

Core Knowledge Science Program—Domain Map

Core Knowledge Science Content

- Some natural resources are limited, so people must be careful not to use too much of them (for example, oil deep in the earth used to make gasoline, wood from trees used to burn, build homes, and/or to make paper, and water for drinking, cooking, washing, etc.)
- Conservation: Practical measures for conserving energy and resources (for example, walking or using public transportation instead of driving a car, planting saplings to replace trees that are cut down, not leaving water running when not being used, limiting how often lawns and decorative plants are watered, turning off unnecessary lights, etc.)
- Some materials can be recycled (for example, aluminum, glass, paper)
- Pollution (for example, littering, smog, and water pollution) can be harmful, but if people are careful they can help to reduce pollution.

***This unit contributes to meeting or exceeding the following Next Generation Science Standards:***  
*Standards noted with an asterisk (\*) are those that incorporate engineering and design*

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

***Rationale:***  
This unit extends learning from two previous units, *Animals & Their Needs* and *Plants & Farms*, to connect student knowledge to the developing core idea of [ESS3.C](#) (Human Impacts on Earth’s Systems). Specifically, the concept of organisms changing their environment (DCI [ESS2.E](#)) is applied and extended through connection to the concept of the conservation of natural resources ([ESS3.A](#)). These are three core ideas central to the NGSS Kindergarten topic of [Interdependent Relationships in Ecosystems](#).

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

***Rationale:***  
The core idea of natural resources ([ESS3.A](#)) is also central to this particular standard, K-ESS3-1, which notes in its DCI Foundation Box: “Humans use natural resources for everything that they do.” This unit connects student knowledge about human and animal needs (Units 1 and 2), and about farming (Unit 3), with new student learning about natural resources.

**This unit offers the opportunity to foreshadow learning that will support the following Next Generation Science Standards:**

***2-PS1-1.*** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

***2-PS1-2.*** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.\*

**Rationale:**

As students learn that some materials can be recycled, such as aluminum, glass, and paper, they are beginning the early progression of [PS1.A](#) by discussing different kinds of matter and classifying examples “by [their] observable properties (e.g., visual, aural, textural), by [their] uses, and by whether [they] occur naturally or [are] manufactured.” (Framework, page 108)

This idea will be extended by the introduction to magnets in Kindergarten Unit 6, *Pushes, Pulls, & an Introduction to Magnets*, during which students will classify materials according to whether they are or are not attracted to a magnet. In future grades, this progression will continue in Grade 1 Unit 5: *Matter & Its Properties*; in Grade 1 Unit 6: *Introduction to Electricity* (re: conductive versus nonconductive materials); and in Grade 2 Unit 4: *Magnetism* (re: naturally occurring lodestones versus manufactured magnets). This idea will then be applied in Grade 2 Unit 5: *Simple Machines* during an engineering design challenge.

### Potential Skills & Cross-Curricular Integrations

*The connections listed below are intended as ideas for possible integration across this unit. Finding connections in math, in language arts, and in works of poetry, art, and music may help as you create meaningful learning experiences for your students. Connections such as these can help your students make links between various disciplines and deepen their understanding of this domain.*

**POTENTIAL CCSS Math Connections**

[MP.2](#) Reason abstractly and quantitatively. (K-ESS3-1)

[MP.4](#) Model with mathematics. (K-ESS3-1)

[K.CC](#) Counting and Cardinality (K-ESS3-1)

**POTENTIAL** CCSS ELA Connections

R.K.1 With prompting and support, ask and answer questions about key details in a text. (K-ESS2-2)

W.K.1 Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book. (K-ESS2-2)

W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS2-2), (K-ESS3-3)

SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS3-1)

**POTENTIAL** Cross-Curricular Connections**Potential Links:**

**ELA:** Sayings & Phrases—"Waste not, want not."

**History & Geography:** American Presidents, Past and Present—Theodore Roosevelt (a pioneer for conservation as a naturalist and environmentalist)

**Mathematics:** Patterns & Classification—Establish concepts of likeness and difference by sorting and classifying objects according to various attributes; define a set by the common property of its elements; in a collection of objects that includes a given set and an item that does not belong, indicate which item does not belong.

**Prior Knowledge****Core Knowledge Preschool Sequence**

Scientific Reasoning and the Physical World

**Goal:** *Demonstrate an initial understanding of the elements of the material world.*

**Level II**

- Observe, describe, and record some basic properties of water, air, and light, their presence, and their effects in the physical world
- Identify and describe objects that can be recycled
- Identify and describe some ways that resources and energy can be conserved (e.g., recycling, turning off the lights, turning off the water, etc.)

