

# ARIZONA WATER RESOURCE

VOLUME 19 NUMBER 4 FALL 2011

## Protecting Resources - Satisfying Consumers: New Corporate Water Strategies

By Stephan Przybylowicz

*“It’s a promise to be a good citizen of the world, protecting the Earth’s natural resources through innovation and more efficient use of land, energy, water and packaging in our operations.” – PepsiCo, on their environmental sustainability promise*

Environmentalists and corporations have not always seen eye-to-eye on matters of how our natural resources should best be used. In fact, many people see corporate industry as inherently anti-environmental. However, without industry, we would not be able to enjoy many of the comforts of modern day living. Corporations have many responsibilities including: to gain profit for their investors, to keep costs low for their consumers, to use natural resources efficiently, and to maintain decent pay and working conditions for their employees. So, how should corporations balance these differing needs with protection of the natural environment? Many corporations now have developed multiple ways of creating this balance. These include water stewardship plans, partnerships between corporations and environmental groups that help both parties agree on a water management strategy, implementation of environmental best practices, and new ideas for the future of water accountability and transparency.

### Water Stewardship Goals:

PepsiCo offers the world’s largest portfolio of billion-dollar food and beverage brands, with 19 different product lines that each generates more than \$1 billion in annual retail sales. They have also developed a comprehensive environmental sustainability plan in order to guide their water use. In terms of water, PepsiCo commits to the principles of 1) respect for the human right to water through world class efficiency in their operations, 2) preservation of water resources, and 3) enabling access to safe water. To realize these principles, they have developed the following goals:

*Corporate water continued on page 8*



*Water harvesting tank collects rain water from the roof at the 4Y homestead.*

## Through Dry Times

By Alanna Riggs

My family has been ranching in Arizona since its territorial days, and today we still live on the original homestead at the 4Y ranch in Dragoon, Arizona. In the past my ancestors have had to adapt to the changes in the land, in technology, and in culture. For the past few decades we have been adapting to a different change--drought.

The 4Y homestead sprawls out on either side of a wide shallow wash that meanders out of the Little Dragoon Mountains. Huge cottonwoods line the wash between the house and the corrals, and spread their branches far out over the sand beneath them. Back in the old days, that wash used to run year round and the little well at the head of the canyon supported the homestead’s water needs. There was even enough excess water to fill and designate a huge tank for a swimming pool. However, within my lifetime the wash has become ephemeral, if it runs at all, and the well has gone dry.

For the past fifteen years the 4Y has been supported by unpredictable monsoons and by hauling thousands of gallons of water in from off the ranch. Needless to say, ranch management has changed drastically in order to cope with these drier conditions. The cow herd has dropped in numbers, not only because of the lack of good grass producing rains in the summer, but because it is almost impossible to keep up with a thirsty herd in the summer. When those saving rains come in July and August, if we are lucky enough to have

*Dry Times continued on page 2*

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Author Alanna Riggs with friend

*Dry Times continued...*  
dirt tanks fill up, all artificial drinkers are turned off to encourage cattle to drink from those free watering holes. Sometimes after a good season the well at the head of the canyon gets a little water in it. But we never use it. That water that runs underground down the canyon is all that keeps our ancient cottonwoods alive year to year.

It's not just the cattle who bear the brunt of the drought on the ranch. As caretakers, my family has made huge lifestyle changes in order to live more sustainably on the dry land. All water that goes through our houses is used until it can't be used anymore. No water goes down the drain at the 4Y; it's recycled. It is used again for domestic purposes like washing the dishes,

only been there overnight, is suddenly full of tadpoles, water bugs, and surrounded by wildlife tracks? Have you tasted the tannin stained waters that spill past the oak roots and form deep amber pools in exposed bedrock? Water can be very spiritual to those who owe their traditions, their lives, and their future to it.

As a sixth generation rancher in Arizona, I plan to return to the land after I graduate and continue my family's legacy. I know that water issues, and indeed other natural resource issues as well, are only going to get more difficult in Arizona. I hope that, like my ancestors, I will continue to find ways to sustain the land, the water, and the animals so that I may preserve my family's traditions through the dry times. 🏡

or for agricultural purposes like watering the two remaining peach trees that have survived from the good ol' days of free water. The two main houses on the ranch are also becoming water harvesting efficient, with basins to collect rain from the roof and landscaping that can direct water to gardens. We have also replaced all outdated plumbing, so that there are no leaks or waste, and are using special appliances such as toilets with EPA WaterSense labels.

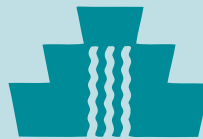
Growing up with such a lifestyle has made me very aware of the importance of water in southern Arizona. It has also cultivated in me a rather personal relationship with the resource. The scarcity of this precious commodity and the reverence with which I have been taught to treat it has transformed it into a sort of deity of the land. Like all deities, its favor can make you prosper or it can destroy your livelihood by turning its back on you. It might seem foolish to make such a statement about water, but not everyone has truly witnessed the power of water. Have you ever seen a creek as the first waters of a storm come down? The dark churning roar rolls boulders and lifts trees, it is an awesome sight. Have you ever heard water drip down dry stones into a clear pool that, although it has



Cottonwood Creek shows evidence of recent rain. The 2011 monsoon was good to the 4Y.

## WRRC Receives Reclamation Grant Award

WRRC professionals, Susanna Eden and Jackie Moxley, and Director Sharon Megdal have been awarded \$86,567 from the U.S. Bureau of Reclamation Landscape Conservation Cooperative Science Projects funding through the WaterSMART (Sustain and Manage America's Resources for Tomorrow) Program. It was one of nine projects funded across the Western States. The two-year project, Utility Guide to Rainwater/Stormwater Harvesting as an Adaptive Response to Climate Change, will develop a decision support tool to be used by public utilities and agencies to evaluate suitability and cost-effectiveness of rainwater and stormwater capture at various scales for multiple benefits. The project will investigate potential benefits of additional supply, reductions to flooding and other water resource management issues, in addition to water conservation. 🏡



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Editor's Note: Alert readers will notice an abundance of reading material highlighted in this issue of AWR. No less than 16 reports and books are referenced. This year has been particularly productive of important and interesting reading for those of us who love the topic of water. If we have left out a new book or report you think would interest our readers, please let us know. At the current rate of productivity, you will see many more publications noted in the pages of this newsletter.



