UN Millennium Assessment’s Biodiversity Synthesis Report. He was lead editor of the seminal book, *Biodiversity, Ecosystem Functioning, and Human Well-Being* which summarizes over 900 studies that have explored how biodiversity loss threatens nature and our society.

His work has been widely recognized by the scientific community. He is an ISI widely cited author, and in 1995, won the Ecological Society of America’s Mercer Award for best ecological paper by younger ecologist. He was selected as a Fellow of the American Association for the Advancement of Science and an Aldo Leopold Leadership Fellow in 2001. He received Columbia’s Lenfest Award for excellence in teaching and research in 2008.

Suggested Readings:

Cardinale, B. J. et al. 2012. Biodiversity loss and its impact on humanity. *Nature*, 486:59-67.

Naeem, S., et al. 2016. Biodiversity as a multidimensional construct: a review, framework and case study of herbivory's impact on plant biodiversity. *Proc. R. Soc. B.* 283:1844. The Royal Society.

Naeem, S. et al. 2012. The functions of biological diversity in an age of extinction. *Science* 336.608: 1401-1406.

ABSTRACT:

Biodiversity is a multidimensional construct, but it is rarely treated as such. Most often, we use the single metric of species richness to quantify biodiversity loss though it is well known that functional, phylogenetic, and other dimensions of biodiversity can be equally important. We use structural equation modeling to explore how the loss of diversity in multiple dimensions provides novel insights into the way ecosystems function. We provide three examples; (1) the consequences of herbivory on understory vegetation in a hardwood forest, (2) the biodiversity in carbon flux of the arctic tundra vegetation, and (3) the consequences of biogeography on the fragility of bird communities in the Solomon Islands. These studies support the argument that the well documented, often adverse consequences of biodiversity loss on ecosystem functions and services are likely to be more complex than prevailing unidimensional studies have proven.

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WOODS HOLE, MA

Dr. Daniel H. Buckley

College of Agriculture and Life Sciences
School of Integrative Plant Science
Cornell University

The Secret Lives of Soil Microbes

October 20th — 3:00 PM
Loeb Laboratory G70, MBL



Daniel Buckley is a microbial ecologist whose research investigates the ecology and evolution of soil microorganisms and the causes and consequences of microbial diversity. His research program focuses on characterizing novel microorganisms, determining the ecological functions of soil microorganisms, and revealing the ecological and evolutionary principles that govern microbial diversity and biogeography.

He earned his B.S. in Microbiology (1994) at the University of Rochester and his Ph.D. in Microbiology (2000) at Michigan State University, where in 2007 he was recognized as a “Distinguished Alumnus” in the Dept. of Microbiology and Molecular Genetics. His graduate research focused on the ecology of soil microbial communities and was conducted in the laboratory of Thomas M. Schmidt in affiliation with the Center for Microbial Ecology. Dan's postdoctoral research in the laboratory of Pieter T. Visscher at the University of Connecticut examined linkages between microbial diversity and biogeochemistry in marine microbial mats and stromatolites. Dan joined the Cornell faculty in 2003 as a Microbial Ecologist. From 2009-13 he was co-director of the summer MBL Microbial Diversity course.

He received a National Science Foundation Faculty Early Career Development (CAREER) award in 2005 for excellence in integrating research and education. He has served as Director of the Graduate Field of Soil and Crop Sciences at Cornell. He also currently serves on the editorial boards of *Applied and Environmental Microbiology* and *Environmental Microbiology*.

For more info: <https://blogs.cornell.edu/buckley/> ; <https://scs.cals.cornell.edu/people/daniel-buckley>

Suggested readings:

- Pepe-Ranney, C., Campbell, A. N., Koechli, C., Berthrong, S. T., Buckley, D. H. 2016. Unearthing the ecology of soil microorganisms using a high resolution DNA-SIP approach to explore cellulose and xylose metabolism in soil. *Frontiers in Microbiology*. 7:703.
- Pepe-Ranney, C., Koechli, C., Potrafka, R., Andam, C., Eggleston, E., Garcia-Pichel, F., Buckley, D.H. 2016. Non-cyanobacterial diazotrophs dominate dinitrogen fixation in biological soil crusts at the early stage of crust formation. *International Society for Microbial Ecology Journal*. 10: 287–298.

