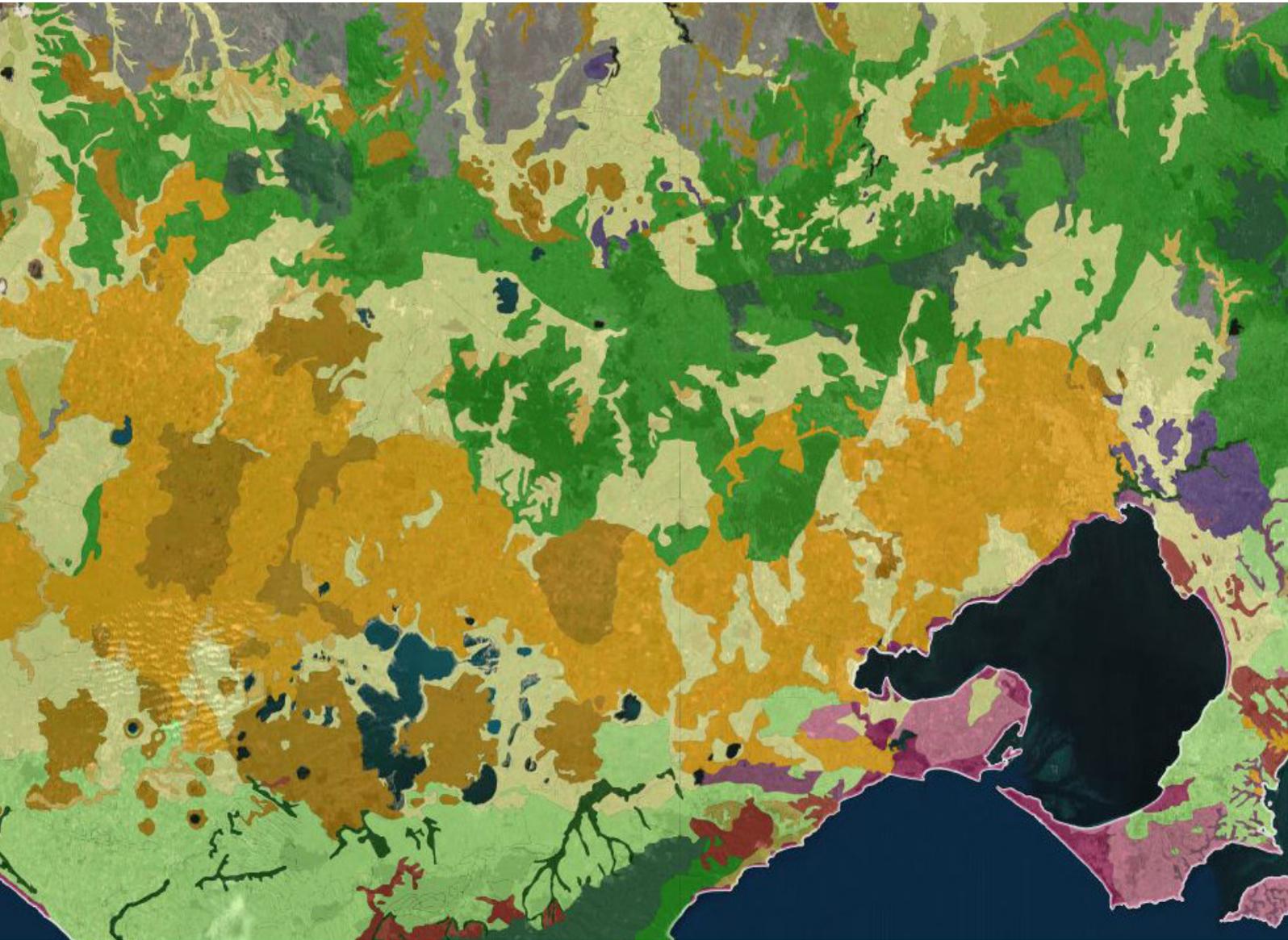


SPATIAL CONNECT

An activity based project



Exploring Victoria's Biodiversity

LEVEL 9/10

SPATIAL CONNECT

Exploring Victoria's Biodiversity

Introduction

biodiversity is the variety of all forms of life including all plants, animals, microorganisms. Biodiversity can also refer to the variety and combinations of genes (the building blocks of life) within species and the variety of habitats, such as forests, wetlands, deserts and coral reefs.

