

Tap Water High School Unit

Human Sustainability - HS - ESS3

Next Generation Science Standards Alignment

Lesson Focus	Performance Expectation	Disciplinary Core Idea	Cross Cutting Concept	
<p>Tap Water Usage:</p> <p>Challenges, responsibilities, and solutions</p>	<p>HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy resources based on cost-benefit ratios.</p> <p>Engaging in argument from evidence (HS-LS2-6, HS-LS4-5)</p>	<p>ESS3.A: Natural Resources Resource availability has guided the development of human society. (HS-ESS3-1)</p> <p>All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (HS-ESS3-2)</p> <p>ESS3.C: Human Impacts on Earth Systems: The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3)</p> <p>ETS1.B: Developing Possible Solutions When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (<i>secondary to HS-ESS3-2</i>),</p>	<p>Cause and effect (HS-LS4-5, HS-ESS3-1)</p> <p>Influence of engineering, technology, and science on society and the natural world (HS-ETS1-3, HS-ESS3-3)</p> <p>Science Addresses Questions About the Natural and Material World Science and technology may raise ethical issues for which science, by itself, does not provide answers and solutions. (HS-ESS3-2) Science knowledge indicates what can happen in natural systems—not what should happen. The latter involves ethics, values, and human decisions about the use of knowledge. (HS-ESS3-2) Many decisions are not made using science alone, but rely on social and cultural contexts to resolve issues. (HS-ESS3-2)</p>	

Steps	Activities	Connection to NGSS	Connection to CCSS	Resources									
<p>Engage:</p> <p>Tap into what students know or think about the topic</p>	<p>Students will:</p> <p>-identify water users and their interconnectedness of their needs</p>	<p>This activity will help students understand the needs of human societies and the requirement for responsible management of natural resources.</p>		<p>Common Water usage activity http://www.tech2o.org/resources/curriculum/Grade_06/lp_10_science06_01.pdf</p> <p>or -</p> <p>Have students list as many users of water in their state as they can think of. Expand this list by using this link for water usage in 2010 to look up water users and the approximate amount of water they use. Write down the names of all water users on index cards and have students line up in a continuum showing most to least water usage. Discuss.</p> <p>or -</p> <p>8-4-1: One for All (page 299 - Project Wet) http://store.projectwet.org/water-activities-water-lesson-plans-educators-curriculum-guide-2-0.html</p> <p>Project Wet provides free access to their curriculum after freeeducator training http://portal.projectwet.org/</p>									
<p>Explore:</p> <p>Key concepts New skills Inquiry Establish relationships</p>	<p>Students will:</p> <p>-learn who's in charge of California's water supply.</p> <p>-identify California's hydrologic regions and water sources.</p>	<p>These lessons will help students recognize that the availability of fresh water has had an effect on the development of our society</p>		<p>http://www.californiaeei.org/ (Liquid Gold Unit)</p> <table border="1"> <thead> <tr> <th>Lesson</th> <th>Learning Objectives</th> <th>Summary of Activities</th> </tr> </thead> <tbody> <tr> <td> <p>1</p> <p>Who's in Charge of the Water?</p> <p>Preparation Time: 15 min. Instructional Time: 50 min.</p> </td> <td> <ul style="list-style-type: none"> Describe the spectrum of considerations that are involved in decisions about California's supplies of fresh water. </td> <td> <p>Students read about the Sacramento-San Joaquin Delta and the establishment of the CALFED Bay-Delta Program to manage its resources. They work in groups to identify elements of California's water management and use issues through analysis of the article.</p> </td> </tr> <tr> <td> <p>2</p> <p>Supply and Demand for California's Water</p> <p>Preparation Time: 20 min. Instructional Time: 50 min.</p> </td> <td> <ul style="list-style-type: none"> List major uses of water in California and describe their importance to society. Identify the sources and locations of major water supplies in California (for example, surface water, reservoirs, and aquifers). </td> <td> <p>Students review the hydrologic cycle and general climatology, topography, and geology of California, and identify surface water and groundwater sources in California. They analyze the hydrologic regions of the state and discuss California's water supply and use patterns.</p> </td> </tr> </tbody> </table> <p>California EEI is free to all teachers. Units are complete with all materials: teacher guide, students workbooks, visuals, masters, assessments, etc.</p> <p>They provide webinars for deeper use of unit..</p>	Lesson	Learning Objectives	Summary of Activities	<p>1</p> <p>Who's in Charge of the Water?</p> <p>Preparation Time: 15 min. Instructional Time: 50 min.</p>	<ul style="list-style-type: none"> Describe the spectrum of considerations that are involved in decisions about California's supplies of fresh water. 	<p>Students read about the Sacramento-San Joaquin Delta and the establishment of the CALFED Bay-Delta Program to manage its resources. They work in groups to identify elements of California's water management and use issues through analysis of the article.</p>	<p>2</p> <p>Supply and Demand for California's Water</p> <p>Preparation Time: 20 min. Instructional Time: 50 min.</p>	<ul style="list-style-type: none"> List major uses of water in California and describe their importance to society. Identify the sources and locations of major water supplies in California (for example, surface water, reservoirs, and aquifers). 	<p>Students review the hydrologic cycle and general climatology, topography, and geology of California, and identify surface water and groundwater sources in California. They analyze the hydrologic regions of the state and discuss California's water supply and use patterns.</p>
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<p>Explore</p> <p>Key concepts New skills Inquiry Establish relationships</p>	<p>Students will:</p> <p>-explain the major components of the urban water cycle (source, water, water treatment, water use, wastewater treatment and return to nature)</p>	<p>These lessons will help students understand the complex systems in place to support urban development.</p>	<p>CCSS.ELA-LITERACY.WH.ST.11-12.2.A Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</p>	<p>Water cycle - natural - http://water.usgs.gov/edu/watercycle.html</p> <p>Water cycle - interactive - http://water.usgs.gov/edu/watercycle-kids-adv.html</p> <p>and -</p> <p>From Source to Tap and Back - http://www.pbs.org/newshour/extra/lessons_plans/understanding-your-water-from-source-to-tap-and-back-again/</p> <p>or -</p> <p>Water Resources Are Managed Unit http://store.projectwet.org/water-activities-water-lesson-plans-educators-curriculum-guide-2-0.html</p> <p>Project Wet provides free access to their curriculum after free educator training.</p>
<p>Explain</p> <p>Students explain their understanding of concepts and processes. New skills and concepts are introduced.</p>	<p>Students will:</p> <p>- examine water use across the U.S.</p> <p>-examine the cost factors involved in supplying clean water to consumers and removing wastewater</p> <p>-recognize that cost and environmental considerations influence the planning and construction of water projects</p>	<p>Students will create/annotate a map showing water usage</p> <p>Students will create a graph based on data obtained and studied.</p> <p>Students will evaluate requirements set by society.</p>	<p>CCSS.ELA-LITERACY.RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p>	<p>Water Use in the U.S. http://water.usgs.gov/watuse/wuto.html</p> <p>Understanding a Water Bill http://www3.epa.gov/watersense/our_water/understanding_your_bill.html</p> <p>and/or -</p> <p>The Price is Right (page 357 - Project Wet) http://store.projectwet.org/water-activities-water-lesson-plans-educators-curriculum-guide-2-0.html</p>

