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Photo: CAP canal, Ben Lepley, 2017 WRRC Photo Contest

ARIZONA WATER RESOURCE

The Water Resources Research Center Quarterly Newsletter

Volume 26 Number 4 Fall 2018

Electronic Water News Available from Many Sources

As this is the final issue of the WRRC's *Arizona Water Resource* newsletter, we thought it would be useful to list some other sources of water information to which you may want to subscribe. This is not a complete list, but it includes some of our favorites.

For Arizona water news, both the Arizona Department of Water Resources and the Central Arizona Project send email newsletters. These links will take you to subscription pages: <https://azwaternews.com/> and <http://www.cap-az.com/public/cap-news/>. The CAP email is narrowly focused on their activities, but both will keep you updated on drought contingency planning. The ADWR email ranges somewhat more widely with links to stories from other news outlets.

The Arizona Department of Environmental Quality does not have an email newsletter, but you can sign up for notifications and updates about water quality program topics at https://public.govdelivery.com/accounts/AZDEQ/subscriber/new?topic_id=AZDEQ_259. The ADEQ provides opportunities for citizens to get involved in water quality monitoring and assessment through Arizona Water Watch (<http://www.azdeq.gov/programs/azww>). You can subscribe to program updates at the link above.

A “Government Goes On” feature in the newsletter of the Arizona Hydrological Society is informative and topical. The email newsletter is sent to AHS members, but you can find the articles on its web page at <https://azhydrosoc.org/news-events/>.

Other sites to find Arizona water news include Arizona Audubon – Water in the News (<http://az.audubon.org/water-news-0>) and AZ Water Association – Water in the News (<https://www.azwater.org/news/>). Membership in these organizations will put you on an email list, but you will have to “pull” the water news from these sites, because they do not “push” it to you.

On the other hand, if you subscribe to a list of water news pushers, water news from various sources will turn up in your inbox. If you get on the mailing list of the Water Conservation Alliance of Southern Arizona (WaterCASA), a variety of news articles and opinion pieces on water-related topics will come to you. Another email list that often sends items of interest to subscribers is the Arizona Riparian Council. This is more of an information sharing and chat email list, and exchanges of comments and information resources can be expected. One more mailing list with water-related messages, frequently from federal government agencies, is managed by Mary Reece

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Public Policy Review

Feature

at the Bureau of Reclamation. These articles and other items of interest to water groupies range further afield than Arizona.

The Arizona Municipal Water Users Association “AMWUA Blog,” (<http://www.amwua.org/blog>), a weekly feature by AMWUA’s executive director, appears on the AMWUA homepage (<http://www.amwua.org/>) along with other current information on water issues. If you would like to receive AMWUA emails, send a request to AMWUA.communications@amwua.org.

Water Use It Wisely focuses on conservation and provides water saving tips as well as news in its newsletter, which you can sign up for at <https://wateruseitwisely.com/news-events/>.

Email newsletters that cover Southwestern water issues include the Western Governors’ Association; subscribe at <http://westgov.org/contact>. Water Deeply is a digital media project of a team of journalists and technologists covering water issues in the U.S. West. They are known for thoughtful articles on topics of current interest. You can sign up for their newsletter at <https://www.newsdeeply.com/water>.

The journalist John Fleck, who is also the director of the University of New Mexico Water Resources Program, writes a blog (<http://www.inkstain.net/fleck/>) focused mainly on water issues, which provides news along with his take on current events.

The Water Education Foundation is based in California and its “Aquaforia” newsletter arrives daily with a few selected new articles usually focused on California, but occasionally with a wider Western focus. The subscription page is <https://www.watereducation.org/SignUp>.

“BC Water News”, published by the engineering firm Brown and Caldwell, collects news stories within six geographic regions of the United States and emails links to these stories to you once a week. We have seen links to small town newspapers and University of Arizona postings, as well as stories from major online and print news outlets. A recent issue linked to the Silver Belt with an article on our work in the Globe-Miami area. You can subscribe for any or all regions at <http://register.bcwaternews.com/>. When you do, you are likely to see your name listed among the new subscribers on your first e-newsletter.

