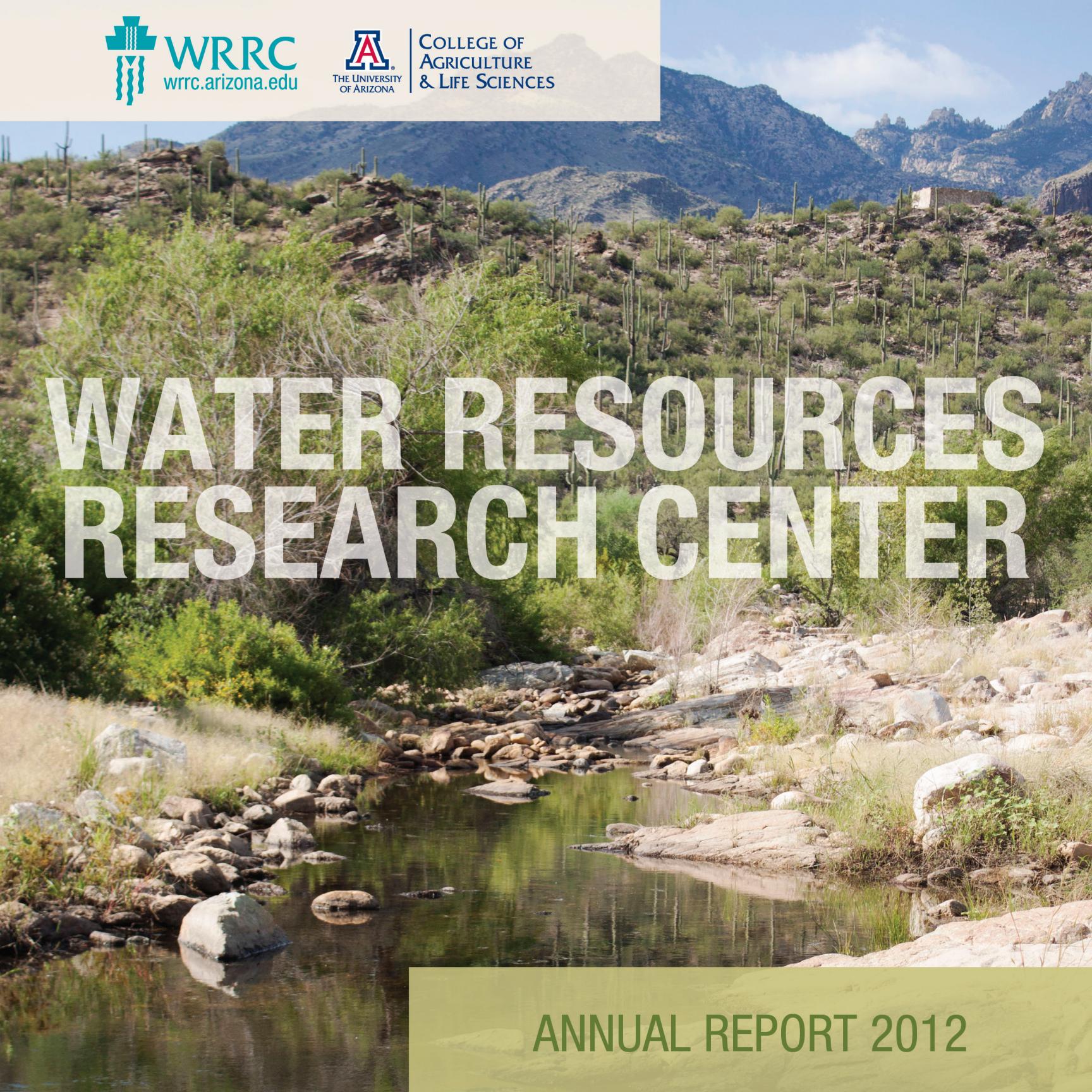


WATER RESOURCES RESEARCH CENTER



ANNUAL REPORT 2012



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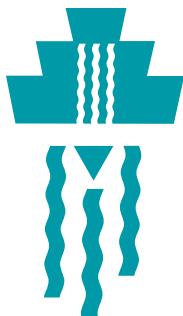
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Appendices are available online at wrrc.arizona.edu/annual-report-2012

Appendix A: WRRC 2021 Strategic Plan, including the 2012 Objective Metrics Report

Appendix B: Supplemental Information

Cover photo: Bryce Emily Megdal



Providing Knowledge for Better Water Management and Policy

A unit of the University of Arizona College of Agriculture and Life Sciences, the Water Resources Research Center (WRRC) promotes understanding of critical regional water management issues through research, community outreach, and public education. In a strategic planning process conducted early in 2012, the WRRC enunciated its vision for the future: to expand its applied research program, increase engagement at multiple levels, and maintain a reputation for excellence in educational and outreach programs. To realize this future, the WRRC has worked to increase its capacity to conduct water policy and management research, engaged and mentored a growing number of students, expanded support for K-12 water education, and improved the effectiveness of its information dissemination activities. The full text of the WRRC's **2021 Strategic Plan**, as submitted May 18, 2012 to the University of Arizona College of Agriculture and Life Sciences, can be found in Appendix A.

WRRC Director



Sharon B. Megdal, Ph.D., WRRC Director, is the C.W. and Modene Neely Endowed Professor for Excellence in Agriculture and Life Sciences and Professor/Specialist in the University of Arizona Department of Soil, Water and Environmental Science. In addition, she directs the Water Sustainability Program (WSP) and is co-director of the Water, Environmental, and Energy Solutions (WEES) Initiative that encompasses WSP. Dr. Megdal holds courtesy appointments with the UA School of Government and Public Policy, the School of Geography and Development, the College of Architecture, Planning and Landscape Architecture, the Mel and Enid Zuckerman College of Public Health, the James E. Rogers College of Law, and the Arizona Center for Judaic Studies. She is a member of the Arid Lands Resource Sciences Graduate Interdisciplinary Program and the Institute of the Environment. Dr. Megdal serves on the Central Arizona Water Conservation District Board of Directors, a position to which she was elected in November 2008. She is a member of the UNESCO-GEF (Global Environmental Facility) Transboundary Waters Assessment Programme, Groundwater Expert Group and joined the UA Center for Middle Eastern Studies Advisory Board in 2011. A member of the National Institutes for Water Resources since 2004 and its board since 2011, she will take the role of President Elect in 2013.

Dr. Megdal's work addresses a range of water policy and management themes, including water governance and planning, competition for water resources, and international comparative analysis. She is actively engaged in several of the research projects and programs described in this report, and has been involved in a growing portfolio of international collaborations. She was on sabbatical for the Spring 2012 semester, during which she traveled to Jordan, Uruguay, Australia and France for meetings and lectures on water policy and management. She participated in the World Water Forum in Marseille, France, and in a June workshop at the Organisation for Economic Co-operation and Development (OECD). In Australia, her lectures were hosted by the University of South Australia, the Australian national research agency CSIRO and the Murray-Darling Basin Authority. She was also hosted at The Hebrew University of Jerusalem, where she served as a Lady Davis Visiting Professor. Dr. Megdal has continued her collaboration with researchers at the Jordanian Royal Scientific Society on a pilot grey water project and hosted a workshop on further collaboration in October 2012. She developed the Israel Water Management Program, a program of meetings, site visits and lectures in Israel, which was conducted in early November 2012.

The list of Dr. Megdal's 2012 publications and presentations is long and varied (see Appendix B Sections 10 and 11), and includes an edited volume of papers emanating from the 2009 workshop on Arizona-Israeli-Palestinian water issues. On top of her other work, Dr. Megdal served as committee chair or member for several graduate students.

