



Planned and Unintended Consequences of Environmental Change

Seizing Science to Meet 21st Century Engineering Challenges



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103 Churchill
Hall
3PM - 4PM

*This seminar is free and
open to the public.*

ABSTRACT: On the 50th anniversary of the National Environmental Policy Act, we revisit the Environmental Impact Assessment (EIA) process in the light of recent advances in our understanding of complex environmental systems.

In particular, research will be presented that investigates the emergent space-time organization of water cycle processes by climate, topography, landform, and land-cover in the Andes and in the Amazon basin which in turn determines regional freshwater supplies, material fluxes, and extreme events. The results show that small-scale anthropocentric land-use change (mining, agriculture, and others) can impact the viability of macro-engineering projects (e.g. dam construction) and lead to continental-scale environmental change. Examples of engineering projects over CONUS will be reviewed emphasizing the differences between evidence of impacts (planned consequences) and evidence of feedbacks including long-range dependencies (unintended consequences). Finally, we argue that EIA tools need to be expanded and updated to incorporate the most recent science and modeling capabilities (e.g. Earth System Models).

Further, the case is made to link the EIA and the engineering project development processes is necessary to achieve adaptation, sustainability and resilience

needs of coupled human-natural systems in a changing climate.

Bio: Dr. Ana P. Barros is the Edmund T. Pratt, Jr. School Professor of Civil and Environmental Engineering at Duke University. Her primary research interests are in Hydrology, Hydrometeorology and Environmental Physics with a focus on water-cycle processes in regions of complex terrain, remote sensing of the environment, and predictability and risk assessment of extreme events. Her research relies on intensive field and laboratory experiments, large-scale computational modeling, nonlinear data analysis and environmental informatics. Prof. Barros has served in multiple national committees over the years, such as the Space Studies Board of the National Research Council, the Water Science and Technology Board, the Board of Atmospheric Sciences and Climate, and the US National Committee for the International Hydrology Program (IHP) of the UNESCO. She was a Senior Fellow at the Energy and Climate Partnership of the Americas (ECPA) 2011-2015, and she is a founding member of the ASCE committee on Climate Change and Adaptation. Currently, Dr. Barros is Chair of Atmospheric and Hydrospheric Sciences at AAAS, and President-Elect of the Hydrology Section of AGU.