



Environmental Science Merit Badge Workbook

SCOUTMASTER BUCKY

Scouts participating in a Scoutmaster Bucky merit badge opportunity, whether online or in person, should consider using the Environmental Science merit badge pamphlet for discovery and knowledge, along with the class preparation pages for clarifications, insights, and expectations.

<https://scoutmasterbucky.com/merit-badges/environmental-science/environmental-science-pamphlet.pdf>

<https://scoutmasterbucky.com/merit-badges/environmental-science/environmental-science-cpp.pdf>

REQUIREMENTS 2a, 5a, and 6c REQUIRE COUNSELOR APPROVAL.

REQUIREMENT 6c REQUIRES PARENT / GUARDIAN APPROVAL.

REQUIREMENT 1: Describe the meaning of environmental science in your own words.

Notes:

REQUIREMENT 1: Explain how you think we can use science to understand, conserve, and improve our environment.

Notes:



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REQUIREMENT 2a: Choose an area approved by your counselor and observe (sight, sound, and smell) its ecosystem over a two-day period. Discuss what you learned with your counselor.

Area / Location:

COUNSELOR APPROVAL: IS REQUIRED.

Counselor's Name

Phone or Email

Counselor's Signature

Date

☐

approved

DAY 1:

Sight:

Sound:

Smell:



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DAY 2:

Sight:

Sound:

Smell:

SUMMARY OF THE ECOSYSTEM

Notes:



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REQUIREMENT 2b: Make notes about the living, nonliving (e.g., rocks) and formerly living components. Include information about interactions among the components.

Living Components:

Nonliving Components:

Formerly Living Components:



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REQUIREMENT 2b: Make notes about food chain, predators, native species, and invasive species) and identify how human activities have affected the ecosystem. Discuss what you learned with your counselor.

Food Chain:

Predators:

Native Species:

Invasive Species:



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DO ONE OF THE FOLLOWING (3A, 3B, or 3C) FOR REQUIREMENT 3

REQUIREMENT 3a: Learn what Particulate Matter (PM) is.

Notes:

REQUIREMENT 3a: Learn how Particulate Matter (PM) gets into the air.

Notes:

REQUIREMENT 3a: Learn what the harmful effects of Particulate Matter (PM) are.

Notes:

REQUIREMENT 3a: Learn what is being done to reduce Particulate Matter (PM) in the air.

Notes:



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REQUIREMENT 3a: Perform an experiment to test for particulates that contribute to air pollution. Discuss what you learned with your counselor.

Experiment Description:

State the Problem:

Gather Information:

Form a Hypothesis:



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Do an Experiment (explain):

Analyze the Data:

Conclusion:

Notes:



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REQUIREMENT 3b: Discuss how air pollution and transportation affect each other by giving at least three examples.

Example #1:

Example #2:

Example #3:

REQUIREMENT 3b: Compare two modes of transportation (e.g., gasoline-powered v. electric vehicles, gasoline-powered car v. bicycle, etc.) . Discuss what you learned with your counselor.

Mode #1:



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Mode #2:

REQUIREMENT 3c: Learn about the Clean Air Act. Make notes on when it was passed, its environmental goals, what progress has been made and what remains to be done to achieve the law's goals.

Notes:



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REQUIREMENT 3c: Describe the impact, benefits, and costs of the law (the Clean Air Act).

Impact:

Benefits:

Costs:

REQUIREMENT 3c: Describe what is required to implement and enforce the law (the Clean Air Act).

Notes:



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DO ONE OF THE FOLLOWING (4A, 4B, or 4C) FOR REQUIREMENT 4

REQUIREMENT 4a: Identify where your community sources water, how it is treated, and disposed.

My Community:

Where my community sources its water:

How my community's water is treated:

How my community's water is disposed:

REQUIREMENT 4a: Obtain and review a water quality report from your area. Discuss what you learned with your counselor.

Notes:



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REQUIREMENT 4b: Identify a local or regional area that experiences periodic flooding and/or drought.

