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Chapter 8- Key Issues for the Future

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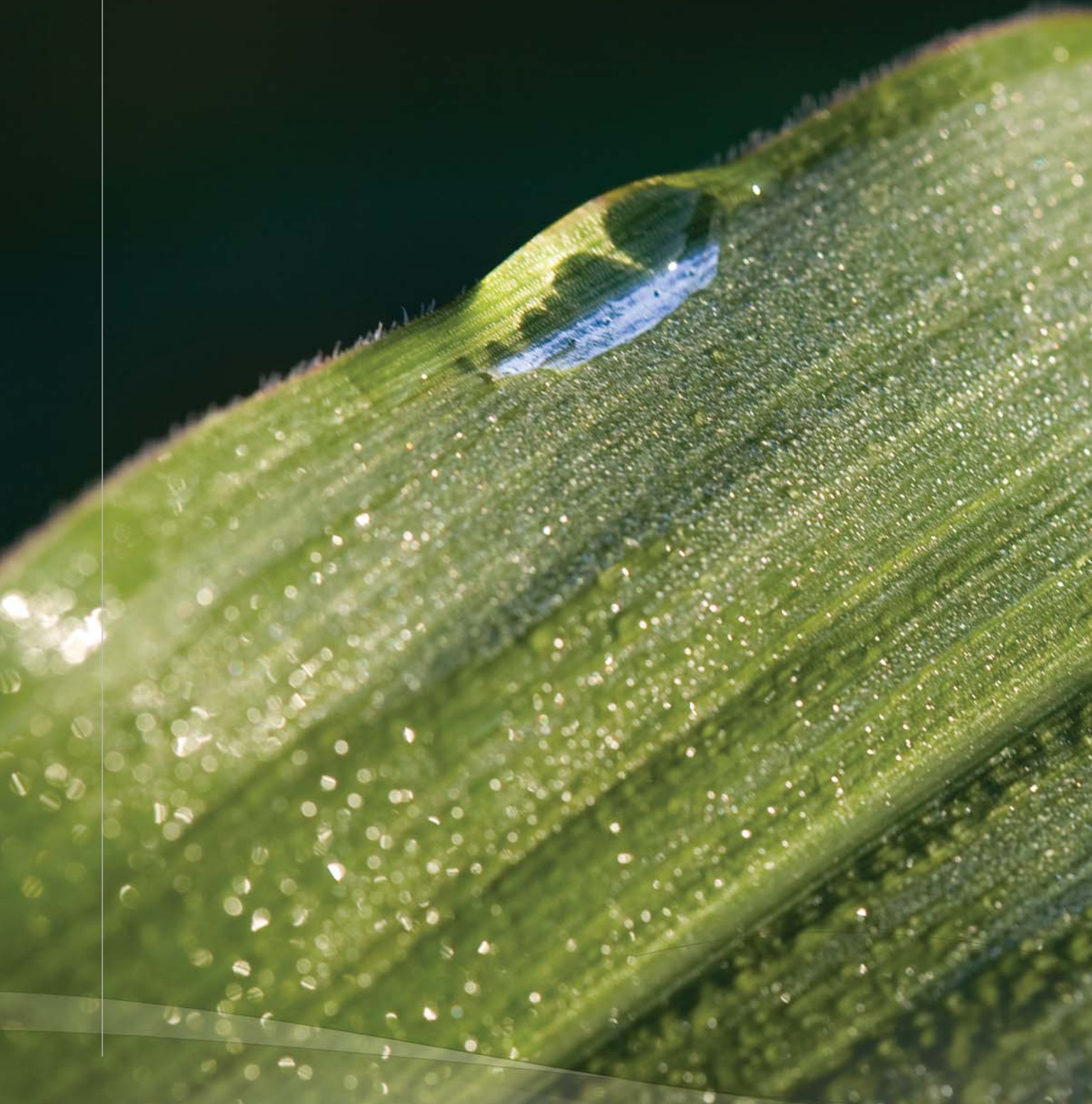
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A close-up photograph of a green leaf, likely from a plant, showing intricate vein patterns and numerous small, glistening water droplets on its surface. The lighting is soft, highlighting the texture and color of the leaf against a dark background.

