Distinguished Scientist Seminar Series

SEMESTER IN ENVIRONMENTAL SCIENCE 2021

Sponsored by: MBL Division of Education & MBL Ecosystems Center

September 17th — 3:00 pm, Speck Auditorium, Rowe Building, MBL
CHRIS REDDY, Senior Scientist, Dept. of Marine Chemistry
Woods Hole Oceanographic Institution
The Role of Science in Extreme Pollution Events

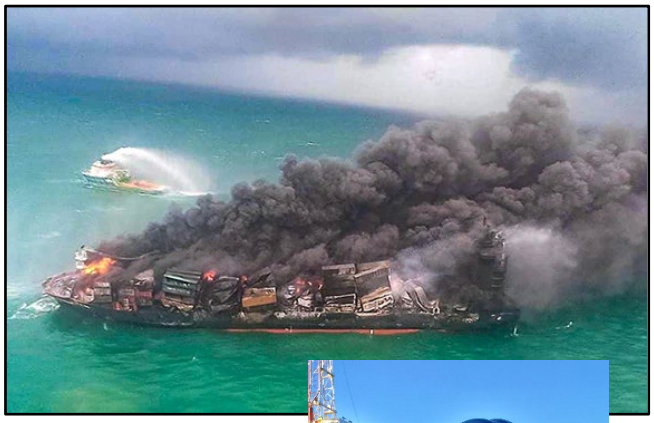
October 1st — 3:00 pm, Speck Auditorium, MBL
PETER FRUMHOFF, Chief Climate Scientist
Union of Concerned Scientists
Solar GeoEngineering Approaches to Cool the Earth: A Dangerous Distraction or an Idea Whose Time has Come?

October 15th — 3:00 pm, Speck Auditorium, MBL
LAUREN ALEXANDER AUGUSTINE, Executive Director, Gulf Research Program
National Academies of Sciences & Engineering
Science and Coastal Resilience and Recovery

November 5th — 3:00 pm, Speck Auditorium, MBL
STEWARD PICKETT, Distinguished Scientist
Cary Institute of Ecosytems Science
The Ecology of Segregation as Illustrated by the Work of the Baltimore School of Urban Ecology.

- Coffee and cookies will be available half an hour before the seminar -

2021 Distinguished Scientist Seminar
Semester in Environmental Science
MBL ECOSYSTEMS CENTER, WOODS HOLE, MA



Dr. Chris Reddy
Senior Scientist
Woods Hole Oceanographic Institution

The Role of Science in Extreme Pollution Events



September 17th— 3:00 PM, Speck Auditorium, MBL

When an acute environmental crisis occurs, scientists and engineers have a unique opportunity and, arguably, an obligation to apply their experience and knowledge to help the front-line responders. Cultural differences, metrics for success, and varying levels risk tolerance between the "science" and "response" communities often limit the most beneficial outcome. Ultimately, both sides need to learn from, appreciate, and respect each other to successfully address such crises. Similarly, science and other stakeholders (media, government official, industry, and non-governmental organization) must continuously strive to better understand each other and the challenges each faces.

An ongoing disaster off the coast of Sri Lanka (photo above) illustrates these challenges. On May 21, 2021, a fire broke out on the deck of cargo ship the M/V *X-Press Pearl* while it was anchored 18 km off the coast of Colombo, Sri Lanka. The ship was also loaded with 1,486 containers carrying an assortment of raw materials and hazardous chemicals. While the fire raged out of control for several days, billions of burned and unburned small plastic pieces called nurdles washed ashore along 75% of Sri Lanka's coastline. Chris Reddy was one of the lead scientists providing advice and guidance during this crisis. In this talk, he will discuss how he acquired and analyzed field samples, aligned with non-governmental organizations, briefed US State Department officials, conducted several media interviews, and ultimately published a peer-reviewed manuscript based on his findings. He will convey lessons learned from his involvement in this and other crises, such as the 2010 Deepwater Horizon diester and oil spills in Russia, Brazil, and Mauritius.

Reddy earned a BS in chemistry from Rhode Island College and PhD in chemical oceanography from the University of Rhode Island, and is now a senior scientist in the Department of Marine Chemistry & Geochemistry at Woods Hole Oceanographic Institution (WHOI). He has led numerous field operations along coastlines, in the open ocean, and to the deep seafloor. In addition to oil spills and plastic pollution, he studies ocean dumping; biofuels, and replacing petroleum-derived materials in personal care products with chemicals harvested from algae. He enjoys venturing outside of the ivory tower to communicate science to the public, industry, and policymakers, and is constantly seeking out those who will benefit from new scientific knowledge and then actively engaging them.

Reddy has published over 200 peer-reviewed manuscripts and holds eight U.S. patents. He has testified before Congress five times, written more than 30 opinion pieces on science and how science work, and given hundreds of interviews for print, radio, and television. In 2014, he was honored with the C.C. Patterson Award for his work on the impacts of petroleum in the ocean, and in 2018 the American Geophysical Union recognized Reddy's achievements as a science communicator with their Ambassador Award.

