

# **Lesson 2: The History of Water Treatment**

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## Purpose

A clean, safe drinking-water supply and wastewater treatment have contributed significantly to public health and human longevity. Historically, the ingenuity of man in the development of methods to treat water, making it safe for drinking has contributed to the ability of man to explore and settle new areas of the nation and world.

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## Objective

Students will research the history of water treatment in the world, our nation, and Northwest Arkansas. (Cause and effect of water treatment throughout history).

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## Arkansas Framework Correlation

### Language Arts

#### 7<sup>th</sup> Grade

OV.1.7.1 Use vocabulary from content area texts and personal reading

OV.1.7.2 Use standard English in classroom discussion and *presentations*

OV.1.7.4 Demonstrate appropriate eye contact, posture, and volume

OV.1.7.5 Use correct pronunciation and inflection/modulation to communicate ideas and information

OV.1.7.6 Contribute appropriately to class discussion

OV.2.7.1 Demonstrate effective listening skills by exhibiting appropriate body language

OV.2.7.3 Listen attentively for main ideas, details, and organization

OV.2.7.4 Demonstrate attentive listening skills to respond to and interpret speaker's message

OV.3.7.1 View a variety of visually presented materials for understanding of a specific topic

OV.3.7.2 Use appropriate criteria to evaluate media for bias and propaganda

W.5.7.1 Write to develop narrative, expository, descriptive, and persuasive pieces

W.5.7.2 Select the form of writing that addresses the intended audience

W.5.7.3 Create expository, narrative, descriptive, and persuasive writings

W.5.7.10 Write across the curriculum

R.9.7.15 Organize information, including simple outlining

R.9.7.16 Use skimming, scanning, note-taking, outlining, and questioning as study strategies

R.9.7.19 Evaluate personal, social, and political issues as presented in text

R.10.7.5 Use skimming, scanning, note taking, outlining, and questioning as study strategies

R.10.7.6 Organize and synthesize information for use in written and oral presentation

R.10.7.11 Read and utilize functional/practical texts, including forms, reports, cover letters, letterheads, and business letters

R.11.7.3 Add content words to sight vocabulary

R.11.7.6 Use resources to determine meaning of technical and specialized vocabulary

IR.12.7.3 Use print and electronic sources, such as card catalogs and computer databases, to locate information

IR.12.7.7 Develop notes that include main topics, details, summaries, and paraphrasing from multiple types of sources

IR.12.7.9 Use research to create one or more oral, written, or visual presentations /products

## Science

### 7<sup>th</sup> Grade

NS.1.7.1 Interpret evidence based on observations

PS 5.7.10 Investigate scientists, careers, and historical breakthroughs related to elements, mixtures, and compounds.

## Social Studies

### 7<sup>th</sup> Grade

.6.3.7 Analyze a timeline that illustrates selected historical event

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## Problem Question

How has the treatment of water developed over time?

## BACKGROUND INFORMATION

- Before municipal water service became common in the developed world, people were quite vulnerable to waterborne diseases such as cholera, yellow fever and typhoid fever, diseases that we associate with the Third World.
- Water is such a good solvent that it is known as the universal solvent. It picks up all kinds of contaminants causing water in nature to often not be clean and safe enough for people to drink.
- People did not understand Germ Theory and there were no antibiotics.

- Children often were forced to quit school and go to work when they lost one or both parents. They often worked long hours, six days a week to support their families.
- Well into the 20<sup>th</sup> Century, most cities in the United States piped sewage to nearby creeks or rivers without treatment.
- The Clean Water Act, required municipalities to remove most wastewater and industrial pollution before discharging into waterways.

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## Timeline

Days 1 and 2: Elicit student background and teacher introduces the history of water treatment, careers in water treatment, and the water treatment process.

Day 3: Field trip to Beaver Water District to research their topic(s) (water treatment and its local history and careers)

3 additional days to finish the history of water portion of the project including explore, explain, elaborate, and evaluate.

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## Materials

Materials will vary depending upon the visual chosen by each student group. (See 7 E's)

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## Teacher Preparation

Arrange for use of the computer lab for research and as needed.

Arrange for library time as needed.

Arrange for materials for student visuals as needed.

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## Additional Resources

**Resources** for materials not included:

**UA Center for Math & Science Education**

<http://www.uark.edu/~k12info/>

479.575.3875

**Northwest Arkansas Education Co-Op**

<http://starfish.k12.ar.us/web/>

479.267.7450

**Beaver Water District**

[www.bwdh2o.org](http://www.bwdh2o.org)

479.717.3807

Know of other resources? Please let us know!

[education@bwdh2o.org](mailto:education@bwdh2o.org) or 479.756.3651

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# 7E's History of Water Treatment

## Elicit

Ask: Form your experiences with books, movies, tv programming, etc.

- What was/is life like in areas where the water supply was/is untreated and/or not piped to homes?
- What conflicts have arisen over the use of water?

## Engage

Students participate in the interactive The Aquaventureer Time Machine; Travel through Wastewater; Past, Present, and Future at the EPA website:

<http://www.wef.org/AboutWater/ForStudents/WastewaterTimeline/>

This may be done whole class, as student teams at one computer, or as individuals in the computer lab.

## Explore

Divide students into groups of 3-4. Each group will research an assigned topic and prepare a visual and oral presentation for the class. The History of Water Treatment will be the encompassing theme. Topics may include the history of dams, irrigation systems, aqueducts, pipelines, water purification systems, the Clean Water Act of 1972, Beaver Lake and Beaver Water District, or others of student interest approved by teacher.

The student made visual element of the project may be a model (preferred when possible), poster, video, PowerPoint, interactive whiteboard presentation such as a flipchart, foldable, or other teacher-approved visual. The visual element chosen must receive prior teacher approval.

Make it fun! The 4-6 minute classroom oral presentation may be in any teacher-approved format (play, role playing, puppet show, commercial or advertisement, etc.) and should include:

- Introduction (approximately 1 minute)
  - Introduces students to the topic
  - Sparks interest
  - Lets students know how the topic will be developed
- Organized Body (2-4 minutes)
  - When did the history of your topic begin?
  - How has your topic changed since the beginning?
  - If applicable, how does it work?
  - If applicable, how is the water in this system returned to be used again?
  - If applicable, what are the environmental problems with this system?
- Conclusion (approximately 1 minute)

- Tell a story about what our lives might be like if the technology, law, etc. of your topic had not happened.

## Explain

Using cash register tape, student groups construct a timeline of the history of water treatment.

## Elaborate

Using what has been learned in this lesson, students predict what the future of water treatment may hold and explain their view.

## Evaluate

Students will be evaluated on participation in group research, visual element and oral presentation.

## Extensions

- **Play Beaver Water District's Watershed Jeopardy Challenge for 7<sup>th</sup> Grade. Download from the Beaver Water District website at [www.bwdh2o.org](http://www.bwdh2o.org).**
- Students research and prepare a report; "How Historical Weather-Related Disasters in the United States Have Affected the Water Supply and Water Treatment in the Affected Areas." Examples: hurricanes, tornadoes, floods, droughts, etc.