



LESSON OBJECTIVE

- Understanding how changes in physical or biological components can lead to shifts in populations

GRADE

- 6

STANDARDS

- Life Science

TIME REQUIRED

- 60-90 min

VOCABULARY

- Producer
- Consumer
- Herbivore
- Carnivore

MATERIALS

- Deck of cards for every 5-8 students
- Natural "spoons" such as sticks, rocks, or pinecones (1 per student)
- Bandanas or strip of cloth for every student

RECOMMENDED ASSESSMENT

- Class discussion

Introduction

Students will understand how changes in physical or biological components can lead to shifts in populations by playing a card game similar to Spoons and then playing a physical game to model population changes within an ecosystem.

State Standards

MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Lesson Plan

Background Knowledge –

Review how to play the card game Spoons.

- Producer*: an organism that produces its own food through photosynthesis
- Consumer*: an organism that gets its energy from eating a plant or animal
- Herbivore*: an organism that consumes plant material
- Carnivore*: an organism that consumes meat

Activity 1 –

Animals need food, water, shelter, and space to survive in their environments. Changes in the environment due to physical or biological components can make it challenging for some species to not only survive, but also thrive. We're going to play a version of the card game Spoons to model this competition to survive.

- Split students into groups of about 5-8. Each group will receive a deck of cards and one less natural item than there are people playing (groups of 8 will need 7 items).
- Have students sit in a circle with the items in the middle so no one person is closer to the pile than anyone else.
- Choose a dealer for the first round and have them shuffle and deal 4 cards to each player.

- Clubs = food, Diamonds = water, Spades = shelter, Hearts = space

5. Each person is an animal trying to survive in their environment. The point of the game is to collect 4 of a kind so that all of your animal's specific needs are met.
6. The dealer will grab a card off the top of the deck and decide if they want to keep it or discard it because you can only have 4 cards in your hand. Then the dealer will place their discarded card face down in front of the person to their left.
7. The dealer will then quickly continue the same action with the next card on the top of the deck and everyone else will quickly pick up and discard as the cards come to them.
8. If the dealer runs out of cards in the deck before someone gets four of a kind, they will grab from the discard pile that will be to the left of the last person in the circle and the game can continue.
9. When a player has all of their needs met (gets 4 of a kind), they will grab a stick from the pile. This player has succeeded at finding everything they need to survive, and their animal's population has increased! Then everyone else will scramble to get a stick too. Everyone who gets a stick has managed to keep their population the same. The person without a stick is in trouble – their survival needs were not met, and their population is in decline. If an animal has a declining population 3 times during the game, their animal becomes endangered. If they have a declining population 5 times during the game, their animal becomes extinct.
10. After a couple of rounds, introduce physical and biological components:
 - a. Human development – less space for plants and animals, so have another group pull 1-3 hearts out of the deck so that the players don't know what numbers have been pulled.
 - b. Drought – less water for animals, so have another group pull 1-3 diamonds out of the deck.
 - c. Wildfire – burns down shelter for animals, so have another group pull 1-3 spades out of the deck.
 - d. Long Winter – spring is late to arrive, so there is a lack of food. Pull 1-3 clubs out of the deck.
11. Each component can last one round or many rounds and can stack if you choose. Be sure to have students put the removed cards back into the deck for the next round if not stacking changes.
12. Over the course of the game, the goal is for students to have a population increase (get 4 of a kind) and also not go extinct.
13. How did changes in the availability of food, water, shelter, or space affect the group? Did anyone become endangered or go extinct?



Activity 2 –

1. This game is called Winter’s Coming and it shows how changes in plant and animal populations can affect each other over time. You’ll need a large space to run (a playground is perfect) and each student will need a bandana or strip of cloth.
2. In this game, each student will be either a berry (producer), bunny (herbivore consumer), or hawk (carnivore consumer). How you wear your bandana will indicate what you are in the game.
3. Each round of the game will simulate 1 year of life in the wild. Every time you yell, “Winter’s Coming”, students should gather back to you to see what the population looks like after the year is over.
4. Berries will wear their bandana tied around their wrist. The goal of berries is to survive by avoiding being eaten by the bunnies. If they survive the year, they will get to “evolve” like a Pokémon into bunnies the next year. If a berry gets eaten (tagged), they will be berries again next year.
5. Bunnies will wear their bandana on their upper arm. Bunnies must avoid being eaten (tagged) by a hawk but also succeed at eating (tagging) a berry. If a bunny survives by doing both things, they will get to “evolve” into a hawk the following year. If a bunny is eaten or starves to death, their corpse decomposes and grows into a new berry bush.
6. Hawks will wear their bandana tied as a headband. Hawks must survive by eating (tagging) a bunny. If a hawk survives, they stay a hawk the next round. If they die of starvation, their corpse decomposes and grows into a new berry bush.
7. Each round should last between 1-2 minutes. Start with 1/3 of the class as each species. Release the berries first, then release the bunnies, then release the hawks to run. After each round of play, yell “Winter’s Coming” and discuss what the current populations look like (it will take a few rounds for major change to take place).
 - a. You can record the changes that take place over time by making a chart like this and then graphing the population changes over time.

Year	Berries	Bunnies	Hawks
1	10	10	10
2			
3			
4			
5			

- b. In the wild, berries don’t become bunnies the next year just because they aren’t eaten, but in our game they do. Why do we think that is? What is it helping us model? *[If*

there is a year that is mostly berries and hawks, the hawks will die off from a lack of food. With an abundance of berries and no predators around, bunnies are likely to move into the area to take advantage! We're simulating that change in the ecosystem by having the kids "evolve" into higher beings. This also helps keep the game moving.]

- c. So why do bunnies who survive evolve into hawks? [Similarly, if there is a year with no hawks, the bunny population will explode. This will attract new predators into the area looking for an easy meal, so we're going to have the kids become new hawks.]

8. You can also do a "lightning" round where winter comes early and the round is only 30 seconds long. This can help when game play seems to have slowed down or you want to illustrate changes in population that you see before more students get eaten.
 - a. Is there a sudden explosion of bunnies? What does that mean will happen to the hawk and berry populations next year?
 - b. Is there a round with no bunnies at all? What will happen to the hawks then?

9. Ecosystems have a way of balancing out when things get too uneven. When there is a lot of food, animal populations can soar. Of course, this doesn't take into consideration the other needs of animals like water, shelter, and space.
 - a. Have students graph the changes that you recorded in your chart each round. How did the ecosystem balance itself as the game went on?

Extending the Lesson –

Lead a class discussion about the two games. What did the students notice? What would happen if a new species were introduced into either game? What would happen if students worked in groups to help their species survive (did any berries discover that they could hide behind hawks to stay safe from the bunnies)? How do animals in the wild work together to survive?

Discover Further

Post Activity –

Have the students create a resource map of the things they need to survive (including both physical and emotional needs). How do the needs of humans differ from the needs of animals? How can we make sure we have what we need to survive?

Learn More –

Animal wellbeing at the Zoo means that all of our animals have the resources they need to survive but are also free from discomfort, pain, injury, disease, fear, and distress and are free to express normal behavior. Animals that are going extinct often struggle to find the resources they need, so we are proud to help support those animals as part of our conservation efforts. To learn more about the Zoo's conservation programs, visit <https://kidszoo.org/conservation/>.