About the work of the University of Arizona Water Resources Research Center (WRRC)

Sharon B. Megdal, Director

CAP Board Meeting

October 10, 2024

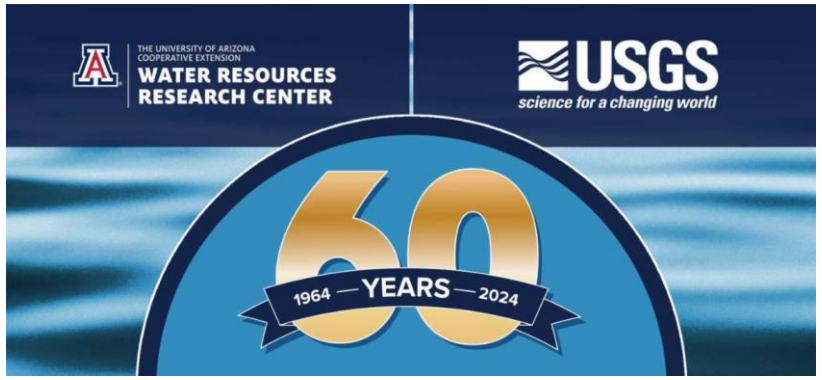
THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
WATER RESOURCES
RESEARCH CENTER

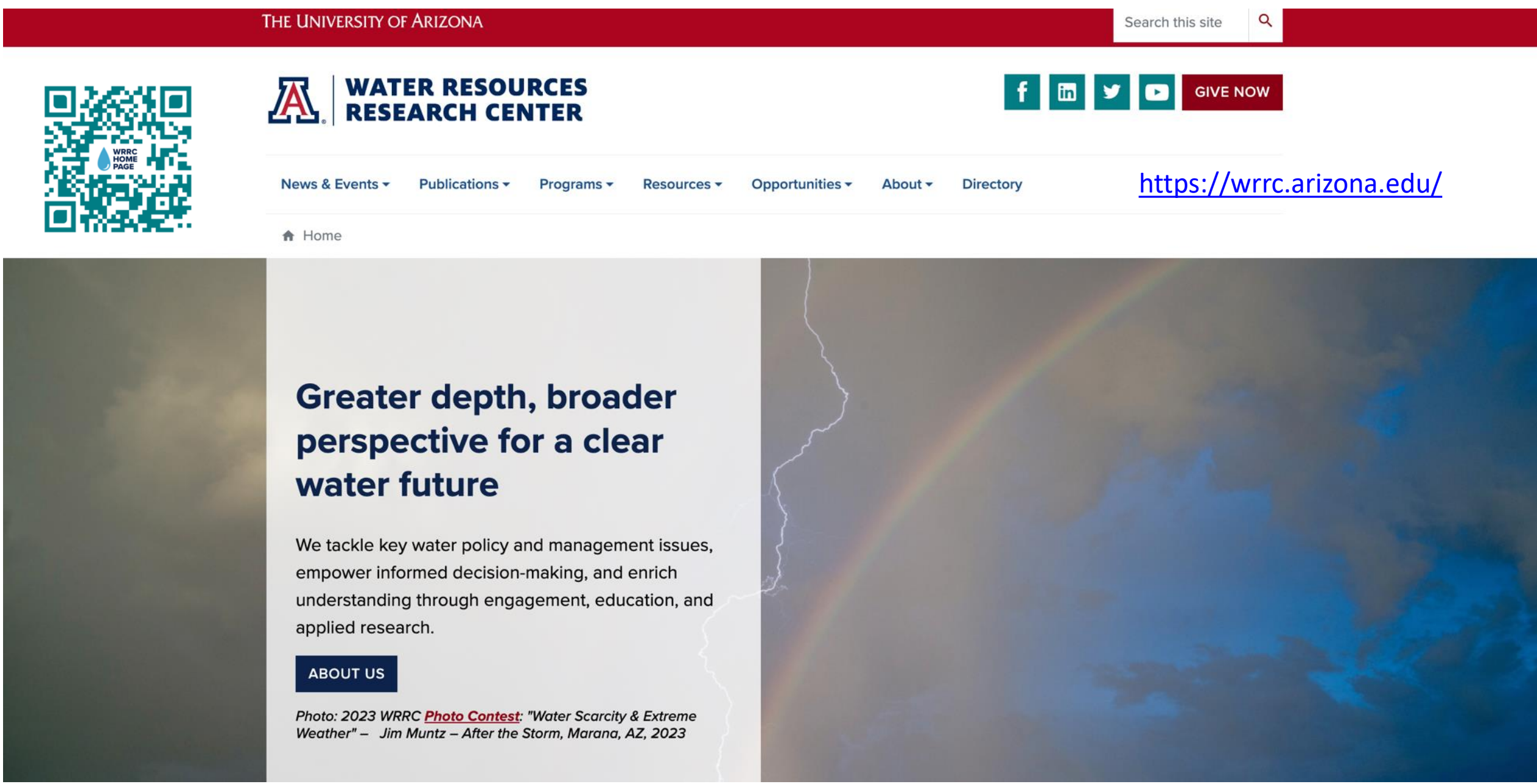
smegdal@arizona.edu

wrrc.arizona.edu

WRRC celebrates 60 years in 2024 as a federally authorized center

- WRRC is the designated Water Resources Research Institute (WRRI) for Arizona pursuant to the Water Resources Research Act (WRRA) of 1964, as amended
- WRRC is an Extension Center and research unit at the University of Arizona (does not house degree programs)
- Funds from the WRRA Section 104(b) program help support:
  - Research on water-related issues involving students at Arizona's 3 state universities
    - 2024 project: Indian Water Rights Settlements in AZ: An Analysis of their History and Potential Future (Aminta Menjivar, PhD candidate)
  - WRRC's robust Information Transfer Program
    - **Weekly Wave e-News Digest**: 3,853 subscribers as of 9/2024
    - **Water Webinars**: average 148 attendees/webinar in 2023
    - **2024 Annual Conference**: 900 registrants (in-person & virtual)
    - **Arroyo**: sent to 10,628 recipients in 2023
    - **County Water Factsheets**: 14 of 15 counties complete
    - **WRRC Website:** 196,323 page views in 2023