**Urbanization  
Uncertainty and Water:  
Planning for Arizona's Second  
Hundred Years**

 **Water Resources  
Research Center  
2012 Conference**

**Tuesday, January 24, 2012**  
Pre-Conference Workshop  
Monday, January, 23

The University of Arizona  
Student Union Memorial Center Ballroom

## Water Resources Research Center 2012 Annual Conference

On January 24, 2012, the Water Resources Research Center is holding its annual conference, “Urbanization, Uncertainty and Water: Planning for Arizona’s Second Hundred Years”; in the Student Memorial Union at the University of Arizona in Tucson. Organized in collaboration with the ASU Morrison Institute for Public Policy, the conference builds on their recently released report *Watering the Sun Corridor: Managing Choices in Arizona’s Megapolitan Area* [see Resources this issue] addressing overarching questions about the kind of future we want and how we might get there—with a special focus on water.

As Arizona embarks on its second century as a state, its future holds both promise and uncertainty. Among the major challenges Arizonans will have to face are changing demands on our finite water supplies. Arizona is already one of the most urbanized states in the U.S. and will become even more urban in the future, with a metropolitan region predicted to extend from Prescott, through the Phoenix area cities, Pinal County and the Tucson area, to south-central Cochise County. Where will the water come from to support such a megapolitan area? What are the implications for the region and the rest of the state of such a concentration of population?

Civic, business and environmental leaders will join water policy and management experts in examining the water challenges of the “Sun Corridor” in Arizona.

The conference keynote speaker Rob Lang, Fellow of the Brookings Institution and Director of Brookings Mountain West, is well known as an expert on growth and adaptation of megapolitan areas. Grady Gammage will discuss the Sun Corridor report. David Brown and Karen Smith will each present and answer questions about other recently released reports – *The Water Resources Development Commission Final Report*, for which Mr.

Brown served as Co-Chair, and the Grand Canyon Institute’s *Arizona at the Crossroads: Water Scarcity or Water Sustainability?* authored by Dr. Smith. For a change of pace, historian Jack August, author of *Vision in the Desert* and *Dividing Western Waters*, will speak at lunch on the history of water for cities in Arizona’s first 100 years.

The WRRC’s annual conferences generally attract a diverse audience of 200-300 people, including decision-makers, water resource managers, professionals of all sorts, academics, students and the public. With its timely theme, we expect the conference to attract participants from throughout the “Sun Corridor” and from across the state.

The one-day conference will be preceded on January 23 by an optional workshop sponsored by the Sonoran Institute and the Lincoln Land Institute. The report, *Watering the Sun Corridor* will be reviewed and discussed. An interactive session will focus on the fundamental policy and value choices we will face about water in the Sun Corridor and on the driving forces that will shape these choices and water use and management in Arizona. Results from this discussion will be reported to the full Water Resources Research Center conference on the 24th and will help shape a Sonoran Institute initiative to educate and engage the larger community of civic, business and political leadership in a broad based regional dialogue on our shared water future.


The conference web site can be accessed by going to the WRRC conference button on the WRRC home page at [cals.arizona.edu/AZWATER](http://cals.arizona.edu/AZWATER) Information on conference cost, registration and the program are now available.

If you have any questions, please contact Jane Cripps at [jcripps@cals.arizona.edu](mailto:jcripps@cals.arizona.edu).

## AWWA Conference to be Held in Phoenix

The American Water Works Association Water Quality Technology Conference and Exposition will be in Phoenix, AZ on November 13-17, 2011.

Drinking water quality is a global issue that requires constant research, evaluation, scrutiny, and advancement from industry leaders. Innovations in contaminant detection, new regulatory requirements, potential health issues, and increased security concerns are creating challenges that must be faced head-on. Water professionals from around the world come to AWWA’s Water Quality Technology Conference and Exposition every year to benefit from “An Oasis of Ideas for a Changing Environment.”

Regular registration for the full conference is \$620 for AWWA members and \$795 for non-members. Please visit the conference webpage at <http://www.awwa.org/Conferences/wqtc> for more information about the conference and registration rates. 



## Southern Arizona Athena Awards

Friends of the WRRC, Keri Silvyn, Dr. Soyeon Shim and Katharine Kent were among 10 finalists for the 2011 Southern Arizona Athena Award honored last month at a luncheon sponsored by the Arizona Small Business Association (ASBA). By the end of the luncheon, Keri Silvyn, of Lewis and Roca and Imagine Greater Tucson had been named the 2011 ATHENA Recipient of Southern Arizona.

Keri was recognized for her involvement with Imagine Greater Tucson (IGT). Through her work with IGT she meets with neighborhood associations, environmental groups, businesses, and other diverse community interests with the goal of finding the foundational values that will unite the region.

Dr. Soyeon Shim, director of the University of Arizona's John and Doris Norton School of Family and Consumer Sciences, has managed multi-million dollar fundraising campaigns and for the past 20 years has built a world-renowned academic program in the College of Agriculture and Life Sciences.

Katharine Kent is President of the Solar Store and the only woman in the U.S. to hold certification from the North American Board of Certified Energy Practitioners as both a photovoltaic and solar thermal installer. The Solar Store provides energy solutions for homeowners whether they live in urban or rural settings.

The Arizona ATHENA award is bestowed on an exceptional woman who has achieved excellence in her business or profession; has served the community in a meaningful way; and has assisted and mentored women in their attainment of professional goals and leadership skills. The award is highly respected and is well known throughout the U.S. and the world.

These women have participated with the WRRC on conferences and other projects, so we can attest to their passion, commitment and service to the community.

Congresswoman Gabrielle Giffords was named the 2011 National ATHENA Recipient.

More information on the Athena awards can be found at [www.asba.com/athena](http://www.asba.com/athena).

## Regional Water Assessment Released by Pima Association of Governments

In 2010, the Regional Water Assessment Task Force of the Pima Association of Governments was convened to help the region shape its efforts to achieve a sustainable water future. As an initial step, the Task Force held a series of computer network-based ThinkTank sessions to gain input and guidance from stakeholders throughout the Tucson Active Management Area. The sixty four participants included elected officials, municipal managers, public and private utility managers, water attorneys, representatives from Central Arizona Project, state and federal agencies, Indian nations, University of Arizona, and people that represented economic, environmental, agricultural, and mining interests.