External Advisory Committee

The External Advisory Committee (EAC) to the WRRC is made up of leaders in the Arizona water community, and their advice is invaluable to advancing the Center's mission. The annual meeting of the EAC was held December 7, 2012 at the Nina Mason Pulliam Rio Salado Audubon Center in Phoenix, Arizona. Listed below are EAC members and their affiliations as of December 2012.

Guy Carpenter, Carollo Engineers

Randy Chandler, U.S. Bureau of Reclamation

Mark Cross, Montgomery & Associates

Henry Darwin, Arizona Department of Environmental Quality

Sandra Fabritz-Whitney, Arizona Department of Water Resources

Kathleen Ferris, Arizona Municipal Water Users Association

Alan Forrest, Tucson Water

Ed Fox, Arizona Public Service

William Garfield, Arizona Water Company

Patrick Graham, The Nature Conservancy

Joe Gysel, EPCOR Water USA, Inc.

Trevor Hill, Global Water Resources

John Hoffmann, U.S. Geological Survey

John Lewis, Inter Tribal Council of Arizona, Inc.

David Modeer, Central Arizona Project

Richard Morrison, Morrison Institute for Public Policy, Arizona State University

Cliff Neal, City of Phoenix

Sarah Porter, Audubon Arizona

Luther Propst, Sonoran Institute

Dave Roberts, Salt River Project

Joe Sigg, Arizona Farm Bureau Federation

David Snider, Pinal County Board of Supervisors

Bob Strain, retired, City of Sierra Vista

Mark Stratton, Metropolitan Domestic Water Improvement District

Chris Udall, Agri-Business Council of Arizona

Nan Walden, Farmers Investment Company

Sid Wilson, retired, Central Arizona Project

Ron Wong, BKW Farms

Innovative Programs Combine Research and Outreach

The WRRC conducts a robust in-house research program focusing on questions with policy relevance. Projects consistently combine research with engagement of stakeholders and translation of scientific information for research users. By joining stakeholder communication with research, the WRRC supports water resource planning and management in the real world. Funding for these projects is provided by grants from federal agencies, charitable foundations, and by UA's Technology and Research Initiative Fund. See Appendix B Section 1 for a summary of projects and funding awards.

Federal Water Resources Research Act Section 104 Program

In addition to its in-house research, the WRRC manages a grant program under the Water Resources Research Act, Section 104b, which supports an information transfer program and research projects at Arizona's three state universities. The WRRC is also responsible for submitting proposals from Arizona principal investigators in response to the national 104g call. The 104b and 104g programs are administered by the U.S. Geological Survey (USGS), which has been a WRRC partner throughout the years.

The WRRC selected three projects in December 2011 for 104b grants program funding, which were carried out during the project year from March 2012 through February 2013. Final research reports on the previous three 104b projects, funded in 2011, were submitted to the USGS and posted on the WRRC website (wrrc.arizona.edu/programs-research). The WRRC's Technical Advisory Committee also reviewed proposals for the 2013-2014 cycle and four projects were selected for funding despite continuing funding uncertainties. See Appendix B Section 2 for a list of these projects.

Dr. Paul Ferre of the UA Department of Hydrology and Water Resources has been conducting research on a project that received a 104g nationally competitive research grant in 2010. The three-year project, *Improving Hydrologic Investigations through Multi-Model Analysis and Discriminatory Data Collection*, will be completed in 2013.

U.S.-Mexico Transboundary Aquifer Assessment Program (TAAP)

The United States-Mexico Transboundary Aquifer Assessment Program (TAAP) is a collaborative U.S.-Mexico scientific program. In Arizona TAAP is led by the WRRC and the USGS, and in Mexico is led by the National Water Commission (CONAGUA) and the Geology Department from the University of Sonora (UNISON). The program is conducted under the auspices of the International Boundary and Water Commission (IBWC). In 2012 the Arizona-Sonora technical workgroup prepared binational and bilingual reports about the San Pedro and Santa Cruz aquifer systems, which will be submitted to IBWC in 2013. Throughout 2012, technical collaboration generated new, synthesized scientific and Geographic Information System (GIS) products for inclusion in these reports.

Recommendations made by participants from both countries at the IBWC's Border Water Resources Summit in 2012 urged continued study of groundwater aquifers. The technical participants from Arizona and Sonora recommended



Plácido dos Santos served as a staff analyst for the Arizona-Sonora TAAP program from February 2012 through June 2013. In collaboration with the International Community Foundation (ICF), he led and supported outreach efforts with visitors from Mexico, including a tour of Southern Arizona storm water management, reclaimed water and constructed wetlands projects for Municipal dignitaries from La Paz, Baja California Sur. Dos Santos also led a field visit for a group of undergraduate water resources students from the Autonomous University of Chapingo (UACH) in Durango, Mexico and organized a visit and field tour for the Rector of the Autonomous University of Baja California Sur (UABCs) and other water resources investigators from La Paz. He is also a member of the Sonoran Institute's Living River Technical Committee and has continued his volunteer service as a federally appointed member of the National Climate Assessment Development and Advisory Committee (NCADAC).

Anne Huth, Ph.D. served as an independent contractor for the TAAP and developed a broad range of ground-breaking hydrogeological GIS products for the binational effort.

the development of a binational 3-D groundwater-surface water model of both basins. However, available funds expired in March 2013 and there is no U.S. source of funding to continue this effort. The need for U.S. federal funds to continue TAAP has been supported by written communications from Congressman Raúl Grijalva and Arizona Department of Water Resources (ADWR). Mexico's National Water Commission (CONAGUA) has expressed a willingness to provide additional funds to continue TAAP collaboration if the U.S. government provides a financial match. However, the USGS has not sought an appropriation for the program and, to date, has not indicated that such binational collaboration will be a priority in the future. wrrc.arizona.edu/TAAP

Groundwater Governance and Management

A new program, Groundwater Governance and Management, explores how groundwater is governed within and across jurisdictions. In fall 2012, the WRRC and the Udall Center for Studies in Public Policy at UA initiated the project *Groundwater Governance in the U.S.* This effort aims to better understand the scope of groundwater governance across the United States. As a first step, the project launched a national-scale survey of U.S. state agency officials. Internationally, the WRRC has been involved in the project *Groundwater Governance - A Global Framework for Action* (2011-2014), supported by the Global Environment Facility and implemented by the Food and Agriculture Organisation of the United Nations jointly with UNESCO's International Hydrological Programme, the International Association of Hydrologists and the World Bank. The project is designed to raise awareness of the importance of groundwater resources for many regions of the world, as well as to identify and promote best practices in groundwater governance to achieve sustainable management of groundwater resources. www.groundwatergovernance.org

Groundwater, Climate and Stakeholder Engagement (GCASE)

Incorporating Climate Information and Stakeholder Engagement in Groundwater Resources Planning and Management is a project funded by the National Oceanic and Atmospheric Administration (NOAA) with three objectives: (1) To address climate uncertainties with an innovative modeling framework; (2) To increase stakeholder capacity to adapt water planning and management to future climate uncertainties; and (3) To establish the

transferability of the modeling framework and capacity building approach. The study focuses on an area within the Santa Cruz Active Management Area (SCAMA) to demonstrate how groundwater management efforts can use a modeling framework to develop adaptive water resource management strategies. The first project meeting was held on August 6, 2012, and a Kickoff Workshop involving regional and statewide stakeholders was held on October 18, 2012, with 24 people attending. The purpose of the Kickoff Workshop was to engage stakeholders in understanding the modeling framework's capabilities and the impacts of climate change. It also provided essential background information on groundwater management in the SCAMA and initiated development of a case study for testing the modeling framework. Beginning in late 2012, the existing modeling framework was enhanced with information on climate change produced from scientific projections. Additional stakeholder engagement workshops are planned for the SCAMA and other areas in Arizona. wrrc.arizona.edu/GCASE

