Giving credit where credit is due is a very rewarding habit to form. Its rewards are inestimable.

~Loretta Young

AWRA Award Nominations
Deadline for Nominations: May 1, 2018

The American Water Resources Association annually recognizes outstanding individuals in the water resources profession. You do not need to be an AWRA member to nominate or win an award.

Consider nominating a project, colleague, department or organization for an AWRA Award.

Visit www.awra.org for more information and award descriptions.
FEATURE ARTICLES

6 Overview of Water Ethics
Where did water ethics originate and where are they headed?
By David Groenfeldt

8 A Conceptual Framework for Water Ethics
How can values and water categories inform a framework for water ethics? Find out here.
By David Groenfeldt

12 Water Ethics and Professionalism: Quo Vadis?
Is our penchant for gizmos and technology outstripping our ethical foundations?
By Glenn Schrader

15 The Ethics of Flood Risk Management
Flood risk management is not simply about optimization and efficiency.
By Neelke Doorn

18 Endangered by Injustice: The Human Right to Water in the United States
Can we make the human right to water a guiding light of water resources management? The author thinks so.
By Susan Lea Smith

21 MAD About an Ethical Approach to Unsustainable Groundwater Extraction
What is an ethical approach to unsustainable groundwater extraction? And how could someone be MAD about it?
By Michael E. Campana

24 Indigenous Water Ethics: Protecting our Sacred Waters for Future Generations
Indigenous peoples are raising their voices. We need to tune in, or suffer the consequences.
By Mona Polacca and Darlene Sanderson

OTHER FEATURES

Messages
5 President’s Message
Brenda Bateman, AWRA President

Columns
26 Philosophy and Ethics: Fr. Damien of Molokai, Catholic Social Justice and the Human Right to Water
28 Testing the Waters: Integrating Hydrography and Elevation in National Hydrography Mapping

AWRA Business
30 AWRA State Section and Student Chapter News
32 AWRA’s 2017 Annual Water Resources Conference – Student Presenter Competition
33 February JAWRA Highlights
34 2018-2019 Richard A. Herbert Memorial Scholarship Opportunities

About this issue
Issue theme: Managing Water Ethically
Guest Editors: David Groenfeldt, Susan L. Smith, Michael E. Campana

Ethical considerations are becoming increasingly important to water resources governance and management. This issue presents an overview of the important questions as well as some answers. David Groenfeldt provides a brief overview of the birth and growth of water ethics and presents an ethical framework by focusing on categories of water and values. While celebrating the innovation so lauded today, Glenn Schrader poses the question rarely asked: should this gizmo be unleashed in the human marketplace and environment? Where do ethics come into play? Neelke Doorn argues that there is more to flood risk management than simply efficiency or optimization. Ethical issues arise from the distribution of risks and responsibilities and value conflicts. Susan Lea Smith tackles the human right to safe drinking water in the United States and provides solutions to making this right a guiding light of water resources management. Ethical unsustainable groundwater extraction? Oxymorons aside, Michael Campana suggests that stakeholders can get MAD (Managed Aquifer Depletion) and plan for future generations while simultaneously depleting the aquifer supplying them. Mona Polacca and Darlene Sanderson conclude this seminal issue by invoking the voices of indigenous peoples whose innate beliefs espouse ecosystem needs, clean water and sanitation.
WHEN I BEGAN my professional career in 1993, I had the privilege of working for a group of institutional investors (pension funds, university endowments, trusts, estates, etc.) who were interested in using the weight of their financial resources to shape the ethical behavior of U.S. corporations. As part of this work, I had the opportunity to audit the governance, labor and environmental performance of U.S. factories all over southeast Asia. In and amongst all of these activities, it was the appropriation, use and discharge of water that caught my eye. The answers to the questions “who gets the water?,” “how is it used?,” and “how clean is it?” say a lot about who we are as a society.

My next assignment was with a partnership of the U.S. Commerce Department, U.S. Environmental Protection Agency and U.S. Agency for International Development. Through a mix of technology transfer, professional exchanges and policy training, U.S. officials were paired with overseas counterparts to help modernize environmental protections and water supplies in locations throughout Asia.

