

Elizabethtown Area
School District
Environmental Science in Lancaster County

Course Number: 341

Length of Course: 18 weeks

Grade Level: 11-12 Elective

Total Clock Hours: 120

Length of Period: 80 minutes

Date Written: June 11, 2007

Periods per Week/Cycle: 5

Written By: Margie Reed

Credits (if app.): 1

Weighting: 1.0

Prerequisite: Earth Science; Biology

Course Description:

This course will focus on environmental issues and problems that face Lancaster County residents at present and will encourage students to try to determine issues that will affect the future. Topics presented will include: ecosystems and habitats, land and water use, pollution and treatment, watersheds, and wetlands, endangered and extinct species, Lancaster County natural resources, conservation, and waste management issues. Students will seek to find ways of solving current environmental problems in the county, including urban and suburban sprawl.

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I. Overall Course/Grade Level Standards

Students will KNOW and be able TO DO the following as a result of taking this course.

- A. Know how to use laboratory materials correctly.
- B. Use data collected in laboratory experiments to formulate conclusions.
- C. Use library-reference skills for fact-collecting and evaluation of data.
- D. Evaluate ecosystem and habitat health based on indicator species found within.
- E. Develop and use problem-solving skills.
- F. Use classification skills to identify micro and macro-invertebrate species.
- G. Use past and current data to extrapolate future impact.
- H. Discuss the cause-effect relationship of man on the environment of Lancaster County.
- I. Distinguish sources of pollution and the environmental impact of each.
- J. Give examples of the environmental impact of excessive land use.
- K. Develop a plan of management and conservation for county resources.

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II. Content
Major Areas of Study

List all units of study below:

<u>Unit</u>	<u>Estimated Time</u>	<u>Materials</u>
1. Ecosystems and Habitats	3 Weeks	School farm, water test kits, soil test kits, fish tanks, TV, DVD/video player, videos, field guides, labs...
2. Energy, Natural Resources, Recycling and Conservation	3 weeks	IMC, Videos, current articles, various "trash" items, TV labs...
3. Watersheds and Wetlands	4 weeks	Chesapeake Bay Foundation field trip, field guides, labs, TV, any available current technology (for research and demonstration purposes)...
4. Air, Land and Water Use	4 Weeks	Labs, School farm property, field guides, computers, IMC, videos, TV
5. Threatened, Endangered and Extinct Species	4 weeks	Labs, IMC, videos, TV, DVD, video player...

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Name of Course: Environmental Science Name of Unit: Ecosystems
 Essential Question for the Unit: Why are healthy ecosystems important?

Unit Objectives/Key Questions			
A. What are the component parts of an ecosystem?	I	D, A	4.6.10A
B. What relationships exist between the species in an ecosystem (habitat)?	E	J, H, G, A	4.6.10B, C 3.6.7A
C. How is an energy web different from a food chain?	C	A, C	4.6.10A, B, C
D. What impact do outside influences have on an ecosystem?	E	J, H, D	4.6.12A, C
E. How are the acceptable levels of pollution within an ecosystem defined?	I	I, K	3.9.10B, C 3.5.4A, B
F.			
G.			
H.			
I.			
J.			

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Name of Course: Environmental Science Name of Unit: Natural Resources
 Essential Question for the Unit: How are Earth's resources utilized?

Unit Objectives/Key Questions			
A. How is energy obtained and used in Lancaster County?	E	G, C, D, K	4.2.10C, D 4.2.12A, D
B. What role do humans play in resource use/misuse?	E	H, I, K	4.2.12 B, C, D 4.3.10 B 4.8.10D
C. What role do regulations and government policies (local, state, and national) play in conservation of resources?	E	E, C, K	4.2.12B, C 4.9.12A
D. How do resources go from raw to post-consumer materials?	E	I, C	4.2.10C, D 4.2.12D
E. How can we distinguish renewable from nonrenewable resources?	C	C, A	4.2.10A, C 4.2.12A
F. How do natural occurrences such as drought, floods or fire impact nature resource banks?	I	K, G, B	4.2.10B
G.			
H.			
I.			
J.			