**Core Knowledge Science** (Previously taught Kindergarten units)

**Unit 1: The Human Body: Basic Needs & Five Senses**

Identify the basic needs of human beings.

**Unit 2: Animals & Their Needs**

Describe how animals can change their habitats in order to meet their needs.

**Unit 3: Plants & Farms**

- Identify what plants need in order to live and grow.
- Compare and contrast plants' basic needs (to survive) with the needs of animals and human beings

**CKLA Kindergarten Objectives**

*The following objectives are addressed through the Core Knowledge Language Arts program (CKLA), which builds students' background knowledge in certain domains of literature, science, and history. To learn more about how and why the Listening & Learning Strand of CKLA approaches science content through read-alouds and ELA instruction, [read more about the CKLA program](#).*

**Domain Anthology: Taking Care of the Earth**

- Explain why people have a special responsibility to take care of the earth.
- Explain that earth is composed of natural resources (land, water, and air) and that humans, plants, and animals depend on earth's natural resources to live.
- Explain different types of pollution, including litter, air pollution, and water pollution, and how most types of pollution are caused by people.
- Explain what happens to garbage, from its creation to being dumped in the landfill; to recyclable materials, from home to a recycling factory; to discarded food, from the table, to the compost pile, and to the garden; and the water cycle.
- Identify the recycling symbol and the phrase "reduce, reuse, and recycle," and understand that recycled materials are made from items that have already been used and otherwise would be garbage.
- Identify common recyclable materials, including glass, plastic, aluminum, cardboard, and paper; and that composting is a type of recycling.
- Identify possible solutions for the problems of garbage, litter, pollution, and conserving natural resources.

**What Students Will Learn in Future Grades****Core Knowledge Sequence****Grade 1: Living Things & Their Environments****C. Environmental Change and Habitat Destruction**

- Environments are constantly changing, and this can sometimes pose dangers to specific habitats, for example:
  - Effects of population and development
  - Rain forest clearing, pollution, and litter

**Grade 3: Ecology** (including review from Grade 1)

- Habitats, the interdependence of organisms with their environment
- The concept of a “balance of nature” (constantly changing, not a static condition)
- The food chain or food web: producers, consumers, and decomposers (*although the tendency is to recognize the limits of these models as well; see also Grade 1.*)
- Ecosystems: how they can be affected by changes in environment (for example, rainfall, food supply, etc.), and by human impacts on the earth
- Human impacts on the environment:
  - Air pollution: emissions, smog
  - Water pollution: industrial waste, runoff from farming
- Measures we can take to protect the environment (for example, conservation, recycling)

**Core Vocabulary**

The following list contains the Core Vocabulary words suggested for purposeful integration across this Kindergarten unit. Boldfaced terms can be introduced and/or reviewed with students using a Word Work activity, as modeled by the [Core Knowledge Language Arts program](#) (CKLA). The inclusion of the words on this list does not mean that students are immediately expected to be able to use all of these words on their own. However, through repeated exposure across the lessons, students should acquire a good understanding of most of these words and begin to use some in conversation.

**Natural Resources**

environment, **natural resource**, manufactured, riches, use, activity, depend, need, want, find, locate, important, everyday, comfort, planet, earth, consume, limited, abundant, waste, grow, replenish, replace, **(non)renewable**, material, substance, product, production, consumption, fossil, **fuel**, coal, gas, oil, petroleum, sunlight, minerals, soil, trees, plants, crops, land, livestock, food, water, ocean, river, stream, lake, ice, glacier, air, atmosphere, ozone

[Also consider how to apply previously learned vocabulary from Unit 3 Plants & Farms]

**Human Impacts on the Environment**

change, impact, consequence, global, world, **cause**, **effect**, long-term, short-term, **system**, **cycle**, interact, conserve, sustain, reduce, lessen, save, help, clean, preserve, protect, aware(ness), careful, practical, effective, responsible, reminder, positive, negative, environment, habitat, community, population

**Pollution and Garbage**

**pollution**, pollutant, harm(ful), hazard(ous), dangerous, litter, dispose, discard, waste, **packaging**, landfill, dump, garbage, trash, mess, pile, bin, litterbug, smog, car, truck, vehicle, factory, company, smoke, burn, decay, **toxic**, contamination, health, clean, fresh, **treatment**, destroy, exhaust, chemical, industrial, urban, rural

