THE ZOO Teacher Resource Guide

Conservation of the Kihansi Spray Toad

6-8th Grade
HOW TO USE THIS RESOURCE GUIDE

We created this guide to support student learning utilizing Animal Planet’s The ZOO, a television show focusing on animal care, conservation, and education at The Bronx Zoo. In the following pages, we highlight a storyline from the show and provide you with tools and tips for learner engagement and understanding. The Bronx Zoo Education department created this resource in collaboration with our Teacher Advisory Council, a group of certified teachers and educators that supports education programming at The Bronx Zoo. Below, you will find an outline and tips on how to use each section of this guide.

Summary
This section includes the season and episode number, a summary of the episode’s storyline, and timestamps to help you navigate to the applicable portions of the episode. Please note that the timestamps may not match exactly, depending on the browser and website that you are using to watch the episode.

Background Information
This section provides more information and context for the highlighted storyline. This information may include natural history, animal biology, conservation background, and more. This information will help both you and your learner get a more complete picture of the topic covered in the episode.

Vocabulary
This section defines words introduced in the episode that may be new to the learner or have a different meaning in the context of The ZOO or conservation in general.

Connection to Standards
In this section, you will find a list of the specific standards that this resource meets if completed in full. Next Generation Science Standards (NGSS) and New York State Standards Common Core (NYSS CC) are both included.

Episode Discussion Topics
This section was developed to encourage discussion and further understanding of the concepts introduced in the show. These questions are intended to facilitate a meaningful conversation about topics introduced in each segment of the storyline. Feel free to use as many of them as you wish to further understanding based on the needs of your learners.

Activities
This section details activities that align with the content of the individual storyline. There is an introductory activity to do before watching, a follow up activity to do after, and extension activities to help connect these lessons to other subjects.

Additional Resources and Literature
This section contains resources related to the topic of the episode as well as recommended reading for continued learning.
The Bronx Zoo prepares to send Kihansi spray toads back to Tanzania, Africa and participate in a soft release after the species has been extinct in the wild for 10 years. This episode discusses the challenges with monitoring and reintroducing the species back into their natural habitat.
Why do zoos participate in captive breeding programs?

Zoos and aquariums participate in captive breeding programs to help sustain healthy and diverse populations of the species in their care. The Association of Zoos and Aquariums contributes to population management and conservation of species through the Species Survival Plan (SSP). The SSP helps organize collective zoo and aquarium-based efforts to conserve species. These efforts include breeding programs, as well as educational initiatives, scientific research studies, and conservation efforts in the wild.

Environmental impacts of the hydroelectric dam in Tanzania

In 1995, the Tanzanian government built a hydroelectric dam in the Kihansi River Gorge. The purpose of a hydroelectric power dam is to utilize the energy of flowing water, transforming it into electrical energy to generate electricity. Hydroelectricity is an important source of energy for many countries around the world, including Tanzania. Dams often have unintended negative effects on the surrounding environment and wildlife. The building of a dam is often a multi-layered affair with many different stakeholders involved in creating a solution that satisfies everyone.

Importance of preserving biodiversity

There are three main interconnecting factors that are vital for organisms to survive on Earth. A sustainable biodiverse region needs to have a complex ecosystem, a healthy variety of species, and genetic variety within those species. Every link provides stability for the next. Since many organisms are dependent on each other for survival, taking away just one component can weaken the entire system.
VOCABULARY

- **Indicator Species**: an animal or plant species that can be used to infer conditions in a particular habitat

- **Population**: the number of individuals of the same species that live in a particular geographic area at the same time, with the capability of breeding

- **Extinct**: a species, family, or other larger group that has no living members

- **Gorge**: a narrow valley between hills or mountains, typically with steep rocky walls and a stream or river running through it

- **Microclimate**: the climate (weather conditions) of a very small area, especially when it differs from the climate of the surrounding area

- **Acclimatize**: to respond either physiology or behaviorally to a change in conditions in the natural environment

- **Conservation**: the practice of protecting animals and other species and their habitats

- **Elastomer**: a strong, stretchy substance similar to rubber that was used to mark the toads in the episode

- **Biodiversity**: the variety of species found in an ecosystem

- **Soft release**: gradually accustoming wild animals to a new environment before releasing them into it
CONNECTION TO STANDARDS

New York State Standards – Common Core (NYSS CC)

Living Environment: Standard 4

Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Performance Indicator 7.1

Describe how living things, including humans, depend upon the living and nonliving environment for their survival.

Major Understanding 7.1b

Given adequate resources and no disease or predators, populations (including humans) increase. Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem.

Next Generation Science Standards (NGSS)

**MS-LS2-5**- Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

**MS-ETS1-2**- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
EPISODE DISCUSSION TOPICS

Segment 1 (07:10 - 12:40): Introduction to Kihansi Spray Toads

- Which two zoos have spray toads?
- Where are the toads from? What happened to the toads’ natural habitat? How long have the toads been missing from their natural habitat?
- What were the initial challenges the zoo had when the toads arrived?

Segment 2 (17:22 - 23:55): Preparing them to travel to Tanzania

- What are some preparations that were made before making the trip with the spray toads? What was one preparation that surprised you?
- How is the holding facility at University of Dar es Salaam different than the one at the Bronx Zoo?
- What is the Tanzanian team going to teach the Bronx Zoo team in the gorge?

Segment 3 (27:10 - 31:55): Hiking up the mountains

- Why is the foot washing station important before hiking into the mountain?
- What are the professions of the people that work at the Rungwe basecamp? Which of those would you like to do?
- In what part of the wetlands are the toads located?

Segment 4 (35:20 - 41:00): Releasing toads back into the wild

- Why do the scientists inject dye into the toads? What are they trying to do? How could this strategy be helpful for the team in the Bronx?
- What are some challenges the spray toads might face once released back into the wild? Do you think the population in the wild is sustainable? Why or why not?
- Why reintroduce toads back into the wild? Why not keep them in the zoo?
Objective:
In this activity, students will think about how zoos design exhibits to meet the needs of animals, staff, and visitors.

Summary of Lesson:
Students will design an exhibit for an animal of their choice after researching the needs of that species.

Steps:
1. Instruct students to choose an animal and research the needs of that species, considering things like climate, habitat, and dietary needs.
2. Using what they learn in their research, direct students to design an exhibit for their species.
3. As students work on their designs consider giving them the following prompts:
   a. What is the role of a zoo?
   b. What do animals need to have in their exhibits to sustain their health and ensure that their needs are met?
   c. How will zookeepers access the exhibit safely to provide food, clean and maintain the space?
   d. How will zoo visitors observe the animals?
   e. What information should be provided to the public to help them learn more about your animal?
4. Ask students to share their ideas with the group. They can share the features of the exhibit and explain how those features will meet the needs of animals, staff, and visitors.
Follow Up Activity

Design a Local Animal Soft Release

Objective:
In this activity, students will use their knowledge of the Kihansi spray toad reintroduction to create a similar soft-release enclosure suitable for a local animal.

Summary of Lesson:
Students will design a habitat for an animal local to their area that needs to be reintroduced to the wild. Students should rely on the knowledge they have gathered through watching the episode, and can conduct research to learn more.

Steps:
1. Have students brainstorm what local wildlife might be affected by human infrastructure in the area around their school or neighborhood. Ask students to choose one local animal and either individually or in groups design a soft release enclosure for that animal.
2. Have the students research their animal to learn about the habitat, diet, and other needs of the animal.
3. Instruct students to create a small enclosure model or draw an enclosure design for their animal, based on their research.
4. All aspects of the design should have a purpose and students should label each part of their design to explain its purpose.
5. As students work on their enclosure designs consider giving them these prompts.
   a. What environmental needs does your animal have?
   b. What type of climate should the enclosure be in?
   c. What food sources are needed for the animal?
   d. Think about the challenges the Bronx Zoo and the Tanzanian team encountered when creating their soft release enclosure.
6. Ask students to present their designs to the group.
Extension Activities

**Art:** Ask students to imagine that they are hired by the Bronx Zoo to create some informational signs about a species of their choice. Students can select a species to create a sign that will educate the public about this animal and its importance.

**Debate Question:** Pose the following question to the students: “What are the ethical implications of tagging an animal? What are the pros and cons of tagging an animal?” Allow students to discuss this topic in small groups and share out their thoughts.

**Visit the Bronx Zoo:** Bring your students to the Bronx Zoo to take the Innovative Conservation program and visit Kihansi spray toads in the World of Reptiles exhibit. You can learn more about Bronx Zoo Education programs at [http://www.bronxzoo.com/learn](http://www.bronxzoo.com/learn).
ADDITIONAL RESOURCES AND LITERATURE

Literature on Kihansi Spray Toads:

Kihansi Spray Toad's Journey Back Home: This article by the Global Environment Facility highlights the history of the Kihansi Spray Toad’s population in Tanzania, describes the Bronx Zoo’s involvement in their reintroduction, and discusses the work still needed to ensure the survival of the species.

Kihansi Spray Toad (Nectophrynoides asperginis) IUCN Red List: This website details the conservation status of the Kihansi Spray Toad prior to their reintroduction to the wild.

Once Extinct in the Wild, Kihansi Spray Toad Returns to Tanzania (by Way of the Bronx and Toledo): This article from Scientific American tells the conservation story of the Kihansi Spray Toad and highlights the Wildlife Conservation Society’s involvement.

Literature on Exhibit Design

How to Design a Zoo Exhibit in Four Steps: This article from the Smithsonian Science Education Center, provides a quick overview of the exhibit design process.

The Future of Zoo and Aquarium Design: This edition of WAZA Magazine, released by the World Association for Zoos and Aquariums, contains articles on how zoo exhibit design has changed over the years and on various aspects to consider in designing zoo exhibits.

PHOTO CREDITS

All photos: Julie Larsen Maher/WCS