



GO WITH THE FLOW

Atlantic Canada Water and Wastewater Association Newsletter

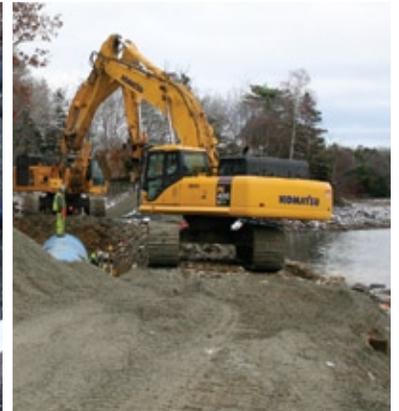
An affiliate of the American Water Works Association and the Water Environment Federation SPRING 2011

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GO WITH THE FLOW is published four times yearly by the Atlantic Canada Water and Wastewater Association, PO Box 41002, Dartmouth, NS, B2Y 4P7. Copyright 2011 by the Atlantic Canada Water and Wastewater Association and the American Water Works Association. Published in the USA.

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On the cover:

Just 15 minutes south of St. John's, Petty Harbour has been continuously occupied since at least 1598, predating the arrival of the Mayflower and making it one of the oldest European settlements in North America. It is also the site of the first hydroelectric generating station (Petty Harbour Generating Station) in Newfoundland and Labrador.

Chair's Corner



AWWA and WEF Ink Pact, and Reaching Out to YPs

by Robert Gillis, P. Eng.

I hope you enjoyed the first issue of our new *Go With the Flow* magazine, published by the American Water Works Association, as much as I did. We are now on our second issue with Amy McHarg from CBCL in Saint John taking over as Newsletter Chair. Thank you Amy for stepping up into that role. Amy requests that if you know of a newsworthy story, project, application or regulation that you feel would be of interest to your colleagues, please ensure you submit to our local office or to her directly (amym@cbcl.ca). If you have any comments or feedback, please be sure to let the office or Amy know. Your input is valued.

Remember, our newsletter will only be as good as the content included; we're especially looking for articles about the

challenges we face in Atlantic Canada, but that may also apply in other places. Sharing the talents, expertise and experience of our members with other North American water and wastewater organizations is one of the great opportunities we have.

Earlier this month, AWWA and WEF announced an agreement to more closely collaborate on programs, services and major policy issues. Details on the arrangement are included in the article on page 4. This is exciting news and lays a stepping stone towards one voice for water and fiscal reasonability for both organizations.

Our Young Professionals Committee is doing some great work by further strengthening our Halifax chapter and expanding into Saint John and

Fredericton with new chapters. A "shout out" should go out to Stephanie Gora, CBCL Halifax, and Scott Grasman, City of Fredericton, for all their continued efforts; and to Greg McCann, City of Fredericton, and Barb Crawford, Dillon Consulting Saint John, for stepping up into leadership roles as local YP contacts. Thank you and keep up the good work! Remember that if you are under 35, or new to the industry and want to get involved, please contact Stephanie and pass along your name and interest.

As a final note, thank you for being a part of ACWWA and I hope you enjoy this issue. If you have any questions or would like to volunteer with any of our committees, please do not hesitate to contact a board member or the ACWWA office.

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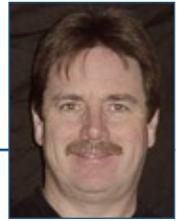
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WEF Delegate's Update



New Members Mean a Bigger Voice by Gary Chew

Hello to all WEF members in Atlantic Canada, hope all is well in the early stages of 2011. Your WEF member association (ACWWA) has been very busy trying to make 2011 an active year for membership, programs and awards. Here are a few notable highlights.

Our Atlantic Canada membership is now over 100, which allows us to be a voting member on the WEF House Of Delegates. We get to play a part in decisions that are made at that level, which is great. I am going to give you, the membership, a project: target at least one person in your organization who could benefit from a WEF membership and get them joined up. It gives them access to the WEF website, which contains loads of material from training to webinars and updates on what is going on in the

wastewater industry. It also gives them a subscription to *Water Environment and Technology Magazine*, and believe me, they will find articles in every magazine they receive that are of interest. The WEF membership form is available on the ACWWA website, from Clara Shea at the office or just email me and I will send it to you.

At our ACWWA conference in St. John's in October we will be getting the 5s Select Society Of Sludge Shovellers award off the ground. We will be nominating one or two members each year depending on the availability of deserving candidates. Watch for the details.

I would also like input from our WEF members on what wastewater training programs you would like to see on our training agenda. This is your association,

so give us your input!

That is about it for now. Check out the WEF website at www.wef.org. There is a ton of good information there, so make use of it. In case you have a question on WEF or would like to become a member, my email is gary.chew@sansom.ca; I would be more than glad to help. A notable date is Oct. 16-19, WEFTEC, in Los Angeles, Calif. It is North America's largest wastewater tradeshow, loaded with great wastewater/water seminars. It is well worth attending. Also, we will see you at our ACWWA Conference in St. John's, Newfoundland. Make sure you say hello to Betty Jordan, the WEF Board Of Delegates representative who will be coming all the way from Alexandria, Va. to be with us in St. John's. See you soon!

AWWA Director's Report



New Bylaws, and ACE Returns to Toronto by Bruce Buchanan

The bylaws for the Atlantic Canada Section of AWWA were approved at the recent Winter Board Meeting in San Antonio. As you may remember, we had to form an AWWA Section again after changing to an association that represented both AWWA and WEF. This is mostly to keep the paperwork in order, and members should not notice any significant changes in the operation of the business.

By now you must have received our first Newsletter prepared by AWWA at their Denver office. The intent remains the same for the Section, to provide the reports and articles to AWWA for the newsletter. AWWA will then supplement the Newsletter with additional water-related content. Based on the positive comments we received, the "new"

newsletter was a good one, and we look forward to the continued success of this endeavor. To help AWWA ensure that success, ACWWA is attempting to obtain a permit that will significantly cut postage costs for the newsletter.

Congratulations to Wayne Stiver of the Ontario Section, who was elected vice president at the Winter board meeting. His term will run from June 2011 to June 2012. This is important for Canadian Sections, which will now have representation on AWWA's Executive Committee. You may remember that Ken Brothers held this position while a director for Atlantic Canada.

Charlie Anderson of the Texas Section was elected as incoming AWWA president, to take office in June 2012.

Good news on the Canadian front, the Annual Conference and Exposition (ACE) will be returning to Toronto. After the board approved the six-city rotation (which excluded Toronto), a policy was developed, as a result of a strong push by the Canadian directors, to allow other cities to submit proposals to AWWA. The City of Toronto, after building a new convention center, stepped up to the plate with a very good financial proposal. The schedule is for ACE to be in Toronto in 2023 and again in 2029 as a result of the unanimous approval from the AWWA board. ACE has always been successful financially when it came to Toronto and very well attended by the Canadian members.

Continued on page 9



AWWA, WEF Sign Collaboration Agreement

The American Water Works Association (AWWA) and the Water Environment Federation (WEF) announced an agreement to more closely collaborate on programs, services and major policy issues.

The resolution states that the organizations “resolve to support and lead as necessary an effort to develop a cohesive voice for the water community by encouraging collaboration between our members, coordinating programs and services, and developing consensus on major water policy issues.”

