Addressing Water Variability and Scarcity
- The Role of Agricultural Research

July 17, 2019 · 12:30 - 5:15 p.m.
IFPRI · 1201 Eye St. NW · Washington, DC (and via live webcast)

ilsirf.org/symposium2019

The Environment and Production Technology Division, International Food Policy Research Institute (IFPRI) and the ILSI Research Foundation are pleased to welcome you to the symposium: Addressing Water Variability and Scarcity - The Role of Agricultural Research. Our panel of speakers include experts from IFPRI, United States Agency for International Development (USAID), United States Department of Agriculture Economic Research Service (USDA ERS), Donald Danforth Plant Science Center, World Bank, and Georgetown University. Their presentations today will focus on new technologies that are being developed and/or applied to mitigate the impacts of water stress on agricultural productivity, as well as the enabling policy environment that is needed to ensure that water-related research and development efforts are effectively deployed and scaled up. The symposium will conclude with a panel discussion, during which questions from the audience will be accepted.

Join the Conversation!

The ILSI Research Foundation Twitter handle is @ILSIRF. The IFPRI handle is @IFPRI. Abstracts and speaker bios may be found on the event webpage: ilsirf.org/symposium2019.

Example Tweets

At the Symposium: Addressing Water Variability & Scarcity - The Role of Agricultural Research! Enjoying talks by speakers from @IFPRI @ILSIRF @USAID @USDA_ERS @DanforthCenter @WorldBankWater @georgetownafs @almondboard. Abstracts & live webcast link: https://ilsirf.org/symposium2019/

Learning more about the role of agricultural research in addressing water variability and scarcity at today’s @IFPRI & @ILSIRF symposium. Grab the link to the live webcast and more at https://ilsirf.org/symposium2019/, and mention @ILSIRF to submit questions for the panel discussion.

Q&A

The symposium will include a panel discussion with all the speakers, as well as an opportunity for questions and answers from attendees. You can ask questions in-person, on Twitter by mentioning @ILSIRF, or by emailing rf@ilsi.org.
## Agenda

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<td>The New Agricultural Research Revolution, Water, and the Future of Public Sector Research</td>
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Abstracts

An Overview of Promising Technologies for Improved On-Farm Management of Water
Biniam Iyob, Ph.D., Bureau for Food Security, USAID

Good on-farm management of water in developing countries could contribute in a major way to help vulnerable farmers out of poverty. Fortunately, we are in an era where technologies for on-farm water management are rapidly evolving. Water lifting technologies such as solar pumps have been undergoing product changes and price reductions that are increasing their adoption. Similarly, water conveyance methods, such as drip irrigation, have also seen their accessibility and utilization increase in many developing countries. In addition to the technologies themselves, a strategic approach is needed to achieve widespread and sustainable adoption. Such an approach could result in improved food security, resilience, and nutrition. Four factors, called the four Ps, borrowed from the marketing field, might be useful for increasing adoption of sustainable practices for on-farm water management. First, the technology product has to fit in the context and stakeholder preferences. Second, the price of the technology has to be reasonable to adopters. Third, the promotion of the technology has to be communicated well and at the right platforms. And, fourth, the technologies have to be available at the right place and time. However, these four Ps are not enough. Many other critical factors also need to be considered for the technologies to be sustainable (environmentally, socio-economically, and politically). These factors include: the right crop type; good agronomic practices for fertilizer and seed; pest and weed management; access to markets for farmers to sell produce; resilience mechanisms such as insurance; equity considerations for gender and youth; and related policies.

Small Farm Use of Precision Technologies for Row Crop Production in the U.S.
David Schimmelpfennig, Ph.D., USDA ERS

This paper considers characteristics of small farms that grow different row crops. These structural characteristics are then related to adoption rates for various precision agricultural technologies on small farms. Taking the smallest 10-15 percent of a nationally representative sample of farms growing each crop, small rice and wheat farms are over twice the size of small maize and soybean farms, and field sizes on these farms are much larger. This means that small maize and soybean farms have many more fields to manage using precision technologies. Soybean fields tend to be larger than maize fields on small farms.

Higher national adoption rates for precision practices on larger farms indicates that the smallest farms, and those with the most fields, may find adoption more difficult. Soil mapping adoption is higher on mid-sized small farms for most crops. Guidance is more widespread on all sizes of small wheat and rice farms, and they have the largest average field sizes. VRT seed, chemical, and fertilization are likewise more popular on larger small wheat and rice farms.