Looking for a more technical focus to your news? Try the Water Online newsletter. You can sign up here: <https://www.wateronline.com/user/Edit>. Directed mainly toward water and wastewater utilities, it often has a human interest story among the reports on technological innovations, resources, and practices. Water resource professionals will find interesting articles in the AWRA Blog (<http://awramedia.org/mainblog/>), but to receive the AWRA newsletter you will have to join the American Water Resources Association.

The Ground Water Protection Council’s “Groundwater Communiqué” is a twice-monthly email newsletter that primarily alerts members about activities and events, but also can contain information on resources and research and other news. You can subscribe at <https://us11.list-manage.com/subscribe?u=e4d95ec7676fac6a01f324ddd&id=4bbdc7127e>.

The organization American Rivers has a newsletter that provides information as it promotes appreciation and protection of rivers; scroll to the bottom of the page to subscribe (<https://www.americanrivers.org/blog/>). Other advocacy organization, such as Water Keepers Alliance (<https://waterkeeper.org/news/>) also have newsletters that keep subscribers up to date on their issues and activities.

The U.S. EPA Office of Water sends out a newsletter to subscribers with information on the activities of the agency and its partners relating to protection and restoration of waterways (<https://public.govdelivery.com/accounts/USAEPAOW/subscriber/new>). The U.S. Bureau of Reclamation’s newsletter features the Bureau’s activities (reclamationinfo@usbr.gov) including current research.

The Forester Network, which publishes several magazines including *Water Efficiency* and *Stormwater*, also emails blogs on water and energy related topics. The variety of these offerings is very broad and they are a good source of conversational tidbits. The subscription page gives you a choice of newsletters (<https://foresternetwork.com/newsletter-sign-up/>).

Go to WaterWired for “news, analysis, humor, reviews, and commentary from [hydrogeologist] Michael E. ‘Aquadoc’ Campana” (<http://aquadoc.typepad.com/waterwired/>) an idiosyncratic mix that reflects Campana’s broad interests and global experience.

If you get on the list of the International Water Association (<http://www.iwa-network.org/>), you will receive the *Source* magazine with a variety of international water stories. For global water news, a personal favorite is Circle of Blue. Stories are collected from across the globe, frequently citing The Guardian, Al Jazeera, and The Times of India. You can sign up for the monthly newsletter and/or a daily feed at <https://www.circleofblue.org/tag/frontpage/>. They also offer a weekly Federal Tap, which presents what’s going on in Washington D.C. relating to water.

If we haven’t listed your favorites, please let us know. It’s hard to keep up with the diverse and dynamic world of water. The above listed sources can help—and it doesn’t even include social media sources such as Facebook and Twitter. And don’t forget, the Weekly Wave will continue to provide updates on our activities and events, as well as items and announcements focusing on our friends, colleagues, and community.



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Scarcity, Challenges, and Community-based Solutions



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ANNUAL CONFERENCE

FRIDAY, FEB. 1, 2019
7:30 AM - 2 PM

BLACK CANYON CONFERENCE CENTER
9440 N 25TH AVE, PHOENIX, AZ 85021

7:30 - 8:00 am	Registration and Continental Breakfast
8:00 - 8:25 am	Welcomes
8:25 - 9:25 am	Framework Presentations
	Water Tour of Arizona
	Water Laws and Regulations in Arizona
	Tribal Perspectives on Water
9:25 - 9:55 am	Keynote: Brenda W. Burman, Commissioner, U.S. Bureau of Reclamation (Invited)
9:55 - 10:10 am	Break
10:10 - 10:55 am	Community Panel I
	Cochise County: Collaborative Work Toward Sustainable Groundwater
	Cochise County: Agriculture and Water Resource Implications
	Pinal County: Collaborating Over the Long-term
	Graham County and Cobre Valley: Community Planning and Oral History Forums
	Gila River Indian Community: Innovative Solutions to Manage Multiple Water Resources
11:00 - 11:55 am	Community Panel II
	Yuma County: Water Uses, Security, and Conservation
	Mohave County: Surface and Groundwater Issues and Solutions
	Colorado River Indian Tribes: Managing Decreed Colorado River Water Rights
	Yavapai County: A Market-based Approach to Agricultural Water Conservation
	City of Flagstaff: Water Conservation Approaches
	Town of Payson: Water Supply and Long-Term Planning
12:00 - 1:15 pm	Lunch
	12:30 - 1:15 pm: Community Solutions - Moderated Lightning Talks
1:15 - 1:55 pm	Arizona Legislators Panel
1:55 - 2:00 pm	Closing Comments