With the March 2018 edition of IMPACT magazine focusing on water ethics, it is fitting that several of us from AWRA are headed to the 8th World Water Forum in Brasilia, Brazil. Under the theme “Sharing Water,” discussions will focus on the topic areas that still need a lot of work and investment, particularly the U.N. Sustainable Development Goals, the Paris Climate Agreement and the Sendai Framework for Disaster Risk Reduction. A two-day side discussion will explore management of water resources and the provision of water sanitation service.

While attending the World Water Forum, we will observe World Water Day—held on March 22 each year. World Water Day is about taking action to solve the water crisis for 1.8 billion people around the globe—people whose source of water is contaminated, putting them at risk of cholera, dysentery, typhoid and other diseases.

There are a number of ways you can get involved professionally, by ensuring that your customers and communities have the information they need to make informed choices about their drinking water and water infrastructure. Create opportunities so that they have a voice in these issues. Continue to invest in professional training and modern communication tools for your staff and your organization.

There are also ways to make a positive contribution on the personal level. To improve rural drinking water and irrigation systems, you can support the efforts of Heifer International, Engineers without Borders, Water.org, or Green Empowerment. To improve kids’ abilities to swim and to handle themselves around water, you can seek out Swim Tayka. To donate time or supplies to make emergency and personal hygiene kits, contact local relief organizations. And there are always opportunities to remind students and their families of the importance of having clean, reliable sources of water by contributing to AWRA’s Richard A. Herbert Memorial Scholarship or volunteering in the classroom, after-school programs and outdoor camps. Project Wet offers a helpful, hands-on curriculum for all ages.

Please visit conversations.awra.org to describe your experiences and ideas about how we can all get involved in the ethics of water. Because the answers to the questions: “Who gets the water?” “How is it used?” and “How clean is it?” say a lot about who we are as a society.

Brenda O. Bateman can be reached at president@awra.org.

Corrections to AWRA Board of Directors Call for Nominations

The Board of Directors Call for Nominations form included in the January issue of IMPACT had some incorrect information. Following is the corrected information:

- Nominations should be submitted to Martha Narvaez, Water Resources Center, University of Delaware, DGS Annex, Newark, DE 19716 or mcorrozi@udel.edu.
- Nominations must be received no later than February 28, 2018.
- AWRA is also requesting nominations for Secretary/Treasurer.

For complete details and a corrected nomination form, please go to: http://www.awra.org/about/bod-information.html
An Overview of Water Ethics

David Groenfeldt

“Water Ethics” is a young and still-emerging field that has mostly grown out of an initiative by UNESCO’s Commission on the Ethics of Scientific Knowledge and Technology (COMEST) from 1998 to 2004. An initial report in 2000 was followed in 2004 by a series of 14 reports on various aspects of “Water and Ethics” ranging from gender to groundwater to environment, plus a synthesis report, “Best Ethical Practice in Water Use” (co-authored by C. Brelet and Lord Selborne). The reports are available through UNESCO or on the Water Ethics Network website, waterethics.org.

When the UNESCO-COMEST initiative concluded in 2004, the topic was taken up by the Botin Foundation in Spain, resulting in two important publications: Water Ethics (2007), a book of case studies edited by Ramon Llamas and associates, and in 2012 a special issue of Water Policy edited by Jerome Delli-Priscoli. Meanwhile, in 2010, a book on water ethics by Peter Brown and Jeremy Schmidt republished key articles related to water ethics and helped frame the topic as a distinct subfield of water management. My own book, Water Ethics: A Values Approach to Solving the Water Crisis (2013) spelled out a systematic framework (summarized in my article on page 8). Most recently, COMEST has again taken up the theme of water ethics, including both fresh and marine water, with a new report expected in 2018 or 2019.

