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Arizona Water Institute

A consortium of Arizona's three universities focused on water sustainability through research, technical assistance, education, and technology; building collaborative, multidisciplinary solutions to water management challenges

2007 Annual Report

The AWI is a partnership that brings together the combined expertise and resources at Arizona's three universities – Arizona State University, University of Arizona, and Northern Arizona University – to address critical issues of water sustainability and to position Arizona as a world leader in water resources management and technology. Working together with three state agencies – Water Resources (ADWR), Environmental Quality (ADEQ), and Commerce (ADoC) – AWI provides access to hydrologic information, supports communities and water managers, and promotes the development and spread of technologies to further water sustainability.

This annual report from the Arizona Water Institute includes the following major topics:

I. Highlights of 2007

Key achievements in the last year include:

- The water community, state agencies and the faculty are very engaged; we now have over 100 partners, including utilities, tribal entities, watershed groups, state, local and federal agencies and the private sector (Attachment 1).
- Team building efforts across the universities are working well and external grant proposals have already been funded on all three campuses that were initiated through AWI activities.
- The approach to defining and managing collaborative projects is working, and AWI is increasingly viewed as a logical partner for communities throughout the state that are facing water problems and need technical support.
- We now have two two-year contracts in the works (for the Central Arizona Project and the Bureau of Reclamation) that are not connected to AWI grant funding, and another possible contract supporting Chino Valley (and hopefully other regional partners) seeking solutions to support water sustainability.

- Students who have been associated with AWI projects are in particular demand in the private sector and in government because of their experience in interdisciplinary and applied projects.
- AWI regularly receives requests from journalists, researchers, potential students and business interests who need information, and is regularly requested to make presentations at national and international meetings.
- AWI is the model for several other states that are interested in creating similar organizations (specifically, New Mexico, Texas, Colorado and California, and several states in Mexico). This is a vote of confidence in our approach to bridging the gap between science and decision-making.
- We are working with a number of national research organizations who are interested in investing in AWI; including pledging funds for projects.
- We are actively working with the Arizona Water and Pollution Control Association (AWPCA), which is the largest water and wastewater organization in Arizona (more than 3,200 members), and they are now financial supporters. We anticipate providing a research clearinghouse in partnership with AWPCA and are running the opening session on water sustainability research at their annual conference in May.
- Fundraising from private sources has been challenging, but we have raised $1.5 million total in external funds in the last two years, counting both direct investment and matching funds.

Activity Highlights:

- Successful completion of AWI projects on schedule (for status and outcomes for each project, see Attachment 2).
- 58 high quality collaborative project proposals for this year's grants received and reviewed by three committees, resulting in selection of additional 15 projects for 2008.
- Establishment of AWI as the coordinator for the Arizona-Sonora Binational Institute for Water and Renewable Energy, and completion of the strategic guidance document for the Institute.
- AWI invited by the US Geological Survey (USGS) to testify on climate change adaptation for water managers at a Congressional briefing.
- AWI sponsored the Conference on Climate Change and Higher Education at ASU in November, which provided the forum for the first commitment from an entire state university system to developing solutions to climate change issues – including representatives of the Board of Regents and the presidents and faculty of UA, NAU and ASU.
- Agreement from the Bureau of Reclamation to expand and extend the AWI Colorado River project – Enhancing Water Supply Reliability through Enhanced Use of Climate Predictions – for at least another two years.
- AWI sponsored a regional workshop on defining the research agenda for salinity issues in Arizona that was well attended and received excellent reviews from researchers and water managers.
- AWI jointly sponsored a successful field trip to the Colorado River Delta, with SRP, ADWR, CAP and others.

Funding Highlights

Total funded activity for AWI since its inception, including direct funding, cash and cash matching, is $4.75 million:

- The Arizona Board of Regents provided $200,000 to support administrative costs for both 2006/07 and 2007/08.
- The Arizona Legislature provided $1.5 million for 2006/07 ($500,000 to each campus); this amount was cut 20 percent for 2007/08 ($400,000 to each campus).
- A 2-year grant from Bureau of Reclamation provided $226,224, with an additional $230,483 in leveraged funds, to continue to work on the use of climate information for managing the Colorado River. Additional funding of $240,000 to $300,000 is anticipated for the next two years. The UA Water Resources Research Center is also directly sponsoring this research.
- An initial grant of $150,000 was received in 2006 from Arizona Community Foundation to support the establishment of the Arizona Hydrologic Information System (AHIS) at ASU, with significant activity focused at ASU's Global Institute of Sustainability.
- AWI received a $100,000 TRIF (Technology Research Initiative Fund) grant through SAHRA to support a programmer and the new Informatics faculty position for AHIS, plus $75,000 from the Institute for the Study of Planet Earth, and $45,000 from Biosphere 2, derived from a Science Foundation Arizona grant.
- A concerted effort to involve major utilities, water providers, and private sector interest has resulted in contributions from Pima County, APS, Tucson Water, City of Phoenix, Salt River Project, Global Water, Central Arizona Project and Tucson Electric/Unisource, City of Scottsdale and City of Chandler.

AWI is working to develop targeted private sector support in several key areas, including high technology industries, engineering and consulting companies, and the real estate and development industry, and will shortly sign a contract with CAP for $100,000 per year for two years to work collaboratively on a planning study to estimate water demand for the communities along the Colorado River. This will be a joint UA-ASU project. Several other contract and funding opportunities are currently being pursued.

Grantwriting

- In 2007, AWI developed, in cooperation with others, several large-scale proposals, including two National Science Foundation proposals, one for an inter-program grant: "INTEROP: Building a Watershed-Based Community Interoperability Network" and the other in Geoinformatics: "A Framework for Integrating Drought, Global Change and Water Management Data." The proposals were not funded but will be revised and resubmitted. A proposal to Science Foundation Arizona to support the Arizona Hydrologic Information System was submitted in January 2007, but was also not funded.

II. Research Activities

Focus areas for research

As a result of internal discussions with the Executive Committee, and considering both the likelihood of future investments and the strengths of the three universities, six research focus areas have been selected for AWI:

A. Arizona Hydrologic Information System (AHIS)
B. Climate change/drought/adaptation,
C. Energy/water sustainability,
D. Capacity building/watershed research and support,
E. Salinity management & technologies and
F. Emerging pathogens and treatment technologies.

The following discussion includes research and other activities in each focus area:

A. Arizona Hydrologic Information System

The web-based AHIS (www.azwaterinstitute.org/ahis/) has been established and is in the beta-testing phase. The aims are 1) to develop a "metadata" catalog of known available water resources information; 2) to design the structure for data-sharing among the three universities; and 3) to develop long-term public access to the information system. AHIS enables agencies, academic institutions, consultants, and others to provide real-time access to their extensive data collections and metadata. Several proof-of-concept applications have been developed, including the Arizona Wells web application, which makes accessible data developed and maintained by the USGS, ADWR, ADEQ, and the Arizona Geological Survey through a single intuitive user interface that supports a variety of search approaches.

After a long search, AWI is about to hire an informatics expert at UA to oversee interagency coordination, project management, and fundraising.

AWI Projects in this category include:

- Web-based Access to Water Related Data (2007)
- AHIS Web Portal Development (2008)

B. Climate change/drought/adaptation

AWI-Funded projects in this category include:

- Assessment of the Navajo Nation Hydroclimate Network (2007)
- Improved Tools for Drought Planning and Management (2007)
- Drought Indicator and Trigger Tool for Community Water Systems (2007)
- Sensitivity Analysis of Arizona State Drought Status Determination (2008)

Other related activities:

- AWI was the primary coordinator of the Conference on the Role of Climate Change in Higher Education, held in Nov. 2007 at ASU. Presentations were made by all three

university presidents, key faculty members at each of the universities, and two members of the Board of Regents. Over 200 people attended, and excellent media coverage included dissemination of the entire program via webcast, DVD and cable TV.