Draft Agenda 10/12/18

Peace Corps Experience Inspires Focus on Community-Environment-Water Complex

by Christopher Freimund, WRRC Graduate Outreach Assistant

How do you adjust to being put in a context that feels completely outside of your understanding of the world? When everything seems foreign, from the way people dress, the language spoken, food available, religious ideology, to work ethic, how do you adapt? Can you relate to people? How do you communicate? These are a few examples of the type of questions that all Peace Corps volunteers have to reconcile within themselves at some point in their service. If you are fortunate and open minded, the answers to these questions can lead to personal growth, greater understanding, collaboration, cultural sharing, and creating a feeling of home and family. Upon departure, having spent two years within a new way of being, the next question becomes, how do you take that growth and those internal changes and reconcile them within your original world context?

I was a Peace Corps Volunteer in Guatemala from 2015-2017, where I inevitably encountered these challenges and tried to answer these questions. During those two years I helped



Author Chris Freimund's 25th birthday/going away party with his host family.

coordinate inter-institutional programs at regional, state, and local levels. Through these programs we created plans to strengthen health promotion policy and practice within the public education system. This work included capacity building with teachers, organizing camps for students, policy meetings with the local government, and visits to rural schools to carry out small-scale projects. Although this project was focused on health and education, my work very quickly became environmentally oriented. Sacapulas, the community in which I lived, faces massive deforestation and water scarcity. This is largely due to resource dependence, lack of regulation, and a changing climate. In my work, it

became impossible to discuss public health without addressing these large environmental concerns as well.

It was apparent early on that water would be a major issue that would weave throughout many aspects of my service. How do you discuss health practices, hygiene, or nutrition if there is no water available in the school or in nearby communities? My host family and I only received water in our home once every three days for one hour in the morning. We would store this water in a large concrete tub and then use it for cooking, cleaning, laundry, and if you are my 8-year-old host brother, the occasional storing of fish caught nearby. Due to this lack of a reliable municipal water source, the neighboring river was used for everything from bathing to washing clothes. Unfortunately, as there was not a planned-out trash management system, or any kind of water treatment, the river became increasingly contaminated.

In this setting, the focus of my work shifted. I became part of the community Environmental Committee. With this working group, we created a trash management plan for the town to reduce contamination; with help from USAID we formed a climate change adaptation plan; we initiated a bottle garden program in schools with high levels of malnutrition; and implemented a large-scale reforestation effort with students. These experiences in Sacapulas impressed upon me the importance of multi-disciplinary cooperation to deal with complicated environmental and community issues. It was a powerful learning experience that reinforced my educational and career interests to go down a more environmentally oriented path.

Throughout the two years in this community I was able to come to terms with some of those previously posed questions. I became very accustomed to being the tallest person in the room, or having children asking to touch my red hair. I grew to understand the differences in dress, and what region of the country each one was from. I learned to do my laundry by hand, which was a source of entertainment for the women in my host family. I ate tortillas with everything, even pasta, and still frequently crave them. By the end of my service I had a sense of home and family, and fostered a new way of knowing the world. I did not fully realize the impacts of this sense of place until I returned to the U.S. to find that my idea of home had changed.

So, now that I have returned, I am attempting to address that final question. How do I take what I have experienced and learned and incorporate it into a life in the United



Elementary school student learning about planting and watering trees during a school-wide reforestation event.