Desert Water Harvesting Initiative (DWI)

Building on its previous efforts to support water harvesting demonstration sites and knowledge transfer, the WRRC established the Desert Water Harvesting Initiative (DWI) to enhance outreach and communication between utilities, practitioners, academics and interested citizens. The DWI includes a two-year research grant funded by the U.S. Bureau of Reclamation WaterSMART Program for the Desert Landscape Conservation Cooperative to develop a decision guide to rainwater and stormwater harvesting. First steps in this work, the *Utility Guide to Rainwater/Stormwater Harvesting as an Adaptive Response to Climate Change*, involved gathering input from a technical advisory committee of experts and practitioners, and hosting a series of meetings with personnel representing various professional interests from communities across the Tucson region. Input was also provided by the Rainwater-Stormwater Professionals Network, which meets semi-annually at the WRRC to keep members abreast of current and planned activities, resources and data. The tool box being developed from these consultations will provide communities with the resources necessary to assess various water harvesting strategies for addressing multiple challenges, including a decreasing water supply, flooding, stormwater quality, urban heat island effects and climate change. The DWI also includes an online data clearinghouse for research and publications on water harvesting, low-impact development and green infrastructure, and a collection of small research and demonstration projects funded through the UA Green Fund. wrrc.arizona.edu/DWI



The Environmental Water Program

The Environmental Water Program has grown considerably in recent years and in 2012 included three major projects that combine research, analysis, stakeholder engagement and public outreach.

Connecting the Environment to Arizona Water Planning (EnWaP), a project funded by the Nina M. Mason Pulliam Charitable Trust, began its second of three years in October 2012. This project engages water stakeholders across Arizona to increase understanding of environmental water demands and how communities can consider those demands in their water planning and management. WRRC's 2010 *Arizona Environmental Water Needs Assessment* provided an information base for collaborations. In addition, the WRRC developed four regional bulletins providing concise introductions to the current knowledge about environmental water demands, gaps in current understanding, and ways in which environmental demands can be considered alongside other regional water

demands. WRRC personnel are available to make presentations on the EnWaP project and available data as well as to provide technical support, research assistance, GIS analysis/mapping and stakeholder meeting facilitation.

In 2012, the EnWaP team shared information on Arizona's environmental flows and water demands through four regional bulletins and 18 presentations to more than 500 stakeholders in 10 counties. As a result of these presentations, the team has received requests from five communities and watershed groups to actively participate in their water planning processes. This year, EnWaP collaborated with partners in the conservation community as well as federal and state agencies. The project team also participated in three statewide water planning processes. Ultimately, the project aims to establish dialogue among water users about voluntary, stakeholder-driven options for addressing the needs of the environment in the context of limited water supplies and existing water rights. To promote dialogue the project is developing the *Roadmap for Considering the Environment in Arizona Water Planning*. wrrc.arizona.edu/Water-for-the-Environment

Supporting Watershed Management Planning for People and the Environment in the Desert Landscape Conservation Cooperative Region: A Demonstration in the Upper Gila River Watershed

River Watershed is a two-year project funded by the Bureau of Reclamation WaterSMART Desert Landscape Conservation Cooperative to work with the Gila Watershed Partnership and the Arizona Cooperative Extension Office in Graham and Greenlee Counties. The project team is developing a baseline watershed assessment for the Upper Gila Watershed to aid the Gila Watershed Partnership in its water management planning. The project will also determine methods for assessing baseline watershed conditions throughout the southwest and create planning scenarios that incorporate expected climate changes and environmental water needs. The outputs of this project are expected to lead directly to the creation of a comprehensive watershed plan for the Upper Gila Watershed in Graham and Greenlee Counties. wrrc.arizona.edu/node/10690

Conserve to Enhance (C2E), an innovative mechanism to connect voluntary conservation behavior with projects that benefit the environment, was developed by the WRRC with funding from the U.S. Bureau of Reclamation Phoenix Projects Office. Grants from The Walton Family Foundation have also supported the WRRC's efforts to expand and refine the program. For the past two years, the WRRC has collaborated with several parties in the Tucson region on a pilot C2E project. One successful component of this effort was the approval by Tucson Mayor and Council of the insertion of a check-box onto water bills that may be marked by taxpayers for the purpose of making funds available to C2E for riparian enhancement. Some of the funds contributed by taxpayers have supported a demonstration site at Atturbury Wash for native vegetation and passive rainwater harvesting. The pilot phase of the Tucson C2E program concluded in December 2012, and the program is now transitioning to Phase Two, which will increase participant recruitment and fund neighborhood-scale projects.



This year, the C2E team made 25 presentations, reaching at least 1,000 stakeholders at conferences and meetings throughout the Colorado River Basin, including new audiences in Arizona, Nevada, California, Utah, New Mexico and Colorado. The team shared the C2E concept, outcomes from the Tucson pilot program, and opportunities for



Aaron Lien is a Research Analyst with the WRRC's Environmental Water Programs. His work is focused in two areas: the C2E program and the EnWaP program. For the past year, Lien has worked to expand adoption of the C2E concept to new communities within the Colorado River Basin. He is working with water providers to launch several new C2E programs by the end of 2013. In addition, he secured grant funding to develop a suite of online tools that will simplify C2E for water providers and consumers. He also leads the Collaborative Watershed Assessment for the Upper Gila River, a part of the WRRC's Environmental Water Planning program. Funded by the U.S. Bureau of Reclamation and the UA-WEES program, the watershed assessment seeks to provide stakeholders in the Upper Gila Watershed with information about the impacts of climate change, drought and other challenges for the watershed and its natural resources.

Transitions



Brittany Choate Xiu is a Program Coordinator for the Environmental Programs team. She works primarily on the Connecting Environmental Water Needs to Arizona Water Planning (EnWaP) project, which aims to establish voluntary, stakeholder-driven options for addressing environmental water demands throughout Arizona. In Fall 2012, Xiu transitioned into a staff role after working for two years as a graduate research assistant with the Environmental Water Program team. She co-authored the *Environmental Flows and Water Demands* regional bulletin series along with Kelly Mott Lacroix, Leah Edwards and Joanna Nadeau. This series provides information on the current knowledge and information gaps regarding environmental demands in Arizona's Central, Colorado River, North/Northeastern and Southeastern regions. She was also a primary contributor to the 2012 reprint of the WRRC's *Arizona Environmental Water Needs Assessment* and companion *Methodology Guidebook*.



Candice Rupprecht has been at the WRRC for more than five years and in 2012 she transitioned from her work with Arizona Project WET to become a staff member with the Environmental Water Programs. Currently, most of her work focuses on developing the C2E program within Arizona and growing the Tucson C2E program. Working in conjunction with Aaron Lien, Rupprecht is developing capacity to expand the program throughout the Colorado River Basin. She is also working with the Town of Clarkdale to develop a Sustainable Water Resources Management Program, which is part of the larger town initiative known as Sustainable Clarkdale and is the first of its kind in the state.



Joanna Nadeau worked as a Research Analyst on the C2E and EnWaP programs. In 2012, she worked to implement and evaluate C2E pilot programs and raise awareness among policy makers and planners about environmental water needs. She assisted in the creation of a C2E guide and readiness rating worksheet that enable communities to tailor C2E programs to their unique settings. She also led the effort to create a database from the Arizona Water Needs Assessment inventory of studies. In addition, she assisted in securing grant funding for the Participatory Watershed Assessment for the Upper Gila and helped start the national groundwater governance survey project. Nadeau left the WRRC in October 2012 to pursue a new role at Audubon International in Troy, New York.