- AWI's work with U.S. Bureau of Reclamation on the project "Enhancing Water Supply Reliability through Improved Climate Prediction" resulted in the 1,000-year extension of the tree ring record for the Upper Colorado to the prehistoric period. This work is now the principal underpinning of a new understanding of long-term drought sequences and has been mentioned in many news reports, including *National Geographic*, *The New York Times*, and a National Academy of Sciences publication. Another activity related to this project is the development of a new method for predicting precipitation within watersheds based on sea surface temperatures, enabling better predictive capacity for tributary inflows into the Colorado River. Project activities also supported Reclamation in the development and review of the economics and climate-change portions of the Environmental Impact Statement for shortage sharing on the Colorado River.
- In May, 2007 AWI sponsored a national workshop defining a research agenda to further the use of improved understanding of decadal scale climate variability to enhance prediction of future climate conditions.
- In February, 2008 AWI sponsored a two-day "Climate Change Adaptation for Water Managers" regional conference for water managers and researchers. This facilitated "café style" meeting was focused on building relationships between water managers and researchers, and developing a research agenda based on water managers' needs.

C. Energy/water sustainability

AWI-funded projects in this category include:

- Linking Water and Energy-Water Quality and Yield from Fuel Cells (2007)
- Linking Water and Energy-White Paper on Water and Energy in Arizona (2007)
- Linking Water and Energy-White Paper on Life Cycle Costs and Water Implications of Alternative Technologies (2007)
- Water and Energy Sustainability with Rapid Growth in the Arizona-Sonora Border Region (2008)
- Best Practices Guide for Rural Water/Energy Usage in Arizona (2008)
- Enhancing Sustainable Water Reclamation Using Algae-Based Biotechnology (2008))

Other related activities

- With the Dept. of Commerce, AWI is helping to establish Biosphere 2 as a major sustainability research/outreach/education facility, in part by co-sponsoring two workshops (held in January and February of 2008) on strategic planning and on energy and water conservation.
- AWI is the Arizona coordinator of the new Arizona-Sonora Binational Institute for Water and Renewable Energy. Based on a Memorandum of Understanding signed by Arizona Governor Janet Napolitano and Sonora Governor Eduardo Bours in September, 2007, the Binational Institute connects the research communities of all three Arizona universities with their counterparts in Sonora to inspire the region's best research minds to address our biggest challenges: water resources, energy requirements, and the technologies needed to sustain them in the region. Initial projects will focus on the nexus of water and

renewable energy; how to improve the management of transboundary water resources, and the development of renewable energy in the Arizona-Sonora region. The strategic plan developed by AWI appears as Attachment 3. A workshop to define projects was held February 21, 2008.

D. Capacity-building and watershed research and support

AWI-Funded projects in this category include:

- Evaluation of ADWR Management Plans (2007)
- Environmental Flow Requirements in the Verde River (2007)
- Approaches to Water Management by Tribes in Arizona (2007)
- Smart Irrigation Control for Landscape Irrigation (2007)
- Identify and Characterize Arizona Heritage Waters (2007)
- Integrated Riparian Area Monitoring: Floods, Water Source and Biological Response
- Conservation of Water Using Acoustic Emission Technology (2007)
- Arizona's Agricultural Economy – Future Scenarios and Water Management Implications (2008)
- Impacts of Forest Thinning on Water Balance (2008)
- Verde River Flows Study Phase II: Integrated Research for Refining Flow-Ecology Response Models (2008)
- Hydroclimate Management Capacity Building and Watershed-Based Precipitation-Runoff Modeling in the Navajo Nation (2008)
- Developing a Process for Identifying and Prioritizing At-Risk Water Resources for the Coconino Plateau (2008)
- Status of Generation, Reuse and Recharge of Treated Wastewater in Arizona: Evaluation of Programs, Data Sources and Utilization Options (2008)

Other related activities
AWI is working on several fronts related to capacity building – working with watershed groups, communities and utilities to address specific sustainability issues, and supporting efforts to build an employment pathway for water and wastewater treatment plant operators with Gateway Community College, among other examples.

E. Salinity management and technologies

AWI-Funded projects in this category include:

- Electrocoagulation Technology in Semiconductor Manufacturing (2007)
- Water Recovery and Residuals Management for Reverse Osmosis Treatment of CAP Water (2007)
- Reverse Osmosis Pretreatment Using Ion Exchange Brine Recycle and Selective Precipitation

Other related activities
In August 2007, AWI sponsored a major regional workshop on salinity management. Researchers and water managers were invited to define the research agenda for desalination in

Arizona and plan a pilot project for large-scale treatment of CAP water to maximize water availability and effectively manage the saline waste stream. As follow-on to this workshop, a 2008 grant was awarded to further develop a promising large-scale pretreatment approach to greatly improve efficiency and reduce brine wastewater volumes in the reverse-osmosis treatment of CAP water.

F. Emerging pathogens and treatment technologies

AWI-Funded projects in this category include:

- Proof of Concept Development: Sensor for Disinfection By-Products in Drinking Water (2007)
- Effectiveness of Sewage Treatment Plants in Removing Estrogenic Compounds from Treated Wastewater (2007)
- Collaborative Approach to Analyzing Emergent Contaminants in Arizona Water (2007)
- Evaluating Proposed Operational Practices for Control of *Naegleria fowleri* in Arizona's Public Drinking Water Systems (2008)
- On-Site Microbial Monitoring of Water by Electrokinetic Lab-on-a-Chip (2008)
- Operation of the Activated Sludge Process for Removal of Estrogenic Activity During Conventional Wastewater Treatment (2008)

III. Project Management and AWI Operations

As a result of the initial cross-university RFP and the subsequent awards from the three universities from the first two years, there are now have 32 Arizona Water Institute collaborative projects to manage (many of the first year projects are now either complete or will be completed shortly; a list of the projects and outcomes is in (Attachment 2). AWI has received significant positive feedback from cooperating entities.

All AWI projects are assigned to a project manager who is either a campus coordinator, an AWI Associate Director, or the Executive Director. The project manager develops the MOU and the required timelines and milestones, reviews and comments on interim and final products, assists with stakeholder engagement in the project, and approves payments. In some cases project managers also have substantive roles relative to report writing and coordination within the project.

2008 AWI Sponsored Grant Project Selection

An RFP was issued in early July, 2007, with proposals due September 20. The RFP was structured around the Institute's theme areas listed above. The campus coordinators and associate directors worked closely with our partner agencies as well as with researchers and community stakeholders to help build teams and focus proposals. This approach proved to be quite successful, and AWI received 58 collaborative proposals. The quality of these proposals was even better than last year, and literally all of them were fundable. Competition for the AWI grants is very intense. Twelve projects were selected in the initial inter-campus competition. These projects were extensively reviewed by a broad spectrum of stakeholders, academics and

agency representatives, with the final selection made by the Executive Committee. Three more projects were later selected for funding by UA and NAU using campus AWI funds. Additional projects are still being discussed.

AWI Central Staff/Support

SAHRA (the NSF Center for Sustainability of semi-Arid Hydrology and Riparian Areas) continues to provide office space, furnishings, computer and administrative support for the central office. The central staff, including Kathy Jacobs, the Executive Director, and Tonya Haymore, Administrative Associate, work for all three universities and support the activities of AWI across the state. Their salaries are currently paid by ABOR. Tonya has now worked for AWI for almost two years, and Anna Spitz, who works half time as the UA coordinator and one-quarter time doing project management for AWI as a whole, has been with AWI for a year and a half.

Tonya handles all business and purchasing activities within the central AWI office, mailing list, web development and communications. She maintains shadow bookkeeping and tracks all our financial records, supports all our meetings and conferences, handles travel arrangements, and coordinates the grant proposal reviews.

AWI Meeting Coordination

AWI staff now schedule all of the AWI meetings across the campuses, including weekly coordination meetings, monthly Executive Committee meetings and business manager meetings, and External Advisory Committee meetings twice a year. Coordinating AWI activities across the three universities, including project management, financial management, communications, and collaborative research is a significant effort.

Campus Coordinators

All three coordinators have campus listservs and hold meetings to facilitate communication with faculty and students and promote generation of project ideas and funding opportunities as well as efficient management of projects.