States? To begin with, my Peace Corps experience showed me the importance of contributing to whatever community I am a part of, it impressed upon me the desire to live simply, even with access to excess, and to appreciate small things previously taken for granted. I am attempting to incorporate all of those lessons into my life here. My work in Sacapulas inspired me to continue focusing my career on environmental issues. This leads me to my graduate studies in Natural Resources at the University of Arizona, steered by a particular interest in the interconnectedness between community resource management and resilience. It

thoroughly instilled in me the importance of safe and reliable water resources, which connects me to my work at the Water Resources Research Center on campus. Although the setting and the systems in place are very different, there are similarities in the issues faced in my Peace Corps community and those faced here in Arizona, particularly in relation to water. Tucson seems to be the right place for me to take my experiences and incorporate them into a new community while continuing to learn and explore these issues that interest me.

Small Interventions Can Have Large Impact in Rural Nepal

by Rachel Murray, WRRC Graduate Assistant

In 2013, a community in the middle hills of Nepal guided me through the fascinating networks of rural South Asian life under modern pressures. The experience confirmed what I had suspected for some time—my personal and professional curiosity with the tangle of culture, society, and nature that constitutes water governance is infinite.

While conducting research on farmer managed irrigation systems (FMIS) and adaptations to climate change in Nepal, I discovered the village of Higuwa tucked into the foothills beneath the fifth highest mountain in the world, Makulu. Higuwa and its proximal villages comprise an agricultural-ecological system (agroecosystem) reliant on small community-built FMIS fed by the nearby Malta River.

Here I made an unexpected discovery about access to water, namely, what appears to be water scarcity may in fact be institutional barriers to accessing water. I saw how simple design elements incorporated into government interventions can result in a cascade of benefits including removal of barriers to water access.

Higuwa and the surrounding communities were experiencing serious water shortages, but upon examination, it became clear that these shortages resulted from potentially rectifiable situations. The narrative that the community and regional government representatives wove for me highlighted potential spots for efficient, effective interventions that increase agroecosystem resilience and scope for adaptations. One particularly desirable target for government action is the nexus of small FMIS and women farmers.

The ward of Higuwa (divided into three “tols”, Higuwa, Sanisare, and Bharajatan) joins eight proximal wards to form a Village Development Committee (VDC). Tols conduct monthly development meetings and each year the municipality provides funding for development proposals that can be in one of four areas: electricity, irrigation, drinking water, or road development. Throughout months of interviews, informal conversations, and focus group meetings, nearly every woman I asked said that Higuwa’s greatest development concern was water, either

drinking or irrigation. In contrast, approximately 85% of men answered, road building. The men found road development appealing because it increases the value of the land near the road. Each year that municipal development funding has been awarded to Higuwa’s ward, the money has gone to road construction, leading to obvious questions concerning the



Kanchenjunga Mahila Samiti (Kanchenjunga Women’s Committee) Savings and Loan Group.

lacuna in women's decision-making power and its potential consequences.

In the mid 1990's, the District Women's Development Office (WDO) helped Higuwa's women form a savings and loan venture, but meetings are held in the morning on the first of each month, the same day and time as the tol development meetings. When I asked why they chose the same time as the development meetings, the President, Sankuntala, replied "We didn't, our meeting was here first". The men chose the time for the tol development meetings declaring, "Only the men are enough. The women have their meeting, now we have ours".

Unfortunately, road building has also created problems for irrigation canal (kulo) functioning. I mapped the central kulo, assisted by Higuwa elders, who pointed out multiple areas clogged with sand from the road above and several sections damaged by yearly landslides that villagers attribute to road construction. The women I spoke with about kulo dysfunction stressed the disproportionate pressure this places on women farmers, because women are in charge of the planting and weeding, which both require water on the field. In addition, two years prior, a road-construction bulldozer destroyed a drinking water pipe that supplied water to two-thirds of Higuwa. As in most of Nepal, women in Higuwa bear the majority of the responsibility for obtaining drinking water, and now they must walk farther to collect water.