The agreement grew from a conversation among AWWA and WEF presidential officers and treasurers, who gathered in Washington, D.C. during the fall of 2010 to explore opportunities to work together. WEF’s board of directors approved the resolution at its November meeting and AWWA’s board completed the approval process in January. With the resolution in place, leaders from both organizations will develop a work plan for 2011 and subsequent years to fulfill the spirit of the agreement.

“This resolution enhances our existing efforts to work more closely together to advance sound water policy, the interests of our members and the publics they serve,” said WEF President Jeannette Brown. “Both AWWA and WEF are excited to explore



future partnerships that make the water profession’s collective voice even stronger.”

“The water industry has changed in recent years, and our work is no longer easily defined as either ‘water’ or ‘wastewater,’” said AWWA President Joseph Mantua. “AWWA and WEF recognize that, now more than ever, increased collaboration will benefit members from both organizations and improve our collective effectiveness, particularly in matters of public policy.”

AWWA and WEF already work together on many initiatives, including the Young Professionals Summit, the Utility Management Conference, the Work for Water workforce development project and in many other areas. As a first step under the new resolution, the organizations recently announced plans to combine forces for the 2011 Water Matters! Fly In, which will bring more than 150 leaders from both organizations to Washington, D.C., in April to inform Congress on key water issues.

Canadian Affairs Committee Report by Bruce Buchanan

The AWWA Board, at its Winter meetings, approved the sunsetting of the Administrative and Policy Council. This has a direct effect on the Canadian Affairs Committee, as it reported to APC.

In 2010, AWWA completed a program analysis of all their committees, councils and programs. This was carried out to determine the effectiveness of the committees, councils and programs to AWWA and its members. Each was scored and ranked in the top third, middle third and bottom third. Those that scored in the bottom third were categorized into three categories; 1 for sunset; 2 for repackage/repurpose and 3 to provide a timeline to achieve predefined results with the objective of beginning the process of making resources available for new programs and initiatives in the future.

As a result of this analysis, the Executive Committee recommended to the board that APC be sunsetted.

The board then approved the formation of an ad hoc committee consisting of members from the Canadian Affairs Committee, Sectional Services Committee and the Membership

Committee. These committees formed the ad hoc, as they were the committees that reported to APC and now needed new direction.

The other duties of APC were either sunsetted or transferred to another council. Another committee may be formed if required.

In general terms, the ad hoc committee will determine if there are adequate common issues among the three committees to form one or two committees, or if there is no common ground, that three committees should remain.

Once that is determined, the final issue to resolve is where the committee(s) will report. Will that be to another committee or directly to the Executive Committee? When CAC was originally formed, it reported to the Executive Council.

The three committees are preparing background information that will be submitted to the ad hoc committee. The information will be reviewed to determine the new composition and function of the committees. The tentative schedule for the ad hoc committee is to report to the AWWA board at ACE11.

Water Research at Dalhousie: People, Discovery, Innovation

by Graham Gagnon, Dalhousie University

At the 2010 National Drinking Water Conference, my colleague and friend, Judy MacDonald, encouraged me to get the word out on our research program at Dalhousie University. Thus, one of my New Year's Resolutions for 2011 is to prepare a few short pieces about it for *Go With the Flow*.

As a University researcher who receives support from the Natural Sciences and Engineering Research Council of Canada, I will prepare three articles that address "People, Discovery and Innovation," the pillars for NSERC research. This first article will address the "people" aspect of the program.

In NSERC terms, the success of a research program is often assessed by whether it graduates Master's or PhD students who have had an impact the Canadian water industry. John Eisnor, Mike Chaulk and Dr. Jennie Rand are three water professionals who are making their stamp.

John Eisnor is a key member of the engineering group at Halifax Water. John completed his Master's in 2001, studying water quality in distribution systems. In 2007, John and his wife Christine Bonnell-Eisnor were awarded the J.D. Fraser Service Award from Engineers Nova Scotia.

Mike Chaulk graduated with his Master's in 2004 in the area of membrane treatment. In 2010, Mike, along with his colleagues from CBCL Limited, were awarded the ACEC Canadian Consulting Engineering Award of Excellence for their design of the Tatamagouche Water Treatment Plant.

Dr. Jennie Rand is an Assistant Professor at Acadia University who completed her PhD in 2006. In 2010, she was awarded a large equipment grant to set up her research program at Acadia and is contributing to ACWWA by directing the Section's scholarship program.

While I really cannot take credit for any of the professional successes of John, Mike, or Jennie, they are examples of the bright young talent from university labs who will change the face of the water industry in the years to come. For ACWWA, they also illustrate why the "Fresh Ideas" competition, the "University Forum" and the "Young Professionals" committee are so important.

For our current cohort of graduate students, 2010 was a fantastic year! Yamuna

Vadasarukkai (PhD student) represented our section as the ACWWA Fresh Ideas winner for 2009 at the AWWA Annual Conference in Chicago. Alisha Knowles (PhD student) was invited to provide an AWWA webcast concerning removal of organic matter by coagulation. Finally, Krysta Montreuil (Master's student) won the 2010 Fresh Ideas contest in Saint John, NB for her work on characterization of organic matter.

Our research program relies heavily on the goodwill and financial support of many water utilities, provincial agencies and private industry in Atlantic Canada, which have been highly supportive of our students and their research outcomes. My next article will focus on *Discovery* from our water research program.

Graham Gagnon is a Professor & the NSERC/Halifax Water Industrial Research Chair at Dalhousie. He is a Past Chair of ACWWA and the 2009 recipient of the Ira MacNabb Award.



Reid Campbell, M.Eng., P.Eng., Director of Water Services at Halifax Water is pleased to announce the appointment of Alisha Knowles to the position of Water Quality Manager. Alisha is a member of AWWA, ACWWA, and also completing her Ph.D. candidacy at Dalhousie University. Alisha has spent the last four years as part of Dr. Graham Gagnon's team at Dalhousie University, working in the NSERC - Halifax Water Industrial Research Chair in Water Quality and Treatment. Alisha will be leading Halifax Water's efforts in water quality research, process optimization and water quality master planning.





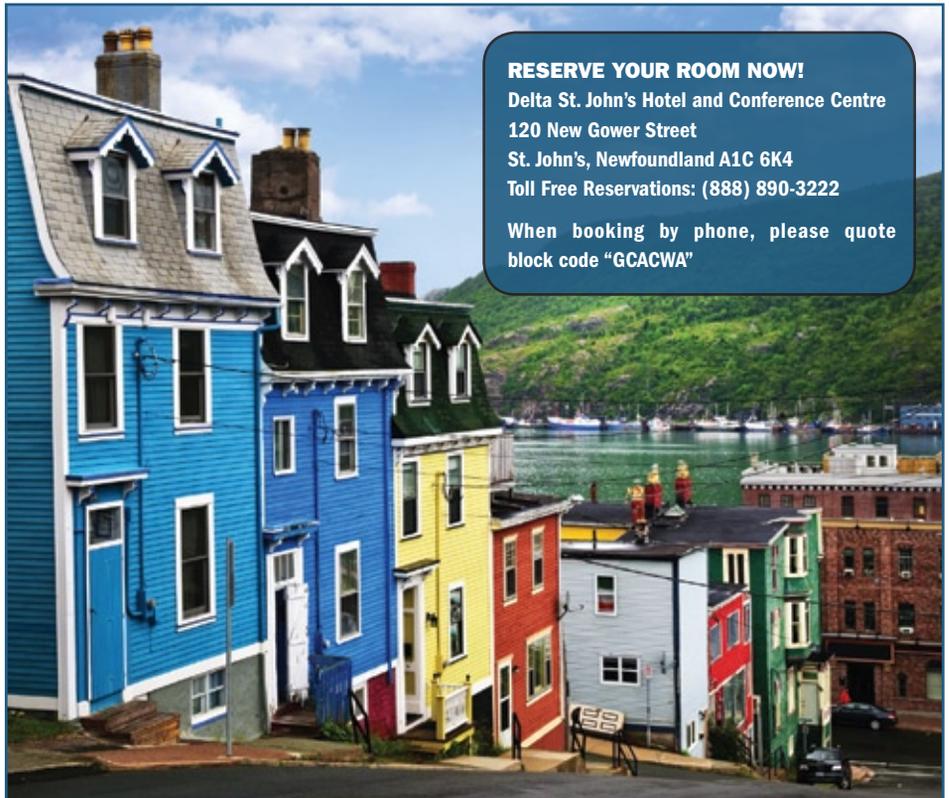
Annual Conference 2011: Got Water?