- Anna is the project manager for multiple AWI projects, assists with the newsletter and with tracking funding for projects. She is assigned to work on major grant applications and managing the UA intern and faculty incentive programs. She also directly worked on the project team for the Verde Flows and AHIS projects.
- An office has been established at the Global Institute of Sustainability at ASU; Jim Holway continues as the campus coordinator for ASU and is now ably assisted by Tamlin Engle. AWI has had excellent cooperation and support from GIOS, especially related to supporting the Associate Directors and the Climate Change and Higher Education conference.
- NAU has an AWI office that is supported by Beate Hoyt, with Abe Springer and Paul Gremillion serving as co-coordinators. NAU has been exceptionally supportive of all AWI activities and very engaged in our work.

Associate Directors

- There are now only two Associate Directors, as Bennett Curry left his position as AD for Commerce in December. Chuck Graf has been in his position for a year and a quarter, and Plácido Dos Santos for exactly one year.
- Chuck has been doing a yeoman's job as manager of most of our water quality projects, liaison for ADEQ, and coordinator of the salinity workshop. He serves on 13 statewide committees and advisory boards (chairing two) and reviews proposals for many other organizations. He regularly helps coordinate conferences and workshops and has been assisting in fundraising and grant writing. He is known statewide as a water quality expert and frequently provides support and advice on water quality issues.
- Plácido is the AD for ADWR, and has worked hard to engage ADWR in AWI activities. He initiated a new Water Table for the Arizona-Mexico Commission at ADWR's request and is now the lead Arizona coordinator for the Arizona-Sonora Binational Institute for Water and Renewable Energy. He coordinated and led a very successful bilingual field trip co-sponsored by AWI to the lower Colorado and Delta area and is managing several AWI projects. He also participates in reviewing research proposals for outside entities and has been invited to Washington DC twice in the last year to provide input to EPA.

Business Office Coordination

AWI holds regular phone conferences between the business managers on the three campuses. Many accounting issues and other administrative problems have been resolved, including devising a method for AWI grants to be counted towards promotion and tenure through the sponsored projects office at ASU, and establishing a mechanism to roll forward AWI funds past the fiscal year end. Currently, AWI is developing an accounting practices notebook that documents each university's unique approaches to particular topics as well as our shared accounting practices. End of the fiscal year accounting has been completed for all three universities and a budget prepared for FY 2008.

The UA Arizona Research Labs' business office now manages the ABOR administrative funds that support the central office salaries as well as the UA appropriation. They are doing an excellent job. The UA Foundation manages the 501.C.3 account for AWI and is being very supportive. The Global Institute of Sustainability at ASU is successfully managing the account that supports the three Associate Directors. In general, AWI is treated as a "center" within the allocation formulas for each university.

External Advisory Committee

The External Advisory Committee was established in 2006. It currently includes 40 individuals representing a broad geographic, political and sectoral spectrum (Attachment 4). Two meetings of this group were held in 2007, including one at the Department of Water Resources and one at Global Water in Maricopa. These meetings were focused on providing updates to the Advisory Committee and getting feedback from them regarding our progress. At the second meeting several of our AWI projects were featured, and updates were given by key faculty investigators.

AWI has been working on concepts for further engaging the AWI External Advisory Committee. An idea that AWI experimented with this year was establishing four subcommittees to focus on specific aspects of AWI work. The subcommittees are: a) strategic planning; b) capacity building; c) fundraising; and d) special projects. Each of the subcommittees is chaired/co-chaired by the campus coordinators and the Associate Directors. Each of the subcommittees has met at least once this fall, but this approach has not yet proven wholly successful.

IV. Outreach and Presentations – 2007

Outreach and Communications

With financial assistance from the Department of Commerce (CEDC), AWI has developed a full set of graphics for "branding" our products, including the website, stationary, brochures, business cards, publication covers, etc. Outreach activities in 2007 include:

- AWI prepared a total of eight public handouts for AWI, and have revised our full-color publicity brochure. AWI now has a set of handouts that can be used for different audiences that are updated on a regular basis.
- The AWI website is maintained in-house, updated weekly and averages 196 hits per week.
- Approximately 22 newspaper articles have been written about AWI during the last year.
- An opinion piece for the *Arizona Republic* appeared January 11, 2008 (Attachment 5)
- Over 2100 individuals now receive the AWI e-newsletter
- Seven bimonthly, 4-6 page AWI e-newsletters were distributed in 2007.

Presentations

Presentations are a major part of the AWI outreach and education activities. Presentation titles are in italics in the list below. Presentations include 37 by Jacobs, six by Chuck Graf, and eight by Placido Dos Santos). Those titled "Arizona Water Institute" are all variations of presentations about the structure, function and purpose of AWI tailored for the specific audience.

- Jan. 11, USGS Tucson Office, *Arizona Water Institute* (Jacobs)
- Jan. 23, AWI External Advisory Committee, *AWI First Year Report* (Jacobs)
- Jan. 23, Commerce and Economic Development Committee, *AWI First Year Report,* Phoenix (Jacobs)
- Jan. 25, House of Representatives, Committee on Ag and Natural Resources, *Arizona Water Institute,* Phoenix (Jacobs)
- Jan. 26, Guest lecturer, Arizona Water Policy class, *Current Issues in Water Quality Management from A to Z,* UA (Graf)
- Jan. 30, NAU Civil Engineering Class, *Job Opportunities in Water Resources,* Flagstaff (Jacobs)
- Feb.16, American Association for the Advancement of Science, Invited Talk: *Mixing Science and Policy in the Practice of Water Management,* San Francisco, CA (Jacobs)

- Feb. 21, Presentation on ADWR proposals at the Border Governors' Conference Water Work Table planning meeting in El Paso, Texas (Dos Santos)
- Feb. 26, Guest lecturer, Water Policy & Management class, *Current Issues in Water Quality Management from A to Z,* ASU (Graf)
- Feb. 27, AZ Legislature Water Expo, Phoenix (Dos Santos)
- March 15, Sabino Canyon Naturalists, *Water Issues in the Tucson Region*, Tucson (Jacobs)
- March 20, USGS Western Region Ground-Water Management Workshop, *Connecting Science, Modeling and Decision-making in Water Management,* San Diego, CA (Jacobs)
- April 7, Cochise County Growth Symposium, *Water Issues in Cochise County*, Tombstone (Jacobs)
- April 17, Salt River Project Helicopter Tour of Phoenix-area SRP system for Sonoran State Water Commission (CEA) personnel and AWI staff, Phoenix (Dos Santos)
- April 27, United States Geological Survey Congressional Briefing, *Preparing Water Managers for Drought and Climate Change in the Southwest,* Washington DC (Jacobs)
- May 1, ADEQ Northern Regional Office, *An Introduction to the Arizona Water Institute*, Flagstaff (Graf)
- May 3, AWPCA, *Arizona Water Institute,* Glendale (Jacobs)
- May 16-18, Western Governor's Association/Western States Water Council/California DWR, Climate Change Research Needs Workshop, *Adapting to Climate Change: Facilitating Scientist-End User Interaction*, Irvine, CA (Jacobs)
- May 10, 2007, Arizona Municipal Utilities Leadership Institute, "Partners for the Future," *Arizona Water Institute,* Payson (Jacobs)
- May 19, SAHRA External Advisory Committee, *SAHRA Stakeholder Engagement Program*, Tucson (Jacobs)
- May 31, Heritage Highlands Democrats, *Climate, Drought and Other Tucson Area Water Issues,* Tucson (Jacobs)
- June 5, Authored "Evolution of ADEQ's Border Environmental Program" for ADEQ 10th Anniversary Conference, Phoenix (Dos Santos)
- June 14, Inaugural meeting of the Arizona-Mexico Commission Water Committee, Tucson (Dos Santos)
- July 12, ADEQ Water & Wastewater Seminar, *An Introduction to the Arizona Water Institute*, Phoenix (Graf)
- July 21, Onsite Wastewater Educational Conference & Exhibition, *The Arizona Water Institute: Progress, Projects, and Opportunities*, Flagstaff (Graf)
- July 24, CH2MHill, *Arizona Water Institute*, Phoenix (Jacobs)
- Aug. 16, Arizona Municipal Water Users Association, *Arizona Water Institute*, Phoenix (Jacobs)
- Aug. 21, AWI External Advisory Committee, Global Water, Maricopa (Jacobs)
- September 10, Geography class lecture, *Groundwater-Surface Water Issues*, UA (Jacobs)
- Sept. 12, National Center for Atmospheric Research, *Design of Decision-Support Research Programs for Adaptive Water Management,* Boulder, CO (Jacobs)
- Sept. 18, Arizona Planning Association Professional Development Workshop: *Active Management Areas and Assured Water Supplies: Myth vs. Reality*, Tucson (Jacobs)