Identified Local Area:

REQUIREMENT 4b: Collect facts on prior event(s) and investigate the environmental impacts of these extreme events. Discuss what you learned with your counselor.

Notes:



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REQUIREMENT 4c: Learn about the Clean Water Act. Make notes on when it was passed, its environmental goals, what progress has been made and what remains to be done to achieve the law's goals.

Notes:

REQUIREMENT 4c: Describe the impact, benefits, and costs of the law (the Clean Water Act).

Impact:



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Benefits:

Costs:

REQUIREMENT 4c: Describe what is required to implement and enforce the law (the Clean Water Act).

Notes:



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DO ONE OF THE FOLLOWING (5A, 5B, or 5C) FOR REQUIREMENT 5

REQUIREMENT 5a: In an area (yard, park, golf course, farm, etc.) approved by your counselor...

Selected Area:

COUNSELOR APPROVAL: IS REQUIRED.

Counselor's Name

Phone or Email

Counselor's Signature

Date

☐

approved

REQUIREMENT 5a: Make a list of the pesticides, herbicides, and fertilizers used and how often they are applied. Identify the benefits of their use and the environmental impact, including effects on non-target species (including humans), what happens if the chemicals infiltrate into the groundwater, and what happens to any runoff of the chemicals. Discuss what you learned with your counselor.

PESTICIDES:

Pesticides used and how often they are applied:

Benefits:



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Environmental Impact:

Effects on Non-Target Species (including Humans):

What happens if the chemicals infiltrate into the groundwater:

What happens to any runoff of the chemicals:



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HERBICIDES:

Herbicides used and how often they are applied:

Benefits:

Environmental Impact:

Effects on Non-Target Species (including Humans):

What happens if the chemicals infiltrate into the groundwater:

What happens to any runoff of the chemicals:



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FERTILIZERS:

Fertilizers used and how often they are applied:

Benefits:

Environmental Impact:

Effects on Non-Target Species (including Humans):

What happens if the chemicals infiltrate into the groundwater:

What happens to any runoff of the chemicals:



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REQUIREMENT 5b: Learn about the erosion process and identify an example of where erosion occurs.

Notes:

Example of where erosion occurs:

REQUIREMENT 5b: Determine where the eroded material ends up.

Notes:

REQUIREMENT 5b: Determine how erosion can be minimized.

Notes:



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REQUIREMENT 5c: Learn about a land pollution incident that led to a site being listed on Environmental Protection Agency's Superfund National Priority List.

Incident Site Name and Location:

REQUIREMENT 5c: Identify what caused the incident, what the effects were on the environment, what remediation has been done, and the current condition of the site. Discuss what you learned with your counselor.

What caused the incident:

What were the effects on the environment:

What remediation was or has been done:

Current condition of site:



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DO ONE OF THE FOLLOWING (6A, 6B, or 6C) FOR REQUIREMENT 6

REQUIREMENT 6a: Do research on one endangered species found in your state.

PLEASE NOTE THAT THIS REQUIREMENT STATES THAT THE SELECTED ENDANGERED SPECIES MUST BE FROM YOUR STATE. CHOOSING ONE THAT IS NOT IN YOUR STATE DOES NOT FULFILL THE REQUIREMENT AS STATED. BE PREPARED!

Selected Endangered Species:

REQUIREMENT 6a: Learn about its natural habitat, why it is endangered, what is being done to preserve it, and how many individual species are left in the wild. Prepare a 100-word report about the species and include a drawing or photo. Present your report to your patrol or troop. Discuss what you learned with your counselor.

Natural Habitat:

Why is this species endangered:

Preservation Efforts:

How many are left in the wild:



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REQUIREMENT 6b: Do research on one species that was endangered or threatened but that has now recovered.

Selected Recovered Endangered Species:

REQUIREMENT 6b: Learn about how the species recovered, and what its new status is.

Notes:



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REQUIREMENT 6b: Prepare a 100-word report on the species and include a drawing or photo.

