

Topic: Earth Systems and Human impact	8th Grade
Standard/Performance Expectation	Instructional Resources
<p><b>8-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distribution of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.</b></p> <p><b>(Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distribution of resources as a result of past processes includes but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps) metal ores (location of past volcanic and hydrothermal activity associated with subduction zones) and soil ( location of active weathering and/or deposition of rock)</b></p> <p><b><u>What Students Need to Know:</u></b></p> <ul style="list-style-type: none"> <li>• The distribution of Earth's resources(mineral, energy, groundwater)</li> <li>• What is meant by geoscience processes</li> <li>• Geoscience processes of the past and present</li> <li>• The relationship between geoscience processes and earth's mineral, energy, and groundwater resources</li> </ul> <p><b><u>What Students Need to be able to Do:</u></b></p> <ul style="list-style-type: none"> <li>• Construct a scientific explanation based on evidence</li> </ul>	<p><a href="http://betterlesson.com/next_gen_science/browse/2254/ngss-ms-ess3-1-construct-a-scientific-explanation-based-on-evidence-for-how-the-uneven-distributions-of-earth-s-mineral-energy-a">http://betterlesson.com/next_gen_science/browse/2254/ngss-ms-ess3-1-construct-a-scientific-explanation-based-on-evidence-for-how-the-uneven-distributions-of-earth-s-mineral-energy-a</a></p> <p><a href="#">Earth History Theories</a></p> <p><a href="https://www.stemonthebrain.com/resources/codes/ms-ess3-1">https://www.stemonthebrain.com/resources/codes/ms-ess3-1</a></p> <p><a href="http://rssu.org/documents/drivesync/Curriculum%20Website/Science/G%20L%206/Gr.%206%20Earth%20and%20Human%20Activity/Gr.%206%20Earth%20and%20Human%20Activity%20Unit.pdf">http://rssu.org/documents/drivesync/Curriculum%20Website/Science/G%20L%206/Gr.%206%20Earth%20and%20Human%20Activity/Gr.%206%20Earth%20and%20Human%20Activity%20Unit.pdf</a></p> <p><a href="http://www.csecweb.org/science/ess/lessons/book/chap25.pdf">http://www.csecweb.org/science/ess/lessons/book/chap25.pdf</a></p> <p><a href="http://www.kean.edu/~csmart/Observing/17.%20Mineral%20resources%20and%20waste%20disposal.pdf">http://www.kean.edu/~csmart/Observing/17.%20Mineral%20resources%20and%20waste%20disposal.pdf</a></p> <p><a href="http://geography.about.com/od/urbaneconomicgeography/a/Resource-Distribution-And-Its-Consequences.htm">http://geography.about.com/od/urbaneconomicgeography/a/Resource-Distribution-And-Its-Consequences.htm</a></p> <p><a href="http://science.kqed.org/quest/2014/03/26/groundwater-beneath-the-surface/">http://science.kqed.org/quest/2014/03/26/groundwater-beneath-the-surface/</a></p> <p><a href="http://www.vossfoundation.org/assets/UNEP_Global_Water_Resources.pdf">http://www.vossfoundation.org/assets/UNEP_Global_Water_Resources.pdf</a></p> <p><a href="http://carey.jhu.edu/one/wp-content/uploads/2009/03/02_btn_lg.jpg">http://carey.jhu.edu/one/wp-content/uploads/2009/03/02_btn_lg.jpg</a></p>

**How Students will Learn/Science and Engineering Practice:**

**Constructing Explanations and Designing Solutions**

- Construct a scientific explanation based on valid and reliable evidence obtained from sources ( including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future

**Crosscutting Concept: Cause and Effect**

- Cause and effect relationships may be used to predict phenomena in natural or designed systems

**Common Core Writing Connections**

**WHST6-8.2** Write informative/ explanatory texts to examine a topic and convey ideas, concepts and information through the selection, organization and analysis of relevant content

**WHST 6-8.9** Draw evidence from informational texts to support analysis, reflection and research

<http://www.kean.edu/~csmart/Observing/17.%20Mineral%20resources%20and%20waste%20disposal.pdf>

[http://pubs.usgs.gov/gip/gw/how\\_a.html](http://pubs.usgs.gov/gip/gw/how_a.html)

<http://moodle.unitec.ac.nz/mod/book/tool/print/index.php?id=185792#ch13316>

**08-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.**

**[Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are**

[Human Gear Design](#)

[The Human Impact on Earthquakes 8-ESS3-2](#)

[Designing Earthquake Resistant Structures](#) 8-ESS3-2, ETS1-4

preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).]

**What Students Need to Know:**

- What natural hazards are (earthquakes, volcanic eruptions, tornadoes, hurricanes, floods, mass wasting, tsunamis)
- The relationship between natural hazards and catastrophic events
- How natural hazards are predicted/forecasted
- The relationship between natural hazards and the development of technologies

**What Students Need to be able to Do:**

- Analyze and interpret data for a specific reason

**How Students will Learn/Science and Engineering Practice:**

**Analyzing and Interpreting Data**

- Analyze and interpret data to determine similarities and differences in findings.