Parallel to this evolutionary process has been the emergence of Indigenous Water voices, primarily through the triennial World Water Forums. At the 2003 Forum in Kyoto, Indigenous participants proclaimed the “Indigenous Peoples Kyoto Water Declaration” which, though not using the terminology of ethics, was all about ethical responsibilities to protect water, a theme brought home to the U.S. public through the Standing Rock demonstrations in 2016. Indigenous water values have been indirectly absorbed into the development of water ethics, but there is much potential for more deliberate alliance-building.

The “values space” of water management has become, rather surprisingly, an exciting place to be. In addition to “water ethics,” the buzz words include “water integrity,” “water stewardship” and “water values” with initiatives and organizations formed around each of these themes. All these concepts and more can be subsumed within a broad definition of “water ethics.” In spite of the bad taste that the word “ethics” might leave in some of our mouths(!), the deliberate application of ethics has the potential for fostering truly integrated policies that can guide us to the elusive goal of sustainable, just and hopeful water management.

David Groenfeldt is an adjunct associate professor of anthropology at the University of New Mexico, Albuquerque. He established the Water-Culture Institute in 2010 to promote the integration of Indigenous and traditional cultural values into water policy and helped establish the Indigenous Water Initiative to coordinate inputs from Indigenous Peoples in the 2003 and 2006 World Water Fora. Contact: dgroenfeldt@waterculture.org.
AWRA Partner Members

Thank you for your continued support.

AWRA Partner Members* are an integral part of our organization and the field of water resources management. Please take a moment to visit some of their websites and become familiar with what each is doing to further water resources management in their specialty.

*Partners listed are as of January 23, 2018.
Values about water, beyond the usual economic values, are finally getting serious attention in many venues: the UN High Level Panel on Water’s “Bellagio Principles” on valuing water (May 2017); the Vatican conference on water values on World Water Day last year (worldwatervalues.org), and American water utilities sounding the alarm for greater investments in urban water infrastructure (thevalueofwater.org). Meanwhile, the ongoing tragedy of Flint’s water crisis and the tone-deaf and violent response to indigenous values at Standing Rock (see Jennifer Veilleux’s article in Water Resources IMPACT, March 2017, pp. 32-34) have brought water issues to the forefront of public awareness.
Water Ethics and Professionalism: Quo Vadis?

Glenn Schrader
The number and impact of catastrophic floods have increased significantly in the last decade, endangering both human lives and the environment. With ongoing climate change, the risk of flooding is likely to increase even further. Flood management touches upon three major ethical issues: (1) the distribution of risks or safety levels (i.e., distributive justice), (2) value conflicts, and (3) the distribution of responsibilities. Traditional approaches to flood risk management reduce this threefold challenge to an often-monetary optimization problem, emphasizing efficiency but ignoring ethical aspects. The ethical approach to flood risk management which I outline in this paper aims to balance considerations of both efficiency and equity.
Endangered By Injustice
The human right to water in the United States

Susan Lea Smith
MAD About an Ethical Approach to Unsustainable Groundwater Extraction

Michael E. Campana

“Nothing is impossible for the man who doesn’t have to do it himself.”
– A.H. Weiler (Weiler’s Law)

Ethical, adjective: conforming to a standard of what is right and good; may suggest the involvement of more difficult or subtle questions of rightness, fairness, or equity.
– Merriam-Webster Online Dictionary
Indigenous Water Ethics: Protecting our Sacred Waters for Future Generations

Mona Polaeaca and Darlene Sanderson

Water is sacred. Our rivers are the arteries and veins of Mother Earth.


As demonstrated in our submissions to the World Water Forum and other fora, indigenous peoples call for consideration of our views regarding the protection, conservation, safety of and access to clean water (both fresh and saltwater) with sanitation.

Indigenous peoples’ outcry to protect water comes from their worldview: Water, (including surface water, subterranean water and evaporated water) carries the essential cultural, social, historical, genealogical and economic connectedness of all people, plants and animals in the region. Cultural and social perspectives of water and oceans have existed for millennia, and are largely overlooked when decisions are made that affect our waterways. Climate change exacerbates these challenges. Although many efforts address water issues raised by indigenous peoples, this article focuses attention on the efforts to hold the Indigenous World Forum on Water and Peace, an event to give voice to the indigenous peoples’ perspective on water issues and contribute solutions at the global scale.

