9th Grade EdZoocational Adventure Guide

Theme: Keystone Species

Grade level: 9th

DESE Standard: EVS-LS2-6: Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

Overview: A keystone species is a species on which other species in an ecosystem largely depend. It is a species that is so important that if it were removed, the ecosystem would change drastically. They hold together the complex web of relationships within their community. A keystone species can be an animal, a plant, or even a microorganism. As unlikely as it seems, starfish are an example of a keystone species within the marine environment. Sea stars are predatory and feed on mussels and barnacles which have no other natural predators. Losing the sea star allows for an explosive growth in the number of mussels and barnacles which can quickly overtake a reef community. Like pulling the wrong block from a Jenga tower, the balance is lost and the whole thing collapses.

Activity: As students advance along the tour, they should document the role of each species within its environment. Then write how that species shapes its ecosystem and what would happen to that ecosystem if that species were removed.

Activity Extension: Consider the possibility of replacing one of these keystone species with another. How might the ecosystem be changed? What effects might other species within the ecosystem encounter?

9th Grade Tour Guide

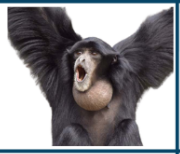
This self-guided tour takes your class along a path to exhibits with animals that are considered keystone species. This path does not cover the entirety of the zoo but is meant to accentuate the lesson narrative.

- As you enter the zoo, head to the right to the Reptile House.
- Remind students that calm, quiet guests see more animals. Loud noises send them into hiding, making them harder to find.
- **Alligators:** Alligators are apex predators and help keep the populations of other species in check. Alligators also alter the landscape of the wetlands by pushing mud and materials around. As they wallow and nest, they create new pools of water and habitats for aquatic animals to live in during the dry season. Alligators can also travel from salt to freshwater when hunting, which transfers nutrients from salt water to poorer fresh waters. Without alligators, dryer seasons would be extremely difficult for many species of animals, along with the quality of the food webs in their environment.
- **Elephants:** Asian elephants have many ways of benefiting their ecosystem. They are seed dispersers and can disperse seeds up to 30 miles away during their daily walks. Elephant dung is also a very nutrient rich fertilizer that allows plants to germinate quickly. Their dung provides food for other animals including the dung beetle and certain larval insects, which may then be eaten by other animals like field mice and honey badgers. Elephants can greatly modify the environment around them too, clearing new pathways for other species or even creating new watering holes. Removing the Asian elephant would be catastrophic for the ecosystem.
- **Sloth Bears:** Sloth bears play an important role in their environment due to their unique diet. Sloth bears eat fruit during the fruiting season, making them a valuable seed disperser for these specific plants. However, they also play a big role in termite population control as they are specially designed to consume huge numbers of termites. Without sloth bears, the termite population would grow immensely, and their large concrete-like mounds would devastate the landscape. Sloth bears are equipped to rip open these mounds and feast on the termites within, minimizing the growth of these colonies.
- **Cheetahs:** Cheetahs are apex predators in the African savannah. Cheetahs help control the herbivore population, which helps maintain a high-quality ecosystem. If cheetahs were removed from the ecosystem, the vegetation would be overeaten by herbivores which could lead to soil erosion, less water, and the conversion of grasslands into a desert landscape. Little Rock Zoo has two cheetah brothers, Padfoot and Prongs.
- **Tortoises:** Sulcata tortoises and radiated tortoises help manage vegetation in poor and arid ecosystems. When tortoises eat the plants around them, the seeds pass through their feces onto the ground. Their feces will then serve as a fertilizer for plant growth, adding to the limited resources and nutrients around them. As they travel around a large home area, they can disperse seeds many miles away. If they were removed from the wild, this arid ecosystem would struggle to regenerate itself.
- **Siamangs:** Siamangs are important seed dispersers in the ecosystem they live in, especially since they eat from over 160 different types of plants. Living in trees, they drop some of these fruits to the ground as either food bits or feces. This can feed some ground dwelling animals but also allows the growth of new plants below. Removing this valuable seed disperser from the wild would cause a decrease in the diversity and fruit in that area, reducing food accessibility to other animals.
- **Gorillas:** Gorillas are mostly vegetarians and consume a variety of plants including bamboo, reeds, and fruits. This makes them very important seed dispersers, promoting the growth and diversity of the plants in their environment. Further, as gorillas move around, their large bodies push open gaps in the forest that allow sunlight to come through and nourish the undergrowth. Gorillas are keystone species as they continually shape the forests and the environments around them.

Name:

Keystone Species

Instructions: Use this field journal to explore some keystone species while on your visit to the Little Rock Zoo. Fill in the chart with the info you learn while on your tour.

Animal:	Role in Ecosystem:	What Would Happen Without Them?
Alligators 	predators, ecosystem engineers	
Elephants 		
Sloth Bears 		
Cheetahs 		
Tortoises 		
Siamangs 		
Gorillas 		

Connection: What local species do you think are keystone species? Why? What makes it a keystone species?