



Salamander of the Gods

OVERVIEW

Salamander of the Gods highlights efforts to restore wild populations of two endangered Mexican salamanders, the axolotl and the achoque. The film shows researchers, farmers, fishers, and Dominican nuns working together to conserve these species. Additional information can be found on [this episode's webpage](#).

KEY CONCEPTS

- Local, historical, and cultural knowledge play an important role in conservation efforts.
- Sustainable practices that benefit wildlife often also benefit human communities.
- Collaboration between different people and groups is essential for effective conservation.

BACKGROUND

Long a symbol of Mexican heritage and culture, the axolotl is a popular pet and pop culture icon. It is interesting to observe because it maintains juvenile characteristics (e.g., feathery gills, webbed toes, and a dorsal fin) even as an adult, a phenomenon called “neoteny.” The axolotl is also an important model organism — especially in heart, central nervous system, stem cell, and tissue regeneration research — because of its large embryos and ability to regrow body parts.

Despite its ubiquity in captivity, the axolotl is critically endangered in the wild. Its last wild population, which resides in Lake Xochimilco in southern Mexico City, declined from around 6,000 individuals (per km²) in 1998 to just 36 in 2014. To help restore wild axolotls, a team of scientists and farmers is using a sustainable farming practice originally developed by the Aztecs: human-made island gardens, called “chinampas,” in the lake. Chinampas provide nutrients for crops while filtering the water with plants, which benefits both people and nature. The team is also raising axolotls in captivity so they can be released back into the wild.

The second part of the film features a different team working with the achoque, another critically endangered species of salamander related to the axolotl. Wild achoques are found only in a single lake, Lake Pátzcuaro, in central Mexico. Scientists are working with the local fishing community to reduce pollution in the lake and ultimately reintroduce captive-bred achoques. They are applying some of the lessons learned from the successful reintroduction of the endangered tequila fish into a nearby river. They are also drawing on the expertise of local Dominican nuns, who have been raising achoques (originally to make cough syrup) for over a century.

People/groups highlighted in the film include:

- Mexican biologists who are working to conserve axolotls and achoques.
- Farmers (chinamperos) and development planners using sustainable farming practices.
- Fishermen and community members who are helping to reduce water pollution.
- Nuns who are experts at breeding and raising achoques in captivity.
- Artists and artisans who are helping to build community awareness and passion for the achoques.

BIODIVERSITY THREATS

Five of the biggest threats to biodiversity are represented by the acronym **HIPPO**: **h**abitat loss, **i**nvasive species, **p**ollution, **p**opulation growth (of humans), and **o**verharvesting. The HIPPO threats shown in this film include:

- **Habitat loss:** The Spaniards destroyed most of the axolotl's habitat by draining the lake. Declining water quality due to pollution has also degraded the axolotl's and achoque's habitats.
- **Invasive species:** Invasive fish species, such as carp and tilapia, were intentionally introduced by humans as food sources. They prey on axolotl eggs and young.
- **Pollution:** Axolotls and achoques spend their entire lives in the water, and they are especially sensitive to water pollution because of their permeable skin. Agricultural pesticides and wastewater have degraded the water quality in the lakes where they live.
- **Population growth:** Human population growth has led to more human impacts, such as increased pollution.

DISCUSSION QUESTIONS

- (*Before the film*) How might changes in an environment (whether natural or human-caused) cause some species to decline?
- Why are there so many axolotls in captivity, and how might we restore the wild population with captive individuals?
- As a population of a species decreases, so does its genetic diversity. Why might losing genetic diversity be detrimental, and how can captive breeding efforts help counteract this?
- What might changes in the axolotl and achoque populations indicate about the overall health of their ecosystems? What other species might function as "indicator species" for ecosystem health?
- Collaboration between different people and groups is essential for effective conservation. Describe some specific examples of collaboration in the film and how they have been successful.

REFERENCES

Voss, S. Randal, and H. Bradley Shaffer. "Adaptive evolution via a major gene effect: paedomorphosis in the Mexican axolotl." *Proceedings of the National Academy of Sciences* 94, 25 (1997): 14185–14189.
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CREDITS

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