- Sept. 20, Water Education Foundation Colorado River Symposium: The Colorado River Compact at 85 and Changes on the River, *Opportunities for Adaptation to Climate Change*, Santa Fe, NM (Jacobs)
- Sept. 27, PERC National Conference for Journalists, *Facing the Realities of Rising Temperatures*, Big Sky, MT (Jacobs)
- Oct. 5, Gateway Community College, Focusing Arizona on Global Warming Solutions, *The Impact of Climate Change on Arizona Waters*, Phoenix (Jacobs)
- Oct. 10, SAHRA Annual Meeting, *Enhancing Water Supply Reliability: An Interdisciplinary Project to Improve Predictive Capacity in the Colorado River Basin*, Tucson (Jacobs)
- Oct. 11, SAHRA Annual Meeting, *SAHRA's Stakeholder Engagement Program: Science Supporting Water Management*, Tucson (Jacobs)
- Oct. 12, SAHRA Annual Meeting, *Summary of Stakeholder Input*, Tucson (Jacobs)
- Oct. 18, Binational Water Forum, *Reuse of Reclaimed Water in Arizona: Past, Present, and Future*, La Paz, Baja California, Mexico (Graf)
- Oct. 19, *Binational Institute for Water and Renewable Energy*, La Paz, Baja California Sur, Mexico (Dos Santos)
- Oct. 24, Cooperative Extension Western Conference, *An Overview of Arizona Water Issues/Focus on the Arizona Water Institute*, Tucson (Jacobs)
- Oct. 25, WSP Water and Energy Forum, *AWI Water Sustainability Activities*, Tucson (Jacobs)
- Oct. 26, Panelist, *Community Conversation on Water*, Tucson (Jacobs)
- Nov. 1, CAP Board Meeting, *Arizona Water Institute*, Tucson (Jacobs)
- Nov. 2, AWPCA Utility Council Meeting, *Preparing for Drought and Climate Change: What Can We Do About It?* Gilbert (Jacobs)
- Nov. 6, Nevada Water Resources Association, Climate Change Symposium, *Preparing for Drought and Climate Change: What Can We Do About It?* Springs Preserve, Las Vegas, NV (Jacobs)
- Nov. 12, Dividing the Waters, Science for Judges Workshop IV, *Adaptive Water Management in the Context of Climate Variability and Change: Applications to Judicial Decision-Making*, La Jolla, CA (Jacobs)
- Nov. 15, Western States Water Council Legal Committee, *Adaptations to Improve Supply Reliability Under Climate Change*, Phoenix (Jacobs)
- Nov. 15-16, Arizona-Mexico Commission Plenary Session in Ciudad Obregon, Sonora, Mexico, *Binational Institute for Water and Renewable Energy*, (Dos Santos)
- Nov. 16, Western States Water Council, *Arizona Water Institute*, Phoenix (Jacobs)
- Dec. 4, Arizona Invasive Species Council, Maricopa County Extension Office, *Arizona Water Institute*, Phoenix (Jacobs)
- Dec. 11, US EPA/GSA Conference regarding the Federal Advisory Committee Act, *Chairing FACA Committees* (Dos Santos)

Other Conferences, Committees and Workshops Sponsored and/or Attended by AWI – 2007

AWI sponsored or co-sponsored 7 major events in 2007 (those in italics). The other events involved AWI but were not "major events" that we sponsored.

- Jan. 9-10, US Climate Change Science Program Stakeholder Meeting, Washington (Jacobs)
- Jan. 31–Feb 1, San Francisco Public Utilities Commission – Water Utility Climate Change Summit, San Francisco (Jacobs)
- Feb. 23, Session Moderator and Discussant, Western Regional Science Association, Newport Beach (Jacobs)
- *Feb. 27, Water Expo at the Legislature, Phoenix (Dos Santos and Curry)*
- Mar. 2-3, The Colorado Compact in the 21st Century: Time for Change?, Salt Lake City (Jacobs)
- Mar. 23, Climate Prediction Applications Science Workshop, Drought and Climate Prediction Products and Tools, Moderator, Seattle (Jacobs)
- *March 23, AWI Decadal Climate Prediction Workshop, Coordinator and Moderator, Seattle (Jacobs)*
- Apr. 22, Earth Day at Boeing (Curry and Graf)
- Apr. 22, Earth Day at UA (Spitz)
- April 23, Investor Owned Utilities Association Water Summit, Phoenix (Jacobs)
- May 9-10, National Summit on Coping with Climate Change, Ann Arbor (Jacobs)
- *Jun. 20-21, WRRC Conference, Phoenix, 20th Anniversary of the Environmental Quality Act and ADEQ: Assessing and Protecting Arizona's Water Quality Conference, Panel moderator and Co-sponsor with WRRC, Phoenix (Jacobs and Graf)*
- *Aug. 6, AWI Salinity Research Workshop, Improving Salinity Management and Desalination Technology for Brackish Water Resources in the West: A Workshop to Establish an Agenda for Applied Research, Tempe (Graf)*
- Aug. 31, Arizona Hydrological Society, SW Hydrology/Arizona Hydrological Society Panel session moderator: *Sustainable Water, Unlimited Growth, Quality of Life: Can we Have it All?,* Tucson (Jacobs)
- *Sept. 27-28, Water Work Table meeting of the Border Governors' Conference in Puerto Peñasco, Sonora, Mexico (Dos Santos)*
- *Oct. 15-17 - Binational Field Trip of the Lower Colorado River Delta Region, Arizona and Sonora (Dos Santos)*
- Nov. 5, Inaugural Binational meeting regarding a Transboundary Aquifer Assessment of the Santa Cruz River Basin in Nogales (Dos Santos)
- *Nov. 26, AWI Conference on Climate Change and Higher Education, Moderator and Coordinator, Tempe (Jacobs)*
- Dec. 10, California Water Strategic Planning Workshop, Sacramento (Jacobs)

V. Conclusions

The measures of success for AWI are evolving over time, and have been discussed by the strategic planning subcommittee. The list currently includes factors such as:
1) water is better managed in Arizona because of our technical support;
2) a broad spectrum of stakeholders is engaged;
3) there is identifiable implementation of research and assistance results;
4) there is an increasing number and quality of partnerships between universities and practitioners, and of new connections across the universities; and
5) there are new resources coming to Arizona due to tech transfer/economic development efforts.

Although it is difficult to quantify improvements in all of these categories, it is clear that AWI has made significant progress in each of them. Progress is very visible in the context of engaging stakeholders, increasing the number and quality of partnerships, and implementation of research and assistance results—the jury is still out regarding substantial contributions the other two measures but momentum is clearly building in both.

Other measures of success for consideration include:
6) expanding the capacity of the universities to meet specific real-world needs of water providers, agencies, tribes, NGOs and economic sectors related to water and energy sustainability;
7) training students in interdisciplinary, applied sustainability-related fields so that they are better prepared to join the work force of the 21st century;
8) completing projects in a timely fashion that are useful in a real world context;
9) demonstrating a broad spectrum of financial support from a variety of sources;
10) helping define and fund “cutting edge” research needs for water sustainability;
11) ensuring that under-served communities have increased access to university resources;
12) increasing the visibility of the universities and the state as the “go-to” place for water-related knowledge and research;
13) increasing the number of technology transfer and job opportunities related to water;
14) conducting workshops, training sessions and other educational opportunities to translate science to applications; and
15) ensuring that AWI is a “learning organization” – that is, it adapts well to changing circumstances and priorities.

In virtually all of these categories AWI is making substantial contributions. Although the pace of AWI activities is a bit hectic, we have made significant progress in two years and are looking forward to future challenges!