There is a growing global community of indigenous leaders from across the regions of Mother Earth who are unifying to address the imbalance in humanity’s relationship with water. In 1999, at the World Indigenous Peoples Forum on Education in Hilo, Hawai‘i, a call was issued to indigenous peoples to address water issues by organizing an indigenous-led forum on water.

Since then, there have been similar calls at the 3rd, 4th and 5th World Water Fora (in Kyoto, Japan in 2003, Mexico City, Mexico in 2006, and Istanbul, Turkey, 2009). Also, at the UN Permanent Forum on Indigenous Issues in New York in 2007, 2008, 2009 and 2011, indigenous peoples urged all nation states and all UN agencies concerned with water to support an indigenous-led World Forum on Water and Peace. At least 35 non-governmental organizations, including the Global Indigenous Youth Caucus, the Global Indigenous Women’s caucus, the Global Indigenous Peoples Caucus, and the North American Indigenous peoples Caucus as well as UNICEF endorsed this recommendation.

The 2007 final report of the UN Permanent Forum on Indigenous Issues included this recommendation. However, the report failed to identify clear lines of support for such a forum. To date, no nation state has yet responded with...
Fr. Damien of Molokai, Catholic Social Justice and the Human Right to Water

Eric J. Fitch

IN 1873, BISHOP Louis Desire Maigret, vicar apostolic of the Diocese of Honolulu in the Kingdom of Hawai‘i, called for volunteers from his priests to minister to the leper colony on Molokai. He received four volunteers. The first priest to go was Fr. Damien De Veuster, a Belgian national who was a member of the Congregation of the Sacred Hearts of Jesus and Mary. He had come to Hawai‘i in 1864 and was ordained in that same year. He spent the first nine years of his ministry serving in parishes on the Island of Hawai‘i. In 1865, King Kamehameha IV and the Hawai‘ian legislature created a leper colony on the Kalaupapa Peninsula on the coast of Molokai, and separated from the rest of the island by 2,000 foot high cliffs. The residents of the colony were separated physically from the rest of humankind. They were under-provisioned and functionally abandoned by the Kingdom. Not only were they suffering from Hansen’s disease (leprosy), but from abandonment and exile by their people.

They were a perfect example of what Christian teaching calls the “least of our brothers.”

Fr. Damien arrived on Molokai at the colony in May 1873. His “job” was to minister to the spiritual needs of the residents of the colony, avoid exposure to what was considered a highly contagious disease, and rotate out when his replacement arrived in a few months. He was to be one of four part-time pastors, but he was so touched by the plight of his flock...
Testing the Waters: Integrating Hydrography and Elevation in National Hydrography Mapping

Silvia Terziotti, Karen Adkins, Stephen Aichele, Rebecca Anderson and Christy-Ann Archuleta

RELIABLE AND ACCURATE hydrography data are critical to sound decision-making for many natural resource activities, ranging from traditional water resources subjects like surface water flow management, water resources planning, water quality and flood risk management to conservation and management of aquatic ecosystems, wildlife and habitat, forests and coastal zones. To better understand user requirements and associated benefits of improved hydrography data, the U.S. Geological Survey (USGS) and Natural Resources Conservation Service (NRCS) interviewed respondents from federal, state and local government agencies, private industry, and nonprofit organizations for the Hydrography Requirements and Benefits Study (2016, https://nationalmap.gov/HRBS.html). Results regarding mission critical activities found that annual benefits of existing hydrography data exceed $530 million. Implementing all reported requirements was estimated to add an additional $600 million in benefits. Respondents identified integrated hydrography and elevation data as necessary to their most critical activities, and notably, their greatest need was for hydrography data to align with elevation data at 1:12,000 or better scale.

