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In recent years there has been unparalleled concern for the great numbers of people who lack access to clean water and sanitation – 1 billion to 2.5 billion, by some accounts. Water professionals, students, and others have answered the call by working or volunteering for organizations that seek to alleviate the suffering caused by dirty water and poor sanitation. The term 'hydrophilanthropy' was coined to describe these humanitarian activities, and this IMPACT issue explores some of the facets of hydrophilanthropy, including questions about the efficacy of these endeavors and controversy over the use and meaning of the term itself.

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The topic was hydrophilanthropy and now it was the audience’s turn. I was a moderator at a recent conference plenary session on that subject, with three excellent speakers having presented various aspects of the topic. In the question and answer period, it became obvious that several of the audience members thought that the term “hydrophilanthropy” had negative connotations, which led to an interesting discussion on the meaning of the word.

First, let me offer a confession. You won’t find the word hydrophilanthropy in any current dictionary I know of. I invented the term hydrophilanthropy several years ago to describe colleagues I admire who donate their time, money, and inspiration to projects that improve the world’s sustainable clean water supply. Since that time, I have heard many definitions of the word. Some definitions use it to describe people ensuring a water supply primarily for immediate human use, while some meanings include providing sustainable water for ecosystems. Many characterizations speak of considerations for clean water and sanitation, and often interpretations of the word focus on addressing challenges in developing nations. I’ve found that the explanations of what a “hydrophilanthropist” does vary with the background and experience of the one explaining. Some explanations focus on the practical, efficacious development, and preservation of water supplies, while others describe a more general, attitudinal deportment of people engaged in humanitarian efforts, particularly those associated with the succease of thirst, waterborne disease, pain, and poverty. And those are only some of the positive connotations offered in various definitions – the participants at the conference had several negative and limiting definitions as well.

When I think of the many definitions and perceptions of hydrophilanthropy thrown around in the plenary session, I’m reminded of the Indian parable of the blind men (or alternatively men in the dark) and the elephant. In the story, each man feels a different part of an elephant and is asked to describe it. Of course, each describes it in a totally different fashion. The story has a great history and appears in many different places and cultures, such as in the Jainist Syadvada (Anekantvad or the theory of Manifold Predictions), the Buddhist Udana, in Sufi Muslim scholarship such as the works of the Persian poet Sanai of Ghazni, Afghanistan (The Walled Garden of Truth) and the 13th Century Persian poet Rumi (Masnavi), in writings of the Hindu scholar Ramakrishna Paramahamsa, and in the parable’s retelling by 19th Century American Poet John Godfrey Saxe (Wikipedia, 2010). This story of the elephant and the blind men is meant to discourage dogmatism, show the limits of individual perception, promote living in harmony with those of different belief systems, and illustrate that the truth can be stated in dissimilar and even contradictory ways.

Yet another conference participant argued that paid employment is essential to human nature and satisfaction, that hydrophilanthropy implied unpaid donation of time, money, and or effort. The part of the hydrophilanthropic elephant that this blind person grasped was that employment is an underpinning of human self-worth, and sustainable water projects, particularly in impoverished regions, demand formal employment which promotes community involvement. Wasn’t it Ralph Waldo Emerson (2002) who said, “The crowning fortune of a

I propose a flexible, open minded approach to the description of hydrophilanthropy and its attributes, a definition that includes many diverse activities and practitioners who advance the sustainability of clean water in the world.
The Meaning of Hydrophilanthropy . . . cont’d.

man is to be born to some pursuit which finds him employment and happiness, whether it be to make baskets, or broad swords, or canals, or statues, or songs?” A contrary blind man in the audience said his experience was that communities didn’t necessarily need paid employment to assume serious stakeholder responsibility and participation. And so the debate went on.

As the discussion continued, I thought that maybe it wasn’t necessary to have an exacting definition of hydrophilanthropy. Although many people know the parable of how the elephant feels to the blind men, I believe few know of its corollary, how the blind men feel to the elephant. Squishy and malleable, I thought. Perhaps it’s the pliable, varied perceptions and selective experience of the impressionable blind men and women in the audience that give each person their own definition. It was important to know why people (soft blind men like you and me) might have negative impressions of “hydrophilanthropy,” a term that actually should be as defendable as motherhood and apple pie. Maybe some past hydrophilanthropic projects were carried out in ill-advised ways, were fraught with corruption, fomented division and unrest in communities, and ignored the experience of professionals in the field. These rough appendages and surfaces of the hydrophilanthropic elephant are not its most attractive features, but they do exist.

New well in Cameroon, installed by local people and University of Nevada student group SAIWI (Student Association for International Water Issues) (Photo courtesy of Cathy Fitzgerald, 2009).

So what is the nature of hydrophilanthropy and how to best describe our elephant? What questions, spoken and unspoken buzzed in the audience during the conference plenary session? The first question was obvious. Is there a potential for great good coming from those who attempt to improve the world water situation? Certainly. Okay then, societal benefit is an intention of those who undertake hydrophilanthropy. However, could well it be made that someone who dedicates their life to increasing clean water supply for those in need, is a hydrophilanthropist, regardless of the terms or motivation. Lastly, for the academics in the audience, what is the line between describing something as research and/or hydrophilanthropy, if your project involves some of both? Is hydrophilanthropy a dirty word for academics that are primarily judged by peers and administrators on their research productivity?

I propose a flexible, open-minded approach to the description of hydrophilanthropy and its attributes, a definition that includes many diverse activities and practitioners who advance the sustainability of clean water in the world. If you’ll pardon the circus pun, this puts the hydrophilanthropic elephant under a big, inclusive tent. Water security and development are often integrated with education, health, and societal functions, so they are naturally interdisciplinary endeavors. Clean water development can be a Rosetta Stone to help solve the hieroglyphics of many community challenges, and hydrophilanthropists of all descriptions can, and do, lead the charge. There are many examples of how professional and academic groups have risen to this challenge. For instance, several groups, such as the Canadian CARA network, build capacity by increasing the number of educated water professionals around the world. There are many professional organizations like the U.S. Chapter of the International Association of Hydrogeologists, the American Water Resources Association, and the National Ground Water Association that provide grants and/or sponsor overseas individuals to become members and receive benefits like professional publications. Other non-governmental organizations, for example Rotary Club International, and the Ann Cameron Judge Foundation, directly sponsor water projects. Student and faculty groups in academia have scholarly exchanges of all sorts, do collaborative research, assist capacity building, and are increasingly carrying on water sustainability projects overseas.

As a blind man who has roamed around different parts of the elephant, I don’t claim to know what hydrophilanthropy is, nor do I believe an exacting definition is really crucial. My experience has given me a glimpse of what it is about, and I’m grateful for that. I have had the
opportunity to give lectures at overseas universities and government agencies, and to offer advice on water projects in parts of the world that are struggling economically. With students and community members, I have had the opportunity to put in wells in rural African communities. The camaraderie and enthusiasm of the professionals, faculty, students, and community members on these projects has been inspiring, and it has always been a transformative experience. My personal dabbling and exploring ways to help alleviate world water woes probably makes me a more of a hydrophilanderer than a hydrophilanthropist, but I’ve had a rewarding glimpse.

So, what is the meaning of the term hydrophilanthropy? In this short article, aside from avoiding numerous potential elephant jokes (I hope you are grateful!), to my great satisfaction I also have not attempted to offer a single, exact definition or be explicit about its meaning. Many people are trying to improve the world condition in their own way – I hope that you are too, reader. So what is hydrophilanthropy? If you are a water scientist or engineer, a public health professional, a water policy researcher or academician, I don’t have to tell you. You probably have your own definition. If you are a person who cares about sustainable clean water in the world, I don’t have to be explicit. You may be living your own definition. I encourage you to find out, or continue to find out what hydrophilanthropy is, in your own way. Grasp the elephant and tell me what you think. And watch out for the elephant’s rougher bits.

REFERENCES

Dr. David K. Kreamer
Professor, Department of Geoscience University of Nevada, Las Vegas
4505 S. Maryland Parkway Las Vegas, NV  89154-4010
(702) 895-3553 / Fax: (702) 895-4064
dave.kreamer@unlv.edu
http://geoscience.unlv.edu/ davidkkreamer.htm

Dr. David K. Kreamer is a Professor of Geoscience and past Director, Water Resources Mgmt. at the Univ. of Nevada, Las Vegas. His research includes environmental contamination, spring sustainability, and clean water supply in developing nations. He has given over 150 invited lectures, seminars, and workshops including those for the U.S. Environmental Protection Agency, Bureau of Land Mgmt., the National Ground Water Association, over 40 universities, more than 30 state agencies, and has lectured worldwide.
HYDROPHILANTHROPY AND EXPERIENTIAL LEARNING IN HONDURAS
Michael E. Campana

REVELATION

It was not a dark and stormy night but rather a hot and sticky one. In January 2001, I traveled to northwestern Honduras (Puerto Cortés area) with colleague Loring Green to investigate a potential Lifewater International project, but after just two days it was apparent that the proposed work was not within our repertoire. With five days left before departure, Rolando López, our Catracho (slang for Honduran person) escort who had requested Lifewater's assistance, filled our time with visits to other potential Lifewater projects, none of which turned out to be feasible.

The morning before our departure we hiked for an hour or so into the Sierra de Omoa, a rugged mountain range that trends SW-NE parallel to Honduras’ northwestern coast from the Guatemalan border east to the Puerto Cortés area. Rolando wanted us to see a community water project being implemented by a friend, Alex Uriel del Cid. This was my last full day in Honduras, perhaps forever, and Rolando was certain I would enjoy what I was about to see. He was right.

Upon reaching the village of Miramar, Rolando, Loring, and I observed Alex instructing the villagers how to organize a junta de agua (water committee) that would maintain and operate the water system, collect revenue, shut off delinquent users, and plan for expansion. Alex had the villagers’ rapt attention. He held my attention too, even though I barely understood the Spanish he spoke. His charisma was evident to all those who came in contact with him.

When Alex was finished he came over and Rolando introduced us. Alex explained that his approach was the same in each village. The villagers first had to establish a junta de agua (water committee) that would maintain and operate the water system, collect revenue, shut delinquent users, and plan for expansion. Alex had the villagers’ rapt attention. He held my attention too, even though I barely understood the Spanish he spoke. His charisma was evident to all those who came in contact with him.

I realized my students and I could learn much by working with Alex and the villagers. I had been doing hydropathanthropy for several years and was starting to introduce it to my students. With Loring, Rolando, and Alex standing around, something came over me and I said to no one in particular, “I’d love to bring my students here to work with Alex this summer.” Rolando immediately translated this into Spanish, and a big smile spread across Alex’s face.

I should add that I had made no mention of bringing students down here for hydropathanthropic work. At the time I directed the University of New Mexico’s (UNM) Water Resources Program (WRP) (http://www.unm.edu/~wrp/) and its Master of Water Resources (MWR) degree, and had occasionally thought about taking students to developing countries but had usually dismissed it as being far too much trouble. In fact, at the Houston airport while I awaited the flight to San Pedro Sula, standing amongst the legions of red and yellow-shirted aid and mission workers, I noticed a college professor escorting his students to Honduras and thought to myself, “That guy has to be crazy.” Little did I know that his affliction was contagious.

We would be partnering with the Honduran national water authority SANAA (Servicio Autónomo Nacional de Acueductos y Alcantarillados) (http://www.sanaa.hn), which would provide the pipe for the water system and certify that the system design and operation met its standards. SANAA would require all parties to sign an agreement defining the responsibilities of each. I would sign the agreement on behalf of UNM, although I was unsure exactly what I was committing UNM, but I recalled the aphorism, “It’s easier to ask forgiveness than permission.” SANAA’s main responsibility was to provide support for completed systems, primarily through its circuit rider program, whereby a trained worker would periodically visit each village to assist villagers in maintaining their system. I returned home favorably impressed with SANAA’s approach and felt confident that sustainability would be ensured.

After I made the decision to implement this course, I specifically remember thinking to myself as I flow back to the USA, “This will either be the dumbest thing I’ve ever done or the smartest thing.” Fortunately, thanks to luck and some truly remarkable students and Catrachos, it turned out to be the latter.

REALITY

And so it had been decided: we would work with Alex in Miramar, a community of several hundred residents. The UNM MWR graduate students and instructors would live in the village, in the vacant old schoolhouse, and pay some of the villagers to cook for us. We would be in-country about ten days.