Arizona Water Institute Partners

Attachment 1

Name of External Partner	Project Partnership	Financial Research Sponsor	Contributing Sponsor	Workshop Sponsor
Agri-Business Council of Arizona, Inc	✓			
AM Brown, Private			✓	
APS	✓		✓	
Arizona Farm Bureau	✓			
Arizona State Parks Department	✓			
Arizona Water and Pollution Control Association	✓		✓	
AZ Dept of Commerce	✓			
AZ Dept of Environmental Quality	✓			
AZ Dept of Health Services	✓			
AZ Dept of State Parks	✓			
AZ Dept of Water Resources	✓			
AZ Geological Survey	✓			
Biosphere 2	✓			✓
Brown and Caldwell				✓
Central Arizona Project	✓		✓	
Chuck Pettis, Private			✓	
City of Chandler	✓			
City of Chandler			✓	
City of Flagstaff	✓			
City of Goodyear			✓	
City of Mesa	✓			
City of Phoenix	✓	✓	✓	
City of Scottsdale	✓		✓	
City of Tucson	✓		✓	
City of Tucson Office of Conservation & Sustainable Development	✓			
Coconino National Forest	✓			
Coconino Plateau Water Advisory Council	✓			
Community Watershed Alliance of the San Pedro Valley	✓			
Damon S Williams and Associates				✓
Errol L Montgomery and Associates				✓
Friends of the Santa Cruz River	✓			
Gila Watershed Partnership of Arizona	✓			
Global Institute of Sustainability	✓			✓
Grand Canyon Wildlands Council, Inc	✓			
Institute for the Study of Planet Earth (ISPE) - UA	✓			
Intel Corporation	✓			
InterTribal Council of Arizona, Inc	✓			
James E Rogers College of Law - UA	✓			
King County Washington	✓			
Kleinfelder West, Inc	✓			
Little Colorado River Watershed Coordinating Council	✓			
Maricopa County Department of Health Services	✓			

Arizona Water Institute Partners

Attachment 1

Name of External Partner	Project Partnership	Financial Research Sponsor	Contributing Sponsor	Workshop Sponsor
Maricopa County Environmental Services Department	✓			
Maricopa County WasteWater Management	✓			
Metro Water District	✓			
Museum of Northern Arizona	✓			
National Oceanic and Atmospheric Administration (NOAA)	✓			
National Science Foundation	✓			
National Water Research Institute	✓		✓	
Navajo Nation	✓			
Office of the State Forester - AZ State Land Dept	✓			
Pima County Parks and Recreation Department	✓			
Pima County Wastewater Management	✓		✓	
Pinal County Board of Supervisors	✓			
Salt River Project	✓		✓	
Science Founation Arizona	✓			
Show Low Creek Watershed Enhancement Partnership	✓			
State of Arizona Game and Fish Department	✓			
The Nature Conservancy	✓			
Town of Prescott Valley	✓			
Tucson Audobon Society	✓			
Tucson Electric/Unisource			✓	
Tucson Water	✓		✓	
Udall Center for Studies in Public Policy - UA	✓			
United States Bureau of Reclamation	✓		✓	✓
United States Fish and Wildlife Service	✓			
United States Geological Survey	✓			
US Department of Agriculture	✓			
US Dept of Agriculture Natural Resources Conservation Service	✓			
Verde River Basin Partnership	✓			

Name of University Campus Partner	Project Partnership	Financial Research Sponsor	Contributing Sponsor	Workshop Sponsor
American Indian Policy Center - ASU	✓			
Applied Indigenous Studies Department - NAU	✓			
Aramark Catering Services - ASU				✓
Centennial Forest - NAU	✓			
Climate Assessment for the Southwest - UA	✓			✓
Cooperative Extension - UA	✓			
Decision Center for a Desert City - ASU	✓			✓
Decision Theater	✓			
Dept of Agriculture and Resource Economics - UA	✓			
Dept of Biological Sciences - NAU	✓			
Dept of Civil and Environmental Engineering - ASU	✓			

Arizona Water Institute Partners

Attachment 1

Name of External Partner	Project Partnership	Financial Research Sponsor	Contributing Sponsor	Workshop Sponsor
Dept of Electrical Engineering - NAU	✓			
Dept of Geography and Regional Development - UA	✓			
Dept of Geology - NAU	✓			
Dept of Hydrology and Water Resources - UA	✓			
Dept of Soil, Water and Environmental Sciences - UA	✓			
Environmental Communication Resource Center - ASU	✓			
Environmental Research, Development & Education for the New Economy (ERDENE) - NAU	✓			
Global Institute of Sustainability	✓			✓
Merriam-Powell Center for Environmental Research - NAU	✓			
Morrison School of Management and Agribusiness - ASU	✓			
Sandra Day O'Connor College of Law - ASU	✓			
School of Earth and Space Exploration - ASU	✓			
School of Forestry - NAU	✓			
School of Life Sciences - ASU	✓			
School of Natural Resources - UA	✓			
State Climate Office - ASU	✓			
Sustainability of semi-Arid Hydrology and Riparian Areas (SAHRA) - UA	✓	✓		✓
Tree-Ring Laboratory - UA	✓			
Udall Center for Studies in Public Policy - UA	✓			
Water Quality Center - ASU	✓			
Water Quality Center - UA	✓			
Water Resources Research Center - UA	✓	✓		✓
Water Sustainability Program - UA	✓	✓		✓

2008 AWI Funded Proect Summary (2/20/08)

2008 Project	AWI Funds*	Partner Funds*	Total Investment*	Non-University Partners**	Expected Outcomes	Status	Benefits to Arizona's Citizens
1. Enhancing Sustainable Water Reclamation Using Algae-Based Biotechnology *Investigators (Pricipal Invest. in bold): **Baxter** (NAU); Hu, Sommerfield (ASU)	$45,000	$6,160	$51,160	Phoenix	Perform research to integrate algae-based biotechnology into sewage treatment processes for bioenergy production, carbon dioxide sequestration, and dissolved solids reduction.	Selected for Funding	Promotes enhanced energy production potential of sewage treatment plants, reduced energy use and carbon footprint, and improved quality of treated wastewater available for beneficial reuse.
2. Evaluating Proposed Operational Practices for Control of Naegleria fowleri in AZ's Public Drinking Water Systems *PI: **Brown**, Rittmann, Abbaszadegan (ASU); Gerba (UA)	$48,028	$63,924	$113,053	Peoria, Tucson, Mesa, Chandler	Evaluate operational practices in public drinking water systems to ensure that the deadly amoeba, *Naegleria fowleri* , if present in the source water, is controlled and will not pose a threat to human health.	Selected for Funding	Protection of drinking water supplied by public drinking water systems.
3. Reverse Osmosis Pretreatment Using Ion Exchange Brine Recycle and Selective Precipitation *PI: **Ela**, Arnold (UA); Ketterer (NAU)	$47,942	$43,664	$91,606		Characterization of a novel pretreatment approach that could greatly increase the effectiveness and reduce brine wastewater volumes in the RO treatment of CAP water.	Selected for Funding	Enhance the feasibility of large-scale treatment of CAP water to augment the water supply in Tucson and elsewhere.
4. Arizona's Agricultural Economy - Future Scenarios and Water Management Implications *PI: **Frisvold** (UA); Aggarwal, Patterson, Acharya, Molina (ASU)	$38,657	$11,352	$50,009	Agri-Business Council of Arizona	Hold six listening sessions with key agricultural stakeholders to determine their vision for the future of agriculture in AZ. Based on this input, develop 3-5 future scenarios for agriculture and evaluate their water management implications, both medium-term (to 2020) and long-term (2020-2050).	Selected for Funding	This project analyzes future scenarios for agriculture as a first step to allow policy makers to consider water needs in Arizona, to avoid unintended disruptions to agricultural economies and rural communities and to evaluate different criteria for any potential water transfers.
5. On-Site Microbial Monitoring of Water by Electrokinetic Lab-On-A-Chip *PI: **Islam**, Porter (NAU); Chae (ASU)	$44,780	$20,000	$64,780		This project combines in a unique way two emerging technologies (microfluidics and microcantilever sensors) that could lead to the development of real-time instruments for detecting and quantifying dangerous chemicals and pathogenic organisms.	Selected for Funding	Technologies for real-time detection of dangerous chemicals and pathogenic organisms are critically needed in the drinking water and wastewater treatment industries and for homeland security purposes. This project has very high commercialization potential.
6. Impacts of Forest Thinning on Water Balance *PI: **Kolb**, Montes-Helu, Flikkema (NAU); Breshears (UA)	$48,416	$183,823	$232,239	NSF, USDA	Builds on ongoing work by evaluating new concepts for modeling evapotranspiration (ET) in ponderosa pine forests undergoing thinning. A new approach using wireless, compact, distributed data-logging sensors will be used to provide ET data.	Selected for Funding	Thinning is often promoted to reduce forest fire hazard and increase surface water yield in ponderosa pine forests. ET is a key factor in estimating runoff and water yield for thinned plots. This project will help evaluate the water and related benefits of forest thinning.
7. Arizona Hydrological Information Portal - A Collaborative Web Environment for the AHIS *PI: **Otte** (NAU); **Gries**, Aguilar (ASU); McGill (UA); Abraham (Klienfelder)	$48,670	$15,400	$64,070	Kleinfelder	This project will integrate recently completed components of the Arizona Hydrological Information System (AHIS) into a single user-accessible and user-friendly Web portal through which users will be able to easily and efficiently manage and share data.	Selected for Funding	The Web portal will allow state agencies, researchers, private industry, and the general public easy Internet access to a wealth of cross-agency water data in AZ and aids AHIS in becoming the electronic clearinghouse for user-friendly access to water data in Arizona.

