Community Colleges, Education, and the Impending Water Crisis

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Thank You

Johnson County Community College’s Center for Sustainability (email jantle@jccc.edu to join monthly sustainability webinars)

Advance Technology Environmental and Energy Center (Eastern Iowa Community Colleges)
Supporting community colleges in educating for and building a clean and sustainable economy

www.theseedcenter.org
Speakers

Christine H. Radke, Technical Project Manager, Water Environment Federation

Dr. Jeremy Pickard, Associate Director, Advanced Technology Environmental and Energy Center (ATEEC)

Mike Smith, Department Chair, Lead Discipline Chair, Lead Faculty, Red Rocks Community College
Christine H. Radke, PMP
Technical Project Manager
Water Science & Engineering Center
We are the water quality people
Challenges

Climate Change
Challenges

Increased Water Consumption

Nutrients (Nitrogen and Phosphorus)

“Non-Flushable” Products
Challenges

Infrastructure

Workforce
Opportunities

“UOTF processes will be circular in the sense that water, nutrients, solids, heat, energy, and other constituents will be reused and not disposed.”
Opportunities

Water Reuse / Reclamation

Biosolids for Land Application
Opportunities

Waste Heat and Renewable Energy

We Turn Waste into Warmth
Opportunities

Recovery of Nutrients and Other Constituents

http://www.ostara.com/saskatoon
Opportunities

Decentralized Systems

Green Infrastructure
What’s Needed

• Update Water Curriculum/Body of Knowledge
  • New technologies and processes (advanced treatment systems, energy, automation)
  • New practices (asset management, soft skills such as communication)
  • More on-the-job/apprenticeship type learning

• New Workforce
  • Marketing and sales
  • Business (finance)
What’s Needed

• Integrated Watershed Planning & Management that engages the public, civic leadership, potable water utilities, and other infrastructure professionals
Resources

- www.WaterforJobs.org
- www.WorkforWater.org
- www.thevalueofwater.org
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Defining Water Management

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NSF tasked ATEEC with performing a more thorough occupational analysis of the water management field, as part of the Center’s ongoing environmental occupation efforts.
The Forum

Forum Objectives

• Title and definition of the field of water management
• Definition of technician
• Water management occupational categories
• Technician-level occupational titles
• Job functions typically performed in each occupation
• Emerging issues and trends
The Forum (cont.)

Forum Partners
- Partnership for Environmental Technology Education (PETE)
- Association of Boards of Certification (ABC)
- Water Environment Federation (WEF)

Forum Participants
- Business leaders
- Industry experts
- Government agency representatives
The Forum (cont.)

Results can be downloaded, free of charge, at http://ateec.org/defining-water-management-report/
The Results (cont.)

Step 1 – Group Discussion
- Defining “Water Management” field
- Defining “Water Professional” occupation
- Creating Overarching Job Categories
Definitions

http://ateec.org/defining-water-management-careers-chart/
What is the Water Management Field?

Water management is a career field that applies the principles of science, math, technology, engineering, communication, economics, management, and law to ensure water quality and to sustainably manage water as a resource to protect public health and the environment.
What is a Water Professional?

A Water Professional applies knowledge, skills, and abilities to perform scientific, technical, managerial, regulatory, and communication tasks and responsibilities.
Occupational Categories

- Administration
- Engineering
- Laboratory
- Plant Maintenance
- Regulations & Compliance
- Wastewater Operations
- Water Operations
- Watershed and Runoff Control
The Forum (cont.)

Step 2 – Small Group Discussions

Creating, defining, and refining technician-level job titles and functions
Step 3 – Sharing Results
Small groups shared findings with the large group, then formed a consensus.
What is the Water Management field?

Water Management is a career field that applies the principles of science, math, technology, engineering, administration, economics, management, and law to the management of water to ensure water quality and to sustainably manage water as a resource to protect public health and the environment.

Job Titles

http://ateec.org/defining-water-management-careers-chart/

Wastewater Operations
- Chief Operator
- Collection System Operator
- Instrumentation Technician
- Environmental Compliance Technician
- Office/Reception/Help Desk
- Hematologist
- Inspector
- Laboratory Technician
- Process Control Operator

Water Operations
- Water Operations Coordinator
- Water Quality Technician
- Water Distribution Operator
- Water Treatment Operator
- Water Plant Operator

Wastewater Operations
- Chief Operator
- Collection System Operator
- Instrumentation Technician
- Environmental Compliance Technician
- Office/Reception/Help Desk
- Hematologist
- Inspector
- Laboratory Technician
- Process Control Operator

What is a Water Professional?