Thus began trips to Honduran villages each June from 2001 through 2005. Graduate students from the MWR program would spend their required capstone field course helping to build water and sanitation systems in Honduran villages and would complete a joint project.

Since the trips were part of a required course I raised all funds to pay for the trips, about $115,000 for 74 person-trips over five years. For each year except the last, Dr. Michele Minnis, one of the WRP’s instructors, would serve as co-instructor. Sixty-five students participated.
We prepared the students for the different culture they would encounter, and cautioned them against the ‘ugly American’ syndrome. We educated them on the history, government, culture, economics, and sociology of Honduras. The concept of hydrophilanthropy was also introduced. Books such as Alvarado (1989), Schulz and Schulz (1994), and Donahue and Johnston (1998) were very useful. Personal safety was discussed. We also provided each with a popular tourist guide (Moon Handbook) to Honduras.

Course materials became more sophisticated with time. By the 2003 trip I had prepared a packet of materials derived mainly from Lifewater International (reissues of USAID technical documents http://www.lifewater.org), the journal Waterlines (http://practicalaction.org/?id=waterlines), Davis and Lambert (2002), and Jordan (1980). This packet covered WaSH (water, sanitation, and hygiene) issues as well as gender, governance, and other issues.

Each year we worked in a different village in the same general area. After the 2001 trip we split the students into two groups and had them work sequentially (i.e., one group went down to work for ten days, then the other group would go down and the first group would return home). The two groups would overlap in-country for about three days, which we spent at Copán Ruinas, the resort town near the Mayan ruins of Copán near the Guatemalan border. We gave the outgoing students time to unwind, clean up, and visit with the incoming students, who received a briefing from them. It also promoted bonding among the students.

Later course projects were better defined than the early ones. We generally left it to the students to decide for themselves (with our approval) the nature of the project. We selected two students who would serve as project leaders/report editors and lead the students in identifying a project. To the extent possible, the decision on the nature of the project was made before the trip, although flexibility was permitted because of the changing situations in-country. Projects dealt with such things as source water protection plans, education and outreach programs, and watershed management plans. One student even created an ingenious Spanish language board game to teach children about environmental stewardship. For more details on the trips and the course see Campana (2010).

RECOLLECTION

The trips generated a lot of buzz. Even before the first trip I received inquiries from non-MWR students as to whether they could join the trip. In a few cases, parents called me seeking to send their high-school age children on the trips. In two of these cases it was apparent to me that the parents wanted these trips to ‘straighten their kid out’ and expected me to assume the role of boot-camp drill instructor. Needless to say, I declined such requests, even foregoing a large donation in one instance.

Many of the 65 students underwent a transformative experience, as manifested by joining Peace Corps – working with faith-based and secular NGOs, and doing WaSH work in developing countries.
Hydrophilanthropy and Experiential Learning in Honduras . . . cont’d.

No student ever asked to opt out of the course. It was a required course, but had a student expressed real reservations about the trip I would have made other arrangements. During pre-trip orientation I stressed to the students that anyone with safety, health concerns, or health conditions should not take the trip. Safety was not a real concern; the villagers had a very protective attitude toward all of us. When I asked one campesino why he was bringing a rifle to a swimming hole, he replied, “Jaguar.” I later learned that he was concerned about banditos. To my knowledge, that was the only such incident in five trips.

The trips were discontinued after 2005 because I left UNM for Oregon State University. However, had I remained at UNM, I likely would have suspended the trips for several years to rethink my approach (Campana 2010).

The UNM trips to Honduras were very popular. They generated a lot of favorable publicity for UNM and the MWR degree program. The now defunct Albuquerque afternoon paper, The Tribune, featured a story titled “Benevolent Voyagers” in the local news section. Dedicated students sought to matriculate to work in developing countries. With respect to the latter, I designed a track in the MWR curriculum for those interested in focusing on developing countries. I left UNM before I implemented it.

I gradually introduced the concept of hydrophilanthropy into the MWR curriculum, using various opportunities to discuss this type of work. Articles and book chapters dealing with work in developing countries were also featured not only in my courses but also in the MWR introductory core course and the field course.

The fact that the students and instructors knew each other fairly well was a definite strong point. The students had also been through a number of courses with each other. I often wondered how the trips would have unfolded had the students been self-selected and I had not been familiar with them.

REFLECTION

With few exceptions, those who took the course had positive comments on what they did and learned. Of the 65 students, only one had a negative experience; it just was not her “cup of tea.”

For me, the course was a wonderful and transformative experience. What I enjoyed the most was seeing students rising to the occasion without complaint when conditions dictated an increased level of effort. The ingenuity and industriousness of the students were sources of inspiration to me. The fact that we all lived together in the village enabled us to know each other and the villagers.

But once the euphoria dissipated, reality arrived. Were the trips ‘feel-good’ or ‘do-gooder’ trips (or perceived as such) in which the gringos benefited far more than the villagers and implemented unsustainable projects (see articles by Christine Casey Matute and Stephanie J. Moore; and Breslin, 2010)? Did the projects impart some lasting benefits to the recipients? Did we do enough to build capacity? Is it sufficient that the donors benefited?

These and other questions must be addressed before initiating future trips and projects.

After I made the decision to implement this course, I specifically remember thinking to myself as I flew back to the USA, “This will either be the dumbest thing I have ever done or the smartest thing.” Fortunately, thanks to luck and some truly remarkable students and Catrachos, it turned out to be the latter. In my 17 years at UNM the course trips and the students who took them constitute my fondest memories and what I miss the most about UNM. I am grateful, for they have revealed much and left me with many things to ponder.

REFERENCES


AUTHOR LINK

Michael E. Campana
Department of Geosciences
104 Wilkinson Hall
Oregon State University
Corvallis, OR 97331-5506
(541) 602-4085; Fax: (541) 753-4015

e-mail
aquadoc@oregonstate.edu

WEBSITES
http://aquadoc.typepad.com/waterwired
http://twitter.com/waterwired

Dr. Michael E. Campana is Professor of Geosciences and former director of the Institute for Water and Watersheds at Oregon State University and Emeritus Professor of Hydrogeology at the University of New Mexico. He formerly taught at the University of Nevada-Reno, UC-Santa Cruz, and Georgia State University and worked at the Desert Research Institute. He is founder and president of the Ann Campana Judge Foundation, a 501(c)(3) hydrophilanthropy working in Central America. He is President-Elect of AWRA and former chair of NGWA’s Scientists & Engineers Division. He is a former Fulbright Scholar to Belize. He runs the WaterWired blog and Twitter. His Spanish still has a long way to go. (Photos courtesy of Michael E. Campana).
Guía Para La Vida (APLV) (http://www.aplv.org) is one of many NGOs intent upon helping the rural population of developing countries handle the problem, both old and urgent, of access to unpolluted water. APLV has been working for 24 years in the Central American country of Nicaragua but since 1995 it has adopted a point of view which, while perhaps not unique, is worth presenting because it leads to a development model that is far from the usual ones.

APLV, which considers access by all people to clean water as a basic (albeit massively denied) right, recognizes that material, technical, and administrative help cannot be expected to come to poor countries from abroad forever. An important element in shortening the time required for poor rural populations to be supplied with decent drinking water is to maximize the contribution that the local population itself can make to this development. The end goal is in fact to ensure that the development units created in the developing countries become autonomous.

It is widely understood that in rural settings the bulk of the manual labor required to build water systems must and does come from the benefiting population. But many of these water systems require technical knowledge. That knowledge might in principle be provided by local engineers but they are costly, too few, and in any case, the planning, design, and building supervision needed for these village systems turns out to require a mix of technical training and familiarity with campesino (i.e., rural) life.

So 15 years ago APLV bet that selected youngsters with campesino backgrounds could be trained to master the techniques required to select, design, procure, budget, and supervise the construction of village water systems even when these systems involve technically advanced features. This was the beginning of our special technical school, ETAP (Escuela Técnica de Agua Potable, or Potable Water Technical School: http://es.aplv.org/node/100). This is a work-study school in the sense that all the ETAP students are also given important responsibilities within the field water projects that are designed and executed by APLV. It is located in Rio Blanco, in the Department of Matagalpa.

The training must squarely acknowledge the reality of public rural education in the primary and secondary schools of impoverished countries: a very elementary academic level is the rule.

As a result, the training period needs be fairly long (2.5 to 3 years), and much individual attention needs be allowed for (small classes). Students spend approximately 40% of their instructional time in the field and 60% in the classroom. APLV technicians often serve as field instructors and the school is directed by, and most of the classroom teaching done by, volunteer engineers from abroad. Students acquire the mathematical and engineering facility necessary to do technical work on water systems, and graduate with a fully-accredited "Bachelor" degree, similar to an honors technical high school degree in Nicaragua, with the title of "Hydraulic Technician." A syllabus (Spanish only) and more detailed school information (English and Spanish) can be downloaded from http://bit.ly/cHx8Wa.

Given the proficiency of the entering students, tools for the transfer of technological proficiency must be thought anew. Here the role of the computer is decisive: while the young technicians-to-be will almost always remain slow at mathematical manipulations they are almost invariably adept at the use of computer programs so that the necessary bridge to that proficiency is the creation of special computer programs which, from the point of view of the user, short circuits involved mathematical or physical developments.

Can the value of ETAP be assessed objectively? We believe that the answer is clearly "Yes"

The creation of such programs and their assimilation by ETAP students is one of the specialties of Agua Para La Vida and ETAP and naturally these programs become the preferred tools of our project designers who are invariably graduates of ETAP. Throughout the course of study at ETAP, the principles on which the programs are based and elementary examples of their application are presented in parallel with the computer programs.

There are of course other areas of training (reinforced concrete construction, general hydraulics, topography and map making, procurement and logistics, elements of accounting and budget making, report writing etc.) that are handled by more conventional means.

The most widely used APLV programs are briefly described below.

**NeatWork** is a distribution network tool specifically designed for gravity systems serving typical rural conditions and minimizing material cost. This set of two integrated programs first proposes to the technician a design based and elementary examples of their application that is statistically optimized. The second part of the program is a simulator that rapidly compiles the flow rates (according to the proposed design or any other criterion) at all the outlets under a very large set of alternate realistic scenarios and provides the statistics of the performance of each outlet. This allows the operator to gauge the design and to modify it if it fails some of the constraints placed on it performance.

**Air In Pipes** is a conduction line design tool that automatically prescribes the diameters, gauge, and order of placement of the pipes as well as the precise location of
automatic air release valves that are strictly necessary to evacuate air blocks. This program also provides a design with minimum material cost.

Abridge is a suspension pipe bridge dimensioning program that automates the bridge design.

These programs not only facilitate the training of competent technicians but also allow a much higher level of performance for the water systems by combining strict conformity with the required performance with minimum material cost.

Whenever these programs have been thoroughly tested in the field, they are made freely available to one and all either by direct access from the APLV website (http://aplv.org/technical_resources) or through request by mail (aplv@aplv.org). This is the first way by which APLV facilitates the duplication of centers of development of potable water systems.

Now, while the number of ETAP graduates is limited, it exceeds the needs of Agua Para La Vida itself, so that some of these graduates are available to local NGOs engaged in similar development and to other organizations (e.g., government agencies) that undertake their own water projects. This is a second way by which APLV facilitates the multiplication of poles of water development expertise.

Can the value of ETAP be assessed objectively? We believe that the answer is clearly “Yes.” We have repeatedly handed over to fresh ETAP graduates, both men and women, the full responsibility of a new water project from feasibility assessment to completion and performance evaluation and we have found that these graduates needed very little advice from our more experienced technicians.

So ETAP works. It is relatively expensive because it handles only a few students (generally eight or so) at a time and because it admits candidates on the basis of their ability and dedication, regardless of their means, which are almost always nil. It makes it possible for these students to remain in school for the required prolonged stay by providing them with free tuition, room, and board unless they are sponsored.

ETAP needs and deserves your support as a pioneering experiment in technology transfer and in-country capacity building. It is a model worth emulating.

Dr. Gilles Corcos was for many years a professor of engineering at the University of California, Berkeley, and is currently Emeritus Professor of Engineering at the University of California, Berkeley. While he has taught a large variety of engineering and geophysical subjects his specialty and the focus of most of his publications is fluid mechanics, both theoretical and experimental. He was co-founder and is still both Executive and Technical Director of Agua Para La Vida.