Join us in St. John's, Canada's oldest city, as we all talk about water and wastewater. Water and wastewater have been topics of conversation and concern from the public to the political sectors. We all know we "Got Water," but can we keep it in good supply and keep it safe for consumption? Quantity and quality are everybody's concern.

From Hurricane Igor's devastation in Newfoundland to the state of emergency in parts of Nova Scotia, water is a necessity. It can be devastating to the population if it is unobtainable, even for short periods of time.

The influx of debris or flood water infiltration into our source water from natural events can put increased strain and challenges on our potable water treatment plants, but it doesn't end there—increased stress on our infrastructure, small systems, and larger flows and storm water infiltration can overrun our wastewater treatment facilities.

Reunite with friends and colleagues as we share our Newfoundland hospitality and discuss the many issues and challenges that we as water and wastewater profes-



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sionals must contend with in the production, conveyance and removal of waste from water.

Eger Takes WEF Helm

Jeff Eger, former executive director of Sanitation District 1, in Fort Wright, Ky., assumed leadership in February of the Water Environment Federation.

WEF's board of trustees first announced Eger's hiring as the organization's new executive director in December. "It is an extreme honor to join such a dedicated team of water professionals. The volunteer leadership and staff have been quite helpful during this transition," said Eger. "I couldn't be more optimistic about WEF's future, and look forward to being a part of these efforts."

During his 16-year tenure with SD1—the second largest public sewer utility in Kentucky, with \$1 billion in assets—Eger developed and implemented a regional stormwater management program to comply with USEPA regulations, and began taking responsibility of public stormwater collection systems in 2009. He also supervised the regionalization of 30 municipal sanitary

sewer systems in response to pending federal environmental regulations and legislative changes.

In addition, Eger has experience in working with organizations active on the regional and national levels. He is a member and past chairman of The Ohio River Valley Water Sanitation Commission (the water pollution control agency for the Ohio River and its tributaries) and also chairs the Wet Weather Partnership, a national organization dedicated to seeking environmentally responsible solutions to urban wet-weather issues. Eger earned a communications degree from Northern Kentucky University.

A full Q&A, including Eger's immediate and future plans for the Federation, is available at www.wef.org.

"We are very excited to now have Jeff on board and look forward to working with him to further WEF's mission of preserving and enhancing the global water environment," said WEF President Jeanette Brown.

Sackville Gets New Water Tank

by George Woodburn, P.Eng., Town of Sackville, and Bruce Buchanan, P.Eng., R. V. Anderson

The Town of Sackville recently commissioned its new 2,500 m³ elevated water-storage tank. The composite structure, consisting of a 19m-high concrete pedestal and 14m-high steel tank for water storage, is located near the downtown.

A review of the water storage requirements for the town was completed shortly after the construction of the new water treatment plant in 1998. Work undertaken by the Insurance Advisory Organization in 1999 predicted that a major fire would deplete the Town's water supply; a review by R. V. Anderson Associates in 1999 determined that the Town was in need of an additional 2500 m³ of storage.

With the introduction of the infrastructure funds by the federal government to assist municipalities with their aging infrastructure, the decision was made by town council to apply for funding.

The importance of the additional storage hit home one evening in August 2006, when a fire started in an apartment building on Main Street. The building was old and the fire spread quickly, engulfing the structure, sending flames high in the air directly across from Town Hall and adjacent to many businesses. Several neighboring communities provided firefighting assistance.

In order to monitor the water availability in the system, the town engineer took up a post beside the fire chief and kept in continuous touch with the utilities foreman, who was at the water treatment plant.

The available water storage at the WTP was augmented by water from Silver Lake, located on the East side of town. The 12-hour fire basically consumed all the available water in the town's distribution system.

Later that year, the town completed the design for the elevated water tank, so the project would be "shovel ready" once funding was received. The town received funding in January 2009.

Landmark Structures was awarded the contract in April and construction commenced in May. The concrete pedestal was completed by September and the tank was substantially completed in July 2010. Included in the project was 1km of water line to connect the elevated water tank to the water system.



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ACWWA Cross Connection Control Committee Seeking Members

The ACWWA Cross Connection Control Committee is seeking members from all four Atlantic Provinces. The committee's mission is to promote the local standardization of cross connection control regulations and programs, create awareness of cross connection control and facilitate certification of cross connection

control professionals, to increase the safety of drinking water in Atlantic Canada. If you are a purveyor, regulator or work in the Cross Connection Control industry and are interested in joining our committee, please contact committee chair Fred Sawyer, (506) 658-6698, or E-mail fred.sawyer@nbcc.ca.

Fixed Network AMR System for Moncton by Max Fawcett

Management consultant Peter Drucker said that if you can't measure something, you can't manage it. The city of Moncton could add a footnote to that widely traded aphorism, based on its experience implementing a fixed network AMR system. As they've learned, the more accurately you measure something, the easier it is to manage.

But the decision to install a new system of measurement for water usage wasn't inspired by any management theories. Instead, it was motivated by the imminent failure of the existing system, a telephone-line based set-up that shared infrastructure with the city's other utility networks. "In the end," says Mike Richard, the city of Moncton's utilities supervisor, "we had a quarter of our accounts that weren't reading." They thought about patching up the old system, but soon realized that the only satisfactory solution was an entirely new system.

Enter the Hexagram STAR system, a radio-based network that relays information from the household meter transmitter units to a series of 28 data collection units that are mounted on roofs and utility poles throughout the city. Those units can take up to four reads a day, and that information, once collected, is linked into the billing system. Both the city and its customers have benefited from the enhanced quality of information, which was instrumental in the city completing its first-ever International Water Association water audit in 2008.

The system also allows the city to create usage pattern profiles in order to determine when something unusual is happening. "If the average current is 200 per cent above the previous level, then you've either got theft or a leak," Richard says. "This provides us with a service call, where we can go out and respond at a given time." Those service calls, Richard suggests, have helped

the city curtail the number of leaky toilets, bathroom fixtures and frozen pipes, all of which can lead to substantial volumes of wasted potable water. "It's become a big leak detector, you might say." Plugging those leaks is having an impact, too, if the city's consistent water consumption levels are any indication.

