

4.1 Do numbers of different organisms change in an ecosystem?

Lesson outcomes

At the end of this activity students will be able to:

- explain how the numbers of an organism (population) may change due to changes in the numbers of other organisms in the ecosystem.

Equipment list

The **CLASS** will require:

- internet access

Each **GROUP** will require:

- *Student Guide*

Each **STUDENT** will require:

- **Notebook**

Things to consider

Ensure students do not skip the first step in the task. They should not start the interactive part of the activity until they are familiar with the living things that make up the ecosystem.

Lesson plan

Step 1: Remind students to become familiar with the living things in the seagrass ecosystem before they start the interactive.

Step 2: As the students work with the interactive ensure they are clear about what they intend to change and the resulting effect it has on other living things. They should record their ideas and the results in the spaces provided. This will generate a summary that enables students to understand the system dynamics. These summaries can be saved as pdf documents and added to their **Notebooks**.

Step 3: Direct students to form groups of four to discuss the questions in the digital resource.

Step 4: After group discussions, ask some students to tell the class what they decided had caused a change tested by a pair in their group.

Step 5: Create a class list of factors that might cause changes in the ecosystem, such as those tested in this activity.

Suggested question/s:

- What changes were you expecting to see?
- Did you see what you expected?
- Can you explain why the changes you tested and observed might have occurred?

4.2 In what ways might humans change ecosystems?

Lesson outcomes

At the end of this activity students will be able to:

- plan an investigation into human resource use and communicate findings to peers.
- apply an understanding about food webs to interpret environmental impacts.

Equipment list

The **GROUP** will require:

- *Student Guide*
- internet access if an internet search is allowed.

Each **STUDENT** will require:

- **Notebook.**

Things to consider

Students plan and carry out research into the changes in ecosystems that may result from human use of a chosen resource. Students report on their research methods and conclusions and answer classmates' questions.

- Students will find it much easier to search for relevant information if they are investigating a specific example of resource use. They may use the notes about resource use in their student guide to decide on a subject. For example, they may investigate the environmental effects of the use of old growth forests as a grazing ground for cattle, of clearing forest for crop farming, of using solar energy as a renewable energy source or commercial use of nets for fishing in a local area.
- You may choose to direct the students to a significant local issue of resource use.
- Useful resources can be found by searching for 'Environmental effects of' where the human disturbances may be urbanisation, mining, coastal development, agriculture, commercial fishing, hunting, solar farms, wind farms, etc.
- You may choose to limit the topic or topics the students investigate and place copies of relevant information on a class wiki, or make the information available in some other way.
- You may choose to allow students to summarise their conclusions in a poster, a verbal presentation, a blog or another electronic format.

Lesson plan

Step 1: Discuss with each group the topic and nature of the information they plan to collect. If necessary, clarify focus by asking questions about the nature of the resource they are investigating, how it is collected and exploited and what information they expect to find.

Step 2: When students analyse their collected data, remind them that they must support their conclusions in a class presentation by referring to this information. Suggest this would be easier if the information was summarised clearly in a table, list or diagram.

Step 3: Arrange group presentations and encourage students to ask questions about the resource, the way it is used, the sources of information or how the information collected supports a viewpoint.

4.3 Managing ecosystems

Lesson outcomes

At the end of this activity students will be able to:

- describe how traditional Indigenous management practices help us manage ecosystems today.

Equipment list

The CLASS will require:

- *Student Guide*
- internet access.

Each STUDENT will require

- ***Notebook.***

Things to consider

This activity is intended to support the development of literacy skills as students explore links between traditional Aboriginal practices and today's management of Australian ecosystems.

This activity could be paired with a story-telling session by a local Indigenous person about traditional Aboriginal practices, such as burning, food gathering, caring for the environment and the ways these practices are related to our current desire to sustainably manage ecosystems.

You could show video clips of Aboriginal people discussing how they maintained their environment and food sources. Some useful URLs include:

<http://www.twinlakes.net.au/page11/page11.html>

http://www.ehow.com/info_8284905_aboriginal-land-management-techniques.html

Lesson plan

Step 1: Consider your students' reading and interpretation skills and if necessary work with different groups to read materials or find meaning.

Step 2: After reading about wetland burning, ask the students to view the video of today's burning practices.