Have Questions About IMPACT?
Contact AWRA HQ
By Phone • (540) 687-8390
By Fax • (540) 687-8395
By E-Mail • info@awra.org
Check Out Our Home Page At
www.awra.org

Dr. Gilles Corcos
Emeritus Professor of Engineering
University of California, Berkeley
Co-founder, Agua Para La Vida
Bagin
38580 Allevard, France
Phone: (33) 4 76 45 19 36

E-MAIL gilcorc@gmail.com

WEBSITE http://www.aplv.org

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THE BUMP IN THE ROAD

Packed shoulder to shoulder with the three other students in the back of the Range Rover we had our host, Peter, as driver, and Deb, our faculty advisor, as co-pilot. We had just stopped to pick up a 2-stroke water well drill, drill pipe, and bits that we carefully packed with the suitcases on the roof rack. Filled with apprehension and excitement we were finally setting out to the small village of Matuu, 150 kilometers west of Nairobi, Kenya, where we would be living and working over the next two weeks. As we rounded the first corner there was a loud creeeeek … then POP! The roof rack had ripped off and was hanging precariously off to one side of the Range Rover with our suitcases and equipment teetering along with it. As Peter went in search of help, Scott, an environmental science student, began befriending the crowd of children that were starting to gather around. I heard a loud shriek and turned around only to see Scott racing down the road with about 20 kids whooping with laughter close behind. Needing to find a new mode of transportation, which would take several hours, we all had the opportunity to entertain and be entertained by the group of children, which had now doubled in size. This bump in the road would turn out to be the first of many roadblocks throughout our stay in Matuu, but like this incident, each challenge reminded us that we were far from the comforts of home and taught us lessons on patience and resourcefulness. Long after dark we finally pulled up to the mud hut that we would call home for the following few weeks while attempting to drill a groundwater well and install a rain catchment system. As we entered the hut, Peter’s family greeted us and our growling stomachs with steaming goat stew and jappatti. And so began our Kenyan experience.

THE PROBLEM

Water, health, and poverty are inextricably linked. The United Nations estimates that half the world’s population lives in conditions where lack of sanitation and access to clean water threaten their existence. Limited access to clean water results in an annual death rate of 3.3 million due to waterborne diarrheal diseases alone. In developing nations, women and girls can spend from three to eight hours daily collecting water. Health problems and long hours devoted to collecting water both impinge upon economic investments, which prolong cycles of poverty.

As we are students, our main focus is educating and providing communities with the tools and resources to manage their water resources equitably and effectively.

SAIWIs APPROACH TO PROVIDE ACCESS TO CLEAN WATER

In response to the need for improved potable water supplies, students in the Hydrologic Sciences Graduate Program at the University of Nevada, Reno (UNR), created the Student Association for International Water Issues (SAIWI) (http://www.saiwi.org) in the fall of 2000. Dedicated to increasing access to clean drinking water and improved sanitation services throughout the developing world, SAIWI works on a local, village-to-village level to implement sustainable water projects that educate and empower communities and expand the global perspectives of our student volunteers. Over the last ten years, the student run club has grown to include both undergraduate and graduate students from a diverse array of disciplines. SAIWI’s members work hard to research, organize, and raise the necessary funds to travel to developing countries to fulfill SAIWI’s mission. In Reno, SAIWI volunteers organize educational talks, film showings, and panel discussions addressing local and global water concerns.

SAIWI students have completed 17 small scale water development projects in Haiti, Chile, Ghana, Panama, Bolivia, Uganda, Cameroon, Guatemala, Kenya, and the Navajo Nation. These projects have incorporated drilling and maintenance of water wells, geophysical resistivity surveying for future well placement, gravity fed water distribution system construction, water quality testing, sedimentation pond construction, pit latrine excavation, community wide organic gardening implementation, hygiene education workshops, and rainwater catchment system installation. Our projects focus on using local materials and basic technologies that are easily replicable by the communities we visit. As we are students, our main focus is educating and providing communities with...
the tools and resources to manage their water resources equitably and effectively. Thus, each project is catered to the needs of the individual community with the intention of providing local individuals with the skills to maintain and continue the project into the future.

**THE KENYA EXPERIENCE: MAY-JUNE 2010**

The World’s Water 2008-2009 Biennial Report on Freshwater Resources recently reported that Sub-Saharan Africa is the region of the world with the greatest need for water accessibility and sanitation improvements (Gleick et al., 2009). Of the entire region, only 56% of the population has access to drinking water (Palaniappan, 2009). Oxfam International estimates that 23 million people in East Africa suffer from food shortages resulting from sustained drought (http://www.oxfam.org). Kenya has suffered from drought for over half of this decade.

Through connections with the nonprofit, International Development Missions, we learned of the need for water in the rural areas surrounding the town of Matuu, Kenya. Matuu lies about 150 kilometers west of Nairobi on a plateau south of Mt. Kenya in the Kamba tribal region. The area around the village includes approximately 50,000 subsistence farmers and tradesmen. Unofficial observations report that approximately 75% of the residents live under the poverty line. In the rural areas outside of the town, the villagers are mainly subsistence farmers who own a cow, a couple of goats, chickens, and small patches of maize and beans. Women and children spend mornings and evenings walking to a dry riverbed to fill plastic containers with water that percolates into holes dug in the sand of the riverbed. Usually the containers are carried with straps that wrap around the forehead. After school, children stop by the river and fill small containers to bring home as well. When droughts plague the area villagers walk up to three kilometers to springs where they may have to wait in line up to 24 hours.

SAIWI’s objective was to drill a well that would benefit approximately 50 families (about 300 people). In addition, we planned to install rainwater catchment systems on the roofs of community centers and hold workshops to teach villagers how to dig other wells, maintain the pumps, and practice good hygiene. However, the three weeks that we had to complete the projects were full of challenges. The vehicle and drill that we borrowed broke down continually and usually took hours to repair. When screws would break, people would have to make one from scrap metal or catch a public bus into town, a trip that could easily take half a day. Unfortunately, our time ran out before the well successfully provided clean water. Thus, we are keeping in close contact with our host to troubleshoot and monitor its productivity. However, during our down time, we were able to install a rain catchment system that can hold 8,000 liters of water on the community church, which will help the village access water during the dry season.

Next year we will return to complete the water well using the Terry Waller Baptist Manual Method for well drilling. Introduced to our club by Dr. Cathy Fitzgerald, this method was developed by Terry Waller of Water For All International (http://www.waterforallinternational.org) and based on an ancient method from Asia. This method is inexpensive and easy to teach. A group of SAIWI members used this method in Cameroon in 2008 to drill one well, and the community has drilled four more since the group left. Thus, we anticipate that the community members who were eager to learn and help with the well and rain catchment system this year will be able to drill their own wells after our return trip next year.

**REFLECTIONS ON SAIWI’S APPROACH**

In general, the people who need water the most live in geographically or politically challenging areas in which to work. Working in developing countries is often much slower than working in the United States and communication can be difficult. It also takes time to understand and adapt to cultural norms, such as when to barter and where to find supplies. These differences often make working in impoverished regions challenging; however, the obstacles that SAIWI students face expose the daily struggles that people in other countries continually confront and reinforces the need for SAIWI. To overcome the limitations of some of our projects, SAIWI stays in contact with each community we visit and returns when needed. Not only do UNR students learn and grow with each trip, but so does SAIWI. These lessons are passed down so that the next group of incoming students can be inspired and trained to provide the much needed water development assistance to communities around the world.

**REFERENCES**


Katie Mann and Arica Crootof are past and present Co-Presidents of the Student Association for International Water Issues (SAIWI) at the University of Nevada, Reno. Ms. Mann, who was Co-President from May 2009 until May 2010, recently graduated with a Master’s degree in Geography and was the trip leader for the summer 2010 Kenya trip. Ms. Crootof is a current Co-President and has been serving since January 2010. She is a second year Master’s student in Hydrology.

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**HAVE SOME COMMENTS ABOUT THIS ISSUE OF IMPACT? SEND US YOUR FEEDBACK**

_**Water Resources IMPACT**_ is in its 12th year of publication and we have explored a lot of ideas. We hope we have raised some questions for you to contemplate. “Feedback” is your opportunity to reflect and respond.

We want to give you an opportunity to let your colleagues know your opinions … we want to moderate a debate … we want to know how we are doing. For this issue send your letters by e-mail to:

Michael E. Campana (aquadoc@oregonstate.edu) or
Earl Spangenberg (espangen@uwsp.edu)

Please share your opinions and ideas. Please limit your comments to approximately 350 to 400 words. If published, your comments may be edited for length or space requirements. Also visit AWRA’s Water Blog at http://awramedia.org/mainblog/ to view past essays from our Future-ing Project.

**SPECIAL 4-PAGE INSERT WITH INFO ON AWRA’S 2010 ANNUAL WATER RESOURCES CONFERENCE PHILADELPHIA, PENNSYLVANIA NOVEMBER 1-4, 2010**
CREATING THE FUTURE IN NICARAGUA
Rob Bell and Anna Segur

INTRODUCTION

Lack of access to clean drinking water affects over 1.2 billion people and is one of the foremost challenges facing the developing world. Globally, contaminated water is the second greatest cause of infant mortality: an estimated 1.8 million children die each year as a result of illnesses linked to consumption of polluted water. Communities lacking water and sanitation are often poor and do not have the skills or the resources to undertake water and sanitation projects. As a result, traditional development projects have often taken a paternalistic, top-down approach focused on project delivery in which the beneficiary community plays a passive role, the infrastructure is provided at no cost, community members are paid for their labor, and little attention is paid to local capacity building and community organization. However, this approach does not tend to generate sustainable access to water and sanitation. Throughout the developing world, one can find abandoned and unused latrines as well as broken and contaminated water systems that have failed to improve water and sanitation access.

Nicaragua is the second poorest country in the Western hemisphere: approximately 80% of the population lives in poverty, surviving on under $2 a day. The country has been victim to natural disasters and a civil war that have destroyed infrastructure, drained resources, and derailed the country’s economic development. Over half its population of 5.8 million people lacks access to clean drinking water and sanitation, relying instead on polluted streams and rivers as their only source of water. The same streams and rivers which supply water for drinking and cooking are also used for cleaning hand-held pesticide pumps, washing clothes, and bathing. Livestock and other animals bathe in and drink from the rivers as well. These conditions result in contaminated water unsuitable for human consumption.

To build capacity and help ensure sustainability, El Porvenir (Spanish for ‘the future’), a nonprofit organization, assists rural Nicaraguan communities improve their living standards through self-help drinking water, sanitation, reforestation, and hygiene education projects. We have pioneered an alternative approach to rural water and sanitation projects that increases project sustainability by: (1) requiring active community involvement in all stages of project design and implementation; (2) building local capacity to manage and maintain water and sanitation infrastructure; and (3) leveraging sustainable tourism and a network of volunteers for outreach, funding, and support.

EL PORVENIR’S VILLAGE-BASED APPROACH

In rural villages, lack of access to clean drinking water also imposes a significant burden on women and children, who are responsible for bringing water for all the household needs. Often, women and children spend several hours a day carrying five-gallon buckets of water on their heads, reducing the time available for school or other activities. Each full bucket of water weighs 40 lbs. and sometimes must be carried several kilometers.

Nicaragua’s water shortages are further exacerbated by rampant deforestation: since 1950 the country has lost 49% of its forest cover. Deforestation affects the drinking water supply because it reduces rainfall, rainwater infiltration, and aquifer recharge rates, causing the water table to drop, and village wells to go dry. Deforestation also leads to erosion of fertile topsoil, reducing agricultural productivity and causing deadly landslides. El Porvenir was founded 20 years ago to assist rural Nicaraguan villages secure access to clean drinking water. Over time, El Porvenir grew into an integrated program that allows communities to improve their living standards through sustainable development in clean water, sanitation, reforestation, and hygiene education. It supports communities to build, maintain, and repair their own drinking water and sanitation facilities, implement good hygiene practices to reduce illness and disease, and manage their watersheds in a sustainable manner. Since its founding in 1990, El Porvenir, working from six local offices, has completed over 746 water and sanitation projects in four departments of Nicaragua, benefiting over 105,000 Nicaraguans.

We traditionally work with rural Nicaraguan villages that are too small (250 people or less) or remote to receive assistance from other development agencies, and too poor to finance water and sanitation projects on their own. Most villagers are subsistence farmers or day laborers. The cost of a basic household latrine is equivalent to four months’ wages for the average household. Given these circumstances of absolute poverty and need, and the undeniable benefits of water and sanitation, altruism may motivate people or organizations to provide water and sanitation infrastructure for free without requiring any contribution or participation from the villages. However, we have found that with technical assistance and targeted support, villages can initiate, implement, and maintain water and sanitation projects. Furthermore, the engagement of the village as active stakeholders in planning and implementation actually contributes sustainable access to water and sanitation.