Find information on our initiatives on the WRRC's website.

Bridging the academic and non-academic communities

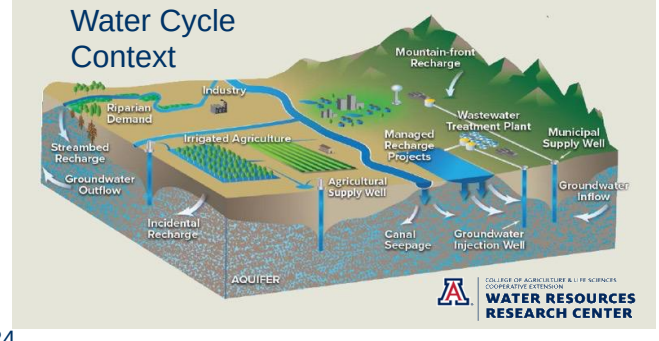
- Applied research
  - Groundwater governance and management
  - Transboundary Aquifer Assessment Program
  - USDA-funded work on irrigated agriculture in the Southwestern US
  - Groundwater, including governance and managed aquifer recharge
  - Colorado River Basin water issues
  - Rural watershed work
- Extension and Engagement
  - Water RAPIDS
- Work at geographic scales from local to international
- Work across different water-using sectors
- Partnerships are foundational to our work
- Applied research, engagement, and education efforts are interwoven

I teach the graduate course "Water Policy in Arizona and Semi-arid Regions" each Spring semester

Water policy and management reflect many determining factors

- Resource Availability
- Location of water demands and supplies
- Economics
- Historic and Current Legal/Institutional Framework
- The nature of involvement of multiple governmental and non-governmental entities, including the extent of centralized versus decentralized decision making
- Politics of Area
- Public values and socio-cultural factors
- Historical context
- Information
- Etc…

Importance of Context



Megdal, Graduate class, Water Policy in Arizona and Semi-arid Regions, January 12, 2024

20

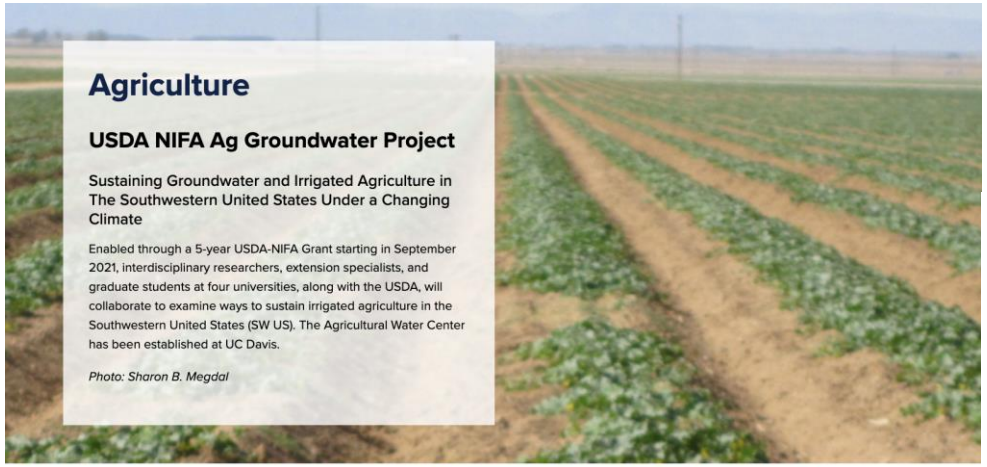
"I learned so much in your class! It was very interesting and I loved the guest speakers and the pragmatic conversations that we had!"

"I learned so much from this class that has already been directly applicable in my work."

Week 4, Feb. 2, 2024

4	2/2	**Salt River Project** Christa McJunkin, Senior Director, Water Supply & System **Central Arizona Project** Nolie Templeton, Water Resources Analyst and Laura Grignano, CAGRD Manager

Applied Research and Analyses



Cooperative Extension | USDA NIFA | Water Resources Research Center | UC Davis Agricultural Water Center | Environmental Science

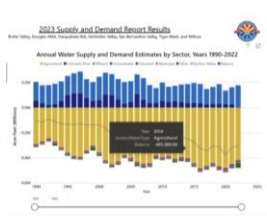
Publications
Learn more

Groundwater, Climate, and Stakeholder Engagement (GCASE)
Learn more

Groundwater Governance & Management News

WRRC Director Submits Groundwater Comments to PCAST
July 22, 2024
The President's Council of Advisors on Science and Technology (PCAST) has formed a working

WRRC Grad Student Highlighted in Water Resources Magazine
Jan. 5, 2024
Simone A. Williams is a WRRC graduate research associate and Director Sharon B. Megdal chairs



