



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:**
- 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.**

Requirement 1

Use this area to make a timeline of the history of environmental science in America. On your timeline, include dates, names of people or organizations, and important events.

Identify the contribution made by the Boy Scouts of America to environmental science: _____

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

Do ONE activity in EACH of the following categories. 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. Both activity options are listed for each category but you only need to do one in each category.

Ecology:

1) After conducting your experiment to find out how living things respond to changes in their environments, use this area to briefly describe your experiment. _____

_____ Discuss your observations with your counselor.

2) After conducting your experiment illustrating the greenhouse effect, use this area to briefly describe your experiment. _____

_____ Discuss your observations with your counselor.

Air Pollution

1) After conducting your experiment to test for particulates that contribute to air pollution, use this area to briefly describe your experiment. _____

_____ Discuss your findings with your counselor.

2) After conducting your study to test the effects of acid rain on plants, use this area to briefly describe your study. _____

_____ Discuss your findings with your counselor.

Water Pollution

1) After conducting an experiment to show how living things react to thermal pollution, use this area to briefly describe your experiment. _____

_____ Discuss your observations with your counselor.

2) After conducting an experiment to identify the methods that could be used to reduce the effects of an oil spill on waterfowl, use this area to briefly describe your experiment. _____

_____ Discuss your observations with your counselor.

Land Pollution

1) After conducting your experiment to illustrate soil erosion by water, use this area to briefly describe your experiment. _____

_____ Show your patrol or troop the photographs or drawings that you made of the soil before and after your experiment.

_____ Create a poster of your results and present it to your patrol or troop.

2) After conducting your experiment determining the effect of an oil spill on land, use this area to briefly describe your experiment.

_____ Show your counselor your journal and discuss your observations with your counselor.

Endangered Species

1) What endangered species did you select to research? _____
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? _____

_____ Prepare a 100 word report about the organism and include a drawing or photo of it. Present your report to your patrol or troop.

2) What is the organism that you selected 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? _____

_____ Prepare a 100 word report on the species and discuss it with your counselor.

Resource Recovery

1) After performing an experiment on packaging materials and finding out which are biodegradable, use this area to briefly describe your experiment. _____

_____ Discuss your conclusions with your counselor.

2) Is there a recycling program in your community?

_____ If yes, what items are recycled? _____

Who pays for the recycling? _____

If your community does not have a recycling program then write the questions and conduct the survey as instructed in the merit badge pamphlet. After conducting your survey that included questions about attitudes towards recycling, what should be recycled and the community's willingness to support a recycling program, use this area to briefly describe your survey and the area you surveyed. _____

_____ Attach a copy of your survey and discuss your observations with your counselor.

Requirement 4

Use this area to tell how you built your ecosystem in a bottle. _____

List what types of plants, fungi and small animals you used. _____

Tell why you chose these particular items to put into your ecosystem. _____

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 and discuss your observations.

Requirement 5

For this requirement you are required to select an outdoor area to study. Do either option A or B and record your results below.

Option A

After you marked off three study plots of four square yards each, how many species did you find in each one?

Plot 1: _____ Plot 2: _____ Plot 3: _____

List each species below and list your estimation of how much space is occupied by each.

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

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

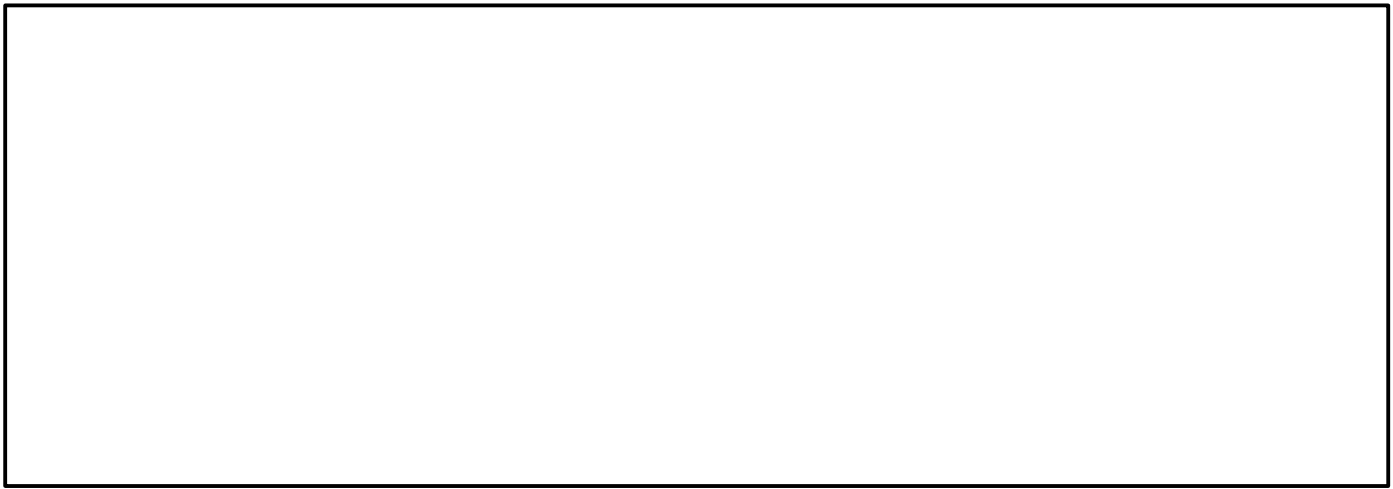
_____ Species: _____ Space Used: _____ Species: _____ Space Used: _____

_____ 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 or chart comparing the plots:



_____ After writing your report that adequately discussed the biodiversity and population density of your study area, attach a copy of it with this worksheet and discuss your project with your counselor.

Option B

Use this area to take notes during each of your four visits (30 minutes each time) to your study area. In your notes you will want to include such items as the time of day, weather conditions, temperature, any activity you see, and any differences to the study area since your last visit. Compile your notes into a journal.

1st Visit: _____

2nd Visit: _____

3rd Visit: _____

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.
