



# ENVIRONMENTAL SCIENCE

## Merit Badge Requirements

1) Make a timeline of the history of environmental science in America. Identify the contribution made by the Boy Scouts of America to environmental science. Include dates, names of people or organizations, and important events.

2) Define the following terms and describe the relationships among them: population, community, ecosystem, biosphere, symbiosis, niche, habitat, conservation, threatened species, endangered species, extinction.

3) Do ONE activity in EACH of the following categories (using the activities in this pamphlet as the bases for planning and carrying out your projects):

**A) Ecology**

- 1) Conduct an experiment to find out how living things respond to changes in their environments. Discuss your observations with your counselor.
- 2) Conduct an experiment illustrating the greenhouse effect. Keep a journal of your data and observations. Discuss your conclusions with your counselor.

**B) Air Pollution**

- 1) Perform an experiment to test for particulates that contribute to air pollution. Discuss your findings with your counselor.
- 2) Conduct a study to test the effects of acid rain on plants. Discuss your findings with your counselor.

**C) Water Pollution**

- 1) Conduct an experiment to show how living things react to thermal pollution. Discuss your observations with your counselor.
- 2) Conduct an experiment to identify the methods that could be used to mediate (reduce) the effects of an oil spill on waterfowl. Discuss your results with your counselor.

**D) Land Pollution**

- 1) Conduct an experiment to illustrate soil erosion by water. Take photographs or make a drawing of the soil before and after your experiment, and make a poster showing your results. Present your poster to your patrol or troop.
- 2) Perform an experiment to determine the effect of an oil spill on land. Share your journal and discuss your conclusions with your counselor.

**E) Endangered Species**

- 1) Do research on one endangered species found in your state. Find out what its natural habitat is, why it is endangered, what is being done to preserve it, and how many individual organisms are left in the wild. Prepare a 100-word report about the organism, including a drawing. Present your report to your patrol or troop.
- 2) Do research on one species that was endangered or threatened but which has now recovered. Find out how the organism recovered, and what its new status is. Write a 100-word report on the species and discuss it with your counselor.

**F) Resource Recovery**

- 1) Perform an experiment on packaging materials to find out which ones are biodegradable. Discuss your conclusions with your counselor.
- 2) Find out if your local community has a recycling program in effect. If it does, find out what items are recycled, and who pays for recycling. If your community does not have a recycling program, write questions for and conduct a survey on recycling. Include questions about attitudes toward recycling, what should be recycled, and your community's willingness to support a recycling program. Discuss your findings with your counselor.

4) Build an ecosystem in a bottle. Include soil, plants, fungi, and small animals found in your local environment. Maintain the ecosystem for at least seven days after completing construction of the ecosystem. Observe it daily, and keep a record of your observations. Discuss your observations with your counselor.

5) Choose an outdoor area to study. In your study area, do ONE of the following:

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

**A)** Mark off three study plots of four square yards each, and count the number of species found there. Then estimate how much space is occupied by each species found in the plots. Make a chart, graph, or table to compare the plots. Write a report that adequately discusses the biodiversity and population density of your study area. Discuss your report with your counselor.

**B)** Make four visits to the study area, staying for at least 30 minutes each time, to observe the living and nonliving parts of the ecosystem. Keep a journal of your observations, including a discussion of differences noted during the four visits. Write a report on your observations and discuss it with your counselor.

**6)** Propose a hypothetical construction project in your community and prepare a limited environmental impact statement for the project. Study the area to see what the impact of the project might be upon the living and nonliving parts of the ecosystem

**7)** Develop a project that would help solve an environmental problem, reduce an environmental impact, or affect environmental awareness in your community. Include plans for a specific project that could be done by your patrol or troop.

**8)** Discuss three possible careers in the field of environmental science. Identify the education that you would need to pursue ONE of these careers.

*Worksheet Created by: Rob Greenland – robgreenland@juno.com*

## **Requirement 1**

Use this area to make a timeline of the history of environmental science in America.

Requirements Last Revised: 4/1/99

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Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

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Identify the contribution made by the Boy Scouts of America to environmental science. Include dates, names of people or organizations, and important events: \_\_\_\_\_

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## Requirement 2

Describe the following terms and describe the relationships among them:

Population: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Community: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Ecosystem: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Biosphere: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Symbiosis: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Niche: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Habitat: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Conservation: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Threatened Species: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Endangered Species: \_\_\_\_\_  
Relationships: \_\_\_\_\_

Extinction: \_\_\_\_\_  
Relationships: \_\_\_\_\_

## Requirement 3

You have been given six categories. For each category there are two options. Select and complete ONE option form EACH category.

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

Use the activities in the Environmental Science merit badge pamphlet as the bases for planning and carrying out your projects. Briefly describe below each of the activities you did. Keep all your paperwork, notes and activity materials that you used for your experiments and studies and show them to your counselor.

