

ARIZONA WATER RESOURCE

The Water Resources Research Center Quarterly Newsletter

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Reflections on Change and Continuity in WRRC Outreach

by Sharon B. Megdal, Ph.D.

This is my 75th *Arizona Water Resource* (AWR) column since joining the WRRC in February 2002. When I interviewed for the Associate Director position, which I held until becoming Director in July 2004, I expressed interest in contributing a policy column to the newsletter on a regular basis. Over 16 years later, I am pleased to say that I have not missed an issue. It is also with somewhat mixed emotions that I am using this column to inform our readership that we will cease publishing the AWR with the Fall 2018 issue.

We transitioned from printing and mailing the newsletter to an all-digital format in 2017. While that saved some funds, publishing the newsletter on a quarterly basis continues to strain our resources. We started our Weekly Wave e-news digest about six years ago as a means of consolidating email announcements, particularly those about the WRRC annual conference and our sponsored seminars. The Weekly Wave, published as the bi-weekly Summer Wave during the University of Arizona's summer break, has evolved into a mechanism for us to share news as well as announcements in a more concise and flexible format, something more consistent with today's communications platforms.

During 2017, we at the WRRC took a look at how we deploy staff and student resources and engage with our varied stakeholders. Given resource constraints and the changing nature of how we receive and share information, we recommended to the

WRRC External Advisory Committee that we discontinue the AWR. We also recommended that we use the Weekly Wave to carry some AWR features, such as occasional commentary from guest writers and my column. The WRRC External Advisory Committee, and others with whom we have shared our recommendations, concurred. Producing the Weekly Wave is truly a team effort. We look forward to continuing to communicate with our stakeholders and welcome your thoughts as to the Weekly Wave's content going forward. If you are not already a subscriber, please sign up at <https://wrrc.arizona.edu/subscribe>.

At the current time, we plan to continue the production of our annual *Arroyo* newsletter, which focuses on a single topic linked to our annual conference. The 2018 issue, *Water and Irrigated Agriculture in Arizona*, was published in May. With the hiring of a summer research intern, we are working on the 2019 issue based on our March 2018 conference, "The Business of Water". The current and past *Arroyo* issues can be found at <https://wrrc.arizona.edu/publications>.

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Our efforts to connect our stakeholders to up-to-date information and insights through seminars continue throughout the year. While we do tend to slow down over the summer, we have had the opportunity to schedule two seminars by international experts. The first was held on June 15 and featured Dr. Shafick Adams of South Africa's Water Research Commission. Dr. Adams' lecture on diversification of South Africa's water supplies under conditions of drought was well-attended and included strong on-line participation. The second seminar, on July 18, featured two experts from the Arava desert region of Israel. Their presentation on food, water, and energy in the Arava region included discussion of renewable energy deployment in this water-scarce region. We offer live streaming of our seminars and post recordings of them, subject to speaker permission. Information on our sponsored and co-sponsored seminars is shared via the Weekly Wave and can be found on our web page <https://wrrc.arizona.edu/brown-bag-seminars>.

The WRRC's annual signature outreach and engagement event is our conference. We are still working on the date and location of our 2019 conference. Our goal for the annual conference is to bring together varied insights and information on a topic of interest and importance to the State. Especially for those who have not attended recent conferences, I refer you to our conference web page, <https://wrrc.arizona.edu/conference>.

As you can tell, a key tool for engaging with our stakeholders is through the WRRC website <https://wrrc.arizona.edu>. We endeavor to keep our outreach and programmatic pages up to date and post reports, bulletins, and publications, subject to copyright restrictions. Also included among our postings are our annual reports and strategic plan metrics. We provide access under the Programs tab to extensive information on Arizona Project WET (<https://arizonawet.arizona.edu>), as well as our programs on water quality, groundwater, transboundary aquifer assessment, water harvesting, and water planning and research carried out in various locations across Arizona. We offer presentations on water resource related topics to diverse audiences throughout the year and, while we do not post them all, I am happy to share mine with you on request. My Curriculum Vitae, which can be found at <https://wrrc.arizona.edu/director>, lists my presentations.