Step 3: Conduct a class discussion of the conclusions of several or all groups.

4.4 Removing pest species

Lesson outcomes

At the end of this activity students will be able to:

- discuss why eradication of the rabbits from Macquarie Island was considered an appropriate environmental management strategy.

Equipment list

The **GROUP** will require:

- internet access.

Each **STUDENT** will require:

- **Notebook.**

Teacher content information

Macquarie Island is an Australian territory half way between New Zealand and Antarctica. It is home to about 40 expeditioners over summer and 16 over winter. It is a breeding place for millions of seabirds, mostly penguins, and seals.

The main work on Macquarie is biological science but other programs include upper atmosphere physics, geoscience, medicine, meteorology and climate change studies.

Things to consider

- This activity is intended to support the development of literacy skills through the use of provided text to answer questions about removal of rabbits from Macquarie Island.
- Students can check and if necessary modify their answers by viewing video clips provided in the digital resource. How would you like students to view the videos, as a class, in small groups or on individual devices?

Lesson plan

Step 1: Refer students to the map to locate Macquarie Island and to the images of the island inhabitants. Remind them of the work they did in **Activity 1.2** on conditions in Antarctica.

Step 2: Consider students' reading and interpretation skills and if necessary work with groups to read materials or find meaning in the *Student Guide* text.

Step 3: The discussion questions require students to read and interpret the text. Help where necessary by asking questions such as those below.

- Did the rabbits eat other animals or did they eat the plants on Macquarie Island?
- The text refers to soil erosion. Why do you think this happens?
- What is it that interferes with the nest building of the island's native birds?
- How were the insects and worms harmed?
- Why were there so many rabbits on the island in the early 2000s?
- Can you name three or more methods tried to remove the rabbits from the island? Which succeeded?
- Some people concerned for animal welfare didn't want to use poisons dropped from helicopters? Was this because they didn't want the rabbits killed or another reason?

Step 4: Once the groups have had time to discuss questions based on their reading, direct them to the videos in the digital resource to check or modify answers.

Ask students to discuss the question posed in the guide: 'Can removing an introduced pest from an ecosystem enable the ecosystem to return to its original wild state?'

4.5 An attempt to control a pest that went very wrong

Lesson outcomes

At the end of this activity students will be able to:

- explain the causes and effects of change in ecosystems into which the cane toad has migrated in terms of food chains and food webs.

Equipment list

The **CLASS** will require:

- internet access.

Each **GROUP** will require:

- *Student Guide*

Each **STUDENT** will require:

- **Notebook.**

Things to consider

In this formative assessment task students see a video about the introduction of the cane toad to Australia. Students develop explanations of why the observed changes in numbers of other species have come about and explain these interactions by drawing food chains or a food web.

Curriculum descriptions addressed:

- Interactions between organisms can be described in terms of food chains and food webs; human activity can affect these interactions (ACSSU112).

Evidence shown in student work

Students should be able to:

- Explain why cane toads were introduced to Australia
- Propose an explanation as to why they became a problem
- Identify some organisms damaged by cane toads
- Describe a method used to try to control the cane toad
- Develop a series of food chains or a food web and use it to explain the problems caused by cane toads in Australia.

If your students live in an existing or potential cane toad area, they might visit

<http://www.feralscan.org.au/toadscan> and participate in an online national cane toad mapping initiative.

Lesson plan

Step 1: First show the class the video without pauses or explanations.

Step 2: Direct the students to the questions in the **Notebook** section. Explain that although students can discuss answers with others, you want them to write individual answers in their **Notebooks**, which will show what they have learnt and remembered about food webs and food chains from previous activities.

Step 3: As the students draw their food web encourage them to review the video to find as many things as possible eaten by the cane toad. They should then deduce for themselves what these animals eat and what will happen to their numbers or that of their food sources.

Step 4: Review students' food webs to analyse their understanding of webs and interactions leading to changes in organism numbers in ecosystems. An evidence checklist for the assessment of relevant understandings is provided above.

Step 5: Watch the video on quolls and the novel technique to train quolls to avoid cane toads with the use of cane toad sausages.

Follow up:

A **very entertaining** and quirky video you might show the class is 'Cane Toads: The Conquest' at <https://www.youtube.com/watch?v=8PxxLtiAYdw> (1 hour, 20 minutes).