Biosphere Learning Progression

Grades K-2: GLOBE Protocols Aligned with NASA and NGSS

NGSS Disciplinary Core Ideas Content Progression: In K-2, students learn how things people do can impact the environment. They also investigate choices that can be made to reduce these impacts. In their exploration, students develop an understanding of how different organisms (both plants and animals) have specific needs, how those needs determine the habitats in which they live, and how habitats are being affected by the choices made by humans. In the Elementary GLOBE storybooks, the characters demonstrate the process of scientific investigation and data collection as they make observations of changes they see occurring in their environment and work together to identify solutions to impacts made by humans.

NGSS Performance Expectations: (Note: the following Performance Expectations and 3 Dimensional Learning are aligned with GLOBE and NASA Resources and are meant to support the development of the associated content and skill development but may not lead to complete mastery)

K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

K-ESS3-1 Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

K-ESS3-3 Communicate solutions that will reduce the impact of humans on the land, water, air, and/or living things in the local environment.

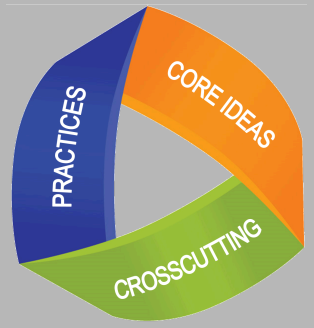
1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

1-ESS1-2 Make observations at different times of the year to relate the amount of daylight to the time of year.

2-LS2-1 Plan and conduct an investigation to determine if plants need sunlight and water to grow.

2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.



NGSS Science Practices:	NGSS Disciplinary Core Idea:	NGSS Crosscutting Concepts:
Planning and Carrying Out Investigations: Make observations (firsthand or from media) to collect data which can be used to make comparisons. (1-ESS1-2, 2-LS4-1) **Analyzing and Interpreting Graphs:** Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1) **Developing and Using Models**	**LS1.C Organization for Matter and Energy Flow in Organisms** All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1) **LS2.A Interdependent Relationships in Ecosystems** Plants depend on water and light to grow. (2-LS2-1) Plants depend on animals for pollination or to move their seeds around. (2-LS2-2) **LS3.A Inheritance of Traits** Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1) **LS3.B Variation of Traits** Individuals of the same kind of plant or animal are recognizable as similar but can	**Patterns** Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1) Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS3-1,1-ESS1-2)

Use a model to represent relationships in the natural world. (K-ESS3-1) Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2) **Engaging in Argument from Evidence**: Construct an argument with evidence to support a claim. (K-ESS2-2) **Constructing Explanations and Designing Solutions** Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1) **Obtaining, Evaluating, and Communicating Information:** Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)	also vary in many ways. (1-LS3-1) **LS4.D Biodiversity and Humans**: There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) **ESS1.B Earth and the Solar System** Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2) **ESS2.E Biogeology:** Plants and animals can change their environment. (K-ESS2-2) **ESS3.A Natural Resources** Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1) **ESS3.C Human Impacts on Earth System:** Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (K-ESS2-2, K-ESS3-3) **ETS1.B Developing Possible Solutions**: Designs can be conveyed through sketches, drawings, or physical models. (K-ESS3-3)	**Systems and System Models:** Systems in the natural and designed world have parts that work together. (K-ESS2-2, K-ESS3-1) **Cause and Effect:** Events have causes that generate observable patterns. (K-ESS3-3, 2-LS2-1) **Structure and Function** The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)
GLOBE Application:		
GLOBE Protocols: • Air Temperature Protocol • Precipitation • Surface Temperature Protocol • Green-up Protocol • Green Down Protocol **Elementary GLOBE Story Books:** • The Mystery of the Missing Hummingbirds • All About Earth	**GLOBE Learning Activities:** • All Year Long: (Outdoor Learning Experience) Learners make observational drawings in nature and compare their results throughout the seasons. (1-ESS1-2, 2-LS4-1) • The Colors of the Season: (Outdoor Learning Experience) Learners make observational drawings in nature and compare their results throughout the seasons. (1-ESS1-2, 2-LS4-1) • GLOBE Trees Sprout Science Journey: Use the one-pager to guide learners' learning and discovery of various aspects related to the needs and habitats of trees. (K-LS1-1, K-ESS3-1, K-ESS3-2, 2-LS2-1, 2-LS4-1) • Life Cycle of a Tree Learners will learn about the life cycle of trees by	**Guiding Questions:** 1. What do plants need to survive? Animals? 2. How do plants and animals (including humans) change the environment? -Land -Air -Water