We hope you have enjoyed reading the *Arizona Water Resource* over the years. Past issues can also be found on our website. Our final Fall 2018 issue will feature water news resources that have emerged in the last few years, a comment from an *Arizona Water Resource* founder, and a retrospective look at my columns. Regarding my columns, in recent years, I have asked the students in my Spring graduate class to read them and formulate questions as their first assignment. (For those with interest in enrolling, this class, Water Policy in Arizona and Semi-arid Regions meets weekly during the Spring semester on Friday mornings from 9:00 to 11:30 at the WRRC.) In my final AWR column, I intend to highlight some of my favorite columns.

I do not want to pass up this opportunity, however, to mention a few of my past columns that relate to the Lower Basin Drought Contingency Plan (LBDCP). Anyone who pays attention to the news will know that Arizona has recently renewed its public dialogue on how to approach LBDCP structure and implementation in Arizona. We have known for some time that Arizona would face cutbacks in deliveries of Colorado River water through the Central Arizona Project. In Fall 2013, I published the column entitled "Shortage Projections May Inspire Changes in Thinking". In the Winter 2014 issue, I discussed the talking points on Arizona's water achievements and challenges, which had been circulated in December at the Colorado River Water Users Association annual conference.



This electronic billboard concept from the Winter 2015 AWR Public Policy Review shows Lake Mead level as of January 2015. Source of bucket graphic: Central Arizona Project

Published a year later, the column, "15 Water Wishes for 2015", is one of my personal favorites. More than one of my wishes relates to Colorado River conditions and actions to take. Wish number four was "to explore developing an electronic billboard campaign that shows Lake Mead elevation levels and links to sources of information about what these levels mean for Central Arizona Project water deliveries. It could be an interesting way to engage the public." And wish number 10 was that "we determine our solution paths here in Arizona and throughout the Colorado River Basin before a crisis develops. It might take some event(s), however, such as a shortage declaration on the Colorado River, to interest the general public and spur action. Although we do know a shortage declaration is likely, even without one, Arizona will voluntarily use less Colorado River water over the next three years pursuant to the recently signed Memorandum of Understanding to leave water in Lake Mead with the hopes of forestalling a shortage declaration."

As always, I welcome your feedback via email (smegdal@email.arizona.edu), including any you might have on the billboard idea, which I still like! 🙏



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All of Dr. Megdal's Public Policy Columns are available here: <https://wrrc.arizona.edu/columns>

AWR – The Early Years

The headline for the premier issue of *Arizona Water Resource* read “State-wide Water Newsletter Debuts,” and the University of Arizona Water Resources Research Center began the uninterrupted 26-year run of its AWR newsletter. According to that first story, AWR was a response to a need, recognized by representatives from various water organizations within the state, for a publication that allows the Arizona water community to share news and information. The information sharing needs that were highlighted included a calendar of events, “information on research and other studies, publication notices, legislative affairs, legal developments, notices of regulations and hearings, notes on transitions, and other types of information of general interest.”

The AWR was developed cooperatively, with input from across the water community. For the first issue, the newsletter team contacted many organizations and invited them to provide material. In that issue, they extended the invitation to include AWR readers, writing “Think of us as a bulletin board for Arizona’s water community. If an item is of interest to you, it probably has wide-spread interest, so please share it.” Contributors were urged to FAX their notices for the sake of timeliness.



John W. Harshbarger

This first issue also noted the passing of John W. Harshbarger, founder of the University of Arizona’s Department of Hydrology and Water Resources, who died October 10, 1991, at the age of 77.

