

# Succession

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**Strand** Interactions of Life Forms

**Topic** Investigating interactions of populations, their effects on ecosystems, and succession

**Primary SOL** BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include

- interactions within and among populations, including carrying capacities, limiting factors, and growth curves;
- succession patterns in ecosystems;
- the effects of natural events and human activities on ecosystems; and
- analysis of the flora, fauna, and microorganisms of Virginia ecosystems.

## Background Information

All ecosystems of the world are important in the circle of life, for they work together to maintain a balance or equilibrium on Earth. All living and nonliving components of an ecosystem must remain stable for the ecosystem to function properly. Ecosystems are like finely tuned machines: if something in an ecosystem is disrupted, it can cause organisms to die or migrate and affect the populations of other ecosystems.

Disruptions in an ecosystem can happen naturally, or they can be caused by human influence. Either way, nature has a plan in place to fix or recreate ecosystems that are destroyed or made unstable; this is called “**succession**.” There are two kinds of succession: primary and secondary.

**Primary succession** is when life starts to grow in an area in which it never existed before (e.g., life growing on a new island formed in the middle of the ocean by a volcano eruption). **Secondary succession** is when life grows in an area that previously held some kind of life that died out (e.g., life growing in a burned-out forest).

Frequently, we read or hear about an ecosystem going through succession someplace in the world, or even here in Virginia, due to a forest fire, an oil spill in the ocean, the cutting down of a forest, etc.

## Materials

- Copies of the three attached handouts
- Internet access
- Coloring utensils

## Vocabulary

*abiotic, biome, biosphere, biotic, carnivore, climax community, community, consumer, deforestation, density independent factor, ecosystem, emigration, habitat, herbivore, immigration, limiting factor, nonrenewable resource, omnivore, pioneer species, pollution, population, primary succession, producer, renewable resource, resource depletion, secondary succession, succession, urbanization*

### **Student/Teacher Actions (what students and teachers should be doing to facilitate learning)**

In this during- or post-learning activity, students will create newspaper articles and accompanying headlines about real or fictitious succession events that have occurred in Virginia. The articles will recount various kinds of environmental devastation that have happened to some Virginia ecosystems, as well as what scientists believe will happen to the ecosystems in the future. Students will use key vocabulary and pictures to tell their stories. The teacher will introduce and explain the vocabulary and concepts involved.

1. Have students brainstorm various different ecosystems in Virginia and then research on the Internet those that interest them.
2. Have students choose the ecosystems on which they will focus (e.g., Chesapeake Bay, marshland, Dismal Swamp, Piedmont, Blue Ridge Mountains, Coastal Plain, freshwater).
3. Distribute copies of the attached Scoring Guide for Newspaper Article, and go over the assignment and its expectations. Tell students that they may use their notes, textbook, and the Internet to get information and ideas. You may wish to specify minimum and maximum lengths for the articles.
4. As students write, circulate in the classroom to address questions, concerns, or problems. Remind students to use the scoring guide as a checklist for their articles and to underline vocabulary words and terms.

### **Assessment**

- **Journal/Writing Prompts**
  - Distribute copies of the attached Writing about Succession handout, and have students follow it to create a short essay. Also provide copies of the Scoring Guide for Writing about Succession for students to use as a checklist.

### **Extensions and Connections (for all students)**

- Supplement this activity with a video on succession in Virginia's ecosystems, showing real examples of how an ecosystem has experienced succession after devastation.
- Have students write a supplement to their newspaper article, choosing and writing about an endangered organism (e.g., bald eagle, osprey, blue heron, blue crab, oyster, bay grass) that was severely affected by a natural disaster or human activities. Have them include
  - the common name and scientific name of their endangered organisms
  - descriptions and/or pictures of the organisms
  - the numbers of these organisms left in the ecosystems
  - the causes of the organisms being endangered.
  - what can or is being done to protect the organisms
  - how the disappearance of the organisms would affect other biotic and abiotic factors in the ecosystems.

### **Strategies for Differentiation**

- Employ flexible groupings of students by grouping them according to common readiness levels, shared interests, or diverse strengths.
- For ELL students, create a word wall with images of unfamiliar, nonscientific vocabulary terms related to the environment (e.g., pond, lake, shrub).