Robert Gillis, an engineer with Atlantic Purification Systems Ltd. and the chair of the Atlantic Canada Water & Wastewater Association, says that Moncton's monitoring system illustrates the value of good information. "Without accurate knowledge of what's going on in your water distribution system and the efficient relaying of that information, you can't provide the level of service necessary to ensure that safe drinking water is provided to your residents." Perhaps more important is the influence that this kind of accurate knowledge can have on the people who generate it. In Moncton, the fixed network AMR system has stimulated a greater interest water usage patterns and how to improve them. "You can monitor your own usage," Richard says. "Customers become more educated; they tell two friends or neighbours and the power in numbers just grows exponentially because you've educated them and empowered them to do it themselves."

This article originally appeared in the Water's Next supplement found in the January/February 2011 issue of Water Canada magazine. Reprinted with permission.



Membership Committee Members Wanted

Members are the backbone of the Atlantic Canada Water and Wastewater Association—without members we cannot be successful. Therefore it is important for ACWWA to grow its membership. The Membership Committee has been tasked to achieve this goal.

The Membership Committee is made up of enthusiastic indi-

viduals who believe in making and keeping water safe. If you are a passionate individual who has a strong desire to make ACWWA the leading professional association in Atlantic Canada, please consider joining the Membership Committee. If you are interested in getting involved, please contact John Eisnor at johne@halifaxwater.ca or (902) 490-1930.

WEF Delegate's Update

Continued from page 3

AWWA's 2011 budget was approved at \$28,776,800, including our section allotment of approximately \$16,000. The association continues to work hard on controlling expenditures, and a surplus was realized, though smaller than projected.

The association continues to lose members, and 2011 is projected to be no different. Membership is the one of the main income generators for the association, but one of the main reasons for the drop in membership (determined by exit surveys) is employers not paying for memberships due to tough economic times. The second factor is the increasing number of life members, which receive free membership after 30 years with the association.

It worth noting that Canadian membership remains strong, with very little fluctuation in the numbers during this overall decline.

In other news, the presidential officers and executive directors of AWWA and WEF met in September, 2010 with the idea of enhancing the collaboration between the organizations. After the meeting, a smaller group was assembled (consisting of immediate past presidents and executive directors) to develop a board resolution. The resolution is a starting point for AWWA and WEF to work more closely together to advance sound water policy. The following is the resolution approved by the AWWA Board at the Winter meetings:

WHEREAS; AWWA and WEF understand that a thoughtful, integrated and coordinated approach to the important public health, environmental, financial and societal challenges associated with clean and safe water is in the public interest.

WHEREAS; AWWA and WEF recognize that effective collaboration will advance the science of water and positively influence the development of sound water policy.

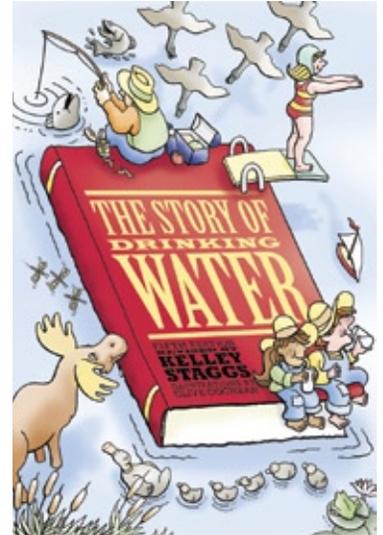
WHEREAS; AWWA and WEF acknowledge our responsibility to develop consensus on the major water challenges facing society.

NOW THEREFORE; AWWA and WEF resolve to support and lead as necessary an effort to develop a cohesive voice for the water community by encouraging collaboration between our members, coordinating programs and services and developing consensus on major water policy issues.

The Board also approved the sunset of the Administrative and Policy Council. This has a direct effect on the Canadian

Affairs Committee, as it reported to APC.

Finally, AWWA has an all-new edition of *The Story of Drinking Water*, AWWA's best-selling activity book for children. The booklet was expanded from 16 to 24 pages and includes new colorful illustrations and age-appropriate activities. The new edition follows science curriculum guidelines for grades 4 to 6, which broadens its marketability to the education market. A companion teacher's guide with additional water activities has also been developed.



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Diana Lane, managing scientist, and John Cromwell, managing economist, are with Stratus Consulting (www.stratusconsulting.com), Boulder, Colo., and Washington, D.C., respectively. Elizabeth Strange is a senior technical specialist with ICF International (www.icfi.com), Washington, D.C.

Source Water Protection

When major watershed events affect vegetation, drinking water supplies can be placed in peril. Forward-thinking utilities are assessing and managing such events to minimize risks to their drinking water supplies.

BY DIANA LANE, JOHN CROMWELL, AND ELIZABETH STRANGE

RISK MANAGEMENT PREPARE FOR WATERSHED EVENTS TO ENHANCE WATER TREATMENT

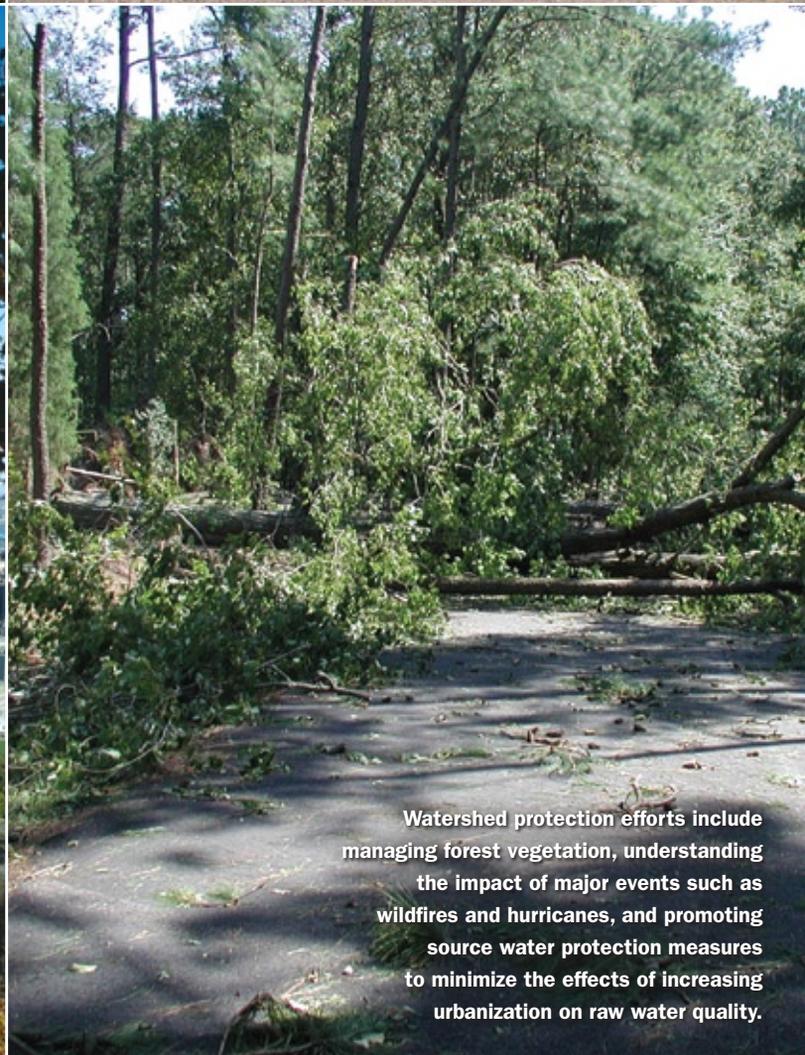
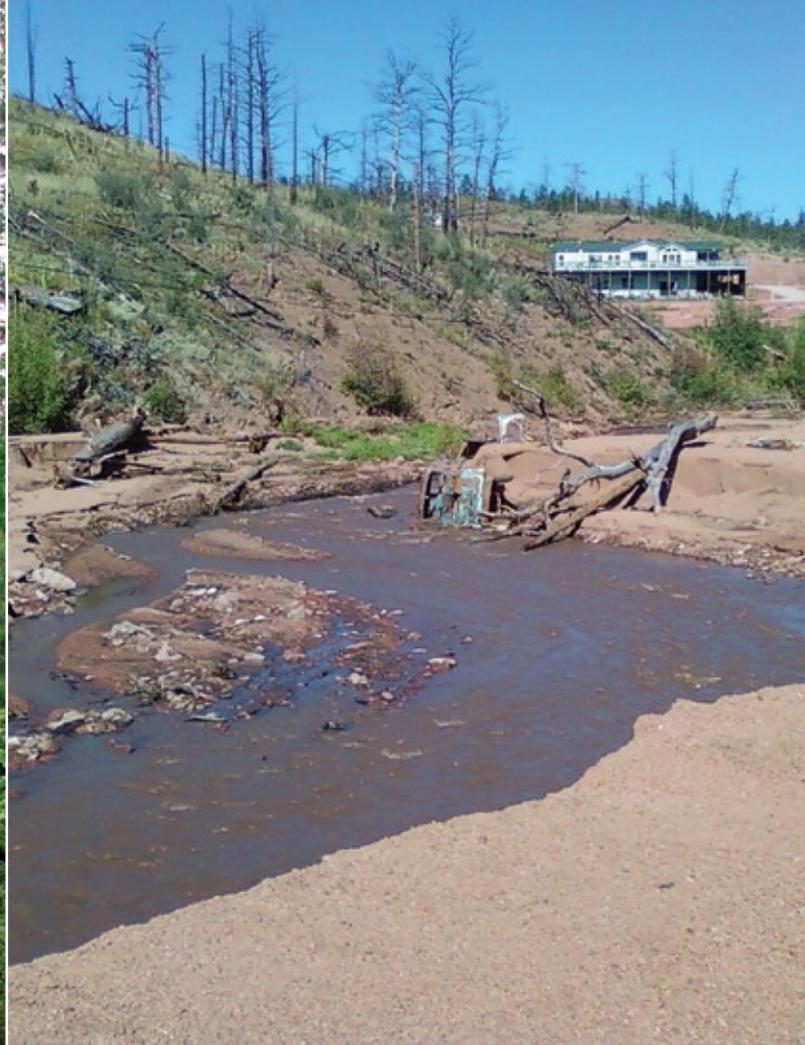
UTILITIES DEPENDING ON surface water face risks from a variety of natural and human-caused events that affect vegetation and disrupt source water quality or quantity. After major events such as a wildfire, hurricane, flood, or mudslide, utilities may have to shift to emergency operations because of water quality variables outside the range of normal treatment processes.

