Academic Standards for Environment and Ecology

Grades PreK – 3
October 1, 2012

Pennsylvania Department of Education

GRADES PreK – 3
Environment and Ecology
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Environment and Ecology

XI. INTRODUCTION

This document includes Environment and Ecology Standards that describe what students should know and be able to do in these areas:

- ◊ 4.1. Ecology
- ◊ 4.2. Watersheds and Wetlands
- ◊ 4.3. Natural Resources
- ◊ 4.4. Agriculture and Society
- ◊ 4.5. Humans and the Environment

The Declaration of Rights, Article 1 of the Pennsylvania Constitution states in Section 27: "The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and aesthetic values of the environment. Pennsylvania's public natural resources are the common property of all people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people." To this end it is our responsibility to develop a citizenry that is aware of and concerned about the total environment and has the knowledge and skills to work toward solutions to current problems and the prevention of new ones.

Environment and Ecology is grounded in the complexity of the world we live in and its sustainability. It examines the world's natural processes and social systems. Environment and Ecology places its main emphasis in the real world. Allowing students to understand, through a sound academic content base, how their everyday lives revolve around their use of the natural world, the resources it provides and the laws that influence it.

These standards establish the essential elements of what students should know and be able to do as they move from PreK to 3rd grade. The sequential nature of this document reflects the need for rigorous content that students will be expected to achieve.

The study of Environment and Ecology will allow students to be active participants and problem solvers in real issues that affect them, their homes, schools and communities. The very interdisciplinary nature of this field allows teachers and students to use science, technology and social systems as the vehicles to a better tomorrow through the Environment and Ecology Standards.

With the addition of PreK-3 Environment and Ecology Standards, it is suggested that Grade 1 focus on terrestrial habitats; Grade 2 focus on aquatic habitats; and Grade 3 focus on wetland habitats.

A glossary is included to assist the reader in understanding terminology contained in the standards.

GRADES PreK – 3
Environment and Ecology

Science as Inquiry: Understanding of science content is enhanced when concepts are grounded in inquiry experiences. The use of scientific inquiry will help ensure that students develop a deep understanding science content, processes, knowledge and understanding of scientific ideas, and the work of scientists; therefore, inquiry is embedded as a strand throughout all content areas. Teaching science as inquiry provides teachers with the opportunity to help all students in grades PreK-3 develop abilities necessary to understand and do scientific inquiry. These are very similar across grade bands and evolve in complexity as the grade level increases.

Science as Inquiry

Grades PreK - 3

Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:

- Distinguish between scientific fact and opinion.
- Ask questions about objects, organisms and events.
- Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.
- Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.
- Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.
- Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.
- Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced and review and ask questions about the work of other scientists.

Content Area Strand					
	4.1.PK.F	4.2.PK.D	4.3.PK.C	4.4.PK.E	4.5.PK.F
	4.1.K.F	4.2.K.D	4.3.K.C	4.4.K.E	4.5.K.F
	4.1.1.F	4.2.1.D	4.3.1.C	4.4.1.E	4.5.1.F
	4.1.2.F	4.2.2.D	4.3.2.C	4.4.2.E	4.5.2.F
	4.1.3.F	4.2.3.D	4.3.3.C	4.4.3.E	4.5.3.F