Kelly Mott Lacroix joined the WRRC in July 2012 as a Research Analyst in the EnWaP project after working for a year as a graduate assistant on the program. Together with other members of the EnWaP team, she is working statewide with stakeholders to build a roadmap for considering the environment in water planning and management. At the watershed level, this will help the Gila Watershed Partnership understand its resources and start planning for the future of those resources, and at the local level it will facilitate creation of a water resources management program that ensures the Town of Clarkdale's vitality while protecting the Verde River. She recently joined the board of the Cienega Watershed Partnership.

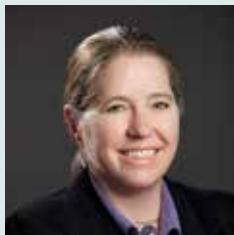
addressing environmental water needs. Building on previous work, the C2E team created products to support development and documentation of C2E programs, including a comprehensive *Conserve to Enhance Program Design Guide* to help communities develop their own C2E programs, and a 10-minute webcast, *An Intro to Conserve to Enhance*, covering the basics of C2E. Other outreach materials include a brochure, fact sheets, program development resources, and other publications. Throughout the spring and summer of 2012, the WRRC also hosted a series of webinars about C2E and similar water customer contribution programs. wrrc.arizona.edu/conserve2enhance.html

New Capabilities in Water Quality Research

Water Quality Research Program

Since assuming her responsibilities in late 2011, the WRRC Associate Director Jean E. McLain has assembled an active wet lab for conducting water quality research. Located in the Marley Building on the University of Arizona campus, the 900-square foot lab contains modern equipment necessary to conduct microbiological analysis of water and soil. Through the spring and summer, the lab provided training to four undergraduate students from the Departments of Public Health, Microbiology and Veterinary Sciences. In fall 2012, the lab hosted two graduate students from the Soil, Water and Environmental Science Department who assessed bacterial antibiotic resistance and irrigation water quality.

Collaborative water quality projects include *Dredging Influences on Canal Water Quality*, which examines the potential for downstream adverse water quality impacts from re-suspension of contaminants that may occur during maintenance of irrigation canals. The goal is to improve management practices on safe use of canal water for growers of fresh produce (melons and leafy greens) in Yuma, Arizona. Another project, *Guidelines for Irrigation Water*



Jean E. McLain, Ph.D., Associate Director of the WRRC, also holds positions as Associate Research Scientist and Associate Professor in the Department of Soil, Water and Environmental Science. She currently directs research projects focusing on human health and environmental risks of using recycled municipal wastewater for irrigation, and represents the WRRC on expert panels related to water sustainability, including the City of Tucson Citizen's Water Advisory Committee and the Flagstaff City Manager's Advisory Panel on Contaminants of Emerging Concern. In addition, she chairs the University of Arizona Food Safety Consortium, an 80-member inter-departmental research group focused on improving the safety of the nation's vegetable, meat and dairy supplies. McLain lectures widely on the subject of sustainable water supplies, both within Arizona and at professional meetings nationwide, and in July 2012 she was the invited plenary speaker at commencement ceremonies held at the Center for Investigative Science of Yucatán in Mérida, Mexico. McLain's laboratory serves as a training ground for UA undergraduate and graduate students, and in 2012 she also hosted graduate students from New Mexico State University and Penn State University for work on summer internships. McLain is also active in professional societies, including the Soil Science Society of America, the Arizona Water Association, and the American Society for Microbiology, and holds the position of Associate Editor for both the Agronomy Journal and the International Journal of Water Science.

Sample Collection, is evaluating currently-used water sample collection strategies for the detection of *Escherichia coli* in canal irrigation waters. The team is working with project partners to determine what sampling strategies are currently being used to assess water quality and to identify sampling methods that may be contributing to errors in data. The goal is to provide guidelines for a standardized protocol for sample collection of irrigation waters used for produce (leafy greens).

Two other water quality research projects involve work with researchers at Biosphere2 (B2). A project funded by SAHRA (Sustainability of Semi-Arid Hydrology and Riparian Areas), *Developing qPCR Protocols to Assess Bacterial Activities in the Biosphere2 Hillslope Experiment*, involves collaboration with researchers at the B2 Landscape Evolution Observatory (LEO) to develop methods that will aid in reconstructing microbial colonization of soils. The project is developing real-time PCR assays to quantify microbial cycling of nitrogen and carbon in soil and water in order to construct a “baseline” of targeted microbial genes within the LEO soils and pore water. The second project, *Assessing Biological and Chemical Quality of Harvested Rainwater in Arizona*, will examine samples collected from rainwater harvesting tanks at B2 and the WRRC with the objective of designing simple in-line carbon filters that will decrease health risks of harvested rainwater.

Cross-Campus Collaborations for Water Sustainability

The Technology and Research Initiative Fund (TRIF) at UA, established in 2001, has enabled campus water leaders to make strategic investments in research, education and outreach programs that have resulted in significant contributions to resolving water resource issues and addressing the challenges of sustaining high quality water supplies for economic development in the state. In June 2012, the Water Sustainability Program (WSP) completed its first year of funding as part of the new TRIF-funded Water, Environmental and Energy Solutions (WEES) collaboration with the Institute of the Environment (IE) and the Renewable Energy Network, under co-directors Diana Liverman (Co-Director of IE) and Sharon B. Megdal (WRRC Director). Through the WSP, funding is provided for strategic initiatives, new faculty hires, student support and fellowships, research projects, and special events such as conferences, workshops, and presentations. The WRRC serves as the management hub for the WSP and continues to play a pivotal role in implementing, developing, and managing program components under the leadership of WRRC and WSP director, Sharon B. Megdal. wsp.arizona.edu



With WSP funding, the WRRC continues to expand its applied research programs in water policy and management, and to provide high quality education and outreach products and publications. Training opportunities for graduate students have been a major benefit of this funding. Through the WRRC, WSP funded two graduate students during the Spring semester to carry out research related to recommendations of the Arizona Governor's Blue Ribbon Panel on Water Sustainability. Their projects included an investigation into water reuse for agriculture and research on the nexus of water and energy in mining. In the Fall semester, funds were provided for research associated with the DWHI by a Ph.D. student in Ecology. Other funding for student training and cross-campus events is listed in Appendix B Section 5.



Jackie Moxley, Program Director for WEES and WSP, is responsible for the overall management and coordination of WEES and WSP programs, funding and reporting. She also supports certain activities at the WRRC, including planning and implementation of the Desert Water Harvesting Initiative (DWHI). She is a co-PI on this U.S. Bureau of Reclamation grant project, which aims to develop water harvesting assessment tools for decision makers. In 2012 she worked with Susanna Eden and graduate student Jenna Cleveland to launch the DWHI web page on the WRRC site, which includes resources, publications and an experts directory. She is pivotal to the organization of the semi-annual meetings of the Rainwater Stormwater Professionals Network (RSPN), which continues to bring in special speakers to address the RSPN on various topics of interest. She also organized a meeting of the Arizona Statewide Water Conservation and Information Sharing group, with a full program of speakers who addressed residential water use, municipal water savings, household filtration devices and more. Other activities include serving on the WRRC conference planning committee, the LID (Low Impact Development) Conference research agenda workshop planning committee, and the Desert Oasis Steering Committee. She also represents Appointed Professionals on the UA President's Advisory Council for Environmental Sustainability as an elected member of Eco-Ops, a UA employee group.

