



**Water Systems Teacher Fellows Program
Community Curriculum Case Study**

World Water Challenge

A year-long quest to meet the water needs of our local and global communities, now, and far into the future

Grade 7 - Social Studies

Problem Statement

As global citizens, what actions can we take to solve world water challenges to ensure a sustainable future for all?



Teacher Design Team
Tamara Truax, Maile Morgan

Grade 7 Social Studies
Bellevue School District, WA

About the Water Systems Teacher Fellows Program

Teacher Fellows (grades 6-12) are paid a stipend over a 12-month period to develop new or refine existing problem-based curriculum that integrate water supply, wastewater, and stormwater management systems. Fellows integrate classroom rigor with community impact while advocating for district-wide adoption of the methods and resources they develop. Fellows are selected from the Lake Washington, Bellevue, Issaquah, and Tukwila School Districts. The Program is funded by [Cascade Water Alliance](#) and facilitated by [Sustainability Ambassadors](#).

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About Problem-Based Learning

Problem-based learning (PBL) is experiential learning organized around the investigation and resolution of messy, real-world problems. Teachers coach student thinking and guide student inquiry as a co-investigator. PBL increases student motivation through the pull of problem dissonance, intrinsically inspiring students to take on more and delve deeper as they make a personal investment in the outcome of their inquiry. Coupled with cognitive coaching strategies, PBL calls upon critical and creative thinking by suspending the guessing game of: "What's the answer that the teacher wants me to find?" PBL promotes metacognition and self-regulated learning as students generate strategies for defining problems, gathering information, analyzing data, building and testing hypotheses, comparing strategies with those of other students and mentors, and sharing results with real-world stakeholders. Source: http://bie.org/about/why_pbl

School District Context

The Bellevue School District has launched three district instructional initiatives that support its mission: "to provide all students with an exemplary college preparatory education so they can succeed in college, career and life." Commitment to the Community is one portion of the Positive and Productive Life initiative. The mission of the Middle School Committee is to create curricula at each grade level that foster students' sense of connection to and responsibility for their local and broader communities. Through these experiences students should gain the civic competencies needed to make active contributions to real-world problems. The Committee is facilitated by Patty Shelton, Curriculum Director for K-12 Social Studies. Water Fellows Tamara Truax and Maile Morgan are both members of this Committee.

City Context

The City of Bellevue [Environmental Stewardship Strategic Plan](#) includes developing and implementing projects, programs and policies to advance sustainability and maintain a balance of built environment with protected natural areas. In the section of this plan focused on the interdependent relationship between energy and water. The stated goal is to ***"ensure long-term access to clean energy and water while reducing the fiscal and environmental impacts of consumption."*** Students can play a direct role in meeting this goal.

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Classroom Context: This thematic, problem-based curricular thread was designed over the course of the year by Maile Morgan, district 7th grade Social Studies course leader and teacher and at Chinook Middle School, and Tamara Truax, 6th/7th grade Human Geography teacher at International School, both in the Bellevue School District. The World Water Challenge is designed to align with the existing units of the district 7th grade social studies curriculum, which focus on the geography and cultures of the Middle East, Africa, India and China, as well as the geography and economics of Washington State. However, the World Water Challenge also aligns very well with the two-year looping human geography course at the International School.

District-Wide Pilot in 2016-17 School Year: The School District Curriculum Department has approved this unit to be piloted in all 7th grade classrooms in all 7 middle schools during the 2016/17 school year. This will impact the learning of 1,300 students.

Project Summary

Throughout the year, students gain a layered understanding of the importance of **three integrated water systems**: a clean water supply, effective wastewater treatment, and the management of polluted stormwater runoff. Water systems thinking and sustainability are lenses through which students analyze water challenges facing people in each of the world regions studied and help students make connections between local and global water issues to envision a more sustainable future for all.

After an initial **Water Challenge Pre-Test** and introduction to natural and human water systems, students explore the development of Prehistoric River Civilizations and the need for these early peoples to manage water. At the same time, students examine their own direct and virtual “**water footprint**” in a modern consumer context.

When studying modern Sub-Saharan Africa, students focus on the **United Nations Sustainable Development Goal (SDG) 6: Clean Water & Sanitation**, examining the effects of a lack of clean water on children in Africa, and evaluating the efforts of NGOs to address the need for adequate access. Next, students examine India’s need for reducing pollution and propose

solutions for the culturally vital Ganges River. Within our China Unit, students develop proposals to the City of Bellevue based on inquiry research into the effectiveness of China's "Sponge Cities" in controlling flooding and cleaning stormwater.

