

## CEE SPECIAL SEMINAR

**“HUMAN-ENVIRONMENTAL SYSTEMS: SUBTLE CASUAL RELATIONSHIPS, HIGH VARIABILITY, PERVASIVE UNCERTAINTY, LIMITED DATA, & IMPERFECT MEASUREMENTS...PERFECT FOR A NEW MULTIDISCIPLINE”**

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**ABSTRACT**

Many critical natural, engineered, economic, and human health systems exhibit important linkages between their physical and human behavioral components. Examples include global climate change, coral reef protection, and natural disaster mitigation and resilience for floods, hurricanes, drought, earthquakes, and wild fires. In the past economic models have placed primary focus on human needs and preferences and the ability of an economic system (i.e., factors of production, labor, technology, etc.) to satisfy these, but with overly simplified physical models for resource extraction, material utilization, product use phases, and their environmental impacts. In contrast environmental (and related studies of natural disasters) often ignore or greatly simplify the human behavioral elements of aleatory mislearning, risk perception, trust, confirmation bias, and social norms.

In this talk I review recent examples of human-environmental models developed by the author and other investigators. Examples include models for environmental impact and natural disasters. The talk begins with the DPSIR framework, extended to include the role of scientific studies and Decision Landscapes for regulatory and stakeholder processes. Solution methods are illustrated using expert elicitation, Bayesian Belief Networks, and regret based valuation

**BIOGRAPHY**

**Mitchell Small** is the H. John Heinz III Professor Emeritus of Environmental Engineering in the Departments of Civil and Environmental Engineering and Engineering & Public Policy at Carnegie Mellon University. He received his PhD in Environmental and Water Resources Engineering (1982) at the University of Michigan and has served as a faculty member at Carnegie Mellon since that time. Professor Small's research addresses environmental fate, transport, and exposure; environmental statistics and uncertainty analysis; and integrated assessment of environmental systems and human behavior. Professor Small's professional and public service activities have included: Associate Editor, Environmental Science and Technology (1995-2011); elected Fellow of the Society for Risk Analysis (2003), and service on numerous EPA Science Advisory Board committees and nine National Research Council committees ranging from: Hazardous Wastes in Highway Rights-of-Way (1990-1993); Risk Characterization, leading to publication of the book, Understanding Risk (1994-1996); and Risk Management and Governance Issues in Shale Gas Extraction, Chair (2012 – 2014).