

**Science**  
**Grade-Level Expectations: Environmental Science**  
**(Recommended for Grades 11–12)**

**Science as Inquiry**

**The Abilities Necessary to Do Scientific Inquiry**

1. Write a testable question or hypothesis when given a topic (SI-H-A1)
2. Describe how investigations can be observation, description, literature survey, classification, or experimentation (SI-H-A2)
3. Plan and record step-by-step procedures for a valid investigation, select equipment and materials, and identify variables and controls (SI-H-A2)
4. Conduct an investigation that includes multiple trials and record, organize, and display data appropriately (SI-H-A2)
5. Utilize mathematics, organizational tools, and graphing skills to solve problems (SI-H-A3)
6. Use technology when appropriate to enhance laboratory investigations and presentations of findings (SI-H-A3)
7. Choose appropriate models to explain scientific knowledge or experimental results (e.g., objects, mathematical relationships, plans, schemes, examples, role-playing, computer simulations) (SI-H-A4)
8. Give an example of how new scientific data can cause an existing scientific explanation to be supported, revised, or rejected (SI-H-A5)
9. Write and defend a conclusion based on logical analysis of experimental data (SI-H-A6) (SI-H-A2)
10. Given a description of an experiment, identify appropriate safety measures (SI-H-A7)

**Understanding Scientific Inquiry**

11. Evaluate selected theories based on supporting scientific evidence (SI-H-B1)
12. Cite evidence that scientific investigations are conducted for many different reasons (SI-H-B2)
13. Identify scientific evidence that has caused modifications in previously accepted theories (SI-H-B2)
14. Cite examples of scientific advances and emerging technologies and how they affect society (e.g., MRI, DNA in forensics) (SI-H-B3)
15. Analyze the conclusion from an investigation by using data to determine its validity (SI-H-B4)
16. Use the following rules of evidence to examine experimental results:
  - (a) Can an expert's technique or theory be tested, has it been tested, or is it simply a subjective, conclusive approach that cannot be reasonably assessed for reliability?
  - (b) Has the technique or theory been subjected to peer review and publication?
  - (c) What is the known or potential rate of error of the technique or theory when applied?
  - (d) Were standards and controls applied and maintained?
  - (e) Has the technique or theory been generally accepted in the scientific community? (SI-H-B5) (SI-H-B1) (SI-H-B4)

**Science and the Environment**

**Ecological Systems and Interactions**

1. Describe the abiotic and biotic factors that distinguish Earth's major ecological systems (SE-H-A1)
2. Describe the characteristics of major biomes on Earth (SE-H-A1)
3. Use the 10% rule and data analysis to measure the flow of energy as represented by biomass in a system (SE-H-A2)
4. Determine the effects of limiting factors on a population and describe the concept of carrying capacity (SE-H-A3)

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5. Examine and discuss the major stages of succession, describing the generalized sequential order of the types of plant species (SE-H-A4)
6. Analyze the consequences of changes in selected divisions of the biosphere (e.g., ozone depletion, global warming, acid rain) (SE-H-A5) (SE-H-A7)
7. Illustrate the flow of carbon, water, oxygen, nitrogen, and phosphorus through an ecosystem (SE-H-A6) (LS-H-D1)
8. Explain how species in an ecosystem interact and link in a complex web (SE-H-A7) (SE-H-A10)
9. Cite and explain examples of organisms' adaptations to environmental pressures over time (SE-H-A8)
10. Analyze the effect of an invasive species on the biodiversity within ecosystems (SE-H-A9)
11. Explain why biodiversity is essential to the survival of organisms (SE-H-A9)
12. Give examples and describe the effect of pollutants on selected populations (SE-H-A11)

**Resources and Resource Management**

13. Evaluate whether a resource is renewable by analyzing its relative regeneration time (SE-H-B1)
14. Analyze data to determine the effect of preservation practices compared to conservation practices for a sample species (SE-H-B2)
15. Identify the factors that cause the inequitable distribution of Earth's resources (e.g., politics, economics, climate) (SE-H-B3)
16. Evaluate the effectiveness of natural resource management in Louisiana (SE-H-B4) (SE-H-B5)
17. Analyze data to determine when reuse, recycling, and recovery are applicable (SE-H-B5)
18. Identify the factors that affect sustainable development (SE-H-B6)

**Environmental Awareness and Protection**

19. Determine the interrelationships of clean water, land, and air to the success of organisms in a given population (SE-H-C1)
20. Relate environmental quality to quality of life (SE-H-C2)
21. Analyze the effect of common social, economic, technological, and political considerations on environmental policy (SE-H-C3)
22. Analyze the risk-benefit ratio for selected environmental situations (SE-H-C4)
23. Describe the relationship between public support and the enforcement of environmental policies (SE-H-C5)

**Personal Choices and Responsible Actions**

24. Identify the advantages and disadvantages of using disposable items versus reusable items (SE-H-D1)
25. Discuss how education and collaboration can affect the prevention and control of a selected pollutant (SE-H-D2) (SE-H-D3)
26. Determine local actions that can affect the global environment (SE-H-D4)
27. Describe how accountability toward the environment affects sustainability (SE-H-D5)
28. Discuss the reduction of combustible engines needed to significantly decrease CO<sub>2</sub> in the troposphere (SE-H-D6)