### Recycling

reuse, recycle, **recyclable**, renew, symbol, aluminum, can, newspaper, paper, bottle, glass, plastic, soda, jug, bag, cardboard, compost, collect, **transport**, recycling center, shredder, heat, oven, **furnace**, remove, smelt, melt, blend, mix, pour, cool, harden, roll, mill, flatten, reshape, shipment, procedure, **process**, step-by-step, [examples of items made from recycled material]

### Other Forms of Conservation

faucet, sink, light switch, electricity, forest, woods, **logging**, wood, paper, [items made of wood and paper], erosion, weathering, plant, park, rain forest, tropical, temperate, **diversity**, species, **alternative**, solar, wind, hydroelectric, electric, nuclear, green, bikes, carpool, transportation, bus, [other types of mass transit]

## Potential Misconceptions

Students have been shown to learn significantly more science when their teachers demonstrate strong knowledge of potential student errors, and when the teacher plans accordingly (Sadler & Sonnert, 2016). The following incorrect statements serve as a sampling of the “intuitive theories” or “alternative conceptions” that students and teachers may actively use to describe their thinking, and which might interfere with the process of learning. The details following each statement are not intended to imply the scope of instruction for this grade, but instead provide a clearer sense of what students (of all ages) often misunderstand and/or overgeneralize when investigating and describing scientific ideas.

### Misconception: “Different kinds of organisms (species) do not compete for the same natural resources.”

Students may conclude that different organisms/species use different resource stores (i.e., sources of resources) to meet their needs for food, water, space, and/or light. This idea may be reinforced by oversimplified representations of food chains/webs without special instruction to uncover and address this misconception. Increasingly complex relationships in the environment will be systematically explored through the CK Science program and across grades K–5.

### Misconception: “Conservation means not using natural resources.”

This is an overgeneralization. For example, humans need fresh water to survive, so we must use this natural resource in order to live. There are at least two different ways to approach conservation: *conservation* in the sense of reducing the use of certain natural resources (i.e., “use this, not that,” such as using reusable water bottles instead of plastic ones that may be thrown away); and *efficiency* in the sense of doing what we need/want with fewer resources (i.e., solving the problem of “how can we do more with less?”).



**Misconception: “Organisms of the *same* species do not compete with each other for natural resources.”**

Similar to the above misconception, students may conclude that organisms of the *same species* (or in similar groups or classes) use different resource stores to meet their needs (i.e., they rely on different sources of water, food, and/or light). For example, some students state that plants do not compete with other plants for light, water, and space. This may be reinforced by simplified representations of food chains/webs without special instruction to uncover and address this misconception. Increasingly complex relationships in the environment will be systematically explored across grades K–5.

**Key points for instruction:**

“Students of all ages . . . may have the tendency to imagine that all environmentally friendly actions help to solve all environmental problems (for example, the use of unleaded petrol reduces the risk of global warming),” (*Atlas of Science Literacy*, Vol. 2, pg. 20, AAAS Project 2061). As instruction progresses within and across the grades, teachers should attempt to clearly and accurately foster descriptions of cause and effect relationships.

**Potential Objectives for This Kindergarten Unit**

*The organization of the following objectives reflects the order in which they are expected to be addressed. The proposed timing within the unit (“beginning,” “middle,” or “end”) and aligned NGSS are also noted. In addition to daily lessons focused on each objective, days have been built into the unit for review and assessment.*

**Beginning**

- Explain what a “natural resource” is and give at least three examples
- Identify everyday objects that are made from natural resources
- Describe how humans use the earth’s natural resources (K-ESS3-1)
- Identify common resources that are limited and nonrenewable
- Classify resources as renewable or nonrenewable
- Describe how humans have changed the environment around them in order to meet their needs (K-ESS3-2)
- Identify examples of garbage produced by humans
- Describe why landfills pose a problem for humans, animals, and plants
- Identify different forms of pollution
- Describe why pollution poses a problem for humans, animals, and plants

**Middle**

- Describe why humans have a special responsibility to take care of the earth
- Describe how humans can reduce the pollution in their environment
- Identify items that can be used over and over again
- Identify materials that can be recycled (2-PS1-1)

- Classify objects as recyclable or as garbage
- Compare and contrast the process of composting with the process of recycling

**End**

- Identify how we can conserve energy and resources
- Describe the significance of Earth Day
- Develop solutions that can protect the earth's natural resources (K-ESS3-3)

**Potential Big Guiding Questions****Essential Questions:**

- **What is a natural resource?**
- **How do humans depend on earth's natural resources?**
- **How do humans change the planet?**

RE: Natural Resources and Human Impacts on the Environment:

- What kinds of natural resources are used in our classroom?
- How do humans depend on other animals as well as on plants? (application of previous units)
- How do humans change their environment to meet their needs? (application of previous units)

RE: Pollution, Garbage, and Recycling

- How much waste do we produce as a class in a day (or week)?
- What items can we use over and over again without making waste?
- Where do our newspapers, cans, and bottles go when we recycle them?