Research-Based Curricula for 21st Century Education

Arizona Project WET (APW) is a water education program with a long history of success. In 2012, APW implemented numerous pilot-tested programs that positioned the program at the forefront of innovative STEM (science, technology, engineering and mathematics) education. Through professional development designed to transform instructional practice and direct student engagement that offers relevant and real-world experiences at school and in the field, APW is assisting districts in meeting their current needs. With sponsorship that totaled more than \$3 million in the last 12 years, APW sustains partnerships with public and private partners throughout the state. Garnering well-earned attention, APW programs were featured this year on television and in the press (see Appendix B Section 13). ag.arizona.edu/arizonawet



Teacher Professional Development

Using research-based content, APW delivers hands-on professional development for inquiry-based learning on water. APW helps teachers develop their instructional practice and water-related content mastery through STEM integration, interdisciplinary standards inclusion, project-based learning, relevant real-world applications and collaborative work. In 2012, APW provided 21 workshops to 370 teachers who together reached more than 26,000 students. Post-workshop surveys have shown that 92 percent of teachers consider the workshop content to be relevant, that APW improves their own knowledge, and that they intend to become better water stewards as a result of the workshop.

Water Investigations Program (WIP)

Following successful pilot testing, the Water Investigations Program was formalized and established a partnership with The Nature Conservancy. The WIP promotes STEM integration, water stewardship and science literacy through hands-on student participation, a teacher-driven scope and sequence, the application of real-world solutions and community engagement. More than 4,000 Phoenix Valley middle and high school students have participated in the WIP in the past two years. WIP students drive positive change using science and engineering to impact their communities. In 2012 they saved 8.8 million gallons of water by changing out aerators at school and in their homes.

The WIP integrates learning about riparian areas with critical thinking skills. The program provides an opportunity for students to visit an Arizona river; this year, one-third of the participating students had never been to a river before. By the end of the program, most students learn three functions of riparian areas, and 63 percent can list at least one river that is part of their water supply. Before entering the program, students who were asked to list ways to conserve water overwhelmingly (89 percent) selected behavioral methods over technological methods.

After the program, responses were approximately 50 percent behavioral and 50 percent technological. In addition, after the program, 15 percent more students felt they could think critically and creatively about their own questions, and 25 percent more students felt they could explain a scientific study and its significance.

One hundred percent of teachers found the WIP to be unique and relevant, with teachers reporting that their students' understanding significantly improved on the topics of 1) water use (93 percent); 2) water resources (93 percent); 3) riparian areas (100 percent) and 4) the interconnectedness of water resources (93 percent).

Of 26 WIP teachers, 98 percent considered that the information, strategies and instructional methods presented during the workshop were valuable to them and that the materials provided would be helpful for teaching about water and environment. The teachers reported that the workshop met their expectations and that it had a positive impact on their teaching and water stewardship.

Another component of the WIP program is the Mentor Scientists. In Spring 2012, through funding from the WSP and Arizona Department of Environmental Quality, UA students served as Mentor Scientists in WIP field investigations with middle school students at the Hasssayampa River Preserve. Student Mentor Scientists are listed in Appendix B Section 7.

Arizona Water Festivals (AWF)

The Arizona Water Festival program instills an understanding of water in the earth system and Arizona's water resources. The Festivals offer multiple benefits: professional development on a standards-based unit for teachers,



a day of exploration for up to 1,000 students, volunteer involvement for the community, and an opportunity for sponsors and collaborators to invest in effective education. In 2012, APW helped 11 communities deliver AWF programs, which reached 6,895 students, 145 teachers, and approximately 400 volunteers. A summative evaluation of the AWF program demonstrated statistically that students' understanding of water and earth systems was not only established, but deepened, even high-scoring students' responses improved on the post-test. Historically, 100 percent of teachers found the program to be very valuable for students, and 98 percent found that the program

increased their students' understanding of water and water conservation. As APW's longest-running program, the AWF has garnered a wealth of testimonials over its 12-year history. The program's educational potential is summarized in the following survey response: "I feel that every 4th grader should get the chance to participate in the Water Festival because I have seen how the festival helped to increase the understanding of difficult concepts by using hands on experiences coupled with classroom lessons. The experiences at the festival helped to reinforce what I had taught in the classroom. The activities are very high interest and standards based."



school teachers an opportunity to explore relevant content about the Earth and acquire new skills for learning and teaching through authentic inquiry. At the camp, teachers explore environmental change in our region from multiple perspectives, using hands-on field investigation, classroom modeling, and NASA satellite imagery. They also practice new skills while exploring Earth's changes in fire, water, climate and biodiversity. The workshop culminates with planning, implementing and presenting in a poster session their own investigations of change over time. During 2012, 26 of these posters were displayed at the Arizona-Sonora Desert Museum and in the WRRC Sol Resnick Conference Room.

A large majority of the Laurel Clark Earth Camp Experience participating teachers reported that the program provided them with new tools for teaching students about change over time in the Earth's systems and for preparing students to take positive action in their local communities. They also considered themselves better equipped to teach about the greenhouse effect, climate change and adaptations of desert wildlife, and were more confident about using satellite data, NASA and other image resources in their teaching and investigations.

Tucson Water Program – Sweetwater Wetlands and Groundwater Flow Model Presentations

In Tucson, APW has integrated Project WET lessons into the curricula of one-third of the science classes taught in third and sixth grades. A field day at Sweetwater Wetlands and a groundwater flow model presentation are part of

the third-grade curriculum. In 2012, seven APW-UA students facilitated 175 in-classroom ground water flow model presentations for 3,955 students. Data from 2,200 questionnaires before and after the presentations show an approximate 10 percent improvement in students' understanding of the groundwater system.

The Sweetwater Wetlands Water Festival was attended by 155 third grade classes instructing 3,628 students and 513 adult chaperons. Seventy-nine Sweetwater Wetlands Guides were distributed to teachers. A data sampling of 703 Sweetwater questionnaires covering knowledge of environmental water flows shows a pre-test average of 3.53 and a post-test average of 4.75 out of 5 points possible.



Kerry Schwartz, Director of Arizona Project WET, runs the statewide water education program that expands each year and now reaches tens of thousands of individuals. As an Associate Specialist with the Department of Agricultural Education, she combines her knowledge of water resource management and hydrogeology with an ability to engage adults and children in learning. Schwartz supervises and works with a team of specialists in three extension offices. She has raised over \$3 million dollars to support APW programming over her tenure at the UA and has sustained partnerships with corporations, foundations and governmental agencies, even as economic realities became challenging. Currently, Schwartz is working on STEM-focused education programs that integrate science and engineering practices into education programs that foster critical and creative thinking skill development. As part of her outreach mission, Schwartz participated in the Arizona STEM Network, convened by the Science Foundation Arizona in Phoenix on August 28, 2012. She is also a member of the Next Generation Science Standards Review Committee for the Arizona Department of Education K-12 Academic Standards for Science.



Holly Thomas-Hilburn, APW Coordinator of Applied Programs, has led many of APW's direct outreach programs since 2008. In 2012, Thomas-Hilburn transitioned to coordinating the Water Investigations Program. In partnership with The Nature Conservancy, the program engaged 20 teachers and their students in a year of exploration around water resources, water use and water in the environment. She works with two community coordinators to provide both ongoing professional development and direct in-classroom support to teachers throughout the year, and direct classroom instruction several times throughout the year, including a field experience for students at a riparian area.



