

*Grand Canyon*  
*Distance Learning Program: Life on the Edge (Ecology)*

**Pre-program lesson: Complete the following activity prior to the distance learning program.**

**School Subject:** Life science  
**Grade Levels:** 4<sup>th</sup> – 8<sup>th</sup>  
**Time Requirement:** One or two class periods (60-90 minutes)

**Arizona State Standards Addressed in the pre-lesson:**

SC03-S1C3-02: Construct reasonable interpretations of the collected data based on formulated questions.  
SC03-S1C4-03: Communicate with other groups to describe the results of an investigation.  
SC04-S1C2-05: Record data in an organized and appropriate format.  
SC04-S1C1-04 and SC05-S1C1-03: Locate information related to an investigation.  
SC04/05-S1C4-01: Communicate verbally or in writing the results of an inquiry.  
SC04/05-S1C4-03: Communicate with other groups or individuals to compare the results of a common investigation.

**Lesson Overview**

Grand Canyon is a classroom and laboratory where the study of ecology teaches us about our interconnections between each other and with the rest of the natural world.

**Lesson Objectives:** Students will be able to:

1. Name at least 5 animals that call Grand Canyon home
2. Demonstrate research skills
3. Create at least one food chain, including a plant, herbivore, and carnivore or omnivore

**Materials**

The first two materials can be found at: <http://www.nps.gov/grca/forteachers/distancelearningopportunities.htm>

- *Grand Canyon Ecosystems* article (1 per student or group)
- Page one of the *Grand Canyon Ecosystems* worksheet (1 per student)
- White poster paper (one piece approximately 8” x 36” per team)
- Markers, paints and other art supplies for drawing and coloring

**Background Information**

The concept of an ecosystem is important because it conveys one of the key insights that we have gained from the science of ecology, that everything is related to everything else. Everyday perception tells us that we live in a world composed of distinct units: trees, rocks, animals, buildings, and so on. Yet all of these seemingly unconnected fragments are in fact part of one system; they are interrelated, and this interrelation is essential for life. Since no piece exists independently of another, none can be modified without affecting the others. It is this idea that is behind the term “ecosystem”. In the study of Ecology, we identify the species and community to which an organism belongs and how it interacts with the ecosystem and other organisms in the ecosystem. Scientists have also studied the interaction between different organisms and classified their interactions into different types. All of these interactions form a “web of life”. When organisms are removed, the interactions and connections are broken and the web is weakened. Humans are a part of every ecosystem, so everything we do affects the parts of an ecosystem.

## Procedure

### Grand Canyon Ecosystems Article

This article can be found as a PDF, at: <http://www.nps.gov/grca/forteachers/distancelearningopportunities.htm>.

This article was created to offer the children background information on Grand Canyon's ecosystems and serve as a resource for gathering information about their ecosystem in a manner that is appropriate for their age level. Feel free to incorporate computer lab time or visit your library to gather additional information about Grand Canyon and the ecosystem(s) found near your home/school.

1. Distribute the *Grand Canyon Ecosystems* article to each student or group.
2. Ask each child to read the **first page** of the article silently, or in a group. You may wish to read the **first page** out loud with the students.
3. Highlight what an ecosystem is. This article introduces non-living components as an important part of the ecosystem. Ask the children to think of abiotic (non-living: i.e. water, sun, air, rock) and biotic (living: i.e. plants and animals) components in their environment and discuss how they interact. Include examples from your local ecosystem in the discussion. Time permitting, guide ecosystem research in your computer lab or library to gather enough information to complete the worksheet.
4. Now that they have been introduced to Grand Canyon's ecosystems, divide the class into five groups. Assign each group their own ecosystem and ask the groups to read the section on their particular ecosystem.
5. Distribute the *Grand Canyon Ecosystems* worksheet to each student. Each group will collect information from the article and/or group research to answer the questions on the first page of the worksheet.
6. After doing the research and completing page one of the worksheet, each student group will draw their ecosystem on the 8" x 36" piece of paper. Ask the students to draw a picture of what the ecosystem looks like based on the description in the article and any other supplemental materials you have provided. This should include the environment as a whole, including plants and animals, and any other distinguishing characteristics of the ecosystem. Encourage them to use their imagination and reference their materials.
7. Each group will present this piece of paper during the distance learning presentation. Markers or other very bold colors will improve the ecosystem visibility for the ranger(s). The students will present answers to the following questions to their classmates and the ranger(s) during the program. Prepare students for an oral presentation and assign them duties for sharing the following information:
  1. What elevation range is your ecosystem located within?
  2. How much precipitation does your ecosystem receive?
  3. What are the dominant plant species? Name at least two.
  4. Name at least two animals found here.
8. Encourage your students to create a list of questions prior to the distance learning program. They will have the opportunity to present these questions to the park rangers during the last five to ten minutes of the program. Please guide your students in writing thoughtful questions.