Notes:

REQUIREMENT 6b: Present your report to your patrol or troop. Discuss what you learned with your counselor.

Presented Date, Time, and Location:



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REQUIREMENT 6c: With your parent or guardian and counselor's approval, work with a natural resource professional to identify a completed project that has been designed to improve the habitat for a threatened or endangered species in your area. Visit the site.

Natural Resource Professional's Name and Title:

Site Identified to Visit:

PARENT / GUARDIAN APPROVAL: IS REQUIRED.

Parent's / Guardian's Name

Phone or Email

Parent's / Guardian's Signature

Date ☐ *approved*

COUNSELOR APPROVAL: IS REQUIRED.

Counselor's Name

Phone or Email

Counselor's Signature

Date ☐ *approved*

REQUIREMENT 6c: Report on what you saw to your patrol or troop. Discuss what you learned with your counselor.

Presented Date, Time, and Location:

Notes:



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DO ONE OF THE FOLLOWING (7A, 7B, or 7C) FOR REQUIREMENT 7

REQUIREMENT 7a: Determine five ways to conserve resources or use resources more efficiently in your home, school, or camp.

Resource Conservation Practice #1:

Resource Conservation Practice #2:

Resource Conservation Practice #3:

Resource Conservation Practice #4:

Resource Conservation Practice #5:



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REQUIREMENT 7a: Practice at least two of these methods for at least one week. Discuss what you learned with your counselor

Method #1:

Method #2:



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REQUIREMENT 7b: Explain Resource Recovery and why it is important to reduce pollution.

Notes:

REQUIREMENT 7b: Collect samples or take photos of ten items that can demonstrate the principle of Reduce, Reuse, Recycle. Explain your collection, how these materials are currently handled, and potential improvements. Discuss what you learned with your counselor

Be sure to bring your samples or photos to share with your merit badge counselor

This requirement must be reviewed with your merit badge counselor.

BE PREPARED!

Notes:



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REQUIREMENT 7c:

Identify five items in your household that will become hazardous waste. Explain how they should be properly stored, what special care is needed for disposal, and proper disposal options available in your area. Discuss what you learned with your counselor

ITEM #1:

Item Name / Description:

How this item should be properly stored:

What special care is needed for disposal of this item:

Proper disposal options for this item in your area:



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DO ONE OF THE FOLLOWING (8A, 8B, or 8C) FOR REQUIREMENT 8

REQUIREMENT 8a: Investigate pollination and its importance to our environment and ecosystems.

Notes:

REQUIREMENT 8a: Make a list of five pollinators and the plants that attract them in your region. Explain the importance of pollinators and what Scouts can do to support pollinators in their area. Discuss what you learned with your counselor

PLEASE NOTE THAT THIS REQUIREMENT STATES THAT THE SELECTED POLLINATORS MUST BE FROM YOUR REGION. CHOOSING ONE THAT IS NOT IN YOUR REGION DOES NOT FULFILL THE REQUIREMENT AS STATED. BE PREPARED!

POLLINATOR #1:

Name / Type:

Plants that attract this pollinator:

POLLINATOR #2:

Name / Type:

Plants that attract this pollinator:



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POLLINATOR #3:
Name / Type:
Plants that attract this pollinator:
POLLINATOR #4:
Name / Type:
Plants that attract this pollinator:
POLLINATOR #5:
Name / Type:
Plants that attract this pollinator:



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REQUIREMENT 8a: Explain the importance of pollinators.

Notes:

REQUIREMENT 8a: Explain what Scouts can do to support pollinators in their area.

Notes:



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REQUIREMENT 8b: Visit an area with flowering plants during pollination season for an hour to observe pollination.

Selected Observation Area:

REQUIREMENT 8b: Record which pollinators are attracted to which plant.

