# "Ecosystems"
# Grade 5 – Summative Assessment

## Assessed Understandings

Students will understand:

1. Organisms within an ecosystem interact with each other and their environment.
2. Organisms within an ecosystem can be categorized as producers, consumers, or decomposers and can be sequenced in simple food chains.
3. Food webs are diagrams that illustrate the dependent and interdependent relationships within ecosystems.
4. Growth and reproduction of organisms within an ecosystem are affected by factors such as food, light, water, temperature, and acidity (pH).
5. Natural events and human activities can cause a disturbance to or imbalance of an ecosystem.
6. Requirements for the survival of organisms.
7. Sun as a source of energy.
8. Path of energy from the sun to the producers and then to the consumers.
9. Critical analysis of evidence; distinguish opinion from scientific evidence.

 

# Teacher Notes for the "Ecosystem" Assessment

## Introduction

These items are designed to provide an assessment of what students know and understand at the completion of the *Science & Technology for Children (STC) Ecosystems* module. This document includes teacher directions, response sheets for the individual students, and analytic scoring rubrics for each question. **A close look at the rubrics prior to the administration of the assessment will be helpful to the teacher.**

## Time and Preparation for the Assessment

This assessment should take about **two, 45-minute class periods** to administer. You are free to read aloud any or all portions of the assessment to your students. Without giving away a more appropriate response, please help students understand the intent of the question or task. This is not a test of reading, writing, or artistic ability. Students may be encouraged to use any and all resources available, including material from classroom charts and individual journals. Please use the terminology from the investigations within the kit.

## Directions for Administration

The only prior preparation for this assessment would be to ensure that each student has access to an eco-column.

**Question 1:** Teachers should make the students aware that they are to observe an eco-column. If a group of students are sharing the eco-column, students should independently observe the eco-column for the answers.

1. Observe the eco-column. Name three specific living organisms and three specific non-living materials in the eco-column. Place them on the T-chart below.

**Question 2:** Interdependency of organisms in an ecosystem relies on the living and non-living factors to survive together.

2. Name two basic needs that organisms must have to survive. Explain how the organisms in the eco-column are **interdependent**.

**Question 3:** Environmental factors affect growth and reproduction of organisms.

3. Name **three** environmental factors that could affect the growth and reproduction of the guppies in an eco-column. Tell how each factor might affect the guppies.

**Question 4:** The basic concept for the science curriculum in life sciences is for the student to understand the source of energy for living organisms comes directly from the Sun.

4. What is the source of energy for all ecosystems?

 

**Question 5:** Food chains are essential to the survival of all organisms in an ecosystem. Each organism has a role in the success of its ecosystem.

5. Complete a simple food chain using organisms found in the picture. Be sure to include the energy source.

**Question 6:** Different ecosystems still have similarities and differences. However, the elements of a food chain may change. The concept for survival remains necessary for growth and reproduction even when the organisms change the roles remain constant (producers, consumers, decomposers).

6. Look at the picture of the "Wetland Ecosystem." If all the large-mouth bass disappear, describe how the number of perch and minnows in the food chain may be affected. Explain why this will happen.

**Question 7:** Interpretation in the scientific method is crucial for understanding of the hypothesis. In this question, the students are asked to look at the data, make predictions, draw conclusions, and decide what would be a key element to improve the health of the ecosystem by drawing on the evidence from the data sheets.

7a. Use the data from the graphs on page 6 to determine the health of the Delmarva River. Write **two conclusions** that are supported by the data.

7b. What are **three** possible causes for the change in data over the four-year period? What steps can be made to improve the health of the Delmarva River?

 

# Scoring Rubrics
# "Ecosystems"
# Summative Assessment

**Question 1:** Name three specific living organisms and three specific non-living materials in the eco-column. Place them on the T-chart below.

This question measures the student's ability to identify and distinguish between living non-living things in an eco-column.

**Criteria for a complete response:**

1. Living things in the ecocolumn include: guppies, fish, mosquito fish (Gambusia), isopods (rolie polies, pillbugs, and sowbugs), crickets, snails, duckweed, elodea, mustard seeds, rye (grass), alfalfa, and algae**.**
2. Non-living things in the eco-column include: air (or its components), water, sunlight, soil, waste, gravel, and rocks.

***Teacher Note:*** Organisms that were once alive and are now dead are considered living. Living things in science refer to organisms that fit many qualifications, including ability to reproduce, exchange gases, emit waste, have DNA, etc.

| Code | Response |
|---|---|
| | ***Complete Response*** |
| 20 | Response includes three specific living and non-living materials. |
| 29 | Any other scientifically correct response. |
| | ***Partially Correct Response*** |
| 10 | One error in the non-living category. Student has 5 of 6 responses correct. |
| 11 | One error in the living category. Student has 5 of 6 responses correct. |
| 19 | Any other partially correct response. |
| | ***Incorrect Response*** |
| 70 | Two or more errors. Student has 4 or fewer correct responses. |
| 79 | Any other incorrect response. |
| | ***Non Response*** |
| 90 | Crossed out/erased, illegible, or impossible to interpret. |
| 99 | Blank. |

 

**Question 2:** Name two basic needs that organisms must have to survive. Explain how the organisms in the eco-column are interdependent.

This question measures the student's understanding of what an organism needs in order to survive in this ecosystem.

**Criteria for a complete response:**

1. A complete response includes two of the following: food (plants), water, space, light, correct temperature, snails, air (oxygen), correct pH.
2. For each essential component there must be an explanation showing why it is essential for survival. (Growth is acceptable in only one of the two responses.)

Examples of possible explanations:

- Water is a medium for providing oxygen or provides space for the fish to live.
- Plants are food, provide oxygen, or protection for the fish.
- Snails improve water quality by cleaning up waste material.
- Oxygen (or air) for fish to breath—may appear in the student explanation either with water or with plants.

| Code | Response |
|---|---|
| | ***Complete Response*** |
| 20 | The response meets both criteria. |
| 29 | Any other scientifically correct response. |
| | ***Partially Correct Response*** |
| 10 | Response meets criterion 1 but explains only one component correctly. |
| 19 | Any other partially correct response. |
| | ***Incorrect Response*** |
| 70 | Response lists one component with no explanation. |
| 79 | Any other incorrect response. |
| | ***Non-Response*** |
| 90 | Crossed out/erased, illegible, or impossible to interpret. |
| 99 | Blank. |

 

**Question 3:** Name three environmental factors that could affect the growth and reproduction of the guppies in an eco-column. Tell how each factor might affect the guppies.

This question measures the student's ability to recognize that environmental factors affect living organisms.

**Criteria for a complete response:**

1. Lists three environmental factors.
   a. Examples: Environmental temperature, overcrowding, pH of water, food supply, pollution, water quality, access to sunlight, access to air.
2. Describes how three environmental factors affect the guppies.
   a. Examples: If the temperature is too hot or cold, the guppies may die or not reproduce. If the pH is too high or low, the guppies may die or not reproduce. If the food supply is insufficient, the guppies may die. If the water quality is poor, the guppies may die.

| Code | Response |
|---|---|
| | ***Complete Response*** |
| 20 | Meets the criteria. |
| 29 | Any other scientifically correct response. |
| | ***Partially Correct Response*** |
| 10 | The response includes at least two correct factors with accurate description. |
| 19 | Any other minimally correct response. |
| | ***Incorrect Response*** |
| 70 | The response includes only one correct factor with description. |
| 79 | Any other incorrect response. |
| | ***Non-Response*** |
| 90 | Crossed out/erased, illegible, or impossible to interpret. |
| 99 | Blank. |

 

**Question 4:** What is the source of energy for all ecosystems?

This question measures the student's ability to identify the Sun as a source of energy for the eco-column.

**Criterion for a complete response:**

1. Student mentions the sun, solar energy, or sunlight as the source of energy for the eco-column. (In classrooms with no natural light, other forms of light are acceptable.)

| Code | Response |
|---|---|
| | ***Complete Response*** |
| 10 | Response must include Sun or some form of light. |
| 19 | Any other scientifically correct response. |
| | ***Incorrect Response*** |
| 70 | In addition to light, the response includes other things that are not sources of energy. |
| 76 | The response repeats the substance or stem of the question. |
| 79 | Any other incorrect response. |
| | ***Non-Response*** |
| 90 | Crossed out/erased, illegible, or impossible to interpret. |
| 99 | Blank. |

 

**Question 5:** Complete a simple food chain using organisms found in the picture. Be sure to include the energy source.

This question measures the student's ability to describe the path of energy from the Sun to the producers, consumers, and decomposers in this ecosystem.

**Criterion for a complete response:**

1. Describes the path of energy—from the Sun to the producers (e.g., plants) and then to the consumers (e.g., animals) and decomposers (e.g., fungus, worms, etc.).

| Code | Response |
|---|---|
| | ***Complete Response*** |
| 20 | The response meets criterion. |
| 29 | Any other scientifically response. |
| | ***Partially Correct Response*** |
| 10 | The response correctly identifies everything except the energy. |
| 11 | The response correctly identifies everything except producer. |
| 12 | The response correctly identifies everything except consumer. |
| 13 | The response correctly identifies everything except decomposer. |
| 19 | Any other partially correct response. |
| | ***Incorrect Response*** |
| 70 | Response describes path of energy from sun to consumer. |
| 79 | Any other incorrect response. |
| | ***Non-Response*** |
| 90 | Crossed out/erased, illegible, or impossible to interpret. |
| 99 | Blank. |

 

**Question 6:** Look at the picture of the "Wetland Ecosystem." If all the large-mouth bass disappear, describe how the number of perch and minnows in the food chain may be affected. Explain why this will happen.

This question measures the student's ability to describe how populations within a wetland ecosystem may be affected if a producer or consumer is removed.

**Criteria for a complete response:**

1. The response describes effects on the number of perch and minnows in the food chain when all the bass are removed.
2. The response explains why the number of perch and minnows change.

Examples of possible explanations:

- The large-mouth bass would not be around to eat the perch, so the perch population would increase.
- More perch eating more minnows would lead to a decrease in the minnow population.

**OR**

- As large-mouth bass disappear, the heron would eat more perch; therefore, the perch population would decrease.
- With fewer perch to eat the minnows, the minnow population would increase.

| Code | Response |
|---|---|
| | ***Complete Response*** |
| 20 | The response meets both criteria. |
| 29 | Any other scientifically correct response. |
| | ***Partially Correct Response*** |
| 10 | The response meets criteria 1 with no explanation. |
| 11 | The response meets criteria 2. |
| 12 | The response describes one plausible effect on one organism with a correct explanation. |
| 19 | Any other partially correct response. |
| | ***Incorrect Response*** |
| 70 | The heron dies—no other plausible effects on other organisms. |
| 71 | Difficult to score due to overuse of pronouns. |
| 79 | Any other incorrect response. |
| | ***Non-Response*** |
| 90 | Crossed out/erased, illegible, or impossible to interpret. |
| 99 | Blank. |

 

**Question 7a:** Use the data from the graphs on page 6 to determine the health of the Delmarva River. Write two conclusions that are supported by the data.

This question measures the student's ability to identify changes in population by interpreting data. This data represents change over a given period of time.

**Criteria for a complete response:**

1. Populations of fish and frogs are declining.
2. Population of algae is increasing.

| Code | Response |
|---|---|
| | ***Complete Response*** |
| 20 | The response meets criterion above. |
| 29 | Any other scientifically correct response. |
| | ***Partially Correct Response*** |
| 10 | The response refers to only the fish or frog population. |
| 11 | The response refers to only the algae population. |
| 19 | Any other partially correct response. |
| | ***Incorrect Response*** |
| 70 | The response identifies a cause rather than reporting a trend in the data. |
| 71 | The response compares the fish and frog counts. |
| 79 | Any other incorrect response. |
| | ***Non-Response*** |
| 90 | Crossed out/erased, illegible, or impossible to interpret. |
| 99 | Blank. |

Question 7b: What are three possible causes for the change in data over the four-year period? What steps can be made to improve the health of the Delmarva River?

This question measures student's ability to predict causes for an observed data trend and suggest possible ways to improve the data.

**Criteria for a complete response:**

1. Identifies three possible causes for the data trend. Examples: pollution (road salt, acid rain, fertilizer), change in temperature, human activities such as trash or over-fishing, increase in other predators or new species of predator.
2. Describe three ways to improve the river based on the listed causes. Examples: use less road salt, control fertilizer runoff into the water, limit fishing, and limit human use of the river.

| Code | Response |
|---|---|
| | ***Complete Response*** |
| 20 | The response meets criteria above. |
| 29 | Any other scientifically correct response. |
| | ***Partially Correct Response*** |
| 10 | Lists one reason for the changes. |
| 19 | Any other partially correct response. |
| | ***Incorrect Response*** |
| 70 | The response identifies a trend rather than listing a cause from the data. |
| 79 | Any other incorrect response. |
| | ***Non-Response*** |
| 90 | Crossed out/erased, illegible, or impossible to interpret. |
| 99 | Blank. |