In August 2011, the Task Force members completed analysis of the ThinkTank responses and generated a report that includes tables showing the responses and analysis results. The Task Force focused on those ideas that gained the highest level of consensus to identify several ThinkTank themes, which are described in the

report. In addition, several regional priorities emerged out of the ideas and the Task Force went one step further to conceptualize how Regional Solution/Strategy Groups might be used to help the region follow up on the ideas generated through the sessions.

The full text of the report, along with tables and appendices, can be found at [www.pagnet.org/](http://www.pagnet.org/)

## Is Clean Water a Human Right?

The Universal Declaration of Human Rights was ratified by all the nations of the world in 1948. This includes 30 articles guaranteeing a broad sweep of human rights across many human endeavors, from Life to Liberty to Freedom of Thought. Recognizing that over a billion people across the planet lack access to clean and potable water and that millions die each year as a result, advocates are calling for the addition of Article 31: The Right to Water.

Article 31 would state that "Everyone has the right to clean and accessible water, adequate for the health and well-being of the individual and family, and no one shall be deprived of such access or quality of water due to individual economic circumstance."

To find out more about the Universal Declaration of Human Rights, Article 31, and to sign a petition to the United Nations, please visit <http://article31.org/>.

## The WRRC Welcomes New Associate Director



Jean E.T. McLain, Ph.D. has accepted the position of Associate Director and will begin her position on November 28, 2011. She also has been appointed Associate Research Scientist at the WRRC and the Department of Soil, Water and Environmental Sciences. Jean comes to the WRRC from the USDA-Agricultural Research Service, US Arid-Land Agricultural Research Center in Maricopa, Arizona, where she has been

a Research Scientist since 2004. Her current research interests are directed at the public health and environmental safety of reclaimed municipal wastewater, with the goal of extending limited groundwater and surface water supplies in the arid Southwest.

Jean received her doctorate from Duke University in Microbial Ecology after earning degrees in Forest Science from Yale University and Forestry from the University of Vermont. Since 2004, she has served as an Assistant Adjunct Research Scientist in the UA's Department of Soil, Water and Environmental Science. She comes to the WRRC not only with outstanding research credentials, but also with an enthusiasm for the mission and goals of the WRRC and real excitement to become a part of our team. 🏡

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## Pacific Institute Offers Water and Energy Saving Tools



Water fountain icon from WeTap smartphone application, courtesy of The Pacific Institute

can quickly find a fountain instead of buying a plastic disposable water bottle. The app is now in beta-testing in San Francisco and the Institute is looking for more test participants. As the test, users upload the locations and conditions of water fountains in the Bay Area onto their phones. If you are in the Bay Area and would like to participate, you can send an email to [wetap@pacinst.org](mailto:wetap@pacinst.org). If you would like to see which fountains have already been mapped, you can visit the googlemap website at <http://maps.google.com/maps/ms?msa=0&msid=210194966373106851467.0004a09197bd0293c938a&ie=UTF8&t=h&z=5>.

The second product the Institute has prepared is called WESim, the Water-Energy Simulator, which is a user-friendly analytical tool. Water and energy managers, municipalities, and decision-makers can use WESim to evaluate the energy and greenhouse gas implications associated with changes such as population growth, climate change, alternative water and energy sources, and new water treatments to meet stricter guidelines. More information about WESim can be found at <http://water-energy.lbl.gov/drupal.files/wett/9%20Heather%20Cooley.pdf>.

## EPA Announces Sustainability Website

The EPA has recently revamped their sustainable water infrastructure web pages. The EPA is committed to promoting sustainable practices that will help ensure that citizens continue to enjoy the benefits of clean and safe water. Guided by the Agency's "Clean Water and Drinking Water Infrastructure Sustainability Policy," they are working with a broad group of stakeholders to help bring about more sustainable practices on three levels: sustainable water infrastructure, sustainable water sector systems, and sustainable communities. To support local officials as they meet these challenges, the updated web pages also have a new section specifically for local officials. The pages provide information, resources, and materials designed to meet the needs of local officials committed to leaving a legacy of sustainable water infrastructure. It provides information that every local official should know about their community's water infrastructure and

offers concrete, achievable steps that local officials can take to put their community on a more sustainable path or enhance existing efforts to address their water infrastructure needs. To review EPA's revamped sustainable infrastructure web pages, please visit: <http://water.epa.gov/infrastructure/sustain/index.cfm>. To view the local officials section please see: <http://water.epa.gov/infrastructure/sustain/localofficials.cfm>.

## Paper on Transboundary Aquifers Looks at Institutional Asymmetry


The article, "The Importance of Institutional Asymmetries to the Development of Binational Aquifer Assessment Programs: The Arizona-Sonora Experience," by Chris Scott and Sharon Megdal is now available for free download from the international journal *Water*. The authors illustrate the principle that water policy depends fundamentally on the location of the supply and demand for water and the legal/institutional framework for water management. Within and across nations, laws and structures for water management decision making vary, often significantly. Recognizing these differences can aid in overcoming challenges inherent to the assessment and management of transboundary waters. This paper examines current binational efforts to develop the scientific information to support water management decision making along the United States-Mexico border. The full text is available at <http://www.mdpi.com/2073-4441/3/3/949/>.

## New USGS Report on Arizona's Alluvial Basins

The United States Geological Survey has recently released "Water Availability and Use Pilot: Methods Development for a Regional Assessment of Groundwater Availability, Southwest Alluvial Basins, Arizona" by Fred D Tillman, Jeffrey T. Cordova, Stanley A. Leake, Blakemore E. Thomas, and James B. Callegary.

To provide updated information to stakeholders addressing issues surrounding limited groundwater supplies and projected increases in groundwater use, the USGS Groundwater Resources Program instituted the Southwest Alluvial Basins Groundwater Availability and Use Pilot Program to evaluate the availability of groundwater resources in the alluvial basins of Arizona. The principal products of this evaluation of groundwater resources are updated groundwater budget information for the study area and a proof-of-concept groundwater-flow model incorporating several interconnected groundwater basins. This effort builds on previous research on the assessment and mapping of groundwater conditions in the alluvial basins of Arizona, also supported by the USGS Groundwater Resources Program.

