Gustavus Chemistry Seminar – Friday, November 21, 2014

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**Air Pollution Kills! So What?  
Air Quality Engineering to Improve Public Health**  
Prof. Julian Marshall  
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Abstract  
According to the World Health Organization, urban air pollution is one of the top 15 causes of death globally (one of the top 10 causes in high-income countries), annually responsible for ~1.7% of deaths worldwide (in high-income countries, 2.1%). How can we reduce those health effects? This presentation will discuss three investigations into that question: (1) Urban form describes the physical layout of an urban area – for example, city shape, population density, sprawl, and “patchiness” of urban growth. We have found that air pollution is related to urban form, for cities in the US and internationally, raising the question of whether urban planning can help cities meet air quality goals. (2) In developing countries, indoor air can be especially polluted, owing to combustion of solid fuels for heating and cooking. In a rural village in Karnataka, India, we conducted a randomized control trial of a higher-efficiency stove, to test whether the stove improves indoor air pollution, health effects, and climate-relevant emissions. (3) We have explored how shifting from conventional fuels to bio-fuels changes the locations of emissions, thereby impacting air quality and who is exposed to pollution. The goal is to understand whether biofuels are better for human health and the environment than the fossil fuels they replace. A constant theme through these topics is environmental justice: which groups have higher exposures to air pollution, and how changes in emissions would shift the correlations between emissions and demographic attributes such as race and income.  
  
Julian Marshall is an Associate Professor in Civil Engineering at University of Minnesota. Julian received his BSE in Chemical Engineering from Princeton University, and his MS and PhD from the Energy and Resources Group at UC Berkeley. He completed a post-doctoral fellowship in Environmental Health at University of British Columbia. His honors include a McKnight Professorship, and the Joan M. Daisey Outstanding Young Scientist Award. Julian is the co-founder and co-director of the Peace Corps Masters degree in Civil Engineering at University of Minnesota, and the Acara program, which helps students launch social ventures to address environmental and health challenges in the US, India, and Uganda.

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