The results indicate that there is some use of each technology in most of the size categories of small farms. This is despite the fact that adoption increases with farm size for all row crops examined at the national level. Small farm adoption of PrecAg only goes to zero on the smallest farms for one crop – maize. This is the crop with the highest national adoption levels.

Novel Approaches to Breeding for Resilience in Water Stressed Environments
Todd Mockler, Ph.D., Donald Danforth Plant Science Center

Sorghum is the fifth most widely grown cereal crop worldwide and also an attractive system for the development of bioenergy feedstocks. It has innate resilience to drought and heat stresses, versatile end-uses, and a rapidly developing suite of genetic, genomic, and phenomic tools. Drought is a complex trait, and identifying the genes underlying sorghum’s innate drought tolerance and how they are regulated requires advanced approaches in genetics, genomics, and phenotyping. Our approach has included sequencing and analyzing the genomes of several hundred racially, geographically, and phenotypically diverse sorghum lines representing all five major sorghum races. Sequencing ~400 sorghum genomes revealed millions of genomic sequence variants and identified candidate genes underlying several traits of interest. Exploration of the sorghum ‘pan-genome’ provided an initial catalog of “core” and “accessory” genes that are potential sources of adaptive alleles. Our work also leverages a field-based phenotyping infrastructure at Maricopa, AZ, which provides an exceptional capability for managed stress trials in a hot and arid environment through controlled irrigation. An automated field scanner system collects high-resolution phenotyping data using a variety of sensors throughout the growing season, from seedling establishment to harvest. Being able to assess the genotype-to-phenotype link in response to drought over the life cycle of the plant will facilitate the discovery of genes and their functions. Identifying the genes underlying drought tolerance will ultimately reveal the genetic basis for the remarkable phenotypic plasticity of sorghum.
Enabling Environments for Achieving Innovations in Water Management in Agricultural Production
Mutsa Masiyandima, Remi Trier, and Regassa Namara, World Bank – Water

Irrigation has the potential to accelerate growth in several countries, with benefits accruing to more than 180 million people and revenue in excess of US$20 billion annually. In SSA, such growth is a tool for reducing poverty. Many triggers and drivers for irrigation development exist, including climate change, decreasing farm sizes requiring intensification for farming to remain viable, more accessible and affordable technologies and services, and a proliferation of irrigation service markets. This presentation will be on creating enabling environments to harness the potential for expanding irrigation that exists. Focusing on Africa and with examples from Africa and Asia, we will discuss (a) existing barriers to innovation in water management for agriculture including environment, financing, issues of scale, capacity, and institutions, (b) priority enabling conditions to introduce and scale-up smallholder irrigation, (c) innovative financing mechanisms, (d) technologies, and (e) efforts required to address capacity challenges in reference to the need for extension services and technical assistance for smallholder farmers, especially when transitioning from rainfed to irrigated production and when the technological changes involves the change of crops. We will close with a brief discussion of the World Bank approach for scaling up farmer-led irrigation to enhance irrigation impacts.

The New Agricultural Revolution, Water Use, and the Challenge for Public Sector Research
Mark Giordano, Ph.D., Walsh School of Foreign Service, Georgetown University

We are in the beginning stages of a biological science and information revolution that will have unprecedented impacts on agriculture, including the ways in which crops use water and farmers respond to increasing variation in its availability. The revolution has so far been typified by 1) dramatic rates of technologic change and diffusion, 2) reductions in the costs of technology development, 3) change in the nature of the science, scientists and implementers involved, 4) transformation in the source of investment towards the private sector, and 5) rapid growth in the volume of investment targeting agriculture. The revolution holds tremendous potential for poor farmers, particularly those in regions bypassed by the original Green Revolution and traditional agricultural water investments. However, the nature of the new revolution is rapidly shifting agricultural priority setting away from national and international public sector and NGO actors, as well as traditional agricultural researchers and research centers. These actors have a major role to play in informing and shaping the new revolution so that it benefits rather than harms the poor. Whether the role can be realized will depend on how quickly they can recognize and adapt to the new agricultural research environment.

Speaker Biographies

Claudia Ringler, Ph.D.
Deputy Director
Environment and Production Technology Division, IFPRI

Claudia Ringler is Deputy Division Director at the International Food Policy Research Institute (IFPRI). A thought leader on water for food, she manages IFPRI’s Natural Resource Theme, co-leads the Institute’s water research program, and is a co-manager of the Managing Resource Variability, Risks, and Competing Uses for Increased Resilience (VCR) flagship of the CGIAR Research Program on Water, Land, and Ecosystems (WLE). Claudia also chairs the Food, Energy, Environment, and Water Network (FE2W) and is associated with the Sustainable Water Futures Program of Future Earth. She has published more than 100 journal articles in the areas of global water and food security, gender-water and gender-climate change linkages, and the synergies of climate change adaptation and mitigation. Claudia has a Ph.D. in agricultural economics from University of Bonn and an M.A. in International Development Economics from Yale University.