The AWR team consisted of Joe Gelt (editor), Todd Sargent (reporter), Jim Suriano (calendar) and Gary Woodard (publisher). They produced

ten issues—growing from 8 to 16 pages—in 1992, all printed in black, white and turquoise on recycled & recyclable paper.

In May 1992, the four-months-old AWR congratulated itself on the favorable response within the water community, where many individuals contributed content or expressed interest in contributing in the future. Some organizations (ADWR, CAP, SRP, Tucson Water, USGS Water Science Division, and the Water Utilities Association of Arizona) supported AWR through sponsorships. Circulation grew to over 2,500. Over a cover story on the Yuma Desalting Plant and the Ciénega de Santa Clara, was a photo of AWR publisher Gary Woodard’s son and Susanna Eden’s daughter, ages seven and six, playing at a water fountain. (Eden was then a water research specialist at the WRRC).

The first Guest View appeared with the May 1992 issue with three views on CAP underutilization by Dave Iwanski, then at the AgriBusiness Council of Arizona, Mike Brophy, a water



This design for the front page, with its Southwestern Native American motif, defined the AWR for 17 years.

attorney with Ryley, Carlock & Applewhite, and Mark Myers, identified as a businessman active in water/environmental issues. Hard as it may be to believe now, 25 years ago underutilization of CAP water was a major problem. A few issues later, Hugh Holub, a water attorney, weighed in on the same subject.

In June 1992, AWR published a letter from Sharon B. Megdal, who was then the Executive Director of the Tucson AMA Water Authority and a member of the Governor’s CAP Issues Task Force. Megdal began her letter with evidence that she was an AWR reader: “I enjoyed reading AWR’s guest viewpoints on solutions to CAP underutilization.” Megdal goes on to say that “the problem is complex, and complex problems rarely have simple solutions.” She presents the perspective of the Tucson Active Management Area (AMA), which, she argues, should not be ignored as remedies that support agricultural CAP water use are developed. She wrote, “We must not forget that Arizona’s future is not just the future of the Pinal County farmers or Maricopa County.” The Tucson AMA Water Augmentation Authority, like the problem of CAP underutilization, is long gone, and as a member of the current CAP Board, Megdal is now in a position to represent the Tucson AMA directly.

At the end of its first year, AWR reported the results of a reader survey conducted in October 1992. Of the 248 surveys they



Cover photo of Gary Woodard's son and Susanna Eden's daughter, ages seven and six, playing at a water fountain.

mailed via the US Postal Service, about half were returned. The survey indicated that AWR was shared by subscribers with others, turning a circulation of 2,750 into a readership of just over 10,000. Readers included people in education and research, local, state and federal government, engineering and hydrology, water providers, irrigation districts, libraries, environmental organizations, major water users, law firms, and the interested public. The most-read sections of the newsletter were the cover photo and front-page stories; the least-read section, oddly enough, was the calendar. There was a tension between timeliness and depth of coverage, which



Photographs of the 1993 flood published in the Feb. 1993 issue of AWR. Rillito River in Tucson and Gila River at Winkelman Flats, AZ. Source: Barbara Tellman

continues to this day. As a result, the AWR team, with the advice of their cooperators, proposed dropping the calendar. They also promised to try to limit future issues to 12 pages, a promise they largely fulfilled.

Topics suggested by survey respondents look very much like today's issues: environment, water quality and treatment, groundwater hydrology, the Central Arizona Project, Indian water rights, and legislation. Readers liked the range of

topics covered and a "large number lauded our willingness to air opposing sides of an issue or unpopular views." The new publication was more willing to deal with hot-button issues than most such enterprises. The informal and chatty Water Vapors column was inaugurated in the April/May 1993 issue with this statement: "Exhaustive market research indicates that essentially no one reads the Communications section. So, taking a cue from Madison Avenue, we renamed it!" The format was also changed. The June/July column carried the news that the Arizona Hydrological Society had become an AWR sponsor. The Water Vapors column evaporated in 2008.