The risks depend on the ecological and sociological characteristics of a utility's watershed and the utility's collection, storage, treatment, and distribution systems. A utility in a sparsely developed forested area could face a high risk of wildfire and little risk of urbanization. A utility in a fast-growing coastal region might face a high risk of

urbanization and hurricane or flood damage. A direct filtration plant faces risks different from those of a conventional filtration plant.

Utility managers can proactively manage potential watershed disruptions by

- assessing specific risks with respect to large-scale vegetation changes.
- understanding the impact of fire, storm, and urbanization events on water quality and quantity.
- understanding potential management strategies that can help reduce risks of large-scale vegetation changes or mitigate the effects of these changes.
- learning from experiences of other water utilities that have coped with major events and their aftermath.



Watershed protection efforts include managing forest vegetation, understanding the impact of major events such as wildfires and hurricanes, and promoting source water protection measures to minimize the effects of increasing urbanization on raw water quality.

Source Water Protection

ASSESS RISKS

Water utilities should understand which large-scale watershed events can produce water quality variables outside the range for which their treatment facilities were designed. Natural events include wildfires; storm events such as hurricanes, tornadoes, and floods; mudslides; insect and pathogen infestation; and drought. Impacts of human-caused events, many of which occur gradually and often aren't readily apparent, include invasive species, timber harvesting, and land-use conversion such as agricultural development or urbanization. Events may occur singly or as event cascades in which one event, such as a wildfire, triggers subsequent events, such as mudslides or exotic species invasions.

To assess risks, utilities can

- identify the types of large-scale events that may occur in their watersheds; historical information can provide a starting point.
- survey and map areas of existing damage, if any, and areas likely to be sensitive to future events.
- assess the relative risks of particular events, considering the likelihood of occurrence and relative magnitude.
- compile sources of real-time information, such as updated drought and wildfire predictions and urbanization maps, to assess ongoing risk.
- identify potential event cascades.
- identify key vulnerabilities and treatment concerns for each type of event.

UNDERSTAND IMPACTS

Large-scale vegetation losses lead to soil changes, which can increase water volume, surface runoff, and erosion, as well as decrease water quality and water infiltration. The figure on page 13 compares runoff and sedimentation for intact forests with runoff and sedimentation in forests affected by fire or agricultural conversion. After major fire and storm events, increased erosion and sediment loads can affect water quality within hours and persist for more than a decade.

Large-scale vegetation changes can mobilize organic matter, organic and inorganic chemicals, and microorganisms carried downstream in runoff or bound to eroding sediments. Large-scale vegetation change typically affects several categories of water quality parameters, including

- Suspended solids
- Dissolved organic and inorganic chemicals (e.g., cyanide, hydrocarbons, manganese, fertilizers, pesticides, and salt)
- Total organic carbon
- Microbial contaminants

The type and quantity of sediments and contaminants deposited or dissolved in drinking water sources dictate treatment needs. Persistent or severe changes in these parameters can necessitate additional pretreatment processes; filtration technologies; disinfectants; advanced technologies; and, in some cases, changes to treatment facilities requiring significant capital and operating expenditures. Slow-sand filtration beds, for example, can be clogged by source water with high clay content. Direct filtration and conventional treatment plants can be disrupted by source water with high turbidity, requiring additional chemicals and coagulation time to achieve desired end points.

Large-scale vegetation change also can affect the quantity and timing of water availability. The total volume of water obtained from a watershed can increase if vegetation cover is removed. In addition, decreased vegetation cover can lead to increased "flashiness" in streams, with large, faster streamflows following rainfall or snowmelt. These changes can make capturing and storing water more difficult or necessitate larger reservoirs. In contrast, the replacement of native vegetation by nonnative species may result in decreased water yields if introduced species have higher biomass and transpiration rates than native species.

UNDERSTAND STRATEGIES

Various strategies can help water utilities prevent or reduce the risk from large-scale

watershed vegetation changes. Some events, such as catastrophic wildfire and insect infestations, can be prevented or minimized by watershed management strategies to reduce fuel loads, increase species and age-class diversity, and promote watershed health. Negative effects of human activities such as timber harvest, urbanization, and agriculture can be avoided or minimized if a utility can purchase the vulnerable land, obtain restrictive conservation easements, or work with landowners. Risks from these events also can be minimized through best management practices to reduce soil erosion and sediment loadings.

When events occur, management strategies can minimize source water harm. For example, sediment traps, sediment management plans, and aggressive revegetation efforts can minimize turbidity increases after major fires or storm events. Protecting buffer areas around streams can minimize the effects of land-use changes, such as a timber harvest or agriculture. Minimizing algal growth in reservoirs also can benefit influent water quality.