Morven A. McLean, Ph.D.
Executive Director
ILSI Research Foundation

Morven A. McLean, Ph.D. is the Executive Director of the non-profit International Life Sciences Institute (ILSI) Research Foundation, where she works with a dedicated team on multi-sectoral, interdisciplinary scientific and capacity building programs that span agriculture, nutrition, and the environment.

Dr. McLean first joined the ILSI Research Foundation in 2009 as Director of the Center for Environmental Risk Assessment, and in 2013 was additionally appointed lead for sustainable agriculture and nutrition security across the ILSI organization internationally. She has held the position of Chief of Canada’s Plant Biotechnology Office, the federal regulatory authority for the assessment and release of genetically modified plants, and was President of AGBIOS, a consultancy that works internationally with governments, non-governmental organizations, and the public and private sectors on issues of policy and regulation pertaining to genetically modified foods, crops, and forest tree species. Dr. McLean has served as a technical expert on biotechnology risk assessment, regulation, and policy for many organizations, including the Food and Agriculture
Organization, the World Bank, the United States Agency for International Development, the United National Environmental Program, and the Secretariat to the Convention on Biological Diversity, as well as many national governments.

Dr. McLean received her B.Sc. (Agriculture) from McGill University, M.Sc. in environmental biology from the University of Guelph, and Ph.D. in molecular plant virology from the University of British Columbia. She completed her post-doctoral training with Agriculture and Agri-food Canada’s Vancouver Research Station.

Mark W. Rosegrant, Ph.D.
Research Fellow Emeritus
Director General’s Office, IFPRI

Dr. Mark W. Rosegrant is a Research Fellow Emeritus in the Director General’s Office (DGO) of the International Food Policy Research Institute (IFPRI). Prior to joining DGO, he was director of IFPRI’s Environment and Production Technology Division. With a Ph.D. in Public Policy from the University of Michigan, he has extensive experience in research and policy analysis in agriculture and economic development, with an emphasis on water resources and other natural resource and agricultural policy issues as they impact food security, rural livelihoods, and environmental sustainability. He currently directs research on climate change, water resources, sustainable land management, genetic resources and biotechnology, and agriculture and energy.

He is the author or editor of 12 books and over 100 refereed papers in agricultural economics, water resources, and food policy analysis. Dr. Rosegrant has won numerous awards, such as Outstanding Journal Article (2008), Quality of Communications Award (2004), and Distinguished Policy Contribution Award(2002) awarded by the Agricultural and Applied Economics Association (formerly American Agricultural Economics Association); and Best Article Award (2005) from the International Water Resources Association. Dr. Rosegrant is a Fellow of the American Association for the Advancement of Science; and a Fellow of the Agricultural and Applied Economics Association.

Biniam Iyob, Ph.D.
Water and Irrigation Advisor
Bureau for Food Security, USAID

Biniam Iyob joined the U.S. Agency for International Development’s Bureau for Food Security in 2013 to work as a water and irrigation advisor. He is also the activity manager for the Feed the Future Innovation Lab for Small-Scale Irrigation, the Cereal Systems Initiative for South Asia, and four Farmer to Farmer projects. Previously, he taught geography courses at the University of New Hampshire, helped assess irrigation and harvesting methods at a sugar cane farm in Mauritius, and served as a research assistant regarding tourism and business for a consulting firm. Earlier, he worked as a soil and water conservationist with the Ministry of Agriculture, as an assistant hydrogeologist for a consulting firm, and as a technical/manual laborer in irrigated farms run by the Eritrean army. He holds a doctorate in geography focusing on the Nile Basin and a master's degree in remote sensing of vegetation change from Oregon State University, an MBA from the University of Mauritius, and a bachelor's degree in soil and water conservation from the University of Asmara, Eritrea.