4.1 Ecology					
	4.1.PK GRADE PK	**4.1.K GRADE K**	**4.1.1 GRADE 1**	**4.1.2 GRADE 2**	**4.1.3 GRADE 3**
Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:					
The Environment	4.1.PK.A Identify living and nonliving things in the immediate and surrounding **environment**.	4.1.K.A Identify the similarities and differences of living and non-living things within the immediate and surrounding **environment**.	4.1.1.A Identify and describe the basic needs of living things in a **terrestrial habitat**.	4.1.2.A Describe how a plant or an animal is dependent on living and nonliving things in an **aquatic habitat**.	4.1.3.A Differentiate between the living and nonliving components in an **environment**.
Materials Cycles	4.1.PK.B Intentionally Blank	4.1.K.B Intentionally Blank	4.1.1.B Intentionally Blank	4.1.2.B Intentionally Blank	4.1.3.B Intentionally Blank
Energy Flow	4.1.PK.C Identify that plants need the sun to grow.	4.1.K.C Intentionally Blank	4.1.1.C Describe a simple **food chain** within a **terrestrial habitat**.	4.1.2.C Identify sources of energy in an **aquatic habitat**.	4.1.3.C Identify sources of energy.
Biodiversity	4.1.PK.D Identify basic needs of living things.	4.1.K.D Observe and describe what happens to living things when needs are met.	4.1.1.D Identify living things that are threatened, endangered, or extinct.	4.1.2.D Identify differences in living things (color, shape, size, etc.) and describe how **adaptations** are important for **survival**.	4.1.3.D Identify **organisms** that are dependent on one another in a given **ecosystem**. • Define **habitat** and explain how a change in **habitat** affects an **organism**.
Succession	4.1.PK.E Identify the change of seasons in the **environment**.	4.1.K.E Identify how the changes of seasons affect their local **environment**.	4.1.1.E Describe the seasons and describe how the change of the season affects living things.	4.1.2.E Identify how living things **survive** changes in their **environment**.	4.1.3.E Identify changes in the **environment** over time.

4.1 Ecology					
	4.1.PK **GRADE PK**	**4.1.K** **GRADE K**	**4.1.1** **GRADE 1**	**4.1.2** **GRADE 2**	**4.1.3** **GRADE 3**
Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:					
Science as Inquiry	4.1.PK.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.1.K.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.1.1.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.1.2.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.1.3.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)

4.2 Watersheds and Wetlands					
	4.2.PK GRADE PK	**4.2.K GRADE K**	**4.2.1 GRADE 1**	**4.2.2 GRADE 2**	**4.2.3 GRADE 3**
Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:					
Watersheds	4.2.PK.A Identify various types of moving water in Pennsylvania.	4.2.K.A Identify components of a **water cycle**.	4.2.1.A Explain the path water takes as it moves through the **water cycle**.	4.2.2.A Intentionally Blank	4.2.3.A Define the term **watershed**. • Identify the **watersheds** in which you reside.
Wetlands	4.2.PK.B Identify a **wetland** as an ecosystem in Pennsylvania.	4.2.K.B Differentiate between **terrestrial**, **aquatic**, and **wetland ecosystems** in Pennsylvania.	4.2.1.B Intentionally Blank	4.2.2.B Intentionally Blank	4.2.3.B Identify plants and animals found in a **wetland**.
Aquatic Ecosystems	4.2.PK.C Describe an **aquatic** (water) and **terrestrial** (land) **habitat**.	4.2.K.C Identify that there are living and nonliving components in an **aquatic habitat**.	4.2.1.C Intentionally Blank	4.2.2.C Identify and describe the basic needs of plants and animals in an **aquatic ecosystem**.	4.2.3.C Identify plants and animals that live in lakes, ponds, streams, and **wetlands**.
Science as Inquiry	4.2.PK.D *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.2.K.D *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.2.1.D *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.2.2.D *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.2.3.D *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)

4.3 Natural Resources					
	4.3.PK GRADE PK	**4.3.K GRADE K**	**4.3.1 GRADE 1**	**4.3.2 GRADE 2**	**4.3.3 GRADE 3**
Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:					
Use of Natural Resources	4.3.PK.A Identify how the **environment** provides for the needs of people in their daily lives.	4.3.K.A Identify some **renewable resources** used in the classroom.	4.3.1.A Identify some **renewable resources** used in the community.	4.3.2.A Describe the jobs/hobbies people have in the community that relate to **natural resources**.	4.3.3.A Identify the **natural resources** used to make various **products**.
Availability of Natural Resources	4.3.PK.B Identify **natural resources** available to people in their daily life.	4.3.K.B Recognize the importance of conserving **natural resources**.	4.3.1.B Recognize the difference between **renewable** and **nonrenewable resources**.	4.3.2.B Identify **products** and **by-products** derived from **renewable resources**.	4.3.3.B Identify local **natural resources**.
Science as Inquiry	4.3.PK.C *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.3.K.C *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.3.1.C *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.3.2.C *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.3.3.C *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)

