

2010

## Opening- Proceedings of the 2010 Water for Food Conference

Prem S. Paul

*University of Nebraska at Lincoln, ppaul2@unl.edu*

Monica Norby

*University of Nebraska-Lincoln, mnorby1@unl.edu*

Gillian Klucas

*University of Nebraska-Lincoln*

Ashley Washburn

*University of Nebraska-Lincoln*

Elizabeth Banset

*University of Nebraska-Lincoln*

*See next page for additional authors*

Follow this and additional works at: <http://digitalcommons.unl.edu/researchecondev>

---

Paul, Prem S.; Norby, Monica; Klucas, Gillian; Washburn, Ashley; Banset, Elizabeth; and Miller, Vicki, "Opening- Proceedings of the 2010 Water for Food Conference" (2010). *Office of Research and Economic Development--Publications*. 53.  
<http://digitalcommons.unl.edu/researchecondev/53>

This Article is brought to you for free and open access by the Research and Economic Development, Office of at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Office of Research and Economic Development--Publications by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

---

**Authors**

Prem S. Paul, Monica Norby, Gillian Klucas, Ashley Washburn, Elizabeth Banset, and Vicki Miller



Proceedings of the 2010 Water for Food Conference

Lincoln, Nebraska – May 2-5



water  
for  food

A GLOBAL INSTITUTE AT THE UNIVERSITY OF NEBRASKA

Proceedings of the 2010  
Water for Food Conference

Lincoln, Nebraska – May 2-5

UNIVERSITY OF  
Nebraska

© 2010, The Board of Regents of the University of Nebraska. All rights reserved.

Proceedings of the 2010 Water for Food Conference, May 2-5, Lincoln, NE.

**Citation:**

University of Nebraska–Lincoln Office of Research and Economic Development (2010).  
Proceedings of the 2010 Water for Food Conference. Lincoln.

ISBN: 978-0-615-41249-8

Additional comments and information requests may be directed to:  
Prem S. Paul, Vice Chancellor for Research and Economic Development  
301 Canfield Administration Building  
University of Nebraska–Lincoln  
Lincoln, NE 68588-0433  
(402) 472-3123 • ppaul2@unl.edu

## **Credits**

### **Executive Editor**

Monica Norby

### **Writers**

Gillian Klucas, Monica Norby

### **Production Editor**

Ashley Washburn

### **Contributing Editors**

Elizabeth Banset, Vicki Miller

### **Photography**

Joel Brehm, Craig Chandler, Brett Hampton, Alan Jackson/Jackson Studios, Monica Norby, Robert Cope

### **Additional photos**

©iStockphoto.com/Simon Gurney, p. 12; Nathan Laurell/Flickr, p. 14; ©iStockphoto.com/iEverest, p. 16; ©iStockphoto.com/neotakezo, p. 17; ©iStockphoto.com/urosr, p. 18; Valmont Industries, p. 20, p. 106; CIMMYT, p. 26, p. 88; ©iStockphoto.com/FrankvandenBergh, p. 31; Richard Nyberg/USAID, p. 33, p. 65, p. 76; Ben Barber/USAID, p. 35; Anne Wangalachi/CIMMYT, p. 41, p. 77; International Rice Research Institute/www.irri.org, p. 46; IFPRI/Flickr, p. 54; USAID, p. 61; ©iStockphoto.com/enviromantic, p. 90; ©iStockphoto.com/micheldenijs, p. 110; Doug Wilson/USDA-ARS, p. 112, ©iStockphoto.com/Lpieuchot, p. 126; ©iStockphoto.com/romarko, p. 129; C. Hamlin/USAID, p. 141

### **Design**

Sym Labs

### **Transcription**

Julie Pell, Doris Schuessler

The University of Nebraska is an Affirmative Action/Equal Opportunity institution.