"Arizona is one of the fastest growing states in the nation, and groundwater supplies will undergo increased demand as water needs for growing population are balanced with Arizona's agricultural sector," said USGS hydrologist Fred Tillman, who led this water availability and use pilot study. "This USGS report is intended to aid state and local agencies by providing them information about groundwater to help better plan for the future."

The full text of the report can be found at <http://pubs.usgs.gov/sir/2011/5071/>. 

## Water Resources Development Committee Report Released

The Water Resources Development Commission (WRDC) has released its final report. In 2010, the Arizona State Legislature passed House Bill 2661, which established the WRDC. The WRDC was given the task of assessing Arizona's demand for water and the supplies available to meet those demands for the next 25, 50, and 100 years. The WRDC consists of 17 commission members and nine ex officio members representing state and federal agencies and the Governor's office. ADWR Director Sandra Fabritz-Whitney serves as Chair for the Commission and ADWR staff provide technical and administrative support to the WRDC.

The final report contains the Commission's assessment of water demand and supply in Arizona for the next 100 years. Five committees formed to assess various aspects of the issue and each produced a report, which is also publicly available. Beyond these assessments, the WRDC made progress in evaluating the issues and challenges associated meeting water needs. The report concludes that there are portions of the state that have supplies available to meet future needs, while other areas within the state will require development of additional supplies for future demand. Moving forward, Arizona must develop a broad portfolio of solutions to meet the numerous water supply challenges that are inherent in this diverse state. The WRDC recommends that it be given until the sunset date of September 30, 2012, to continue the development, evaluation and prioritization of potential solutions or legislative proposals. The final report, along with the data contained in the five committee reports, is intended to serve as the foundation for future water management planning.

The full text of the WRDC Final Report can be found at [http://www.amwua.org/resource\\_documents/wrdc\\_final\\_rdl\\_n\\_110923.pdf](http://www.amwua.org/resource_documents/wrdc_final_rdl_n_110923.pdf).

## Grand Canyon Institute Releases Report on Economics of Arizona's Water Supply

The Grand Canyon Institute has released *Arizona at the Crossroads: Water Scarcity or Water Sustainability?* The report reinforces and extends in important ways the recent Arizona State University Morrison Institute report *Watering the Sun Corridor*, an examination of water resources for the three-county area of Maricopa, Pinal and Pima. *Arizona at the Crossroads* focuses on the economics of water supply and demand and includes a call for action through five specific legislative actions designed to place Arizona on a path to more sustainable water use.

1. Maximize Arizona's sustainable water resources, especially reclaimed water. The Legislature should direct water agencies to encourage the use of reclaimed water, where it is physically possible to do so, for all safe purposes as deemed by the Arizona Department of Environmental Quality.

2. Water customers need better information to discourage wasteful water consumption. The Legislature should require water providers to issue detailed information to customers on water use and clear pricing for each block of water used. Water providers within Active Management Areas should be required to implement tiered rate pricing, including a category of excessive or wasteful, with appropriate rates to discourage excessive use.

3. Simplify laws governing Arizona's surface-water rights for environmental purposes. The Legislature should create a commission to investigate Arizona's surface-water legal framework and provide recommendations for changes that will provide greater flexibility in

securing in-stream flow and riparian-water rights.

4. Investigate innovative, market-based approaches to water management. The Legislature should create a commission to investigate market-based approaches to water allocation and make recommendations concerning any needed changes in Arizona law.

5. Institute a statewide financing mechanism for water acquisition and infrastructure. The Legislature should consider expanding the authorities of the Water Infrastructure Finance Authority to allow for enhanced water acquisition and augmentation or create a new authority that would have the ability to assist all parties, including private parties, in water-supply acquisition. The Legislature should consider authorizing a new and sufficient revenue stream to fund water infrastructure, including water acquisition costs.

The full text of the report is available online at [http://grandcanyoninstitute.org/sites/grandcanyoninstitute.org/files/GCI\\_Background\\_Report\\_Water\\_Policy\\_0.pdf](http://grandcanyoninstitute.org/sites/grandcanyoninstitute.org/files/GCI_Background_Report_Water_Policy_0.pdf).

## "Tidal wave of books on the current water problem"



*Elixir: A History of Water and Humankind*  
By Brian Fagan

Published in 2011 by Bloomsbury Press, New York  
ISBN 978-1-60819-003-4

Matt Garcia, formerly Arizona Hydrologic Information System Project Manager for the Arizona Water Institute, writes a water blog accessible at <http://hydro-logic.blogspot.com>. The following review is excerpted from Matt's blog dated September 5, 2011.

"In his newest work *Elixir: A History of Water and Humankind*, Brian Fagan does not pretend to tell the future of water on our planet. . . In *Elixir*, however, Mr. Fagan has brought together some of the finest and most accessible scholarship on the interpretation of our human history since the rise of agriculture around 12,500 years ago, together with his own investigations and those of numerous others into the origins and fates of historical societies and the relation of those events to the way we have approached our most fundamental natural resource: freshwater. This is a work of history, sociology, agriculture, hydrology, climate, resource sciences, innovation and humanity that is every bit as relevant to our globalized society today as we could hope, if only we are willing to learn the lessons provided by our checkered past.

Why was this particular book so difficult to write? First, of course, there is little effort required in order simply to add another voice to the recent "tidal wave of books on the current water problem." To distinguish his narrative, Mr. Fagan focuses on the long history of water management, a subject well within his grasp though not yet addressed directly and comprehensively within the Fagan oeuvre. Second, and related to that focus, Mr. Fagan recognizes both the local scale and global scope of water management among various civilizations over the course of millennia. Our heightened awareness and lack of coherent response, to the twentieth- and twenty-first-century series of water crises around the globe is

not the first such episode in human history, and likely won't be the last. The issue to be addressed is, most importantly, will we figure it out this time, and not just for the survival of humanity, but in a manner that helps our descendants over time as well? Mr. Fagan's third objective in the development of Elixir has been to demonstrate that water management methods and outcomes from the past are not so far away as we might like to believe. As many water-savvy civilizations have fallen to conflict (e.g., many Mesopotamian societies) and attrition (ancient Greek culture and society, eventually subsumed by the Romans) as have seemingly disappeared due to climate change and anthropogenic effects on water scarcity (e.g., the Mayans, most famously)...No matter how much we may see on the fate of Mayan civilization, and how incredible the history remains, the puzzle of that cultural demise is still not yet entirely solved...

