

Managing Water and Climate Risks in Agricultural Systems

Andy McDonald

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Monell Building, Room 137, Lamont Campus

Abstract:

To meet expected levels of demand by 2050, current projections suggest that global agricultural production must increase by 70 -90%. In and of itself this will be a substantial task, necessitating an accelerated rate of productivity gain for major food crops, especially in rainfed cropping systems and in many developing regions which have large gaps between economically attainable and achieved yields. Unlike the primary challenges posed during the Green Revolution of simply increasing aggregate food production, there is also now a strong imperative that agricultural systems serve multiple functions including livelihoods, ecosystem services, and reducing conflicts with other economic sectors by becoming more efficient users of natural resources. The increasing certainty of significant climate change is likely to compound these challenges. Understanding and mitigating climate risks together with increasing crop water use efficiency are preconditions for success. Within this framework, this talk will focus on 1) the complex role of resource conserving technologies (RCTs), 2) integrated weed management in a variable and non-stationary climate, 3) comprehensive assessment of U.S. bioenergy mandates, and 4) the challenges of mainstreaming climate change adaptation into rural development efforts. In the past 15 years, agricultural innovation systems have become much more fragmented and multifaceted and, as a whole, perhaps less adept at understanding and exploiting scientific knowledge. At the same time, the multiple functions required from agriculture systems necessitate integrated approaches to management that are increasingly knowledge intensive. Moving forward, advanced research institutions must play a central role in agricultural development by ensuring that issues of scale, integration across disciplines, and process-based insights inform management, public policy, and investment.

Speaker Bio:

Andrew McDonald is a research associate in the Department of Earth and Atmospheric Sciences at Cornell University and also the research coordinator for the New York State Water Resources Institute. He received MSc and PhD degrees in Crop & Soil Sciences from Cornell University



and was also awarded a post-doctoral fellowship from the USDA's National Research Initiative. His research interests include the quantification of climate and soil influences on crop yield potential and understanding linkages between environmental factors and the damage caused by agricultural pests. The scale of these studies ranges from the stress physiology of individual plants to field and landscape processes explored through simulation modeling. Aspects of this research are used to develop practical strategies for increasing the efficiency, resilience, and profitability of agricultural production, especially as they relate to issues of water resources management and climate change. He also was a lead author on the World Bank's IAASTD assessment of international agricultural development. For the Bank's Vulnerability to Climate Change in Agricultural Systems in Latin America and the Caribbean: Building Response Strategies project, Andrew serves as the primary technical consultant for modeling tools and the biophysical dimensions of climate change. In New York State (US), Andrew is the co-chair for water resources on the ClimAID project, a collaborative effort with multiple stakeholder groups to identify potential climate change-related vulnerabilities and opportunities for building resilience.