LEARN FROM OTHERS

Utilities can learn from the experiences of other utilities. A Water Research Foundation report—*Utility Guidance for Mitigating Catastrophic Vegetation Change in Watersheds*—provides 18 brief case studies about water utilities that have responded to catastrophic events or the risk of future events. The case studies include the following watershed management practices:

- The Massachusetts Department of Conservation and Recreation, Division of Water Supply Protection, manages its watershed forests to increase structural and species diversity to minimize the effects of natural disturbances and provide high-quality surface water for the unfiltered Massachusetts Water Resources Authority's regional water system.
- Fairfax (Va.) Water participates in a voluntary, regional-based partnership of water utilities and government partners

The best strategies consider the speed at which a triggering event occurs, an event's predictability and likelihood, and the magnitude of immediate and cumulative impacts to water supply and treatment needs.

where water supplies cross state boundaries to give water utilities a stronger voice in watershed protection efforts.

- Asheville (N.C.) Water Resources Department experimented with biological control agents to reduce the threat of an insect outbreak that threatens a large stand of mature hemlock trees, but there was no strong evidence of benefit.
- Bend (Ore.) Water Division has a high-quality drinking water supply that originates in an old-growth forest at high risk of wildfire. The city supports fire prevention efforts and completed a feasibility study for a water treatment facility that could be modified to accommodate high-turbidity water after a wildfire.
- Denver Water has experienced several major wildfires that caused large, expensive disruptions to normal operations. The utility has responded with proactive revegetation, construction of sediment traps, and forest management efforts.
- Newport News (Va.) Waterworks receives water from six watersheds that are threatened by hurricanes, floods, drought, and urbanization. The utility works cooperatively with state government agencies to protect the watersheds and engages in heightened forest management after large storm events.

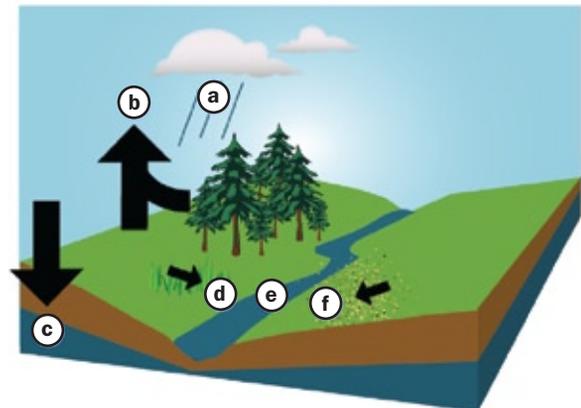
DEVELOP AN OVERALL STRATEGY

To minimize negative effects of large-scale watershed events on drinking water quantity and quality, utilities can respond with a variety of strategies. The best strategies consider the speed at which a triggering event occurs, an event's predictability and likelihood, and the magnitude of immediate and cumulative impacts to water supply and treatment needs. Developing effective strategies requires good communication among water treatment plant operators and watershed managers. A utility can analyze which preparation or response strategies are environmentally appropriate and cost-effective. Such planning can minimize water supply disruptions or costly additional treatment.

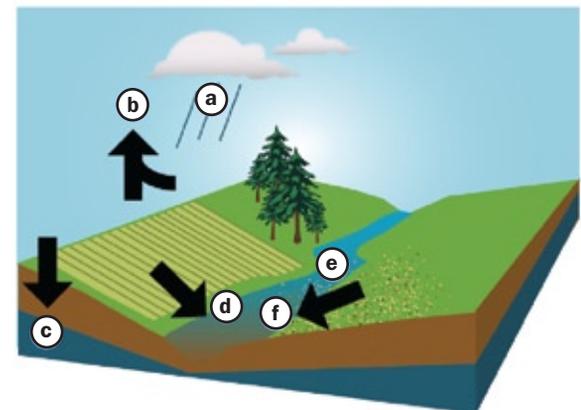
Key Hydrological Processes

Arrow size indicates the magnitude of flux in (1) intact forests, (2) intensive agriculture, and (3) forests after wildfire.

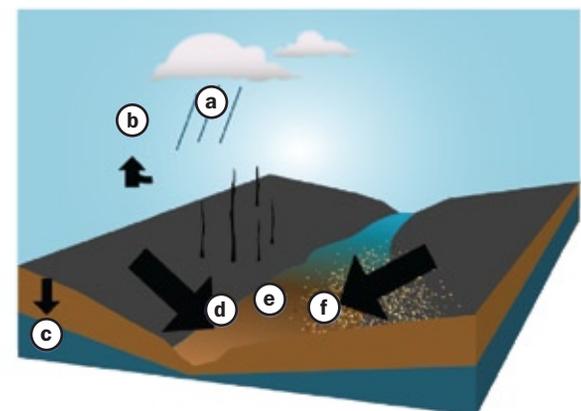
1. In intact forests, evapotranspiration and infiltration rates are high, leading to low runoff and sedimentation.



2. Conversion to agriculture is associated with periodic disturbance of vegetation and soil compaction, reducing evapotranspiration and infiltration and increasing runoff and sedimentation.



3. Fire removes vegetation and makes soil surfaces impermeable, dramatically reducing evapotranspiration and infiltration and increasing runoff and sedimentation.



LEGEND

- | | | |
|------------------------|------------------|-------------------|
| (a) Precipitation | (c) Infiltration | (e) Stream Volume |
| (b) Evapotranspiration | (d) Runoff | (f) Sediment |

SOURCE: STRANGE, E.M.; LANE, D.R.; AND HERRICK, C.N. UTILITY GUIDANCE FOR MITIGATING CATASTROPHIC VEGETATION CHANGE IN WATERSHEDS. ©2009 WATER RESEARCH FOUNDATION. REPRINTED WITH PERMISSION.



SHARON PHILLIPS

What drives tomorrow's water leaders

MANY YOUNG PROFESSIONALS
HAVE FOUND THAT INTEGRATED
WATER MANAGEMENT STUDIES
HELP THEM TO BE TRULY
EFFECTIVE IN THEIR WORK.

Ask Karen Franz Delfau from the United States why she chose a career in water management and she'll give you one word: Passion. Delfau has a tremendous passion for water. With a background in research science, community empowerment, law and policy, and project development and management in developed and developing countries, she has worked for 10 years in the water industry in various positions around the world.

But passion, it turned out, was not enough. Delfau found she was not able to see beyond the immediate challenges to address their root causes. She worked harder and harder to try to do this. At one point her employer identified that she was performing three full-time roles, and yet it still wasn't enough to bring about effective and lasting change. She's not alone in the water sector in such a level of commitment.

Fellow students in Australia, where Delfau is enrolled in the International WaterCentre's (IWC's) Master of Integrated Water Management, come from all over the world, but they have almost all been driven there by a similar passion—to make a real difference in environmental and humanitarian issues in the world.

ACROSS THE GLOBE, STUDENTS SEE SUSTAINABLE RESOURCE MANAGEMENT AS KEY

The students come from Australia, China, Uganda, France, Pakistan, Ecuador, the United States, Iran, the United Kingdom, Canada, and many other countries. They come from vastly different cultural, personal, and professional backgrounds. They talk about their commitment to social justice, an obligation



The International WaterCentre's Master of Integrated Water Management program appeals to young professionals from around the world who feel passionately about the importance of water and who also understand that solutions to current and future water issues will come from understanding and addressing social, cultural, and environmental factors related to those issues.

to their people, a desire to turn around the damage that we are doing to our natural environment, the need to make a practical difference—but they all agree on one thing: that the best way to achieve all this, to improve people's lives and the planet's health, is through managing water in a sustainable and effective manner.