8. Status of Generation, Reuse and Recharge of Treated Wastewater in AZ: Evaluation of Programs, Data Sources and Utilization Opportunities *PI: **Rock**, Uhlman, Eden, Westfall (UA); Fox, Stromberg, White (ASU); Solop, Newell (NAU)	$49,930	$16,983	$66,913	ADEQ, ADWR, USBR	Identify and compile data on reclaimed water and its reuse/recharge from ADWR, ADEQ, and other sources. Based on the data compilation, the current status of reuse/recharge and state regulatory programs governing those activities will be evaluated, and further opportunities for more widespread and efficient reuse will be identified.	Selected for Funding	Project will provide a better understanding of the extent of reuse/recharge in Arizona, how this source of water compares to other sources of supply (groundwater, surface water, CAP water), and opportunities for promoting additional utilization.
9. Water and Energy Sustainability with Rapid Growth in the Arizona-Sonora Border Region *PI: **Scott**, Varady, Garfin (UA); Pasqualetti, Guhathakurta (ASU)	$50,000	$6,635	$56,635		This project will 1) map spatial patterns of population growth and economic drivers in the rapidly growing Arizona-Mexico border region, 2) quantify current and future energy and water requirements, 3) assess future energy and water sustainability including impact of climate change, and 4) evaluate alternative management scenarios.	Selected for Funding	Water and energy demands are inextricably linked at the Mexican border and need to be evaluated from a combined management perspective. Information on projected energy or water shortfalls identified in this study will assist Arizona and Sonora in developing sustainable energy/water strategies.
10. Sensitivity Analysis of Arizona State Drought Status Determination *PI: **Selover** (ASU); Crimmins, Garfin (UA); Craig (ADWR)	$47,709	$10,230	$57,939	ADWR	Drought status in AZ is currently determined using set of subjective weighting factors for various drought indicators (e.g., rainfall and streamflow). This project will analyze the drought indicators and weighting factors , develop optimal calculation methodologies and weightings, and test against historical records for prediction accuracy.	Selected for Funding	Portrayal of drought status to affected parties, government officials, and the general public needs to be as accurate as possible. This project will provide a better scientific basis for determining drought status in Arizona, which in turn will allow more appropriate and effective drought mitigation strategies to be implemented.
11. Verde River Ecological Flows Study Phase II: Integrated Research for Refining Flow-Ecology Response Models *PI: **Stromberg**, Schmeekle (ASU); Springer (NAU); Meixner, Reinthal (UA)	$32,394	$30,721	$63,115	The Nature Conservancy	One of the products of the first phase of this study (2007 AWI Project #4) was a consensus research agenda for determining the ecological response to hydrologic variation in the Verde River. This 2008 study begins implementing the research agenda, including integrated data collection (floodplain characteristics, riparian vegetation, fish and fish habitat-flow relationships, groundwater levels, etc.) and further development of the flow-ecology response model.	Selected for Funding	In the upper Verde River, increased groundwater pumping will cause conflicts between human and ecosystem needs due to resulting flow decreases to the river. The aim of this project is to better define the water requirements needed to maintain the ecologic characteristics of the Verde River system (fish, riparian plants, etc.). The information gained is essential to devise approaches to sustain the Verde River ecosystem as water demand grows.
12. Hydroclimate Management Capacity Building and Watershed-Based Precipitation Runoff Modeling in the Navajo Nation *PI: **Tecle**, Anderson, Cobb, Heinrich (NAU); Garfin, Crimmins (UA); Leeper, Tallsalt-Robertson (Navajo Nation)	$49,796	$10,000	$59,796	Navajo Nation Dept of Water Resources	This project follows up on findings of a 2007 AWI-funded project (#5) on the Navajo Nation by 1) developing manpower and building capacity in hydroclimatic science and instrumentation management and 2) modeling watershed-scale rain–runoff relationships.	Selected for Funding	This project will help the Navajo Nation acquire reliable information on water yield and stream flood flows for economic development, flood and drought forecasting and management, and hydraulic structural design and ecosystem maintenance. All of this information will help provide a better quality of life in tribal communities.

13. Operation of the Activated Sludge Process for Removal of Estrogenic Activity During Conventional Wastewater Treatment *PI: **Quanrud**, Saez (UA); Propper, Vail, Ingram (NAU)	$54,408	$33,350	$87,758		Continues research from a 2007 AWI-funded project (#6) by using bench-scale methods to determine the effectiveness of specific unit sewage treatment processes to remove endocrine disrupting chemicals (EDCs) from treated wastewater. The project also supports continued development of a rapid immuno-based sensor to detect key estrogenic compounds.	Selected for Funding	Promotes safe and effective reuse of reclaimed water in Arizona by identifying the specific sewage treatment plant processes and operational methods that will most effectively remove EDCs from treated wastewater. The sensor, which has great commercialization potential, will make analysis of key estrogenic compounds simpler, faster, and cheaper.
14. A Best Practices Guide for Rural Water/Energy Usage in Arizona *PI: **S. Mead**, Schlinger, Auberle, J. Mead (NAU); Casavant (UA); Sejkora (AZ State Parks)	$50,000	$20,000	$70,000	Az State Parks	Develop a best practices guide for rural communities to conserve water, reduce energy usage, and minimize greenhouse gas emissions in the management and operation of their water and wastewater infrastructure.	Selected for Funding	Rural communities operating water treatment/distribution and wastewater collection/treatment systems generally do not have the personnel and expertise to help them "green" their infrastructure. The best practices guide from this project will fill that gap and benefit the communities from both economic and environmental standpoints.
15. Developing a Methodology for Identifying and Prioritizing At-Risk Water Resources for the Coconino Plateau ***PI: **Springer**, Stevens, Manone (NAU); Hogan (UA)	$27,652	$0	$27,652		The project will (1) convene a workshop of experts in scientific, cultural, historical, and water law fields to identify Coconino Plateau's most important hydrologic features, (2) compile existing information about "at-risk" water resources at these sites, (3) conduct site visits to fill in basic data gaps, and (4) develop a prioritization scheme and prioritize areas.	Selected for Funding	By identifying at-risk water sources on the Colorado Plateau, an opportunity exists to prioritize these sources for management and protection as needed. The methodology will be published and disseminated for use by other watershed groups throughout Arizona to ensure that at-risk water are properly identified and prioritized.
2008 Investment*	$683,382	$472,242	$1,155,624				

Total 2007 and 2008 Investment*	$1,486,881	$1,197,545	$2,684,426

Binational Institute for Water and Renewable Energy

Strategic Plan

FINAL – January 30, 2008

Background

In a Governors' Joint Statement signed on September 28, 2007, Arizona Governor Janet Napolitano and Sonora Governor Eduardo Bours Castelo recommended establishment of the Binational Institute for Water and Renewable Energy (i.e. the Binational Institute). Their joint statement presents a vision for the Binational Institute and establishes a target for "an action-oriented strategic plan" by January 1, 2008. This Strategic Plan document is intended to meet this requirement and put the Binational Institute on course to facilitate projects that will advance the economic competitiveness of the Arizona-Sonora region.