From the beginning of USGS topographic mapping in 1884 and throughout the era of manual cartography, hydrography and elevation information were collected simultaneously and presented jointly on single map sheets. With the arrival of the digital age, hydrography and elevation data were acquired and managed separately due to disparities in data formats and relative accuracies. Although the national elevation and hydrography datasets have diverged, the user need for integration remains strong as noted in the Hydrography Requirements and Benefits Study.

The USGS is responding to the need for integrated hydrography and elevation data in two ways. First, the USGS is developing the National Hydrography Dataset Plus High Resolution (NHDPlus HR), which is built from 10-meter data from the 3D Elevation Program (3DEP), the National Hydrography Dataset (NHD), and the Watershed Boundary Dataset (WBD). These three data sources are integrated into a geospatial framework that determines the path that water would flow from any point in a stream or on the land surface. The tools to build the NHDPlus HR alter the elevation surface to conform to the hydrography, which is a quick, practical solution if the elevation data are less accurate than the hydrography layer, as has been the case in the past. However, recent growth in high resolution elevation data in 3DEP light detection and ranging (lidar) collections has provided a new opportunity to use another approach to the integration of hydrography and elevation data.

A new technique for providing integrated hydrography and elevation data is being developed using the 1-meter 3DEP lidar-derived elevation data across the nation. The USGS elevation and hydrography programs are currently exploring how to derive hydrography data directly from lidar data, with the goal of updating the National Hydrography Dataset (NHD). This approach of using high accuracy elevation data from 3DEP to create lidar-derived hydrography will greatly enhance the vertical and horizontal spatial integration between landscapes and the stream network, providing the level of accuracy and detail required for local scale applications (Figure 1).

In 2017, the USGS funded a pilot project in five geographic areas to better understand the costs and utility of deriving hydrographic features from lidar data and adding attributes to allow users to relate the lidar-derived linework to the NHD (Figure 2). The USGS developed a data dictionary with a simplified set of hydrographic features that match features in the NHD, such as Stream/River, Artificial path, Lake/Pond, or Canal/Ditch, and developed a set of additional feature

Figure 1. Elevation and hydrography datasets collected separately will have some misalignment of features (circled areas). (A) USGS topographic map: streams and contours match at the 1:24,000 scale; (B) the NHD high resolution streams and a lidar-derived shaded relief elevation surface showing some misalignment; (C) comparison of horizontal alignment of NHD and densified lidar-derived stream network. Base credit: U.S. Historic Topographic Map Collection, 3D Elevation Program, National Hydrography Dataset, The National Map
American Water Resources Student Chapter, University of Wisconsin – Stevens Point

The AWRA–UWSP student chapter has been very active this semester in education, service and development for our members and the communities of Central Wisconsin. We have supported two speaking events on campus, including the Clean Wisconsin Environmental Speakers Program focusing on Wisconsin’s water resources. Every year, we have hosted river clean up days for members and the community, and this fall, we officially adopted a one-mile stretch of the Wisconsin River through Living Lands and Waters adopt-a-river mile program. Almost every weekend, we have organized events for members such as aquatic invertebrate collection tours, lake sampling and groundwater monitoring workshops. As winter sets in, we have been focused on bringing professionals in water related fields to meetings to discuss their careers in water resources. Our plans for next semester include hosting an ice fishing tournament to raise money to send students to the AWRA State Conference in Appleton, WI.

AWRA Florida Continues Momentum in 2018

In February, AWRA Florida co-hosted the 27th Annual Southwest Florida Water Resources Conference in Fort Myers. The conference theme was the Changing Climate of Regulation and Funding. Regulations regarding sea level rise and flood mitigation and insurance were discussed, which is a hot topic due to Florida’s extensive coastline. The keynote address was given by Michael Grunwald, author of *The Swamp: The Everglades, Florida, and the Politics of Paradise*. Performance of regional water systems during and after 2017’s Hurricane Irma was another session topic. Flooding impacts on native ecosystems was discussed, and the degree of preventative maintenance of stormwater systems on flooding problems was highlighted. In addition, a statewide water resources student research poster contest was held for high school and university students and many cash prizes were awarded.
FGCU Student Chapter of AWRA Service Project