A water professional applies knowledge, skills, and abilities to perform scientific, technical, managerial, regulatory, and administrative tasks and responsibilities.
Wastewater Operations

- Chief Operator
- Collection System Operator*
- Industrial Pretreatment Operator
- Instrumentation Technician*
- Plant Operator*
- Pretreatment Coordinator
- Process Control Operator**

* Various levels (e.g., supervisor, team leader, senior lead, shift supervisor, operator I, operator II, operator III, non-certified maintenance worker, operator-in-training (OIT))

** Various levels (e.g., operator, engineer, supervisor)
Job Functions
http://ateec.org/defining-water-management-report/
Emerging Issues and Future Trends

• Administration

http://ateec.org/defining-water-management-report/
Emerging Issues and Future Trends

- Outreach
- Sustainability
- Technology
- Training

http://ateec.org/defining-water-management-report/
Next Steps

Six “Regional Water Conversation” forums

Upcoming in May:
- Central Carolina Technical College, Sumter, SC
- Bristol Community College, Fall River, MA
- Lane County Community College, Eugene, OR
- Cuyamaca College, El Cajon, CA

Completed:
- Red Rocks Community College, Lakewood, CO
- Eastern Iowa Community Colleges, Davenport, IA
Next Steps (cont.)

Online, interactive water technology program database
http://ateec.org/water-technology-programs-listing-2/
Next Steps (cont.)

Expanded offerings of ATEEC’s no-fee, downloadable water instructional and curricular materials

http://ateec.org/ateec-downloads
Instructor Professional Development Workshops

- Currently exploring funding possibilities
- Based on ATEEC’s model workshops for sustainable energy
- One-week intensive sessions
- Hosted by a water technology research institution, with presentations, tours, and demonstrations of latest technologies by researchers and business/industry reps
- Hands-on activities, peer-to-peer learning, and follow-on network
- Possible international workshop
- Participant creation of instructional materials and curricula
- Check ateec.org home page for announcements & application
WATER QUALITY MANAGEMENT TECHNOLOGY

RED ROCKS COMMUNITY COLLEGE

Community Colleges and the Water Crisis
Who we are and what we do.
STATUS OF THE WATER INDUSTRY

• Although much has been done to make the industry more “sustainable” in terms of supply and demand, very little effort has actually been adopted into the idea of environmental sustainability. This is giving reference to alternative use and sustained water supplies.

• Of course, we do not have control of the environment, but do have control of environmental development. New technologies in water reuse systems and reclamation have been developed but not completely adopted. Very few communities in the continental United States actually have a reuse system dedicated to irrigation and industrial applications. Only in the western half of the country are districts adopting recharge planning into their operations and NO state in the country is aggressively active with storm water management and enhanced large scale catchment.

• The ONLY way to get this fixed is community support which will come from public education. Everyone will need to make sacrifices to make our water supplies sustainable.

• The big picture is that the necessary development will be expensive and we will have to rely on public support to acquire the funding to maintain our growth and development needs.
STRATEGIC PLANNING

• Retiring Workforce – Loss of education, experience and system knowledge
• Fast Track Education – The unemployed need to return to work quickly
• Diversity in Employment – Need to make good use of different demographics to enhance the industry’s workforce

• Supply Issues – Droughts and Compacts restrict development and community growth

• Aging Infrastructure – Lack of prioritization of replacement and upgrades
• Treatment Efficiencies – Dated and often less efficient than they can be
SOLUTIONS:

- Retiring Workforce, Fast Track Education and Diversity – can be addressed in the same way:
  - Educational programs need to be flexible, rigorous and economical.
- Supply Issues, Reuse and Catchment – related to “Conservation”
  - Compacts need to be revisited by legislation and altered for the 21st century.
  - Enhanced catchment and reuse systems need to be developed to put less stress on snowpack and runoff.
- Aging Infrastructure and Treatment Efficiencies – all financially driven
  - Proper education that provides new technology as well as alternative techniques needs to be shared by all industry partners.
  - Collaborate with efficient replacement strategies.
SO WHAT CAN ANY COMMUNITY COLLEGE DO?

