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ENVIRONMENTAL SCIENCE	**GRADE: H.S.**	**UNIT #: 2**

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SCOPE AND SEQUENCE UNIT 2

Lesson	**Earth's Systems**	PE's and DCI's	Suggested Pacing Year
1	• Understand the major components of Earth as a system.	HS-ESS2.2, HS-ESS2.A	2
2	• How and why is Earth constantly changing?	HS-ESS2.2, HS-ESS2.A	1
3	• How do Earth's major systems interact?	HS-ESS2.2, HS-ESS2.A	1
4	• Explore and illustrate the components of the geosphere, hydrosphere and cryosphere	HS-ESS2.B	1
5	• Understand the major components of the hydrosphere and geosphere	HS-ESS2.C	2
6	• Design and explain models that demonstrate the difference between the atmosphere and magnetosphere	HS-ESS2.D,PS4.B	2
7	• Explain the relationship between Earth's surface phenomenon and human activities	HS-ESS3-1,ESS3-3,ESS3-4,HS-ESS3-6	7

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December				
Mon	Tue	Wed	Thu	Fri
12 Lesson 1	13	14	15	16 Lesson 2
19	20 Lesson 3	21	22 Lesson 4	23

January				
Mon	Tue	Wed	Thu	Fri
2	3 Lesson 5	4	5	6
9 Lesson 6	10	11	12	13 Lesson 7
16	17	18	19	20
23	24	25	26	27
30				

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February				
Mon	Tue	Wed	Thu	Fri
		1 Lesson 7	2	3
6 Post Unit 2 Assessment	7	8	9	10
13	14	15	16	17
20	21	22	23	24
27	28			

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How do the major Earth systems interact?
How do the properties and movements of water shape Earth's surface and affect its systems?

The performance expectations in HS Earth's Systems help students formulate answers to the questions: "How do the major Earth systems interact?" and "How do the properties and movements of water shape Earth's surface and affect its systems?" Six sub-ideas from the NRC Framework are addressed in these performance expectations: ESS2.A, ESS2.B, ESS2.C, ESS2.D, ESS2.E, and PS4.A. Students can develop models and explanations for the ways that feedbacks between different Earth systems control the appearance of Earth's surface. Central to this is the tension between internal systems, which are largely responsible for creating land at Earth's surface (e.g., volcanism and mountain building), and the sun-driven surface systems that tear down the land through weathering and erosion. Students understand the role that water plays in affecting weather. Students understand chemical cycles such as the carbon cycle. Students can examine the ways that human activities cause feedbacks that create changes to other systems. The crosscutting concepts of energy and matter; structure and function; stability and change; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. In the HS Earth's Systems performance expectations, students are expected to demonstrate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, and engaging in argument from evidence; and to use these practices to demonstrate understanding of the core ideas.

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# Blocks	STUDENT LEARNING OBJECTIVES	CORRESPONDING DCIs	DISCOVERY EDUCATION RESOURCES	ASSESSMENT
	• Understand the major components of Earth as a system. • How and why is Earth constantly changing? • How do Earth's major systems interact? • What are the major components of the Earth system? • Explore and illustrate the components of the geosphere, hydrosphere and cryosphere (E1)	**HS-ESS2-2.** Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems**.** **ESS2.A:** Earth Materials and Systems Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. **ESS2.D:** Weather and Climate The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space.	**Discovery Education Model Lessons** **5E Model** **Earth as a Sphere** Engage Explore Explain	**Assessment 1:** Unit Pre-Assessment **Assessment 2** Constructed responses (Discovery Education) **Assessment 3:** Evaluate

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# Blocks	STUDENT LEARNING OBJECTIVES	CORRESPONDING DCIs	DISCOVERY EDUCATION RESOURCES	ASSESSMENT
	Hydrosphere and Geosphere • Understand the major components of the hydrosphere and geosphere • How do Earth's major systems interact? • What are different types of water? • What gases do we breathe? • Design and explain models that demonstrate the difference between the atmosphere and magnetosphere	**HS-ESS2-2.** Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems**.** **ESS2.A:** Earth Materials and Systems Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. **ESS2.D:** Weather and Climate The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space.	**Discovery Education Model Lessons** **5E Model** **Hydrosphere and Geosphere** Engage Explore Explain Elaborate Additional Resources	**Assessment 1** Constructed responses (Discovery Education) Evaluate **Assessment 2** Hands on Labs **Assessment 3** **Lab**

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# Blocks	STUDENT LEARNING OBJECTIVES	CORRESPONDING DCIs	DISCOVERY EDUCATION RESOURCES	ASSESSMENT
	• Identify natural resources and understand how humans use them. • Describe where natural resources come from. • Explain the difference between renewable and non-renewable natural resources. • Describe some environmental effects of using natural resources. • Describe and explain ways that we can conserve natural resources. • Explain how the availability of natural resources has affected human activity. • Understand that human activity can affect the global environment and Earth systems. • Recognize that the success of technological designs is dependent on economic, environmental, ethical, and societal demand	**ESS3.C: Human Impacts on Earth Systems** The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. **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. **ETS1-1** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	**Discovery Education Model Lessons** **5E Model** **Natural Resources** Engage Explore Explain Elaborate Additional Resources Population Plastics Wind Technology Dam Technology Note: Wind and Dam technology activities can be used in Unit 3 Fluid Earth.	**Assessment 1** Constructed responses (Discovery Education) Evaluate **Assessment 2** Hands on Labs **Assessment 3** **Lab**

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Modifications
Teacher Note: Teachers identify the modifications that they will use in the unit. The unneeded modifications can then be deleted from the list.
• Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)
• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
• Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
• Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
• Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
• Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
• Use project-based science learning to connect science with observable phenomena.
• Structure the learning around explaining or solving a social or community-based issue.
• Provide ELL students with multiple literacy strategies.
• Collaborate with after-school programs or clubs to extend learning opportunities.