

Made by: Ashley Grapes
Grades: 7th Grade Life Sciences or Biology
Activity Duration: 50-90 minutes

African Safari Ecosystem Lab (5-E Model)

Purpose/Rationale: The purpose of this lesson is for students to understand the complexities and interconnectedness of ecosystems through such elements as predator-prey relationships, parasitism, symbiosis, death, and complex behaviors. They will accomplish this by making an African ecosystem food web, which will not only represent the complexities in predator/prey relationships, but the complexities of relationships among animals as a whole.

The students will also explore the consequences of disrupting an ecosystem, on both a small and large scale. A class discussion should follow in which students talk about what processes, namely human induced ones, that are harming our planet. The class will discuss what endangered species there are in their local area and what their community is doing to both exacerbate and perhaps mitigate the issue. This discussion will include community volunteering, proper disposal of waste, recycling, and efficient energy usage.

This lesson is flexible in that it is up to the teacher's discretion which ecosystem is chosen, what organisms are chosen, what topics are discussed, what examples are used, and how difficult the reading is on the cards. The evaluation also allows for diverse answers by asking open-ended questions, freedom in research, and it utilizes artistic talents. The research paper could be exchanged for a PowerPoint presentation if some children have difficulty reading and writing. This is a visual, auditory, and conceptual lab with many means to fulfill the main objectives.

SOL:

- LS.5 The student will investigate and understand how organisms can be classified. Key concepts include the characteristics of the species.
- LS.7 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include complex relationships within terrestrial, freshwater, and marine ecosystems; and energy flow in food webs and energy pyramids.
- LS.8 The student will investigate and understand that interactions exist among members of a population. Key concepts include competition, cooperation, social hierarchy, territorial imperative; and influence of behavior on a population.
- LS.9 The student will investigate and understand interactions among populations in a biological community. Key concepts include the relationships among producers, consumers, and decomposers in food webs; the relationship between predators and prey; competition and cooperation; symbiotic relationships; and niches.
- LS.12 The student will investigate and understand the relationships between ecosystem dynamics and human activity. Key concepts include change in habitat size, quality, or structure; population disturbances and factors that threaten or enhance species survival; and environmental issues (water supply, air quality, energy production, and waste management).

NSES Standards: Populations and ecosystems, diversity and adaptations of organism, Natural and human-induced hazards

Materials and Resources:

25 index cards	Scissors
50 photographs (25 large and 25 small of each animal)	Ball or spool of yarn
Double sided tape	Venus Fly trap if available

Amsel, Sheri. "Food Webs." African Grassland (Savanna) Food Web. Exploring Nature Educational Resource. © 2005 - 2010. September 14, 2010. <http://exploringnature.org/db/detail.php?dbID=2&detID=1224>
Lesson modified from a lab in: Project Wild. 2009. Good Buddies, pg. 91.
Lesson modified from a lab in: Project Wild. 2009. What's for Dinner? pg. 96

Safety: Be aware of student allergies in case certain fabrics could be harmful.

Procedure:

Engage: Begin class review of previously learned materials. This includes the vocabulary words producer, consumer, herbivore, carnivore, omnivore, and decomposer. Ask thought provoking questions that probe at their misconceptions. Show a Venus fly trap eating a mealworm as a discrepant event to show that plants may be carnivorous and move. (10-20 minutes)

Explore: Students will each be given a card. On the front of the card without the lines is a picture of the organism they "are" with a short description introducing the organism to the class. Have the student hold up their card to the class and then read the organism's introduction. On the back of the card with the lines is the organism that "eats them." The description below this picture should talk specifically about the organisms eating habits. Have the student read the description and tell the class if the organism is a carnivore, omnivore, herbivore, producer, or decomposer. (30-40 minutes)

The organism on the back of the student's card will match the organism on the front of another student. Have the first student hold a piece of string and unravel it to the "matching" student and repeat. The class will build a food web that goes as follows:


Grass → impala → cheetah → fungi → termites → acacia tree → giraffe → lion → tick → grouse → hyena → fungi → baobab tree → baboon → wild dog → dung beetle → mongoose → king cobra → hawk (dies) → vultures → leopard → nematode → fish → fish eagle → crocodile

Explain: Along the way short lectures or class discussion should be held. These should include talking about certain feeding behaviors, symbiotic relationships, parasitism, territorial marking, death, etc. Students will discuss that these animals, although they may seem different (water vs. land; producers vs. consumers; microscopic vs. large), they are all interconnected. (Included in Explore)


Elaborate: After all the students have read their cards a food web is formed. Ask the students to all tug on their strings and discuss that the ecosystem is firm and stable. Now ask the students to not grasp their string but to just let it go around their finger. Take a pair of scissors and cut two or three "species out" (extinction). Ask the students to tug the string. Ask the students to raise their hand if the string felt loose or fell apart. Ask how cutting the string only 2 or 3 times affected so many other organisms in their ecosystem. Discuss how extinctions such as the ones in their ecosystems could occur. Discuss how these problems (deforestation, climate change, pollution, poaching) are human-related activities, and how humans could leave less of an ecological footprint on the world as a whole (10-30 minutes)

Evaluate: The students will be evaluated on the completion and effort on a homework assignment and on a research paper. This activity sheet will test their knowledge of carnivores, omnivores, decomposers, food webs, symbiosis, parasitism, human impact, and ecosystems by class assignment that if not finished, may be completed for homework. The research paper will be on an endangered species from the student's state. First the student must research why it is on the endangered species list and why it is important to conserve. For the latter point they will have to think critically about the big picture of an ecosystem and how other organisms depend on the endangered species they chose. Finally once the student has justified their animal's critical existence to the health of the environment they must present conservation effort plans that are both in existence and that they have thought come up with. The paper will be evaluated with the use of a rubric and the instructor may allow a rough draft evaluation. Students with IEP's may be given a shortened version on the paper and be allowed to revise their paper twice, or may give an oral presentation instead.


Back of card

 Lion

Not many predators could take down a giraffe as his prey! The lion is one of them!


 Tick

Ticks feed off the blood of other animals. This includes the lion!


 Grouse

A grouse is kind of like a wild chicken. It likes to eat insects like ticks and seeds.


Front of card

 Giraffe

The giraffe is the tallest animal in the world! This makes it very hard to drink!

 Lion

The lion is King of the savannah. What could possibly eat a lion!

 Tick

The tick is a parasite. This means it hurts another animal to live. A tick sucks

Card examples

AFRICAN SARFARI ECOSYSTEM
Student Post-Activity Sheet

Name: _____

Why do you think we started our web with a grass?

Why do you think a food web is more realistic than a food chain when talking about an ecosystem?

What happened when we cut some animals out of our ecosystem? What does this tell you about the stability of an ecosystem and the interactions among the different organisms?

What's symbiosis? How does it differ from parasitism?

Today we learned about the African ecosystem. Draw an ecosystem from anywhere else in the world. Include at least 5 different organisms and label them carnivore, omnivore, herbivore, producer, or decomposer accordingly. Connect them with lines based on their relationships. They do not all have to be predator/prey relationships but make you label the type of relationship on each line (Ex. predator/prey; symbiotic; parasitic; decomposing).

Research Paper Guidelines

We will be going to the library for the next two class periods to prepare for a research paper. You are going to write a two-three page (1.5 spaced) research paper on an endangered animal in our state. Your paper should include at least three credible sources and must include the following information:

1. Introduction
2. Background information about your animal (range, taxonomy, feeding habits, etc)
3. Reason for being on endangered species list (habitat loss, pollution, hunting etc)
4. Describe the animal's unique niche in its natural habitat and why its existence is important to the fitness of other organisms and to the ecosystem it inhabits. You will need to research and give specific examples of other organism's interactions with your endangered species.
5. Describe ways the state is attempting to help the animal.
6. Think of other ways you, your community, the state, or the government could help the animal further. Present your own conservation plan.
7. Conclusion
8. Works Cited in MLA or APA

Please refer to the following website on citing references and writing your Works Cited section. Make sure you cite any idea (even if it is reworded), picture, or video you find.

