



Environmental Science

Merit Badge Workbook

This workbook can help you but you still need to read the merit badge pamphlet.

The work space provided for each requirement should be used by the Scout to make notes for discussing the item with his counselor, not for providing the full and complete answers. Each Scout must do each requirement.

No one may add or subtract from the official requirements found in **Boy Scout Requirements** (Pub. 33216 – SKU 34765).

The requirements were last issued or revised in 2006 • This workbook was updated in January 2013.

Scout's Name: _____

Unit: _____

Counselor's Name: _____

Counselor's Phone No.: _____

<http://www.USScouts.Org> • <http://www.MeritBadge.Org>

Please submit errors, omissions, comments or suggestions about this **workbook** to: Workbooks@USScouts.Org
Comments or suggestions for changes to the **requirements** for the **merit badge** should be sent to: Merit.Badge@Scouting.Org

1. Make a timeline of the history of environmental science in America.

1500s	1600s	1700s	1800s	1900s	2000s

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

Date	People/Organization	Event
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_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

2. Define the following terms: population, community, ecosystem, biosphere, symbiosis, niche, habitat, conservation, threatened species, endangered species, extinction, pollution prevention, brownfield, ozone, watershed, airshed, nonpoint source, hybrid vehicle, fuel cell.

Population: _____

Community: _____

Ecosystem: _____

Biosphere: _____

Symbiosis: _____

Niche: _____

Habitat: _____

Conservation: _____

Threatened species: _____

Endangered species: _____

Extinction _____

Pollution prevention: _____

Brownfield: _____

Ozone: _____

Watershed: _____

Airshed: _____

Nonpoint source: _____

Hybrid vehicle: _____

Fuel cell: _____

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 and 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.
- ☐ 3. Discuss what is an ecosystem. Tell how it is maintained in nature and how it survives.

b. Air Pollution

- ☐ 1. Perform an experiment to test for particulates that contribute to air pollution. Discuss your findings with your counselor.
- ☐ 2. Record the trips taken, mileage, and fuel consumption of a family car for seven days, and calculate how many miles per gallon the car gets. Determine whether any trips could have been combined ("chained") rather than taken out and back. Using the idea of trip chaining, determine how many miles and gallons of gas could have been saved in those seven days.
- ☐ 3. Explain what is acid rain. In your explanation, tell how it affects plants and the environment and the steps society can take to help reduce its effects.

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.
- ☐ 3. Describe the impact of a waterborne pollutant on an aquatic community. Write a 100-word report on how that pollutant affected aquatic life, what the effect was, and whether the effect is linked to biomagnification.

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. (Per National, "troop" means "unit".)
- ☐ 2. Perform an experiment to determine the effect of an oil spill on land. Discuss your conclusions with your counselor.
- ☐ 3. Photograph an area affected by erosion. Share your photographs with your counselor and discuss why the area has eroded and what might be done to help alleviate the erosion.

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.
- ☐ 3. With your parent's and counselor's approval, work with a natural resource professional to identify two projects that have been approved to improve the habitat for a threatened or endangered species in your area. Visit the site of one of these projects and report on what you saw.

f. Pollution Prevention, Resource Recovery, and Conservation

- ☐ 1. Look around your home and determine 10 ways your family can help reduce pollution. Practice at least two of these methods for seven days and discuss with your counselor what you have learned.
- ☐ 2. Determine 10 ways to conserve resources or use resources more efficiently in your home, at school, or at camp. Practice at least two of these methods for seven days and discuss with your counselor what you have learned.
- ☐ 3. Perform an experiment on packaging materials to find out which ones are biodegradable. Discuss your conclusions with your counselor.

4. Choose two outdoor study areas that are very different from one another (e.g., hilltop vs. bottom of a hill; field vs. forest; swamp vs. dry land). For BOTH study areas, do ONE of the following:
- a. Mark off a plot of 4 square yards in each study area, and count the number of species found there. Estimate how much space is occupied by each plant species and the type and number of non-plant species you find.

Study Plot Location 1: _____ Number of Species: _____

Plant Species	Space each occupies
Non-Plant Species	Number found

Study Plot Location 2: _____ Number of Species: _____

Plant Species	Space each occupies
Non-Plant Species	Number found

- b. Make at least three visits to each of the two study areas (for a total of six visits), staying for at least 20 minutes each time, to observe the living and nonliving parts of the ecosystem. Space each visit far enough apart that there are readily apparent differences in the observations. Keep a journal that includes the differences you observe. Then, write a short report that adequately addresses your observations, including how the differences of the study areas might relate to the differences noted, and discuss this with your counselor.