There are lessons in the tales of history that Mr. Fagan brings together here, instructions for ways to deal with water scarcity and its impacts on agriculture and society in times of environmental stress, climate change, and poor legacy management of vital resources...Some of these lessons remain puzzles that are yet to be solved in scholarly anthropological circles, but the growing confluence of social and hard sciences will eventually contribute to a clearer picture of our past...Now, if we fail to do something about it so that the next generations inherit the same or worse, we can only blame ourselves. In the preface, Mr. Fagan quotes Rachel Carson's *Silent Spring* to significant effect: "In an age when man has forgotten his origins and is blind even to his most essential needs for survival, water along with other resources has become the victim of his indifference." The alternative, as difficult as it may seem to some, is to learn and evolve as better stewards of our environment, and to develop a philosophy and means of human and agricultural sustainability that operates within the resilience capacity for the most fundamental of our natural resources."

For the full review, please visit <http://hydro-logic.blogspot.com/2011/07/book-review-elixir-by-brian-fagan.html>.

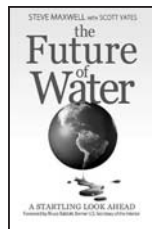
### Other New Water Books to Check Out:



*The Big Thirst: The Secret Life and Turbulent Future of Water*

Author: Charles Fishman

Bringing readers on a lively and fascinating journey—from the wet moons of Saturn to the water-obsessed hotels of Las Vegas, where dolphins swim in the desert; and from a rice farm in the parched Australian outback to a high-tech IBM plant that makes an exotic breed of pure water found nowhere in nature—Fishman vividly shows that we've already left behind a century-long golden age when water was thoughtlessly abundant, free, and safe and entered a new era of high-stakes water. In 2008, Atlanta came within ninety days of running entirely out of clean water. California is in a desperate battle to hold off a water catastrophe. And in the last five years Australia nearly ran out of water—and had to scramble to reinvent the country's entire water system. But as dramatic as the challenges are, the deeper truth Fishman reveals is that there is no good reason for us to be overtaken by a global water crisis. We have more than enough water. We just don't think about it, or use it, smartly.



*The Future of Water: A Startling Look Ahead*

Authors: Steve Maxwell and Scott Yates, forward by Bruce Babbitt

Around the world, water tables have dropped lower and lower as more straws are dipped into the finite number of aquifers. With the challenges of population growth, dilapidated infrastructure, and polluted water, finding solutions takes on new complications. The authors present scenarios for the broad trends that will have a significant impact upon future water challenges: population, economic growth, energy, climate change, and general demographic trends. They examine what might be in store for us and how individuals, water utilities, industries, and countries can change the future of water. The book discusses how water usage and storage must change in our homes, in agriculture and industry to deal with the looming crisis.

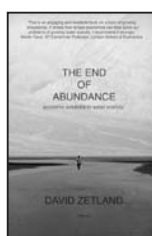


*Blue Revolution: Unmaking America's Water Crisis*

Author: Cynthia Barnett

An award-winning journalist reports on the many ways one of the most water-rich nations on the planet has squandered its way to scarcity, and argues the best solution is also the simplest and least expensive: a water ethic.

From backyard grottoes in California to sinkholes swallowing chunks of Florida, *Blue Revolution* exposes how the nation's green craze largely missed water—the No. 1 environmental concern of most Americans. But the book also offers inspiration. Reporting from San Antonio to Singapore, long-time journalist Cynthia Barnett shows how local communities and entire nations have come together in a shared ethic to dramatically reduce consumption and live within their water means. *Blue Revolution* combines investigative reporting with descriptions of solutions from around the nation and the globe. The first book to call for a national water ethic, *Blue Revolution* is also a powerful meditation on water and community in America.



*The End of Abundance: economic solutions to water scarcity*

Author: David Zetland

In another book to signal a change from plenty to scarcity, David Zetland uses economic theory to offer a new approach to water. In a past of abundance, we had clean water to meet our demands for showers, pools, farms and rivers. Our laws and customs did not need to regulate or ration demand. Over time, our demand has grown, and scarcity has replaced abundance. We don't have as much clean water as we want. We can respond to the end of abundance with old ideas or adopt new tools specifically designed to address water scarcity. In this book, Zetland describes the impact of scarcity on our many water uses, how the institutions of abundance fail in scarcity, and how economic ideas and tools can help us direct water to its highest and best use. Written for non-academic readers, *The End of Abundance* provides examples, insights and ideas to anyone interested in the management of our most precious resource.

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Abbott employees volunteer with Project WET (photo courtesy of Kerry Schwartz)

- Improve water use efficiency by 20 percent per unit of production by 2015;
- Strive for “positive water balance” in operations in water-distressed areas;
- Provide access to safe water to 3 million people in developing countries by the end of 2015.

These goals were created in 2007 and as of 2010, the company has achieved more than 15 percent improvement in water efficiency. By 2011, they have provided access to clean water to one million people from the world’s most drought-stricken regions.

The Coca-Cola Company also has implemented water-related goals, in partnership with the World Wildlife Fund (WWF):

- Conserve seven of the world’s most important freshwater basins (includes the Yangtze, Mekong, Danube, Rio Grande/Rio Bravo, Lake Niassa, Mesoamerican Reef Catchments, and Southeast U.S. Rivers and Streams)
- Improve water efficiency in the company’s operations (a water-use ratio of 2.16 by 2012)
- Reduce the company’s carbon emissions (grow the business while keeping the carbon steady and a 5 percent absolute reduction in developed countries)
- Promote sustainable agriculture (sugarcane, oranges, and corn)
- Inspire a global movement to conserve water (media coverage, World Water Week, Keystone Youth Policy Summit, UN Climate Change Conference, Panama’s “Vigilantes del Agua,” Poland’s “Rivers for Life,” and Malaysia’s Protect “Our Water, Protect Our Lives” campaigns)

#### **Partnerships are Key:**

The Coca-Cola Company has already seen vast improvements since initiating their partnership with WWF in 2007. This includes a 12.6 percent improvement in water efficiency and 7.7 percent reduction in carbon emissions in developed countries (although the total greenhouse emission of the company has increased; they are working to address this disparity).

PepsiCo has been working with industry peers, governments, academia, nongovernmental organizations (NGOs) and local communities to help conserve water. Their partnership with Columbia University Earth Institute was launched in 2008 and has supported a range of projects that test novel methods of managing water. PepsiCo has also made significant monetary contributions to the work of water.org and the Safe Water Network.