Students use their knowledge to analyze the relationship between economic vitality and ecosystem health in our **Puget Sound region** where managing polluted stormwater runoff is a high priority for scientists and policymakers. Students explore what is already being done at the county and city level and analyze what they can do as individuals or within their families to ensure a more sustainable future.

As part of **World Water Day** activities In March, students conduct a Water Wiki inquiry to investigate the local, regional, and global topics from the original Pre-Test and share results by publishing their articles in a class Wiki and presenting in expert panels.

Using this knowledge, they each commit to making changes in their own behavior and educating and recruiting family members to take the **Personal & Family Water Challenge Pledge**. As a follow-up, students reflect on their progress and make specific plans to improve or add to their impact on conserving and protecting water for a sustainable future. Data collected from the Pledge is analyzed and student representatives prepare and **present an annual report to stakeholders** including city and county staff and the Cascade Water Alliance.

Curriculum Flow for 2016-2017 Pilot

Washington State Geography

1. Water Challenge Pre-Test (2 partial days, computer access)
Goal: introduce year-long water themes & facilitate inquiry
 - a. Students take pretest online – (30 min.)
 - b. Once data is available, students complete Pretest Analysis (30 min.)

2. Water Challenge: Water Systems (1 day)
Goal: introduction to establish understanding of the basics of water systems
 - a. Two natural water systems (water cycle & watershed) & three human water systems (supply, wastewater treatment, stormwater management) - PPT, student activity to capture main ideas (notes page)

Early River Civilization

3. Water Challenge: Mesopotamia (1 day)
Goal: understand the importance of water management in the development of organized civilization
 - a. Examine how early civilizations managed water, apply water systems knowledge

4. Water Challenge: Water Footprint (1 day, computer access)
Goal: consider the sustainability of direct and virtual water use in our modern consumer civilization
 - a. Water footprint online, then class collective poster, 1 per class to post in hallways

Africa

5. Water Challenge: UN Sustainable Development Goals, focus on #6 (1-2 days)
Goal: understand the scope of the United Nation's efforts to tackle world problems, including clean water & sanitation
 - a. Capturing the Heart of Global Goals – making posters in groups by theme, all look at #6
6. Water Challenge: Africa Water Challenge (5 days)
Goal: understand how the lack of adequate clean water affects children's lives in Africa; evaluate current NGO efforts to improve access to clean water
 - a. Video & debrief
 - b. Africa Water Challenge District Assessment
 - c. Africa Water Challenge PSA Poster – inquiry research evaluating a water NGO in Sub-Saharan Africa

India

7. Water Challenge: Healing the Ganges (2 days)
Goal: understand how a river so holy to a society can be so polluted; generate & promote solutions
 - a. Chasing Rivers Video, PIGEARS, Causes of Water Pollution
 - b. Advertising for Good – Ad, with marketing strategy, to stop one type of pollution on the Ganges

World Water Day (March 22 - between India & China, pause to celebrate)

8. Water Challenge: Water Wiki Inquiry (2 days, computer access)
Goal: understand global, regional, and local water issues through inquiry
 - a. Wiki Inquiry of Pre-Test topics, Expert Panels (inquiry research & presentations)
 - b. The story of bottled water (video & guide)
9. Water Challenge: Personal & Family Water Challenge Pledge (30 min, + homework)
Goal: commit to making behavioral changes or taking actions to protect & conserve water; educate and persuade family members to make a pledge
 - a. Personal & Family Water Challenge Pledge

China

10. Water Challenge: China's Sponge Cities (3 days, computer access)

Goal: determine how China's experience with sponge cities can help Bellevue become more sustainable

- a. Inquiry about how China's sponge cities address water scarcity, flooding, and quality
- b. Propose to Bellevue city planners which aspects of sponge cities are most relevant to creating a more sustainable Bellevue

Washington State Economics

11. Poison Waters (3-4 days)

Goal: understand how humans have changed the environment to serve their economic needs, leading to continuing threats to the health of Puget Sound and generate sustainable solutions

- a. Poison Waters video, guide, map, PPT
- b. CIEvR written response (claim, evidence, reasoning)

12. Water Challenge: Water Pledge Follow-up (30 min.)

Goal: measure progress and follow through with commitment to community

- a. Check in on how the Personal & Family Water Pledges are going, students report on how their actions, come up with strategies to improve or meet personal pledge goals

Community Impact Statement

Evidence that we have measurably contributed to solving the problem.