Over the years, AWR has published Guest Views from a variety of contributors, many of them prominent experts and professionals, including (with their titles as of the time of writing) Arizona State Senator John Mawhinney, Arizona Department of Water Resources Director Rita P. Pearson, and Chief Engineer Herman Bower of the U.S. Water Conservation Lab. In January-

February 2000, Sharon B. Megdal, then with MegEcon Consulting, provided a Guest View on the need for public discussion of groundwater management 20 years after passage of the Groundwater Management Act.

While Joe Gelt remained editor until 2009, AWR publisher Gary Woodard left the helm in 1999 and contributed his first Guest View as Director of Knowledge Transfer for the Sustainability of Semi-Arid Hydrology and Riparian Areas (SAHRA) center at the end of 2000. Also in 2000, AWR ceased printing on recycled/recyclable paper.

In the January-February 2002 AWR, Sharon B. Megdal's appointment to the position of WRRC Associate Director was announced, and in the March-April issue the first of her Public Policy Review columns appeared discussing the need to fine-tune the Central Arizona Groundwater Replenishment District (CAGR). 



Water Researchers Tackle Questions about Toxic Algae and Mountain System Recharge

Two new water-related research projects were recently completed using funding that the Water Resources Research Center (WRRC) receives through the US Geological Survey from annual appropriations for the federal 104(b) Program. The WRRC is Arizona's federally authorized Water Resources Research Institute, and as such administers the 104(b) Program, which provides support for research and information transfer projects on water-related issues of importance to Arizona and the region. In the past, projects funded through the WRRC have explored fundamental issues affecting the water supply, both in terms of water quality and quantity.

This year, a project led by University of Arizona professor Kevin Fitzsimmons and graduate student Robert Lynch titled "Might Recycled Wastewater Solve the Rising Problem of Toxin-Producing Algae?" explored the production of toxic algal blooms in recycled water and groundwater. The second project, "Impact of Projected Climate Changes on Mountain-block Recharge Processes" was spearheaded by hydrology professor Thomas Meixner and PhD student Ravindra Dwivedi, with input from professors Paul Ferre and Jennifer McIntosh. The study investigated mountain system recharge processes.

The Fitzsimmons and Lynch project explored the conditions that cause toxic blooms of blue-green algae in water. Although common in most water bodies around the world,

blue-green algae can sometimes cause severe problems with surface water quality. When algal blooms form, water deoxygenation occurs, leading to fish kills. Furthermore, some species of algae can produce microcystins during algal blooms, deadly neurotoxins that are harmful to both humans and animals. Toxic algal blooms occur all over the world, but the environmental triggers that cause "normal" algal blooms to suddenly become toxic are poorly understood. Recent scientific advances have resulted in methods to identify genes involved in toxin production and methods to quantify trace chemicals in water samples, both of which will help in identifying environmental triggers inducing toxin production in algae.

This study compared levels of algae, heavy metals, toxic algae, and microcystins in water samples collected over one summer. Two large ponds were sampled eight times each within a six-month period. The first set of samples was taken from a pond filled with recycled water at Sweetwater Wetlands. The second set of samples came from an irrigation retention pond fed by groundwater. An exciting finding was that, while levels of toxins and toxic algae increased in the groundwater-filled pond during summer months, levels in the pond containing recycled water remained below detection limits. These results agree with a previous study that strongly indicated the presence of a factor (chemical, physical, or biological) in recycled water that prevents the formation of toxic algal blooms. Although correlations were found between toxins and some of the measured water parameters, more work needs to be done to identify factors controlling toxin formation. Knowledge of the factors inducing toxin formation would help water managers design strategies that prevent the development of dangerous water quality conditions.