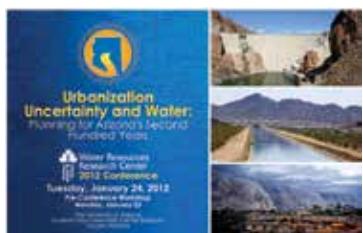
Tina Sleeper, APW Program Coordinator, began working for APW in June, 2012. She coordinates the statewide Arizona Water Festival (AWF) program by helping Arizona communities bring the interactive program to their fourth grade teachers and students, training volunteers to facilitate hands-on water science lessons, and facilitating professional development workshops for elementary school teachers. Sleeper works with the APW Director to match potential sponsors and funders with programming that reaches community-driven goals. Her background in education, curriculum development and proposal writing has been useful in continuing to improve and evolve the AWF curriculum to match the changing standards and initiatives in education and meet local goals for water education.

Water Resource Information for Everyone

The WRRC has a long history of leadership in disseminating sound and independent information through events, publications and electronic communications. The WRRC's Strategic Plan identifies maintaining and enhancing this capability as a major strategic goal.

Annual Conference

The WRRC's Annual Conference, *Urbanization, Uncertainty and Water: Planning for Arizona's Second Hundred Years*, was held on January 24, 2012, in collaboration with Arizona State University's Morrison Institute for Public



Policy. Three contemporary reports were featured: *Watering the Sun Corridor: Managing Choices in Arizona's Megapolitan Area*, published by the

Morrison Institute; *Arizona at the Crossroads: Water Scarcity or Water Sustainability*, published by the Grand Canyon Institute; and the *Final Report* of the Water Resources Development Commission (WRDC).



Approximately 330 people from 40 communities across Arizona attended the event. A half-day workshop on water sustainability in the Sun Corridor, sponsored by the

Sonoran Institute and the Lincoln Institute of Land Policy, was held in conjunction with the conference and attracted 60 participants. Thirteen external sponsors contributed to the conference.

Planning for the 2013 Annual Conference, *Water Security from the Ground Up*, progressed throughout 2012. Organized in collaboration with the USGS Arizona Water Science Center, the conference program focused on water security. The WRRC planning committee utilized a broad definition of water security to ensure that a range of issues, from sustainability of water supplies and protection of water quality, to policy tools for water governance, would be addressed by invited speakers. External sponsors included utilities, consulting firms and nonprofit organizations.

Brown Bag Seminars

The WRRC expanded its series of Brown Bag seminars to fulfill demand for information on water-related topics of current interest. Brown Bag seminars provide a forum for researchers, students and community members to learn about and discuss water resources and



management issues. The Brown Bag forum offers information and opportunities for two-way dialogue and for community-university interaction. Seminars focus on topics of broad interest to academics from multiple disciplines and members of the water-and related-resource communities. Twenty Brown Bags were held during the project year. Average attendance was 23 people, with 44 percent representing the community and 56 percent from the university. Dates and titles of the Brown Bags are listed in Appendix B Section 9.

Other Outreach & Communication Events

Some additional outreach events warrant special attention owing to their high attendance and impact:

Every February the WRRC hosts a “Chocolate Fest” for friends in the water community. University faculty and students, retired WRRC personnel and friends from the community attend this event to socialize, share chocolate treats, and celebrate the year.



In May 2012, the WRRC hosted a group of 30 undergraduate students from the University of Chapingo (Durango, Mexico) for an international exchange about the C2E program, water harvesting, environmental restoration and water management policies in Arizona.

On September 19, the WRRC co-hosted a screening of WATERSHED, a documentary produced by the Redford Center and directed by award-winning filmmaker Mark Decena. WATERSHED tells the story of the threats to the Colorado River and suggests actions that can be taken to protect and restore it. The film was followed by a panel discussion on the current state of the Colorado Delta ecosystem, the need to restore flows, restoration work underway and current community efforts to conserve water and create a new water ethic. The event took place at The Loft Cinema in Tucson, Arizona, and was co-hosted with the Sonoran Institute, the Redford Center, and Save the Colorado.

From October 1-4 a Grey Water Workshop was held at the WRRC to plan future collaborations with researchers at the Jordanian Royal Scientific Society. Presentations were made by Jordanian and Arizona grey water experts at a pre-workshop meeting attended by interested members of the Arizona water community.



On October 23, WRRC hosted the Statewide Water Conservation Infoshare meeting (co-sponsored by the WRRC and WSP). The Infoshare group is comprised of water conservation staff from municipalities, utilities and other agencies. Speakers addressed residential water use, municipal water savings, household filtration devices and other water conservation topics. A field trip to Sweetwater Wetlands followed the presentations.

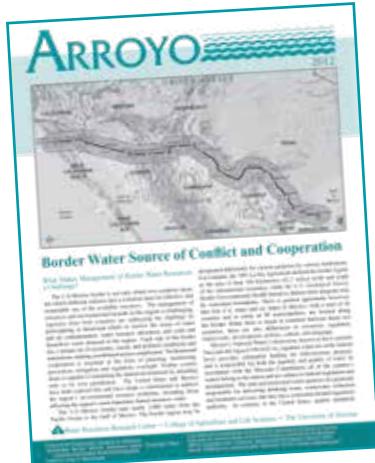
Arizona Water Resource Newsletter (AWR)

Published by the WRRC since 1993, the AWR newsletter appears quarterly. With a new look and under a new editorial process, the highly regarded newsletter continued as a keystone of the WRRC's Information Transfer program. The AWR is an 8-to 12-page newsletter focusing on state and regional water issues. In 2012, new procedures were put in place to develop a greater percentage of articles written



Susanna Eden, Ph.D., is the WRRC's Assistant Director, and in 2012 she was responsible for managing the WRRA Section 104(b) research grant program and the 104(g) nationally competitive grant program for the WRRC. She oversaw activities related to the AWR quarterly newsletter and the annual Arroyo. She managed the Montgomery & Associates Summer Writing Internship program, supervising the intern's research and writing for the Arroyo. Lead author for the 2012 Arroyo, she also wrote articles for and edited the AWR, providing supervision and editorial guidance to student authors. She was co-organizer of a workshop on water harvesting research needs at the *AridLID 2012 Conference: Green Infrastructure and Low Impact Development in Arid Environments*. With Jackie Moxley, she co-directs the DWHI, which includes a project aimed at developing tools for assessing the feasibility of water harvesting for multiple benefits. She is a co-principal investigator on the NOAA-funded GCASE project that combines an innovative modeling concept with intensive stakeholder engagement in support of groundwater planning and management. She is a member of the team responsible for organization and development of the WRRC Annual Conference and the Brown Bag seminar series. She also serves on the UA Appointed Professionals Advisory Council.

by external authors and Graduate Outreach Assistants. In addition, the AWR template has been refined, yielding a cleaner look and greater ease of layout. The print version is sent free of charge to approximately 2,000 subscribers, while an electronic version is available online and emailed to an additional 1,100 subscribers. The AWR has a broad readership; the majority of its recipients are from Arizona, but it is also mailed to other states and countries. The publication regularly includes feature articles, a guest view, news briefs and sections on special projects, as well as announcements and publication notices. A public policy column, written by WRRC Director Sharon B. Megdal, regularly receives attention and comment as a leading source for water policy analysis. Many issues of the newsletter include a four-page special supplement. In Summer 2012, the WSP sponsored a supplement of program highlights. Features in 2012 included articles on the new Central Arizona Water Conservation District (CAWCD) Board members, food safety, the National Climate Assessment for the Southwest, interactions with Mexican water researchers and managers and STEM water education in Arizona.



Arroyo

An annual newsletter that presents in-depth discussion of a single topic, Arroyo addressed *Border Water, a Source of Conflict and Cooperation* in the 2012 issue. The U.S-Mexico border is not only where two countries meet, but where different cultures face a common need for effective and sustainable use of available resources. The 2012 Arroyo examines the water-related issues challenging resource management along the border, as well as binational efforts to resolve them.