We have found the following factors to be key to ensuring long term access to clean drinking water and sanitation: community empowerment through active participation and ownership in all aspects of the project; use of appropriate technology made from low-cost, locally avail-
creating the future in nicaragua... cont’d.

able materials that can be maintained and repaired by
the community (such as the rope pump; http://www.
ropepump.com/); and community capacity building and
creation of sustainable community organizations to man-
age water and sanitation resources in the long term.

By promoting community initiative, leadership, and
decision making, El Porvenir seeks to help communities
to help themselves. Projects begin when a community ap-
proaches us to request assistance. These communities
are then prescreened to determine their level of commit-
tment to the project. The community must be willing to
play an active role and provide locally available materials
(sand, gravel, stones), all project labor, coordination,
transportation of materials, as well as a small financial
contribution anywhere from $1 to $25 per family. We
provide technical assistance, tools, and materials for the
construction of wells, latrines, community wash stations,
fuel-efficient cook stoves, and tree nurseries. Once the
infrastructure is built, the community must assume re-
sponsibility for ongoing maintenance and repair of the
water and sanitation infrastructure that is financed
through a small monthly water fee paid by each house-
hold. This fee varies based on the type of project but can
be $0.50 or $3 per month.

When community members contribute their own
available resources, they are more committed to ensuring
the long term sustainability of their water and sanitation
systems. Project labor provided by the community in-
cludes hand digging wells to a depth of 15-20 meters;
digging latrine pits to a depth of 3 meters; lining and
sealing with stone, bricks or cement; creating village tree
nurseries; transplanting seedlings to the watershed area;
and fencing off the watershed and well areas.

Community capacity building is also essential to en-
sure that the water and sanitation systems continue to
function long after they are built. For this reason, we (1)
help the community organize water and sanitation com-
mittees that are responsible for maintenance and repair;
(2) provide training and technical assistance in construc-
tion, maintenance, and repair of wells and latrines (up-
keep and repair of rope pumps, proper cleaning of la-
trines and wells, water testing, and treatment); (3) teach
the community about the interrelation between trees and
water and the importance of watershed conservation; and
(4) conduct workshops and household visits for students
and families to identify risky behaviors and learn good
hygiene practices, thereby reducing sanitation related
illnesses.

village work trips

A final component of our innovative approach to in-
crease access to water and sanitation in Nicaragua is the
use of sustainable tourism “village work trips” as a
source of funding, outreach and volunteer support.
Work trips are designed to introduce participants to the
reality of rural life in a developing country, increase
awareness of water and sanitation needs and challenges,
and allow participation in both short and long term de-
velopment of rural Nicaraguan communities. Groups
guided and organized by El Porvenir visit rural
Nicaraguan communities to work side by side with local
families in the construction of wells, latrines, village
washing facilities, or in the reforestation of a micro-
watershed. As a result of its extensive experience in
Nicaragua and our local staff, we are able to tailor itiner-
aries to the interests and needs of each group, selecting
from a wide variety of sites such as coffee farms, volca-
noes, lakes, colonial towns, and bird sanctuaries. Local
speakers enrich the experience with personal conversa-
tions and anecdotes about their lives and their country.
The cost of the trip funds the purchase of project materi-
als, and when participants return to the United States
(U.S.), they become part of El Porvenir's awareness and
fundraising process, thus enabling the ongoing develop-
ment of water and sanitation systems in other rural
Nicaraguan communities. Every year, 10-15 groups par-
ticipate in El Porvenir's sustainable tourism activities,
providing a life changing experience for 100-150 tourists
per year and generating 12% of El Porvenir's annual

These nontraditional trips appeal as a niche destina-
tion for travelers who do not want to visit U.S. style re-
sorts, but rather want to experience another country on
a personal basis and to be able to contribute to a tangi-
ble improvement in community living standards in the
developing world. The tour experience is designed to in-
crease awareness and build El Porvenir’s funding base
long after the conclusion of the actual tour. By visiting
rural Nicaraguan communities and working alongside
local families, trip participants become aware of the
many challenges people face when living without access
to water or sanitation and how hard villagers work to im-
prove their own lives. Furthermore, participants learn
how little money is needed to entirely transform the
health of these remote villages. Upon their return to the
U.S., they see their own privilege and are motivated to
fund El Porvenir's rural water sanitation projects.

This post from the blog (http://www.world-
widewachs.com/Nicaragua.htm) of an El Porvenir work
trip participant summed it up nicely: “Once you’ve left
the comfort of your own world and looked into the faces
of people who have nothing, held their hands in yours,
worked side by side with them, seen and experienced
their minimal standard of living – how can you not do
something? When you have experienced a world whose
inhabitants don’t live as comfortably as our dogs, how
can you take a hot shower, open a refrigerator door, drive
a car, shop in a grocery store, or do any of a thousand
other everyday tasks without remembering those who not
only have no showers, refrigerators, cars or grocery
stores – they have no water, electricity, and sometimes
no food or clothes. It’s so easy to take for granted the riches
and opportunities available to us in the U.S. ... We owe it
to the rest of the world to give something back.”

Author Link

Rob Bell
Executive Director, El Porvenir
R.P. 71
Managua, Nicaragua
(011) 505-2268-5781
Rob Bell has been Executive Director of El Porvenir since 2006, and has over ten years of experience living and working in Central America. He has presided over significant growth of the organization during his tenure as Executive Director. Prior to working at El Porvenir, Rob worked at other for-profit and nonprofit organizations in Central America and in Canada. He has a degree in management and mathematics.

Creating the Future in Nicaragua ... cont’d.

Featuring Series on Satellite Hydrology (cont’d).

This series concludes with an article in which Antarpreet S. Jutla et al., investigate relationships between cholera incidence and coastal processes and explore the utility of using remote sensing data to track coastal plankton blooms, using chlorophyll as a surrogate variable for plankton abundance, and subsequent cholera outbreaks.

Technical Papers

Jinxia Wang et al., examine the emergence of water user associations in China and assess if they are adhering to the practices spelled out by the Five Principles, a set of recommended practices that are supposed to lead to successful operation.

Christopher J. Woltemade looks at the impact of compacted residential soils on stormwater runoff.

Matthew Thompson et al., use mathematical programming techniques to identify the efficient frontier between sediment reduction and treatment costs for forest roads.

Eric C. Merten et al., investigate the recovery of sediment characteristics in four moraine, headwater streams in north-central Minnesota after forest harvest.

John W. Brakebill et al., use the SPARROW model to describe the sources and transport of fluvial suspended sediment in nontidal streams of the Chesapeake Bay watershed and vicinity.

C.D. Arp et al., couple monitoring, remote sensing, and modeling techniques to generate baseline datasets of lake surface temperature and ice cover in the Alaskan Subarctic and Arctic.

Robert M. Hughes et al., survey 51 stream sites located in regions of row-crop agriculture to evaluate the comparability of four indexes of physical habitat conditions relative to each other.

Jonathan D. Phillips characterizes the Trinity River, Texas, according to its geologic framework, valley width and confinement, slope, sinuosity, channel-floodplain connectivity, and flow regime, leading to the identification of 18 hinge points where major transitions occur.

Discussion and Reply

A recent article, “Stream Temperature Relationships to Forest Harvest in Western Washington” generated a discussion and reply.

And … more Book Reviews!

A full Table of Contents may be viewed at http://www.blackwell-synergy.com/toc/jawr/46/4

JAWRA ~ Journal of the American Water Resources Association
**WHY DO YOU CARE?**

**Stephanie J. Moore**

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**THE QUESTIONS**

We were walking through a small village in northwestern Honduras, under a turquoise sky, past coffee beans and adobe bricks drying in the sun, when Ronaldo looked over at me and asked, “Why do you care about our water?”

Ronaldo was a member of the water committee for the pueblito of Buena Vista, in the Department of Santa Barbara. He and two other members of the water committee were graciously showing us around their village, so we could inspect their water system and interview the residents/water users. We had just climbed down from the top of their storage tank, where we had inspected their supply line and hypochlorinator, and we were en route to our next stop, a home, randomly selected by my American colleague and me.

I wasn't exactly sure of the answer, or even of the true intent of his question: Why are these Americans here in our town, asking us questions about our water? Who would be interested in all of these details? Why do they want to see our latrines and know when we wash our hands?

So, I gave him the most logical and straightforward answer I knew: people who donate money to help build water systems want to know if those systems are working, and how long and how well they continue to work after construction. The donors want to know if they are making a good investment.

Ronaldo accepted my answer with a gentle nod and murmur; he even seemed pleased with it. As we continued our walk through his village, we chatted about the nuances of those mysterious benefactors, what they do and don’t like to do with their money, and how they want to know if their money is making any sort of measurable difference in the lives of people they have never met. Ronaldo was very curious about what sort of data we were collecting and how Buena Vista’s water system compared to other systems in Honduras.

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**THE WORK**

That was April 2008, and I was in northwestern Honduras with seven other Americans. We were volunteers with Water For People’s (WFP) World Water Corps. Our mission was to complete a monitoring survey of 22 projects constructed over the past seven years. While there, we worked closely with WFP Honduran staff. Several Honduran college students joined us to learn about rural water systems and also to help with translating.

We weren’t building a water system, or even designing one. We were simply there to support WFP by acting as independent observers whose purpose was to document the condition of the water systems we visited. Perhaps a monitoring trip isn’t as glamorous as actually building a water system, but it is just as important.

Our group split into three smaller teams to visit each of the 22 systems we were assigned to monitor. The systems were located in various communities scattered throughout four departments of northwestern Honduras: Atlántida, Cortés, Santa Barbara, and Yoro. All but one of the communities were served by a spring fed water system, usually with a separate line and faucet going to each individual home (only one community used groundwater supplied by a new well). In each community, we interviewed members of the water committee, the school teacher, and at least 10 water users. We reviewed financial records and bank statements. We inspected the water system, including the source, storage tank and hypochlorinator, distribution points at individual homes, and latrines. We made observations and asked questions about basic hygiene and sanitation. We used WFP’s standardized monitoring protocol to ensure that data was collected in a consistent manner.

The results of that trip were encouraging. We found 17 of the 22 systems were in optimal condition at the time of our visit, three were suffering from seasonal shortages, and only two were broken. Buena Vista’s water system was working well. Although they had experienced several disruptions in service in the past year, they were able to repair the system on their own, using their own funds. WFP used results of that trip (along with results from all of their monitoring trips) to continuously evaluate and improve their work.

**Equally valuable are the ‘soft’ people skills gained from interacting with the cast of characters involved in an international volunteer project; volunteers from various professional backgrounds, host country and in-country staff, village residents and water users, local politicians, etc.**

My first trip with WFP was in 2007 to Mexico, where our team completed a scoping study to identify potential opportunities for WFP to expand into that country. There, we traveled to rural areas in the states of Oaxaca, Morelos, Mexico, and Michoacan. We visited one of the largest peri-urban cities in the world, Iztapalapa, outside Mexico City. We met with several remarkable people working with well organized nonprofit organizations, all of whom were eager to provide better access to clean water to the people they work with. Much to my dismay, the Board of Directors chose not to expand into Mexico in the immediate future (although I understand it is still on their list for future expansion at some yet to be determined time). Nevertheless, I appreciate the investment they made to thoroughly evaluate their expansion options, and I continue to be so impressed with their mission and organization that I remain a devoted volunteer.
**MY MOTIVATION**

While there are countless organizations and volunteer groups that design and build water systems in developing countries, there are few who monitor the longevity and continued functionality of these projects. Due to lack of oversight, many of these systems fail within one to two years of installation (Breslin, 2010). Perhaps naively, I was astonished to learn about the transient nature of so many of these systems. Imagine the disappointment of a community who once celebrated a new and clean water source but now must start anew on the quest for clean water and outside assistance. Imagine the money and effort spent (wasted?) on now defunct systems.

With my limited time (vacation from paying job and time on the planet in general), I wanted to ensure that what little I could contribute would create a lasting change and empower those that I hoped to help. At first, I was overwhelmed with the sheer number of volunteer groups in the water world. When I narrowed the search to groups that monitored the long term success of their projects, far fewer choices remained.

Fortunately, there are many groups that do monitor the success of their projects, and these groups have several things in common.