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Name of Course: Environmental Science Name of Unit: Watersheds
 Essential Question for the Unit: How are natural watersheds defined?

Unit Objectives/Key Questions			
A. How can you locate watershed boundaries on a topographic map?	E	A, B, C	4.1.10B
B. How can you calculate the impact of water velocity on the future boundaries of a watershed?	C	C, E	4.1.10B 3.6.7A 4.1.12A
C. What effects do humans have on watersheds and wetland regions?	I	H, G	4.1.10E 4.1.12E 4.2.10B
D. Why are wetlands essential to human existence?	E	J, B, C	4.1.10D 4.1.12D
E. What are the different types of wetlands?	C	A, F, D	4.1.12D 4.1.10A
F. What types of aquatic and terrestrial organisms exist in wetland/watershed areas?	I	F, A, D	4.1.10C 4.1.12B
G. How can we determine if pollution is/has occurred in a wetland/watershed region?	E	I, H, F	3.6.7A 3.6.10A 4.1.12C
H. How do natural events affect watershed and wetland regions?	E	A, B	4.2.12E 4.2.10B, E
I.			
J.			

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Name of Course: Environmental Science Name of Unit: Air, Land, Water
 Essential Question for the Unit: How have changes in air, land and water use affected the quality of these resources?

Unit Objectives/Key Questions			
A. What effect do current local, state and national regulations have on air, land and water quality in Lancaster County?	E	K, H, G, I	4.3.12 A, B 4.9.12 A 3.2.12 C
B. Why are conservation and preservation important concepts for these resources?	E	D, K, G, E	4.8.10D 4.8.12C
C. How does the Lancaster County Farmland Preservation plan affect land use?	I	H, E	4.8.10B, C
D. What pros and cons exist in solid waste treatment in Lancaster County?	E	H, E, K	4.2.12D 4.3.12A 4.9.12A
E. What are the major air, land (soil) and water pollutants?	E	B, C, K	4.3.12A 4.8.10A 4.3.10A, B
F. How is Lancaster County handling urban sprawl?	C	H, J, K, B	4.8.10B, C
G. How does permeability and porosity of soils affect land use?	I	C, B, J, K	4.8.12B 4.8.10B, C
H.			
I.			
J.			

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Name of Course: Environmental Science Name of Unit: Endangered Species
 Essential Question for the Unit: How can we recognize natural vs. human effect on animal species populations?

Unit Objectives/Key Questions			
A. What effect does biodiversity have on species population count?	E	F, G, D	4.7.10A 4.3.10C 4.7.12A
B. How do conservation and preservation techniques aid biodiversity in a given habitat?	I	K, J, E, B	4.7.10C 4.7.12C
C. What criteria is used to identify a species as endangered, threatened or extinct?	E	B, D	4.7.10C 4.7.12C
D. What laws exist concerning threatened, endangered or extinct species?	E	K, H, G	4.3.10B 4.9.10A 4.7.12C
E. What effects are seen in any habitat when one or more species is lost to that habitat?	I	F, E, D	4.7.12A
F. What steps can we take to protect the threatened and endangered species that live in Lancaster County?	C	C, B, G	4.7.7C 4.7.10C 4.7.12C
G. What factors contribute to natural fluctuations in species populations?	I	G, E, D, C	4.7.12C
H. How do management strategies help to keep species populations viable?	I	K, J, I, G	4.7.10C 4.7.12C
I.			
J.			

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III. Course Assessments

Check types of assessments to be used in the teaching of the course.
(Provide examples of each type.)

- | | |
|---|--|
| <input checked="" type="checkbox"/> Objective Tests/Quizzes
<input checked="" type="checkbox"/> Constructed Responses
<input checked="" type="checkbox"/> Essays
<input type="checkbox"/> Reports
<input checked="" type="checkbox"/> Projects
<input type="checkbox"/> Portfolios
<input checked="" type="checkbox"/> Presentations
<input checked="" type="checkbox"/> Performance tasks

<hr style="width: 100%;"/> | <input type="checkbox"/> Response Journals
<input type="checkbox"/> Logs
<input type="checkbox"/> Computer Simulations
<input checked="" type="checkbox"/> Research Papers
<input type="checkbox"/> Class Participation
<input type="checkbox"/> Notetaking
<input type="checkbox"/> Daily Assignments
<input type="checkbox"/> Writing Samples

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|---|--|

Provide copies of common assessments that will be utilized for all students taking this course. Overall course/grade level standards will be measured by a common course assessment. Unit objectives will be measured on an ongoing basis as needed by the classroom teacher to assess learning and plan for instruction. List common assessments below and recommended date/time frame for administration (at least quarterly).