GOAL Students understand the complexity of local and global water challenges; can critically evaluate and generate actionable solutions that bring about more sustainable water systems; and take personal responsibility to act to conserve and protect our water.			
Original conditions <i>What were the conditions before we took action?</i>	Impact <i>How did conditions improve as a result of our action?</i>	Recommendation <i>What do we think should happen next?</i>	Stakeholders <i>Who should know about our results and recommendations?</i>
Water Footprint Students calculate their direct and virtual Water Footprint & share with school community	Students spread awareness of specific direct and virtual Water Footprint behaviors to inspire behavioral change	Connect directly to the Water Challenge Pledge (start a menu of ideas for students to consider), ask students to design a more ambitious awareness campaign	Next steps: evaluate needs and develop tools and relationships for communicating with: Other students, faculty, administration, clubs (Green Club, MUN, Roots & Shoots, Key Club, etc.)
Africa Water Challenge Students evaluate the effectiveness of a Sub-Saharan Africa Water NGO	Students gain civic competency in evaluating proposed solutions	To pilot	Parents & family, parent networks & neighbors Community civic groups or centers
Healing the Ganges Students propose a solution for a cause of pollution	Students gain civic competency in generating and communicating solutions	To pilot	Bellevue School District City of Bellevue Cascade Water Alliance
Water Wiki/Expert Panels Students develop expertise and learn specific actions that conserve and protect water	Students gain civic competency in evaluating community problems & solutions Students learn a large number of specific actions they & others can take to conserve and protect water	Connect more directly to the Water Challenge Pledge (start a menu of ideas for students to consider for the Pledge)	King County Water NGOs Schools in other states or countries

<p>Personal & Family Water Challenge Pledge Students choose several behaviors they will personally change and educate their families to inspire them to pledge behavior changes to conserve and protect water</p>	<p>Students and families pledge to make behavior changes. One month later they must report and evaluate their progress to encourage follow-through. Report results to stakeholders</p>	<p>Work with Cascade Water Alliance to create an online tool where data can be collected and families can link to more information, fact sheets and specific instructions for action steps. This could be used by all districts in the Alliance.</p>	
<p>China's Sponge Cities applied to Bellevue Students propose aspects of "Sponge Cities" for development in Bellevue to reduce the impact of polluted stormwater runoff</p>	<p>Students gain civic competency in evaluating community problems & solutions, applying concepts from one context to another, generating solutions, tracking data, and communicating results</p>	<p>To pilot</p>	
<p>Sustainable Solutions to Puget Sound Pollution Students examine threats to Puget Sound and propose sustainable solutions</p>	<p>Students gain civic competency in evaluating community problems, generating solutions, tracking data, and communicating results</p>	<p>To pilot</p>	

Curriculum Rigor meets Community Relevance

Standards Assessed	Critical Content	Community Connections
<p>C3 (College, Career, and Civic Life) Framework for Social Studies State Standards Inquiry Arc (Based on Common Core)</p> <ol style="list-style-type: none"> 1. Developing questions and planning inquiries 2. Applying disciplinary concepts and tools 3. Evaluating sources and using evidence 4. Communicating conclusions and taking informed action <p>Civics Standards for MS D2.Civ.7.6-8 Apply civic virtues and democratic principles in school and community settings</p> <p>D2.Civ.10.6-8 Explain the relevance of personal interests and perspectives, civic virtues, and democratic principles when people address issues in government and civil society.</p> <p>Geography Standards for MS D2.Geo.4.6-8 Explain how cultural patterns and economic decisions influence environments and the daily lives of people in both nearby and distant places.</p> <p>Economics Standards for MS D2.Eco.1.6-8 Explain how economic decisions affect the wellbeing of individuals, businesses, and society.</p> <p>D2 Eco.2.6-8 Evaluate alternative approaches or solutions to current economic issues in terms of benefits and costs for different groups and society as a whole.</p> <p>D2.Eco.8.6-8. Explain how external benefits and costs influence market outcomes.</p>	<p>Water Systems: understand the two natural water systems (water cycle & watershed) & three human water systems (supply, wastewater treatment, stormwater management)</p> <p>Mesopotamia: understand the importance of water management in the development of organized civilization</p> <p>Water Footprint: consider the sustainability of direct and virtual water use in our modern consumer civilization</p> <p>UN Sustainable Development Goals, focus on #6: understand the scope of the United Nation’s efforts to tackle world problems, including clean water and sanitation</p> <p>Africa Water Challenge: understand how the lack of adequate clean water affects children’s lives in Africa; evaluate current NGO efforts to improve access to clean water</p> <p>Healing the Ganges: understand how a river so holy to a society can be so polluted; generate and promote solutions; evaluate current NGO efforts to improve sanitation services in India</p> <p>Water Wiki Investigation: understand global, regional, and local water issues through inquiry</p> <p>Personal & Family Water Challenge Pledge: commit to making behavioral changes to protect & conserve water;</p>	<p>Alignment with Community Performance Measures</p> <p>UN Sustainable Development Goal 6; Ensure access to clean water and sanitation for all.</p> <p>Washington State Department of Ecology-Protecting Our Waters</p> <p>Puget Sound Vital Signs Dashboard</p> <p>Cascade Water Alliance Conservation Plan</p> <p>City of Bellevue Environmental Strategic Plan - Energy and Water Section</p> <p>City of Bellevue Comprehensive Plan</p> <p>City of Bellevue Stormwater Management Plan</p>