	1 Poor Comments	2 Fair Comments	3 Ok Comments	4 Good Comments	5 Excellent Comments
Completeness Required length Introduction complete 1-5 complete Conclusion complete					
Content Relevant Supports paper Strong Accurate					
Organization Thoughts and topics grouped together Paper flows logically Paragraphs flow logically					
Writing Style Grammar Spelling Punctuation Transitions					
References Used 3 references References valid Works Cited correct Citations in paper correct					
Total Points					

Use the above rubric when writing your paper. If your final paper includes all of the rubric elements, you will receive an A.

Student Name: _____

Research Paper Rubric

	1 Poor Comments	2 Fair Comments	3 Ok Comments	4 Good Comments	5 Excellent Comments
Completeness Required length Introduction complete 1-5 complete Conclusion complete					
Content Relevant Supports paper Strong Accurate					
Organization Thoughts and topics grouped together Paper flows logically					
Writing Style Grammar Spelling Punctuation Transitions No first tense					
References Used 3 references References valid Works Cited correct Citations in paper correct					
Total Categorical Points					

Total Points =

Total points times 4 = **/100**

Final Grade

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Final Comments:

Detailed Procedure

Introduction/Pre-questions

So you are in life sciences, right? What do you study in life science? (Living things)

Can you give me some example of things that are living?

- most will name animals
- hopefully others will include plants
- How about bacteria, are they living? Fungus? Why shouldn't we forget about these?

So all animals, plants, bacteria, and fungi are placed into two categories based on what they eat. Remind me of what these are. (Consumer, producer)

- What are you considered? Why?
- So what is an example of a producer? (will say plants)
- Are all plants producers? (most will say yes) How about a Venus fly trap? If available bring in a Venus fly trap and show them!

What have you learned about classifying animals by what they eat (Carnivore, etc.)

So I'm going to name some animals and you guys shout out if you think it's an omnivore, a carnivore, an herbivore, or a decomposer.

- human (omnivore)
- raccoon (omnivore)
- mouse (omnivore)
- pig (omnivore)
- dog (omnivore)
- So sometimes things aren't what they seem, right? You'll learn that in science and in nature there are always exceptions to the rule and things can get very complicated!
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Activity/Lesson Questions

So now we are going to do a fun activity to see just how complicated things can get! Today we are going to Africa! This classroom has now become a safari and each of us is going to become a living thing in this ecosystem. Remind me of what an ecosystem is.

I'm going to hand each one of you a card (pass out the cards). On the front, which is the side that has no lines is the organism you are. On the back is the organism that eats you! We are going to make a food web, and today we are going to start with grass. Why would we start with grass? Who has the grass? Go ahead and read what is on your card.

"Grass is a producer because it makes its own food from the sun. Producers make food for all of us consumers who cannot make food ourselves so a plant is a good place to start in a food web!"

Ok, great! And who eats you? What consumer eats grass (impala)? (ask this student to hold the end of the string and take the ball of yarn, unravel it, and take it to the “impala” student) What does your card say?

(Continue this all the way through the steps. You can discuss all sorts of animal behaviors, parasitism (tick and nematode), decomposers (dung beetle, fungus), scavengers (hyenas, vultures), and symbiosis (ticks and fungus).

Discussion/Post-Questions

So now that we are done making out food web, what can you tell me about it? (Interconnectedness, complexity) I want everyone to grab onto their string really hard and tug on it. Is it staying pretty strong? Why? What does that tell you about a food web? (Stability)

So what are some things that could disrupt an ecosystem? (Poaching, global warming, desertification, habitat loss, pollution) If an animal or plant goes extinct, will it affect all the other plants and animals? Let’s take these scissors and cut the strings to show that these animals went extinct. Now everyone pull on your string. (Web falls apart in places) What happened to our ecosystem when a few animals went extinct? What does that tell you about conservation and preservation of habitats and the living things that make that ecosystem their home?

What are the endangered species in our area?