ADWR Releases First Seven Groundwater Basin Assessments
Dec. 8, 2023
The Arizona Department of Water Resources recently released the first seven supply and

Water Policy Options as Arizona Adapts to a Drier Colorado River: A Perspective

Sharon B. Megdal

The Colorado Basin Context

On August 16, 2021, the U.S. Bureau of Reclamation announced the first-ever Tier 1 Colorado River shortage. The water delivery cutbacks, which went into effect on January 1, 2022, per the "Colorado River Interim Guidelines for Low Basin Shortages and Coordinate Operations for Lake Powell and Lake Mead" (2007 Interim Guidelines), are most significant for the Central Arizona Project (CAP). Governed by the Central Arizona Water Conservation District, CAP delivers water into Central Arizona for use by tribal, municipal and industrial, and agricultural users. The reason that CAP water users face the most severe cutbacks is because that, in order to secure approval of the 1968 Colorado River Basin Project Act authorizing CAP construction, Arizona had to agree that water delivered through the CAP canal would be junior in priority to California's Colorado River water deliveries. This means that in deep shortage conditions CAP deliveries could be cut in their entirety before California would experience any cutbacks in water deliveries.

To say management of the Colorado River is complex is an understatement. Colorado River water is shared by seven states, 30 Tribal Nations, and Mexico. Within the U.S., the Colorado River Basin is divided into an Upper Division and a Lower Division. Different formulas govern the distribution of water. Upper Basin water is distributed on a percentage basis but each of the Lower Basin states have a set amount of water that is expected to be delivered in non-shortage years. The 1944 Treaty for Utilization of Waters from the Colorado and Tijuana Rivers and of the Rio Grande between the United States and Mexico, which is implemented by the International

Colorado River Basin

Sharon B. Megdal is Director of The University of Arizona Water Resources Research Center (WRRC). She served as a member of the elected Board of Directors for the Central Arizona Project Water Conservation from January 1, 2009, through December 31, 2020.

In This Issue:

Upcoming Stories:

Municipal Water: Sources & Storage
Watershed Restoration
Watershed Projects Prioritizing
& More!

MANAGED AQUIFER RECHARGE

MAR AS A MECHANISM TO ADVANCE WATER POLICY GOALS: A PERSPECTIVE

by Sharon B. Megdal, Ph.D.
Director, University of Arizona Water Resources Research Center (Tucson, AZ)

Introduction

The imbalance between water supply and demand is of growing concern globally. Rarely a day goes by without news about the dwindling surface water supplies, with the Colorado River as the poster child. Coverage of approaches to addressing the supply/demand imbalance is broad, with strategies including augmentation, reuse, market mechanisms, and conservation. The dialogue involves not only diminishing surface water supplies but also the increasing role of, and threats to, groundwater — which accounts for 99% of Earth's liquid freshwater (UNESCO World Water Assessment Programme 2022, *see* References, below). Not coincidentally, heightened dialogue on groundwater has coincided with World Water Day's 2022 theme: "Groundwater — Making the Invisible Visible" and the annual *United Nations World Water Development Report* with the same moniker. Next August, the annual Stockholm World Water Week has the theme of "Seeing the Unseen: The Value of Water." Next December, the 2022 UN-Water Summit on Groundwater will continue 2022's global focus on groundwater.

A key component of discussions regarding groundwater, including conjunctive management of groundwater and surface water, is managed aquifer recharge ("MAR" — sometimes referred to as artificial recharge). MAR is increasingly being recognized as an important mechanism for addressing water quantity and/or water quality concerns. The 2021 compendium *Managing Aquifer Recharge - A Showcase for Resilience and Sustainability* (2021 Compendium) defines MAR as "intentionally replenishing aquifers to stabilize water storage and improve water quality" (Zheng, Ross et al. 2021, 16). Alternatively, Australia's National Guidelines for Managed Aquifer Recharge define MAR as "the purposeful recharge of water to aquifers for subsequent recovery or environmental benefit. It is not a method for waste disposal" (Natural Resources Management Ministerial Council, et al. 2009, 1). MAR "…can be done in a myriad of ways that respect other uses of water or harness otherwise wasted water. The enthusiasm for MAR schemes and their popularity and success are enhanced by significant auxiliary benefits such as in protecting against seawater intrusion, improving environmental flows, banking water for drought relief and purifying water through natural processes" (Zheng, Ross et al. 2021, 16). As noted by Dillon et al. in the editorial paper for the volume, *Managed Aquifer Recharge for Water Resilience*: "Managed aquifer recharge…is part of the palette of solutions to water shortage, water security, water quality decline, falling water tables, and endangered groundwater-dependent ecosystems. It can be the most economic, most benign, most resilient, and most socially acceptable solution, but frequently has not been implemented due to lack of awareness, inadequate knowledge of aquifers, immature perception of risk, and incomplete policies for integrated water management, including linking MAR with demand management. MAR can achieve much towards solving the myriad local water problems that have collectively been termed 'the global water crisis'" (Dillon, Fernández Escalante et al. 2020, 12).

