

## HS-ESS3-1

Students who demonstrate understanding can:

- HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.** [Clarification Statement: Examples of key natural resources include access to fresh water (such as rivers, lakes, and groundwater), regions of fertile soils such as river deltas, and high concentrations of minerals and fossil fuels. Examples of natural hazards can be from interior processes (such as volcanic eruptions and earthquakes), surface processes (such as tsunamis, mass wasting and soil erosion), and severe weather (such as hurricanes, floods, and droughts). Examples of the results of changes in climate that can affect populations or drive mass migrations include changes to sea level, regional patterns of temperature and precipitation, and the types of crops and livestock that can be raised.]

The performance expectation above was developed using the following elements from *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <p>Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific knowledge, principles, and theories.</p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) 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.</li> </ul>	<p><b>ESS3.A: Natural Resources</b></p> <ul style="list-style-type: none"> <li>Resource availability has guided the development of human society.</li> </ul> <p><b>ESS3.B: Natural Hazards</b></p> <ul style="list-style-type: none"> <li>Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations.</li> </ul>	<p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul> <p>-----</p> <p><b><i>Connections to Engineering, Technology, and Applications of Science</i></b></p> <p><b>Influence of Science, Engineering, and Technology on Society and the Natural World</b></p> <ul style="list-style-type: none"> <li>Modern civilization depends on major technological systems.</li> </ul>

### Observable features of the student performance by the end of the course:

1	Articulating the explanation of phenomena
	a Students construct an explanation that includes: <ol style="list-style-type: none"> <li>i. Specific cause and effect relationships between environmental factors (natural hazards, changes in climate, and the availability of natural resources) and features of human societies including population size and migration patterns; and</li> <li>ii. That technology in modern civilization has mitigated some of the effects of natural hazards, climate, and the availability of natural resources on human activity.</li> </ol>
2	Evidence
	a Students identify and describe* the evidence to construct their explanation, including: <ol style="list-style-type: none"> <li>i. Natural hazard occurrences that can affect human activity and have significantly altered the sizes and distributions of human populations in particular regions;</li> <li>ii. Changes in climate that affect human activity (e.g., agriculture) and human populations, and that can drive mass migrations;</li> <li>iii. Features of human societies that have been affected by the availability of natural resources; and</li> <li>iv. Evidence of the dependence of human populations on technological systems to acquire natural resources and to modify physical settings.</li> </ol>

	b	Students use a variety of valid and reliable sources for the evidence, potentially including theories, simulations, peer review, or students' own investigations.
3	Reasoning	
	a	Students use reasoning that connects the evidence, along with 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, to describe*:
	i.	The effect of natural hazards, changes in climate, and the availability of natural resources on features of human societies, including population size and migration patterns; and
	ii.	How technology has changed the cause and effect relationship between the development of human society and natural hazards, climate, and natural resources.
	b	Students describe* reasoning for how the evidence allows for the distinction between causal and correlational relationships between environmental factors and human activity.