The FGCU Student Chapter of AWRA is initiating a service project to read surface-water gauges on our campus in Fort Myers, FL. The gauges measure water level in stormwater detention ponds around campus, and will be used in future research on hydrologic and hydrogeologic modeling for the campus and its watershed. The project will expand to include installing more gauges and conducting more analyses, giving hands-on experience to Chapter students and providing data to municipalities in our region. The Chapter held a canoe field trip in the Imperial River estuary, and is developing a series of speaker presentations and future field trips. We also helped plan and support the February 2, 2018 Florida Section AWRA meeting in Fort Myers.

Central Washington University AWRA Student Chapter

The Central Washington University AWRA Student Chapter recently took a cross country skiing trip to Blewett Pass in the Cascades. They explored the snowpack in the upper elevations and learned about the importance of winter precipitation for water resource planning in the warmer months. Topics included how the SWE (snow water equivalent) has been measured for decades, and how modern SNOTEL (snow telemetry) stations provides important data for water resource planning in the near and distant future. Once spring arrives, the students at CWU hope to be treated to a tour of the Yakima River Drainage Basin, with veteran water resource professional Tom Ring, to learn what happens to this accumulated winter snowpack once temperatures begin to increase.

GIS and Water Resources X

April 22-25, 2018 | AWRA Spring Conference | Rosen Centre Hotel, Orlando, FL

Early Registration Discount

Member Savings: $150
Nonmember Savings: $100
CONGRATULATIONS TO THE Student Presenter Competition winners of AWRA’s 2017 Annual Water Resources Conference held during the conference in Portland, Oregon, Nov. 5-9.

Thirty-five students participated and were scheduled throughout the 22 oral sessions as well as the poster session. Conference attendees were given the opportunity to judge the students during their scheduled session. The following individuals were selected as the outstanding winners:

Winner of Student Oral Presentation: Using Smart Meters to Uncover Drivers of Water Use for Nonresidential Urban Irrigation—Kim Quesnel, Stanford University, Stanford, CA (co-authors: N. Ajami, J. Urata, A. Marx)

Kim Quesnel is a Ph.D. candidate at Stanford University in the Civil and Environmental Engineering department as part of the NSF Engineering Research Center for Reinventing the Nation’s Urban Water Infrastructure (ReNUWIt) and Stanford’s Water in the West program. In Kim’s research, she takes an interdisciplinary approach to investigating urban water demand as a key component of advancing future supply planning. Additionally, motivated by the water sector’s chronic fiscal challenges, Kim is researching novel approaches to water financing and governance that can help to increase innovation in the water sector.

Prior to coming to Stanford, Kim worked as a civil engineer in Denver, Colorado in the field of environmental remediation, responsible for both technical design work and project management. She has also worked on a wide range of water-related research projects including the laboratory investigation of tsunami wave breaking behaviors at the O.H. Hinsdale Wave Research Laboratory in Oregon, the assessment and design of water filtration systems in rural Thailand, and the study of glacier hydrology through field research in Alaska.

Kim received a B.S. in Civil Engineering from California Polytechnic State University, San Luis Obispo and an M.S. in Civil and Environmental Engineering, Environmental Fluid Mechanics and Hydrology from Stanford. In 2016, she was awarded an Environmental Protection Agency STAR fellowship for her research on urban water demand.