RE: Other Conservation Efforts

- What other kinds of natural resources do we often use?
- What can we do to limit our impact on the environment?
- Why do people use compost piles?

**Potential Assessment Opportunities**

*The following assessment tasks serve as a sampling of how students can demonstrate mastery of lesson objectives. Each aligned objective and NGSS is noted in parentheses. In addition, the proposed timing ("beginning," "middle," or "end") is noted in order to indicate approximately when the assessment should take place.*

**Example #1: (Beginning of Unit 5)**

{**Evaluates Student Mastery of Objective:** Describe why pollution poses a problem for humans, animals, and plants.}

**Advance Preparation:** Create the assessment handouts by dividing pieces of paper in half (top to bottom). At the top of the page, draw or attach three images depicting a plastic bag on the ground,



exhaust coming from a car's tailpipe, and an image of wastewater spilling into a river. Leave the bottom half of the paper blank for students to complete the task assessment.

**Task Assessment:** Ask students to describe what they see in each image. Through guided questioning, help students understand that each image is a representation of pollution. Explain to students that they will select one image, and in the space below (at the bottom of their paper), they will draw what that specific form of pollution does to the people, animals, and/or plants nearby. Rotate around the room, asking students to describe their illustrations, and transcribe their ideas on the bottom of the handouts. (Students, who are ready and able, can write words/phrases that describe their drawings.) Ask students to elaborate on why the pollution poses a problem for humans, animals, and/or plants in the immediate area.

### Example #2: (Middle of Unit 5)

{Evaluates Student Mastery of Objective: Identify materials that can be recycled.} (2-PS1-1)

#### Advance Preparation:

- This activity requires a piece of chart paper or board, magazines, scissors, glue/tape, and large pieces of paper or poster board, one for each pair of students.
- Draw a T-chart on each piece of paper/poster board. On the left side of the chart, draw a symbol that represents “recycling” or affix a green dot; on the right side, draw a symbol that represents “trash” or affix a red dot. You may also wish to tear out magazine pages ahead of time with images of food and other everyday items for students to cut out. Also have two to three images of recyclable and non-recyclable materials of your own to elicit students’ ideas during the introduction of this assessment opportunity.

**Task Assessment:** After the materials have been distributed to each table, explain to students that they will pair up with a partner to flip through a magazine (or magazine pages), looking for materials that can be recycled, as well as items that need to be thrown away after use.

**T- What types of materials can be recycled?** Engage students in a discussion to review the recyclable items previously taught: aluminum (cans), glass (bottles), plastic (bottles), and paper (newspapers, magazines, etc.). As students review each item, tape/paste a corresponding image on a piece of chart paper, and label each example (e.g., affix an image of a plastic soda bottle and label it as “plastic”).

After the review, ask students to work in pairs to sift through the magazine pages and to identify recyclable and non-recyclable items. Pairs should work to cut out each image and to glue or tape it onto their T-charts in the correct sections. As students work on the activity, rotate from table to table, asking the pairs of students to describe the items they have identified as recyclable and those that need to be thrown in the trash—and why.

After students have had the opportunity to identify several items that are recyclable, as well as those that are not, ask pairs to “present” their findings to the whole group. *(Try to call on at least one pair that found a plastic, glass, or aluminum product not in the form of a can or bottle. Or, if necessary, be sure that you have such an example ready to be discussed if no one finds such an example. During previous instruction, students focused on plastic/glass bottles and aluminum cans as recyclable products. Using different products—such as milk jugs, pickle or baby food jars, and cereal boxes—will help students to*

*recognize that the material from which a product is made is what makes the product recyclable and not how the product is used.)* As students identify products that can be recycled, ask them (and classmates in the audience) to explain their thinking. Through questioning, guide students to focus on and describe the materials from which each product is made. Refer back to the review chart made during the introduction to this assessment as needed.