---

## Conference Sponsors

Major conference support underwritten by  
**Robert B. Daugherty Charitable Foundation**

Generous conference support provided by  
**Bill & Melinda Gates Foundation**  
**Monsanto Company**

## Water for Food Conference Committees

### Senior Advisory Council

Michael K. Doane, Monsanto Company  
Simi Sadaf Kamal, Hisaar Foundation  
Katherine Lombardo, Bill & Melinda Gates Foundation  
Robert Meaney, Valmont Industries Inc.  
David Molden, International Water Management Institute  
Keith Olsen, Nebraska Farm Bureau  
Prem S. Paul, University of Nebraska–Lincoln  
Peter Rogers, Harvard University

### University of Nebraska

#### Faculty Planning Committee

Ann Bleed  
Ken Cassman  
Bruce Dvorak  
Kimberly Andrews Espy  
Thomas Farrell  
Sheri Fritz  
Steve Goddard  
Mark Gustafson  
Kyle Hoagland  
Richard Hoffmann  
Monica Norby  
Shashi Verma  
Ron Yoder  
Don Wilhite  
Mike Zeleny  
Sandi Zellmer

### Conference Staff

University of Nebraska–Lincoln  
Office of Research and Economic Development

Tausha Ward Armbruster  
Elizabeth Banset  
Joel Brehm  
Seth Burkey  
Peg Filliez  
Mari Greer  
Kristen Kinnan  
Vicki Miller  
Tim Savage  
Peter Stewart  
Corrie Svehla  
Karen Underwood  
Ashley Washburn  
Becky Zavala  
Lorrie Benson

# Contents

- 11 Foreword**
- 12 Executive Summary**
- 24 Chapter 1: Introduction**
- 28 Chapter 2: Global Perspectives on Water for Food**
- 30 Keynote Address – The Water Crisis and the Future of Global Poverty**  
Jeff Raikes, CEO, Bill & Melinda Gates Foundation
- 34 President’s Welcome – A Visionary Gift for the 21st Century**  
James B. Milliken, President, University of Nebraska
- 36 Chancellor’s Welcome – Water for Food: Imagining the Future**  
Harvey Perlman, Chancellor, University of Nebraska–Lincoln
- 38 Increasing the Drought Tolerance of Crops: Urgency, Myths, Achievements and Realities**  
Gary Atlin, Associate Director, Global Maize Program, International Maize and Wheat Improvement Center (CIMMYT)
- 42 Charting Our Water Future: Economic Frameworks to Inform Decision-Making**  
Giulio Boccaletti, Expert Associate Principal, McKinsey & Company
- 45 Water Security: What is the Challenge and What Needs to be Done?**  
John Briscoe, Gordon McKay Professor of the Practice of Environmental Engineering, Harvard University
- 49 Comparing Green Revolutions in Asia and Nebraska: Lessons for Sub-Saharan Africa**  
Ken Cassman, Heuermann Professor of Agronomy and Director, Nebraska Center for Energy Sciences Research, University of Nebraska–Lincoln
- 53 Science Challenges at the Water/Food Nexus: An NSF Perspective**  
Richard Cuenca, Program Director for Hydrologic Sciences, National Science Foundation
- 56 A System Approach to Water Productivity**  
Robert T. Fraley, Executive Vice President and Chief Technology Officer, Monsanto Company
- 60 ICIWaRM – America’s First UNESCO Category 2 Water Center**  
William S. (Will) Logan, Deputy Director, International Center for Integrated Water Resources Management (ICIWaRM)

- 
- 62 Growing Enough Food Without Enough Water**  
David Molden, Deputy Director General for Research, International Water Management Institute
- 66 Water Sector Improvement through Participatory Irrigation Management in India**  
U.N. Panjiar, Secretary, Ministry of Water Resources, India
- 69 The Water-Saving Irrigation Strategy and Effect in China**  
Shiqi Peng, Chief Scientist, National Agro-Technical Extension and Service Centre, Ministry of Agriculture, China
- 72 Population, Food and Water: Role of Water Management in Global Food Production**  
Krishna C. Prasad, Senior Lecturer in Land and Water Development, UNESCO-IHE, Netherlands
- 74 Going from 1 to 3 Tons Per Hectare in Africa with More Variable Rainfall**  
Pedro Sanchez, Columbia University Earth Institute, 2002 World Food Prize Laureate
- 78 Chapter 3: Genetics and Physiology of Crop Water Use**
- 81 A Global Assessment of Corn Water Use As Affected by Climate, Genetics and Scarcity**  
Marty Matlock, Professor of Ecological Engineering, University of Arkansas
- 82 Plant Research Innovations in the University: When Will They Apply to the Real World?**  
Sally Mackenzie, Ralph and Alice Raikes Chair, Plant Sciences, and Director, Center for Plant Science Innovation, University of Nebraska–Lincoln
- 84 Mapping and Cloning QTLs for Drought Tolerance in Durum Wheat and Maize**  
Roberto Tuberosa, Professor of Biotechnology Applied to Plant Breeding, University of Bologna, Italy
- 85 Breeding for Water Productivity in Temperate Cereals**  
Richard Richards, Chief Research Scientist, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia
- 87 Panel Discussion**
- 90 Chapter 4: Human Dimensions of Water for Food Production**
- 93 Feeding 9 Billion and Maintaining the Planet: Meeting the Challenge of 2050**  
Jason Clay, Senior Vice President of Market Transformation, World Wildlife Fund