Winner of Student Poster Presentation: Degradation of Water Quality Through the Use of Synthetic Titanium Dioxide Nanoparticles and Oxybenzone: The Unfamiliarity of the General Public to Sunscreen Toxicity on Coral Reef Biotas—Martina Cavard, Oxbridge Academy, West Palm Beach, FL (co-authors: T. Thornton)

Martina Cavard is a senior at Oxbridge Academy, and has been conducting independent research regarding the effects of sunscreen on coral reef environments for the past two years. She recently attended the 2017 AWRA National Annual Water Research Conference, where she presented her poster and delivered a lecture presentation; she was one of only eight high school students invited to attend. At Oxbridge, Martina is a member of the Science National Honors Society, National Honors Society and French Honors Society. She is involved in her school’s Green Club, where she organizes and partakes in schoolwide environmental initiatives. Martina is an active participant in her school’s student government association, where she has served as class president and SGA class representative. She will be attending the School of Communication and Weinberg College of Arts and Sciences at Northwestern University in Fall 2018.
Highlights of the JAWRA Technical Papers

Volume 53, Issue 1, February 2018

The February issue of JAWRA is free to the public. View it at: https://tinyurl.com/ybbt8ycf

THIS ISSUE CONTAINS the National Interoperability Flood Experiment II featured collection as well as several other technical papers.

Featured Collection - National Flood Interoperability Experiment II (NIFE II)

The NIFE II featured collection presents seven papers that – 1) evaluate the outputs from the continental-scale flood forecast modeling system with field data and results from other hydrologic models; 2) discuss certain data driven approaches as alternative or complementary approaches to the national data model; and 3) illustrate how streamflow forecasts can be extended to flood mapping and damage assessment.

In the Introduction, Nelson provides a synopsis of the seven papers of the NIFE II featured collection. Model evaluation studies include the paper by Salas et al. who demonstrate the three month nowcasting capabilities of a continental scale streamflow simulation and forecast system implemented through the National Flood Interoperability Experiment. Quintero and Krajewski compare streamflow predictions from the Hillslope Link Model operated by Iowa Flood Center and the National Water Model operated by the National Water Center of NOAA. Finally, Lin et al. assess a large-scale hydrologic modeling framework (WRF-Hydro-RAPID) for simulating evapotranspiration and streamflow over Texas.

Data driven modeling approaches include the paper by Petty and Dhingra who demonstrate the reliability of machine learning approaches to predict streamflows at inoperable gages. Zhao et al. use statistical and hybrid statistical and physics-based models in conjunction with web applications to predict reservoir inflows during flood events. Selvanathan et al. illustrate a hydraulic analysis methodology to estimate national level floodplain changes due to climate change. Gutenson et al. illustrate the utility of Flood Damage Wizard tool to estimate flood damage using approximate fuzzy text matching functions to illustrate how streamflow forecasts can be used in flood management.

Additional Technical Papers

Sadeghi et al. develop and test a method for optimally selecting and sizing stormwater control measures in urban landscapes.

Schifman et al. highlight the utility of EPA National Stormwater Calculator as a screening tool for assessing site runoff dynamics and stormwater management.

Kang and Sridhar assess the impacts of climate change on severity and intensity of future droughts in the Chesapeake Bay Watershed and emphasize the need for using multiple drought evaluation methods using both precipitation and temperature.

Ennenbach et al., based on a national county-scale evaluation, indicate roof based rainwater harvesting has the potential to augment water supplies for urban and suburban uses across the US and especially in counties of the Pacific Northwest, Central, and Eastern regions of the nation.

AWRA Members: Gain full access to all current and back issues of JAWRA by logging into the AWRA website (www.awra.org) then click link to JAWRA Member Home.

2018-2019
Richard A. Herbert Memorial Scholarship Opportunities

Background
In 1980, AWRA established the Endowment-Memorial Fund to be used for the enhancement of education in water resources. The fund has since been renamed the Richard A. Herbert Memorial Educational Fund to honor Richard A. Herbert – a champion for water resources education – who passed away in 1994. In order to carry out his vision, AWRA is proud to announce the availability of scholarships derived from the proceeds of this fund.