4.4 Agriculture and Society

	4.4.PK GRADE PK	4.4.K GRADE K	4.4.1 GRADE 1	4.4.2 GRADE 2	4.4.3 GRADE 3
Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:					
Food and Fiber Systems	4.4.PK.A Identify what plants and animals need to grow.	4.4.K.A Identify common plants and animals found in Pennsylvania agricultural systems.	4.4.1.A Describe the role of soil in agricultural systems.	4.4.2.A Identify **agriculture** as a living system and that food and **fiber** originate from plants and animals.	4.4.3.A Identify Pennsylvania crops that provide food for the table and **fiber** for **textiles**.
Importance of Agriculture	4.4.PK.B Identify people's basic needs.	4.4.K.B Identify common plants and animals used by people.	4.4.1.B Identify **products** and **by-products** of the agricultural system.	4.4.2.B Explain how **agriculture** supports jobs in Pennsylvania.	4.4.3.B Explain how **agriculture** meets the basic needs of humans.
Applying Sciences to Agriculture	4.4.PK.C Recognize that plants and animals grow and change.	4.4.K.C Observe and describe stages of life cycles for plants and animals.	4.4.1.C Describe the life cycles of different plants and animals in a **terrestrial habitat**.	4.4.2.C Examine life cycles of plants and animals in an **aquatic habitat**.	4.4.3.C Use scientific inquiry to investigate what animals and plants need to grow.
Technology Influences on Agriculture	4.4.PK.D Identify basic tools used in gardening at home and at school.	4.4.K.D Identify tools and machinery commonly used in **agriculture**.	4.4.1.D Identify tools used by native Americans and early settlers in **agriculture**.	4.4.2.D Intentionally Blank	4.4.3.D Identify technology used in **agriculture**. • Identify tools and machinery used in agricultural processes.
Science as Inquiry	4.4.PK.E *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.4.K.E *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.4.1.E *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.4.2.E *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.4.3.E *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)

4.5 Humans and the Environment					
	4.5.PK GRADE PK	**4.5.K GRADE K**	**4.5.1 GRADE 1**	**4.5.2 GRADE 2**	**4.5.3 GRADE 3**
Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:					
Sustainability	4.5.PK.A Identify what people need to survive.	4.5.K.A Identify what people use in their everyday life.	4.5.1.A Identify resources humans use from the **environment**.	4.5.2.A Identify the natural resources used to make various **products**.	4.5.3.A Identify resources humans take from the **environment** for their survival.
Integrated Pest Management	4.5.PK.B Identify things in the natural **environment** that can be harmful to people, pets and other living things.	4.5.K.B Identify common **pests** in our homes, gardens and neighborhoods.	4.5.1.B Describe why people consider some insects, plants and other living things to be **pests**, and ways to control their population numbers.	4.5.2.B Intentionally Blank	4.5.3.B Define the term **pest** and identify various plants and animals that humans may call **pests**.
Pollution	4.5.PK.C Identify ways people pollute the **environment**.	4.5.K.C Identify different types of **pollution** (land, water or air) and their sources.	4.5.1.C Describe how **pollution** affects the health of a **habitat**.	4.5.2.C Identify how people can reduce **pollution**.	4.5.3.C Identify different types of **pollution** and their sources.
Waste Management	4.5.PK.D Describe how everyday human activities generate waste.	4.5.K.D Identify waste and practice ways to **reduce**, **reuse** and **recycle**.	4.5.1.D Identify where waste from the home, school and community goes for disposal.	4.5.2.D Describe how people can help the environment by **reducing**, **reusing**, **recycling** and **composting**.	4.5.3.D Describe how waste is generated. • Identify and propose a solution for a waste issue in the school setting (e.g., **litter** in the hallway).
Human Health Issues	4.5.PK.E Intentionally Blank	4.5.K.E Intentionally Blank	4.5.1.E Intentionally Blank	4.5.2.E Intentionally Blank	4.5.3.E Intentionally Blank