# Contents

- 94 Agricultural Water: Challenges and Opportunities for Africa**  
Elijah Phiri, Leader of the Comprehensive Africa Agriculture  
Development Programme (CAADP) Pillar 1, University of Zambia
- 96 Agricultural Productivity in Developing Countries: The World Food Equation and Food Security**  
Lilyan Fulginiti, Professor of Agricultural Economics, University of Nebraska–Lincoln  
Richard Perrin, Jim Roberts Professor of Agricultural Economics, University of Nebraska–Lincoln
- 97 Managing in a World of Ever Increasing Water Scarcity: Lessons from Australia**  
Mike Young, Executive Director, The Environment Institute, University of Adelaide, Australia
- 99 Panel Discussion**
- 102 Chapter 5: Technologies and Advances in Water Management**
- 105 Highlights of Research and Educational Programs Related to Agricultural  
Water Management in Nebraska**  
Suat Irmak, Associate Professor of Biological Systems Engineering, University of Nebraska–Lincoln
- 107 Wireless Underground Sensor Networks: A New Perspective for Automated Water Management**  
M. Can Vuran, Assistant Professor of Computer Science and Engineering,  
University of Nebraska–Lincoln
- 109 Trends in Crop Water Productivity Enhancement: Why the New  
Green Revolution Must Be Blue-Green**  
Steven R. Evett, Research Soil Scientist, USDA-Agricultural Research Service Conservation  
and Production Research Laboratory
- 111 Panel Discussion**
- 114 Chapter 6: A View from Agricultural Producers**
- 117 Rainfed and Irrigated Production in Argentina**  
Martin Pasman, Producer, Argentina
- 118 No-till Rainfed Farming in Nebraska**  
Keith Olsen, Producer; Nebraska Farm Bureau
- 120 Consumptive Water Use on a Nebraska Irrigated Farm**  
Roric R. Paulman, Paulman Farms, Nebraska

---

**121 Farming in an Oregon Critical Groundwater Area**

Aaron Madison, Madison Farms, Oregon

**123 Panel Discussion**

**126 Chapter 7: Climate Challenges to Water for Agriculture**

**128 Impacts of Weather Variability on Rice and Aquaculture Production in the Mekong Delta**

Nguyen Hieu Trung, Dean of the College of Environment and Natural Resources,  
Can Tho University, Vietnam

**130 Change in the Western Himalaya and Hindu Kush**

John (Jack) F. Shroder, Professor of Geography and Geology, University of Nebraska at Omaha

**132 Chapter 8: Key Issues for the Future**

**135 Important to Nebraska and Important Globally**

Ken Cassman, Heuermann Professor of Agronomy and Director, Nebraska Center  
for Energy Sciences Research, University of Nebraska–Lincoln

**136 An Unbiased Source of Information**

Eugene Glock, Producer, Cedar Bell Farms, Nebraska

**136 Filling the People and Research Gaps**

David Molden, Deputy Director General for Research, International Water Management Institute

**137 Putting the Knowledge into Action**

Peter Rogers, Gordon McKay Professor of Environmental Engineering, Harvard University

**138 Panel Discussion**

**142 Appendix**

**144 Poster Competition**

**148 Conference Participants**

**154 Photos**

## In Memoriam



**Robert B. Daugherty**  
Jan. 8, 1922 – Nov. 24, 2010

*“Improving agricultural productivity has been my life’s work.”*

## **\$50 Million Gift from Robert B. Daugherty Foundation Funds Water for Food Institute**

On April 20, 2010, the University of Nebraska announced a \$50 million founding gift commitment from the Robert B. Daugherty Charitable Foundation to support the global Water for Food Institute, a research, education and policy analysis institute focused on the efficient use of water in agriculture.