KEY ISSUES FOR THE FUTURE

Key Issues for the Future

Panel

Ken Cassman

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

Eugene Glock

Producer, Cedar Bell Farms, Nebraska

David Molden

Deputy Director General for Research, International Water Management Institute

Peter Rogers

Gordon McKay Professor of Environmental Engineering, Harvard University

Prem S. Paul, Moderator

Vice Chancellor for Research and Economic Development, University of Nebraska–Lincoln

This panel discussion addressed what participants learned at the conference, goals for the Water for Food Institute during the next three years and perspectives on the most pressing questions facing researchers, producers, policymakers and organizations interested in water issues.



From left: Peter Rogers, David Molden, Eugene Glock, Ken Cassman and Prem S. Paul

Important to Nebraska and Important Globally

Ken Cassman, University of Nebraska–Lincoln

Ken Cassman offered three thoughts to guide the Water for Food Institute: 1) engaging young people is important; 2) irrigated agriculture has a reputation, even in Nebraska, as being bad for the environment and the economy, yet irrigated agriculture will play a significant role in a Green Revolution in Sub-Saharan Africa, although that role has yet to be defined; and 3) research and education conducted at the institute must benefit Nebraska, contribute to the university's land-grant mission and be fundamentally important internationally. "What that means to me is the institute, early on, has to be very successful at picking foci and priorities for their efforts that can be articulated very clearly as important to Nebraskans and important globally," Cassman said.

Because resources won't be enough for separate agendas, issues the institute focuses on must benefit Nebraska's interests and international interests while using the same teaching and research expertise.



Cattle in Nebraska's Sandhills



Eugene Glock (left) and Ken Cassman

Cassman said one example would be to answer the questions: Can high-yield, irrigated agriculture be sustainable in terms of food supply, economics and social acceptance? How can policymakers be convinced that irrigation is sustainable? How can purchasers or donors be convinced that irrigated agriculture can be part of development plans?

A second example might be to conduct life cycle assessments of agricultural systems' water footprints. For example, studies demonstrate that lettuce grown efficiently and trucked elsewhere contributes fewer greenhouse gases than locally produced lettuce. Similarly, feedlot cattle have lower greenhouse gas emissions per unit of meat produced than do grass-fed beef. Understanding agriculture's water footprint will require interdisciplinary integration, Cassman said.

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An Unbiased Source of Information

Eugene Glock, Cedar Bell Farms

Eugene Glock emphasized the importance of compiling and disseminating information. “If you’re trying to push it on people, it’s not going to happen. But if you can show people some way that it’s going to benefit them personally, economically, socially, some way that it will be helpful, they’ll adopt that pretty quickly.” He gave the example of high-pressure pivot irrigation, which uses less water. Although lower pressure pivots are less expensive, when diesel fuel reached \$4 per gallon and it cost up to \$30,000 to add an inch of water to a field, people reconsidered high-pressure irrigation. “That’s what we have to strive for, and that’s what this institute has to have a hand in doing – getting people excited about doing something that is right, not trying to force them,” Glock said.

He also urged the institute to avoid becoming a lobbying agency, but rather to be available to



Eugene Glock

help policymakers make good decisions. Glock, who was the state agriculture representative on former U.S. Sen. Bob Kerrey’s staff, said he believes policymakers need an unbiased center to help determine worthwhile projects to fund.

Filling the People and Research Gaps

David Molden, International Water Management Institute

David Molden believes the institute could fill a “people gap.” Too few people are trained to address water issues, he said. Even the International Water Management Institute (IWMI) has difficulty hiring specialists, including economists.

The shortage of professionals leads to a research gap. IWMI collaborates with universities to fill that gap, taking cutting-edge science and adapting it to local settings. “I think the two



David Molden

major gaps, then, that this institute can fill are really good research ... and a lot more human capacity,” he said.

Water management must change, Molden urged, and it must include an arsenal of solutions, from crop varieties and no-till conservation, to drainage and large-scale irrigation. To appeal to young people, water management must be pitched as a broad, exciting field that also

encompasses politics, social science and ecology. Finally, he said, the institute must reach outside the U.S., really listen to people’s concerns and try to solve those problems.

“There are many players in the game,” Molden said. “The Africans, for example, ... want to take the future in their hands. ... I can only see great collaboration within and would just ask you to step out now into the rest of the world.”