<p>Explain</p> <p>Students explain their understanding of concepts and processes. New skills and concepts are introduced.</p>	<p>Students will:</p> <ul style="list-style-type: none"> -calculate the costs of drinking bottled water as opposed to tap water - examine legislation that aims to provide access to water in schools. -examine the challenges in perceptions and ability to provide water in schools. 	<p>Students will compare the amount of energy and water used to create bottled water as opposed to drinking tap water.</p> <p>Students will identify the health benefits of drinking tap water as opposed to sugary drinks.</p> <p>Summarize the issues, challenges, and solutions.</p> <p>Summarize the issues, challenges, and solutions.</p>	<p>CCSS.ELA-LITERACY.R.H.11-12.1 Cite specific textual evidence to support analysis of secondary sources</p> <p>CCSS.ELA-LITERACY.R.H.11-12.2 Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.</p> <p>CCSS.ELA-LITERACY.R.H.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.</p>	<p>How Much Does Water Cost (p127-131) Take Back the Tap curriculum http://ci.santa-rosa.ca.us/doclib/Documents/Take%20back%20the%20TAP.pdf</p> <p>Legislation SB1413</p> <p>Study http://www.cdc.gov/pcd/issues/2010/mar/09_0005.htm</p>
<p>Elaborate</p> <p>Apply concepts in context</p>	<p>Students will:</p> <ul style="list-style-type: none"> - prepare an argument based on evidence supporting the need for water in schools. -design action plan solutions to provide access to water in schools. 	<p>Students will use data, models, and evidence to establish an argument.</p> <p>They will analyze available information and make judgements based on evidence.</p> <p>Students will recognize the influence of engineering, technology, and science in planning solutions.</p>	<p>CCSS.ELA-LITERACY.W.11-12.1 Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p> <p>CCSS.ELA-LITERACY.W.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience;</p>	<p>How much water should you drink? http://www.mayoclinic.org/water/ART-20044256?p=1</p> <p>Encouraging water consumption in school http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3134515/</p> <p>Action plan ideas http://waterinschools.org/wp-content/uploads/2015/06/WaterWorksGuide20141.pdf</p>

<p>Evaluate</p> <p>Assess knowledge, skills, and abilities</p> <p>Evaluate proposals</p>	<p>Students will:</p> <p>- evaluate competing solutions for developing, managing, and utilizing water resources in schools, taking into account a range of constraints, including cost, safety, reliability, and considering social, cultural, and environmental impacts</p>	<p>Students will include in their evaluation the positive and negative effects of past, current, and potential future solutions to having an adequate and available supply of fresh drinking water in schools.</p>		<p>Resources for evaluation</p> <p>http://waterinschools.org/wp-content/uploads/2015/06/WaterWorksGuide20141.pdf</p>
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Instructional Resources will include and/or supplement work from these organizations, among others.

<http://www.californiaeei.org/> (Liquid Gold Unit)

<http://waterinschools.org/pdfs/WaterWorksGuide2014.pdf>

http://education.nationalgeographic.com/education/media/water-availability-us/?ar_a=1