In 2010, the government opened a nearby Study Center to expand women's development programs. Their subsequent actions provide an excellent illustration of the simple design elements in government interventions that can result in cascading benefits. That year, the Malta Study group held a women's literacy class in Higuwa and one day two people came to this class and told them about an opportunity to start an "income group" wherein the study center would provide seed money and various income generating trainings, if the women could establish small groups of nine, collect

matching funds from each woman, and agree to contribute monthly. Within the year women had formed three separate income groups in the Higuwa area, and community members of both genders spoke frequently of the increases in female literacy, confidence, and willingness to speak up.

These small groups are free to decide their own priorities and request specific inputs and are also free to combine with

other groups, pooling funds and efforts to increase women's independent decision-making power across a wide geographic area. For example, the three groups spread across upper and lower Higuwa could collaborate on a shared, multi-purpose water piping or water storage project. This is significant because the women want to pool funds to purchase and install piping from the canal system for the purpose of growing winter vegetables and restoring drinking water.



Author Rachel Murray planting garlic with farmers in Sankhuwasabha District, Nepal.

With regard to intervention design, the government learned that reaching women through literacy training was an effective jumping-off point for spontaneous formation of small women's savings and loan groups. These groups are able to use small-group learning to create income independence and self-help initiatives, and encourage the creation of more groups. Research indicates that such interventions increase women's participation in all components of decision-making.

The critical lesson I learned from my teachers and mentors in the community and local and regional government is the imperative that effective interventions be based on clear communication and mutual understanding, an authentic co-production of knowledge.

My current PhD research in the Arid Lands Resource Sciences Program at UA, builds on the foundational understanding of sociohydrological governance from my research in Nepal, expanding to investigations of different scales of power relationships with regard to access to water and land tenure in neighboring Pakistan.

Celebrating the Joy and Wonder of Water is Good Policy

by Joe Gelt, Former *Arizona Water Resource* Editor

Ancient wisdom being ancient wisdom might not offer solutions to contemporary problems. But then again one should not underestimate the power of ancient wisdom to give moderns something to think about. We need all the help we can get.

With that in mind consider the words of Lucius Annaeus Seneca (4 B.C.E. – 65 B.C.E.): “Where a spring rises or a water flows, there ought we to build altars and offer sacrifices.”



Brewer Fountain, Boston. Source: Wikipedia.org

Among the many and varied water resource tasks keeping hydrologists, engineers, lawmakers, lawyers, economists, et al. busy, the building of altars and the offering of sacrifices are not likely high on their things-to-do list.

(I personally believe sacrifices at altars might be worth a try, realizing at the same time this is not a strategy likely to gain public favor. [I’m aware, however, it is risky business to presume to know what might win public favor.] An altar set up on the commons, an appropriate sacrifice offered for the public good. Where’s the harm? It might bring rain.)

Perhaps Seneca’s words, however, should not be taken quite so literally. What the Stoic philosopher was getting at with his talk of altars and sacrifices is that water is a holy and essential substance and is deserving of reverence, its occurrence a cause for celebration and devotion.

To talk today of water’s spiritual and aesthetic qualities may sound hollow to our tin ears attuned to a materialistic view of world. Such highfalutin thoughts may be viewed as philosophical and aesthetic meanderings, at odds with the utilitarian ethic of water prevailing nowadays.

What I think is called for is a new understanding of water, a new sensitivity about its meaning and power, an increased appreciation of its joys and pleasures.

To some extent people are already aware of water’s universal appeal. Dull and doltish are those who have not experienced awe when viewing the ocean, who have not admired the natural beauty of a stream or lake, who have not felt a rush of excitement at a powerful waterfall.

Water is all this and more, the more involving what might seem to be pretty prosaic stuff. Water flows from our faucets in our homes. Can some of the magic and mystery of water carry over into our daily use of the substance? Water unbound and bound—but water nonetheless.

I’ve attended my share of water conferences, read a lot of water literature and have encountered an oft mentioned complaint. I call it the “Water Pro’s Lament.” It will be said, not without some justification, that as long as folks can turn a valve and water flows from the faucet they are satisfied.

