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GRADE LEVEL:
Upper Elementary

DURATION:
2 Lessons

SUBJECTS:
Science, Social Studies

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Native or Not?

Lesson Objective & Summary

Objective: Students will be able to understand differences between native and non-native species of life on Mauritius, and will be able to explain how the introduction of non-native species of life can affect native species.

Summary: Students will watch "How Mauritius Formed" to understand why life on Mauritius was separated from life on other islands. Students will also watch "The Aldabra Tortoise" and "The Zebra & the Ostrich" episodes and learn the difference between native (indigenous) and non-native species. They will then participate in a role-playing activity, *Fight for Survival*. Following the activity, students will discuss what they learned about the introduction of non-native species among native species populations, as well as consider the pros and cons of introducing non-native species. Students will watch "The Disappearing Dodo" and discuss how the dodo became extinct. Lastly, students will answer several questions in a written reflection to demonstrate their understanding.

Standards & Benchmarks

From the National Curriculum Standards for Social Studies

- Human beings create, learn, share, and adapt to culture. *(Culture, 1)*
- Through experience, observation, and reflection, students will identify elements of culture as well as similarities and differences among cultural groups across time and place. *(Culture, 2)*
- Personal identity is shaped by an individual's culture, by groups, by institutional influences, and by lived experiences shared with people inside and outside the individual's own culture throughout her or his development. (Individual Development and Identity, 1)

From the National Science Education Standards, Grades 5-8

- All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment. *(Life Science, Standard C)*
- A population consists of all individuals of a species that occur together at a given place and time. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem. *(Life Science, Standard C)*
- Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Fossils indicate that many organisms that lived long ago are extinct. Extinction of species is common; most of the species that have lived on the earth no longer exist. *(Life Science, Standard C)*

From the Common Core Speaking & Listening Standards for Literacy in Science and Technical Subjects (Grade 4/5)

- Engage effectively in a range of collaborative discussions with diverse partners, building on one another's ideas and expressing their own clearly *(Comprehension and Collaboration)*

From the Common Core Writing Standards for English Language Arts & Literacy (Grades 3-5):

- Write informative/explanatory texts to examine a topic and convey ideas and information clearly (T*ext Types and Purposes)*
- Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience *(Production and Distribution of Writing)*

Background Information for Educators

The island of Mauritius was untouched and secluded from outsiders for centuries. Most of the native animal species of Mauritius arrived by air (birds) or sea (amphibians or reptiles) and remained undisturbed until humans began exploring the island. Non-indigenous species of plants (such as the Amazonian Lily, or Victoria Amazonica) and animals (such as the zebra and ostrich) were later introduced to the island by traders, which had a profound effect on the local ecosystem.

Perhaps one of the most significant impacts of imported species was on the dodo bird. Prior to human contact and the introduction of non-native species to Mauritius, the dodo species lived in peaceful abundance without any predators on the island. However, the arrival of humans also brought hunters and predators such as dogs, rats, and monkeys, to the dodo's island sanctuary, and soon the dodo species' inability to protect itself from these foreign species led to their demise and ultimate extinction.

The Aldabra Tortoise is one of the few "endemic" species that still live on Mauritius. Unlike native (indigenous) species of plants and animals, which may be found anywhere, endemic species are entirely unique to their environment and cannot be found elsewhere. The Aldabra Tortoise is highly endangered, due to over-hunting by sailors who corralled them onto ships for food sources, but much is being done on Mauritius to save these gentle giants from extinction.

Guiding Questions	Key Vocabulary
What is the difference between native (or indigenous) and non-native (or imported) species? What are some of the effects when non-native species are introduced to a new environment?	Indigenous Imported Native Endangered Extinct Endemic

Lesson Plan

1. Ask students to take a look at Mauritius on a World Map. What do they notice? (It's an island… It is near the eastern coast of Africa…It is surrounded by the Indian Ocean). Ask students to think about how Mauritius may have formed.

2. Show students the episode "How Mauritius Formed." Then, challenge students to think about how plants and animals may have come to Mauritius. Point out that, because Mauritius is an island, the plant and animal species living on the island were separated from other life forms by the ocean. Explain that these species are called "indigenous."

3. Ask students to share what they know about the words "native" and "foreign" or "non-native." Work together to build clear definitions for all students to understand. If necessary, help students make connections using words or concepts with which they are familiar (i.e.: native peoples are those who were originally come from a place; foreigners are people who come from another country).

4. Have students think about what kinds of animals may be "indigenous" to Mauritius. Then have students check their predictions with a quick visit to the Mauritian Wildlife Foundation website or to this general overview of wildlife on Mauritius: http://www.travelguideline.net/the-wildlife-of-mauritius.html

5. Watch "The Aldabra Tortoise" and "The Zebra & the Ostrich" episodes. Explain that the Aldabra Tortoise is a special type of native animal on Mauritius that does not exist anywhere else in the world. It is therefore called "endemic." Explain that zebras and ostriches were introduced to Mauritius by visitors from South Africa ("non-native species"), and that they thrived in their new island habitat where there were no native predators.