Transboundary Aquifer Assessment Program, particularly Arizona-Sonora Components

WRRC TAAP

WRRC TAAP ESPAÑOL

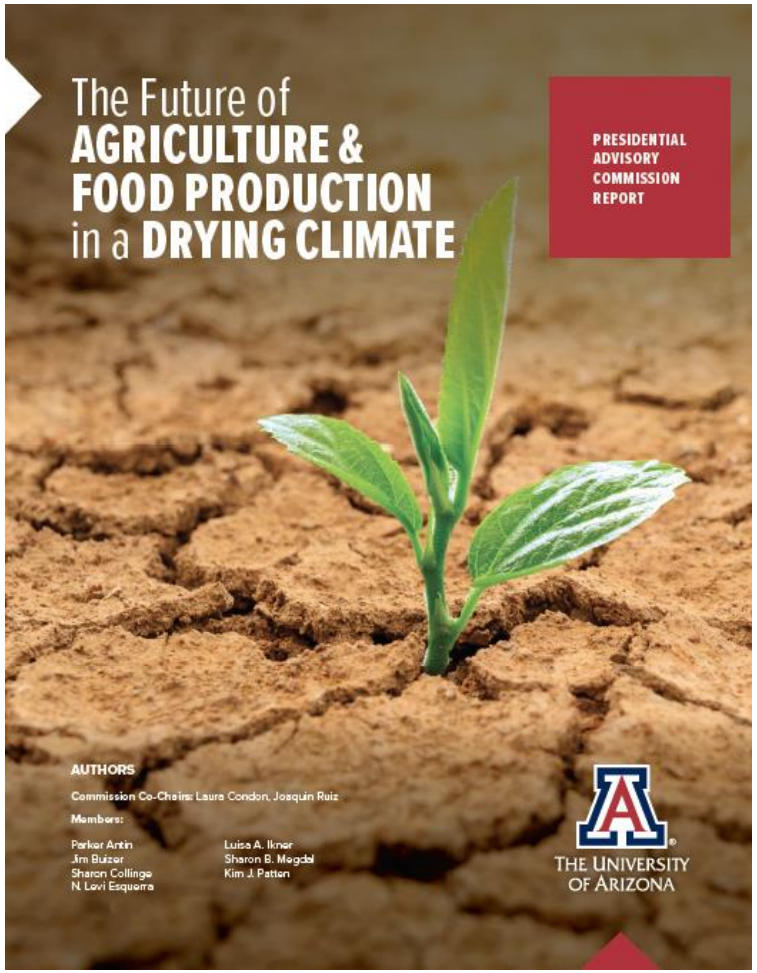
Connecting Middle East and Agriculture

Reflections: Partnering to Address Food, Water, and Energy Security

by Sharon B. Megdal
11/18/2022

The Colorado River Basin's water and energy problems are well chronicled in studies and news reports. With the Colorado River's low flows extending more than two decades and drawdown of water from Lakes Powell and Mead, water in storage is at historic lows. Moreover, the system's hydropower is in jeopardy. Most critically, a "crash" of the system, wherein water would not flow below Hoover Dam, could be more than just a bad sci-fi story. Work is ongoing to develop a consensus strategy that, at the least, increases water delivery cutbacks substantially over those associated with the official 2007 federal guidelines for sharing shortage. Partnerships among stakeholders with diverse expertise, experience, and perspectives will be vital to restoring system security.

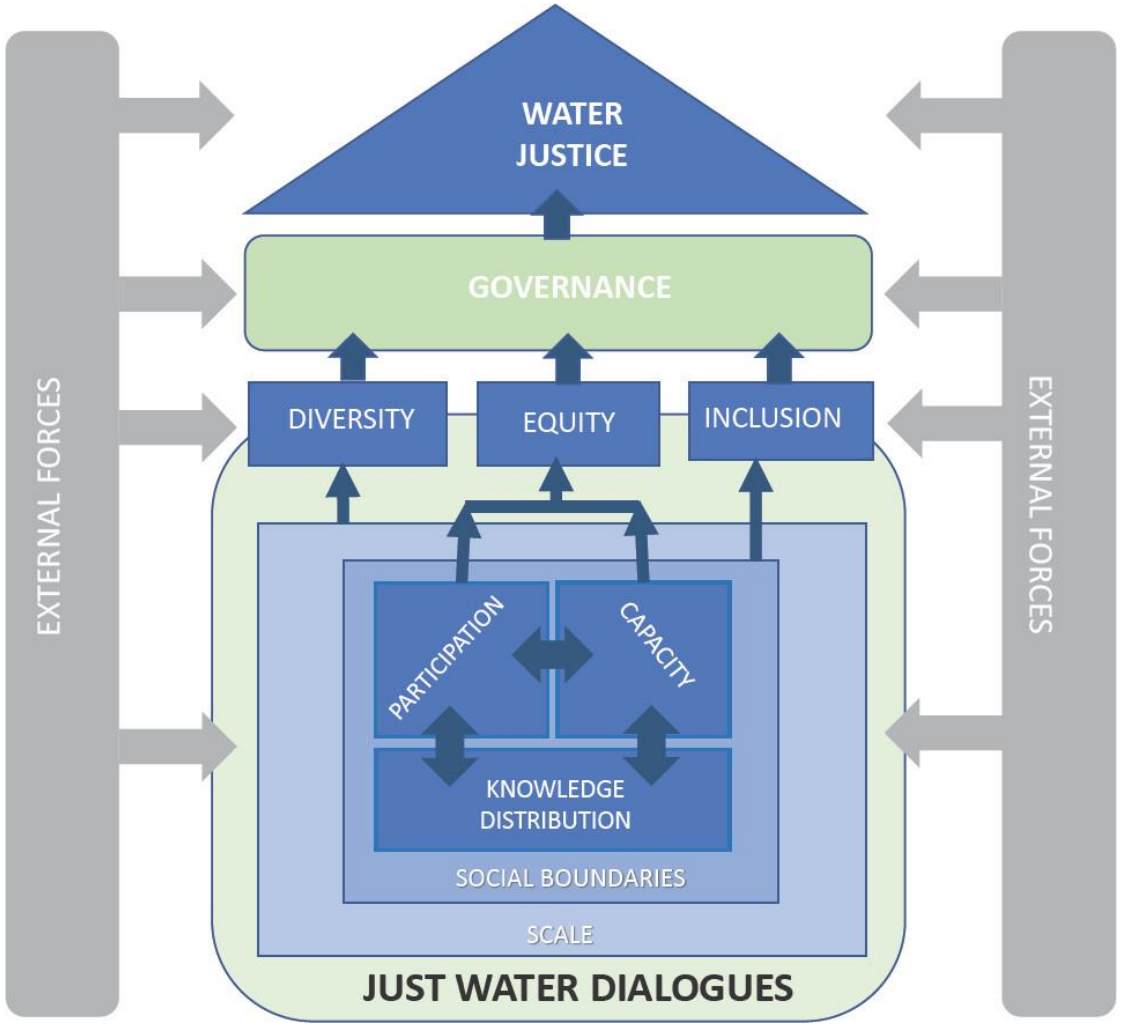
Agrivoltaics in the Arava Valley, Israel.
Photo: Sharon B. Megdal