Vision

The Binational Institute is a collaborative regional initiative that is ambitious, focused, goal-oriented and closely connected to the private sector, with the aim of creating an economic advantage for the region through the wise use of research.

Goal

The Binational Institute will be a performance-driven public-private partnership that connects the research communities of all three Arizona universities with their counterparts in Sonora to inspire the region's best research minds to focus on our biggest challenges: our water resources, energy requirements, and the technologies needed to sustain them in the region.

Mission

To engage universities and research centers, in partnership with the public and private sector interests, in addressing water and energy sustainability of the Arizona-Sonora Region.

Objectives

The Binational Institute will take a regional, applied, problem-solving approach that uses the best practices of all participants, and builds on existing organizations in both states. The Institute will also create a public-private partnership, enlisting industrial partners to create a competitive advantage for the region.

Guiding Principles

The Binational Institute will serve as convener and facilitator to promote broad-based collaboration among entities with an interest in the pursuit of economic development opportunities related to water and energy sustainability in Arizona and Sonora. The Binational Institute will be a visionary organization that fosters international partnerships among the private sector, the public sector and universities for the benefit of the Arizona-Sonora region. This innovative Arizona-Sonora partnership will ultimately pursue economic development opportunities on a global scale by exporting our region's technologies and expertise to other parts of the world with similar needs.

Coordination of Institute Activities and Projects

1. To encourage broad participation and appropriate representation in decision-making, the Binational Institute will operate on the basis of consensus.
2. The State Coordinators of the Binational Institute's activities within Arizona and Sonora are identified in the gubernatorial statement as the Arizona Water Institute (AWI) and the state of Sonora's Council for Science and Technology (Consejo Sonorense de Ciencia y Tecnología - COSCYT).
3. Each participating organization may also identify a coordinator who will serve as primary contact within their respective organization.
4. Contact information for the coordinators within the participating academic institutions is listed in Appendix A and will be updated as needed by informing the appropriate state coordinator.

Building the Public-Private Partnerships

1. To create the public-private partnerships that are needed for the Binational Institute's success and for advancement of our region as a whole, a close working relationship must be developed with potential partners in Arizona and Sonora.
2. Collaborative efforts will be pursued with academia, water and energy-focused utilities, water and energy research organizations, funding institutions such as Science Foundation Arizona (SFAz) and Mexico's National Council for Science and Technology (CONACYT), appropriate governmental agencies, representatives of the Arizona-Mexico Commission (AMC) and the Comisión Sonora-Arizona (CSA) and others that may help advance the Binational Institute's goals and objectives.
3. The Binational Institute will convene potential partners before the end of February, 2008 to explore areas of collaboration, jointly propose an integrated and focused research agenda, and identify "Proof of Concept" projects that can realistically be completed by May 30, 2009.
4. To perpetuate these innovative partnerships and their broad benefits, the Binational Institute will require stable financial support that is currently absent. Such funding is necessary to perform swift, timely and complementary research on both sides of the border and thereby poise our region to capitalize on windows of opportunity. Arizona and Sonora's assurance of future investment in the Binational Institute is vital to build and nurture the new multi-faceted partnerships that will emerge during its initial "proof of concept" phase.

Timeline

This Strategic Plan has been designed to provide guidance during a "Proof of Concept" phase that spans the period January 1, 2008 through August 30, 2009. During this period, the Binational Institute will convene parties interested in binational collaboration regarding water and renewable energy in an attempt to pro-actively identify projects that can reasonably be completed in this time frame. The Binational Institute will also continue to serve as convener and facilitator in planning future activities and ensuring that opportunities to work collaboratively continue to be developed.

Strategic Timeline	
Deadline	**Deliverable**
January 1, 2008	Submit Strategic Plan.
February 29, 2008	Explore project concepts and funding mechanisms with Public-Private Partners including the chairs of the Arizona-Mexico Commission Water Committee.
May 30, 2008	Approve one to three "proof-of-concept" projects for further development and/or implementation.
June 30, 2008	Present selected project(s) to the Arizona-Mexico Commission Water Committee at the Summer Plenary Session.
May 30, 2009	Complete the Binational Institute's "proof-of-concept" project.s
June 30, 2009	Summary report or briefing for the Governors in coordination with the Arizona-Mexico Commission Water Committee. Determine if the Strategic Plan should be updated.
August 30, 2009	Complete the Strategic Plan update and implement suggested changes as necessary.

Project Focus

The Binational Institute will serve the Arizona-Sonora Region by helping to coordinate and integrate applied research efforts that are aligned with real-world goals and thereby promote synergy among otherwise independent efforts implemented throughout the region.

The project focus for the initial "Proof of Concept" phase will be discussed with potential partners. To promote an action-oriented agenda, the Binational Institute recommends that the discussion consider project concepts that encompass all of the following criteria:

1) Nexus between water and renewable energy
2) Enhancing coordination of water management between Arizona and Sonora
3) Exploring the development of renewable energy in the Arizona-Sonora region

"Proof of Concept" Projects - Development, Selection and Implementation

1. The Binational Institute will organize a binational workshop in Phoenix during February of 2008 to identify initial "proof-of-concept" projects that will be advanced for implementation or further development.

2. The workshop will bring together the appropriate research community from Arizona and Sonora, private sector interests, potential funding organizations and others that may help advance the Binational Institute's goals and objectives.

3. The "proof of concept" projects that are ultimately selected for implementation under auspices of the Binational Institute are to be completed by May 30, 2009.

4. To achieve a focused and goal-oriented approach during its initial phase of operation, the Binational Institute expects to limit the number of initial projects implemented to no more than three "proof-of-concept" projects. The binational workshop will be structured to facilitate this objective.

5. Project proposals may also be submitted to the Binational Institute for consideration on an ongoing basis. Since the Binational Institute does not have funding to support any proposals, submitters are encouraged to identify the fund sources they anticipate using.

6. A project review committee will be established with an equal number of representatives from Arizona and Sonora. The primary responsibilities of the project review committee will be to:

    a. Review and evaluate collaborative proposals that may be implemented under auspices of the Binational Institute.
    b. Provide advice and guidance to promote synergies and enhance project viability.

7. The review committee for the initial "Proof of Concept" projects will be comprised of one representative from each of the following organizations:

    a. Arizona Water Institute
    b. Consejo Sonorense de Ciencia y Tecnología (COSCYT)
    c. Arizona-Mexico Commission Water Committee – Arizona representative
    d. Comité del Agua de la Comisión Sonora-Arizona – Sonora representative

8. It is recommended that projects include collaboration with at least one public or private sector entity from Arizona and/or Sonora. Projects implemented under the auspices of the Binational Institute must also include research collaborators from both Arizona and Sonora. These binational research teams may be comprised of academic representatives and/or public-private partners.

9. The Binational Institute will support research investigators from participating institutions who are pursuing funding by preparing letters of support as appropriate. Letters of support or other written positions will be sent in the form of a Joint Communication from the Binational Institute's State Coordinators and consequently, will only be developed if there is agreement between the two State Coordinators.

10. As needed, the project review committee or the state coordinators may request input or support from ad-hoc technical advisors within the university system, the public sector or the private sector.

11. All organizations that financially support the Binational Institute's projects will be provided with quarterly progress reports throughout project implementation and will receive a final report within 30 days after the project is complete.

12. The state coordinators will provide regular updates to the coordinators for the participating organizations listed in Attachment A to ensure that activities of the Binational Institute are clearly communicated.