Suggested readings:

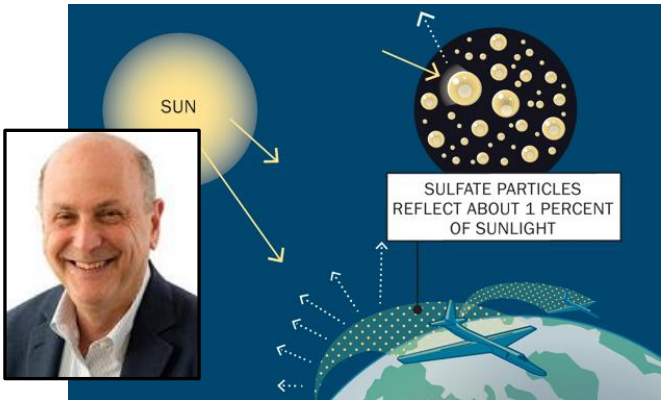
https://www.scientificamerican.com/article/the-problem-of-colonial-science/

Reddy, C.M. Lessons from Deepwater Horizon for coronavirus (2020) *Boston Globe*, posted online on March 31.

Reddy, C.M. (2010). How reporters mangled science on Gulf oil spill. (Opinion), *CNN* website, posted August 25.

Reddy, C.M. Don't assume the worst about the Mauritius oil spill (2020). CNN, posted online August 23.

2021 Distinguished Scientist Seminar
Semester in Environmental Science
MBL ECOSYSTEMS CENTER, WOODS HOLE, MA



Dr. Peter Frumhoff
Chief Climate Scientist
Union of Concerned Scientists (UCS)

Solar Geoengineering Approaches to Cool Earth: A Dangerous Distraction or an Idea Whose Time Has Come?

October 1st— 3:00 PM, Speck Auditorium, MBL

The Union of Concerned Scientists was founded in 1969 by scientists and students at the Massachusetts Institute of Technology. That year, the Vietnam War was raging and Cleveland's heavily polluted Cuyahoga River had caught fire, and the Soviet Union and US harbored potentially cataclysmic nuclear arsenals. The UCS mission was and is to advocate for scientific research to address these pressing social and environmental threats. Today, as climate change has emerged as an important issue, USC also promotes wise climate and energy policy. The latest Intergovernmental Panel on Climate Change (IPCC) report confirms that emissions of greenhouse gases from human activities have already been responsible for approximately 1.1°C of warming during the period 1850-1900. The IPCC synthesis projects that over the next 20 years, average global temperature will warm by an additional 1.5°C. As Chief Climate Scientist at the UCS, Dr. Peter Frumhoff helps formulate the UCS stance on science policy, including strategies for mitigating or even reversing climate change.

A global change ecologist, Dr Frumhoff has published widely on the regional impacts of climate change, the role of tropical forests and land-use in climate mitigation, the role of climate change in extreme weather events, the climate responsibilities of fossil fuel companies, the governance of solar geoengineering research, and the water demands of energy in a changing climate.

In addition to his work at UCS, Dr. Frumhoff serves on the Board of Atmospheric Sciences and Climate at the National Academies of Sciences, Engineering and Medicine (NASEM) and was a member of the NASEM committee thatwrote the 2021 report on *Reflecting Sunlight: Recommendations for Solar Geoengineering Research and Research Governance*. He was a lead author of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) and of the IPCC Special Report on Land Use, Land-use Change and Forestry.

Dr Frumhoff is also on the Board of Editors of *Elementa: Science of the Anthropocene*. Previously, he served on the Board of Directors of the American Wind Wildlife Institute, the Advisory Committee on Climate Change and Natural Resource Science at the US Department of Interior, and was an AAAS Science and was a Diplomacy Fellow at the US Agency for International Development. He has taught at the Fletcher School of Law and Diplomacy, Harvard University and the University of Maryland and in 2014 he was named Cox Visiting Professor in the School of Earth Sciences at Stanford University. He received a PhD in ecology and MA in zoologyfrom the University of California at Davis, and a B.A. in psychology from the University of California at San Diego.

Suggested readings:

https://www.nap.edu/resource/25762/Reflecting%20Sunlight%204-Pager.pdf;

https://grist.org/science/who-gets-to-decide-if-we-study-solar-geoengineering-after-the-scopex-project-canceled/

Frumhoff, P.C. and J.C. Stephens (2018). Towards legitimacy of the solar geoengineering research enterprise. Proceedings of the Royal Society A: Mathematical and Physical and Engineering Sciences https://doi.org/10.1098/rsta.2016.0459

Voosen, P. (2021). U.S. needs solar geoengineering research program report says. Science 372:19 https://science.sciencemag.org/content/372/6537/19.full

2021 Distinguished Scientist Seminar
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MBL ECOSYSTEMS CENTER, WOODS HOLE, MA



Dr. Lauren Alexander Augustine
Executive Director
Gulf Research Program at the National Academies of Science and Engineering

Science and Coastal Resilience and Recovery?

