Dear Parent,

Your son's or daughter's science class will begin exploring the "Interdependence of Life". In this unit, students will learn about the many ways in which living things interact with each other and their environment. By the end of the unit, students should demonstrate a clear understanding of and be able to discuss the following topics:

1. The difference between a biotic and an abiotic environment
    a. Biotic factors are those that are living such as plants, animals, bacteria, protists, and fungi
    b. Abiotic factors are those elements within an ecosystem that are non-living such as temperature, precipitation, mountains, and soil composition

2. The five levels of environmental organization
    a. *Organisms* make up *Communities* which make up *Populations* which make up *Ecosystems* which make up the *Biosphere*

3. The relationship between the abiotic environment and communities
    a. The temperature and precipitation define the type of organisms that can live in a specific area. Ecosystems with specific characteristics are called biomes.
    b. There are 6 major land biomes: Tundra, Taiga (Coniferous Forest) Deciduous Forest, Savanna or Grassland, Tropical Rainforest, and the Desert.

4. Distinctions of the different areas of the ocean
    a. The amount of salinity defines the aquatic ecosystems. Marine ecosystems such as oceans and seas contain more than 1% salinity, Freshwater ecosystems such as rivers and streams contain less than 1% salinity, and estuaries are regions of water where the marine ecosystem meet the freshwater ecosystem and the amount of salinity is constantly changing.

5. The importance of plankton in aquatic ecosystems
    a. Plankton serves as the major *producer* within aquatic ecosystems.

6. Characteristics of coral reefs and intertidal areas
    a. Coral reefs are biologically diverse serving to be a habitat for many varieties of plants and animals. Coral reefs are sensitive to pollutants and cannot tolerate major temperature changes.
    b. Intertidal areas are located in the narrow band between land and sea. Plants and animals must endure being pounded by icy waves at some times while being parched by hot, dry air at others. Despite these extreme conditions, wave-swept rocky shores are full of life because they also have plenty of light, nutrients, and oxygen.Bounded by high and low tides, the intertidal zone is rich in algae and invertebrates, but the particular mix of species varies with proximity to shore. The high intertidal zone, which is inundated only during high tides, has species including rockweed, acorn barnacles, turban snails, and lined shore crabs. The middle intertidal zone, which is exposed to the air at least once a day, is home to creatures such as sea lettuce, aggregating anemones, chitons, gooseneck barnacles, mussels, and ochre stars. The low intertidal zone, which is exposed only during very low tides, is inhabited by coralline algae, giant green anemones, purple sea urchins, and bat stars.

7. Characteristics and the importance of wetlands
    a. The most common feature of all wetlands is that the water table (the groundwater level) is very near to the soil surface or shallow water covers the surface for at least part of the year. The main characteristics of a wetland are determined by the combination of the salinity of the water in the wetland, the soil type and the plants and animals living in the wetland.
        i. **Marsh** – a type of wetland ecosystem characterized by poorly drained mineral soils and by plant life dominated by grasses (see. Fig. 2, Fig. 3 and Fig. 4). Marshes are common at the mouths of rivers, especially where extensive deltas have been built. The marsh plants slow down the flow of water and allow for the nutrient enriched sediments to be deposited, thus providing conditions for the further development of the marsh.

ii. **Swamp** – a wetland ecosystem characterized by mineral soils with poor drainage and by plant life dominated by trees (see Fig. 5). Swamps are found throughout the world, most often in low-lying regions (with poor drainage) next to rivers, which supply the swamp with water. Some swamps develop from marshes that slowly fill in, allowing trees and woody shrubs to grow

8. The differences between a food chain and a food web
    a. Food Chain
    Simple model to show how matter moves through an ecosystem
    3-5 steps
    b. Food Web
    Complex model that shows ALL possible feeding relationships in a community

9. Energy flow through a food web
    a. Producers, Consumers and Decomposers make up food webs
        i. Decomposers and producers keep organic material cycling
            - Producers: make it
            - Decomposers: break it down

    Sample Food Chain:

    Hawks (big bird)

    ↓

    Partridges (little bird)

    ↓

    Grasshoppers

    ↓

    Grass

    → Therefore…

    - Hawks are predators of partridges
    - Partridges are predators of grasshoppers BUT prey to hawks
    - Grasshoppers are prey of partridges BUT predators of grass

10. The different types of relationships
    a. Predatation describes one species, the predator, feeding on and typically killing another organism, the prey species. Predators use various methods to capture prey, just as their prey use various methods to avoid capture. Herbivory is comparable to predation, but herbivores feed on plants rather than animals. Herbivores do not necessarily kill a plant they feed on but sometimes put pressure on the plant species.

    b. Competition describes multiple organisms fighting for the same resources. Interspecies competition is competition between different species; intraspecies competition is competition between organisms of the same species.The competition may or may not involve active interference. Squirrels and deer may both eat acorns in a site but do not directly fight for the acorns and instead make fewer acorns available for the other. Alternatively, competition may involve direct interference, like when a plant secretes chemicals from its roots to keep other plants from growing around it. The more similar two species in a community are, the more competitive they are with each other, fighting for limited resources.

    c. Parasitism is when one species benefits from a second species that is disadvantaged, but generally not killed. A tick feeding on a host is a good example of parasitism. The host is not directly killed by the tick, which benefits from the relationship while the host is adversely affected, as it feeds on the host's blood.

d. Mutalism is an interaction characterized by mutual benefit, so both species benefit from the relationship. A flowering plant producing nectar to attract an animal, such as a bee, is one example. The bee benefits by feeding on the nectar, while the plant benefits because the bee goes on to disperse the plant's pollen. Mutualism can also be thought of as "mutual exploitation."

e. Commensalism describes a relationship in which one species benefits but the other is unaffected. Examples of commensalism include a bird nesting in a tree. The bird is using the tree for shelter but the tree is unaffected. A second example is a certain intestinal bacteria species that lives in an animal's gut, which provides food and shelter for the bacteria, but the bacteria does not negatively or positively affect the host organism. Note that there are many types of intestinal bacteria, and while some -- commensalists -- have no affect on the host, others may benefit or harm the host.

11. The cycle of water in the atmosphere, land, and oceans
    a. The water cycle describes the existence and movement of water on, in, and above the Earth. Earth's water is always in movement and is always changing states, from liquid to vapor to ice and back again.
12. The steps in the carbon cycle and the importance of the carbon cycle to living things
    a. Plants use carbon dioxide and sunlight to make their own food and grow. The carbon becomes part of the plant. Plants that die and are buried may turn into fossil fuels made of carbon like coal and oil over millions of years. When humans burn fossil fuels, most of the carbon quickly enters the atmosphere as carbon dioxide.
    b. Carbon dioxide is a greenhouse gas and traps heat in the atmosphere. Without it and other greenhouse gases, Earth would be a frozen world.
13. The steps in the nitrogen cycle and the importance of the nitrogen cycle to living things
    a. The Nitrogen Cycle includes important process like fixation, mineralization, nitrification and denitrification. In the Earth's atmosphere, it is approximately 78% of Nitrogen making it the largest pool of nitrogen. But, the atmospheric nitrogen has limited availability for biological usage, leading to a lack of usable nitrogen in many types of ecosystems.

Questions to Ask Along the Way

You can help your child learn about these topics by asking interesting questions as he or she progresses through the unit. For example, you may wish to ask your son or daughter the following questions:

- Why is ecology important?
- What is one way that you affect living things other than people or pets?
- Where do we fit on the food chain?
- Can you think of two animals that live in the same environment without affecting each
- other?
- Does water naturally get recycled?
- What happens to animals after they die? Where do their bodies go?
- When you exhale, how does it help plants?
- What would happen if no one in your neighborhood maintained their yards for a year? for
- 20 years?
- What are biomes?
- Which biome has more different animals and plants than any other biome on the planet?
- What is an estuary?
- How do aquatic ecosystems differ? How are they similar?