### Potential Activities & Procedures

*The following activities or procedures serve as a sampling of what instruction could look like in this unit. Each example was specifically designed to contribute to one or more of the aforementioned objectives. In addition, the proposed timing (“beginning,” “middle,” or “end”) is noted in order to indicate approximately when the activity should be conducted during this unit. Aligned NGSS are noted in parentheses.*

#### **Example #1: (Ongoing across Unit 5)**

**{Contributes to the Objective:** Describe how people can conserve energy and resources.}

**Activity:** Have students discuss possible jobs around the classroom that could contribute to taking care of the earth. Make a list of these jobs, and then add them to your daily classroom jobs/routines. Examples may include making sure that paper is being recycled, that the water is turned off in the bathrooms or in classroom sinks, and/or making sure classroom lights are turned off when they are not needed. At the end of the week, have students report back to the class about how they have progressed with their jobs. This is a concrete way to begin having children think about and communicate actions to reduce the human impacts on the earth.

#### **Example #2: (Middle of Unit 5)**

**{Contributes to the Objectives:** Identify examples of garbage produced by humans; and Describe why landfills pose a problem for humans, animals, and plants.}

**Activity:** Track how much garbage is produced and the amount of recyclable items collected by your class each day.

Set up both recycling and trash bins in an area that is easily accessible in your classroom. At the end of each day, weigh the trash bin and the recycling bin using a weight or spring scale. On chart paper or the board, record how much trash (in grams or pounds) the classroom produced that day as well as how much trash students were able to save from landfills by recycling. At the end of the month, determine the total amount of trash collected and how much was recycled. Ask students to think about how their efforts to recycle impacted their environment.

## Websites & Media

### Pictures & Histories of U.S. National Parks:

<http://kids.nationalgeographic.com/explore/history/history-of-the-national-parks/>

This website provides information and images related to the national resources preserved through our national parks.

### Children of the Earth United: <http://childrenoftheearth.org/>

Use this website to find educational materials that focus on the earth's natural resources, as well as on conservation methods such as recycling.

### Conservation and Recycling Activities, Challenges, and Pledges:

- Billion Acts of Green—<http://www.earthday.org/take-action/>
- DoSomething.org—[https://www.dosomething.org/search/apachesolr\\_search/recycling](https://www.dosomething.org/search/apachesolr_search/recycling)

Initiatives such as these offer periodic challenges and pledges that you might select with your students to sign up for and complete. Challenges have ranged from “Clean Like a Champion,” during which teams sign up for a high-paced, athletic cleanup of a local park, to signing a pledge to reduce plastic waste by switching from disposable bottles to reusable alternatives instead.

## Supplemental Trade Books

- *And Still the Turtle Watched*, by Sheila MacGill-Callahan (Puffin, 1996) ISBN 0140558365
- *Caring for Earth*, by Solomon Gordon (National Geographic Society, 2003) ISBN 0792243153
- *Garbage and Recycling* (Young Discoverers: Environmental Facts and Experiments), by Rosie Harlow and Sally Morgan (Kingfisher, 2002) ISBN 075345503X
- *I Am Water* (Hello Reader! Level 1 Science), by Jean Marzollo and Judith Moffatt (Cartwheel, 1996) ISBN 0590265873
- *It's Earth Day!* (Little Critter), by Mercer Mayer (HarperFestival, 2008) ISBN 0060539593
- *Just a Dream*, by Chris Van Allsburg (Houghton Mifflin, 1990) ISBN 0395533082
- *The Lorax*, by Dr. Seuss (Random House Books for Young Readers, 1971) ISBN 0394823370
- *Rachel: The Story of Rachel Carson*, by Amy Ehrlich and Wendell Minor (Voyager Books, 2008) ISBN 0152063242
- *Recycle!: A Handbook for Kids*, by Gail Gibbons (Little, Brown Young Readers, 1996) ISBN 0316309435
- *A River Ran Wild*, by Lynne Cherry (Voyager Books, 2002) ISBN 0152163727
- *The Three R's: Reduce, Reuse, Recycle* (What Do You Know About? Books), by Nuria Roca and Rosa M. Curto (Barron's Educational Series, 2007) ISBN 0764135813
- *The Wartville Wizard*, by Don Madden (Aladdin, 1993) ISBN 0689716672

- *Where Does the Garbage Go?*, by Paul Showers and illustrated by Randy Chewning (Harper Trophy, 1994) ISBN 0064451143
- *Why Should I Save Water? (Why Should I?)*, by Jen Green (Barron's Educational Series, 2005) ISBN 0764131575
- *The Wump World*, by Bill Peet (Sandpiper, 1981) ISBN 0395311292
- *Composting: Nature's Recycler*, by Robin Koontz (Picture Window Books, 2006) ISBN 9781404822009
- *The Earth and I*, by Frank Asch (Houghton Mifflin Harcourt, 2008) ISBN 9780152063955
- *Keeping Water Clean*, by Helen Frost (Capstone Press, 2000) ISBN 9780736848770

Draft