- They work in partnership with local communities and locally established organizations;
- They rely on local resources, including local construction materials, locally appropriate technologies and partnerships with the local private sector;
- They understand that “software” is often more important than “hardware.”
- They work towards improving hygiene and sanitation in each community, and recognize that as an essential ingredient to safe water.
- They make long term commitments, not short term visits.
- They leverage their money with funds contributed by local governments and the communities that they serve.
- They require investment from the communities they work in and, in so doing, encourage self-reliance.
- They monitor progress not by how many new people are provided with clean water each year but by how long projects continue to function.

**BENEFITS OF VOLUNTEERING**

I always enjoy traveling. Add in traveling the back roads of a foreign country, meeting and bonding with locals, developing a basic appreciation of their way of life and daily challenges ... those are immeasurable benefits. Besides the somewhat obvious perk of adventures with travel, my experiences with WFP have contributed to my personal and professional life in countless ways.

Working in another country is always different from working in one’s native country. Initially, my challenge was accepting that most things were completely out of my control. American style punctuality is not the norm. A national strike may close down all highway travel for one or more days. Certain safety features (like seat belts) are considered not standard. One may have to wait a couple hours while the necessary person is located for an interview. One’s language skills may fall short with rural accents and colloquialisms.

Despite these challenges, which I initially perceived as obstacles, I learned to switch gears quickly (“When in Rome...”). Once I accepted that many things were out of my control, it seems we were graced with synchronicity. We reached our every destination, completed all our interviews, made all the necessary observations, entered all of our data, and, at the end of each trip, everyone was safe and sound.

The flexibility learned from this sort of experience can be easily transferred to one’s day job. If one can accomplish a task with so many unknowns and variables, then the more straightforward tasks become much easier. Equally valuable are the ‘soft’ people skills gained from interacting with the cast of characters involved in an international volunteer project: volunteers from various professional backgrounds, host country and in-country staff, village residents and water users, local politicians, etc. If one can successfully navigate the range of personalities and cultural norms, that person has a pretty good chance of improving their people skills.

On a personal level, these experiences broadened my understanding of humanity, the natural world, and the cultural and political complexities of a few more corners of the world. I was impressed to see the pride and commitment of people who have built and maintained their own water systems, and to see those working to do so. I was constantly touched by the graciousness with which we, strangers, were welcomed into their homes.

**SUMMARY**

Back to Ronaldo’s question: Why do I care about their water? Is it selfishly because I like to travel? A desire to make a difference? Perhaps a karmic investment? Modern guilt? I’m really not sure of the precise answer, but I can tell you this: I do care.

I am encouraged to see people taking responsibility for their own well being and working hard to maintain and support their water systems. I appreciate the efforts of organizations like WFP, who are helping people help themselves by empowering them to make lasting changes. I understand that monitoring the long term success of these projects is a crucial component of this work. If I can contribute a little bit of my time, money, and energy to support these people and these organizations, I am happy to do so. Those were easily some of the greatest experiences of my life and I look forward to my next trip.

**REFERENCES**

Stephanie J. Moore is a Hydrologist with Daniel B. Stephens & Associates, Inc. (DBS&A), with over 12 years of experience in water resources investigations. She spent the first eight years of her career with the USGS, researching stream aquifer interactions, vadose-zone processes and water quality, with a focus on natural recharge processes in arid environments. Since 2005, Ms. Moore has worked at DBS&A, where she uses her technical skills to help local and state governments identify and implement practical water resources management solutions. She does her best to avoid bottled water and enjoys volunteering with Water For People in Central America.
HYDROPHILANTHROPY: A VOLUNTEER’S PERSPECTIVE

Christine Casey Mattute

INTRODUCTION

Many of us who have traveled or seen pictures of children sick from waterborne diseases have wanted to do something about it. The question that I have been struggling with for years is, “What is the best approach for a water, sanitation, and hygiene (WaSH) project in a developing country?” Should we do what we can to help a few (and probably learn a lot in the process) or focus our energies on finding organizations that have sustainable projects? I have seen both approaches and I want to share my experiences with small water and sanitation projects in Honduras. I also offer a suggestion for deciding how to help support WaSH projects in developing countries.

From my experience and research, the most important aspects of a water and sanitation project are: (1) simple technology, (2) community involvement, (3) education (technical and health), (4) local partnerships, and (5) monitoring and evaluation.

Larger organizations have enough funding, human resources, and partnering organizations to include all these components in their projects but smaller organizations have a harder time accomplishing this. Some organizations take time to get to the point where they can incorporate all these components, which is the case with Pure Water for the World (PWW) (http://www.purewaterfortheworld.org). They started in 1999 and have made great progress in designing sustainable projects and are still making adjustments to achieve project sustainability.

I started with PWW because they seemed to have all the components of a successful water project. They work with communities with the greatest need and who are interested in working with them. A project is not free. There is a symbolic cost, training of a local group within the community, a health education component, and most importantly (since it is often lacking), follow-up. In Honduras, PWW installs biosand filters in rural homes. I managed a project in a very mountainous area with limited access to many communities during the rainy season.

HANDS-ON EXPERIENCE

My role with PWW was to train a local staff on the technical and managerial aspects of the project. My goal was to leave when I was no longer needed, i.e. the staff was capable of running the project without me. The biosand filter was new for them so there was technical training on the filter’s construction, operation, and maintenance. This was easy for them to learn since it was something tangible. Managing the project took more work since the staff was used to focusing on getting their job done and not thinking as much about the impact of their job or the larger picture of their work. One example of this was ensuring that the supervisor stressed to the workshop staff the importance of washing the sand thoroughly so the filters would function properly and provide clean water.

So many organizations working in developing countries say that education is a critical part of any project. It is true. You cannot expect someone with little education who has been doing something their entire life, to change immediately because you tell them it is important. A popular approach is to target children since they are more likely to change their habits. We noticed that the children learned faster than the adults, even if the adults received more classes. The World Health Organization (2004) says “hygiene interventions including hygiene education and promotion of hand washing can lead to a reduction of diarrhoeal cases by up to 45%.” Working with a partner organization helps make a project’s educational aspect more effective since the organization is already established in the area and has the community’s trust. It is a great way to ensure the education continues after project implementation.

CHALLENGES

The biosand filter project showed me that things are incredibly different on the ground. That was something I constantly had to relay back to our funders. It was not my first experience in a developing country and I know you need A LOT of patience but it still amazed me how many things could go wrong. I am not talking about being stuck in a major storm and having to walk an extra two hours to the community or getting stuck in the mud for over an hour (which of course happened more than once), but about the challenges of testing water samples. There are few places in Honduras where good water quality testing is available. We struggled with the option of using our own testing kit or bringing the sample to a lab. A third party is best to prevent bias. It is also difficult to ensure our staff members are properly trained and using proper technique. We assumed that we would be able to test the water quality without problems but it ended up being a problem for most projects.

In theory, PWW has a good idea about how projects should function, but in practice, they are not working due to organizational and logistical issues

PWW is an evolving organization and until it is more established, the projects will not go as smoothly as the funders expect. PWW tried to expand all over Honduras and other countries before they really had a good foundation. It takes time to establish a project in a new area of the country. In theory, PWW has a good idea about how projects should function, but in practice, they are not working due to organizational and logistical issues. I realize that any project in a developing country, no matter how well established, will have unforeseen challenges.
and obstacles. Some of PWW’s issues could have been prevented with better planning. An example of a setback in our project due to PWW in the United States (U.S.) was that the biosand unit plastic filters were not delivered on time. This delayed installations for a couple of months. Logistical issues arose constantly due to weather, vehicle issues, access to communities, and difficulty with water quality testing. Managing such a project took creativity and flexibility more than any other management skills.

PROJECT IMPACT

In the end, do I feel that I made a difference? Yes. The local staff I worked with learned a lot during our time together, partly just from working on the project and partly from me. I saw them develop new skills and confidence. For me, that was my goal. I was there to train the locals to run the project on their own. We installed many filters and trained many community members, empowering them within the community. The ones who worked with us are more likely to work with other organizations in the future. Since we encouraged women to work with us (and were successful with them), this means more empowered women in a machismo society.

As for providing clean drinking water to rural communities, especially to children under five with parasites and other waterborne diseases, project efficacy is undetermined. We followed up with most communities before finishing the projects, but at the moment there is no one to follow up. One local woman still works in many of our communities with another organization. She visits the homes to make sure they are using the filters but no formal study has been done and no water samples have been taken.

Although our project ended due to organizational issues, PWW has learned from the experience. They are preparing earlier for project monitoring and evaluation. There are now fewer projects in Honduras so they can use more resources for each one. They also work with partner organizations more often. PWW has taken an entirely different approach with their program in Haiti and the results are positive. It is an organization worth investing resources into.

OTHER EXPERIENCES WITH WATER PROJECTS IN HONDURAS

Before joining PWW, I had been involved in some smaller drinking water projects. Michael Campana, the Director of the Water Resources Program at the University of New Mexico, had been working with some Hondurans to help them build gravity-fed water systems in rural mountainous communities (see his paper in this issue). He brought students down for a field class each June for five years. I participated in two projects and then assessed the three prior ones for sustainability for my Master’s Professional Project.

These projects were organized by one man, managed by another, and the supplies came from USAID (U.S. Agency for International Development) through the national water authority, SANAA (Servicio Autonono Nacional de Acueductos y Alcantarillados). There were always extra expenses that the community could not afford so Michael also pitched in. I was told that SANAA was responsible for returning to the community to provide education and support for the community’s water board. For the most part, the systems were functioning, but the water boards were not operating as well as they should have and the communities were unprepared for any major problems. Neither SANAA nor its technician had visited the villages. None of the communities had the proper tools to fix any problems with the pipes; rather, they used what they had to patch leaks.

Part of the reason Michael worked with these communities was that they are so remote (1.5 to 4 hours by foot from paved roads) that no one else wants to work there. So the fact that these communities now have clean water is a very positive outcome even if the projects lacked essential components of sustainability. This type of small project that is focused solely on the implementing of a water project – in this case building a water system – is an effective use of resources.

Unfortunately, I cannot say that about many other small projects in Honduras. There are many people from the U.S. working throughout the country on similar small short term projects. Many of the volunteers worked with a few Hondurans or a church while others worked with a local organization or Rotary Club. The projects often involved constructing a water system for a community, some form of water purification, building latrines, or protecting watersheds. In Copán, I rarely saw a project last more than a year. Although the people from the U.S. had contacts in Honduras, they normally did not work with an established organization or agency that would continue with education or monitor and evaluate the project.

Bringing North Americans to a developing country to see how the poor suffer and to see that they can do something about it definitely helps raise funds. The problem is that all these groups have very small projects that focus on one thing: implementation. All the other essential components of a WaSH project are often neglected. Copán Ruinas seems to be the mecca of organizations and volunteers. It is a beautiful, quaint town in the mountains next to Mayan ruins yet is surrounded by some of the poorest communities in the country. As a more established organization, we would work with other larger organizations in the area and the local government to be more effective and coordinate our trips and projects. But I rarely saw this coordination with smaller groups. These individual short term projects are not an effective use of resources when there are so many possibilities to work with local organizations and play a role in a successful long term project that will have a greater impact on the area.

CONCLUSION

We are fortunate in the U.S. to be able to offer help to those less fortunate. When we see that our clean, treated drinking water is a sharp contrast to the filthy streams and puddles from which some people drink, we are inspired to help. There are multiple forms of support: donating money, volunteering time and skills, and con-
Hydrophilanthropy: A Volunteer’s Perspective ... cont’d.

Contributing resources. All organizations could use financial donations, and those whose projects include all components of a successful project are worthy of support. Volunteering time and skills can be a very rewarding experience for both the people donating and those receiving the help, but it is not always the most effective.

Many universities and student groups send students to work on short term projects, which is a great learning experience for the students but not always effective. There is usually little coordination with local organizations, which might ensure follow up. Many organizations will not work with student groups or may not even be present in areas targeted by student groups. In the latter instance, it is better to do something than to wait for the government or an organization to help.

Other groups donate materials, such as those necessary for latrines, and then participate in work trips to help the communities use the materials. Again, this has positive and negative consequences. The community will now have latrines and the volunteers will feel good about themselves. On the other hand, if the community members are constantly receiving things for free, it can lead to a greedy atmosphere, as has happened in Copán, Ruinas. Some communities are receiving so many donations that community members just expect everything to be handed to them for free. In this situation, it is best to try to work with a local organization or determine the best communities to which to donate.