The Nature Conservancy is an environmental group that has taken

it upon themselves to reach out and work together with corporations to solve water issues. Natural bodies of water are becoming depleted, corporations are the world’s largest water users, and many corporations continue to pollute rivers and lakes. Instead of simply protesting, the Nature Conservancy strives to change corporate behavior through sound science and decades of experience on the ground. They are now working with a growing number of companies to quantify water usage, determine their vulnerability to water shortages, assess the potential ecological and social impacts of water use in local areas, and design and implement watershed projects that improve water conditions, ecological and social health, and lower corporate risks. They are also developing a global water certification program, based on a suite of “best practices standards,” and hope to enroll 100 companies by 2015 and move thousands of companies towards sustainable water use in their operations and supply chains by 2020. For the North American Initiative, A. O. Smith Corp., Badger Meter, Bucyrus International, Constellation Energy, Diversy, MillerCoors, Quad/Graphics and Veolia Water North America have all pledged support.

On the philanthropic end of the spectrum, Arizona Project WET (Water Education for Teachers), a program at the WRRC, is now partially funded by corporate sponsorship. Abbott, a global healthcare and medical research company with a facility in Casa Grande, approached Project WET in 2009 with hopes of becoming a water conservation leader in the community by supporting water education in addition to cutting their own corporate water use. The money comes primarily from the Abbott Fund, which is the philanthropic arm of the company, but the company itself has also contributed funds directly. In addition to financial support, Abbott has also committed a strong base of people power as volunteers during Project WET water festivals, science fairs, and SWAP (School Water Audit Program) projects in local schools.

How is this partnership good for Abbott? Water responsibility is important to the bottom line and becoming engaged in the community is a good marketing strategy to associate the brand name with doing good work.

How is this partnership good for the community? Abbott’s partnership with Arizona Project WET has resulted in over 2.3 million gallons of annual water savings, more than 20 community partnerships, the engagement of some 5,000 students in effective water education programs, and the start of 10 community action projects. The combination of the Abbott’s investment in the community and Project WET’s effective programming has resulted in measurable positive impacts in Southern Arizona communities.

#### **Saving Water is Good Business:**

One key component of PepsiCo’s water plan is recognition that water stewardship is good for business. PepsiCo Chairman and CEO Indra Nooyi states, “[The] successful company in 2030 will be the one that recognizes the possible outcomes of the global crises we face, and one nimble and tenacious enough to embed this recognition into their strategy and business processes.”

Water scarcity poses great business risks, especially to those companies that rely heavily on consistent access to



fresh water. In Casa Grande, Arizona, Frito Lay (now owned by PepsiCo) has equipped their facility with a state-of-the-art water filtration and purification system to recycle and reuse approximately 80 percent of the water used in production. This initial investment will save both water and money in the long run.

In 2007, The Pacific Institute, a non-partisan research institute, released “At the Crest of a Wave: A Proactive Approach to Corporate Water Strategy,” which outlines best practice guidelines for corporate water use. Phase I includes establishing a corporate water strategy, including water use measurements, water-related risk, assessment and prioritization of issues. Phase II includes implementation and innovation by following 3 steps:

1. Identify process and product innovations. This includes decreasing water use and impacts, increasing water recycling and reuse, managing priority supply chain issues, and designing “water-savvy” products.

2. Invest in water-related environmental services. This includes identifying opportunities, assessing potential markets for watershed services, and restoring ecological systems.

3. Align corporate goals with policy advocacy efforts and multi-stakeholder initiatives. This includes collaborations among business, communities, national, and international associations, and government agencies and nongovernmental organizations (NGOs).

In Arizona, Intel has invested over \$30 million in state-of-the-art water conservation technologies. It also implemented water recycling through a reverse osmosis system in New Mexico, which improved its water use efficiency. As a result, the site saves 500 million gallons of water per year. The Abbott facility in Casa Grande is saving almost 3 million gallons of water per year since implementing reuse and recycling programs in 2008. This results in a total cost savings of \$16,900 per year, helping the company keep costs low and contribute to environmental sustainability.

#### New Accountability and Transparency Strategies:

Can the rules for carbon reporting be applied to water? The Carbon Disclosure Project now has its eye on water and has asked major companies to disclose their water use in addition to their greenhouse gas emissions. The campaign includes an 11-page questionnaire that asks companies to specify to what extent they operate in water-stressed areas. Unlike carbon emissions, water use is a local issue. “You can’t offset a water shortage in one region with credits in another region,” states Bart Alexander, Vice President for Global Corporate Responsibility at Molson Coors.

Another relatively new concept is the water footprint. We may be familiar with water footprinting for countries, products, and individuals, but it has yet to be meaningfully applied to companies as a whole. In the context of business, the water footprint is the total volume of fresh water used to produce the goods and services produced by a business. PepsiCo has been active with the Water Footprint Network, a Netherlands-

based nonprofit, and has identified a key factor in water footprint recording: unlike carbon reporting, a single, aggregate number for a water footprint is of little material value. They believe that what is truly important is the impact of their water use and shifting the discussion from “water footprint as a number” to the “components of water that have the most impact.”

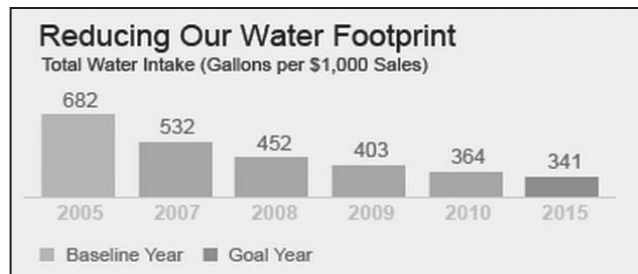
Another innovation in water reporting comes from the Minnesota Water Sustainability Framework, recommending a web-based water reporting and permitting database. Carolyn Sampson, Environmental Manager for the Innovation, Technology, and Quality Division at General Mills, was a member of the Framework’s project synthesis team and explains some of the problems of the current tracking and reporting process: “My time and that of others could be much better spent solving technical problems. Not only is the reporting and permitting process onerous, but there’s no statewide water-related database that allows companies to easily track trends, model performance, or plan for the future.”

The Framework’s proposed system would not only make it more efficient for industry to file reports, but could help businesses and communities plan for the future.