The main objective of the second project was to improve understanding of mountain system recharge processes, specifically the processes that lead to mountain-block recharge through a fractured bedrock aquifer. Mountain system recharge is defined as the total recharge to a valley aquifer occurring from mountain systems, including water that feeds streams and valley groundwater from flow through fractured bedrock. Mountain systems provide critical water and ecosystem services for populations in adjacent alluvial

Mountains for long-term observations of multiple tracers, using multiple methods. These observations were used to evaluate multiple competing conceptual models of streamflow generation and processes affecting stream water quality. A conceptual model involving precipitation, soil water, shallow and deep groundwater proved useful for the study site. Preliminary results suggest that during periods of snowmelt the *quantity* of stream water at the site is maintained by shallow surface storage, such as near surface



Collecting water samples for major and minor cations and anions, stable water isotopes, tritium and Carbon-14 tracers, April 26, 2018.

basins located in semiarid and arid regions. Arizona and much of the southwestern United States rely on the water from these systems which are, worryingly, at risk due to climate change. Current climate projections indicate reduced snowpack, reduced snowpack duration, and increased frequency of extreme precipitation events. These issues compound the already uncertain recharge estimates resulting from the lack of knowledge about natural recharge processes and the hydrologic functioning of mountain systems.

Meixner, Dwivedi and their team chose a high-elevation mountainous site located within the Santa Catalina

water and soil waters. On the other hand, the *quality* of stream water is controlled by both shallow subsurface flow and deep flow through the fractured bedrock aquifers.

The project will lead to improved understanding of recharge processes and how catchments store water and discharge it with time. The results will provide state and local water managers with better estimates of groundwater replenishment rates in lowlands through mountain systems. Study findings are also relevant to other high elevation mountainous areas where fractured-bedrock aquifers play a significant role in streamflow and groundwater recharge. 🌍

WRRR Section 104(b) Research Grant Program

Established by the U.S. Congress within the Water Resources Research Act of 1964, the water resources research institute program supports one institute in each state, the District of Columbia, and three U.S. territories. The WRRR is the designated Water Resources Research Institute for the State of Arizona. The program's major goals are to foster research on water and related issues of importance to the state and region and to encourage the entry of students and young scientists into the field of water resources. The WRRR provides small research grants under Section 104(b) of the Act. Proposals are solicited annually in the fall for the following project year (March 1 through February 28). Faculty members and students at any of Arizona's three state universities are eligible. See <https://wrrc.arizona.edu/programs/small-research-grants> for more information.

WRRC First Newsletter Editor Remembered

The WRRC's first newsletter, the precursor newsletter (1973-1987) to the *AWR*, was called the *Arizona Water Resources News Bulletin*. It was published on behalf of its contributors, including, at various times, the WRRC, Arizona Department of Water Resources, Arizona State Lands Department, Arizona Department of Health Services, and the UA Office of Arid Land Studies. Its editors represented each of its contributors, and Jim DeCook acted as the editor for the WRRC.

In its history, the WRRC has had only a few newsletter editors: Jim DeCook, Joe Gelt, and Susanna Eden. Gray Wilson served briefly in 1984-6 between Jim and Joe. Joe and Susanna are still among the living, but Jim died a year ago in April 2017. It is fitting, therefore, that in this, our penultimate newsletter, we remember Jim, as well as Gray Wilson, who died in October 2011.

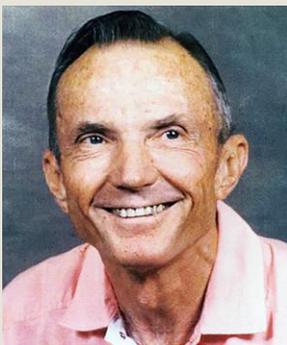
Dr. Kenneth James DeCook lived and worked for most of his life in Tucson. He attended Mansfield Jr. High and Tucson High School, and after WWII service in the Navy, he returned to Tucson to earn his Bachelor of Science degree from the University of Arizona. He went to Austin, Texas for his Masters in Geology from the University of Texas, but came back again to UA for a Doctorate in Hydrology. Recognized in his lifetime for his contributions to water research in Arizona, Jim spent most of his professional career doing

research and teaching hydrology at his Arizona *alma mater*. He also contributed to hydrological and geological studies in Texas during his time there. His association with the WRRC lasted until his retirement. Throughout a career spanning more than 40 years, his research and publications focused on water management issues ranging from the wastewater reuse and water conservation to artificial recharge and rainfall utilization; issues that are still with us today. In 1959, the *Arizona Republic* carried a story on research carried out by Sol Resnick, WRRC founder and early director, and Jim DeCook, testing the use of floodwaters for underground recharge.