**Crosscutting Concept: Patterns**

- Graphs, charts, and images can be used to identify

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

[http://www.bbc.co.uk/schools/gcsebitesize/geography/natural\\_hazards/](http://www.bbc.co.uk/schools/gcsebitesize/geography/natural_hazards/)

<https://www.e-education.psu.edu/geog030/node/378>

<http://www.waikatoregion.govt.nz/Services/Regional-services/Regional-hazards-and-emergency-management/What-are-natural-hazards/>

[http://www.tulane.edu/~sanelson/Natural\\_Disasters/introduction.htm](http://www.tulane.edu/~sanelson/Natural_Disasters/introduction.htm)

[http://campuses.fortbendisd.com/campuses/documents/homework/homework\\_20120917\\_1213.pdf](http://campuses.fortbendisd.com/campuses/documents/homework/homework_20120917_1213.pdf)

<http://www.oas.org/osde/publications/Unit/oea66e/ch01.htm>

<http://www.enhans.org/about/intro.php>

<http://science.howstuffworks.com/innovation/nasa-inventions/nasa-predict-natural-disasters.htm>

[http://www.nap.edu/openbook.php?record\\_id=1840&page=37](http://www.nap.edu/openbook.php?record_id=1840&page=37)

<http://eandt.theiet.org/magazine/2013/07/predicting-the-elements.cfm>

<http://www.bnhcrc.com.au/research/natural-hazards>

<http://www.sciencedaily.com/releases/2002/01/020131073853.htm>

<http://www.ispace.com/news/articles/young-israeli-scientist-can-predict-future-natural-disasters/13396>

<http://pubs.usgs.gov/fs/2007/3009/2007-3009.pdf>

<p>patterns in data</p>	<p><a href="http://www.ffiec.gov/katrina_lessons.htm">http://www.ffiec.gov/katrina_lessons.htm</a></p> <p><a href="http://www.nbcnews.com/id/39079788/ns/technology_and_science-space/t/satellites-spot-imminent-natural-disasters/">http://www.nbcnews.com/id/39079788/ns/technology_and_science-space/t/satellites-spot-imminent-natural-disasters/</a></p> <p><a href="http://technology.inquirer.net/30913/technology-may-help-reduce-impact-of-natural-disasters">http://technology.inquirer.net/30913/technology-may-help-reduce-impact-of-natural-disasters</a></p> <p><a href="http://www.spatialsource.com.au/2013/06/25/technology-to-predict-natural-disaster-impact-years-in-advance/">http://www.spatialsource.com.au/2013/06/25/technology-to-predict-natural-disaster-impact-years-in-advance/</a></p> <p><a href="https://sites.google.com/site/naturaldisasterpreventionin/prevention-prediction">https://sites.google.com/site/naturaldisasterpreventionin/prevention-prediction</a></p> <p><a href="http://www.preventionweb.net/english/countries/statistics/?cid=185">http://www.preventionweb.net/english/countries/statistics/?cid=185</a></p> <p><a href="http://www.munichre.com/en/reinsurance/business/non-life/natcatservice/index.html">http://www.munichre.com/en/reinsurance/business/non-life/natcatservice/index.html</a></p> <p><a href="http://www.ldeo.columbia.edu/chrr/research/hotspots/core_data.html">http://www.ldeo.columbia.edu/chrr/research/hotspots/core_data.html</a></p> <p><a href="http://gcmd.gsfc.nasa.gov/learn/pointers/hazards.html">http://gcmd.gsfc.nasa.gov/learn/pointers/hazards.html</a></p> <p><a href="http://www.usgs.gov/natural_hazards/">http://www.usgs.gov/natural_hazards/</a></p>
<p><b>08-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*</b>  <b>[Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the</b></p>	<p><a href="#">Understanding the Complex Consequences of Local Decisions-Eco Choices</a></p> <p><a href="#">Puzzle boxes for 3-D learning about natural hazards</a></p>

kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can 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).]

**What Students Need to Know:**

- Human impacts on the environment
- What scientific principles are

**What Students Need to be able to Do:**

- Use scientific principles to design a method for a given purpose

**How Students will Learn/Science and Engineering Practice:**

**Constructing Explanations and Designing Solutions**

- Apply scientific principles to design an object, tool, process or system

**Common Core Writing Connection**

**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

**WHST 6-8.8** Gather relevant information from multiple print and digital sources, assess the credibility of each source, and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources

<http://www.caryinstitute.org/educators/teaching-materials/urban-ecosystems/eco-choices/ecosystem-consequences-town-decisions> game for Understanding the Complex Consequences of Local Decisions above

[Green Court Claims activity](#) Human impact on environment

[Chemical Connections A problem-based Learning STEM Experience](#)

[The Lorax Readers' Theater](#)

[Fossil Fuels: Air Pollution and the Greenhouse Effect](#)

[http://people.chem.duke.edu/~jds/cruise\\_chem/oceans/human.html](http://people.chem.duke.edu/~jds/cruise_chem/oceans/human.html)..