October 15th— 3:00 PM
Speck Auditorium, MBL

Coastal communities and their adjacent wetland, estuarine and bay ecosystems face increasing threats from sea-level rise, extreme weather, and pollution including over-enrichment with nutrients, and catastrophic events such as the explosion of British Petroleum's Gulf of Mexico Deepwater Horizon oil rig, which occurred on April 20, 2010. It took nearly three months to staunch the flow of oil from this offshore well and more than 130 million gallons of crude oil was released into the Gulf of Mexico. The oil fouled the coasts of Florida, Alabama, Mississippi, Louisiana and Texas.

After a six year legal battle, British Petroleum settled on fines of $20.8 billion. As part of that settlement, the federal government awarded the National Academy of Sciences $500 million to establish the Gulf Research Program (GRP), a 30-year effort to benefit Gulf communities and ecosystems, and to tackle oil system safety, protect human health and steward and enhance environmental resources. Dr. Lauren Augustine is the Executive Director of this Program and is responsible for overseeing all aspects of management and use of these funds. This includes defining the strategic direction, and leading the development and implementation of this multi-dimensional, science-based program.

Dr. Augustine joined the National Academies in 2002, working on a broad range of topics pertaining to water, natural disasters, and resilience. Prior to joining the Gulf Research Program in 2018, she served as Director of the Resilient America Program, which supports communities' efforts to build resilience to extreme events using science and diverse stakeholder engagement. In addition, she has formerly served as Country Director for the African Science Academy Development Initiative (ASADI), a decadal program that built scientific capacity in national academies across Africa; as Director of the Disasters Roundtable; and as a study director for the Water Science and Technology Board.

Outside of her work at the National Academies, Lauren has served on the World Economic Forum's Global Agenda Council on Risk and Resilience; was a member of the Advisory Board for the American Geophysical Union's Thriving Earth Exchange program; and was a juror for two resilience competitions, Rebuild by Design for recovery after Hurricane Sandy and Resilience by Design in San Francisco. She is also a NATO Expert for the Civil Protection Group.

Dr. Augustine earned her B.S. in applied mathematics and systems engineering and her M.S. in environmental planning and policy from the University of Virginia, and her Ph.D. in an interdisciplinary program that combined physical hydrology, geomorphology, and ecology from Harvard University.

Suggested Reading:
https://theweek.com/environmental-news/1004555/theres-a-new-oil-spill-in-the-gulf-of-mexico-and-nobody-knows-who-is

2021 Distinguished Scientist Seminar
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Dr. Steward Pickett
Distinguished Scientist
Cary Institute of Ecosystem Sciences

The Ecology of Segregation as Illustrated by the Work of the Baltimore School of Urban Ecology.

November 5th—3:00 PM, Speck Auditorium

During the industrial age, there has been a massive migration of the human population from rural settings to cities – today more than half of humanity lives in urban environments. The majority of these new urban settlers around the globe are poor. Over the past three decades, environmental justice research has revealed how marginalized groups typically bear a disproportionate share of the environmental burdens in cities. Increasingly ecologists are recognizing the importance of studying the connections between urban ecosystems and human society. Steward Pickett has been a pioneer in the field of urban ecology, social-ecological systems theory, and the study of natural disturbance to ecosystems. Dr. Pickett was founding director of the Baltimore Ecosystem Study, a ground-breaking interdisciplinary program encompassing research, community engagement, and education.

Dr. Pickett was born and raised in Louisville, KY. He received a B.S. in Botany from the University of Kentucky in 1972, and the PhD in Botany from the University of Illinois, Champaign-Urbana in 1977. He served on the faculty of Rutgers University until 1987, when he moved to Cary Institute of Ecosystem Studies in Millbrook, NY, where he is now Distinguished Senior Scientist.

He has served as President of the Ecological Society of America, and on the boards of the American Institute of Biological Sciences and City as Living Laboratory. He is a recipient of the Botanical Society of America's Centennial Award, a Fellow of the Ecological Society of America, and its 2021 Eminent Ecologist; he is a Fellow of the American Association for the Advancement of Science and of the American Academy of Arts and Sciences. He is a member of the prestigious National Academy of Sciences.

Suggested Readings

Grove, M., Ogden, L., Pickett, S., Boone, C., Buckley, G., Locke, D. H., … Hall, B. (2017). The Legacy Effect: Understanding How Segregation and Environmental Injustice Unfold over Time in Baltimore. *Annals of the American Association of Geographers*, *108*(2), 524–537. doi: 10.1080/24694452.2017.1365585

Locke, D. H., Hall, B., Grove, J. M., Pickett, S. T. A., Ogden, L. A., Aoki, C., … O'Neil-Dunne, J. P. M. (2021). Residential housing segregation and urban tree canopy in 37 US Cities. *Npj Urban Sustainability*, *1*(1), 1–9. doi: 10.1038/s42949-021-00022-0

Zhou, W., Pickett, S. T. A., & McPhearson, T. (2021). Conceptual frameworks facilitate integration for transdisciplinary urban science. *Npj Urban Sustainability*, *1*. doi: https://doi.org/10.1038/s42949-020-00011-9