- Have students group vocabulary words into categories to show connections and/or similar word origins. Opposites could also be paired for contrast. Graphic organizers could be used to show relationships among vocabulary terms.

## Scoring Guide for Newspaper Article

Description	Possible Points (200 total)	Points Earned
Includes four pictures with captions and explanations of the disaster in the Virginia ecosystem, as follows: <ol style="list-style-type: none"> <li>1. Before the natural or man-made disaster in the ecosystem</li> <li>2. During the disaster</li> <li>3. Shortly after the disaster, when pioneer species start to grow</li> <li>4. The climax community, including all biotic and abiotic factors</li> </ol>	60 (each worth 15)	
Includes the when (date and time), where, what, how, and why of the disaster, with details	10	
Includes description of the pioneer species in the succession, estimate of how long succession will take, and description of the stages of succession for this ecosystem	18	
Describes the climax community stage, including <ul style="list-style-type: none"> <li>• three producers</li> <li>• three herbivores</li> <li>• one omnivore</li> <li>• two carnivores</li> <li>• three abiotic factors</li> </ul>	24 (each worth 2)	
Explains how the ecosystem would be affected if one of the above biotic factors were to become extinct	12	
Describes how this disaster affected neighboring ecosystems	12	
Explains how this disaster affected the human population	12	
Describes how another such disaster can be prevented in the future	12	
Demonstrates neatness and creativity	10	
Contains proper grammar and punctuation	10	
Contains at least 20 vocabulary words used correctly and underlined	20	
<b>Total Points Earned</b>		

## Writing about Succession

When an ecosystem experiences some kind of disruption or devastation, it can destroy the delicate balance of the abiotic and biotic components of the ecosystem and cause living organisms to die or migrate out of the ecosystem. Succession is nature’s way of rebuilding an ecosystem after such an event.

In Virginia, farming is prevalent. Farmers grow cotton, corn, soybeans, and peanuts, among other things. The land used to grow these important crops was at one time part of a different ecosystem—an ecosystem that no longer exists.

Write a short essay about succession, as directed below and using at least 15 vocabulary words.

1. Explain what would happen if land used for agriculture in Virginia were abandoned and allowed to flourish undisturbed.
2. Describe what it would look like in one year.
3. Describe what it would look like in 10 years.
4. Identify the pioneer species after one year.
5. Describe the makeup of the eventual climax community.
6. Explain the types of producers and consumers that would be present in this ecosystem.
7. Give an example of succession in your community, and describe what stage it is in and how the succession started.

## Scoring Guide for Writing about Succession

Points	Level	Assessment
100	4	Demonstrates COMPLETE UNDERSTANDING of topic <ul style="list-style-type: none"> <li>• Answers all four bullets satisfactorily</li> <li>• Uses abundant vocabulary throughout in correct context</li> <li>• Includes much relevant information</li> <li>• Expresses responses in full and complete thoughts</li> <li>• Answers prompt above and beyond</li> </ul>
75	3	Demonstrates GOOD UNDERSTANDING of topic <ul style="list-style-type: none"> <li>• Answers at least three bullets satisfactorily</li> <li>• Uses most vocabulary in correct context</li> <li>• Includes relevant information</li> <li>• Expresses responses in full and complete thoughts</li> </ul>
50	2	Demonstrates SOME UNDERSTANDING of topic <ul style="list-style-type: none"> <li>• Answers at least two bullets satisfactorily</li> <li>• Uses some vocabulary in correct context</li> <li>• Includes mostly relevant information</li> </ul>
25	1	Demonstrates VERY LITTLE UNDERSTANDING of topic <ul style="list-style-type: none"> <li>• Answers at least one bullet satisfactorily</li> <li>• Uses NO vocabulary to support answers</li> <li>• Includes some relevant but mostly irrelevant information</li> </ul>
0	0	Demonstrates NO UNDERSTANDING of topic <ul style="list-style-type: none"> <li>• Answers no bullets satisfactorily, OR</li> <li>• Did not attempt to respond</li> </ul>