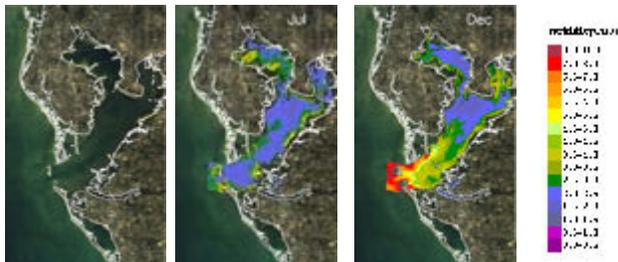


Top Story

Monitoring Coastal Waters from Outer Space

Back in the Dark Ages of the mid-1980s, Frank Muller-Karger was a doctoral student in search of a better way to monitor coastal water quality. Unlike most marine scientists at the time, he chose to look up.

“NASA [National Aeronautics and Space Administration] had launched satellites that were taking pictures from space,” Muller-Karger said. “I wanted to see if we could accurately measure the color of the ocean with those images, and from that, map changes in water quality over time.”



Click on photos for larger images. Left: The MODIS 250-m true color image from the satellite pass on Jan. 18, 2005. Center: The MODIS turbidity composite image for December from 2003 to 2006. Strong wind associated with a winter cold front causes high sediment resuspension in the lower bay, especially near the mouth of the bay. Right image: The turbidity composite for July from 2003 to 2006. In the summer season, wind slows down, thus turbidity is not as high. Far right: Turbidity key. Photos courtesy of Zhiqiang Chen of the Institute for Marine Remote Sensing.

The problem was the 1970s-era satellite imaging technology produced extremely low resolution images — 1 pixel equaled about 1 km² — making color detection difficult. “The technology wasn’t there yet,” he said.

But Muller-Karger saw the possibilities. [Read more](#)

In Memoriam



Ernest C. Tsivoglou

Click photo for larger image.

Loving, loyal father, faithful husband, renowned scientist, and teacher, Dr. Ernest C. Tsivoglou of Atlanta passed away in October at age 85 at Emory Hospital following a heart attack. Born in 1922 in New Hampshire, Tsivoglou grew up in New York City during The Great Depression. He is a former member of the Water Environment Federation (Alexandria, Va.). [Read more](#)



Front Page

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It seems like just yesterday... WEFTEC.07



It seems like just yesterday WEF President Adam Zabinski (far left), 2006-2007 President Mohamed Dahab (center), and Ken Sobbe, chair of the Manufacturers and Representatives Committee, were opening the WEFTEC.07 exhibition hall with a ceremonial ribbon cutting. With WEFTEC now behind us, get the full scoop on the conference in the December issues of [WE&T](#) and [WEF Highlights](#). *Click on photo for larger image.*

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Features

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Features

Monitoring Coastal Waters from Outer Space

Back in the Dark Ages of the mid-1980s, Frank Muller-Karger was a doctoral student in search of a better way to monitor coastal water quality. Unlike most marine scientists at the time, he chose to look up.

"NASA [National Aeronautics and Space Administration] had launched satellites that were taking pictures from space," Muller-Karger said. "I wanted to see if we could accurately measure the color of the ocean with those images, and from that, map changes in water quality over time."

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But Muller-Karger saw the possibilities.

Fast-forward 20 years. Now dean of the School of Marine Science and Technology at the University of Massachusetts, Dartmouth, Muller-Karger also leads a research group at the University of South Florida (Tampa) that has continued to study remote sensing. Thanks to dramatic advances in satellite imaging, one of his doctoral students has made great strides in finishing the work he started.

That researcher — Zhiqiang Chen — and his colleagues studied 8 years of imagery and data from instruments aboard two current NASA satellites, finding ways to make it usable for mapping coastal water quality. Their findings, Muller-Karger said, have direct applications for resource managers who are developing restoration plans for coastal water ecosystems, as well as federal and state regulators charged with defining water quality standards.

Coastal Challenges

Prior to Chen's research, satellite images already had been used to observe changes in water turbidity in the open ocean, where the water is generally clear and atmospheric conditions make it relatively easy for satellite color sensors to measure the light reflected and absorbed by the water.

But coastal water is more optically complex than that in the open ocean, according to Chen.

"River plumes, sediment, dissolved materials, coral reefs, algae, and shallow bottoms can all affect the water color seen from space," he explained.

One of his team's major challenges, therefore, was determining which colors in a satellite image were related to pollution or some other man-made factor, and which were related to a shallow bottom or the atmosphere.

In their research, Chen's team focused on Tampa Bay, Fla., where sediments had for many years entered rivers that emptied into Tampa Bay. As a result, phytoplankton had grown in the water column, shading the ocean's bottom and limiting sea grass growth, according to Muller-Karger, a co-author of the study.

"Ultimately, we want to be able to use satellite imagery to track the source of those sediments and see if they were a natural phenomenon, the result of coastal development, or something else" said Muller-Karger. "Then, if the source is human-related, we can try to manage that human activity."



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For this particular research, however, the researchers concentrated on ways to accurately measure two key indicators of water quality — turbidity and water clarity. To determine water clarity, they relied on satellite data that measured the amount of light reflected by the water, putting it through a two-step calculation to arrive at a measure of water clarity. To assess turbidity, they compared data from another satellite instrument to ground measurements of turbidity, mapping the results.

The bottom line: When compared to independent field measurements, the researchers found that the satellites had accurately measured Tampa Bay's water quality. What's more, the satellites were already collecting the same basic data for coastal waters worldwide.

This finding, they believe, is a quantum leap forward, compared to today's ground-based methods of monitoring coastal waters.

"Today, scientists are still taking monthly boating excursions to set spots along the coasts, and taking water samples to measure things like turbidity and phytoplankton," said Chen.

The data that results from these tests is limited. "While they used to represent a large area, the test results really are only a measure of the water quality at the precise testing site," said Chen.

Because tests are taken only monthly, they also don't capture how rapid changes in winds, tides, pollution, and runoff can affect coastal areas.

By using satellite imagery, however, researchers can dramatically increase both the frequency and the size of the sampling. "The satellite enables us to cover an entire estuary in less than a minute," said Chen. "And it passes over that estuary several times a week. The result is a series of complete snapshots that we can use for comparison over time."

The frequent measurements, the researchers said, could help resolve questions about the causes of water quality changes with the seasons and through the years.

What's Ahead?

Before satellite data can have widespread application, according to Chen, more work must be done to turn satellite's raw data into a more usable form.

"We're in the push now," he said. "It's time to migrate from the research to the operational phase," said Chen. That, of course, will require investment.

One problem, said Muller-Karger, is that the satellites from which the research team drew data are both prototypes. The one equipped to collect ocean color data has been operating since 1997. The other, which collects measurements from the entire Earth's surface every day or two, was launched in 2002.

"NASA only launches research satellites like these once," explained Muller-Karger. "When they break, there are no plans to launch another one as a replacement — even if they're providing a valuable service."

Before that happens, Muller-Karger and Chen both hope other agencies will step in to transfer the technology.



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“Two decades ago, only the military and NASA had the powerful computers and networks to use the data from these satellites,” said Muller-Karger. “Now that this data is accessible to virtually anyone, it’s time it was changed into a form that we can also use to make decisions from.”

— *Mary Bufe, WEF Highlights*

Testing the Waters

WEF Hosts Its Second World Water Monitoring Day Event

The Water Environment Federation (WEF; Alexandria, Va.) hosted its second World Water Monitoring Day™ (WWMD) event Sept. 18. An educational outreach program, WWMD was designed to promote individuals’ involvement in the protection of world water resources. The program is coordinated by WEF and the International Water Association (IWA; London).

WEF celebrated this year’s event at Alexandria’s Oronoco Bay Park on the Potomac River. The significance of the location was not lost on U.S. Congressman Jim Moran (D-Va.).

“The Potomac River is a perfect backdrop for today’s event,” Moran said. “It is a beautiful resource.”

Moran praised the recovery of the Potomac’s health, noting that a river once deemed as one of the country’s most polluted during Richard Nixon’s presidency will soon host the swim portion of an upcoming triathlon.

Robert Hirsch, associate director of water for the U.S. Geological Survey (USGS), noted the 100-year history of USGS monitoring the river.

“A clean Potomac River is important to me professionally and personally,” he said.

This year, WWMD had participants in more than 50 countries, and is continuing to expand internationally, said IWA Development Director Darien Saywell, who spoke at the Alexandria event. IWA is helping bring WWMD to Nigeria — where 300 students are monitoring five sites — as well as Singapore, Tanzania, and China.

“It is important to remember the tens of thousands of people across the world marking WWMD,” he said.

Despite growth in the program, Saywell hopes to continue the international expansion of WWMD across the economic and population spectrum, and Dahab echoes these sentiments. By 2012, he hopes that WWMD will grow to one million participants in 100 countries.

Monitoring the Potomac

“World Water Monitoring Day is one of the stars of our public education program,” said 2006–2007 WEF President Mohammed Dahab.

Although the program is targeted toward young students, WWMD welcomes the participation of people of all ages, according to Dahab, who called it “a community environmental education program.”

Students from Kimball Elementary School (Washington, D.C.), Melvin J. Berman Hebrew Academy (Rockville, Md.), and Beth Tfiloh Dahan Community Day School (Reisterstown, Md.) participated at the Alexandria event, rotating through more than 10 stations that highlighted various aspects of water quality.



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At the three monitoring stations, students tested the water samples from the Potomac River for temperature, turbidity, dissolved oxygen, and pH levels. Other stations were hosted by EPA, USGS, the Washington, D.C. Water and Sewer Authority, the Smithsonian Environmental Research Center (Edgewater, Md.) — which displayed blue crabs — and CH2M Hill (Englewood, Colo.).

Mary Corton, who teaches science to prekindergarten students at Beth Tfiloh Dahan Community Day School, said the students loved the opportunity to attend WWMD. She said her students were very excited to attend this year's event and said that WWMD was great hands-on learning.

Corton and her students participated in the 2006 event, monitoring a pond on school grounds. Three students trekked to the pond every day to take measurements.

"The pond is really, really clean," she said regarding the students' findings.

Stewards for Water

WWMD's main objective, creating stewards for water, was highlighted throughout the day. Moran called the work done by WWMD very important because it builds stewards for water resources, saying "each citizen will be a little more knowledgeable about their own watershed and empowered to protect them."

Ben Grumbles, EPA assistant administrator for Water, agreed.

"EPA is proud to be a partner in the growing global movement to connect citizens with their watersheds," he said.

Hirsch cited the more than 1400 federal, state, local, and citizen groups USGS works with on maintaining and improving water quality. He also discussed the importance of scientists and citizens working together to monitor water sources.

"Progress depends on partnerships," Hirsch said.

Hirsch went on to emphasize the significance of measuring water sources in order to manage them, noting the importance of point source control, non-point source control, and monitoring water sources.

"You can't manage what you don't measure," he said.

Grumbles also said he hoped that WWMD could help encourage the public and citizens to engage in water quality monitoring in a similar way that the "Reading is Fundamental" program has promoted literacy.

"Monitoring is fundamental," he said. "An ounce of education is worth a pound of regulation or litigation."

For more information on World Water Monitoring Day, visit www.wwmd.org.

— **Michael Bonsiewicz**, *WEF Highlights*



News & Events

Reviewers, Authors Sought for Preliminary Wastewater Treatment Operator Training Manual

The Water Environment Federation (WEF; Alexandria, Va.) is developing an operator-focused training manual on preliminary wastewater treatment. WEF is seeking volunteers to review a first draft and develop a questions database for the manual.

Authors who can assist in writing or revising sections based on reviewers' comments also may be needed. The manual is currently in first draft, so authors are not needed to develop the manual from scratch. The manual currently is 30 pages, not including questions, and includes the following sections:

- Septage Receiving
- Screening
- Grinders/Comminutors
- Grit Removal
- Odor Control
- Flow Measurement
- Flow Management
- Safety

The anticipated schedule is as follows:

- Review of first draft: December 2007 to January 2008
- Review of comments and update to final draft: February 2008 to April 2008
- Publication: June 2008

Those interested in assisting with this publication should contact Senior Project Manager Rob Schweinfurth no later than Nov. 30, 2007, at rschweinfurth@wef.org, or (703) 684-2400, ext. 7750. Indicate whether you would like to review, write questions, or author sections of the manual, if needed. All reviewers and authors will be acknowledged in the completed manual.

WEF Members Approve Amendments to Constitution and Bylaws

Members of the Water Environment Federation (WEF; Alexandria, Va.) recently were asked to vote on amendments to the WEF Constitution and Bylaws, proposed by the WEF Board of Trustees.

The required quorum of the membership — 5% — voted to approve the amendments, which are effective immediately.

Click [here](#) for more information on the amendments.



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WEF Student Chapters Host Joint Seminar

The University of Manitoba (Winnipeg, Canada) Water Environment Federation (UMWEF) and North Dakota State University (Fargo) Water Environment Federation (NDSU WEF) in August met for the first of a two-part seminar in Winnipeg. The joint seminar — the first of its kind — aimed to facilitate the cooperation between these two student associations.



Students from The University of Manitoba Water Environment Federation and North Dakota State University Water Environment Federation. Click on photo for larger image. Photo courtesy of Stanislaw Lozecznik.

About 15 presentations covered topics such as wastewater, solid waste and water treatment with focus on biological nutrient removal and membrane reactors, wastewater systems, and waterbodies management. More than 25 participants, including students and professors from both universities, and engineers from the private and public sectors, attended both days.

UMWEF members raised money to hold the seminar, and arranged activities, meals, and dorm rooms for attendees. Additional funding for the seminar came from Tetres (Winnipeg), a consulting firm; Earth Tech (Long Beach, Calif.), a consulting, engineering, and construction firm; Stantec (London, Ontario), a design and consulting firm; CH2M Hill (Englewood, Colo.), an engineering, construction, and operations firm; and the University of Manitoba's department of civil engineering.

Students who contributed to the success of this seminar through their effort and hard work include UMWEF Vice President Dominika Celmer; UMWEF Treasurer Lukasz Jaroszynsky; and the executives and members of UMWEF including Wengbo Yang, Jiazhong Chen, Jong Hyuk Hwang, Qiuyan Yuan, Xiaokang Zhou, and Oswald Wohlgemut. Additionally, I would like to thank the students from the NDSU WEF chapter — especially Chris Hill — for their high-quality presentations and confidence in the importance of this seminar. Next year we will meet in North Dakota, and are looking forward to seeing the research after 1 year of development.

— **Stanislaw Lozecznik**, UMWEF President



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WERF Seeks Proposals for Biosolids Research

The Water Environment Research Foundation (WERF; Alexandria, Va.) is accepting proposals until Nov. 16, for research addressing biosolids pathogen risk assessment and the effective communication of results.

WERF has worked with its subscribers to identify and prioritize their top challenges and plans to establish a flexible and adaptive relationship with individual researchers and research teams. This request for proposals (RFP) is different from some WERF RFPs in the past as it is not soliciting a single project for a set period of time for a set cost. Instead, this RFP identifies an overall goal and suggests some key milestones to focus the research efforts.

WERF anticipates funding approximately \$250,000 to \$500,000 for the first year of research. Due to the scope of this challenge, estimates for the total cost, over a multiyear period, are estimated at up to \$1 million. WERF wants this research to facilitate use of biosolids pathogen risk assessment methodologies for the purpose of making them generally applicable and available to potential users at the local, state, and national levels.

An integral component of this research effort will be to develop an action plan that brings the best risk communications science and practices to communicate the research findings.

“Meeting regulatory requirements for land application practices may no longer be enough to ensure the continued beneficial use of biosolids,” said Dan Woltering, director of research at WERF. “Because of the heightened public scrutiny that land-application projects often face, WERF feels it is important to refine the tools that will allow utilities, land appliers, regulators, and local public administrators to more readily assess the relative risks associated with pathogens in biosolids and effectively communicate the results.”