"I have found that those who work in water do it for the love of it," agrees Marlene Hsu, IWC master's student and project engineer for Mott MacDonald in the United Kingdom. "I have met so many intelligent and passionate people working in the water industry."

NARROW FOCUS OBSCURES THE BIG PICTURE

However, when many of these water professionals joined the workforce, they experienced a sense of ineffectiveness and frustration at the gap between what they saw that needed to be done and what they were able to accomplish because of limitations of

knowledge, experience, opportunity, and frameworks in which to operate. Projects were not being managed from a "big picture" perspective. Individual disciplines were finding solutions that didn't take into account the needs of other fields. People were trying to consider community or political factors without any training on how to do so.

Dalfau found that the lack of information and knowledge transfer across communities, sectors, and borders was a barrier to achieving goals in her work. "Decision-making was reactionary and did not take into account climate change research, policies, and scientific data from upstream governments. Regulations are developed as if in a vacuum, and planning processes head off on the specific trajectory that is

most comfortable to the discipline leading it (i.e., engineers, lawyers, scientists, politicians) without understanding the other efforts under way," she said.

Dalfau was continually questioning her own effectiveness. "I felt like I was 'spinning my wheels,' trying to bring about change to a multitude of issues related to water management," she said. She was constantly seeking some expertise that would help her achieve true change and success in her work.

This feeling that something was missing—that there must have been something more that would enable sustainable water solutions—has been repeatedly echoed by Dalfau's fellow students and alumni in the

Integrated water management brings together people from a wide variety of disciplines to work in a setting that encourages teambuilding and partnerships that reach across professional boundaries and disciplines to solve water-related problems.



IWC program. Many began their careers with an eye toward changing people’s lives in ways that respect the balance of human and natural life on the planet, only to find that the traditional methods of approaching water management cannot do this.

INTEGRATED WATER MANAGEMENT LOOKS AT THE WHOLE

Diane Cousineau, a civil/environmental engineer from Canada, has worked on projects in West Africa and the Middle East that gave her insight into the multifaceted nature of water issues. “Engineers are trained to solve problems,” she said, “and they do this very well. But if they are not trained in understanding the environmental and human aspects of a situation, how can any solution really work? I was undertaking a review of a major project, and people were asking: ‘How can we get water back into this area?’ But they weren’t asking: ‘Why has the water disappeared? How is it being used? What needs do we have to consider? What might it mean politically, culturally, environmentally, or socially if we simply take water out of one place and put it in another?’”

For these professionals, the IWC’s program provided an important part of the answer. Integrated water management is a holistic approach to water management. It considers the

whole water cycle and takes into account the socioeconomic, political, and environmental factors affecting water challenges in order to achieve sound, sustainable solutions for water and water-related problems. “It’s not just doing a job,” said Delfau. “It’s being effective.”

Water issues are intrinsically tied up with everything going on around them. To merely provide water without considering the myriad other factors that affect situations will not be effective. Water must not only be made available, it must be affordable—in urban Uganda only the wealthy have access to running water, while the poor are forced to buy it at three times the price. Water must be of good quality or the weak will suffer—those with compromised immune systems, the very young or old, or infirm. It must be available in a quantity and manner that are sustainable environmentally (e.g., considering availability, drought, flooding, and ecological factors) and socially (e.g., in developing countries girls often drop out of school to walk long distances every day to collect water for their families). Water solutions also must take into account such things as the development of sustainable environmental policies, the ability or willingness of authorities to enforce these policies, issues of equity, political

instabilities, and conflicts arising over ownership and access to water. In the Middle East, for instance, the dwindling water level of the Dead Sea has repercussions not only for people’s livelihoods, political stability, and the environment, but it also has cultural and spiritual repercussions that resonate through the world. “I believe that what we’re seeing in the complexities of water management now is only the tip of the iceberg,” Delfau said. “As clean, reliable water becomes increasingly critical to human and ecosystem survival, things will only become more complicated, not less.”

The growing awareness of all these factors in regional, national, and global contexts is leading more and more water professionals to seek out knowledge of integrated water management as a way forward. The number of water professionals enrolling in the IWC program has doubled each year since its inception in 2008.

Understanding the interconnectedness of water in human and natural systems and adopting a broader perspective than the single-issue approach are vital if effective solutions are to be found. Social, cultural, and environmental factors must be taken into consideration. Water practitioners need to develop creative and critical thinking skills to solve the complexity

of problems now facing our profession. Water projects must be managed in a holistic way.

The experience of studying integrated water management with professionals from all around the world who have a shared passion for water is an experience of expansion and inspiration for many of the program's participants. "This program takes a multifaceted approach to the complexities of water management," said Delfau. "[The] other courses I was looking at focused on one particular aspect, [but] this course approaches the issues from all angles and also provides an international perspective of water issues."

Engineers mix with social scientists, anthropologists with environmental lawyers and hydrologists, urban dwellers with rural dwellers, Africans with Europeans, Europeans with Americans, Americans with Africans, and so on. The mix of knowledge and experience that is shared in the course—professional, cultural, and personal—is indicative of the wide and holistic way in which integrated water managers approach water issues.

"The [program] provides a new perspective that is not usually taught in the physical sciences," said Hsu. As an engineer in the water industry, she enjoyed building things, with a view to making a contribution to society, but she knew there was a lot she did not understand about the wider implications of her projects—on the environment as well as on people. "This program is giving me the skills to really make informed decisions about water resource projects."

CONCLUSIONS

Water practitioners with integrated water management knowledge bring a whole new set of skills into the workplace. They are experienced in working in teams, developing partnerships between professionals and stakeholders, communicating across the specialties, and thinking outside the usual boundaries of problem-solving approaches.

"One of the most valuable things I got from this course," said Cousineau, "is the ability to understand the core issues and jargon of the different specialties, what challenges they each face, and to be able to communicate across the boundaries and coordinate them."

Integrated water managers are water leaders. They speak the languages of myriad disciplines and communities. They empower and inspire others to achieve their potential and to act in ways that provide benefit to current and future generations. They put a human face to water management. They bring together specialists, governments, and communities to form solid working teams that achieve results. They work with professionals in other fields such as energy, land, and biodiversity that influence water outcomes. They take a single problem of water and consider it in the three-dimensional spectrum of human and natural systems in order to find optimal solutions.

"Somebody with an understanding and experience of integrated water management is definitely more valuable than somebody without, as we are now aware of the importance of looking at factors outside our own sectors when considering the management of water resources," said Hsu. "I would certainly take this into consideration when hiring someone."

Cameron Davidson, from the United States, is conducting her third-semester master's research project with Israel's Arava Institute for Environmental Studies, an environmental education and research institute that focuses on cooperatively solving environmental challenges in the Middle East. She is witnessing first-hand some of the ways in which water management, when handled in a holistic and integrated manner, makes a difference in more ways than merely solving water problems. "Living and working with Israelis, Palestinians, and Jordanians has been a great way to learn from many different perspectives," Davidson said. "There have been some intense conversations

going on between students and co-workers. It has been a powerful learning environment. This is what the Arava Institute is about: building peace through the commonality of environmental issues."