David Schimmelpfennig, Ph.D.
Agricultural Economist
United States Department of Agriculture Economic Research Service (USDA ERS)

David Schimmelpfennig is an Agricultural Economist at USDA ERS. His areas of interest are the value of information, and agricultural research and productivity. His work on information economics relates to precision agriculture, market structure, and crop pest early-warning systems. He has investigated productivity growth and efficiency in South Africa, India, and the United Kingdom, in addition to the U.S. He was a senior Fulbright Scholar at the University of Pretoria, South Africa, and had Rockefeller Foundation projects on the impacts of genetically modified crops in South Africa. He has leadership responsibility for the information technology questions on the Agricultural Resource Management Survey (ARMS), the most comprehensive farm production survey conducted by USDA. His high profile work appears in National Geographic, The New York Times, Smithsonian’s National Museum of American History, and Science. He is an associate editor of Renewable Agriculture and Food Systems.
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Todd Mockler, Ph.D.
*Geraldine and Robert Virgil Distinguished Investigator*
Donald Danforth Plant Science Center

Todd Mockler is the Geraldine and Robert Virgil distinguished investigator at the Donald Danforth Plant Science Center. He has helped lead several international consortia that have sequenced plant genomes, including the Brachypodium distachyon, Oropetium thomaeum, strawberry, and black raspberry genomes and the sorghum pan-genome project. His research has also included the development of genomic and bioinformatic tools, with the end goal of improving crop performance and yield. Areas of study include gene regulatory networks, plant abiotic stress responses, genome sequencing and analysis, and high-throughput phenotyping. His published work provides critical tools and approaches for using large-scale multi-omics datasets to understand complex biological systems. In 2012, Dr. Mockler co-founded Benson Hill Biosystems, a crop improvement company unlocking the natural diversity of plants.

He received his doctorate in molecular biology at the University of California – Los Angeles and his bachelor's degree in molecular biology from Wesleyan University in Connecticut.

Mutsa Masiyandima, Ph.D.
*Senior Irrigation and Drainage Specialist*
Water Team - West Africa Unit, World Bank

Mutsa Masiyandima joined the World Bank Water’s West Africa unit as a Senior Irrigation and Drainage Specialist in 2018. Her current work involves supporting implementation of irrigation projects in West Africa where she supports the implementation of the Sahel Irrigation Initiative Project (SIIP) in Burkina Faso, Chad, Mali, Mauritania, Niger, and Senegal, with a focus on the irrigation solutions component. SIIP is a contribution to realizing the Dakar Declaration of 2013. Prior to joining the World Bank, Mutsa spent more than 16 years working on various aspects of water resources and agricultural water management. She coordinated CARE USA’s water interventions work in Ghana, Malawi, and Mali, providing technical guidance to field teams on practices that enhance access to water for production and efficient use of available water (spanning soil and water conservation, conservation agriculture, and irrigation) by smallholder farmers. Prior to her work at CARE, she contributed to AfricaRice’s Sustainable Water and Environment theme in southern Africa, developing, leading and implementing research on agricultural water management, groundwater management, and catchment hydrology. Mutsa has experience working in at least 21 countries, mostly in sub-Saharan Africa, including her native Zimbabwe. She has a Ph.D. in Agricultural Engineering from Cornell University. The Rockefeller Foundation supported her research work on the hydrology of a small catchment in the sub-humid Guinea Savanna zone in Cote d’Ivoire.

Mark Giordano, Ph.D.
*Professor of Geography and Cinco Hermanos Chair in Environment and International Affairs*
Walsh School of Foreign Service, Georgetown University

Mark Giordano is Professor of Geography and Cinco Hermanos Chair in Environment and International Affairs at Georgetown University’s Walsh School of Foreign Service. His research and teaching focuses primarily on the international political dimensions of water and agriculture and the geography of geopolitics. Mark serves on the Institute for the Study of Diplomacy's Working Group on the Global Commons, is a founding member of Georgetown’s India Initiative, and sits on the board of the Kentler International Drawing Space. Prior to joining Georgetown in 2013, Mark held multiple roles at the Sri Lanka-based International Water Management Institute and earlier served as a trade economist with the U.S. Department of Agriculture. He has spent a substantial part of his professional life in Asia and Africa and is from Washington State.

Josette Lewis, Ph.D.
*Director of Agricultural Affairs*
Almond Board of California

Josette Lewis is the Director of Agricultural Affairs for the Almond Board of California. She most recently served as Associate Vice President of the Environmental Defense Fund, where she focused on ecosystems and sustainable agriculture. She previously served as the Associate Director of the University of California, Davis World Food Center and also worked with Arcadia Biosciences as the Director of Agricultural Development to expand the company’s licensing and partnerships, particularly in developing countries. Prior to joining Arcadia, Dr. Lewis spent 16 years with the U.S. Agency for International Development. Most recently, she served as Director of the Office of Agriculture, where she played a leadership role in the development of the Administration’s global initiative on food security, development of a new strategy for agricultural research, and initiated numerous new partnerships with universities, agricultural companies, and non-governmental organizations in the U.S. and developing countries.