Arroyo topics are chosen by the WRRC's External Advisory Committee to address issues of concern. The topic for the 2013 Arroyo is *Contaminants of Emerging Concern* and the 2014 Arroyo will address *The Value of Water*. An internship sponsored by Montgomery & Associates, a water resources consulting firm, supports initial research for the Arroyo. The intern is selected through a competitive process and conducts research, interviews key experts, and drafts reports. In 2012, the intern was Radhumitha Raghav, whose research is the basis of the 2013 Arroyo.

Both the 2012 and 2013 publications are available free online or by subscription. The possibility of phasing out print publication of the AWR and Arroyo was considered, but the popularity of the print format among the WRRC's stakeholders has put any such plans on hold for the foreseeable future. Efforts are underway to increase external support for printing the newsletters.

Electronic Communications

In keeping with current communication trends, the WRRC is placing increased emphasis on the internet as a public information tool. Recent changes focus on timely updating of feature stories on the website and sending email notifications using Constant Contact in a visually attractive format. The WRRC Facebook presence is also growing, with increased attention on keeping posts fresh and interacting with the online community.

The WRRC makes extensive use of its website. In addition to WRRC news and events, the site carries AWR and Arroyo, as well as papers, presentations, and links to other water-related sites. The site also offers a calendar and comprehensive information about WRRC activities, such as the Annual Conference, the Brown Bag Seminar series, the Summer Internship competition, and the 104(b) Research Grants Program. Staff profiles and information about WRRC products are easily accessible. More than 12,000 people from around the world visited the WRRC website in 2012.

Also in 2012, the WRRC website underwent a complete redesign to update the look and improve usability. Updates take advantage of Drupal, an open source content management system, and demonstrate consistency with the UA brand. Web management protocols call for continuous evaluation of the website to improve its efficiency and effectiveness. Web posts are updated frequently and registration for the WRRC Annual Conference is available through the site. The site also includes pages specifically related to activities of current WRRC programs, including the Environmental Water Program, C2E and the Desert Water Harvesting Initiative. A website for the Arizona component of the U.S.-Mexico Transboundary Aquifer Assessment Program is supported by the WRRC and linked through the WRRC website. Links to the Water Sustainability Program and Arizona Project WET website are also provided.



John Polle, Web Manager, creates, develops and manages content for the WRRC website, as well as keeping up with the ongoing maintenance of the site. He also designs printed materials for the WRRC and the various programs associated with the Center. When necessary, he also provides IT support.



Jessica Schlievert, Information and Communications Specialist, will join the WRRC in January 2013. Working with WRRC staff and students, her goal is to improve the WRRC's communications and publicity efforts on a number of platforms, including social media, e-correspondence and media outreach.

Other Outreach

In addition to the above programs, publications and events, WRRC personnel continued their public service activities this year. They were called upon regularly to give lectures and make presentations to diverse audiences across Arizona. WRRC personnel participated on community and regional boards and commissions, served on state and local task forces and study committees, and regularly attended meetings relevant to water resource management and planning. WRRC personnel also responded to inquiries from the public on issues of concern.

In 2012, WRRC personnel produced 46 publications and made 106 presentations statewide, nationally and internationally. See Appendix B Sections 10 and 11 for publications and presentations.

Administrative Support and Coordination

The WRRC depends on the activities of a skilled and dedicated administrative staff to carry out its mission and accomplish its strategic goals. Normally the public's first point of contact with the WRRC, the administrative staff played a key role in maintaining the Center's reputation for professionalism and responsiveness.

Students

The WRRC relies continually on its roster of graduate and undergraduate students to produce the high quality research, outreach and education products for which it is known. Strategic planning identified nurturing future generations of water professionals as a major WRRC goal. In pursuit of this goal, the WRRC develops relationships with students that enhance the effectiveness of its programs while providing valuable learning experiences that prepare students for careers in water and the environment. A list of WRRC-associated students is included in Appendix B Section 12.



Jane Cripps, Administrative Associate, is instrumental in the provision and oversight of WRRC administrative duties and operational functions, including support for the Annual Conference, Brown Bag Seminars, and the Arizona Water Resource newsletter.



LaVonne Walton, Business Manager, handles the WRRC's financial, personnel and human resources management. A long-term employee of the College of Agriculture and Life Sciences, her 24 years of university experience are utilized in all aspects of day-to-day operations and is relied on by members of the WRRC.

Awards and Recognitions

Sharon B. Megdal was a recipient of a “UA at the Leading Edge” award announced at UA Innovation Day on March 6, 2012. She was one of five UA faculty to be recognized for performing cutting-edge research and translating that research into real-world application. Her work on assessing environmental water needs and developing mechanisms for incorporating the demands of all sectors into water planning led to the innovative Conserve to Enhance (C2E) Program.

Kelly Mott Lacroix was the winner of AZ Water’s “Young Professionals, Fresh Ideas” award for her presentation at the 2012 AZ Water conference. She was also invited to serve as a delegate at the Center of the American West Student Congress, September 11-14, 2012. The Congress was one component of “The Nation Possessed: The Conflicting Claims on America’s Public Lands,” commemorating the 200th anniversary of the General Land Office and the 150th anniversary of the Homestead Act.

Kerry Schwartz was co-recipient of the College of Agriculture and Life Sciences’ 2012 Outstanding Team Award.

Jeremy Cusimano, a graduate student at the WRRC, received a Soil, Water and Environmental Science Department’s CALS Scholarship Award.

Stefan Walston, a SWES Master’s student associated with the Water Quality Center Laboratory, was awarded first prize at the Institute of the Environment Grad Blitz, Fall 2012. His presentation also won the award for best connecting research to a societal need.

Recognition of the WRRC programs and personnel achievements in the media are listed in Appendix B Section 14.

Continuing Budget Challenges

The year 2012 offered the challenge of additional state budget cuts, requiring the WRRC to absorb a reduction in funding. In addition, lack of congressional appropriation of funds for the Transboundary Aquifer Assessment Program hampers progress on that program. The WRRC has been able to mitigate reductions with program support from new grants, by use of carryover funding and by leveraging collaborations and partnerships. WRRC personnel continue to pursue new awards and other funding sources.

WRRC Annual Financial Report, 2012 (ending December 31, 2012)

SOURCES	
State Appropriations	\$292,484
Federal Grants	\$432,169
State Grants	\$131,589
Private or Other Grants	\$289,832
Sales and Services Activities	\$456,169
Technology and Research Initiative Fund (TRIF)	\$464,885
Gifted Funding	\$171,666
Total Sources	\$2,238,794
USES	
Salaries and Wages	\$814,742
Fringe Benefits	\$282,693
Operational Costs	\$550,415
Capital Equipment	\$18,401
Total Uses	\$1,666,251
REVENUE AVAILABLE – December 31, 2012	\$572,543

Sources

Sources include revenues available January 1, 2012, which totaled \$529,645, plus revenues received in calendar year 2012.

State Appropriations: State General Fund and tuition collections appropriated to the College of Agriculture and Life Sciences by the State of Arizona. Partial funding is provided for administrative salaries, operations and travel. In 2012 the WRRC had a permanent budget rescission of these funds in the amount of \$4,795.

Federal Grants: This total includes U.S. Geological Survey 104(b) 5-year Cooperative Agreement funded annually in March. The WRRC receives this federal funding as Arizona's State Water Resources Research Institute. The WRRC funded three research grants this year [see Section II, Part I (a)]. The remaining monies were used to support administration of the 104(b) program and Information Transfer personnel and activities. The grant period is March 1st, 2012 through February 28th, 2013, and funds were carried over from calendar year 2011. Also included in this section are all monies received for competitive national federal grants and cooperative agreements awarded to the WRRC.