Name of Common Assessment	When given?
1. Pretest/Post-test (Final)- available upon request	Beginning and End of the Term
2. Energy Presentation Position Project and Paper	Resources Unit
3. Biodiversity mapping	Habitats and Ecosystems
4.	
5.	

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IV. Expected levels of achievement

Current grading scale:

“A ⁺ ” 98% - 100%	“C” 77% - 79%
“A” 95% - 97%	“C ⁻ ” 74% - 76%
“A ⁻ ” 92% - 94%	“D ⁺ ” 71% - 73%
“B ⁺ ” 89% - 91%	“D” 68% - 70%
“B” 86% - 88%	“D ⁻ ” 65% - 67%
“B ⁻ ” 83% - 85%	“F” 64% - 0%
“C ⁺ ” 80% - 82%	

PA Proficiency Levels
Advanced
Proficient
Basic
Below Basic

Attach rubrics, checklists, or other documentation noting how levels of proficiency will be determined for common assessments. The following scoring documents have been developed for this course:

ENERGY RESOURCE POSITION PAPER

In this project you will choose energy resources (see energy resources notes) and write a position paper for or against the use of that resource.

PROCEDURE:

1. Choose an energy resource.
2. Research the following information along with any other information that you feel will be useful in your argument. In other words, you want to learn as much as you can about your chosen resource.
 - a. What is it? (by definition and description)
 - b. Is it renewable or nonrenewable?
 - c. Research its history. (How long have we been using it?, How did we come to discover and use it?)
 - d. What kind(s) of environmental impact does the resource have? (land use...)
 - e. Try to find information about its efficiency (highly efficient – lots of energy derived from relatively small amount or low efficiency – need to use lots to get small amount of energy)
 - f. How do we get it? What allows the resource to be viable?
 - g. What kind(s) of pollution are associated with your resource?
 - h. What are some general, good energy conservation practices?
3. GATHER ALL INFORMATION TO CITE YOUR RESOURCES.

HOW DO YOU WRITE A GOOD POSITION PAPER?

Some tips:

Be knowledgeable! Know what you are talking about and cite credible sources that help support your point of view.

Pick a position that means something to you – the best papers are those in which the author really means what they say.

Beware of misspellings!! They lower your credibility in this type of paper.

PRACTICE, PRACTICE, PRACTICE! Get in front of a mirror. I know this sounds embarrassing, but it will help you a great deal in getting ready for standing in front of an audience and hearing the sound of your own voice. This is a tip that you will get in public speaking classes in college!

1. Be ready to answer questions from your peers.

2. Be prepared to share your viewpoints with the class. (They will be grading you – using the enclosed “Peer Position Paper Criticism” form.
3. At the end – you will turn in your paper and the grade will come using the enclosed “Energy Resource Position Paper” form. An average of the student criticisms (peer averages will count for 30% of the grade, Mrs. Reed will grade the remaining 70%)

4. WHAT MAKES A GOOD CRITICISM?

Not destructive, but constructive.

Gives tips for improvement of presentation

- eye contact, posture, sources

Encourages and raves about excellent points.

- Excellent points are those that make you think in a different way about that resource.

Mature criticisms are those that DO NOT give an unearned perfect grade to friends! You are NOT doing your friends any favors by scoring them higher than they deserve!

Constructive criticisms HELP them to improve and get better at public presentations.

5. You will be given the class criticisms (which have no name on them) after Mrs. Reed gets to read over them and average their scores. Once you get them back, you will be permitted to rewrite or rework problem areas of you paper before you turn in the final product for a grade.
6. Create at least two simple visuals that will help to support your position.

NAME(S) _____

Biodiversity Mapping or what lives around our school?

Habitats:

The Purpose: To inventory and map the various habitats that may exist within your school grounds.

Materials: Tape measure, pencils, rulers and meter sticks, clipboards, paper, field guides

1. Your task is to choose a 15' by 15' section of the property to map and study. Once you decide what area you are going to map out, measure a 15' by 15' square and draw a rough sketch (top down) view of the area. Once that is complete;
2. Brainstorm a list of potential habitats that might exist within your area; for example if part of the pond is in your area then one of your habitat choices will be the pond habitat. Next, if necessary, narrow down your list by developing a classification system of habitat categories or types.
3. Once you have established your basic habitat types, develop habitat type criteria. What features must an area have to be classified into a specific habitat category?
4. Next, conduct a habitat survey. Using your classification system, walk around your area (as much as you can) and list all of the different habitats and their locations (you will need to measure distances here, so your map is accurate). Drawing a rough sketch is advisable at this point (not a top down view, but a side long view).
5. Next, develop symbols/drawings/notations to symbolize the habitats, i.e. tree for forested area (these can be used to make a key for the map you create).
6. Lastly, survey the insect and animal species that exist in your area, noting the habitat that the species is in. Be careful with this step, seeing an actual animal is **NOT** the only way to know that something exists there, be on the lookout for other signs, i.e. scat, feathers, footprints... Make note of the creature, its species, appearance, date, time and circumstance of observation....
7. Before we leave the site for the last time for this activity, take some time to begin the Land-use survey activity below. We will complete this as we go through the process again for another area that we will map and study.

Land-Use Survey

The purpose: To inventory and map the various uses of the land that occurs on school property.

1. Brainstorm the different uses of land that occur on school property. You may need to combine some of the activities under general categories. For example, if one field is used for many different athletic activities, you will need to list all of them but under the general category – athletics.
2. Survey land-uses on your school grounds. Walk around the perimeter, within sight of your teacher, as a class and make a list of all the different land uses and their locations.

3. Next, develop symbols/drawings/notations to symbolize these uses, i.e. drawing of a car for parking, etc (These will be used to make a key for the final mapping project of this activity).

Final Map Activity

Purpose: To examine the diversity of habitats and land-use in the state.

Materials: State map, Student-generated land-use symbols, biodiversity cards, tape, pencils.

1. Examine the Pennsylvania State Road map. Identify, list and describe (what criteria must be met for an area to be designated as this type of habitat?) as many habitats as you can across the state.
2. Are there any parts of the state that are dominated by one type of habitat? Where, name them.
3. Cut out and attach your symbols for land use that you created in step three of the land-use survey activity. These do not have to be exact with certain land uses. For example, a parking area can be placed anywhere on a city or town as ALL cities and towns have some type of parking lot, even if it is at the local grocery store.
4. Select 2 biodiversity cards, research the species you chose –what is their habitat, what do they look like... For each species, draw 5 pictures (rough representations) that look all the same, cut them out, and attach them to the map in the habitat that they are most commonly found in. For some you may not be able to find that habitat 5 times in the state (there are only one or two of these species, so most people will NOT have a hard time with this).

RUBRICS FOR SCORING THIS ACTIVITY FOLLOW:

You will complete one of each of the *habitats* and *land-use* maps and data gathering at both sites of study (the farm and an area around the school) so each will count twice. For example you will get 50 points for each of the two habitats maps you create, provided that you follow instructions and complete ALL required parts, for a total of 100 points.

Scoring Rubrics for Biodiversity Mapping Activity

Habitats:

Rough sketch (top down) or your study area _____/5

Brainstormed list/and final list of habitats _____/5

Habitat type Criteria _____/10

Side long map rough sketch _____/5

Symbols created and attached to final map _____/10

Species survey complete, attached and labeled on map _____/15

Land –use:

Brainstorm list of land-uses on school property _____/5

List of land-use from walking observation _____/5

Symbols created and posted on Final Map project _____10

Final Map Project:

List and description of state habitats (at least 5 are required) _____/15

Answer to step two _____/10

Required land-use symbols attached (see land-use rubric above)

Biodiversity cards researched, symbols created and attached to state map ____/25