#### Looking Towards the Future:

It is clear that corporations have made progress in water sustainability, but there is still a long way to go. As the first phase targets are approached, companies will have to work closely with the environmental community

in order to develop new targets for the next 10-15 years. New strategies will have to be developed. Clear and measurable goals, key partnerships, proactive best practices, and new strategies for accountability and transparency will continue to be important, as will corporate commitment to sustainability through resource conservation and service to the global community. 🏗️



Abbott’s water footprint goals are representative of many corporate water plans ([www.abbott.com](http://www.abbott.com))



### Corporate Water Strategies

Author: Will Sarni

In the past, businesses have viewed water as a minimal operational cost and not a strategic issue. However, water has now emerged as a critical issue for both corporations and the public sector in response to increased water demand, climatic risks and potentially negative impacts on brand value. This innovative book provides up to date information on global water issues and describes how companies can not only address these challenges but also implement high value global water strategies. It shows: why water is a critical business issue for companies which now face water risk to their operations and brands; how new concepts such as embedded water and virtual water are forcing companies to think differently about how they use water to manufacture products; that companies need to develop a corporate water strategy to manage water as a key business issue and capture its real value of water; and how companies can develop partnerships with nongovernmental organizations to implement water strategies.



Brittany Choate began her work at the WRRC in the fall of 2010 with the Arizona Environmental Water Needs Assessment (AzEWNA) Report and Methodology Guidebook. AzEWNA is a two-part publication designed to increase public awareness of environmental flow (e-flow) needs, help policy makers understand the science behind e-flow studies, and identify information gaps in understanding environmental water needs. The goal of AzEWNA is to help bring the environment to the table as a water-using sector. Brittany's involvement with AzEWNA included assisting the authors, Joanna Nadeau and

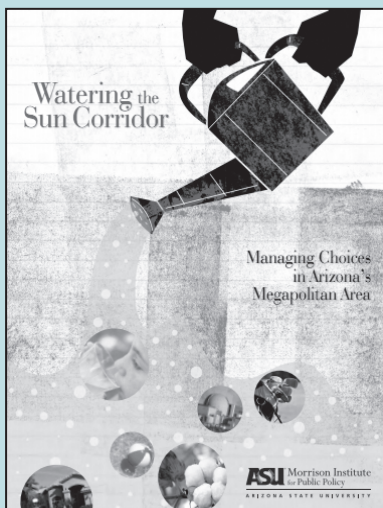
University's Wind Symphony. Later this fall, Brittany will start an internship as an Agriculture Specialist for U.S. Customs and Border Protection in Nogales, Arizona.

Brittany has also been, and continues to be, part of the WRRC's Conserve to Enhance program. Conserve to Enhance (C2E) is a voluntary municipal water conservation program that encourages participants to implement water conservation techniques, track their monthly water bill savings, and then donate some or all of those savings to a fund for environmental enhancement. Brittany has been a part of the Tucson pilot since it began in January 2011, working behind the scenes to design outreach materials, help create the pilot's water Conservation Calculator, calculate participant donations, contribute to writing reports on the pilot. Brittany also presented at a WRRC Brown Bag seminar on potential areas for program expansion in Tucson.

Dr. Sharon Megdal, with compiling information about Arizona's current understanding of environmental water needs, creating flow charts and GIS maps for the publication and designing posters, presentations, and materials for the outreach component of AzEWNA. Brittany also helped write portions of the AzEWNA Report and Methodology Guidebook and provided photos for both publications. For more information about the WRRC's AzEWNA Report and Guidebook, please refer to the centerfold insert in this AWR publication.

Brittany received her bachelor's degree in Environmental Science from the University of Arizona in 2010. As an undergraduate, Brittany was part of the University's Undergraduate Biology Research Program, named one of the University's Pillars of Excellence award recipients, and was her department and college's Outstanding Senior for the Class of 2010. Currently, Brittany is a second year Master's student at the University of Arizona majoring in Soil and Water Science with a minor in Microbiology. In addition to attending classes, Brittany works as a graduate research assistant at the WRRC. She also serves as a College of Agriculture and Life Sciences Ambassador, College Peer Mentor, has been a Graduate Student Representative for the Soil, Water, and Environmental Science Department, and was principal bassoon for the

Over the summer, Brittany was involved in a collaborative project between WRRC and the Colorado Water Institute at Colorado State University. The two sister organizations teamed up to organize an Agricultural-Environmental Cooperation Field Trip. This trip took agricultural and environmental stakeholders from Arizona and Colorado to Oregon to show them successful examples of how local agriculturalists and environmentalists have worked together on water related issues to produce positive results. Brittany worked with Dr. Sharon Megdal on recruiting Arizona participants, planning travel logistics, and acted as an on-the-ground facilitator when the group traveled to Oregon in August. 🏡



## Sun Corridor Report Looks at AZ's Future Water Supply

Do we have ample supply for Arizona's needs today and tomorrow? Are we in a current water crisis? And, if so, what's being done and what should be done? These questions and more are considered in *Watering the Sun Corridor: Managing Choices in*

to 10 million by 2040.

Senior Research Fellow Grady Gammage Jr. is the chief author. He states in what that "[t]he report was written in part to address a string of recent pronouncements that urban Arizona is 'unsustainable,' or 'running dry,' or at 'extreme risk' from climate change because the gap between precipitation and water use is great, and likely to increase."

Also featured in *Watering the Sun Corridor* are submissions by: Ray Quay and Patricia Gober of the Arizona State University's Decision Center for a Desert City; Sharon B. Megdal of the Water Resource Research Center at the University of Arizona; and Pinal County Supervisor David Snider.

