2016 Distinguished Scientist Seminar
Semester in Environmental Science
MBL ECOSYSTEMS CENTER, WOODS HOLE, MA

Tony D'Amato
Associate Professor, Rubenstein School of Environment and Natural Resources
University of Vermont

Sustaining Forest Ecosystems in the Face of Global Change

September 16th — 3:00 PM
Lillie Auditorium, MBL

Global change represents the greatest challenge facing forest conservation and management. In the face of future climate uncertainty it is important to develop strategies that increase adaptive capacity and/or minimize ecosystem vulnerability. An understanding of the past impacts of climate change and other stressors on forest ecosystem function and the ability of management interventions to lessen these effects is necessary for informing the development of adaptive strategies in the face of uncertain future conditions.

Tony D'Amato is a forest ecologist and silviculturist whose research has been at the forefront of advancing our understanding of forest management strategies for addressing global change. He is particularly interested in understanding the developmental dynamics and productivity of natural and managed forest systems, particularly within the context of changing global conditions and societal objectives, and investigating the nature and influence of plant competitive interactions and climate on long-term patterns of tree growth and forest structural development.

Dr. D'Amato is currently an Associate Professor in the Rubenstein School of Environment and Natural Resources at the University of Vermont. Prior to coming to Vermont, he was an Associate Professor in the Department of Forest Resources at the University of Minnesota. He earned a B.S. in Forest Ecosystem Science from the University of Maine, M.Sc. in Forest Science from Oregon State University, and a Ph.D. in Forest Resources from the University of Massachusetts. He was a Charles Bullard Fellow at the Harvard Forest, Harvard University in 2014 and has served as the Chair of the Forest Ecology Working Group for the Society of American Foresters since 2011.

Suggested readings:

Clark, J. S., L. Iverson, C. W. Woodall, C. D. Allen, D. M. Bell, D. C. Bragg, A. W. D'Amato, F. W. Davis, M. H. Hersh, I. Ibanez, S. T. Jackson, S. Matthews, N. Pederson, M. Peters, M. W. Schwartz, K. M. Waring, and N. E. Zimmermann. 2016. The impacts of increasing drought on forest dynamics, structure, and biodiversity in the United States. *Global Change Biology*

Foster, J. R., and A. W. D'Amato. 2015. Montane forest ecotones moved downslope in northeastern USA in spite of warming between 1984 and 2011. *Global Change Biology* 21:4497-4507.

Millar, C. I., N. L. Stephenson, and S. L. Stephens. 2007. Climate change and forests of the future: Managing in the face of uncertainty. *Ecological Applications* 17:2145-2151.

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Tim Essington
Associate Director and Professor,
School of Aquatic and Fishery Sciences
Director, UW Quantitative Ecology and
Resource Management (QERM) Graduate Program

Balancing Tradeoffs in Ecosystem Services: Forage Fish, Marine Fisheries, and Food Webs

September 23rd — 3:00 PM
Lillie Auditorium, MBL

Currently, global fisheries provide about 140 million tons per year of high quality protein rich food for humanity. But many fisheries are declining or threatened by over-harvesting, eutrophic-cation or changing climate. Traditional approaches to managing fisheries have relied on single species models of sustainable catch to establish fishing quotas – Tim Essington has been pioneering more comprehensive, ecosystem based approaches to assessing the health of fish populations.

Tim is developing new approaches to fisheries management that include targeting small forage fish, species that play important roles in food webs. His recent research is focused on fisheries policy tools and the conservation benefits they may provide. Tim is also interested in how climate change, hypoxia, and ocean acidification may affect marine populations and food webs, and the threats these ecosystem-level changes pose for conservation and management. He has over 100 publications in peer-reviewed journals. Finally, he is interested in understanding links between fisheries governance and ecological status of marine ecosystems.

Tim received his Ph.D. in Zoology at the University of Wisconsin in 1999, was Assistant Professor at SUNY Stony Brook from 2002-3 and then moved the University of Washington. He held the Lowell A.Wakefield Endowed Professorship in Ocean and Fishery Sciences at University of Washington from 2008-2013. He was awarded a prestigious Pew Fellowship in Marine Conservation in 2011 and won the University of Washington College of Environment Research Award in 2014.

For more information on the Essington Lab Research: http://faculty.washington.edu/essing/

Suggested readings:

Essington, T. E., et al. 2015. Reply to Szuwalski and Hilborn: Forage fish require an ecosystem approach. *Proc Natl Acad Sci USA. 112 (26):3316.*

Szuwalski, C. S. and R. Hilborn. 2015. Environment drives forage fish productivity. *Proc Natl Acad Sci USA. 112(26):3314-3315.*

Essington, T. E., et al. 2015. Fishing amplifies forage fish population collapses. *Proc Natl Acad Sci USA*. 112 (21): 6648-6652.

Essington, T. E., et al. 2015. A novel model of predator–prey interactions reveals the sensitivity of forage fish: piscivore fishery trade-offs to ecological conditions. *ICES Journal of Marine Science*. 72 (5): 1349-1358.