<p>CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.1</p> <p>CCSS.ELA-LITERACY.CCRA.R.8 Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.</p> <p>CCSS.ELA-LITERACY.SL.8.1.C Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas. Presentation of Knowledge and Ideas:</p> <p>CCSS.ELA-LITERACY.SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.</p>	<p>educate and persuade family members to make a pledge; measure progress, follow-through on commitments, and communicate results to stakeholders</p> <p>China's Sponge Cities: determine how China's experience with sponge cities can help Bellevue improve stormwater management</p> <p>Poison Waters: understand how humans have changed the environment to serve their economic needs, leading to continuing threats to the health of Puget Sound, generate sustainable solutions</p>	
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Teacher Reflection

We came to this project curious and enthusiastic, but with very little knowledge about water systems and the challenges facing societies around the world and in our own local community in meeting the water needs of a society and the planet. Through the Teacher Fellows Program sponsored by Cascade Water Alliance we learned along the way with our students as partners. As we introduced the concept with our classes, many students became genuinely passionate about the learning journey because they discovered actual needs and challenges in their immediate surroundings as well as the relevance of their actions to the lives of people around the world. Other content that was not directly part of the Water Challenge also took on a more purposeful air, as students found connections to our study of water issues. They also demonstrated a stronger sense of responsibility to the world around them that is so critical to the active global citizenship skills that we know the future demands.

The World Water Challenge helps students connect the curricular units together in meaningful ways by supporting the development of a complex worldview and by connecting the content to their communities and lives. Students hone their thinking skills, their mastery of social science disciplinary concepts and tools, their civic responsibility, and their commitment to their community. Our problem-based, thematic unit not only improves student engagement, but strengthens our state-mandated emphasis on Washington State economics and geography.

Really Helpful Resources

City of Bellevue Environmental Stewardship: <http://www.ci.bellevue.wa.us/environmental.htm>

Water Conservation: (Given to students with their Water Challenge Pledges) For more information about how to conserve water, including how to order free faucet aerators, showerheads, and shower timers, check out the Cascade Water Alliance: <http://cascadewater.org/conservation.php>

Water Preservation: (Given to students with their Water Challenge Pledges) For information about protecting our waterways, see this *Keeping Our Waterways Clean* brochure from the City of Bellevue: http://www.ci.bellevue.wa.us/pdf/Utilities/Clean_water_FAQs.pdf, as well Puget Sound Starts Here: <http://www.pugetsoundstartshere.org/>.

Water Systems Experts (Videos):
<http://www.sustainabilityambassadors.org/apps/videos/channels/show/4243207-water-systems>

Water Systems Annotated Links: (*coming soon*)

Water Footprint Calculator: <http://www.gracelinks.org/1408/water-footprint-calculator>

The Source: A 30-minute video about the history of Seattle's water.
<http://www.sustainabilityambassadors.org/apps/videos/videos/show/18927259-the-source-a-story-about-seattle-s-tap-water>

UN Sustainable Development Goals:
<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>
<https://sustainabledevelopment.un.org/sdgs>
<http://www.un.org/sustainabledevelopment/sustainable-development-goals/> (scroll down to Related News)
<http://www.peacetimes.news/category/sustainability/>
<http://www.globalgoals.org/>

Chasing Rivers Part 2: The Ganges: A 25-minute National Geographic video about India's sacred waterway, revered as a god but struggling with pollution. (There is also a 25 min. segment on the Colorado River) <https://youtu.be/mkPwEufhKo> or
<http://video.nationalgeographic.com/video/ng-live/mcbride-ganges-lecture-nglive?source=searchvideo>

Frontline: Poisoned Waters: A video with a segment on the causes of pollution in the Puget Sound
<http://www.pbs.org/wgbh/pages/frontline/poisonedwaters/>