Putting the Knowledge into Action

Peter Rogers, Harvard University

Peter Rogers summarized discussions he heard at the conference, from Pedro Sanchez’s good news regarding Africa’s ability to increase production from 1 ton to 3 tons, which would greatly impact health and economic status, to irrigation’s role in the Green Revolution, which Ken Cassman addressed. “I don’t think we have that for the second Green Revolution,” Rogers said. “We don’t have the land area to expand on. The issue is going to be: How can we do that within the next 20, 30 years?” However, Rogers said he heard little about the negative impacts of climate change, although it was suggested that climate change may result in a 20 to 40 percent reduction in crop production.

He also emphasized an important lesson from Australia regarding the need for institutional reform prior to introducing economic reforms. “We think we can get the market to work its magic and wonders without changing the institutions,” Rogers said. “And I think the

important thing there is that the institutions for water management and regulation are absolutely fundamental, if we’re ever to take advantage of the powerful economic tools we have.”



Peter Rogers

He conveyed cautious optimism regarding increasing water productivity, irrigation efficiency and new varieties and technologies. Climate change is an unresolved issue, however, and Rogers said he believes climate variability will cause many problems requiring attention.

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“But the biggest impression is that political and institutional issues predominate,” Rogers said. “Basically, we have the know-how. We need to establish the can-do.” That will require taking information to the political arena to rearrange institutions and take advantage of what is already possible.

Rogers also emphasized communication. He recommended establishing media contacts through an annual program to bring journalists and media specialists to Nebraska to learn about agriculture. In addition, Rogers said, because intellectual elites on the coasts tend to know little about agriculture, faculty seminars or collaborations would encourage greater understanding, particularly for economists.



Peter Rogers (left) and Prem S. Paul

Questions and Answers

Moderator Prem S. Paul: *If the Water for Food Institute accomplished one impressive thing by next year, what would it be? Within three years?*

Eugene Glock said a framework of the institute’s management structure should be established within the next year. He also pointed out that both smallholder farmers in Africa and large-scale farmers in the U.S. want to produce more with available resources. “I would hope that the institute is moving in the direction to pull things together,” Glock said. Within three years, Glock said he hopes the institute has made progress in compiling research happening worldwide and analyzing ways to best use available resources.

David Molden said within one year he would like a better understanding of critical gaps the

institute wants to fill and to see some quick results. In three years, Molden said he envisions a conference with twice as many attendees, half of whom live outside the U.S.

Peter Rogers recommended scouring the globe to find farmers to attend next year’s conference. “I think we could learn a lot from other farmers from other parts of the world,” he said. International attendees also could take the conference’s message back to their communities. In three years, Rogers said the institute and collaborating institutions should be pushing the U.S. research agenda, through the National Science Foundation, to spend more money on water issues and support young researchers. He also hopes more interested young people will attend the conference.

Ken Cassman said he was impressed that so many young faculty from a wide range of disciplines attended the conference. He said the University of Nebraska–Lincoln should further engage young faculty from diverse fields, such as computer science, education, environmental sciences and journalism, ensuring that they, too, have a stake by selecting priorities that generate excitement. Cassman said his three-year goal for the institute is to build a reputation as an expert in key areas important to Nebraska and the developing world.

Moderator Paul: *Does a need exist for a repository of easily accessible information? Is that something the institute should undertake?*

Molden said he believes it's more important to add to the information base than to become an information clearinghouse.

Rogers said he agreed, adding that clearinghouses require significant money, staff and dedication. Over time, remaining consistent becomes difficult and data quality degrades when resources and efforts flag.

Moderator Paul: *What is the most critical research area to increase water productivity in crops?*

Molden said studying the consumptive use and evapotranspiration component at a range of scales is important because it drives river depletion and groundwater decline.

Glock said he is optimistic that science will meet future needs but is concerned about getting advances to farmers. "We already have a whole lot more science that tells how we can save

water and produce more with limited resources than we're using," he said. "Getting it out to the people that need it is what we have to do, and that is a very difficult situation to tackle." The current adoption rate is too slow to address future problems, but younger people may adapt more quickly than his generation, Glock said.

Moderator Paul: *How do we get products and services from sustainable water use activities to be more valuable than those from unsustainable activities?*

Raising the price of resources forces more efficient use, but is efficiency more sustainable? Cassman asked. A solid analytical framework with measurable, agreed-upon metrics of what constitutes sustainability would answer that question. "That's certainly an area that I see as a crying need, one that a center like the Water for Food Institute could take a major leadership role in," Cassman said.

