

Science Curriculum Map

Grade: 6

Unit: 2

Performance Expectation(s)

6-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.*
[Clarification Statement: Examples of the design process could include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts could include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]

6-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations or the rates of consumption of food and natural resources (such as freshwater, minerals, or energy). Examples of impacts could include changes to the appearance, composition, or structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]

6-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
[Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, or agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence could include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide or methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]

Essential Vocabulary

population	impact
feasible	urban
environment	per-capita
rate of consumption	composition
consumption	biosphere

Essential Question(s)

- How might the conservation and resource strategies used today affect your future? (6-ESS3-3, 6-ESS3-4, 6-ESS3-5)
- How could you monitor and minimize human impact? (6-ESS3-3)
- What evidence might be provided to support the argument that as human population increases, so do the impacts on Earth's resources? (6-ESS3-4)

agriculture volcanic activity global and regional temperatures	<ul style="list-style-type: none"> What questions are scientists asking about the factors affecting rising global temperatures? (6-ESS3-6) 	
Learning Plan		
Science/Engineering Practices	Disciplinary Core Idea	Crosscutting Concepts
<p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.</p> <ul style="list-style-type: none"> Apply scientific principles to design an object, tool, process or system. (6-ESS3-3) <p>Engaging in Argument from Evidence Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).</p> <ul style="list-style-type: none"> Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (6-ESS3-4) 	<p>ESS3.C: Human Impacts on Earth Systems</p> <ul style="list-style-type: none"> Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth’s environments can have different impacts (negative and positive) for different living things. (6-ESS3-3) <p>Indigenous Activists on Tackling the Climate Crisis (NP)</p> <ul style="list-style-type: none"> Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (6-ESS3-3, 6-ESS3-4) <p>The UN Climate Report (NP)</p>	<p>Cause and Effect</p> <ul style="list-style-type: none"> Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (6-ESS3-3) Cause and effect relationships may be used to predict phenomena in natural or designed systems.(6-ESS3-4) <hr style="border-top: 1px dashed black;"/> <p style="text-align: center;">-</p> <p><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ESS3-4) <p>Natural Resources (FC)</p> <ul style="list-style-type: none"> The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus

<p>Asking Questions and Defining Problems Asking questions and defining problems in 6–8 builds on K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.</p> <ul style="list-style-type: none"> ● Ask questions to identify and clarify evidence of an argument. (6-ESS3-5) <p>Coral Reef Regeneration (NP)</p>	<p>STEM Wars Challenge: The Structure that Jack Built</p> <p>Nearpod Lessons/Flocabulary Videos</p> <p>Environmental Change (FC)</p> <p>What is a Natural Disaster? (NP)</p>	<p>technology use varies from region to region and over time. (MS-ESS3-3)</p> <hr/> <p><i>Connections to Nature of Science</i></p> <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> ● Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-ESS3-4) <p>Mitigating Climate Change (NP)</p>
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Resources and Links

Videos

Bozeman Science Videos

- [Natural Resources](#)
 - <http://www.bozemanscience.com/ngs-ess3a-natural-resources>
- [Natural Hazards](#)
 - <http://www.bozemanscience.com/ngs-ess3b-natural-hazards>
- [Human Impact](#)
 - <http://www.bozemanscience.com/ngs-ess3c-human-impacts-on-earth-systems>
- [Climate Change](#)
 - <http://www.bozemanscience.com/ngs-ess3d-global-climate-change>
- [System Models](#)
 - <http://www.bozemanscience.com/ngs-systems-system-models>

Other Resources

Better Lessons

- [Pollution Lab Stations](#)
 - <http://betterlesson.com/lesson/638336/pollution-lab-stations>
- Activity: Carbon Footprint Calculator
 - footprintnetwork.org/calculator
- [NASA Climate Kids](#)
 - <http://climatekids.nasa.gov/science-standards/>
- [Climate Model](#)
 - http://www.windows2universe.org/teacher_resources/teach_climatemodel.html
- [Sequences](#)
 - <http://authoring.concord.org/sequences/11/activities/91>
- [Temp and Co2](#)
 - <http://www3.epa.gov/climatechange/kids/documents/temp-and-co2.pdf>

Summative/Formative Assessment

Formative

- Units have formative assessments built in
- Observations during in-class activities; of students nonverbal feedback during lecture
- Homework exercises as review for exams and class discussions)
- Reflections journals that are reviewed periodically during the semester
- Question and answer sessions, both formal—planned and informal—spontaneous
- Conferences between the instructor and student at various points in the semester
- In-class activities where students informally present their results
- Student feedback collected by periodically answering specific question about the instruction and their self-evaluation of performance and progress

Summative

- Rubrics for projects
- Examinations (major, high-stakes exams)
- Final examination (a truly summative assessment)
- Term papers (drafts submitted throughout the semester would be a formative assessment)

- Projects (project phases submitted at various completion points could be formatively assessed)
- Portfolios (could also be assessed during its development as a formative assessment)
- Performances Student evaluation of the course (teaching effectiveness)
- Instructor self-evaluation

Uncovering Student Ideas in Science-Connections to the Earth and Space Sciences Section of A Framework for K-12 Science Education

- Is It a Rock? V2 (Keeley et al., 2007)
- Where Does Oil Come From? (Keeley and Tugel, 2009)
- Global Warming (Keeley and Tugel, 2009)
- Global Warming (Keeley and Tugel, 2009)

Literacy Standards

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts. (6-ESS3-4) **WHST.6-8.1** Write arguments focused on discipline content. (6-ESS3-4)

WHST.6-8.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (6-ESS3-3)

WHST.6-8.8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (6-ESS3-3)

WHST.6-8.9. Draw evidence from informational texts to support analysis, reflection, and research. (6-ESS3-4)

Math Standards

6.RP.A.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes." (6-ESS3-3, 6-ESS3-4)

6.RP.A.2. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger." Note: Expectations for unit rates in this grade are limited to non-complex fractions. (6-ESS3-3, 6-ESS3-4)

6.EE.B.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number or any number in a specified set. (6-ESS3-3, 6-ESS3-4, 6-ESS3-5)

MP.2 Reason abstractly and quantitatively. (6-ESS2-5, 6-ESS3-5)