In other words, their water expectations and curiosity begin and end at the faucet. All the labors that transported water to the faucet, the engineering and administrative complexities and chores, are little regarded, if at all. Understandably this causes hurt feelings.

I feel the water pro’s pain, but by temperament and interest I am moved more by what I call the Poet’s Lament: that water users use water without awareness and appreciation of the folklore of water, not fully aware that water is the sap and juice of the earth, its wash, ebb and flow the source of life, a substance of beauty, joyfulness and spiritual solace.

Is it too much to ask that water users develop water mindfulness? Is it that they already have too much on their minds? And what will be gained if they do become more water enlightened?

For one, water conservation might be practiced with a deeper understanding and involvement. Water officials bemoan citizens’ limited interest in water resource management, but one aspect of water policy that requires the direct participation of water users is water conservation. To save water or not to save water—and how and to what extent—those are the questions confronting all water users.

Those who respect and cherish water, who acknowledge its power and influence in their lives, are more likely to be committed to conserving water. I think this is true of preserving any natural resource: it begins with love and respect. The thrill of water rushing in a stream or arroyo, the smell of rain in the desert, such occurrences should be the inspiration behind any desert water conservation program.

What is needed to raise water consciousness? What will create new currents of water thinking? It will be no single item from the grab bag of possibilities, but a number of things. The intent of whatever is done, however, would be to celebrate water in a richer and more diverse fashion, beyond the eternal cycle of use and reuse, beyond the strictly utilitarian. Creativity is called for.

An event along this line was an evening of water music and narrative conducted by Water Resources Research Center's Associate Director Claire Zucker. Zucker, a watershed planner and musician, and her bandmate Dave Firestone wove together a variety of historical and current water topics with songs and traditional tunes.

Consider also water fountains. Water fountains can also contribute to the cause of celebrating a higher appreciation of

water. In fact, I don't think it is farfetched to consider fountains water altars. Seneca would likely agree.

Fountains can be designed to display water in a way that expresses or interprets the physical and aesthetic reality of a locale or region. Consider Portland's Ira Keller Fountain. It holds 75,000 gallons of water with 13,000 gallons cascading through it per minute. It was designed to suggest the abundant waterfalls in the Northwest.

In contrast, in very great contrast, a fountain expressing a desert water aesthetic was in Paolo Soleri's Scottsdale studio. It consisted of a pipe slowly dripping water into a stone basin. The drip never fills the basin, which does not have a drain, because the rate of evaporation matches the slow regular dripping of the water.



Water altar. Source: <http://www.turtledance.org>

This slow and restrained water display demonstrates that water is scarce, and its beauty is evident in its scarcity, even in a single drop. Contemplating the fall of that single drop might inspire an appreciation of the wonder and mystery of water, even as it flows or drips into the kitchen sink.



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WATER RESOURCES RESEARCH CENTER

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part the general public and public officials did not. Further education, discussion and debate, therefore, is needed, especially with legislators and likely participants in future legislative debates.” Now, many years later, we are at a very critical juncture in Arizona water management as we grapple with how to absorb the expected reductions in deliveries of Colorado River water to Arizona. There is a comprehensive conversation going on as I write this column. The conversation includes legislators and representatives of the various water using sectors in Arizona. As the impacts of the proposed terms of the Drought Contingency Plan are being explored and debated by a large steering committee, we know that it is more important than ever to build upon the great water management foundations and collaborations that have contributed to Arizona’s economic vitality.

The need for education and robust dialogue on water policy and management is as great as ever. Although, the Water Resources Research Center is ceasing publication

of the Arizona Water Resource as we know it to keep in step with society’s changing approaches to information sharing and enable us to realign Water Resources Research Center resources, I intend to continue to share perspectives periodically through our Weekly Wave news digest. If you do not already subscribe to this Friday e-publication, which includes announcement of our seminars (usually live-streamed) and annual conference, along with short articles, please visit wrrc.arizona.edu/subscribe to add your name.

The compendium of my columns can be found at <https://wrrc.arizona.edu/columns>. As always, I invite you to provide your feedback by emailing me at smegdal@email.arizona.edu.



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