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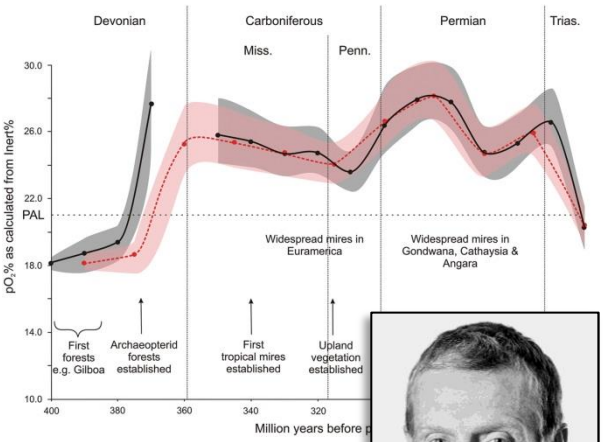
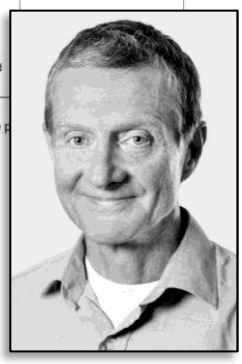


Donald Canfield
Director Nordic Center for Earth Evolution
Professor of Ecology, University Southern Denmark

Breathing Easy at Night: Atmospheric Oxygen and Biological Evolution



October 14th — 3:00 PM
Lillie Auditorium, MBL

Broadly speaking, Don uses the study of modern microbes and microbial ecosystems to understand the evolution of Earth-surface chemistry and biology through time. Don is motivated by the idea that chemical and biological dynamics of ancient ecosystems, and the chemical clues they generate, can best be deciphered in the context of modern biological ecosystems and the physiology of modern microbes.

Don is active in exploring the chemical evolution of the Earth's atmosphere and ocean, and its influence on biological evolution, with a particular emphasis on oxygen. His work is partly physiological — he explores how changing environmental conditions influence the activity levels and chemical signatures generated by microbes. He is also actively engaged in fieldwork. In the modern world, he studies modern ecosystems where chemical gradients generate dynamic microbial interactions such as oxygen-minimum zones where the nitrogen cycle is particularly well expressed. Another example is the interface between sulfidic and oxygenated waters in stratified marine and freshwater basins. Don also does geological fieldwork, looking for rocks deposited during particularly dynamic times in the ancient Earth history.

Don received his Ph.D. at Yale University under the supervision of Bob Berner. He completed postdoctoral fellowships at NASA-Ames Research Center and at the University of Aarhus. He has held positions at Georgia Institute of Technology, the Max Planck Institute of Marine Microbiology and, currently, at the University of Southern Denmark. Don is a member of the editorial board of the Proceedings of the National Academy of sciences (PNAS). In addition to PNAS, Don is on the editorial boards of *Geobiology* and the *American Journal of Science.*

Don has won many prestigious awards for his work. He is a member of the US National Academy of sciences, the Royal Danish Academy of Sciences and Letters, and the Royal Swedish Academy of Science. He was awarded a Docteur Honoris Causa from the University of Poitiers. He is also a fellow of the Geochemical Society, the American Geophysical Union (AGU), the Society for Microbiology, and the American Academy for the Advancement of Science (AAAS). Don won the Vladimir Vernadsky Award from the European Union of Geophysicists (EAG) and the Urey Prize from the European Association of Geochemistry (EAG).

Suggested readings:

Canfield, D.E., 2014a. Oxygen: A Four Billion Year History. Princeton University Press.

Canfield, D.E., 2014b. Proterozoic atmospheric oxygen, in: Farquhar, J. (Ed.), Treatise on Geochemistry, Second Edition. Springer, Amsterdam, pp. 197-216.

Lyons, T.W., Reinhard, C.T., Planavsky, N.J., 2014. The rise of oxygen in Earth's early ocean and atmosphere. Nature 506, 307-315.

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Susan M. Kidwell

William Rainey Harper Professor,
Dept. of the Geophysical Sciences
University of Chicago

Dead Shells Do Tell Tales: Evaluating Human Impacts Using the Youngest Fossil Record

October 28th — 3:00 PM

Lillie Auditorium, MBL

Scientists, environmental managers, and the public increasingly appreciate the diverse and pervasive effects of humans on natural biological systems. However, hard data on rates and patterns of change and on 'baseline' conditions from even a few decades to centuries ago, crucial to evaluating magnitudes and patterns of change and the likely resilience of modern-day systems to continued stress, are extremely difficult to acquire: direct observation often started long after human stresses began. 'Conservation paleobiology' is proving to be a powerful approach in both marine and terrestrial settings, using fossils from the youngest parts of the fossil record, including skeletal remains that are still actively accumulating on land surfaces and seabeds.

In coastal settings, the time-averaged nature of molluscan and other dead-shell assemblages collected in the upper ~10 cm of the seabed is proving to be a powerful means of (i) recognizing that a community has changed and evaluating (ii) how the system changed (which species occur only as dead shells? which occur alive-only or far more abundant alive than dead?) and (iii) when it changed (geologic age-dating of the shells of key species). The ecological memories retained by skeletal remains permit us to recognize species and habitats not otherwise known to be in decline, discriminate natural and anthropogenic drivers, and assess the progress of recoveries. Projects in different settings on several continents demonstrate how this new approach is shifting from proof-of-concept into direct applications for biological conservation and environmental management.

Susan Kidwell is a sedimentary geologist and paleoecologist who has combined field observations, lab experiments, statistical meta-analysis, and modeling to investigate how the fossil record forms and how best to use it to understand the past and anticipate the future of today's biodiversity. She has taught at the University of Chicago since 1985 and is the recipient of many awards, including the 2015 Mary Clark Thompson Medal from the National Academy of Sciences.

For more information: http://geosci.uchicago.edu/people/susan-kidwell/

Suggested readings:

Kidwell, S.M. (2015). Biology in the Anthropocene: Challenges from young fossil records. Proceedings of the National Academy of Sciences, 112: 4922-4929.

Dietl, G.P., S.M. Kidwell, M. Brenner, D.A. Burney, K.W. Flessa, S.T. Jackson, P.L. Koch (2015). Conservation paleobiology: Leveraging knowledge of the past to inform conservation and restoration. Annual Review of Earth and Planetary Science 43: 79–103.