

iFAST: The International Forum on Advanced Environmental Sciences and Technology

A series of distinguished seminars by eminent scientists

8 a.m. CST; 9 a.m. EST; 2 p.m. GMT; 10 p.m. Beijing

Wednesday, Jan. 27, 2021



James Galloway
University of Virginia

<https://evsc.as.virginia.edu/people/profile/jng>

James Galloway is the Sidman P. Poole Professor of Environmental Sciences at the University of Virginia. His research focuses on the beneficial and detrimental effects of reactive nitrogen as it cascades between the atmosphere, terrestrial ecosystems and freshwater and marine ecosystems. His most recent work examines how to maximize the use of nitrogen for beneficial purposes (i.e., food production), while minimizing its negative impacts on people and ecosystems. Galloway is a member of the National Academy of Sciences and is a fellow of the American Association for the Advancement of Science and the American Geophysical Union. He was awarded, with Harold Mooney, the Tyler Prize for Environmental Achievement in 2008.

Nitrogen Out of the Bottle: The Challenge of Managing the Genie

All biological species require nitrogen for survival. The atmosphere around us is full of nitrogen. So, what's the problem?

Human activity converts ~4-fold more N_2 to reactive nitrogen (Nr; all nitrogen species other than N_2) than do natural terrestrial processes (mostly biological nitrogen fixation (BNF) in unmanaged ecosystems). Most of the Nr is created as a consequence of food production, fossil fuel combustion and industry. The Haber-Bosch process, invented in the early 20th century, now provides a virtually inexhaustible supply of nitrogen fertilizer. This one invention is responsible for the existence of about 40% of the world's population. That's the good news. The other news is that most of this nitrogen (and additional amounts from fossil fuel combustion and industry) is lost to the environment, where it has exceeded the ability of the environment to convert it back to unreactive N_2 . The accumulating Nr contributes to smog, greenhouse effect, ecosystem eutrophication, acid rain and loss of stratospheric ozone in a sequential manner—the nitrogen cascade. Collectively, these changes alter climate, decrease air quality and diminish ecosystem sustainability. The challenge is how do we manage the genie—make sure we get the benefits of nitrogen, while minimizing the problems it causes. The presentation will layout the possible, the probable and the improbable (but if it occurred, would be transformative) options for nitrogen management. Included will be the role that nations, institutions and people could play. The presentation will also give examples of success stories, where nitrogen losses to the environment have been decreased, without impacting the service being provided—production of food and energy.



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Register for the Zoom conference at www.ou.edu/ieg/seminars

Organizing Committee Chair: Jizhong Zhou (University of Oklahoma, USA; <https://www.ou.edu/ieg>)
Xueduan Liu (Central South University, China)