Although I would like to say that all organizations working in water and sanitation should have projects that are sustainable and we should only donate to those who do, that is not possible. There are too many factors that play a role in supporting people in developing countries to improve water and sanitation. My recommendation is that when you are donating, consider how you are helping and whether you can predict the results of your actions at least five years in the future.

REFERENCE


Christine Casey Matute
Application Specialist
MEDITECH
Meditech Circle
Westwood, MA 02090
(978) 551-0447
ccasey24@gmail.com

Christine Casey Matute is currently working with MEDITECH to expand their Spanish language product to Latin America. She has volunteered extensively throughout the U.S. as well as in Ecuador and Honduras on watershed management, reforestation, water purification, water quality testing, and restoration projects among many others. She has a Master of Water Resources from the University of New Mexico.

E-MAIL
It’s a warm Tuesday afternoon, and I am sitting with Lucia Alvarado in the village of La Planta – a rather poor community of 46 families outside of Acajutla, El Salvador. Most of the community has steady employment only a few months out of the year – entirely reliant on picking season at the nearby lime plantation. Many others are entirely unemployed and homeless.

Lucia is 46 years old, has six beautiful children, and has lived in La Planta all of her life. On most days you are likely to find her on buses, selling fruits and vegetables to earn a modest income. But ask any of the 178 people of her community, and you will learn that Lucia Alvarado doesn’t just run from bus to bus selling goods. Lucia is the leader of La Planta.

It wasn’t always this way. Only two years ago La Planta did not have a leader. The community had gotten lost between larger communities, out of sight of regional authorities. The community quietly dealt with the issues that surface from extreme poverty. It didn’t work without strong leadership, and things only got worse.

Where we are sitting I can see the river. Lucia shares with me that women used to wake up every morning to fetch water from the river – the same river where they washed clothes and bathed. The resulting illnesses caused education to suffer. Lucia tells me that children and adults all dealt with kidney problems, parasites, and chronic diarrhea due to contaminated water. Two years ago, Lucia had finally had enough.

La Planta had been without leadership for too long, and problems were only growing. So she “took initiative” (as she puts it) to make a difference in her community. She met with the community and shared her idea. Lucia tells me: “My idea was to work for everyone and make something to benefit the entire community and not just my family.” The response to her proposal for leadership was not completely positive at first. In fact, she was told “no” by a nominal leadership committee made up entirely of men. El Salvador, like many other cultures outside of the West, is one where men tend to dominate leadership roles; her “initiative” was not just about leadership – it was about social norms that are tied to the identity of rural Salvadoran life. Lucia refused to concede. After all, she had a plan. “If the men are actually taking into consideration the good of the community,” she says, “they would know that it could be a good thing; if selfish, then they won’t.”

It was finally agreed that Lucia would be the leader of La Planta. But it was also clear that she would have to prove herself. Leadership for women rarely comes easy in El Salvador. “The first thing we needed was water,” she tells me. “The water here was very contaminated. All the detergents from washing clothes and baths had contaminated the river. I knew clean water would be the best thing for our lives. I heard about Living Water International (http://www.water.cc) through the Mayor’s office, and began to show up at the other villages that Living Water was working in.”

Show up she did. Again and again. Over the course of a year, her fierce initiative took her to eight different communities where she learned that Living Water was working. At each site, she cornered Living Water staff members, sharing about the need in La Planta, asking them not to forget. She is a determined leader.

Two months ago, Lucia danced under the water that blew in the air as Living Water developed the first well in La Planta. As I write this, another well is being drilled at La Planta’s primary school.

Lucia steps away from our discussion, and comes back with photos – photos of a volunteer team from America that joined Living Water’s El Salvador crew to drill La Planta’s first well. She shows me photos of each step of the project process – photos of her son and others in the community that spent a week helping to implement the project, photos of the participatory hygiene training that she helped to organize for the women and children of La Planta. One image I will never forget: a photo of her dancing in the clean water that she had advocated for, prayed for, and for which she had challenged the cultural norms of her community.

As we begin to take a walk, Lucia tells me, “Now that our children have clean water, they don’t stay home from school to be sick. This well has been the best thing for our health.” With a smile on her face, she goes on: “Now,
most of the men like me being the leader, because of what I have been able to do. I am very thankful to Living Water International for helping me and my community. I am a strong woman and I feel like we [women] are capable in roles like this. When it comes to this, things are changing.”

It’s Wednesday now, and I’m standing at the school in La Planta. The hand pump has just been installed, and clean water is flowing for the first time. Lucia is here, of course, but she’s not alone. She has brought two of her friends with her – women who are also “taking the initiative” in their own communities. They are standing in the corner of the schoolyard, talking to a Living Water team member – animatedly talking about their own communities, just like Lucia told us about La Planta. I ask Lucia if these women are the leaders of their communities. Her smile tells me, “not yet.”

I have visited 13 of our country operations in the last four years, and the link between women and water is obvious. We know that many women spend 15-20 hours per week collecting water for their family – water that is very often contaminated. We know that these hours result in time poverty, and stunt further opportunities for development. For example, according to the United Nations Development Program “Research in Uganda found households spending on average 660 hours a year collecting water. This represents two full months of labor, with attendant opportunity costs for education, income generation, and female leisure time.”

This is tragic, indeed. And, it also displays a tremendous entrepreneurial spirit and dedication to the regular provision of water (even filthy water) for not just the self, but others as well. This is strength, courage, and determination – all components of leadership and water resource management. Ultimately, these are building blocks towards sustainability. My time in La Planta taught me to recognize the Lucia’s within the communities we serve – across all of our countries of operation. As I visit projects across all of our programs, I tend to find a strong woman leader involved in some of our most successful projects.

Today, I have no doubt that the hand-pumps in La Planta are being cared for and properly managed. Lucia is that assurance.

Note: Living Water International (http://www.water.cc) is an implementer of water, sanitation, and hygiene projects in 26 countries. Since 1990, Living Water has successfully implemented more than 9,000 water projects, completing 1,634 water projects in 2009. Living Water’s integrated approach of training, equipping, and consulting ensures that the energy and resources contributed by volunteers and donors result in sustainable, participatory water systems that meet the long term needs of communities. Living Water International currently implements projects in Africa (Liberia, Sierra Leone, Ghana, Angola, Central Africa Republic, Nigeria, Namibia, Zambia, Malawi, Tanzania, Uganda, Ethiopia, Rwanda, Kenya, Zimbabwe, and Burkina Faso), Latin America (Brazil, El Salvador, Guatemala, Honduras, Nicaragua, Haiti, Mexico, and Peru), and India.

Stan Patyrak is Senior Director of Development at Living Water International, and focuses on strategic partnerships. He is also an avid photographer and a student of culture (cover photos and this article’s photos are courtesy of Stan).
### ACROSS
1. written symbols  
7. Clemens’ specialty  
14. anybody  
15. portable light  
16. military greeting  
17. anonymous  
18. beryls  
20. ante  
22. math. limit  
23. weather map lines  
26. pt. of salt  
27. Rosen or Green  
28. employ  
29. Jean or Godfrey  
32. a stingy person  
34. part of a circle  
36. commonplace (abbr.)  
37. settled a debt  
39. more necessary  
41. indicates the earth  
42. captures  
43. to swagger  
45. to perceive  
46. list ender  
48. not worth much  
52. fence in (abbr.)  
53. followed by Ed or Chips  
54. exclamation of surprise  
56. loose rock  
57. likewise  
59. fuse ores  
61. indicates without  
62. start of nym or science  
64. travel permits  
66. follows loud  
70. rock group  
71. morning hrs.  
73. mistakes  
74. hostel  
76. longings  
77. condition of excitement

### DOWN
1. emitted coherent radiation  
2. baked on metal coating  
3. tenth U.S. President  
4. sightseeing excursion  
5. imposes a duty  
6. spools  
7. followed by mail or belt  
8. _____ Oakley  
9. RR stop  
10. disposition  
11. start of bone or plate  
12. Williams or Rooney  
13. Florentine artist  
15. cravings for power  
19. most glum  
21. anagram of urine  
24. _____ or tails  
25. Indy 500 drivers  
27. helped  
30. swine  
31. followed by rib or tire  
32. acts of God?  
33. insert  
35. ceremonial acts  
38. sports venues  
40. regrets  
44. RN’s specialty  
47. the outdorsy type?  
49. MD’s work place  
50. chair  
51. feel  
53. followed by history or furniture  
55. vehicle for the dead  
58. start of sonic or nova  
60. Ivan and Peter  
62. to make a devout request  
63. canoe propellers  
65. at. no. 82  
66. notice of death (inf.)  
67. rajah’s spouse  
69. boxing outcome  
72. the name of a generation  
75. voter’s option

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**WATER RESOURCES PUZZLER (answers on pg. 30)**
As Southern California continues to look for future water supplies, Cadiz Inc., a publicly traded renewable resources company [NASDAQ: CDZI], appears to be breathing new life into the company’s struggling groundwater storage project.

The Cadiz Water Conservation and Storage Project (Cadiz Project) aims to utilize a portion of an aquifer system located in the Cadiz and Fenner Valleys of San Bernardino County to assist water providers in “dry years.” The project will provide as much as 150,000 acre-feet of water to be used during emergencies, droughts, or other periods of high demand. Cadiz believes the project could provide as much as one million acre feet of underground storage.

By a narrow margin in 2002, the Metropolitan Water District (Met) voted to walk from an earlier version of the Cadiz Project for a variety of reasons. This sent Cadiz’s share price plummeting and resulted in seven years of intense legal battles with Met. The stock, currently trading at $10.96, near its 52-week low of $10.00/share, has continued to slump over the last three years and has underperformed compared to wider market indices. Cadiz and Met finally settled their battle last year, which potentially started a revitalization of the depressed water project.

Recent developments associated with moving the project forward include:

- Cadiz Inc. entered into a 99-year lease agreement with the Arizona and California Railroad Company (AZRC), in September 2008, to use a small portion of the railroad’s existing right-of-way for their project and its pipelines.

- A year-long comprehensive study of the aquifer system conducted by CH2M Hill, an internationally recognized environmental consulting firm, was completed in February 2010. The study estimates total groundwater storage in the aquifer system between 17 and 34 million acre feet, figures much higher than previous U.S. Geological Survey (USGS) estimates.

- In June 2010, the Boards of Directors of the San Margarita Water District and Three Valleys Municipal Water District unanimously approved agreements that assign funds (up to $125,000) to an environmental review and grant the agencies 5,000 acre feet of water per year once the environmental review is finished. Golden State Water Company negotiated the same agreement. These option agreements leave conveyance and distribution of the water to be negotiated.

- Preparatory to the environmental review, Cadiz entered into a Memorandum of Understanding with the Natural Heritage Institute, a global environmental organization, to solicit help with sustainability management throughout the project. As part of their agreement, Cadiz Inc. will be held to strict groundwater management plans and habitat conservation.

Scott Slater, Cadiz Inc. General Counsel, commented, “We are pleased that Golden State has joined Santa Margarita and Three Valleys to participate in the next phase of the project. We are pleased that the project is moving ahead on the strength of sound science and we look forward to the California Environmental Quality Act environmental review process.” Despite the recent positive news for the company, it is unclear if Cadiz will finally begin delivering water to the southern California market. An environmental impact study and the construction of a 42-mile conveyance pipeline are just a few of the immediate obstacles that stand in the way of progression. If successful, the company could help diversify the strained Southern California water supply portfolio.


E-Mail Connection

landry@waterexchange.com
root@waterexchange.com

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I recently attended the 50th Anniversary Conference of the East-West Center in Honolulu, Hawai`i and stayed on a few days afterward to avail myself of research contacts in the Islands. I also squeezed in a bit of sightseeing. My true moment of Zen for the whole trip occurred after I’d taken the long drive up Mt. Tantalus through the rain-forest/watershed conservancy district that lies in the center of mountainside Honolulu. After I got onto Round Top drive, I pulled off into the Pu‘u ‘Ualaka‘a State Way-side and walked to the lookout. There laid out before me was much of leeward Oahu; from Ewa Beach and Pearl Harbor to the West, and Waikiki and Diamondhead to the East. The content of the conference and the fellowship with its participants had lifted my spirit, while some of the conclusions and news intruding from the “real” world dragged me back down.