https://research.arizona.edu/impact/future-of-food

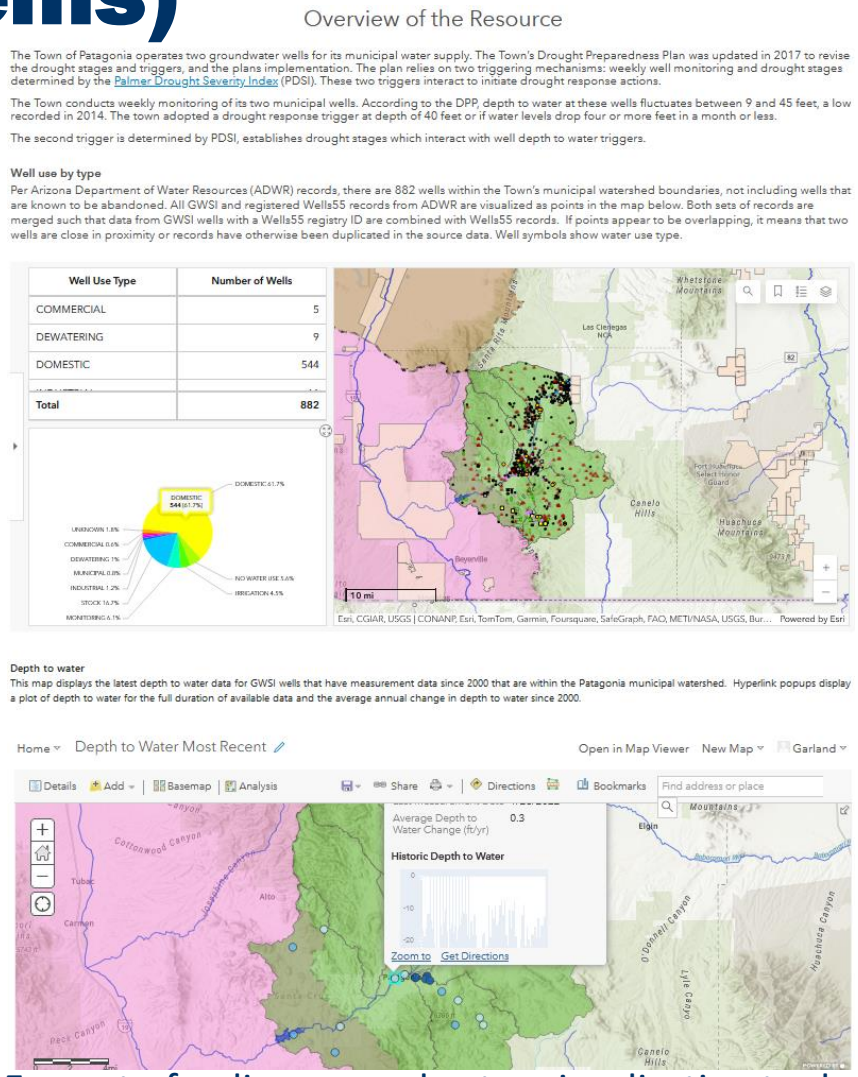
WRRC Diversity Initiatives – Research, education, and engagement

- Indigenous Water Dialogues
  - Initial support from the Agnese Nelms Haury Program
  - 2021 Annual Conference, Tribal Water Resilience in a Changing Environment
  - 2024 WRRA 104b funding for “Indian Water Settlements in Arizona: An Analysis of their History and Potential Future”
- Diversifying Voices in Water Resources
  - 2021-2022 WRRA 104b funded project to investigate the state of knowledge about increasing diversity in water resources dialogues
  - *Journal of Contemporary Water Research and Education* outstanding paper of the year, “Diversity, Equity, Inclusion, and Justice in Water Dialogues: A Review and Conceptualization” published April 2023. **Winner of Best Paper Award!**
  - 2023-2024 Survey of National Water Resources Institutes about activities to promote diversity



Water RAPIDS (Water Research and Planning Innovations for Dryland Systems)

- Flexible approach to water resources planning to strengthen local and regional economies while supporting the natural resources that contribute to quality of life.
- Recent & ongoing projects:
  - Technical support, coordination, and facilitation services in support of Town of Superior with:
    - Queen Creek restoration projects
    - Integrated watershed planning
    - Green Stormwater Infrastructure planning
  - Drought response planning with Town of Patagonia
  - Development of report for a general audience describing the regulations and policies for water use by copper mining in Arizona



Excerpt of online groundwater visualization tools developed as part of drought response planning with Town of Patagonia.