GLOBE Supporting Resources: • Plant Color Guides • Winter Twigs • Elementary GLOBE Educator Implementation Guide • Elementary GLOBE Modules • GLOBE Across the Curriculum • Educator Presentations	exploring the forest for the different stages of tree growth. (1-LS3-1) • Our Leaves are Changing: (Outdoor Learning Experience) OBSERVE. Look, smell, feel, and listen to the leaves. What do you notice? What do you wonder? (K-LS1-1, 1-ESS1-2, 2-LS4-1) • Adopt Your Leaves: (Outdoor Learning Experience) Identify and keep track of a set of leaves and see how they change. (K-LS1-1, 1-ESS1-2, 2-LS4-1) • Observe Green-Down: What color is each leaf? Match the color on the GLOBE leaf color chart to each leaf. (K-LS1-1, 1-ESS1-2, 2-LS4-1) • Investigating Leaf Pigments: Different pigments can exist hidden in other colors. Green down in leaves is the process of the green pigment moving away revealing other color pigments that are left behind. (K-LS1-1, 1-ESS1-2, 2-LS4-1) • Spring is Coming: (Outdoor Learning Experience) Go outside and look around. The seasons are changing! OBSERVE. Look, smell, feel, and listen. What do you notice? (K-LS1-1, 1-ESS1-2, 2-LS4-1) • Adopt your Buds: (Outdoor Learning Experience) Have learners choose a branch that they can reach and tie a ribbon around the branch 4 buds up from the end of the branch. (K-LS1-1, 1-ESS1-2, 2-LS4-1) • Observing Green-Up: (Outdoor Learning Experience) Learners document the stage of the four buds on their branch over time. (K-LS1-1, 1-ESS1-2, 2-LS4-1) • Earth Systems in a Bottle: Learners will create experimental conditions in terrariums in order to study what plants need to survive. (K-LS1-1, K-ESS3-1, 2-LS2-1) • Site Seeing: (Outdoor Learning Experience) To help learners determine that a system's boundaries are based upon the question(s) a scientist wants to answer. (All) • Phenological Gardens: (Outdoor Learning Experience) Learners plant a garden and observe the flowering and leaf development stages of specified plants throughout the year. (K-LS1-1, K-ESS3-1, 1-LS3-1, 1-ESS1-2, 2-LS2-1, 2-LS2-2, 2-LS4-1) • Bird Beaks and What they Eat Learners identify ideal beak shapes for the type of food birds eat. (K-LS1-1, 2-LS4-1) • Zoom In: (Outdoor Learning Experience) The learner will gain an appreciation of nature from a distance and close up point of view. The	3. What are some ways we can help our land, water, and air stay cleaner and healthier where we live? 4. How does the way an organism looks change throughout its life cycle? 5. What role do the essential needs of organisms play in defining the habitats in which they live? 6. How are the habitats of different animals and plants near us different? What animals and plants live in each kind of habitat? a. What makes a forest different from a pond? b. What animals and plants live in the forest, and what animals and plants live in the pond? (Can be changed to reflect local habitats in your

	learner will explore a tree from a distance and then “zoom in” on a specific place or aspect of the tree. The learner will discover that trees can be good habitats for insects, animals, lichen, fungi and even other plants. (K-LS1-1, K-ESS2-2, K-ESS3-1, 2-LS4-1) • Tree Life Cycle: (Outdoor Learning Experience) Learners will learn about the life cycle of trees by exploring the forest for the different stages of tree growth. This activity provides learners with further evidence that all living things, or organisms, grow and change as they progress through their life cycle. Additionally, learners will learn that trees can be good habitats at each stage of life. (K-ESS2-2, K-ESS3-1, 1-LS3-1, 2-LS4-1)	area.)
NASA Assets		
NASA Resources: • NASA Kids Club • NASA for K-4 • Echo the Bat • Climate Kids • Make a Terrarium Mini Garden	 **My NASA Data Visualization Tool: Earth System Data Explorer** (This is a resource to be used by the educator in the development of learning activities for the classroom. It is not meant to be a tool for the learner at this grade level.) **My NASA Data Supporting Resources** • **About the Biosphere** • **Elementary GLOBE Connections** • **Earth System Graphic Organizer**	

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Updated by NASA Langley Research Center Science Directorate, 2025