Loren Graham (Gray) Wilson was well-known for his research and publications on groundwater recharge and the hydrology of the vadose zone (the area between land surface and the water table). He was a scientist with wide-ranging interests. For the WRRC, he produced many publications from his applied research on artificial recharge, groundwater pollution, subsurface characterization, and water reuse, among other topics. In 1997, he received a special award for his contributions to recharge at the biennial International Symposium on Managed Aquifer Recharge, and in 2003, received a Lifetime Achievement award from the Arizona Hydrological Society. He began his career in Arizona as an Assistant Hydrologist under Sol Resnick in the Institute of Water Utilization, the precursor organization to the WRRC, and served as acting director of the WRRC for 18 months from 1984 to 1985. *The Handbook of Vadose Zone Characterization & Monitoring*, which he co-edited, is still in use. 🌍

A Personal Remembrance of Jim DeCook

by Floyd Marsh, Hydrologist



In the following, Floyd Marsh, who was both a professional associate and close friend, provides a reflection on the immense impact that Jim had on those who knew him. These comments follow a brief announcement and memorial recognition for Dr. K. James ("Jim") DeCook, which was included in the April 20, 2018, WRRC Weekly Wave (Volume 6, Issue 16).

Jim DeCook was a distinguished alumnus of the Department of Hydrology and Water Resources (as it was known at the time) and valued colleague to many faculty and students formerly affiliated with the Department and WRRC. Those who worked with him on their M.S. theses, Ph.D. dissertations, and research projects knew him as a humble and supportive advisor. He was a quiet and unassuming man who enjoyed his profession, the outdoors and being with family and close friends. After moving to Arizona from Indiana in his early youth, Jim grew to love and respect the Southwest environment. In his personal time, he took advantage of the vast outdoor opportunities that living in the desert Southwest provides, while sharing this time with his many friends and family members. One of his numerous out-

door passions was hiking the local desert and mountain trails. He enjoyed hiking treks near home in the desert Southwest and abroad in the European Alps. It seemed there was never a trail he didn't enjoy for both the challenge and pure beauty. Further evidence of his pleasure in being outdoors were the Thanksgiving and Christmas potlucks including grilled turkey and all the holiday trimmings in Saguaro National Monument and Catalina State Park with family and close friends. Wind sailing a small catamaran and fishing in nearby Silverbell Lake, Patagonia Lake, and Big Lake in the mountains with friends; beach camping near Puerto Libertard, Mexico, a small fishing village near Puerto Peñasco and piloting a glider in the sky above Marana put him in touch with Mother Nature and all its beauty. Jim, who passed away April 14, 2017, will be remembered by those who know him well, not only for his professional contributions, but also as an outdoor enthusiast and dear friend.

Newsletters in the Evolving World of Communication

by Faith Schwartz, Manager of Communications, University of Arizona Cooperative Extension



As the manager of communications for University of Arizona Cooperative Extension, I have a keen interest in promoting effective communication. With changes in communication media and public expectations, I see practices changing. The WRRC's quarterly newsletter will be discontinued, but the Weekly Wave will continue – a strategic effort the WRRC communications staff is committed to sustaining.

In her featured column, WRRC Director Sharon Megdal explains that resource constraints and new priorities prompted the change. Instead of a curated collection of articles that appear quarterly, the WRRC will put efforts toward the Weekly Wave where WRRC staff members are able to put out timely content – like updates and events – that is important to readers.