<http://www.nationalgeographic.com/eye/impact.html>

<http://www.sustainablebabysteps.com/human-impact-on-environment.html>

<http://www.slideshare.net/sacklax40/human-impact-on-the-environment-presentation>

<http://www.sciencelearn.org.nz/Contexts/Life-in-the-Sea/Science-Ideas-and-Concepts/Human-impacts-on-marine-environments!>

**[How Low Can You Go from Science Scope](#)**

**08-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 and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and 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.]**

**What Students Need to Know:**

- What is meant by per-capita consumption
- The rate of human population increases on Earth
- The effect of human population increases and per-capita consumption of natural resources on Earth's systems (appearance, composition, structure and rate of change of Earth's systems,)

**What Students Need to be able to Do:**

- Construct an argument supported by evidence

**How Students will Learn/Science and Engineering Practice:**

**Engaging in Argument from Evidence**

- 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.

**Crosscutting Concept: Cause and Effect**

[Understanding the Complex Consequences of Local Decisions-Eco Choices](#)

<http://www.caryinstitute.org/educators/teaching-materials/urban-ecosystems/eco-choices/ecosystem-consequences-town-decisions>  
game for Understanding the Complex Consequences of Local Decisions above

[Life with Limited Resources 8-ESS3-4](#)

<http://www.worldwatch.org/node/810>

[http://clinton2.nara.gov/PCSD/Publications/TF\\_Reports/pop-intr.html](http://clinton2.nara.gov/PCSD/Publications/TF_Reports/pop-intr.html)

[How Low Can You Go?](#) from Science Scope

<http://monthlyreview.org/2013/01/01/global-resource-depletion>

[http://www.learner.org/courses/envsci/support/guide\\_unit5.pdf](http://www.learner.org/courses/envsci/support/guide_unit5.pdf)

[http://www.academia.edu/223160/Overconsumption\\_Our\\_use\\_of\\_the\\_worlds\\_natural\\_resources](http://www.academia.edu/223160/Overconsumption_Our_use_of_the_worlds_natural_resources)

[http://www.actionbioscience.org/environment/hinrichsen\\_robey.html](http://www.actionbioscience.org/environment/hinrichsen_robey.html)

[http://www.actionbioscience.org/environment/lessons/hinrichsen\\_robeylessons.pdf](http://www.actionbioscience.org/environment/lessons/hinrichsen_robeylessons.pdf)

<http://atlas.aaas.org/pdf/43-46.pdf>

<http://blogs.ei.columbia.edu/2012/04/27/population-consumption-and-the-future/>

- Cause and effect relationships may be used to predict phenomena in natural or designed systems

**Common Core Writing Connection**

**WHST 6-8.1** Write arguments focused on disciplined content

**WHST 6-8.9** Draw evidence from informational texts to support analysis, reflection, and research

<http://dieoff.org/page120.htm>

<http://blogs.ucl.ac.uk/gee-research/2013/08/30/consumption/>

**08-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, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]**

**What Students Need to Know:**

- Factors that have affected the rise in global temperatures over the past century

**What Students Need to be able to Do:**

- Ask questions to clarify evidence

08-ESS3-5 is appropriate for LDC module

[Global Warming Unit Overview](#)

[Global Warming Unit Teacher Guide](#)

[Global Warming Unit Projections](#)

[Global Warming Unit Investigation Notebook](#)

[Global Warming Unit Melting Ice Evidence Cards](#)

[How Low Can You Go?](#) from Science Scope

[Fossil Fuels: Air Pollution and the Greenhouse Effect](#)

[http://web.viu.ca/sc403/global\\_warming/page3.htm](http://web.viu.ca/sc403/global_warming/page3.htm)

<http://climate.nasa.gov/causes>

[http://www.ucusa.org/global\\_warming/science\\_and\\_impacts/science/global-warming-faq.html](http://www.ucusa.org/global_warming/science_and_impacts/science/global-warming-faq.html)

<http://www.justfacts.com/globalwarming.asp>

<http://www.sciencemuseum.org.uk/climatechanging/climatescienceinfo/zone/exploringwhatmighthappen/2point3.aspx>

**How Students will Learn/Science and Engineering Practice:**

**Asking Questions and Defining Problems**

- Ask questions to identify and clarify evidence of an argument

**Crosscutting Concept: Stability and Change**

- Stability might be disturbed either by sudden events or gradual changes that accumulate over time

<http://www.climatehotmap.org/about/global-warming-causes.html>

<http://www.aip.org/history/climate/solar.htm>

<http://environment.nationalgeographic.com/environment/global-warming/gw-causes/>