Study Area 1:**Visit 1 Date:** _____ **Time Started:** _____ **Time Ended** _____Observations of living parts: _____

_____Observations of nonliving parts: _____

_____Differences noted: _____

_____**Visit 2 Date:** _____ **Time Started:** _____ **Time Ended** _____Observations of living parts: _____

_____Observations of nonliving parts: _____

_____Differences noted: _____

_____**Visit 3 Date:** _____ **Time Started:** _____ **Time Ended** _____Observations of living parts: _____

_____Observations of nonliving parts: _____

_____Differences noted: _____

Study Area 2:**Visit 1 Date:** _____ **Time Started:** _____ **Time Ended** _____

Observations of living parts: _____

Observations of nonliving parts: _____

Differences noted: _____

_____**Visit 2 Date:** _____ **Time Started:** _____ **Time Ended** _____

Observations of living parts: _____

Observations of nonliving parts: _____

Differences noted: _____

_____**Visit 3 Date:** _____ **Time Started:** _____ **Time Ended** _____

Observations of living parts: _____

Observations of nonliving parts: _____

Differences noted: _____

Then, write a short report that adequately addresses your observations, including how the differences of the study areas might relate to the differences noted, and discuss this with your counselor. _____

5. Using the construction project provided or a plan you create on your own, identify the items that would need to be included in an environmental impact statement for the project planned. _____

6. Find out about three career opportunities in environmental science.

Pick one and find out the education, training, and experience required for this profession. _____

Discuss this with your counselor, and explain why this profession might interest you. _____

Requirement resources can be found here:

http://www.meritbadge.org/wiki/index.php/Environmental_Science#Requirement_resources

Important excerpts from the 'Guide To Advancement', No. 33088:

Effective January 1, 2012, the *'Guide to Advancement'* (which replaced the publication *'Advancement Committee Policies and Procedures'*) is now the *official* Boy Scouts of America source on advancement policies and procedures.

- **[Inside front cover, and 5.0.1.4] — Unauthorized Changes to Advancement Program**
No council, committee, district, unit, or individual has the authority to add to, or subtract from, advancement requirements.
(There are limited exceptions relating only to youth members with disabilities. For details see section 10, "Advancement for Members With Special Needs".)
- **[Inside front cover, and 7.0.1.1] — The 'Guide to Safe Scouting' Applies**
Policies and procedures outlined in the *'Guide to Safe Scouting'*, No. 34416, apply to all BSA activities, including those related to advancement and Eagle Scout service projects. [Note: Always reference the online version, which is updated quarterly.]
- **[7.0.3.1] — The Buddy System and Certifying Completion**
Youth members must not meet one-on-one with adults. Sessions with counselors must take place where others can view the interaction, or the Scout must have a buddy: a friend, parent, guardian, brother, sister, or other relative—or better yet, another Scout working on the same badge—along with him attending the session. When the Scout meets with the counselor, he should bring any required projects. If these cannot be transported, he should present evidence, such as photographs or adult certification. His unit leader, for example, might state that a satisfactory bridge or tower has been built for the Pioneering merit badge, or that meals were prepared for Cooking. If there are questions that requirements were met, a counselor may confirm with adults involved. Once satisfied, the counselor signs the blue card using the date upon which the Scout completed the requirements, or in the case of partials, initials the individual requirements passed.
- **[7.0.3.2] — Group Instruction**
It is acceptable—and sometimes desirable—for merit badges to be taught in group settings. This often occurs at camp and merit badge midways or similar events. Interactive group discussions can support learning. The method can also be attractive to "guest experts" assisting registered and approved counselors. Slide shows, skits, demonstrations, panels, and various other techniques can also be employed, but as any teacher can attest, not everyone will learn all the material.

There must be attention to each individual's projects and his fulfillment of *all* requirements. We must know that every Scout—actually and *personally*—completed them. If, for example, a requirement uses words like "show," "demonstrate," or "discuss," then every Scout must do that. It is unacceptable to award badges on the basis of sitting in classrooms *watching* demonstrations, or remaining silent during discussions. Because of the importance of individual attention in the merit badge plan, group instruction should be limited to those scenarios where the benefits are compelling.
- **[7.0.3.3] — Partial Completions**
Scouts need not pass all requirements with one counselor. The Application for Merit Badge has a place to record what has been finished—a "partial." In the center section on the reverse of the blue card, the counselor initials for each requirement passed. In the case of a partial completion, he or she does not retain the counselor's portion of the card. A subsequent counselor may choose not to accept partial work, but this should be rare. A Scout, if he believes he is being treated unfairly, may work with his Scoutmaster to find another counselor. An example for the use of a signed partial would be to take it to camp as proof of prerequisites. Partials have no expiration except the 18th birthday.