## DURING THE DISTANCE LEARNING PROGRAM

### Arizona State Standards Addressed:

SC03-S1C4-01: Communicate investigations and explanations using evidence and appropriate terminology.

SC03-S1C4-03: Communicate with other groups to describe the results of an investigation.

SC03-S4C3-03: Explain the interrelationships among plants and animals in different environments: producers, consumers, decomposers.

SC04/05-S1C4-01: Communicate verbally or in writing the results of an inquiry.

SC04/05-S1C4-03: Communicate with other groups or individuals to compare the results of a common investigation.

### **Materials needed during the program with the rangers:**

- Ecosystem posters created by student groups on the 8" x 36" piece of paper
- Grand Canyon Ecosystems worksheets with the first page completed
- One triangular shaped piece of paper (measuring three feet long, 16" wide at top, tapering down to a point.)
- Easel, whiteboard, or open wall space visible to the rangers during the distance learning presentation to post the ecosystem posters.
- Tape or other items needed to attach posters to surface

### **Procedure**

1. The ranger(s) will begin by reviewing the basic information about the size of Grand Canyon and the components found in every ecosystem. This will reinforce information learned from the Grand Canyon Ecosystems article.
2. After introducing the various ecosystems found at Grand Canyon, the ranger(s) will invite each group to present the information about their ecosystem that they prepared during the pre-program lesson.
3. After each group shares their information, tape the ecosystem drawing to the easel, wall or blackboard, where it is visible for the entire class to see. Ranger(s) will supplement information students know about their ecosystem and highlight special interrelationships found there.
4. Students will follow along during the program and use the information supplied by the ranger(s) to fill in the second page of the ecosystems worksheet.  
*Answers: Boreal Forest- Vole, Ponderosa Forest- Northern Goshawk, Pinyon-Juniper Woodland- people, pinyon jay, mice, Desert Scrub- camouflage; pollinate, Riparian- water; land*
5. Since it is unique to be able to find so many different ecosystems in such close proximity, the ranger will invite the teacher to post the triangular shaped piece of paper to illustrate how the Colorado River has carved a canyon, exposing land at many elevations with many different conditions.
6. The ranger(s) will ask the students to use what they have learned from their ecosystem to create an ecosystem web on their worksheet. The students will be instructed to fill in the web and draw lines to represent connections between the living and non-living parts of the ecosystem.
7. Ecosystems are very complex systems with many different parts. Ranger(s) will discuss the concept of biodiversity. Encourage students to think about ecosystems near them, and to learn more about their own backyard.
8. The ranger(s) will conclude by answering some of the questions the students prepared.

### **Extension Activities:**

There are a variety of activities in the Natural History Lesson Plans on our website at:

<http://www.nps.gov/grca/forteachers/lessonplansandteacherguides.htm>

Especially consider:

- 1) As an additional pre-lesson activity consider the Ecosystem Match-up, which will introduce the five Grand Canyon ecosystems we refer to during the distance learning program.
- 2) As an additional pre- or post-lesson, the Web of Life activity reinforces the interrelationships of different players in an ecosystem.