

# **Addressing the Pipeline Problem: Critical Success Factors in Attracting, Developing, and Retaining Future Water Quality Leaders**

Presented by:

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# Objectives

- To understand the human resource shortage (in the water quality profession) and that it must be addressed to sustain our profession
- To understand the importance of collaboration between academia, practice, and water-quality/engineering-based professional organizations
- To understand the importance of mentoring
- To present some actions taken thus far



# Human Resource Problem, Why?

Water and *PEOPLE* are vital elements of our profession!

Our profession is challenged with:

- a pending outward flux of existing leaders (retiring baby-boomers)
- staggering growth because of increasing demands to provide quality water worldwide
- a reduction in the numbers of those entering water quality practice and engineering educational programs



# Compelling Facts about the Latter

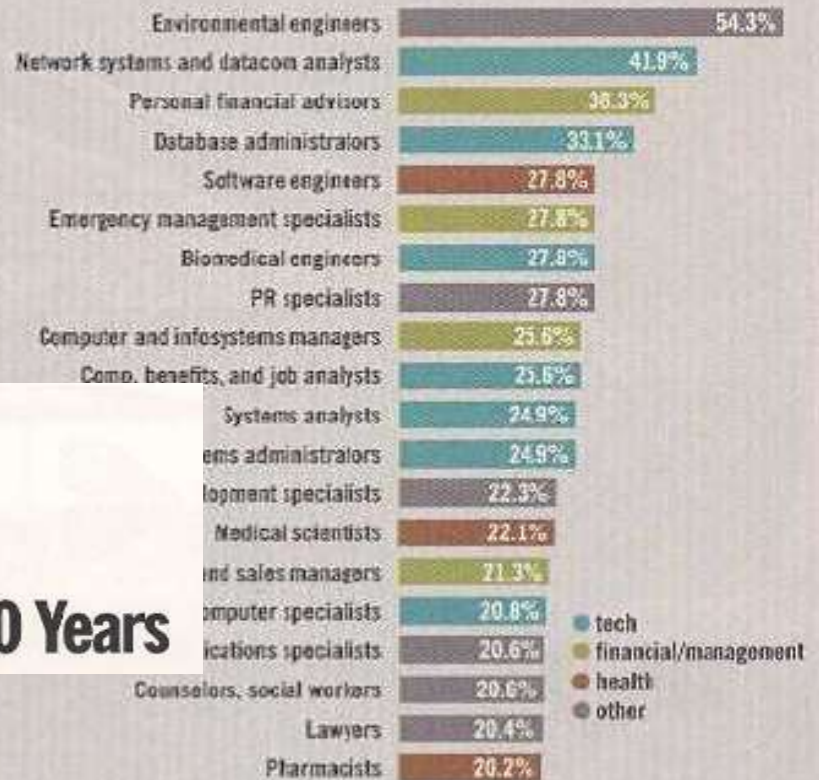
- ASCE Task Group concluded that the requisite body of knowledge required to practice as a PE is best obtained through a combination of an engineering baccalaureate and master's degree, or equivalent (ASCE, 2001)
- The NSF (2007; [www.nsf.gov/statistics](http://www.nsf.gov/statistics)) reported that civil engineering graduate student enrollment in 2005 had decreased by 8% from 1992
- Surveys in 2003 and 2005 at 15 major universities indicated that declining enrollment in Environmental Engineering master's degree programs may be more pronounced (Selna, *et al.*, WEFTEC 2006)

# Environmental Engineers in Demand

The U.S.  
will start  
exporting  
**environ-  
mental  
expertise.**

## 20 Fastest-Growing Professional Jobs

To come up with this list, we took BLS projections from 2002 to 2012, then eliminated blue-collar and relatively uncommon jobs.\* Here are the 20 jobs likely to see an increase of better than 20%.

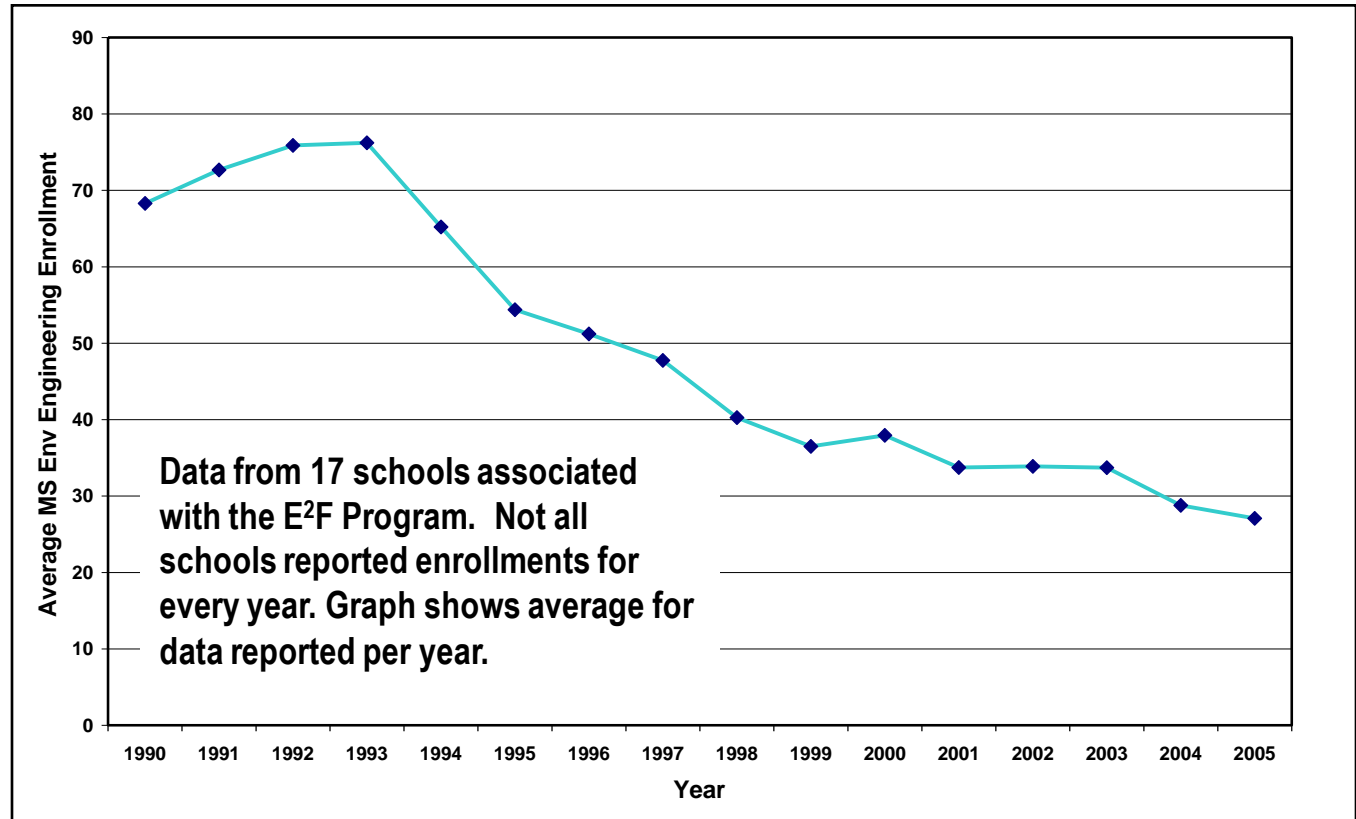


FORTUNE  
**75**

## Hot Careers for the Next 10 Years

March 21, 2005 FORTUNE

# Supply < Demand



From: Selna, M.W., Glaser, H.T., Trussell, R.R., Chan, G.R., and Sullivan, M. 2006. Declining Enrollment has Water and Wastewater Professionals Concerned. *Proceedings of the 79th Annual Water Environment Federation Technical Exposition and Conference (WEFTEC)*, Dallas, TX October 21-25, 2006, 4108-4123.





# How do we attract talent?

- Advancing professionals base their career decisions on:
  - monetary benefits
  - availability of mentoring
  - training that will facilitate their future success
- Senior water quality professionals benefit their organizations and the profession by:
  - encouraging exemplary role models
  - actively participating in mentoring relationships
  - encouraging mentoring relationships



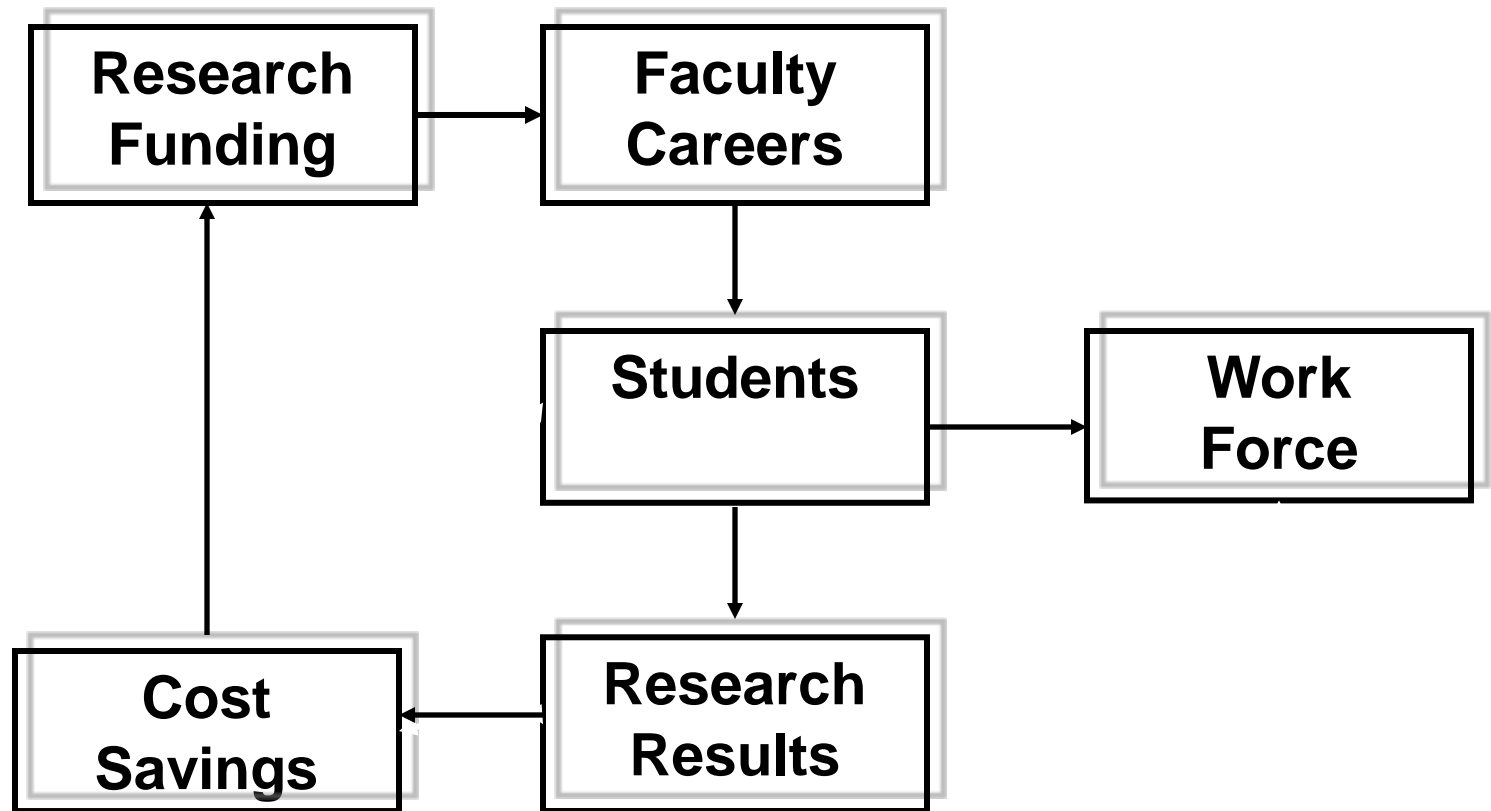
# How do we develop talent?

One word...*Research*

- Research:
  - contributes to the development of innovative technologies and practice
  - together with education, provides a stream of qualified students for the water quality field
- Colleges and research-focused universities can provide services to utilities through collaborative, applied research and consulting services



# Research Investments Can Pay for Themselves





# How do we retain talent?

- Generate professional awareness
- Educate decision makers about elements critical to our industry's sustainability
- Encourage students and YPs to meet the challenge
- Develop and maintain resources to avoid recurrence of the problem

# Generating Professional Awareness

## EDITORIAL

### Pipeline to the Future: Critical Success Factors in Attracting, Developing, and Retaining Your Future Water Quality Leaders

Water and people are two vital elements of the water quality profession. Today, our profession is challenged with a pending outward flux of existing leaders (retiring baby-boomers), staggering growth because of increasing demands to provide quality water worldwide, and a reduction in the number of individuals entering water quality practice and engineering educational programs. This situation has resulted in fierce competition for qualified people in all segments of the profession; and it makes the attraction, development, and retention of people critical to an organization's viability. Meeting these goals requires effective mentoring and the cooperation of all facets of the profession—universities, "industry", and professional organizations.

Advancing professionals base their career decisions on monetary benefits, but also on the availability of mentoring and training that will facilitate their future success. Senior water quality professionals benefit their organizations and the profession as a whole by encouraging exemplary role models and actively participating in and encouraging mentoring relationships. A successful mentoring relationship typically includes five elements:

- **Initiation**, requiring the mentee to identify an interest in an area of relevance to the organization;
- **Integration**, requiring the mentor to find opportunities and institutionally backed financial support for the advancing professional;
- **Training**, involving the mentor allocating appropriate resources and adjusting expectations to allow for the advancing professional's development;
- **Performance**, as the mentee delivers quality work in a timely manner and develops professionally; and
- **Maintenance**, whereby the advancing professional's performance allows for transition to a mentor role.

Non-research-based, four-year educational institutions and research-focused universities are critical to the success of our industry. Research contributes to the development of innovative technologies and practices, and both research and education provide a stream of qualified students for the water quality field. Collectively, colleges and research-focused universities can provide services to utilities through collaborative, applied research and through consulting services. Unfortunately, several undergraduate civil engineering programs in the United States presently require only a single introductory course in environmental engineering, only a fraction of which is dedicated to water quality. The American Society of Civil Engineers Task Committee on the First Professional Degree published, "Engineering the Future of Civil Engineering" (2001; <http://www.asce.org/raisethebar/>). The report concluded that the requisite body of specialized knowledge required to practice as a professional civil engineer is best obtained through a combination of an engineering baccalaureate and master's degree, or equivalent. The National Science Foundation (2007; [www.nsf.gov/statistics](http://www.nsf.gov/statistics)) reported the unfortunate finding that civil engineering graduate student enrollment has decreased by 8% between 1992 and 2005. Considering that water-quality-based educational and research programs in institutions of higher education are imperative for the development of future water quality leaders, faculty must

- Support the water quality community by adjusting curricula;
- Conduct both applied research to address short-term technological needs and basic research to move toward the development of new technological paradigms; and
- Participate and encourage students to participate in international, national, and local professional organizations committed to water quality.

October 2007

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The water quality industry must support the water-quality-based educational and research programs by

- Communicating industry needs to faculty charged with developing curricula;
- Assisting faculty in the classroom;
- Appreciating the broader educational missions of training students to be life-long learners and water quality professionals;
- Involving faculty as collaborators during facility and infrastructure improvements, construction, and optimization to provide a context for useful case studies in the classroom;
- Providing undergraduate and graduate students with relevant internship experiences and employment opportunities; and
- Supporting research programs at institutions of higher education through technological and financial commitments.

Professional associations can play an important role by attracting both academics and practitioners through activities relevant to their reward structures; however, neither of these groups' reward structures encourages significant commitment to these activities. Practitioners are rewarded for meeting corporate or utility objectives and making a net contribution to the bottom line (i.e., winning and delivering projects) and academics are rewarded for effective teaching, acquisition of competitive research dollars, and scholarship productivity.

To address this disconnect, we propose the establishment of an award that recognizes a faculty member and a practitioner who have worked together diligently to bridge the needs of both the educational and the water quality industry missions in ways that lead to increasing the number of students who pursue a future career in the water quality profession. This would allow professional associations to reward exceptional collaborative contributions in a way that would be recognized within each group's reward structure and encourage others to pursue similar efforts.

In large part, the success of our industry depends on adequate funding. The research, education, and capital improvements that resulted from Clean Water Act funding provided a foundation for the modern water quality profession by creating knowledge and bringing significant numbers of practitioners into the profession. The Water Environment Federation (WEF) should team with related foundations and associations to pursue a secure and consistent source of research funding. We estimate that a dedicated source of academic research on the order of \$20 to \$30 million per year is needed. Given the billions of dollars spent each year on facility construction and operation, this could be supported at the Federal level (compare, for example, funding for construction currently provided through the State Revolving Fund).

Together, through innovative thinking and action, water quality professionals can meet all present and future challenges. Professional associations such as WEF link all segments of the water quality profession, but action is required by each segment of the community to meet the present and future challenges.

Joshua P. Boltz, CH2M HILL

Glen T. Daigger, CH2M HILL

Jeremy Guest, Virginia Polytechnic Institute and State University

David Jenkins, University of California–Berkeley

Nancy Love, Virginia Polytechnic Institute and State University

Andrew J. Schuler, University of New Mexico

Rebecca West, Spartanburg Water

Alicia Wilson, Spartanburg Water

# Educating Decision Makers

## Pipeline to the Future:

Critical Success Factors in Attracting,  
Developing, and Retaining Your Future  
Water Quality Leaders.

Thursday, November 8, 2007  
2:00pm - 3:30pm EST



601 Wythe Street  
Alexandria, Virginia  
22314-1994 USA

### WEF Distant Learning Web Cast Series

Listen to industry experts by telephone, and view the web presentation on your computer. **The Pipeline to the Future** is a special webcast presented at no charge to WEF Members!

### General Information

#### Participants should include:

Water Quality Leaders, Students, Academics, YPs, and MA Leaders

#### Webcast Objectives

- Address the current shortage of human resources in the water profession.
- Discuss the importance of mentoring and the five principal steps in the mentoring process.
- Increase the understanding of the importance of collaboration between academia, practice, and water quality professionals.
- Promote participation in academia, practice, and professional organizations.

#### Webcast Topics

- Effective mentoring in Utilities, Consulting, Academia, and Professional Organizations
- Importance of research, funding, and cooperative action
- Pitfalls and benefits for Young Faculty
- Interaction between students and the Industry
- Making and Taking Opportunities, the Modern Water Quality Young Professional

### Presenters:

Joshua P. Boltz, CH2M HILL

Glen T. Daigger, CH2M HILL

Jeremy S. Guest, Virginia Polytechnic Institute and State University

David Jenkins, University of California, Berkeley

Nancy G. Love, Virginia Polytechnic Institute and State University

Andrew J. Schuler, University of New Mexico

Rebecca F. West, Spartanburg Utilities: 2006-2007 WEF Vice President;

2007-2008 WEF President-Elect

Alicia Wilson, Spartanburg Utilities

### Registration Deadlines:

Wednesday November 7, 2007

For complete details and to register online, visit Conferences & Training at [www.wef.org](http://www.wef.org). Professional Development Hours are offered.

### For more information

Call 1-703-684-2445

E-mail [Dcniley@wef.org](mailto:Dcniley@wef.org)

### Registration Fees

WEF Members: No Charge

Non-Member Rate: \$195.00



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The Pipeline to the Future webcast was organized with the support of the WEF Students & Young Professionals Committee and Sponsored by CH2M HILL.



# Encourage Students and YPs



## Unleashing Your Inner Hendrix Mentors can help young professionals' talents shine

Joshua P. Boltz and Jacqueline Kepke



## WEF YOUNG PROFESSIONALS

### Unleashing Your Inner Hendrix Mentors can help young professionals' talents shine

Joshua P. Boltz and Jacqueline Kepke

On June 2, 1967, The Beatles released in North America their magnum opus, "Sgt. Pepper's Lonely Hearts Club Band." It is rumored that a promising young musician was so taken by the LP's title track that he barely slept for 24 hours. You see, the talented young star was intent upon learning to play the song perfectly. Two days later, topping the bill at London's Saville Theatre and with two Beatles (namely Paul and George) in attendance, Jimi Hendrix opened the show with "Sgt. Pepper's Lonely Hearts Club Band." It was noted the crowd's response was so inspiring that Jimi would open the rest of his performances with the same number throughout the remainder of the year.

A talented young baseball player who was rumored to run like the wind and have thunder in his bat

as the Yankees center fielder). In both of these examples, the success of the young stars was built on their natural talent, the opportunities made available to them, and their own initiative and dedication to improvement. As the war for talent rages in the water quality field, there certainly is cause for concern about attracting, developing, and retaining talent.

**YP advancement is a two-way street, with senior staff providing opportunities and YPs taking the initiative to build on their talents and advance their own careers.**

Opportunities are numerous, but young professionals (YPs) are left with challenging decisions about their future development and career direction.

While the following can apply to all career paths, allow us to use technology as an example of the development process. Our perspective is that proper use of technology for career development will attract, develop, and retain YPs through a five-step program that includes inclusion, integration, training, performance, and maintenance. At each of these steps, YP advancement is a two-way street, with senior staff providing opportunities and YPs taking the initiative to build on their talents and advance their own careers.

By definition, innovation requires senior staff to be impossible for imitating or copying. YPs identify a production, or interests, in specific areas of service provided by the organization.

During innovation, senior staff must seek out projects and provide opportunities for junior staff to learn and learn from the company's experts in the appropriate field of interest. At the same time, it is the responsibility of the YPs to conscientiously perform current assignments in a timely fashion and maintain a positive attitude until projects reflecting the areas of recent work.

Adaptation brings results from senior staff providing appropriate resources and adjusting expectations to allow the YPs to learn. However, at this point, additional effort is required by the YP to clearly identify training that is within the realm of the company's developmental regime, on-the-job training that may be appropriately billed to project work, and "homework." Until a thorough understanding of the technology is obtained, YPs must work with a partial understanding of the material. Realistically, there is a bulk of both theoretical and practical knowledge required to function as a technological leader. Therefore, YPs must extend an extraordinary effort to obtain, interpret, and apply the knowledge to the benefit of the company and thereby to the benefit of their career growth. Senior consultants must take time to explain the relevance of the underlying material and respond in a manner that is not condescending when inevitable errors occur. An accomplished mentor will provide thorough feedback, seek out technology leaders who possess the solution if the senior does not, and provide an appropriate barrier between the YP and clients in order to avoid YP embarrassment. This is effectively accomplished by quality control of the YPs' communications and deliverables.

Next, the YPs must meet performance

# Resource for Sustainability



# Gazing into the Future

- Address the disconnect between academic and “industry” reward structures

Invitation to Nominate  
2008 STOCKHOLM  
WATER PRIZE







# Gazing into the Future

- Major legislation shift?

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**FEDERAL WATER POLLUTION CONTROL ACT**  
[As Amended Through P.L. 107-303, November 27, 2002]

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# Gazing into the Future



During his testimony, Glen Daigger urged Congress to increase research and development spending for water conservation technologies.

- Seek a dedicated funding source similar to that provided by the EPA after the CWA

## Expert testimony

CH2M HILL water expert testifies before House Committee on Energy and the Environment

Glen Daigger, an internationally recognized wastewater reclamation specialist and senior vice president with CH2M HILL's Civil Infrastructure Group, provided expert testimony before the U.S. Congress' House Committee on Energy and the Environment on October 30. Daigger spoke on water-use efficiency technologies at a legislative hearing on H.R. 3957, the Water-Use Efficiency and Conservation Research Act of 2007.

The bill, introduced by Utah's Jim Matheson on October 24, calls on the Environmental Protection Agency to work with non-governmental partners to increase research, development, education and technology transfer activities related to water-use efficiency and conservation technologies.



For background and the current status of H.R. 3957, the Water-Use Efficiency and Conservation Research Act of 2007: [www.science.house.gov](http://www.science.house.gov) and search for H.R. 3957.



# Questions?