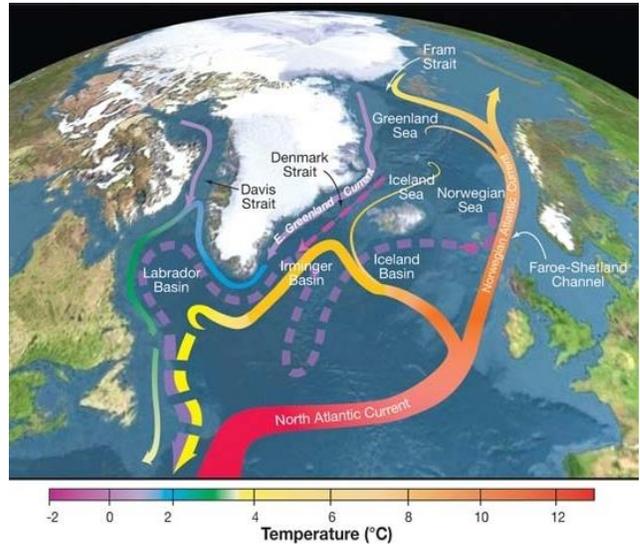
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Dr. Galen McKinley

Dept. of Earth & Environmental Science
Columbia University and Lamont Doherty
Earth Observatory

***Understanding the Ocean's role
in the Global Carbon Cycle***

October 27th — 3:00 PM
Speck Auditorium, MBL



Galen McKinley is an oceanographer and climate scientist. She is passionate about sharing the joys and insights from scientific inquiry with her colleagues, students, the public and policy makers. She studies how the physics, chemistry and ecology of the oceans and Great Lakes respond to climate variability. She is particularly interested in how the climate system and physics shapes the global carbon cycle affecting primary productivity and carbon sequestration in the oceans. Her primary scientific tools are computer simulations and analyses of large datasets. Professor McKinley is currently a member of the faculty at Columbia University and the Lamont Doherty Earth Observatory and was previously a Bryson Professor of Atmospheric and Ocean Sciences at the University of Wisconsin–Madison, where she won two awards for teaching excellence.

In addition to research and teaching, Professor McKinley contributes to national and international scientific coordination and advises policy-makers. She was appointed by the EPA Administrator to help guide the Great Lakes Interagency Task Force (2016-17) and provided advice on the science and research required to understand recovery from the Gulf of Mexico Deepwater Horizon oil spill (CONCORDE Scientific Advisory Panel). From 2011-16 she served on the Carbon Cycle Scientific Steering Group that advises the US Carbon Cycle Interagency Working Group. From 2008 to 2016 she participated in the North American Carbon Program / Ocean Carbon and Biogeochemistry Coastal CARbon (CCARS) and was group leader for Great Lakes Working Group, coauthoring the final CCARS Science Plan.

Dr. McKinley received her Ph.D. in Climate Physics and Chemistry from Massachusetts Institute of Technology in 2002 and her B.S. in Civil Engineering from Rice University, Houston, TX. In 2011, she was an *Institution Visiting Scholar in Physical Oceanography and Marine Chemistry and Geochemistry* at the Woods Hole Oceanographic Institution (WHOI).

Suggested readings:

Global Carbon Cycle: Carbon Around the Earth: <http://www.whoi.edu/main/topic/carbon-cycle> (right corner interactive graphic)

McKinley, G.A., Fay, A.R., Lovenduski, N.S., and D.J. Pilcher. 2017. Natural variability and anthropogenic trends in the ocean carbon sink. *Annual Review Marine Science* 9:125–50.