Looking down at the ever growing skyline, I was reminded of the story of the Tower of Babel from the Book of Genesis. For those unfamiliar with the story, in the time after the great, worldwide flood that wiped out all of humankind except for a tiny remnant, humankind spread out across the earth growing in power and technologi.cal prowess. All humankind spoke the same language and was interconnected socially. One group of humans devised and built a great city with a central tower; a tower so high as to intrude upon God’s heavenly do-main. Humankind, it seemed, had grown “too big for its britches” and so God, accompanied by his angels, went down and broke up the party. Instead of speaking one language which allowed them to work on collective goals, humankind was split up among smaller groups that spoke their own language and could not communicate with others. This inability to communicate as before led to the abandonment of the grand tower project. Humankind was scattered into nations and tribes. This separ-ation creates problems which continue through today. (As a side note, interdisciplinary work between geologists, anthropologists/archaeologists, molecular biologists and others suggest that a much more homogenous human species spread across Africa, Asia, and perhaps beyond was broken up into small pockets of survivors around 70,000 years ago by the explosion and subsequent ash-fall of the supervolcano Toba in what today is Indonesia. This led in part to the diversification of the human species into different phenotypic and cultural groups, but that is a tale for another column.)

People speaking their own languages and sticking with their own tribes or “constituents” was evident when I descended the mountain. Honolulu, Oahu, and all of Hawai`i to one degree or other have grown beyond the available water resources. Like many “wet” places, abundant rainfall is offset by high evapotranspiration, and lack of geological and biological storage. Like many “set- tled” places, human demands have outgrown supply. Even in “paradise,” lack of communication and agree-ment prevent resolution to questions of biological con-servation, invasive species, urban sprawl, and public transportation. A major ongoing debate regards the need for a new above-grade rail system, where to run it, and how to pay for it. Even after most of the issues have been “answered,” the debate continues.

In parts of academe, business, and government, a relatively new crosscutting term describing the babel phenomenon is “silo” or “information silo.” As someone who grew up on a farm, the image here is clear. Silos are tall, tower-like structures that serve as storage facilities for grain, concrete, or silage. They can be large (e.g., grain elevators) or comparatively small (e.g., a traditional farm silo). One distinctive feature of any silo is that even when they are clustered together, they stand alone. In acad-eme, ever increasing specialization of knowledge and expertise combined with the tendency to communicate only with those who speak your own language increasingly interferes with addressing crosscutting questions or prob-lems. It also leads to conflicts over resources.

In domestic politics, it often leads to only being will-ing to listen to those who reinforce presumptions and ideology. An example of the damage that can be done when the worst of academic parochialism meets political ideology can be seen in the following quote: “When Americans think of the National Science Foundation, they think of cross-cutting science, technology, engineering, and mathematics. Most would be surprised to hear that the agency spent $91.3 million over the last 10 years on political ‘science’ and $325 million last year alone on so-cial studies and economics ... NSF spent $91.3 million over the last 10 years on political "science." This amount could have been directed towards the study of biology, chemistry, geology, and physics. These are real fields of science in which new discoveries can yield real improve-ments in the lives of everyone.” In one bold sweep, this U.S. Senator dismissed the merit not just of particular findings, but the entire realm of the Social Sciences. This statement was made by Sen. Coburn (R-AK) in introduc-ing the authorization bill for the NSF budget the “Coburn

**continued on pg. 29**
Water, which sustains and enhances all life, is our most precious natural resource. However, water supplies are limited and increasingly inadequate to meet all demands. Fortunately there are excellent opportunities to improve our water supply situation.

Water Conservation Opportunities ... Currently the United States (U.S.) has the highest per capita water use in the world. While not something to brag about, the good news is we have plenty of room to increase our water conservation, making existing supplies go further. In fact significant water conservation improvements have already been made. Even with population and economic growth, total fresh water use in the U.S. has not increased since 1975 according to the U.S. Geological Survey and has actually declined slightly primarily because of improvements made in irrigated agriculture, urban water use, and industry.

Still we need to conserve more water. There are many ways to use water more efficiently and encourage conservation. Examples include: adopting water efficient toilets, shower heads, and appliances; education to increase awareness and change wasteful water use practices; use of native plants, low water landscapes and efficient irrigation systems; economic incentives such as pricing and rebates; recycling and reuse of existing supplies; and policies such as water conservation regulations, building codes, and the planning and development of low water use communities. In addition to making the best use of existing supplies, these changes can help individuals and businesses save costs by purchasing less water and avoiding expenses needed to develop additional, more expensive supply sources.

Challenges and Connections ... There are also challenges and connections to other scarce resources. In many areas there are few, if any, ‘new’ water supply sources, and existing supply sources are highly variable and/or declining. Groundwater is the source of drinking water for approximately half of the nation and almost all of the rural population. In many places groundwater is being used faster than it is being recharged. Obviously this is not sustainable. In response, water managers are seeking alternatives including recharging aquifers from other sources (currently in Southern California and other locations), switching to surface water supplies if available, use of reclaimed water and desalinating brackish water inland and seawater on the coasts.

Water and energy are closely linked. Large amounts of energy are needed to pump, deliver, treat, heat, and cool water. At the same time, water is needed in energy production at coal, oil, and nuclear electric generating plants, for hydroelectric production and for energy intensive manufacturing processes. Water conservation improvements provide both water and energy savings, extend our scarce resource supplies, and have economic and environmental benefits.

Beyond Temporary Droughts ... A recent analysis by the consulting firm Tetra Tech for the Natural Resources Defense Council found that the present level of water use cannot be maintained and that more than one-third of the counties in the lower 48 states will face increased risk of water shortages by mid-century as a result of climate change. They also found that more than 400 counties, including a large portion of Southern California, will face extremely high risks of water shortages.

We all need to understand water conservation is not just for short term drought shortages. For example, during the early 1990s drought water use in San Diego dropped to 147 gallons per person per day but then after the drought use rebounded to 180 gallons per person per day. Conservation and efficiency improvements can and must be adopted on a continuing basis to meet our future water needs. Continuing and more water conservation are needed and each individual can make a difference. Every drop of water saved will help. (Note: The above article was an invited Foreword to a 12-page special report on water resources published by the Los Angeles Times, August 27, 2010.)

Community, Conversation, Connections ... The 2010 AWRA Annual Conference in Philadelphia, Pennsylvania, November 1-4, is shaping up to be one of the best ever. Conference Co-Chairs Kathy Hale and Martha Corrozi Narvaez, Technical Chair Jim Eisenhardt and Organizing Committee members have created a great program with outstanding keynote speakers and exceptionally high quality sessions with a lot of variety and depth. There will be 75 oral sessions organized into 15 technical tracks including 9 special sessions. A sample of some of the technical tracks and session topics at the conference includes presentations and discussions on river basin planning and management, water supply sustainability, river basin and interdisciplinary approaches to water management, stream and ecosystem restoration, water and energy conservation, water in the next decade, innovative technologies, surface and groundwater source protection, estuary and coastal zone monitoring and adaptive management, legal/policy issues, infrastructure investment, international successes and perspectives, hydrophilanthropy in developing countries, education strategies, and communicating science to policy makers.

The array and integration of scientific, management and policy issues are an excellent testimonial to the multidisciplinary nature of AWRA and its conferences. More information on the conference and AWRA activities, member benefits, and other water resources information is available at http://awra.org.

I look forward to seeing you in Philadelphia!
AWRA congratulates Celso Ferreira, the 2010-2011 recipient of the AWRA Richard A. Herbert Memorial Scholarship—Graduate Student Award, and Tyler Anthony Groh, the 2010-2011 recipient of the AWRA Richard A. Herbert Memorial Scholarship—Undergraduate Student Award.

**Graduate Student Recipient**

**CELSO FERREIRA**

**TEXAS A&M UNIVERSITY**

**COLLEGE STATION, TEXAS**

Celso is currently pursuing his PhD in Water Resources Engineering at Texas A&M University where his focus is on applying GIS to water resources engineering. His broad experience includes traveling, studying, and working in 20 countries; founding a small engineering firm in Brazil; interning at ESRI's Summer Internship Program; serving as the President of the AWRA Texas A&M University Student Chapter; and being recognized for his research and teaching abilities along the way. Celso looks upon his work in water related issues as a mission rather than a career. In his own words, “I am convinced that our generation is going to revolutionize the way our society understands and relates to water ... I have sought every opportunity to learn more about water, environmental issues, and the complex socio-economic relations involved in these issues to make a real difference in the world.” He plans to pursue an academic teaching position when his PhD is complete.

**Undergraduate Student Recipient**

**TYLER ANTHONY GROH**

**UNIVERSITY OF WISCONSIN-STEVENS POINT**

**STEVENS POINT, WISCONSIN**

Tyler is a rising senior at the Univ. of Wisconsin-Stevens Point where he is pursuing a BS degree in watershed management and minoring in soil science and chemistry. His main interest is in the quantity and quality of groundwater, and in particular, water chemistry and hydrology. Tyler has served as the Treasurer of the AWRA Univ. of Wisconsin–Stevens Point Student Chapter, and is currently serving at the President of the chapter. He also is active in the Soil and Water Conservation Soc., serving as its Secretary. During the 2009-2010 academic year, Tyler worked on two research projects, the Plover River Project, and the Horicon Marsh Project. Both are water-quality projects and involve sampling and data collection. In his own words, “I believe that water chemistry might unlock the answer to numerous water issues that we as a country face. For instance, water chemistry may be able to help public wastewater treatment plants come up with more effective ways to reduce the concentrations of nitrates, phosphates, and other chemicals in domestic effluent.” Upon graduating, Tyler will look for work in the groundwater geology or hydrology fields.

**What’s Up With Water ... THE TOWER OF BABEL AND THE BABEL OF POWER ... cont’d. from pg. 27**

Amendment 2631 – Prohibits the National Science Foundation from wasting federal research funding on political science projects.”

This is not an isolated incident. Gov. Bobby Jindal of Louisiana used LUMCON Marine Center as a backdrop for his press conference introducing the plan to build a series of artificial barrier islands to combat the oil heading to shore from the BP/Deepwater Horizon gusher. LUMCON stands for the Louisiana Universities Marine Consortium; a group that has some of the foremost experts in coastal and marine science in the world. Ironically, Gov. Jindal was going against the advice of many of these same scientists, engineers, and analysts from LUMCON, the U.S. Army Corps of Engineers, and most other marine experts. The creation of these islands, first of sand and later perhaps “armored” with stone, will actually do more harm than good through the alteration of tides and currents that may concentrate and trap oil in the coastal marshes. Gov. Jindal babbled on and mainly reinforced that concept succinctly expressed by H.L. Mencken when he observed that for every complex problem there is an answer that is clear, simple, and wrong.

The Fall of Babel tells us of the separation of the human race into groups that at first couldn’t understand each other, and later fought for all manner of resources. Today, babel suffuses the political, social and cultural forums. Some fight to overcome it, some use it to their advantage. Either way, it continues to create chaos and keeps us from resolving problems that need the knowledge and talents of diverse groups.
**President-Elect**

**WILLIAM A. BATTAGLIN**

Bill has been an active member of AWRA since 1993, serving on the Board of Directors, conference committees, publishing in the *Journal of the American Water Resources Association (JAWRA)*, and presenting papers at meetings. He has authored or co-authored 11 articles in JAWRA or other AWRA publications (even one in *Water Resources Bulletin*) since 1990. His article, *Regression Models of Herbicide Concentrations in Outflow from Reservoirs in the Midwestern USA, 1992-1993* received the W.R. Boggess Award for the most outstanding JAWRA paper published in 1998. His latest JAWRA article, *Lagrangian Sampling for Emerging Contaminants Through an Urban Stream Corridor in Colorado* was published in the February 2009 issue. Bill was an AWRA director, serving a 4-year term that ended in 2007. Bill was an AWRA Colorado State Section director in 2005-2007, President-Elect in 2008, and President 2009.

**Director**

**MARTHA CORROZI NARVAEZ**

Martha is an Assistant Policy Scientist with the University of Delaware’s Water Resources Agency (WRA), a unit of the Institute for Public Administration. Martha has been an active member of AWRA for over ten years. Her membership began when she was a graduate student at the University of Delaware and has continued through her professional career.

Martha received her Bachelor of Science (B.S.) in Biology from Lehigh University and her Master of Public Administration (MPA) degree from the Univ. of Delaware where she specialized in watershed management.