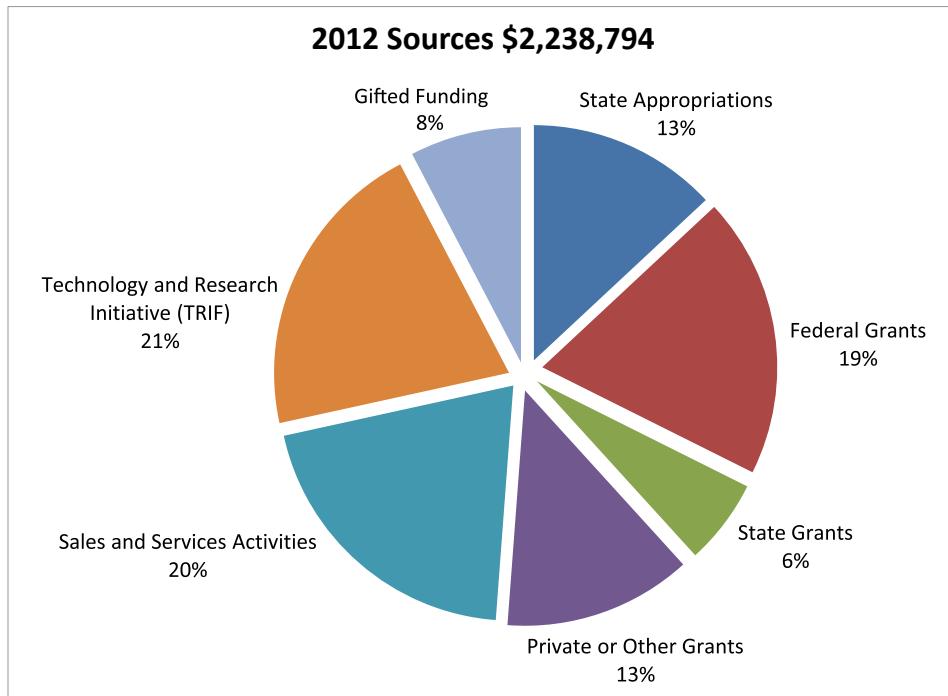
State Grants: Revenue provided by the State of Arizona through awarded competitive grants. In 2012 state agency grants were received from Arizona Department of Water Resources and Arizona Department of Environmental Quality.

Private or Other Grants: Revenues received from local, county and state governmental agencies (non-competitive). In 2012, the WRRC received funding from Central Arizona Project (CAP) and the City of Tucson. Also included are competitive grant funds received from non-profit organizations and private individuals that are processed through the university. In 2012, the WRRC received major grant awards from the Arizona-Sonora Desert Museum, The Nature Conservancy, and the Abbott Fund. This section includes competitive charitable grants processed through the UA Foundation. In 2012, the WRRC received major competitive charitable grant awards from The Nina M. Mason Pulliam Charitable Trust, The Walton Family Foundation, and the Abbott Foundation.

Sales and Service Activities: Revenue from one-time transactions accrued over time by the WRRC from publication sales, annual conferences and miscellaneous services.

Technology and Research Initiative Fund (TRIF): Revenue from the State Technology and Research Initiative Fund (TRIF), a state sales tax-derived fund supporting various programs at Arizona state universities. TRIF funding is allocated to the UA Water, Environmental and Energy Solutions (WEES) initiative, which provides some direct support to WRRC and also funds the Water Sustainability Program (WSP) housed at the WRRC. Only WEES funds awarded to WRRC and WSP funds managed by the WRRC are included in this report.

Gifted Funding: Included are one-time gifts from individuals and companies and revenue generated by endowment interest bearing accounts over a period of time. These funds are used to support WRRC programs, including Arizona Project Wet.



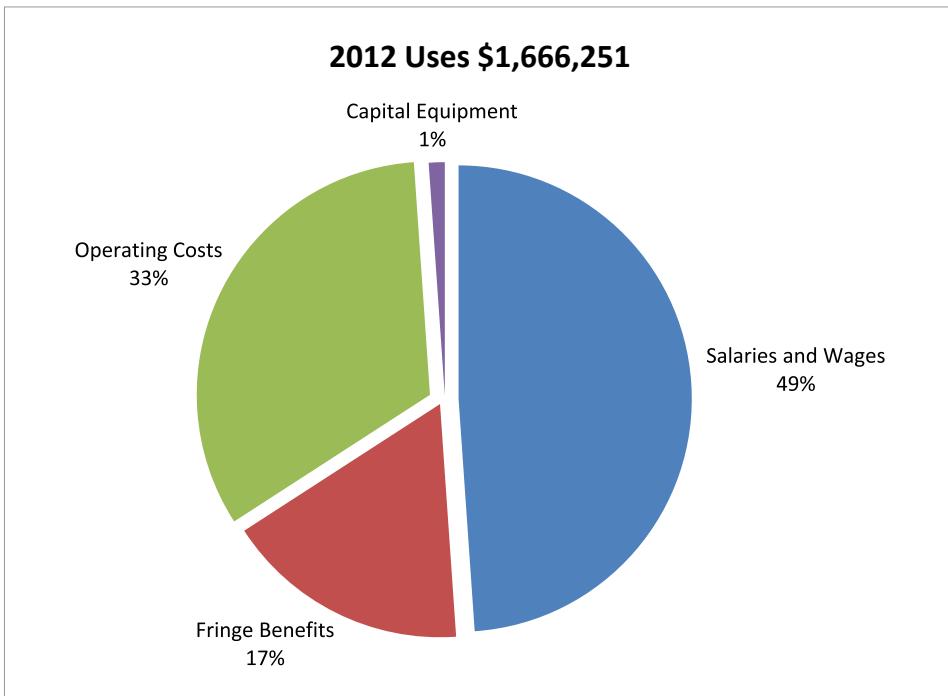
Uses

Salaries and Wages: Expenses include salaries, wages and supplemental compensation paid to WRRC faculty, appointed personnel, classified staff, graduate assistants and student hourly employees. WRRC funding provided salary support to employee groups as follows: faculty, 19.21%; appointed personnel, 40.23%; classified staff, 24.41%; graduate students, 7.58%; student hourly and undergraduate wages, 8.57%.

Fringe Benefits: Expenses include costs of employee fringe benefits (ERE), background checks and required employee training.

Operational Costs: Expenses include: Administrative Service Charges and Indirect Costs; Stipends, Lecturer's Fees, Participant Support and Temporary Labor; Sub-Contractual Agreements 104(b) Grants at ASU and NAU; Printing and Publications; Communications; Educational Supply; Research Supply; Office and General Supply; Travel; Conference Registration Fees; Membership Dues; Building and Vehicle Rental; Business Meetings; UITS FTE Network Funding (Access, University Communication Systems); Building Maintenance and Upgrades.

Capital Equipment: Expenses include costs for the purchase of capital laboratory research equipment, computers, data processing and office equipment.



Revenue Available-December 31, 2012

Total includes: balances available in state appropriations and TRIF accounts that are budgeted on a fiscal year basis (7/1 to 6/30); sales and services activities revenue from one-time transactions accrued over time by the WRRC; and monies from private or other grants and gifted funding that are on varying annual schedules.

Appendices

Appendices can be found on-line at wrrc.arizona.edu/annual-report-2012.

Appendix A contains the WRRC 2021 Strategic Plan, including the 2012 Objective Metrics Report.

Appendix B contains supplemental information, including lists of WRRC publications and presentations.