



Applying knowledge to improve water quality

Pacific Northwest

Regional Water Program

A Partnership of USDA CSREES
& Land Grant Colleges and Universities

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PNWWATER 131

Use and Treatment:

History of Drinking Water

Today we define drinking water as water delivered to the consumer that can be used safely for drinking, cooking, and washing. We tend to take our drinking water supply for granted in the USA; however, poor quality drinking water has probably resulted in over 600,000,000 human deaths throughout history and still claims lives today in poorer countries of the world. As I write this update a cyclone has done major damage in the country of Myanmar (Burma). While the actual cyclone probably killed in excess of 50,000 people, health officials are concerned that contaminated drinking water could actually triple the cyclone death toll. This contaminated water in Burma is likely to spread diseases such as cholera. From a drinking water historical perspective there have been three distinct use periods. These periods include the ancient (pre-1880), progressive (1880-1960), and contradictory (1960-present) periods.



Ancient Roman aqueduct.

The Ancient Period

Ancient civilizations had no scientific knowledge of pathogens in drinking water; however, many of these ancient societies realized that certain types of water treatment resulted in healthier citizens. Even the ancients treated water prior to consumption. Ancient civilizations often treated water using one or more of the following processes: sedimentation, filtration, coagulation, and/or disinfection.

The first written accounts of societies dealing with drinking water comes from ancient Mesopotamia where public sanitation laws enforced about 200 BC required that cisterns (water storage devices) and wells had to be separated by at least 75 feet from cemeteries, tanneries, and slaughterhouses. Again, this society had no knowledge about microbes and pathogens, but through observation recognized that certain activities were not compatible with good quality drinking water.

The Romans were famous for their diligence in seeking, choosing, and transporting drinking water via aqueducts to their cities. Nine different aqueducts delivered water to ancient Rome. The aqueduct-transported water was stored in reservoirs and then distributed by pipes to public fountains for the masses. The water used in ancient Rome was poor by today's standards, but it was the best quality drinking water that humans would use all the way up to 1880. Even with the relatively good water quality in Rome, most citizens drank wine instead of water. The fermentation process in creating wine actually killed many of the pathogens present in drinking water. In the ancient world, healthy people drank wine, while sick people drank water.

After Rome fell, Western civilization fell into the dark ages. During this period of time water sources were not protected, and plagues spread across Europe—some of which were due to poor water quality. Illnesses were often linked to sinfulness, rather than poor water. People used the same water sources for drinking and disposing of their wastes. Humans were in for fourteen centuries of poor quality drinking water.

The Progressive Period

In the late 1800s the sciences of microbiology and organic chemistry were rapidly developing. At this time, scientists were actually able to see bacteria (using microscopes) in water. All of a sudden science realized there was a linkage between



Pacific Northwest Regional Water Quality Coordination Project Partners

Land Grant Universities

Alaska

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<http://www.uaf.edu/ces/water/>

University Publications:

<http://www.alaska.edu/uaf/ces/publications/>

Idaho

University of Idaho
Cooperative Extension System
Contact Bob Mahler: 208-885-7025

<http://www.uidaho.edu/wq/wqhome.html>

University Publications:

<http://info.ag.uidaho.edu/Catalog/catalog.html>

Oregon

Oregon State University
Extension Service
Contact Mike Gamroth: 541-737-3316

<http://extension.oregonstate.edu/>

University Publications:

<http://extension.oregonstate.edu/catalog/>

Washington

Washington State University
WSU Extension

Contact Bob Simmons:
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University Publications:

<http://pubs.wsu.edu/>

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Water Resource Research Institutes

Water and Environmental Research
Center (Alaska)

<http://www.uaf.edu/water/>

Idaho Water Resources
Research Institute

<http://www.boise.uidaho.edu/>

Institute for Water and
Watersheds (Oregon)

<http://water.oregonstate.edu/>

State of Washington
Water Research Center

<http://www.swwrc.wsu.edu/>

Environmental Protection Agency

EPA, Region 10

The Pacific Northwest

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The Project

Land Grant Universities, Water Research Institutes, and EPA Region 10 have formed a partnership to provide research and education to communities about protecting or restoring the quality of water resources. This partnership is being supported in part by the USDA's Cooperative State Research, Education, and Extension System (CSREES).

Our Goal and Approach

The goal of this Project is to provide leadership for water resources research, education, and outreach to help people, industry, and governments to prevent and solve current and emerging water quality and quantity problems. The approach to achieving this goal is for the Partners to develop a coordinated water quality effort based on, and strengthening, individual state programs.

Our Strengths

The Project promotes regional collaboration by acknowledging existing programs and successful efforts; assisting program gaps; identifying potential issues for cross-agency and private sector collaboration; and developing a clearinghouse of expertise and programs. In addition, the Project establishes or enhances partnerships with federal, state, and local environmental and water resource management agencies, such as by placing a University Liaison within the offices of EPA Region 10.

pathogens in water sources, which were used both as a drinking water source and a human waste depository, and the spread of human diseases. At the same time many governments realized that they had a moral responsibility to protect citizens. Consequently, the progressive period of drinking water was initiated in the late 1880s. This period was characterized by the rapid improvement in drinking water quality through the development and use of water treatment technologies. During this time national water regulations were passed in the USA and drinking water standards were developed. This period, which lasted up until the early 1960s, focused on removing microbial pathogens from the water supply.

The Contradictive Period

The current period of drinking water management, the contradictive period, began in the 1960s. In our current period regulations for inorganic chemicals, organic chemicals, and radioactive elements were established. In the USA the Surgeon General issued initial drinking water quality guidelines. In 1974 Congress passed the Safe Drinking Water Act. This Act was passed to further protect the quality of drinking water in the USA. This Act, which is administered by the EPA, received major amendments in 1986 and 1996. The primary goals of the Safe Drinking Water Act are to: (1) ensure high quality water at the tap; (2) set up government oversight of both surface and groundwater sources of drinking water; (3) set up programs to develop standards and regulations; (4) provide funding for state water systems; and (5) develop water monitoring programs. Because of this Act, Americans living in cities are assured of a safe drinking water supply.



National Water Quality Program Areas

The four land grant universities in the Pacific Northwest have aligned our water resource extension and research efforts with eight themes of the USDA's Cooperative State Research, Education, and Extension System.

1. Animal Waste Management
2. Drinking Water and Human Health
3. Environmental Restoration
4. Nutrient and Pesticide Management
5. Pollution Assessment and Prevention
6. Watershed Management
7. Water Conservation and Management
8. Water Policy and Economics

CSREES is the Cooperative States Research, Education, and Extension Service, a sub-agency of the United States Department of Agriculture, and is the federal partner in this water quality program.