

Culturally Responsive STEM Lesson Plan:



KEY-cosystems

Lesson Objectives:

The student should be able to

- distinguish between the roles of various organisms in an ecosystem.
- design an environment that supports a keystone species.
- relate their created ecosystem to their local biological communities.
- relate the health of their chosen species to past or future actions taken by the community and the local government.
- make connections between the needs of a local keystone species and legislation surrounding its home

Next Generation Science Standard:

- MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

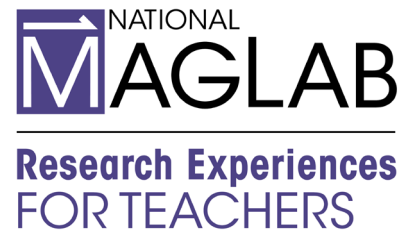
STEM Rationale for Lesson:

In any ecosystem, there are certain organisms necessary for the sustainability of all biological life, otherwise known as keystone species. They help regulate food webs and contribute to the careful balance of an ecosystem. In this lesson students are expected to explain the importance of their chosen species, such as how they contribute to local food chains and how their health affects the health of their home. The class will be exploring the ideal nutrient levels, available food sources, and species diversity found in various ecosystems.

Culturally responsive connection:

This lesson allows students to investigate the components of an ecosystem found in their hometown. In this lesson, students make connections between the needs of a local keystone species and legislation surrounding its home. Students are asked to do research on their community's various ecosystems and find a local keystone species that piques their interest. Students are allowed to use Google Maps to explore the various ecosystems found in their local

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area. After choosing a keystone species, students are instructed to create an ideal home for their chosen organism. At the closing of this lesson, students are given options for the intended audience of their final presentation of their findings; their audience will either consist of the local community members, their class, or their local legislators.

Materials Needed:

Provided by Teacher:

1. Art supplies needed to create a physical recreation of the keystone species' home environment.
 - Markers, colored paper, white paper, paper mâché, twine, metal, etc.
2. Link to [slidedeck](#) that students can copy if they are choosing to do their Ecosystem Creation

Activate Prior Knowledge:

1. Organisms are reliant on other organisms in order to meet their needs.
2. There are various food chains present in every ecosystem.
3. Small changes in one part of an ecosystem may result in a huge change in another.
4. Keystone species are necessary for the health of their home ecosystem.

Lesson Introduction:

In Austin, TX, salamander species found in Barton Springs are endangered and protected by conservation efforts through legislation and actions taken by the city.

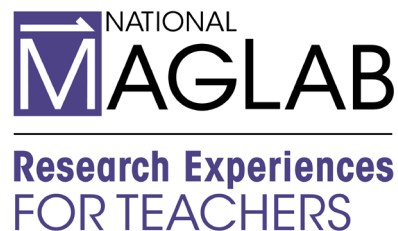
- Teacher:
 - show the students these pages on the Austin Government website and have them discuss **why** they think the city is doing to protect these species.
 - [Barton Springs Salamander](#)
 - [Salamander Habitat Conservation Plan](#)
 - if it is not introduced during discussion, talk about how the role of the salamander is extremely important in its home environment.

You may choose to use any animal that is native to your area and is also threatened/endangered and is protected.

Lesson Activity Steps:

1. Choose a Species
 - Students research and decide on which local keystone species they would like to do their project on
2. Research
 - Students will collect information on

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- the niche of their species
 - the ideal environmental conditions for their species
 - the common ecosystem elements present in the home of their chosen species: herbivores, carnivores, bugs, soil content, vegetation, microorganisms, water quality requirements, and other environmental elements necessary for the health of their species.
3. Gather Necessary Materials
- Students decide if they want to use the [SlideShow](#) or draw on their own paper
 - [SlideShow](#):
 - Google Slides: make a copy of the presentation
 - Choose a background for the ecosystem
 - Students can do this using a solid color or using Google Images (Decorate species' home with elements (organisms, rocks, water, etc.)
 - Physical Creation:
 - Use a pencil to draw a rough sketch of the desired ecosystem (organisms, rocks, water, etc.) of the organism's home
 - create a physical replica of the home of the chosen species as a diorama or other artistic representation
4. Ecosystem Creation
- Students will create an ideal home for their chosen keystone species using their chosen medium (slidedeck or physical creation)
5. Conservation Research
- Students find current legislation that appears to be affecting their chosen keystone species (can either be positively or negatively)
 - Students find any current conservation-focused groups that are geared towards ensuring the health of their chosen species' home

Lesson Assessment

Part 1: Questions about the chosen Keystone Species (this can be done informally throughout the lesson or formally at the end of the lesson)

1. How is the homeostasis of your chosen keystone species maintained by its environment? Provide at least 2 reasons.
2. What will happen if your keystone species is taken out of its ecosystem?
3. How does your chosen species positively contribute to their home?
4. How can legislators ensure the protection of your chosen species' homes?
5. In a busy city, how can we bring awareness to the importance of each individual species?

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Part 2: A Presentation for your Legislator, Community, or Class Members

Create a presentation using a theme of your choosing to send to your legislator or share with your community. Include the following components:

- the identification of your chosen keystone species
- the needs of your chosen species
- the environmental elements found in your species' home
- a picture/display of the ideal ecosystem you created for your chosen species
- at least 4 pieces of local (city, county, or state) legislation you found that may be affecting the sustaining of this species in its home
- at least 3 actions that we, as individuals, can take in order to ensure that our actions are mindful for not only other humans, but the organisms that help sustain our home around us
- various pictures of your chosen species
- Your chosen species and its place in a food web or triangle?

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