Appendix A

Binational Institute for Water and Renewable Energy

- - - Contact Information for Coordinators - - -

Binational Institute for Water and Renewable Energy - - - Coordinators - - -			
Organization	**Coordinators (Primary/Secondary)**	**Phone Number**	**E-Mail Address**
Arizona Water Institute (AWI) **- State of Arizona Coordinator -**	Plácido dos Santos (P) Kathy Jacobs (S)	602-771-8551 / 520-289-0320 520-626-5627	pdossantos@azwater.gov kjacobs@azwaterinstitute.org
Consejo Sonorense de Ciencia y Tecnología de Sonora (COSCYT – represented by the State of Sonora's Secretariat of Economy) **- State of Sonora Coordinator -**	Geovani Ciscomani (P) Franciso Díaz Brown (S)	011-52-662-259-6115 011-52-662-213-8500	gciscomani@economiasonora.gob.mx secretario@economiasonora.gob.mx
Arizona State University (ASU)	Rick VanSchoik	480-965-1846	douglas.vanschoik@asu.edu
Instituto Tecnológico de Sonora (ITSON)	Jaime Garatuza	011-52-644-410-0900 Ext 2100	garatuza@itson.edu.mx
Instituto Tecnológico de Estudios Superiores de Monterrey (ITESM)	Pablo de la Peña	011- 52-662-259-1000 Ext 2201	ppenia@itesm.mx
Centro de Investigación en Alimentación y Desarrollo (CIAD)	Luís Nuñez (P) Pablo Wong (S)	011-52-662-289-2400 Ext 379	luisn@ciad.mx pwong@ciad.mx
Colegio de Sonora (COLSON)	José Luís Moreno		jmoreno@colson.edu.mx
Northern Arizona University (NAU)	Rand Decker	928-523-6083	rand.decker@nau.edu
Universidad de Sonora (UNISON)	Pedro Ortega (P) Chris Watts (S)	011-52-662-259-2108	portega@guaymas.uson.mx watts@fisica.uson.mx
University of Arizona (UA)	Francisco Marmolejo (P) José Lever (S)	520-621-9080 / 520-621-7761 011-52-55-5566-8251	fmarmole@email.arizona.edu jlever@email.arizona.edu

Attachment 3

Group	Last Name	First Name	Organization	Address	City	State	Zip	Phone	Fax	E-mail address	Alternate Information
Executive committee											
	Guenther	Herb	Arizona Department of Water Resources	3550 N Central Avenue, 4th floor	Phoenix	AZ	85012-2105	602-771-8426	602-771-8681	hrguenther@azwater.gov	
	Huenneke	Laura	Vice President for Research, NAU	PO Box 4087	Flagstaff	AZ	86011-4087	928-523-0388	928-523-1075	laura.huenneke@nau.edu	
	Shangraw	Rick	Vice President, Research and Economic Affairs, ASU	PO Box 877205	Tempe	AZ	85287-7205	480-965-1225	480-965-8293	rick.shangraw@asu.edu	
	Megdal	Sharon	Water Resources Research Center, UA	PO Box 210437	Tucson	AZ	85721-0437	520-792-9591 x21	520-792-8518	smegdal@ag.arizona.edu	
	Renfro	Darcy	Office of the Governor	1700 W. Washington Street, 8th floor	Phoenix	AZ	85007	602-542-1455	602-542-7601	drenfro@az.gov	
	Sullivan	John	Salt River Project	1521 N. Project Drive, MS PAB232	Tempe	AZ	85281	602-236-5812	602-683-0963	jfsulliv@srpnet.com	
Executive Director											
	Jacobs	Kathy	Arizona Water Institute	PO Box 210158B	Tucson	AZ	85721-0158	520-626-5627	520-626-7770	kjacobs@azwaterinstitute.org	
Associate Directors											
	dos Santos	Placido	Arizona Department of Water Resources	3550 N Central Avenue, 4th floor	Phoenix	AZ	85012-2105	602-771-8551	602-771-8681	pdossantos@azwater.gov	
	Graf	Chuck	Arizona Department of Environmental Quality	1110 W. Washington St.	Phoenix	AZ	85007	602-771-4661	602-207-4834	cgg@azwaterinstitute.org	
ACTING	Watson	Sandra	Arizona Department of Commerce	1700 W. Washington Street, Ste 600	Phoenix	AZ	85007	602-771-1215	602-771-1209	sandraw@azcommerce.com	
Deputy & Campus Coordinators											
Deputy Coordinator	Gremillion	Paul	Dept of Civil & Environmental Engineering, NAU	PO Box 15600	Flagstaff	AZ	86011-5600	928-523-5382	928-523-2300	paul.gremillion@nau.edu	
	Holway	Jim	Global Institute of Sustainability, ASU	PO Box 873211	Tempe	AZ	85287-3211	480-965-5414	480-965-8087	jim.holway@asu.edu	
	Spitz	Anna	Arizona Water Institute, UA	PO Box 210158B	Tucson	AZ	85721-0158	520-626-3892	520-626-7770	aspitz@hwr.arizona.edu	
SR Coordinator	Springer	Abe	Department of Geology, NAU	PO Box 4099	Flagstaff	AZ	86011-4099	928-523-7198	928-523-9220	abe.springer@nau.edu	
External Advisory Board Members											
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GREEN COLUMN

Water consortium promotes innovation

This article is one in a series of articles contributed by Arizona State University's Global Institute of Sustainability. The institute catalyzes and advances interdisciplinary research and education on environmental, economic and social sustainability.

Kathy Jacobs
Special for The Republic

The Arizona Water Institute (AWI) is a consortium of Arizona's universities — Arizona State University, the University of Arizona, and Northern Arizona — focused on water sustainability through research, education, capacity building and technology development.

Created through a partnership between Intel, the Salt River Project, the governor's office and the three universities, AWI harnesses the expertise of over 400 faculty and staff within these universities to seek "real-world" solutions to water issues. Improved access to water information, technology transfer to water-related industries, and technical support for local governments, tribes and communities are a few of the ways AWI is helping create a sustainable water future for Arizona

AWI also partners with three state agencies—the Departments of Water Resources, Environmental Quality, and Commerce. These partnerships support agency needs for technical information related to water quality and water supply, and are sparking economic development and job creation.

Although AWI is not yet two years old, there are already 18 collaborative projects under way, with another 15 projects set to begin. The primary purpose of these projects is to directly support water managers in sustaining the quality and quantity of Arizona's water supply, but they also focus on technology development, energy and water solutions, and training a new generation of students through practical, interdisciplinary working experiences. AWI is also the Arizona coordinator for a new Arizona-Sonora Binational Institute for Water and Renewable Energy.

Collaborative research

AWI's projects include:

- Building the Web-based Arizona Hydrologic Information System to support decision-making. Partners include the Salt River Project and the Departments of Water Resources and Environmental Quality.
- Working with the Bureau of Reclamation on climate prediction to manage the Lower Colorado River.
- Helping the Navajo Nation construct a climate-observation network so it can better manage its water supplies and improve its drought-management plans.
- Developing real-time sensors to protect drinking water by detecting the presence of contaminants and identifying treatment technologies.

Recently funded projects include:

- Using reclaimed wastewater to produce algae that can be grown in a desert setting for high-energy biofuel production, while improving water quality by removing dissolved solids, in partnership with the City of Phoenix.
- Working with the Agri-Business Council to develop future agricultural scenarios and their implications for water-management.
- Characterizing growth, as well as energy and water sustainability, for the border region under alternative economic and climate scenarios.
- Testing methods for increasing water recovery during reverse osmosis treatment of Central Arizona Project water, in partnership with Tucson water utilities and the Bureau of Reclamation.

Funding AWI

The state's general fund supports AWI through a small appropriation, and the universities provide additional financial support. We are seeking to expand its operations through federal grants, foundation support, private donations, sponsorships from utilities and government agencies and project partnerships.

Although there is much in-state controversy about the sustainability of our water supplies, Arizona is known worldwide for innovative water management.

As it expands, AWI will capitalize on the contributions of the state's water managers and further enhance water sustainability in Arizona.

Kathy Jacobs is the executive director of the Arizona Water Institute (www.azwaterinstitute.org).