WRRC Annual Conference

March 12-13, 2024
Implementing Water Solutions Through Partnerships

Dialogue, collaboration matter most to Arizona's water future

An annual conference, presented by the university's Water Resources Research Center, brought together a wide-ranging constituency to discuss solutions to the state's water-related problems.

By Brad Poole, University of Arizona Cooperative Extension
March 13, 2024

Share Tweet Share Email Print

Session recordings available!

https://wrrc.arizona.edu/news-events/2024-conference/wrrc-2024-conference-agenda

SAVE *the* DATE
May 20–21

WRRC 2025 Annual Conference

SHARED BORDERS SHARED WATERS

Working Together in Times of Scarcity

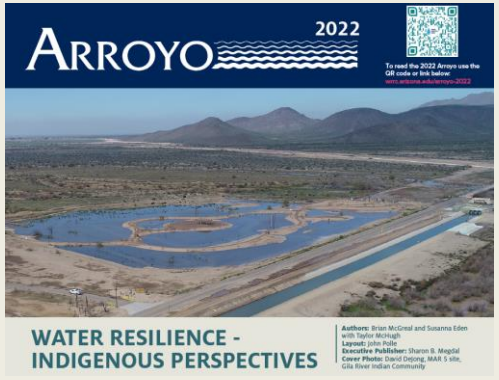
wrrc.arizona.edu/conference

For updates on the conference and other WRRC programming, subscribe to the *Weekly Wave* e-News Digest.
wrrc.arizona.edu/subscribe

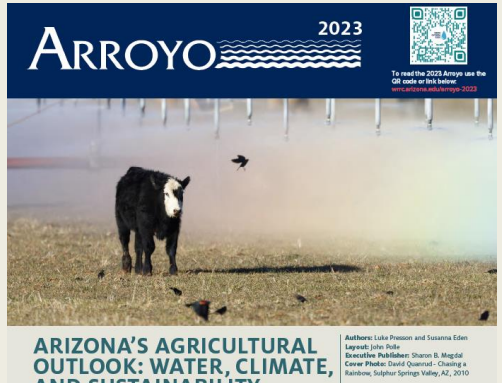
ARROYO

Water Issues Critical to Arizona

The WRRC's *Arroyo* is a unique publication produced each spring to look in depth at a single topic of timely importance to Arizona. Published regularly since 2007, topics have ranged widely. In recent years, the *Arroyo* has been linked with the WRRC Annual Conference topic to capture and expand on the themes and lessons of the conference. The *Arroyo* is available online: **https://wrrc.arizona.edu/arroyo**

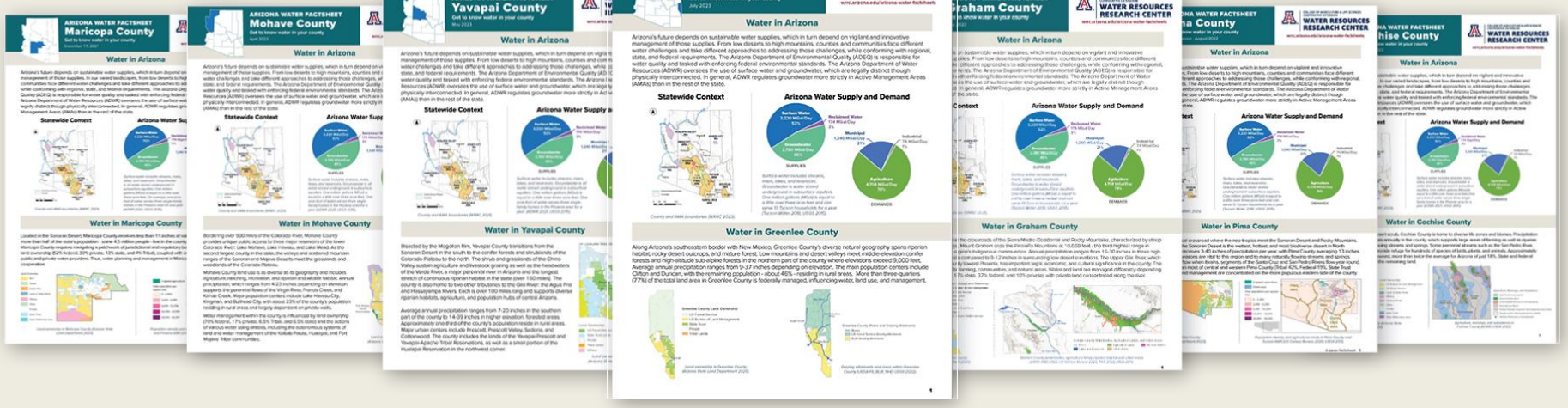


WRRC ARROYO PUBLICATION



County-level Factsheets

ARIZONA WATER FACTSHEETS



Get to Know Water in Your County

These county-level factsheets are designed to answer common questions about water resources, tailored to every county in Arizona to foster understanding of the local nature of Arizona water resource challenges and solutions.