**Ecology**

If you selected **Option 1**:

Conduct an experiment to find out how living things respond to changes in their environments. After conducting your experiment use this area to briefly describe your experiment and the results: \_\_\_\_\_

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If you selected **Option 2**:

Conduct an experiment illustrating the greenhouse effect. After conducting your experiment use this area to briefly describe your experiment and the results. \_\_\_\_\_

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**Air Pollution**

If you selected **Option 1**:

Perform an experiment to test for particulates that contribute to air pollution. After conducting your experiment use this area to briefly describe your experiment and the results: \_\_\_\_\_

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If you selected **Option 2**:

Conduct a study to test the effects of acid rain on plants. After conducting your study use this area to briefly describe your study: \_\_\_\_\_

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**Water Pollution**

If you selected **Option 1**:

Conduct an experiment to show how living things react to thermal pollution. After conducting your experiment use this area to briefly describe the experiment and the results: \_\_\_\_\_

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

If you selected **Option 2**:

Conduct an experiment to identify the methods that could be used to reduce the effects of an oil spill on waterfowl. After conducting your experiment use this area to briefly describe your experiment and the results: \_\_\_\_\_

**Land Pollution**

If you selected **Option 1**:

Conduct an experiment to illustrate soil erosion by water. After you have conducted the experiment use this area to briefly describe your experiment and the results. \_\_\_\_\_

Take photographs or make a drawing of the soil before and after your experiment, and make a poster showing your results. Give a brief summary of the before and after photos or drawings: \_\_\_\_\_

\_\_ Show your poster to your counselor and your patrol or troop.

If you selected **Option 2**:

Perform an experiment determining the effect of an oil spill on land. Keep a journal of your experiment. Give a brief summary of the experiment and the results: \_\_\_\_\_

\_\_ Show your journal to your counselor.

**Endangered Species**

If you selected **Option 1**:

Do research on one endangered species found in your state.

What endangered species did you select? \_\_\_\_\_

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

What is its natural habitat? \_\_\_\_\_  
\_\_\_\_\_

Why is it endangered? \_\_\_\_\_  
\_\_\_\_\_

What is being done to preserve it? \_\_\_\_\_  
\_\_\_\_\_

How many of these organisms are left in the wild? \_\_\_\_\_  
\_\_\_\_\_

\_\_ On a separate piece of paper, prepare a 100-word report about the organism, including a drawing or photo. Attach your report and picture to this worksheet.

\_\_ Present your report to your patrol or troop.

If you selected **Option 2**:

Do research on one species that was endangered or threatened but which has now recovered.

What organism did you select for this option that is no longer an endangered species? \_\_\_\_\_

How did this organism recover from being endangered? \_\_\_\_\_  
\_\_\_\_\_

What is the new status of this organism? \_\_\_\_\_  
\_\_\_\_\_

\_\_ On a separate piece of paper, prepare a 100-word report about the organism, including a drawing or photo. Attach your report and picture to this worksheet.

\_\_ Present your report to your patrol or troop.

**Resource Recovery:**

If you selected **Option 1**:

Perform an experiment on packaging materials to find out which ones are biodegradable. After performing your experiment use this area to briefly describe your experiment and the results: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you selected **Option 2**:

Find out if your local community has a recycling program in effect.

If yes there is a recycling program in your area, what items are recycled? \_\_\_\_\_  
\_\_\_\_\_

Who pays for the recycling? \_\_\_\_\_

If your community does not have a recycling program then write the questions for and conduct a survey on recycling. Include question about attitudes toward recycling, what should be recycled, and your community's willingness to support a recycling program.

Use this area to list some of the questions you used for your survey:

- Question: \_\_\_\_\_
- Question: \_\_\_\_\_
- Question: \_\_\_\_\_
- Question: \_\_\_\_\_
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- Question: \_\_\_\_\_
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Give the results of your survey: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Requirement 4**

Build an ecosystem in a bottle. Include soil, plants, fungi, and small animals found in your local environment. Give a brief description of your ecosystem, the items included, and how you built it: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

After maintaining and keeping a record of your ecosystem for 7 days, list a few of the things you noticed about your ecosystem. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_ Show your ecosystem to your counselor.

### Requirement 5

For this requirement you are required to select an outdoor area to study.

Once you have selected the area that you will study you have two options to choose from for this requirement. Select and complete one of them.

If you selected *Option A*:

Mark off three study plots of four square yards each, and count the number of species found there.

# of Species on Plot 1: \_\_\_\_\_ # of Species on Plot 2: \_\_\_\_\_ # of Species on Plot 3: \_\_\_\_\_

List each species below and list your estimation of how much space is occupied by each species found in the plots:

Species: _____	Space Used: _____	Species: _____	Space Used: _____
Species: _____	Space Used: _____	Species: _____	Space Used: _____
Species: _____	Space Used: _____	Species: _____	Space Used: _____
Species: _____	Space Used: _____	Species: _____	Space Used: _____

Species: _____	Space Used: _____	Species: _____	Space Used: _____
Species: _____	Space Used: _____	Species: _____	Space Used: _____
Species: _____	Space Used: _____	Species: _____	Space Used: _____
Species: _____	Space Used: _____	Species: _____	Space Used: _____

Use this area to draw a graph, chart, or table to compare the plots:

Use the remainder of this page to write a report that adequately discusses the biodiversity and population density of your study area.



Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

3<sup>rd</sup> Visit: \_\_\_\_\_

4<sup>th</sup> Visit: \_\_\_\_\_

Once you have completed your visits, combine you notes and write a report on all your observations. Use this area or separate sheets of your own for your report. Once your report is finished show it to your counselor.





Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

**Requirement 8**

List three possible careers in the field of environmental science. Give a brief description of each.

Career: \_\_\_\_\_ Description: \_\_\_\_\_

Career: \_\_\_\_\_ Description: \_\_\_\_\_

Career: \_\_\_\_\_ Description: \_\_\_\_\_

Select one of the careers you listed above and identify the education that you would need to pursue this career. Also, list any other tasks that would help you in this career. \_\_\_\_\_

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\_\_\_\_\_  
\_\_\_\_\_