The water management workplace of tomorrow is very different from that of today. It is a place that conducts international dialogues among nationalities, cultures, and professional specialty areas. It has a vision that sees the whole picture as well as its separate parts. It tackles inequalities and injustices in the world while it solves water issues. Water leaders of the future work in teams, within the water industry, and in the broader context of community.

If you were to ask Delfau what she thinks about water, she would tell you: "Water is the most fundamental element to life on this planet. It's a limited resource that's being squandered and polluted. Communities are moving farther away from holding the power to connect to and protect their local water resources. Every day I work to reverse this trend."

But if you were to ask her why she chose a career in water management and why she then chose to study at the IWC and what will fuel her throughout her entire career as a water leader in tomorrow's workforce, she will still answer with one word: Passion.

ABOUT THE AUTHORS



Sharon Phillips is the communications officer for the International WaterCentre, a position she has held since 2004.

She is a graduate of Queensland University of Technology with a Diploma of Teaching and of Griffith University with a Graduate Diploma of Teaching Education (special education), both of which are located in Brisbane, Australia. Phillips is a member of the International Water Association and Australia Water Association.

In The Bookstores



Internal Corrosion Manual

AWWA's newest manual, *Internal Corrosion Control in Water Distribution Systems* (M58), can help utilities improve water quality at their customers' taps and reduce customer water quality complaints.

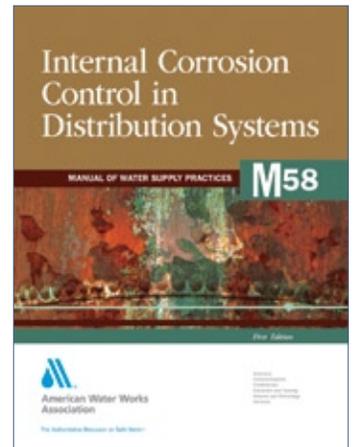
Although water professionals know much about the problems caused by internal pipe corrosion, there has been little practical guidance available to public water systems regarding the design, implementation, and maintenance of an ongoing internal corrosion control program—until now. This new manual provides a practical overview of internal corrosion issues, identifies appropriate corrosion response and control methods, and outlines a complete corrosion monitoring and control program.

M58 addresses the causes of internal corrosion, resulting pipe problems, aesthetic and health issues, comparisons of corrosion control chemicals and compliance with the Lead and Copper Rule.

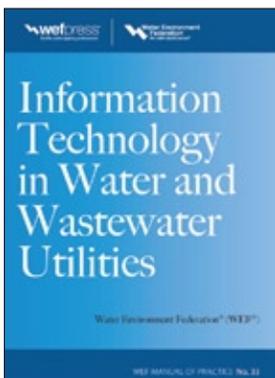
Internal Corrosion Control in Water Distribution Systems also identifies the steps in a corrosion monitoring and control program.

The manual incorporates the newest corrosion research into calcium carbonate and predictors of corrosion; microbial influenced corrosion; the role of coagulant change, chloride, and sulfate; and oxidation-reduction potential.

Internal Corrosion Control in Water Distribution Systems (M58) can be ordered online at awwa.org or by calling the AWWA Bookstore at 1-800-926-7337.



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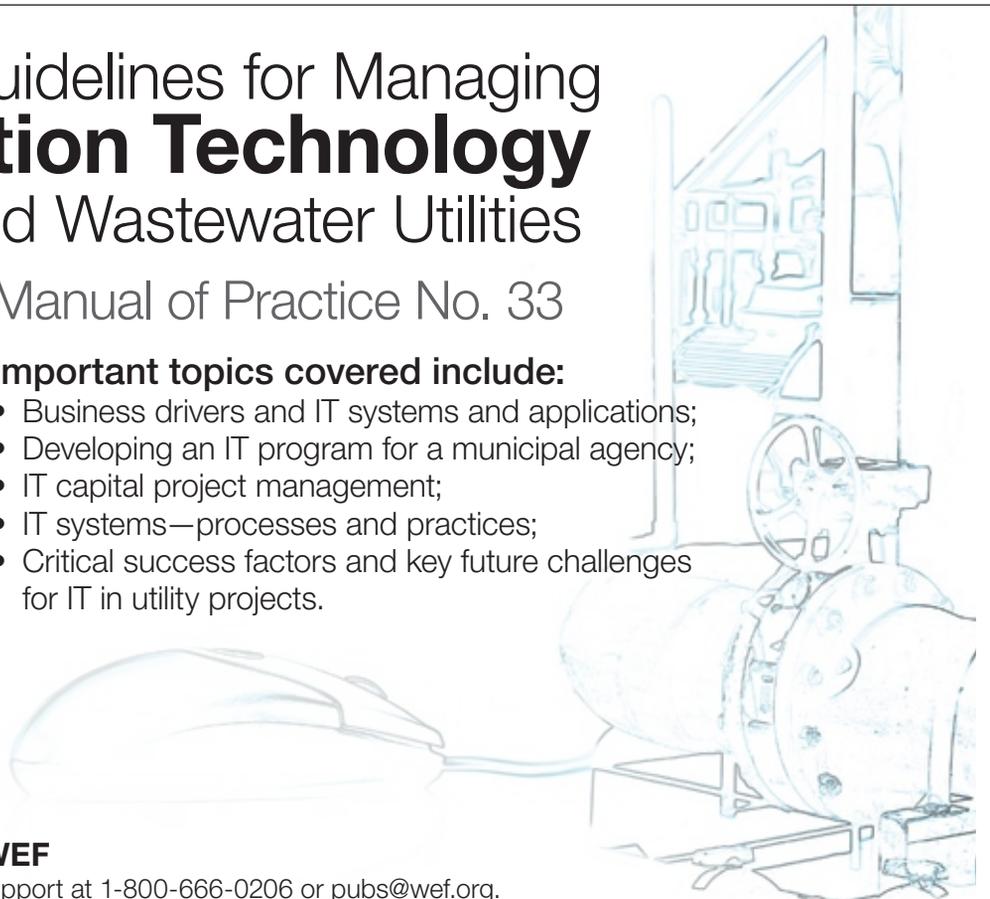
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Certification Corner

Excerpted from the April 2010 issue of *Opflow*, published by AWWA. For more information and references, visit www.awwa.org.

WATER

- 1. Hard water scale is usually caused by**
 - a. calcium bicarbonate.
 - b. calcium carbonate.
 - c. magnesium bicarbonate.
 - d. magnesium carbonate.
- 2. Which of the following is an example of a weighting agent?**
 - a. Polyelectrolytes
 - b. Bentonite clay
 - c. Calcium carbonate
 - d. Sodium bicarbonate
- 3. The minimum detention time in a conventional detention basin is**
 - a. 2 hr.
 - b. 4 hr.
 - c. 6 hr.
 - d. 8 hr.

WASTEWATER

- 1. Which type of organisms are most likely associated with poor treatment or young biomass?**
 - a. Amoebas
 - b. Free-swimming ciliates
 - c. Rotifers
 - d. Stalked ciliates
- 2. The most common flow-measuring device for wastewater is a**
 - a. Parshall flume.
 - b. magnetic flowmeter.
 - c. weir.
 - d. Venturi meter.
- 3. Which of the following would most likely control foaming?**
 - a. Increase the detention time
 - b. Water sprays
 - c. Increase the dissolved oxygen
 - d. Increase solids wasting

ANSWERS

Water: 1. b, 2. b, 3. b
Wastewater: 1. a, 2. a, 3. b

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