

FROG CONSERVATION


LESSON PLANS: SECONDARY SCHOOL



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

The purpose of this lesson is for students to consider the importance of conservation and preservation to ensure sustainability of the natural environment. Students explore the impact of increasing urbanisation and climate change on natural flora and fauna. Through a focus on frogs, students consider what this species requires for survival and the responsibility of ensuring the survival (or restoration) of threatened species in the future.



 Watch this video

Discover how the University of Newcastle is protecting Australia's frog populations.

[NEWCASTLE.EDU.AU/HIPPOCAMPUS](https://newcastle.edu.au/hippocampus)

INTENDED LEARNING OUTCOMES (ALIGNMENT)



SUSTAINABILITY (CROSS-CURRICULUM PRIORITY)

The activities included in this lesson may be adapted by teachers to suit any secondary school year level.

SCIENCE LEARNING AREA:

Stage 4 (years 7 and 8):

- ACSHE135 - solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations

Stage 5 (year 9 & 10)

- ACSSU184 - Transmission of heritable characteristics from one generation to the next involves DNA and genes
- ACSSU176 - Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems:
 - investigating how ecosystems change as a result of events such as bushfires, drought and flooding

HASS LEARNING AREA (GEOGRAPHY SUB-STRAND):

Stage 4:

- ACHGK053 - Causes, impacts and responses to a geomorphological hazard
- ACHGK051 - Human causes and effects of landscape degradation

Stage 5:

- ACHGK070 - Human-induced environmental changes that challenge sustainability
 - discussing the concept of sustainability in relation to environmental functions
 - identifying human-induced environmental changes (for example, water and atmospheric pollution; loss of biodiversity; degradation of land, inland and coastal aquatic environments) and discussing the challenges they pose for sustainability

UN SUSTAINABLE DEVELOPMENT GOALS

- | | |
|--|--------------------------------|
| 11. Sustainable cities and communities | 15. Life on land |
| 13. Climate action | 17. Partnerships for the goals |
| 14. Life below water | |



ALIGNED WITH THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS



The activities included in this lesson may be adapted by teachers to suit any secondary school year level.

OUTCOMES - STAGES 4/5

Science

- SC4-14LW relates the structure and function of living things to their classification, survival and reproduction
- SC4-2VA/SC5-2VA shows a willingness to engage in finding solutions to science-related personal, social and global issues, including shaping sustainable futures

Geography

- GE4-5 discusses management of places and environments for their sustainability
- GE5-5 assess management strategies for places and environments for their sustainability



TOPIC 1

HABITATS AND ENVIRONMENTS

Students are encouraged to consider the importance of habitat to the survival of native species.

Class discussion: consider the impacts of urbanisation on wildlife.

Possible discussion points:

- Adaptability
- Conservation efforts
- Sustainability



Website resource

TOPIC 2

GEOMORPHIC HAZARDS: BUSHFIRES AND FLOODS

Individually or in groups, students explore the impact of geomorphic hazards on wildlife. As an example, teachers may use the 2019/2020 bushfires or the 2018 floods as case studies, to encourage students to consider how the increasing intensity and regularity of such events impacts on flora and fauna.



Website resource

TOPIC 3

CITIZEN SCIENTISTS

Students are then introduced to the idea of conservation science and the fieldwork undertaken to observe and record vital data to monitor, conserve and manage flora, fauna and ecosystems.



A day in the life of an aquatic ecologist

Following the video, the teacher then leads a discussion about the tasks being undertaken by the research group and how these come to inform knowledge.

SAVING THE FROGS

Students view the video Saving the frogs, listening to Professor Michael Mahoney, followed by a discussion about the significance of the work being done with frogs at the University of Newcastle, where the teacher has the opportunity to extend and refine student understanding. Some key ideas from the video include:

- Frogs as bio-indicators of change
- 50 million frogs killed in fires of 2020
- Environmental degradation
- Preservation for future



Saving the Frogs

TOPIC 4

SUSTAINABILITY: ENSURING FROG FUTURES

The following case studies provide opportunities for students to consider how recent scientific advances are working towards the preservation of particular species to safeguard their futures in the face of threats to habitat and environment as a result of climate change, urbanisation, and habitat destruction.

CASE STUDIES

- Teacher provides an overview of the process of cryopreservation
- The purpose of these case studies is for students to consider the importance of biodiversity and how scientists are working to restore the balance.

DNA CRYOPRESERVATION – “IVF FOR FROGS”

- The Australian Ground Frog – Students consider the significance of the development of a method for the freezing of embryonic cells to allow for future cloning. Benefits that may be considered include:
 - The ability to diversify frog populations to avoid inbreeding (reintroduction of historical DNA)
 - Genome banks as “insurance policies” for species under threat of extinction

THE GASTRIC-BROODING FROG: GENOME TECHNOLOGIES AND DE-EXTINCTION

- Students explore the concept of de-extinction (sometimes also referred to as resurrection biology or species revivalism)
 - The Lazarus project – Students investigate how researchers approached de-extinction through the successful revival and reactivation of the genome of the extinct Australian Gastric-Brooding Frog using sophisticated cloning technology

RESOURCES

The following resources may be shown to students, or used to assist students



The Lazarus project website resource



The Lazarus project website resource

The following TED talk provides a comprehensive overview of the work of the Lazarus project, then extending to a Thylacine project (Tasmanian Tigers) – this video is well suited to senior students and teachers:



The Lazarus project video

CONCLUSION

Class discussion: *Sustainability*

Students consider the importance of responsible citizenship in caring for the environment in the face of increasing environmental degradation and climate change. Students should reflect on the importance of preservation as a means of safeguarding the future survival of threatened species.

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