Experts in newsletter communications agree that concentrating efforts on only the most significant content is an effective strategy when resources are limited.

“Content is what makes a newsletter effective. It's great to have lots of color and beautiful images. But if the content is of marginal interest to a reader, those elements won't be enough to make the newsletter valuable to them,” says Pila Martinez, senior director of strategic communications at the University of Arizona.

Martinez worked as a journalist for several years before joining the UA, where she has overseen the publication of high-level communications, including *Lo Que Pasa*, the UA's weekly e-newsletter for employees.

“A common mistake is compiling newsletter content around the question ‘What do we want to tell our readers about us?’ If you want readers to engage with your content, the question to ask is ‘What would our readers find interesting?’” Martinez said. “If you can provide useful and relevant information to readers on a regular basis, you are much more likely to make a connection and a positive impression.”

Susanna Eden, who has edited the WRRC's quarterly newsletter since 2009, agrees that the change is needed. “We think the Weekly Wave gives us a very valuable vehicle for keeping people informed about what's going on in water at the WRRC, the university, and the wider community without overloading their inboxes with announcements.”

Martinez stresses the importance of considering readers when evaluating format and frequency of communication. “There's a balance to be struck between communicating regularly enough to stay in the minds of your audiences and communicating so much that they tune you out or choose to disconnect entirely,” Martinez said.

“It's also important to focus on the goal and not confuse mailing list size with reach. You can send an email communication to 25,000 people. But if only 1 percent of them read it, and then delete it, then nothing has been accomplished. It is more worthwhile to make sure communications are reaching the right audience – even if it's relatively small – and that the content is relevant to that audience,” Martinez said.

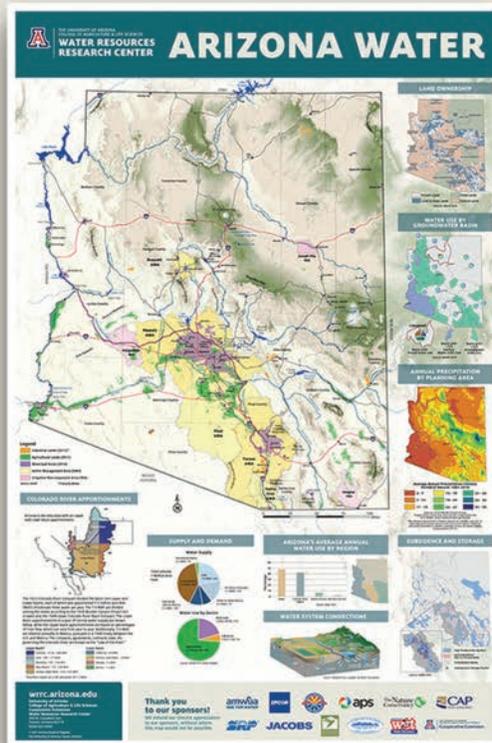
The advent of social media has brought challenges to communicating in traditional ways. That being said, one of the best parts about social media is that it's instant. But that's also its drawback. While instant, it's also fleeting. As I have learned, you may “post” something only to have it “disappear” in an onslaught of dozens of other posts.

While communication methods continue to evolve, with new platforms emerging as others fade away, the need to communicate will never go away. Even though we post to Facebook, or Twitter, or Instagram, those channels only supplement “old-fashioned” communications. Face-to-face interaction and even telephone conversations can never be replaced.

A major issue we face, in both the business and academic worlds, is deciding on which resources to direct where. With greater numbers of people to serve and limited resources, we have to direct time and effort to get the biggest impact, or “bang for the buck.” Right now, e-newsletters continue to be easy, organized packages that retain their value amid all of the options.

I look forward to continuing to receive the Weekly Wave, and applaud the WRRC's efforts to focus its efforts on making it helpful and relevant to its supporters. 

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