wrrc.arizona.edu/az-water-factsheets

Water Webinars & Special Events

- WRRC Water Webinars
  - Diverse audience, averaging 148 attendees and 223 registrants in 2023
  - Presentations from state, national, and international experts
  - Topics: research, policy, water management, community engagement, and more
  - Recordings posted online
- Special Events & Co-sponsored Events
  - Community engagement (e.g., Prescott AMA and Santa Cruz County programs)
  - Book signings
  - Cosponsor events with university and external partners
    - ”Dear Body of Water Project” with U of A Poetry Center
  - Native Voices in STEM seminar series
  - Chocolate Fest every February, where we announce photo context winners

2024 Photo Contest

The WRRC is excited to announce our 2024 Photo Contest. We invite you to showcase your talent by capturing anything from nature and wildlife to industry and agriculture, including people at play and at work. It's totally up to you. Just make sure your picture relates to water and it's in Arizona!*

All submissions must be received on or before Dec. 20, 2024.

*"Borders" category images can be from any location.

Speaking Engagements, Interviews, Inquiries

WRRC Associate Director Jamie McEvoy and Project Manager Garland Speight present posters at Cooperative Extension Conference, August 2024

- Presentations and talks
  - Academic, professional, civic, and community groups
  - Local, state, national, and international engagement
  - 52 presentations in 2023
- Interviews with news organizations
  - Comments on Arizona's water supply, the future of the Colorado River, and other water management issues
  - 75 interviews in 2023
- Public inquiries
  - Respond to water questions and requests for information
  - Phone and web submissions
  - Provide resources or redirect to appropriate department/agency for assistance

Networks and making connections

North American
Women in Water Diplomacy Network: Community Consultation

Monday, January 29, 2024 | 8:30-11:00 MST | Online

WOMEN IN WATER DIPLOMACY NETWORK & PARTNERS

WRRC REFLECTIONS PUBLICATION

Information and story sharing exchange organized by the Stockholm Sami Association hosted by the Canadian Embassy, August 25, 2024.

Reflections: On Stockholm World Water Week 2024 and Bridging Borders

by Sharon B. Megdal
09/06/2024

Bridging Borders: Water for a Peaceful and Sustainable Future was the theme of the 2024 Stockholm World Water Week conference. Organized by the Stockholm International Water Institute (SIWI), the conference attracted global participation with its variety of session formats and content. I very much value the opportunity to participate.

Particularly exciting this year was the elevation of Indigenous voices from around the world, including from the Colorado River Basin. I attended organized and informal sessions with Indigenous participants from the Colorado River Basin and elsewhere, who engaged in experience sharing and relationship-building. The meaningful learning and interactions facilitated by the amazingly welcoming Stockholm Sami Association were uniquely valuable. The commonality of Indigenous experiences across the globe reflects both injustices and opportunities. The value of pairing of Indigenous practices with Western science was highlighted. At the August 28 session, "Enabling Indigenous Peoples Participation: Perspectives from the Colorado River Basin," Colorado River Basin leaders underscored how more inclusive consultation and decision making is not only overdue but necessary to maintaining the health of the Colorado River system. Essential processes called out by Indigenous voices – building and maintaining trust, listening to learn, and inclusivity – were emphasized throughout World Water Week.

Colorado River Basin Panel, August 28, 2024. Pictured from left to right: Tom Buschatzke, Director, Arizona Department of Water Resources; Commissioner Camille Calimlim Touton, US Bureau of Reclamation; Chairwoman Amelia Flores, Colorado River Indian Tribes; Becky Mitchell, Colorado River Commissioner, State of Colorado; Vice Chairman Lorelei Cloud, Southern Ute Indian Tribe; and Session Moderator Daryl Vigil, Water & Tribes Initiative Co-Director, Jicarilla Apache Nation. Credit: Sharon B. Megdal

Reflections: Today Is World Water Day!

by Sharon B. Megdal
03/22/2023

Greetings from New York City and Happy World Water Day! Today is the official start of the UN 2023 Water Conference, the first water conference convened by the United Nations in almost 50 years. Thousands of participants have gathered to commit to strong actions to address water issues at all scales across the globe. It is recognized that advancing achievement of Sustainable Development Goal 6 – clean water and sanitation for all – requires actions on the part of each one of us.

Registration for the conference was not open to individuals. Instead, NGOs, universities, and others had to apply for accreditation to participate. UArizona's accreditation enabled the participation of eight registered delegates, who all arrived in New York City eager to participate. The UArizona delegation members include Colorado River Indian Tribes Chairwoman Amelia Flores, Gila River Indian Community Governor Stephen Roe Lewis, UArizona Professor and Director of the Udall Center for Studies in Public Policy Andrea K. Gerlak, UArizona graduate student Wilzave Quiles Guzmán, Colorado River Basin Water & Tribes Initiative Co-Directors Matt McKinney and Daryl Vigil, UArizona alumna Elia Tapia, and yours truly. It is great to be at the conference with UArizona colleagues and partners, including former UArizona Extension Agent Josh Moore, who now works as Farms Manager for his home community, the Colorado River Indian Tribes.