Observed Pollinator #1:	Attracted to which plant(s)?
Observed Pollinator #2:	Attracted to which plant(s)?
Observed Pollinator #3:	Attracted to which plant(s)?
Observed Pollinator #4:	Attracted to which plant(s)?
Observed Pollinator #5:	Attracted to which plant(s)?
Observed Pollinator #6:	Attracted to which plant(s)?
Observed Pollinator #7:	Attracted to which plant(s)?
Observed Pollinator #8:	Attracted to which plant(s)?



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REQUIREMENT 8b: Explain the importance of pollinators.

Notes:

REQUIREMENT 8b: Explain what Scouts can do to support pollinators in their area.

Notes:



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REQUIREMENT 8c: Learn about the importance of pollination to agriculture

Notes:

REQUIREMENT 8c: Learn about the importance of the economic costs and benefits of pollination to agriculture.

Notes:

REQUIREMENT 8c: Identify four crop-pollinator pairs. Explain the relationship of pollinators to agriculture. Discuss what you learned with your counselor

Crop-pollinator pairs refers to the mutual benefit that can occur when two different plant species are planted in close proximity, with the expectation that pollinators will move between them, enhancing pollination for both.

Crop-Pollinator Pair #1:



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Crop-Pollinator Pair #2:

Crop-Pollinator Pair #3:

Crop-Pollinator Pair #4:

REQUIREMENT 8c: Explain the relationship of pollinators to agriculture.

Notes:



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REQUIREMENT 9:

In your community or camp, investigate two invasive plant or animal species. Learn where the species originated, how they were transported to this ecosystem, their life history, how they are spread, how they impact the native ecosystem, and the recommended means to eradicate or control their spread. Discuss what you learned with your counselor.

PLEASE NOTE THAT THIS REQUIREMENT STATES THAT THE SELECTED INVASIVE SPECIES MUST BE FROM YOUR COMMUNITY OR CAMP. CHOOSING ONE THAT IS NOT IN YOUR COMMUNITY OR CAMP DOES NOT FULFILL THE REQUIREMENT AS STATED.

INVASIVE SPECIES #1:

Name and Description (plant or animal):

Where the species originated:

How transported to this ecosystem (your area or camp):

This species Life History:



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How this species spreads:

How this species impacts the native ecosystem:

Recommended means to Eradicate and/or control spread:

Any Additional Notes:



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INVASIVE SPECIES #2:

Name and Description (plant or animal):

Where the species originated:

How transported to this ecosystem (your area or camp):

This species Life History:

How this species spreads:



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How this species impacts the native ecosystem:

Recommended means to Eradicate and/or control spread:

Any Additional Notes:



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REQUIREMENT 10: Identify the environmental impact topics that would need to be addressed for a construction project such as building a house, adding a new building to your Scout camp, or one you create on your own that is approved by your counselor.

Selected Construction Project:

COUNSELOR APPROVAL: IS REQUIRED IF CREATING YOUR OWN CONSTRUCTION PROJECT.

Counselor's Name

Phone or Email

Counselor's Signature

Date

☐

approved

Identified Environmental Impact Topics:

REQUIREMENT 10: Evaluate the purpose of the proposed project.

Notes:



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REQUIREMENT 10: Evaluate the benefit of the proposed project.

Notes:

REQUIREMENT 10: Evaluate the alternatives (including a no-action alternative) for the proposed project.

Notes:

REQUIREMENT 10: Evaluate any environmental consequences of the proposed project.

Notes:



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REQUIREMENT 11: Identify three career opportunities that would use skills and knowledge in the environmental science field.

Career Opportunity #1:

Career Opportunity #2:

Career Opportunity #3:

REQUIREMENT 11: Pick one and research the training, education, certification requirements, experience, and expenses associated with entering the field.

Selected Career Opportunity:

Training Requirements:

Education Requirements:

Certification Requirements:

Experience Requirements:



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Expenses Associated with:

REQUIREMENT 11: Research the prospects for employment, starting salary, advancement opportunities and career goals associated with this career.

Prospects for Employment:

Starting Salary:

Advancement Opportunities:

Career Goals:

REQUIREMENT 11: Discuss what you learned with your counselor and whether you might be interested in this career.

Notes: