Boy Scouts of America
Merit Badge Series

ENVIRONMENTAL SCIENCE

October 2012

Name: _____

WISSAHICKON WATERSHED valley ASSOCIATION

Scout Booklet Insert

Worm Experiment

Materials:

1. _____
2. _____
3. _____
4. _____

What nonliving environmental factor did we adjust? _____

How did this impact the worms' behavior? _____

_____

How much time did they spend in the lighted part of the box? _____

_____

How much time did they spend in the shaded part of the box? _____

_____

An organism's response to light is called **phototropism.**

Organisms that move toward light are positively phototropic; organisms that move away from light are negatively phototropic.

What type of organism are our worms? _____

Why do earthworms react this way? (group discussion)

Pollution Prevention, Resource Recovery, and Conservation

Look around your home and determine 10 ways your family can help reduce pollution.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Endangered and Threatened Species

Select a species that was endangered or threatened and has recovered.

Your selected species? _____

What caused the decline in the species population?

1. _____
2. _____
3. _____

When did people first recognize that the species population was in trouble?

_____

When was the species officially declared an Endangered or Threatened Species?

_____

What happened that protected the species you selected? _____

_____

_____

_____

_____

What is the new status of your selected species? _____

_____

Oil Spill Experiment

Materials:

1. 4 aluminum pie pans
2. measuring cup
3. 4 cups of tap water
4. tablespoon measure
5. 4 tablespoons vegetable oil
6. string
7. plastic spoon
8. straw
9. paper towel- sheet
10. newspaper strips
11. cotton balls
12. fabric scraps
13. liquid dishwashing detergent

Procedure:

Step 1 -Label pie pans A, B, C, D

Step 2-Pour 1 cup of tap water into each pie pan

Step 3-Add 1 tablespoon of vegetable oil to the water in each pan

Step 4-

Pan A- use plastic spoon to stir the oil- carefully use a straw to blow the oil to one part of the pan

Pan B- use plastic spoon to stir the oil- use a piece of string to collect the oil

Pan C- use plastic spoon to stir the oil- use a paper towel to absorb the oil, then use strips of newspaper, cotton balls, fabric scraps to absorb the oil

Pan D- use plastic spoon to stir the oil- add 1 teaspoon of dish detergent to the water in the pan

Observations:

1. What happened in Pan A when you used a straw to blow the water and oil? What sea condition does this represent?

---

2. How well did the string work to contain the oil in Pan B?

_____

_____

_____

3. Which material best absorbed the oil in Pan C?

_____

_____

_____

4. What happened when you added the dish detergent to Pan D? Why?

_____

_____

_____

Conclusion

Which treatment worked best to clean up your oil spill? _____

_____

Would this be practical at sea? _____

How might water birds, fish and other organisms be impacted by the cleanup methods we tested?

_____

_____

_____

Soil Erosion Experiment

Follow our soil erosion demonstration to learn how soil erosion happens and what we can do to help prevent this type of erosion.

Materials:

1. a few books
2. two shallow pans
3. a deeper pan
4. soil
5. soil with grass growing on it
6. water in a container

Procedure:

1. Prop up the end of the shallow pan on the books.
2. Put the other end of the shallow pan inside the deeper pan.
3. Fill the shallow pan with soil up to the rim.
4. Carefully pour the water from the top end of the pan, and let it flow down.
5. Remove the shallow pan.
6. Look carefully in the deeper pan and record your observations below.

Observations: _____

_____

7. Take the empty shallow pan.
8. Place the soil with plants in it and put it where the other shallow pan was.
9. Carefully pour the water from the top end of the pan, and let it flow down.
10. Remove the shallow pan.
11. Look carefully in the deeper pan and record your observations below.

Observations: _____

_____

What can you do at home to help prevent soil erosion?

Sketch one way to prevent soil erosion.

Ecosystem Study

Site selections:

1. Wissahickon Creek and Stream Bank

2. Woodland

General Observations

	Weather	Season	Soil type	Dominant Species- plants & animals
Wissahickon Creek				
Woodland				

Step 1

Using bright colored tape, define your ecosystem area.

Step 2

Identify the nonliving factors around your plot. Use this table.

	Date	Time	Temperature	Sun or Clouds	Windy or Calm	Flat or Sloped
Wissahickon Creek						
Woodland						

Sketch your plots.

Step 3

Identify the living factors in your plot. Use these tables.

	Nonplant Species	Plant Species	Insects	Mammals	Macro-invertebrates
Wissahickon Creek					

	Nonplant Species	Plant Species	Insects	Small Mammals	Large Mammals
Woodland					

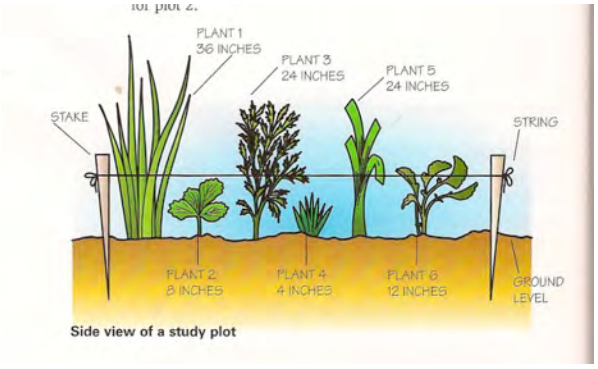
Step 4

Estimate how much space each plant species occupies. (For example, spicebush may occupy 50% of your woodland plot.) Use this table.

	Plant Species	% of Plot	Height (inches)
Wissahickon Creek			
Woodland			

Step 5

Draw a side view of the plants to see their relative size. Use this example as a guide.



Side view of a study plot

My Woodland Side View

Conclusion

How many nonplant species are in each plot?

Creek - _____

Woodland- _____

How many plant species are in each plot?

Creek- _____

Woodland- _____

What could account for the differences between the number of plant and nonplant species in each plot? Why are there fewer plants in the creek ecosystem?

_____

_____

_____

Which plot had more biodiversity? Support your answer.

_____

_____

_____

_____

Environmental Impact Projects

Step 1 - Choose one of the following:

1. Two story apartment building to be built along the Wissahickon Creek south of Butler Pike but north of the Rotary Bridge on the west side of the creek. Automobile access will be from Butler Pike.

2. Construction of a Bird Blind and Nature Center between the two bridges that cross the Wissahickon Creek at the WVWA building. Access will be from the WVWA parking lot.

3. Construction of a soccer field on the area just below the WVWA building along the west side of Wissahickon Creek. The existing property will be demolished. Access will be from Morris Road.

Identify your selected project:_____

_____

_____

Step 2 - Examine your site for the following:

a. What type of plants and animal life are on the site?

_____

_____

_____

_____

_____

b. What type of ecosystem is there? (forest, grassland, desert, etc.)

_____

c. Has the site been disturbed before? _____

d. Is it a habitat for an endangered or threatened species?

_____

e. Does it slope? Would the soil be in danger of erosion during construction?

_____

_____

f. Are there streams or wetlands at the site? _____

g. Is there a reason to believe important fossils or artifacts are on the site?

_____

h. Are there activities on lands next to the site? _____

Step 3

How does the project fit into existing plans for the area? Will your building provide additional low-income housing? Will the Nature Center be used for educational purposes? Will the soccer fields provide space for youth to exercise outdoors?

_____

_____

_____

_____

_____

_____

Step 4

How will the project affect the environment?

a. Will the project cause erosion?

_____

b. Will it disturb forests or other ecosystems?

_____

c. Will it disturb habitats of endangered or threatened species?

_____

d. Other environmental impacts?

_____

_____

_____

Step 5

Identify any effects of the project that will probably be harmful but cannot be avoided.

_____

_____

_____

_____

_____

_____

_____

Step 6

Suggest alternatives to the project that would protect the environment, yet still meet the needs of the people. (Alternatives may include different project designs at the same site or the same project at a different site.)

_____

_____

_____

_____

_____

_____

_____

Step 7

Discuss the trade-offs between short-term and long-term environmental losses and short-term and long-term environmental benefits of the proposed project.

_____

_____

_____

_____

Step 8

How would the project permanently prevent other uses on the site? (For example, land that is paved over cannot be used for community gardens.)

_____

_____

_____

_____

Conclusion

Based on your review of the proposed project, what information would need to be included in an environmental impact statement?

_____

_____

_____

Do you think the project should go ahead as designed or be stopped? Why or why not?

Suggest alternative designs or projects that you would support.