Martha has been an active AWRA member both locally and nationally and has served many different roles throughout her ten years with AWRA. Martha was the Charter President of the Delaware Section of AWRA (DE AWRA), is a DE AWRA board member, and served on the Mid-Atlantic Conference committee. Martha also served on the conference planning committee for the 2006 Annual Conference in Baltimore, Maryland, and is serving as the co-chair for the 2010 Annual Conference in Philadelphia, Pennsylvania. Martha has also presented technical papers at numerous AWRA conferences. She served on the Board of Directors from 2007-2010.

Martha believes it is very important to market the Association to both students and young professionals in order to ensure the participation and leadership of young and energetic water resource professionals now and into the future.

**Director**

**LAUREL E. STADJUHAR**

Laurel E. Stadjuhar, P.E., is an Associate and Senior Water Resources Engineer with Bishop-Brogden Associates, Inc, a consulting firm located in Englewood, Colorado. Ms. Stadjuhar has over 13 years engineering experience including project management, surface water and ground water hydrology and modeling, water rights evaluations, long-range planning and reservoir optimization modeling, statistical analyses, hydraulic and structural analyses, model and database development and analysis, and field investigations. She has served as an expert witness in hearings before the Colorado State Engineer and in water court proceedings and is a registered Professional Engineer in the State of Colorado.

Ms. Stadjuhar has a B.S. degree in Engineering and a B.A. degree in Business Administration from Trinity University. She also received an M.S. degree in Water Resources and Environmental Engineering from the University of Colorado. Her graduate work focused on residential water uses and she has experience in water efficiency and conservation evaluation. Ms. Stadjuhar has completed the Colorado Foundation for Water Education’s Water Leaders Program.

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**Solution to Puzzle on pg. 25**

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ABBYE

YEARS
SENSATION
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Share the Multidisciplinarity

Okay, maybe that’s not a real word, but it is the best way to describe what happens when water resources professionals ~ like yourself ~ come together with folks from such a vast array of disciplines all focused on water resources management. And, it’s one of the many reasons you’re an AWRA member, along with timely and practical information in Water Resources IMPACT, more than 40 years of water resources research in IAWRA, and substantial conference & publication discounts.

Current AWRA Members are Our Best Advocates!

Help Us Spread the Word by Inviting Your Colleagues to Join AWRA as a Half-Year Member Today
(and we’ll reward you for your efforts!)

AWRA’s Half-Year Regular Membership is a great way to introduce your water resources colleagues to AWRA. Dues are only $82.50 for July 1 to December 31, and Half-Year Regular members receive the remaining 2010 print issues of Water Resources IMPACT and the Journal of the American Water Resources Association. PLUS, they’ll have access to ALL online publications and member content via their member login. They can register for the 2010 AWRA Annual Water Resources Conference or the 2010 AWRA Summer Specialty Conference as members and save as well!

Here’s how to do it:

1. Carefully tear this page out of IMPACT
2. Write your name and AWRA membership number (you can find this on the mailing label) in the “Recommended by” line on the Membership Application on the reverse
3. Pass it on to one of your colleagues who has not yet discovered the richness of AWRA membership (or make some copies and pass it on to several!)

OR

1. Point your colleagues to the online AWRA application here: www.awra.org/join
2. Ask them to put your name in the “Person who recommended AWRA to you” box
3. Repeat!

For each new Regular member with your name on the “Recommended by” line who joins between July 1 and October 15:

- we’ll send you a stainless steel water bottle with the AWRA logo
- you’ll be entered into a drawing for a full conference registration at your choice of the 2010 AWRA Annual Water Resources Conference or any 2011 conference (drawing will be held October 18, 2010)
- and finally, you’ll receive our undying gratitude!

Thanks for your membership & for passing it on!
**AMERICAN WATER RESOURCES ASSOCIATION MEMBERSHIP APPLICATION – 2010**

MAIL THIS FORM TO . . . AWRA • C/O MIDDLEBURG BANK • P.O. BOX 2217 • LEESBURG, VA 20177-2217

FOR FASTEST SERVICE . . . FAX THIS FORM (CREDIT CARD OR P.O. ORDERS ONLY) TO (540) 687-6395

QUESTIONS? . . . CALL AWRA HQ AT (540) 687-8390 OR E-MAIL AT INFO@AWRA.ORG

---

**Complete All Sections (Please Print)**

**LAST NAME**

**FIRST NAME**

**MIDDLE INITIAL**

**TITLE**

**COMPANY NAME**

**MAILING ADDRESS**

**CITY**

**STATE**

**ZIP+4**

**COUNTRY**

**IS THIS YOUR HOME OR BUSINESS ADDRESS?**

**PHONE NUMBER**

**FAX NUMBER**

**E-MAIL ADDRESS**

**RECOMMENDED BY (NAME)**

**AWRA MEMBERSHIP #**

---

**Membership Categories**

**Regular and Student Members**

- **Regular Membership** ........................................... $165.00
- **Student Membership (Half Year Only)** ....................... $82.50

**Regular and Student Members** receive online access to 40 years of research in JAWRA (Regular Members receive a print version as well), online access to conference proceedings, online and print versions of **Water Resources IMPACT**, and discounts on publications and conference registrations.

**Associate Member – Single Office**

- **Full Year** ......................................................... $500.00
- **Half-Year (July 1-December 31)** .............................. $250.00

**Associate Member – Enterprise Office**

- **Full Year** ............................................................. $2,000.00
- **Half-Year (July 1-December 31)** .............................. $1,000.00

**Associate Members** receive prominent visibility on AWRA’s website, discounts on exhibit opportunities and AWRA job postings, and **Water Resources IMPACT** online and in print (several copies, if requested).

- **AWRA Membership Certificate** ............................... $11.00

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**Demographic Codes**

(please limit your choice to one in each category)

**Job Title Codes**

| JT1 | Management (Pres., VP, Div. Head, Section Head, Manager, Chief Engineer) |
| JT2 | Engineering (non-mgmt.; i.e., civil, mechanical, planning, systems designer) |
| JT3 | Scientific (non-mgmt.; i.e., chemist, biologist, hydrologist, analyst, geologist, hydrogeologist) |
| JT4 | Marketing/Sales (non-mgmt.) |
| JT5 | Faculty |
| JT6 | Student |
| JT7 | Attorney |
| JT8 | Retired |
| JT9 | Computer Scientist (GIS, modeling, data mgmt., etc.) |
| JT10 | Elected/Appointed Official |
| JT11 | Volunteer/Interested Citizen |
| JT12 | Non-Profit |
| JT13 | Other |

**Employer Codes**

| CF | Consulting Firm |
| EI | Educational Institution (faculty/staff) |
| ES | Educational Institution (student) |
| LR | Local/Regional Gov’t. Agency |
| SI | State/Interstate Gov’t. Agency |
| IN | Industry |
| LF | Law Firm |
| FG | Federal Government |
| RE | Retired |
| NP | Non-Profit Organization |
| TG | Tribal Government |
| OT | Other |

**Education Codes**

| HS | High School |
| AA | Associates |
| BA | Bachelor of Arts |
| BS | Bachelor of Science |
| MA | Master of Arts |
| MS | Master of Science |
| JD | Juris Doctor |
| PhD | Doctorate |
| OT | Other |

---

**Water Resources Discipline Codes**

| AG | Agronomy |
| BI | Biology |
| CH | Chemistry |
| EC | Economics |
| ED | Education |
| EG | Engineering |
| FO | Forestry |
| GR | Geography |
| GE | Geology |
| GI | Geographic |
| LM | Limnology |
| OE | Oceanography |
| PS | Political |
| SC | Science |

**Please note your selected code numbers from above**

**Job Title Code**

**Employer Code**

**Water Resources Discipline Code**

**Education Code**

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**Foreign Airmail Options**: Contact AWRA for pricing.

**Please Note**

- Membership is based on a calendar-year (Jan. 1-Dec. 31); after July 1, **Regular and Associate Members** may elect a six-month membership for one-half the annual dues.
- Students do not qualify for half-year membership.
- Remittance must be made in U.S. Dollars drawn on a U.S. Bank.

**Payment Must Accompany Application**

- Payment must be made by check or one of the following credit cards: Visa, Mastercard, Diners Club, Amex, Discover

- Cardholder’s name:

  - Card # ____________
  - Exp. date ________
  - CSC # ________

- Signature (required)

**Your Primary Reason for Joining? (check one)**

- To receive information through JAWRA and IMPACT
- Networking opportunities
- Technical Committee interactions
- Conference discount
- Employment opportunities
- Other: ____________________________

**How Did You Learn of AWRA? (check one)**

- Promotional mailing
- Internet search
- Journal (JAWRA)
- IMPACT
- Boss/Friend/Colleague
- Email received
- Other: ____________________________

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**Print Name**

**Signature**

**Anticipated Graduation Date (Month/Year):**

**Faculty Signature Endorsement:**

---

**Student Members Must Be Full-Time and the Application Must Be Endorsed by a Faculty Member**

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| GR | Geography |
| GE | Geology |
| GI | Geographic |
| LM | Limnology |
| OE | Oceanography |
| PS | Political |
| SC | Science |

**Please note your selected code numbers from above**

**Job Title Code**

**Employer Code**

**Water Resources Discipline Code**

**Education Code**

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**Print Name**

**Signature**

**Anticipated Graduation Date (Month/Year):**

**Faculty Signature Endorsement:**

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TOP FOUR REASONS TO ATTEND

2010 AWRA Annual Water Resources Conference

LOEWS PHILADELPHIA HOTEL
PHILADELPHIA, PENNSYLVANIA
NOVEMBER 1-4, 2010

REASON #4: MULTIDISCIPLINARITY

Is that even a word? Maybe not, but it does describe perfectly what happens when water resources professionals for such a vast array of disciplines come together. If you see yourself on this list, you should attend:

- Agronomists
- Biological Scientists
- Consultants
- Ecologists
- Economists
- Educators
- Engineers
- Foresters
- Geographers
- Geologists
- Hydrologists
- Hydrogeologists
- Information Technology & GIS Specialists
- Physical Scientists
- Planners
- Policy Makers
- River Basin Association Representatives
- Regulators
- Researchers
- Sociologists
- Soil Scientists
- Students Utility Managers
- Water Distribution Professionals
- Water Law Practitioners
- Water Resources & Natural Resource Attorneys
- Waste Water Professionals
- Local/State/Regional/Tribal/Federal Government Representatives
- Natural Resources & Watershed Managers
- NGO's
- Community Based Organizations
- Legislators and Legislative Staff

REASON #3: STUDENTS RULE

Registration for the conference is deeply discounted for student registrants. Plus, we’ve got a new mentoring program, a Student Orientation session on the first day to help you make the most of your conference experience, a Student Career Night with speed networking, and a Student Presenter Competition. If you are planning your career in water resources, you should be here.

REASON #2: BC NETWORKING F2F IS XLNT

(Translation - Because Networking Face-to-Face is Excellent)

AWRA loves all the social network-y apps from Twitter, to LinkedIn, to Facebook. In fact, you can find us and follow us on all three! And, we encourage you to use your social network to spread the word about the AWRA Annual Conference.

OTOH (on the other hand), we would like to give a shout out to good, old fashioned, face-to-face networking. What’s better than “live chatting” IRL (in real life) with your professional colleagues and friends before, in-between, and after the sessions. AWRA’s new “Ask Me About” and mentoring programs makes networking easy and fun ... even for NUBS (new people at the conference)!

REASON #: A SCIENTIFIC PROGRAM AS RICH AND DIVERSE AS A HEALTHY ECOSYSTEM

The AWRA Annual Conference is like a healthy wetland, reef, or rainforest ecosystem with many species linked together, existing in harmony. A conference that offers up to 75 scientific sessions featuring hundreds of oral presentations, a dozen or more technical tracks, 10 panel discussions, and up to 40 poster presentations on every topic of interest to water resources professionals is a rare and wondrous thing. Support the ecosystem of your profession & attend!

COME TO PHILLY FOR
COMMUNITY CONVERSATION CONNECTIONS

Visit www.AWRA.org for more info

REGISTRATION DISCOUNT COUPON!

TAKE $20.00 OFF

your full conference registration fees for the 2010 AWRA Annual Water Resources Conference.

Simply complete & send in this coupon with your mail-in/fax-in registration form (available on the conference website), or use Discount Code 2010PR.OMO on the online registration form.

Go to www.AWRA.org for the most up-to-date conference information.

*** May not be combined with other offers. ***
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When it's time to publish your next work, think JAWRA first!

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PLUS, online manuscript tracking from submittal through publication!

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