

Strand 8.4: Interactions with natural systems and resources	Interactions of matter and energy through geologic processes have led to the uneven distribution of natural resources. Many of these resources are nonrenewable and per-capita use can cause positive or negative consequences. As energy flows through the physical world, natural disasters can occur which affect human life. Humans can study patterns in natural systems to anticipate and forecast future disasters and work to mitigate the outcomes.	
Standard 8.4.3 (MS-ESS3.C)	Design a solution to monitor or mitigate the potential <u>effects</u> of the use of natural resources. Evaluate competing design solutions <i>using a systematic process to determine how well each solution meets the criteria and constraints of the problem</i> . Examples of uses of the natural environment could include agriculture, conservation efforts, recreation, solar energy, and water management.	
SEP/CCC	Constructing Explanations and Designing Solutions Apply scientific principles to design an object, tool, process or system. Engaging in Argument from Evidence Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.	<u>Cause and Effect</u> Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.
DCI	ESS3.C: Human Impacts on Earth Systems - 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. ETS1.B: Developing Possible Solutions - There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem	
Student Friendly Objective	I can design a solution to monitor or control the effects of the use of natural resources. I can evaluate how well the design solutions that others have created help resolve the problem of overuse of natural resources.	
Anchor Phenomena	There are consequences for using natural resources.	
Vertical Learning Progression	Previous Science Content (Discussed in K-7 Standards)	Future Science Content (Discussed in 9-12 Standards)
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What students will be doing this year:	Using scientific knowledge to generate design solutions - Given a problem related to human use of natural resources, students use scientific information and principles to generate a design solution that: - Addresses the effects of the use of the natural resource. - Incorporates technologies that can be used to monitor and minimize negative effects that human activities have on the natural resource. - Students identify relationships between the human activity and the availability of the natural resource based on scientific principles, and distinguish between causal and correlational relationships to facilitate the design of the solution. Describing criteria and constraints, including quantification when appropriate - Students define and quantify, when appropriate, criteria and constraints for the solution, including: - Individual or societal needs and desires. - Constraints imposed by economic conditions (e.g., costs of building and	

	maintaining the solution). Evaluating potential solutions a. Students use a systematic method to identify the strengths and weaknesses of each solution. In their evaluation, students: i. Evaluate each solution against each criterion and constraint ii. Compare solutions based on the results of their performance against the defined criteria and constraints. b. Students use the evidence and reasoning to make a claim about the relative effectiveness of each proposed solution based on the strengths and weaknesses of each.
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