• The role of a VOCATIONAL CTE program is to support educational needs for applied industries.

• To be successful with this task, education must:
  • Be networked with the local utilities.
  • Be in sync and connected to the local State Licensing and Certification system.
  • Address recruitment by introducing the CTE program to undeclared Science and Math students.
  • Actively work with industry to address public awareness, e.g., work with the required Consumer Confidence Reports.
THE MODIFIED EDUCATIONAL NEED

• There are basically two areas that need to be incorporated into a development plan:
  • Conservation, Reuse, Reclamation and Supply technologies
  • The direct natural resource educational application –
    • Earth Science has been removed from secondary curricula – need to fill that void at the post secondary level.
THE WATER INDUSTRY EDUCATION AT
RED ROCKS COMMUNITY COLLEGE
PROGRAM DIVISIONS

- Water Quality Management Technology
  - AAS Degree and Certificates

- Outreach: ONLINE Education

- Diversity and Job Placement Assistance

- Water Analysis Laboratories

- Distribution System Training Lab

- International Development

- WAVE Short School Program

Diversity and Job Placement Assistance
WATER QUALITY MANAGEMENT

- **AAS Degree: Core Course Requirements**
  - WQM 100 Introduction to Water Quality
  - WQM 105 Specific Calculations
  - WQM 119 Basic Water Analysis
  - WQM 120 Equipment Maintenance
  - WQM 126 Safety and Security Systems
  - WQM 200 Hydraulics
  - WQM 206 Design Interpretations
  - WQM 216 Biological and Bacteriological Analysis
  - WQM 217 Disinfection Techniques

Total 34 Credits
WQM ELECTIVES
12 CREDITS
(ANY 4 COURSES)

- WQM 109 Distribution Systems
- WQM 118 Wastewater Collection Systems
- WQM 121 Environmental Sampling and Volume Measurement
- WQM 122 Instrumentation and Electrical Control
- WQM 123 Reuse Systems
- WQM 124 C and D Review for Water Treatment
- WQM 125 C and D Review for Wastewater Treatment
- WQM 130 Water Chemistry
- WQM 131 Solids Waste Management
- WQM 140 Management and District Leadership
- WQM 150 Troubleshooting
- WQM 160 Source Water Management
- WQM 165 Water Law
- WQM 169 International Development
- WQM 207 Activated Sludge Systems
- WQM 212 Drinking Water Regulations
- WQM 224 A and B Review for Water Treatment
- WQM 225 A and B Review for Wastewater Treatment
- WQM 230 Industrial Treatment and Monitoring
- WQM 280 Internships
- WQM 285 Independent Study
What are Certificates? The Water Quality Management Program has developed 9 different Certificate programs in addition to our existing AAS degree.

- Introduction to Water Treatment
- Experience and Education
- Source Control and Water Audit
- Introduction to Wastewater Treatment
- Treatment Mathematics
- Water Distribution and Collection
- Wastewater Treatment Operator Certification (D-A)
- Water Treatment Operator Certification (D-A)
- Water Quality Analysis
Distribution Training Lab and Educational Support
DEDICATED WATER ANALYSIS LABORATORY
MOBILE WATER QUALITY LABORATORY
JOB PLACEMENT AND DIVERSITY SUPPORT
INDUSTRY/EDUCATION INTEGRATION

• In this industry, regardless of the state or province, industry employment is based entirely on proper credentials. Licensing is the key to a successful program.

• It is ill advised to establish a program that focuses on “passing the exam” vs. providing proficient education. Same is true by having a program that needs to be completed BEFORE a licensing exam can be attempted. It is a fine balance that needs to be an active element when establishing a strategic plan for an educational program.

• Working with employers directly and receiving their guidance through an Advisory Committee will help create educational pathways that will lead directly to employment for students.
  • Certificates
  • Articulation Agreements
  • Professional Development Curricula
The Next Level:
INTERNATIONAL DEVELOPMENT

- BOLIVIA
- BRAZIL
- ECUADOR
- JORDAN
- KENYA
- SAUDI ARABIA

Share the Knowledge:
Train the Trainer Programs
THANK YOU.

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