4.5 Humans and the Environment					
	4.5.PK GRADE PK	**4.5.K GRADE K**	**4.5.1 GRADE 1**	**4.5.2 GRADE 2**	**4.5.3 GRADE 3**
Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:					
Science as Inquiry	4.5.PK.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.5.K.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.5.1.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.5.2.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)	4.5.3.F *See Science as Inquiry* in the Introduction for grade level indicators. (As indicated on page 4.)

XII. Glossary

Adaptation: Special, inherited characteristics that help an organism survive in its environment and which are developed over time.

Agriculture: Science and art of cultivating soil, producing crops, and raising livestock, and in varying degrees the processing and distribution of the food or fiber product or by-product.

Aquatic Ecosystem: The interacting system of a biological community and its nonliving environments; also, the place where these interactions occur (pond, lake, marsh, bog, swamp, creek, river, stream).

By-Product: Something produced or manufactured in addition to the principal product for which the original resource was cultivated or harvested; often takes on a form very different from its source.

Compost: Decomposed organic material resulting from the breakdown by living beings (mostly microbes) and used to enrich or improve the consistency and content of soil for growing.

Fiber: 1) Threadlike rows of cells in foods that give texture and substance, or "bulk," which is important in a healthy diet; 2) slender, threadlike structure combining with other fibers in the form of weaving, knitting, or otherwise intertwining.

Food Chain: The transfer of food energy from one organism to another as each consumes a lower member and in turn is preyed upon by a higher member.

Litter: Waste materials carelessly discarded or accidentally deposited in an inappropriate place. Littering is against the law.

Natural Resources: Those raw materials supplied by the Earth and its processes. Natural resources include nutrients, minerals, water, plants, animals, etc.

Nonrenewable Resources: Natural materials such as oil, gas, coal, etc. which are considered exhaustible because of their scarcity, the great length of time required for their formation, or their rapid depletion.

Non-Point Pollution: Pollution that is carried far from their original source by rain, melting snow, moving water, wind, etc., and deposited in soil or water systems.

Pest:	Any organism that spreads disease, destroys property, competes with people for resources such as food or is considered a nuisance.
Pollution:	Harmful substances deposited in the air, water, or land, leading to a state of dirtiness, impurity or unhealthiness.
Point Pollution:	Contaminants that are discharged or emitted from an identifiable source into the air, water, or soil.
Recycle:	To make materials such as glass, aluminum, paper, steel and plastic into new products.
Reduce:	To decrease the amount of waste we produce by buying only what we need, avoiding disposables, and buying products that are not over-packaged.
Renewable Resource:	A naturally occurring resource that has the capacity to be replenished through natural processes; the sun, wind, trees and animals are renewable resources.
Reuse:	To extend the life of an item by using it again, repairing it, or creating new uses for it.
Terrestrial System:	The interacting system of a biological community and its nonliving environments; also, the place where these interactions occur (meadow, forest, farm, field, city).
Water Cycle:	The paths water takes through its various states – vapor, liquid, and solid, as it moves throughout Earth's systems (oceans, atmospheres, ground water, streams, etc.). The water cycle is also known as the hydrologic cycle.
Watershed:	The land area from which surface runoff drains into a stream, channel, lake, reservoir, or other body of water; also called a drainage basin.
Wetlands:	Lands where water saturation is the dominant factor determining the nature of the soil development and the plant and animal communities (e.g., marsh, bog, swamp).