Rogers cautioned against solving problems by raising prices. He cited an example in Orange County, Calif., where a utility switched to recycling wastewater, not because of pricing, but because the U.S. Environmental Protection Agency (EPA) enforced water quality regulations. Forced to use tertiary treatment, the utility decided to recycle water completely, eliminating huge demand to ship water from northern California and improving water issues there as well. Similarly, the EPA's requirement to monitor 114 chemicals will require wastewater treatment plants to convert to reverse osmosis, which also may lead to significant efforts to recycle wastewater. "We have a strong regulatory system," Rogers said. "You may not like the

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EPA, but the EPA is regulating us, and we have a general consensus that's worth doing.”

Moderator Paul: *What role should private companies have?*

Because public resources for research are declining, private industry must be involved, Glock said. However, that creates new challenges because while industries pay universities for research, they keep the resulting product. “How can we get private industry involved in helping to pay and at the same time make it available to help those people who can't afford to pay for it?” Glock asked.

Water is a huge issue for the private sector, Cassman added. It will be important to identify intersecting issues of importance to the private sector, the developing world and Nebraska.

Rogers said as long as the private sector performs well, concern about its involvement is irrelevant. The issue is ensuring good performance. Some disasters involving water privatization were primarily caused by government failures and a lack of institutions and frameworks regulating private companies. “There is a role for profit-making in even things like water,” he said. “Particularly if they [the private sector] can provide adequate or better services than the public sector.”

Molden cautioned against considering the private sector as only big, international companies. It also includes small-scale private enterprises in other countries. Engaging small businesses in inputs and outputs, such as manufacturing and repairing pumps, would stimulate economies.

Could big U.S. companies downscale technologies to help out? he asked.

Paul said private-public partnerships play important roles at UNL because without them, some new technologies would not reach the marketplace. Companies also can provide capacity building, such as funding for the next Water for Food conference and travel grants for international participants. However, UNL must remain unbiased to maintain credibility, he said.

Moderator Paul: *Is there enough renewable groundwater and surface water in Sub-Saharan Africa to sustain irrigated agriculture?*

Yes, Molden said. “I always question what kind of irrigation? Big scale, small scale – you need all of it, all together.”

Moderator Paul: *Can American farmers produce enough corn and soybeans for feed, food and fuel while using less water on less land and fewer inputs? Also, is it wrong to use crops for biofuels?*

Glock said with the scientific community's help and with proper adoption, these requirements can be met, adding that biofuels are effective and worth producing.

Cassman said that perhaps the biofuel program's most important contribution has been to raise the value of agriculture.

Moderator Paul: *What role should organic agriculture play in this program, particularly as consumers become more environmentally conscious?*

A range of solutions must be considered, including eco-agriculture approaches, Molden said. If smallholder producers are allowed to make money by marketing in the city, why not allow organic agriculture? he asked.

Glock said he does not object to organic agriculture. Many farmers use no-till and as few inputs as possible, “but if you want to feed the world, sometimes you have to do some things that other people may not approve of.”



Farmers in Angola with their potato crop

Moderator Paul: *The world does not lack water, but rather water of appropriate quality. What is the cost of bringing water to the appropriate quality and location?*

Rogers responded that in the next 100 years, desalination will be inexpensive enough to provide the world’s water needs; similarly, the cost of electricity will come down after shifting away from fossil fuels. The issue is affordability in the next 20 to 30 years. Desalination is already cost effective for industrial and municipal supplies, but only in limited areas for agriculture, such as North Africa, which has strong interest in creating agricultural employment.

Molden said desalination costs about 50 cents per cubic meter, but will have to drop to about 3 cents per cubic meter to be viable for agricultural uses.

Moderator Paul: *If many Nebraskans don’t understand irrigated agriculture’s benefits, what role does land-grant extension play?*

Glock said the university’s main role is to provide information. Producers are the people responsible for communicating the importance of agriculture, he said. The institute should avoid becoming a lobbying organization, but it can provide information to promote the research and to analyze policy.

Cassman disagreed. Scientists have great influence with policymakers, he said. “Deeply flawed” biofuels research from leading universities had great sway with policymakers, he said, and growers don’t have the data to convince policymakers. “We don’t have the quantitative framework with regard to all the dimensions of what those benefits are. That’s why this institute could play a key role in helping those that care about water for agriculture make their case.”