The goal of this research program is to incorporate advancements in pathogen risk assessment and communications made over the past 10 years into available methodologies. Demonstrations of method applicability — including the development and testing of a user-friendly interface that allows data to be readily input — are needed in order to put such a pathogen risk assessment approach into common practice. A complementary and equally important aspect is to bring forward and further develop the best risk communications science and practices that are relevant to this topic.

Researchers interested in submitting a proposal may visit the WERF Web site for more information and a complete RFP by clicking [here](#).

Wastewater Engineer, Professor Remembered for Integrity

Loving, loyal father, faithful husband, renowned scientist, and teacher, Dr. Ernest C. Tsivoglou of Atlanta passed away in October at age 85 at Emory Hospital following a heart attack. Born in 1922 in New Hampshire, Tsivoglou grew up in New York City during The Great Depression. He is a former member of the Water Environment Federation (Alexandria, Va.).

Following graduation from Manhattan College (Riverdale, N.Y.) he enlisted in the U.S. Army Corps of Engineers in January 1944. Arriving at Bombay, India in June 1944 after a 2-month voyage from Long Beach, N.Y., he was attached to the 30th Station Hospital CBI Theater as a water supply engineer and later was chief warehouseman at the East India Medical Depot in Calcutta.

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Upon his Honorable Discharge in 1946, he earned his master's degree in sanitary engineering from the University of Minnesota. More importantly, that is where he met and married his wife, Julaine, of 59 years.

Tsivoglou then accepted a commission as sanitary engineer in the U.S. Public Health Service at the Taft Center in Cincinnati. Shortly after his arrival, he was offered an opportunity to attend Ohio State University (Columbus) where he obtained a doctorate in nuclear physics. He became one of the nation's first radiological safety specialists independent of the Navy's Admiral Hyman Rickover and the U.S. Atomic Energy Commission. His doctoral research on ventilation of radon gas from uranium mines in the desert southwest remains one of the foremost advances in improved working conditions for uranium mine workers worldwide.

Once back at the Taft Center, he quickly rose to become director of technical services and research. From the early 1950s until his retirement in 1966, he and his staff were instrumental in development of many of the standards and methods that formed the basis of the nation's first water pollution control regulations.

Beginning with the stream studies needed to clean up pollution of rivers by uranium mills, his and the Taft Center's work in natural river self-purification processes forms the practical basis upon which the health of rivers and lakes in the United States and elsewhere is measured, assessed, and improved. Tsivoglou left the Public Health Service in 1966, and Tsivoglou accepted a professorship to teach sanitary engineering and river self-purification processes at the Georgia Institute of Technology in Atlanta where he remained until 1974.

Tsivoglou is remembered by his students and colleagues in Georgia for his technical clarity, professionalism, and great integrity, and his pragmatic wisdom and counsel. For the City of Atlanta, DeKalb County, and the State of Georgia, he and his teams of graduate students performed the first stream self-purification studies of the Chattahoochee River throughout the metro Atlanta area. Those studies determined and set the limits to which the metro cities, counties, and industries could discharge treated wastewaters to the Chattahoochee and South Rivers during drought conditions such as exist today. He continued to practice as a consulting engineer until his retirement in the early 1980s. His recreational interests included trout fishing, woodworking, and the American Southwest, particularly the books of Tony Hillerman.

Tsivoglou is survived by his wife Julaine, children Stephanie, Peter, and Andrew, and grandchildren Laura, Charlotte, Alison, and Andrew. The last surviving member of his family, he was preceded in death by his father, Constantine Jordan Tsivoglou of Constantinople (Istanbul), Turkey, his mother Lucinda Stearns Tsivoglou of Boston, his sister Helena Spencer of Asheville, N.C., and brother Jordan Constantine Tsivoglou of Newport News, Va. In lieu of flowers, donations to the Diabetes Foundation would be very much appreciated.