6. Ask students to consider what might happen when new animal species are introduced to a new habitat. On a notecard, have students predict what they think might happen to both the native (indigenous) species and the non-native species.

7. Tell students that they will play a role-playing game to learn about this concept, called *A Fight for Survival:*

Role-Playing Game: A Fight for Survival

Adapted from "Battlefield Earth," a lesson plan created by the National Teacher Training Institute's Thirteen Program.

How to Play: Explain that each colored chip represents something needed for plants' and animals' survival:

White: Shelter/Habitat
Red: Food/Minerals
Blue: Water

To play A Fight for Survival, you will need:

A playing field or large area (30' x 60' works well for 20 students), marked off by cones if necessary.

White, Red, and Blue poker chips (enough so that each player may collect one chip of each color during the first round,) spread across the playing field.

Colored armbands, one for each student.

Round One: All players will be native to the specific area. Everyone will line up along the edges of the playing field at the start of each round. At the sound of the whistle, players will enter the playing field, collect one of the three different colored chips and return to the edge of the playing field. After all of the students have returned to the sideline, they return to the playing field and collect another chip of a different color. Once again, they go to the sideline, returning a third time for the third colored chip. After a player has collected all three colored chips, he or she moves to the sidelines to wait for the signal to end the round. All players should survive the first round.

Round Two: This round will be played the same as Round One, but will now include non-native species. Two players wearing colored armbands represent a non-native species. The non-native species are more aggressive and will be allowed to collect two chips per trip into the playing field. The non-native will also be allowed to return to the playing field as often as they are able but must collect three different colors in order to survive. The native species will be considered a survivor if he or she collects three different colored chips as they had done in Round One.

Sound the whistle to end Round 2. Identify the survivors. Evaluate by comparing population size and impact the non-native species had on the natives.

Round Three: Native species that did not survive Round Two become non-native for this round. Give each new non-native an armband. Continue to play Round Three just like Round Two. At the end of Round Three, most, if not all, of the native population should not survive. Evaluate as in Round Two.

Post Game:

1. After playing A Fight for Survival, discuss with your students what they observed as they were playing the game. As a class, ask students to consider how and why everyone survived the first round. Then, ask students to consider what happened in Rounds Two and Three as more non-native populations were introduced.

2. Have students watch "The Disappearing Dodo" episode and read the Flora and Fauna blog. Encourage students to consider what factors played a role in the dodos' and other animals' extinction.

3. On a piece of paper, have each student answer the following questions:

    - What do all living species' need to survive?
    - Why have some species of plants and animals become extinct in Mauritius?
    - Besides using up the resources native species' needed for survival, what are some of the other possible ways that non-native species' may have impacted the indigenous species of Mauritius (hint: What may have happened when humans began settling on the island?)
    - Why do you think there are some indigenous endemic species, like the Aldabra Tortoise, that continue to survive on Mauritius, while other animals, such as the Dodo, are now extinct?

Challenge Questions / Possible Extensions

- What other native species on Mauritius (or in your own community) have been affected by the introduction of non-native species?
- Watch the "Victoria Amazonica" video. How does this plant impact native species of aquatic plants and life? Why are these water lilies so special to the botanical gardens on Mauritius?

Assessment Rubric	Below Expectations	Meets Expectations	Exceeds Expectations
Student Reflection	Student identifies one or two of the basic needs of living organisms. Student uses general and/or vague reasons to explain how non-native species' impact the survival of native species (i.e.: "When new species came, they took the food of the old species, so the old species all died."). Student explains the survival of some endemic species (such as the Aldabra Tortoise) using general ideas (i.e.: "Dodos became extinct because people killed them") but may lack additional reasons to support their statements.	Student clearly identifies the basic needs of living organisms (including habitat, water, and food). Student uses specific reasons to explain how non-native species' impacted the survival of native species (i.e.: "As non-native species began taking resources away from the indigenous species, the indigenous species had a more difficult time surviving"). Student explains the survival vs. extinction of different endemic species (such as the Aldabra Tortoise) with clear explanations and reasons (i.e.: "The Aldabra Tortoise does not have any predator, so the species was able to survive even when non-native species were introduced.")	Student clearly identifies some of the more specific needs of living organisms, perhaps differentiating needs based on type of animal. Student uses specific reasons to explain how non-native species' impacted the survival of native species, but with higher-level thinking and reasoning (i.e.: "When non-native species were introduced to Mauritius, the indigenous species' habitat was invaded, and native species had to now share their limited resources with other animals.") Student explains the survival vs. extinction of different endemic species with clear explanations and reasons that reflect higher-level thinking (i.e.: "When human settlers came to Mauritius, they began hunting dodos as sources of food. They also brought non-native animals to Mauritius who became predators for dodos. Unlike the dodo, which is now extinct, the Aldabra tortoise and its survival were not threatened by the introduction of non-native species").

Assessment / Evidence of Understanding

- Student identifies some of the basic needs of all living organisms, particularly food, habitat, and water
- Student can explain how the introduction of non-native species to an environment can negatively impact the survival of the indigenous species in that environment.
- Student can explain why some endemic species become extinct while others survive.