Water issues are complex and estimates of the annual water supply available to Arizona are highly debatable – and, in fact, are often debated. This new report suggests that with 2.8 million acre feet of renewable water annually, the amount of Arizona's Colorado River entitlement, more than 8 million residents could be supported in the Sun Corridor at current rates of municipal consumption. The full report can be accessed at [MorrisonInstitute.asu.edu](http://MorrisonInstitute.asu.edu). 🏡

Arizona's Megapolitan Area. This report, released in September by the ASU Morrison Institute for Public Policy, takes a comprehensive look at the Phoenix-Tucson area, which forms the heart of urban Arizona and could reach a population of up

## Visit to Oregon Offers Insights into Successful Collaboration

By Sharon Megdal



Addressing the water challenges associated with providing water for Arizona's second 100 years will require stewardship, innovation, and collaboration. It took collaboration to get the Salt River Project and Central Arizona Project built. It took collaboration for the recent test run of the Yuma Desalting Plant, a focus of the WRRC's 2011 annual conference held last April in Yuma, Arizona. This year's conference, scheduled for January 24, 2012, is being planned in collaboration

with ASU's Morrison Institute for Public Policy, and it will focus on some of the water-related choices that will have to be made throughout the state. While past water projects of significant scale and cost were the chosen pathway to increasing water supply, lack of financial capital as well as questions about future water security for our communities are now critical determinants of solutions that will meet our state's future water needs. Will we recycle water like Orange County, California? Will we see significantly more use of gray water and rainwater by households? Can conservation forestall the need for large investments? What about meeting the water needs of our natural environment? Dialogue and collaboration are critical to determining the paths we take.

In late August 2011, the WRRC had the opportunity to convene approximately 20 agricultural and environmental stakeholders from Arizona to visit Central Oregon. The purpose of the trip was to build communication channels among the representatives of both sectors and to learn about successful examples of collaboration. We spent the better part of a week visiting areas where the agricultural/ranching community and what is often referred to as the conservation community (although I think we all are members of the conservation community) have developed approaches to water stewardship that satisfy the interests of both sectors. It is hoped that the actions undertaken will enhance stream flow to aid the spawning of wild salmon and other fish habitat. The trip was made possible by a grant from the Walton Family Foundation and was planned in collaboration with the WRRC's sister organization at Colorado State University, the Colorado Water Institute. A group from Colorado made a similar trip in mid-September.


We visited the John Day-Prairie City area, the Three Sisters-Deschutes River region, and sites in Klamath Falls. In each area, we met with ranchers and conservation organization representatives to hear about their successful efforts. We ate lunch at a park in Prairie City, at an organic farm in Three Sisters, and at the Agency Ranch in the Klamath basin. Among the things we saw: wild salmon spawning; an extremely productive organic farming operation; an elk ranch; streams, creeks and even headwaters; beautiful open grazing pastures; a state-of-the-art fish screen and ladder; and so much more. More importantly, we heard about the various efforts

to conserve or redirect water through adjustments to irrigation practices and replacement of leaky irrigation systems. We heard about these efforts from the project collaborators, all of whom took time from their busy schedules to share their experiences and break bread with us.

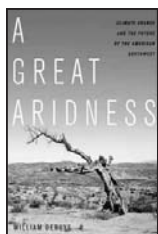
We learned so much. While recognizing that Oregon and Arizona have very different water endowments and uses, a few of the lessons learned are equally applicable to our situation. First is the importance of drivers and what I will call enabling mechanisms. Oregon state law has some innovative provisions relating to leased and transferred water rights. The regionally important Bonneville Power Authority is required to address salmon issues and this requirement has resulted in a source of sizable funding for the voluntary arrangements between ranchers/farmers and conservation organizations. We also learned that developing and implementing the various programs took considerable time and often relied on multiple funding sources. We heard how some projects, such as the Three Sisters Irrigation District fish ladder and screen, were able to take advantage of one-time or short-term funding opportunities. In other cases, federal programs that provide funding through the U.S. Department of Agriculture were important. Unfortunately, the future of some of these programs is uncertain due to changing federal priorities. Of critical importance were the relationships developed among the parties. Trust is a necessary condition for effective partnerships. Its development also takes time. Along with feeling the beautiful air, we could feel the strength of the relationships of the people working within and across the organizations.

While Arizona and Oregon are so very different, we share many similarities. We share a love for the natural beauty of our state and a desire to be good stewards of its resources. We recognize our challenges and have a commitment to develop solutions to them. It is important for us to open up the channels of communication so that we can build the trust that is required for developing the partnerships needed for solution formulation and implementation. Money helps, too, and this is currently a challenge for us all. Key factors to success will include: trust, staying power (hard work!), communication, collaboration, commitment, leverage, drivers, and enabling mechanisms.

The participants in the Oregon field trip engaged in extensive dialogue at the sites and on the long bus rides between them. Many commented on the value of the one-on-one or small group discussions that occurred among the Arizonans. They are looking forward to more learning and communication here in Arizona. I am, too!

As one of the many opportunities we will have for learning and dialogue on meeting Arizona's water needs in our second 100 years as a state, please consider participating in our January 24, 2012 conference. Information on it can be found at the WRRC web site, [www.cals.arizona.edu/azwater](http://www.cals.arizona.edu/azwater). 

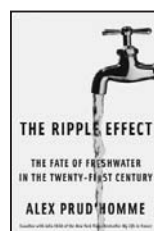
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*A Great Aridness: Climate Change and the Future of the American Southwest*  
Author: William deBuys

In *A Great Aridness*, William deBuys paints a compelling picture of what the Southwest might look like when climate change turns up the heat and the water runs out. This semi-arid land, vulnerable to water shortages, rising temperatures, wildfires, and a host of other environmental challenges, is poised to bear some of the heaviest consequences of global environmental change in the United States. Examining interrelated factors such as vanishing wildlife, forest die backs, and the over-allocation of the already stressed Colorado River--upon which nearly 30 million people depend--the author narrates the landscape's history--and future. He tells the inspiring stories of the climatologists and others who are helping untangle the complex, interlocking causes and effects of global warming. And while the fate of this region may seem at first blush to be of merely local interest, what happens in the Southwest, deBuys suggests, will provide a glimpse of what other mid-latitude

arid lands worldwide--the Mediterranean Basin, southern Africa, and the Middle East--will experience in the coming years.



*The Ripple Effect: The Fate of Freshwater in the Twenty-First Century*  
Author: Alex Prud'homme

As Alex Prud'homme and his great-aunt Julia Child were completing their collaboration on her memoir, *My Life in France*, they began to talk about the French obsession with bottled water, which had finally spread to America. From this spark of interest, Prud'homme began what would become an ambitious quest to understand the evolving story of freshwater. What he found was shocking: as the climate warms and world population grows, demand for water has surged, but supplies of freshwater are static or dropping, and new threats to water quality appear every day. *The Ripple Effect* is Prud'homme's vivid and engaging inquiry into the fate of freshwater in the twenty-first century. 