


Irrigation Leader

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**Growing
Concerns:
Sharon Megdal
of the University
of Arizona on
Drought and the
Future of Food
Production**

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Sharon Megdal, Director, Water Resources Research Center, University of Arizona. Photo courtesy of the Water Resources Research Center.

Growing Concerns: Sharon Megdal of the University of Arizona on Drought and the Future of Food Production



A lettuce field in Wellton, Arizona.

A new report from the University of Arizona looks at the challenges that a drying climate poses to agriculture, particularly in arid places such as Arizona. The Future of Agriculture and Food Production in a Drying Climate makes wide-ranging recommendations to help agriculture adapt to an uncertain future, including developing new drought-tolerant crops, improving soil moisture retention, and expanding partnerships with tribal farmers. In this interview, Sharon Megdal, the director of the university's Water Resources Research Center (WRRC) and a member of the commission that drafted the report, tells us more.

Irrigation Leader: Please tell us about your background and how you came to be in your current position.

Sharon Megdal: I am the director of the WRRC. I've worked at the university and been part of the cooperative extension faculty since 2002. I work on water policy management issues and teach a graduate class each spring titled Water Policy in Arizona and Semiarid Regions.

Irrigation Leader: Please tell us more about the WRRC.

Sharon Megdal: The center's focus is on dealing with critical water issues that are important to the state of Arizona and places beyond. Almost 60 years old, the center is one of 54 federally authorized water resources research institutes. There is one in each state, one in Washington, DC, and three in U.S. territories. By authorizing legislation, the institutes support water quality and quantity research that is important to their respective regions and the nation.

The WRRC acts as a bridge between the academic community and the broader community. We bring people together in many ways, including through our annual conference, which has recently had a significant focus on agriculture. Our publications are often geared to a broad audience. Our *Arroyo* publication is put out each year based on the prior year's conference. The 2023 issue, which is available on our website, is focused on Arizona's agricultural outlook and includes several fact sheets.

We engage with water users and communities in many ways. We gather information to empower rural communities to make more informed decisions. We are a convener. We have been part of the United States–Mexico transboundary aquifer assessment program since its initiation over a decade



Wellton Canal in Wellton, Arizona.

ago. We've been engaging with the U.S. Geological Survey, partners from other universities, and Mexico to look at the status characteristics of our transboundary aquifers. I am also part of a project funded by the U.S. Department of Agriculture and led by the University of California, Davis, that looks at groundwater-dependent agriculture. We're specifically focusing on the portion of Pinal County in central Arizona that is largely dependent on groundwater now that Central Arizona Project water has been cut back. Our team is also working on soil health and cover crops.

Irrigation Leader: What led the president of the university, Robert C. Robbins, to create an advisory commission to draft a report on the challenges facing Arizona agriculture?

Sharon Megdal: We're facing some existential threats when it comes to water availability. This has profound effects on agriculture and food production not only for Arizona but for the entire world. The president asked the commission to evaluate the greatest threats facing food production in Arizona, to delineate the most promising solutions, and to investigate how the university can positively affect the future of agriculture in Arizona.

The report, titled *The Future of Agriculture and Food Production in a Drying Climate*, which can be found at research.arizona.edu/impact/future-of-food, looks at some of the big questions relating to food production from the water use side. How are we going to produce the food needed in the world when water is becoming scarcer, the population is growing, and temperatures are rising? Although the main focus is food production, the report also considers

agriculture that isn't directly for human consumption. For example, we grow a lot of alfalfa here in Arizona, and it's getting attention for being a thirsty crop grown in a water-scarce environment.

The commission was a diverse group, as can be seen in the bios at the end of the report. It was initially chaired by Paul Brierley, then the executive director of the Yuma Center of Excellence for Desert Agriculture, who left the University of Arizona in June to become the director of the Arizona Department of Agriculture. Recognizing the seriousness of what we're dealing with, we completed our work on a short, 6-month timeline, as requested by President Robbins.

As part of our effort, we reached out to several experts for their input. We held multiple listening sessions, including roundtable discussions with the Ag 100 group that advises our vice president for the Division of Agriculture, Life and Veterinary Sciences, and Cooperative Extension. We asked the same questions, which are included in the report, through an online survey. We announced the survey within the University of Arizona and externally, with the external outreach occurring largely through the WRRC's *Weekly Wave* email newsletter, which goes out to over 3,600 people. The commission itself met almost weekly to synthesize, analyze, and formulate our report.

Irrigation Leader: What particular aspects of water availability and food production does the report focus on?