Eligibility & Awards Available
Each applicant must be a national AWRA member. At least one $2,000 scholarship will be awarded to a full-time undergraduate student working toward his/her first undergraduate degree and who is enrolled in a program related to water resources for the 2017-2018 academic year. At least one $2,000 scholarship will also be awarded to a full-time graduate student enrolled in a program relating to water resources for the 2017-2018 academic year.*

Selection Criteria
The undergraduate scholarship will be awarded to the student most qualified by academic performance. Measures of academic performance include the cumulative grade point average, relevance of the student’s curriculum to water resources, and leadership in extracurricular activities related to water resources. The graduate scholarship will be awarded to the student most qualified by academic and/or research performance. The measures of academic performance are identical to those of the undergraduate scholarship with the addition of the quality of the student’s research and its relevance to water resources. Recipients will be selected by the AWRA Student Activities Committee and announced during summer 2018.

Application Process
A complete application packet contains:
• Title page that includes the applicant’s full name, permanent mailing address, email address, phone number where he or she may be easily reached, and the type of scholarship (undergraduate or graduate).
• Two-page summary (approx. 500 words) of his/her academic interests and achievements, extracurricular interests, and career goals as they relate to the above selection criteria.
• Resume or curriculum vitae.
• Three signed letters of reference from professors and/or advisors. Letters of reference MUST include the signatures of the referee – PDFs of the signed letters work best.
• Transcripts of all college courses (undergraduate and graduate). Legible copies of “Issued to Student” transcripts are acceptable to save on fees but unofficial grade reports (such as those students can access from their online student accounts at the university) are unacceptable. Application packets that include unofficial grade reports will not be considered.
• Application packets should be submitted electronically to info@awra.org and limited to 5mb in size to ensure delivery. All applications must be submitted in their entirety. AWRA will provide an acknowledgement of receipt of your application but will not provide updates to your application status or request missing information. Please make sure your application is complete when it is submitted. We look forward to hearing from you.

Deadline: All applications and supporting materials must be received electronically by APRIL 23, 2018.
Questions? Call AWRA at (540) 687-8390 or send an email to info@awra.org

*The AWRA Board of Directors may, at its sole discretion, approve additional scholarship awards, based upon the performance of the Memorial Fund.
2018 Spring Specialty Conference: GIS and Water Resources X
Rosen Centre Hotel, Orlando FL
April 22-25, 2018
Early Registration Deadline: April 2, 2018
www.awra.org

If you haven't attended this conference before:
This is the 10th in a series of conferences designed around geospatial solutions to water resources related problems. Innovative water resources scientists, engineers, modelers, software designers from the public/government agencies, academic and private sectors convene to exchange ideas, compare challenges and solutions. If your aquatic research, management, and conservation involves process models, georeferenced field data, remote sensing, or geostatistical models then this is the venue to show that work.

2018 Summer Specialty Conference: The Science, Management and Governance of Transboundary Groundwater
Worthington Renaissance Fort Worth Hotel, Ft. Worth, Texas
July 9 - 11, 2018
www.awra.org

To date, few treaties, decrees or formal agreements have been codified to manage groundwater as a transboundary resource, and there has been limited discussion on the manner in which these agreements could be effectively negotiated and what scientific information is necessary to support their development and implementation.

The goal of this conference is to stimulate conversations on innovative approaches for identifying the transboundary nature of groundwater resources and the methods that can be used to develop governance agreements to aid in sustainably managing groundwater resources that cross political boundaries.

2018 AWRA Annual Water Resources Conference
Baltimore Marriott Inner Harbor at Camden Yards Baltimore, MD
November 4-8, 2018
www.awra.org
DID YOU FORGET TO RENEW YOUR AWRA MEMBERSHIP, TOO?

IT'S NOT TOO LATE, BUT DON'T WAIT!

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2. Login to your member account at www.awra.org and renew.
   (Contact Christine@awra.org with questions.)

Don't miss an issue of IMPACT or JAWRA. Register for a webinar or access the archives. Resolve to join a technical committee and/or post a query on Conversations.awra.org and interact with other professionals who, like you, are creating the day-to-day solutions for water resources management.

In everything we do AWRA works to bring together the thought leaders in water resource management, research and education. Continue to be a part of everything we do. Renew today!

RENEW. PARTICIPATE. CHANGE WATER RESOURCES MANAGEMENT - FOREVER!