Prior to the formal three-day conference, several of us participated in the all-day March 21 Water Diplomacy Symposium, where the discussion focused heavily on the need for inclusive and equitable consultation and engagement. We explored issues related to Indigenous communities, gender, income, and age, with a very strong focus on shared waters. Empowering ourselves was an important theme, whether it be through sharing of data and information, perspectives, and/or practices. Dialogue through the breaks was robust, and many new friendships were made. The Women in Water Diplomacy Network was the key convener. The network's signature clip will be worn by many throughout the UN Water Conference.


Women in Water Diplomacy Network Clip

World Water Day activities officially started for me at midnight, when I delivered via Zoom the keynote lecture, "Taking action to change the ways we use, consume, and manage water," for the Water Research Center at Sultan Qaboos University.

My World Water Day continued with the afternoon side event session at the UN, The Role of Indigenous People in Governing Shared Waters, which was co-convened by the Water & Tribes Initiative | Colorado River Basin and the WRRC. We were honored that U.S. Department of Interior Secretary Deb Haaland delivered inspirational comments to lead off the session. Observing that water security depends on good water stewardship, she noted that a more equitable water future depends on respect, integrating Indigenous knowledge, and putting words into action. Indeed, the featured speakers from the Colorado River Basin and other parts of the world inspired attendees to recognize that working through respectful partnerships is essential.

Of course, there is great excitement associated with the conference and related events, which are occurring at the UN and all over New York City. Though everyone realizes that action is necessary and commitment statements are being developed, only time will tell if the commitments to action translate into improved water and sanitation conditions.

I'll end this Reflections – more to follow via the WRRC's *Weekly Wave* newsletter and through our March 28 webinar about the conference experience – with how I ended my lecture for Sultan Qaboos University's celebration of World Water Day: Let's all act to improve!

COLLEGE OF AGRICULTURE & LIFE SCIENCES
COOPERATIVE EXTENSION
WATER RESOURCES RESEARCH CENTER

Land Acknowledgement

Sharon B. Megdal, Ph.D.
Director, Water Resources Research Center
The University of Arizona

Informing and educating – from AZ to Global networks

Case study in *Handbook of Water Diplomacy* (in press)

Available on request from smegdal@arizona.edu

DRAFT – Not for citation or circulation – Prepublication version of chapter in *Handbook of Water Diplomacy*, Shafiqul Islam, Kevin Smith, Martina Klimes, and Aaron Salzberg, eds., Routledge Press.

Factors that Contribute to Successful Diplomatic Outcomes: Case Study of the Colorado River Basin Cross-boundary Institution

Sharon B. Megdal
ORCID.org/0000-0001-7781-297X

SIWI Seminar, August 27, 2024. Featured from left to right: Session Moderator Nancy Eslick, Global Water Coordinator,

The seven factors:

- A functioning mechanism for cooperation, including knowledge co-production
- Mutual respect contributing to trust
- Involvement of interested parties (stakeholders)
- Good communication
- Persistence and Patience
- Eating with your partners
- Leadership

Additional noteworthy factors not discussed in the case study:
Transparency + Sharing Lessons Learned (both positive and negative)

The WRRC's small but dedicated staff endeavors to be…

Responsive and responsible

Consultative

Inclusive and welcoming

in…

Communicating clearly

Empowering decision making through developing and sharing information and analyses

Elevating diverse voices and perspectives

Collaborating effectively

Providing engaging and accessible educational programs and materials

so that we are a trusted partner and source of water information!

Connect with WRRC programming!

WRRC Water Webinar: Meaningful Engagement with Aboriginal and Torres Strait Islander Peoples on Inland Waters in Australia – *Lessons Learned from Australian Government Policy Developers and How They Are Learning to Work on Genuine Efforts to Engage Effectively*

Date & Time
USA: Wednesday, October 16, 2024; 3:30–4:45 pm Arizona/MST
Australia: Thursday, October 17, 2024; 9:30–10:45 am AEDT
Location: Webinar Only

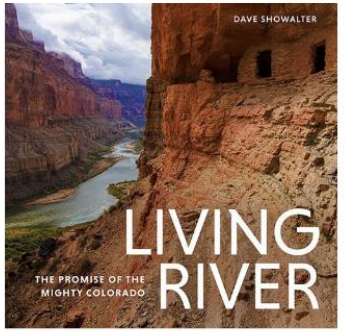
Speakers:
Sheryl Hedges, *Branch Head, Australian Government Department of Climate Change, Energy, the Environment and Water*
Brandon Etto, *Director, First Nations Engagement, Department of Climate Change, Energy, the Environment and Water*

October 16, 2024, 3:30 pm on Zoom

WRRC WEEKLY WAVE SUBSCRIBE

WRRC HOME PAGE

WRRC Special Event: Living River: The Promise of the Mighty Colorado
Author Talk and Book Signing



Date: Thursday, October 31, 2024
Time: 3:00–4:30 pm Arizona Time
Location: Hybrid Event: In-Person Attendance is Limited (please register in advance): 350 N. Campbell Ave, Tucson AZ

Speaker:
Dave Showalter, *Author and Photographer of Living River: The Promise of the Mighty Colorado*

Join the WRRC and conservation photographer Dave

October 31, 2024, 3:00 pm in-person talk and book signing at WRRC and on Zoom

2025 ANNUAL CONFERENCE

SAVE *the* DATE

WRRC 2025 Annual Conference
May 20–21
SHARED BORDERS SHARED WATERS
Working Together in Times of Scarcity

e-News Digest

WEEKLY WAVE

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Keep up with our news and events with a subscription to the *Weekly Wave e-News Digest.*

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Engage with us!!

smegdal@arizona.edu