NU President James B. Milliken said the gift will enable the university to become a global resource for developing solutions to the challenges of hunger, poverty, agricultural productivity and water management. “By 2050, the world’s population will increase by 40 percent and demand for food – produced with finite amounts of land and water – will double,” Milliken said. “We have the experience and opportunity to build a global center in Nebraska, leveraging the knowledge and resources of the University of Nebraska and other leading institutions to help alleviate human suffering and food insecurity.”

Milliken praised the vision and commitment of Robert B. Daugherty, founder of Valmont Industries, who created the most successful irrigation company in the world and remained committed to the efficient and sustainable use of water to feed a growing world population. “Bob Daugherty was a true pioneer and visionary,” Milliken said. “He helped transform production agriculture and was a leader in addressing one of the most critical challenges facing the world.”

When the gift was announced in April, Daugherty said, “I have great faith in the University of Nebraska and its ability to make this institute a place where the best minds come together to find solutions that will improve the quality of life for people around the world through the strategic and responsible use of water.”

The Water for Food Institute is committed to helping the world efficiently use its limited fresh water resources to ensure the food supply for current and future generations. The institute will offer research, education and policy analysis on the efficiency and sustainability of water use in agriculture, the quantity and quality of water resources, and human issues that affect the water decision-making process.

Issues surrounding water for food have long been, and continue to be, a focus of University of Nebraska research. The knowledge and capabilities developed in Nebraska can be shared and applied globally, and Nebraska can, in turn, learn from its regional, national and international partners, Milliken said.

The water for food institute is governed by a board of directors: James B. Milliken, president, University of Nebraska, chairman; Mogens Bay, chairman of the board, Robert B. Daugherty Charitable Foundation, and chief executive officer, Valmont Industries; and Jeff Raikes, CEO, Bill & Melinda Gates Foundation.



# Foreword

Today 75 to 80 percent of human water consumption is used to grow food. The projected doubling in food demand, coupled with the impact of climate change on the geographic availability of water, will significantly increase the demand for water and the potential for a water crisis.

As native Nebraskans, we know very well the linkage between water and food. We grew up in an agricultural state, in an environment with an abundance of good soil, enough rainfall and water for irrigation, and the constant expansion of agriculture through innovation. As the threat of global poverty and food insecurity grows, we know that water security and food security are inextricably linked. Without adequate water resources, we cannot meet the needed increase in food production. We must grow more “crop per drop.”

This was the key issue at the 2010 Water for Food Conference: Growing More with Less, hosted by the University of Nebraska with the support of the Robert B. Daugherty Charitable Foundation, the Bill & Melinda Gates Foundation and Monsanto

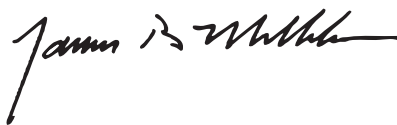


Jeff Raikes, CEO  
Bill & Melinda Gates Foundation

Company. This report documents the ideas and discussions that emerged from that conference.

Two weeks before the conference convened, fellow Nebraskan Robert B. Daugherty showed his commitment to the efficient and sustainable use of water to feed a growing world population with a founding gift of \$50 million from his foundation to the University of Nebraska to establish the global Water for Food Institute. As founder of Valmont Industries, the most successful irrigation company in the world, Daugherty played a role in transforming production agriculture and was a leader in addressing one of the most critical challenges facing our world. His gift creates an opportunity for the University of Nebraska to make a lasting impact on global poverty and hunger.

The conference provided a forum to bring together more than 300 people from 13 countries who share our urgent interest in finding innovative solutions to the challenge of growing more food with less water. We hope this report inspires you to consider your contribution to growing more with less.



James B. Milliken, President  
University of Nebraska