Sharon Megdal: One major theme is increased competition for water at a time when water supplies are diminishing. Another is soil health, which was the second most



A cow and spray irrigation in Sulphur Springs Valley, Arizona.

frequently cited challenge at the WRRC's 2022 conference. In arid areas like Arizona, the decline in soil quality is also critical. We look at the implications of that for yield and productivity. We look at the agricultural system holistically, recognizing the cultural and socioeconomic issues that affect rural communities. We also consider land-use issues. Urbanization and suburbanization in the Phoenix area have permanently converted agricultural land. Fallowing is another issue of concern. We talk about unresolved water rights, including tribal water claims and surface water adjudications that have been ongoing for generations now.

The report highlights the need to recognize and connect better with our tribal communities. We have a lot of tribal production agriculture going on in Arizona, yet tribal and nontribal discussions about water and agriculture usually take place separately. I personally would like to see more communication and interaction between those two broad groups. The report recognizes tribal agriculture and the need to include tribal growers and community representatives along with nontribal ones in all steps of implementing recommendations. We talk about impediments to adaptation, including uncertain regulatory and governmental policies regarding water availability. The report also talks about the lack of public understanding of agriculture and its role. There are also challenges to long-term planning by farmers. If farmers don't own their land, and they don't know whether they're going to have water, how can they plan?

Irrigation Leader: What are some of the solutions the report offers?

Sharon Megdal: Our first focus is on technical solutions using existing resources. How can we produce more with existing water resources, either by changing cropping or by changing irrigation methods? We also recognize that farmers are businesspeople, and they respond to market conditions. They are going to grow crops for which there is demand. We talk specifically about incentive programs to improve irrigation efficiency. Last year, the University of Arizona Cooperative Extension received funding from the governor's office to implement a program to incentivize the installation of more-efficient irrigation methods. It gives out grants for projects that meet certain criteria related to expected water savings. The grant amount is limited to \$1,500 per acre for a maximum reimbursement of \$1,000,000 toward the purchase and installation of a system from an approved vendor.

The report also talks about the need to build capacity in terms of labor for field work and resources for information-sharing and analysis. Training programs will be important for building capacity.

The report also summarizes our university's resources and expertise. The University of Arizona is a land-grant university, so agriculture is a core activity. The report lists our existing assets, including our experiment stations and the Yuma Center of Excellence for Desert Agriculture.

The recommended actions are summarized in the executive summary. We recommend creating an institute for sustainable food, water, and agricultural systems. I know the reaction of some readers will be, "Oh, a university always wants to create new centers and institutes." But we think



Rising temperatures and water availability are concerns for Arizona agriculture.

that an umbrella institute to coordinate the research taking place in various parts of the university would make for more-effective, comprehensive, and responsive research and training programs.

A second recommendation is to create a center for soil health, which affects groundwater recharge and infiltration. This is a more focused objective, and the center could be created sooner than the umbrella institute. The ideas of creating both the institute and the center aim at positioning the University of Arizona vis-à-vis funding entities and partners to do more of the good work we're already doing. Here, too, we want to make more use of our experiment stations and campus agricultural centers, including the Maricopa Agricultural Center in central Arizona and the Yuma Center. We also have Biosphere 2, where research efforts include an agrovoltatics site.


Another recommendation is expanding our partnerships, including those with tribal farmers. The university has an Indigenous Resilience Center and a Native American Advancement and Tribal Engagement Office. Arizona is home to 22 tribal nations, several of which conduct significant irrigated agriculture. The Colorado River Indian Tribes in particular are engaged in significant irrigated agriculture. Like the Yuma area, they rely on mainstem Colorado River water.

The last recommendation is to establish new and strengthen existing collaborations with entities in arid regions around the world. The report also covers external investments and partnerships—with other universities, with agricultural producers, and with industry. A strong commitment to user-centered design will enhance the ability to rapidly develop, test, and scale toward real-world solutions.

Irrigation Leader: Does the report also include recommendations for individual irrigated farmers or state or local policymakers?

Sharon Megdal: We didn't get into enough detail to make those types of recommendations. In the report, we mention the implications of property tax policies on agricultural lands. Although the commission did not have the time or expertise to study that issue, we recommend it as an important area for future study.

Irrigation Leader: What is your vision for the future of irrigated agriculture in Arizona?

Sharon Megdal: I think agriculture has a future in Arizona, but it might look a little different. The size and dispersion across the state might be different. The implications of a diminished Colorado River and overdrafted groundwater can't be fixed with a single approach. The answer to the future of agriculture depends on such factors as where you're looking, what the water source is, and whether you're close to urbanization. In central Arizona, a lot of land is owned by developers. It is only being used for agriculture until the developer develops it. I like to talk about different zones of agriculture in Arizona. I show maps of land ownership and of reliance on different water sources. The state's agriculture will likely look different in the future. Although we cannot paint that picture with any detail now, there is a future, and the University of Arizona would like to work with growers, communities, and all concerned to address the challenges to agriculture and food production in our drying climate. 



Sharon Megdal is director of the University of Arizona's Water Resources Research Center. For more about the WRRC, visit wrrc.arizona.edu.