Australia is one of the most species diverse countries in the world, owing to its geographical isolation and the unique climate and environment. Scientists estimate that of the 8.7 million species thought to inhabit the Earth, one million exist in Australia. Furthermore, 80 per cent of Australia's plants and animals are endemic, meaning they do not occur naturally anywhere else in the world.

A healthy biodiversity has an impact on people's quality of life, playing a critical role in delivering the natural services on which we depend such as clean water and the cycling of nutrients. It also provides important economic, recreational and cultural value. However, biodiversity is in decline due to a variety of pressures and impacts caused by people.

Using the Visualising Victoria's Biodiversity (VVB) web portal, students examine the range of ecosystems in Victoria and discover the rich diversity and distributions of Victoria's flora and fauna.

Aims

Students will:

- understand the distribution and diversity of Victoria's flora and fauna
- relate a variety of environmental factors to determine the presence and diversity of species
- appreciate that the application of a Geographic Information System (GIS) can be useful for scientific research.

Lessons required

3–4 lessons

Curriculum links

This activity is aimed at Level 9 and 10 Geography and Science students.

| Science as a human endeavour | Biological Sciences |
|--|--|
| Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries (VCSSU115) | Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems (VCSSU121) |

| Victorian Curriculum Geography Content Description [Australian Curriculum equivalent] |
|---|
| Geographical knowledge |
| Distribution and characteristics of biomes as regions with distinctive climates, soils, vegetation and productivity (VCGGK133) [ACHGK060] |
| Geographical concepts and skills |
| Identify, analyse and explain significant spatial distributions and patterns and identify and evaluate their implications, over time and at different scales (VCGGC128) [ACHGS067] |
| Identify, analyse and explain significant interconnections within places and between places over time and at different scales, and evaluate the resulting changes and further consequences. (VCGGC129) |
| Select, organise and represent data and information in different forms, including by constructing special purpose maps that conform to cartographic conventions, using digital and spatial technologies as appropriate (VCGGC131) [ACHGS066] |
| Analyse and evaluate data, maps and other geographical information using digital and spatial technologies and Geographical Information Systems as appropriate, to develop identifications, descriptions, explanations and conclusions that use geographical terminology (VCGGC132) [ACHGS067] |

Teacher resources

| Section | Teacher notes |
|--|---|
| Introducing Visualising Victoria's Biodiversity | This section introduces the VVB web portal. Allow students to explore the range of functions the VVB has to offer. Use the search function to choose a location near your school and explore the types of flora and fauna that have been recorded. Flora and fauna records have inherent limitations. For example, not all species will be recorded. There might be an overrepresentation of more charismatic species rather than those species less obvious or less well-known. Discuss these limitations with students before the subsequent activities. |
| Ecosystems in Victoria | In this activity, students explore the change in vegetation types pre- and post-1750. As a class, create a list of major vegetation types before and after colonisation. Estimate the percentage of the major types of vegetation (e.g. moist foothill forest, heathland, grassy woodland). Discuss the environmental factors that may have contributed to these changes. |
| Comparing the biodiversity of the Mallee and the Victorian Alps | This activity compares biodiversity in a semi-arid and forested, high-altitude environment. It relies on an understanding of what flora and fauna are present in each region. In order to manage biodiversity it needs to be measured. Have students watch this video from CSIRO about the status and trends of biodiversity in Australia, and how scientists are making progress to understand how it is changing. |
| Extension activity | This activity gives students a chance to develop their own hypothesis to test using the web portal. By undertaking this activity, students will have a deeper understanding of the benefits and limitations of using spatial technology to understand biodiversity |

Group work

It is suggested that students work in pairs to explore the maps and the two different parks. If pairs select different areas of the parks to explore, they can then work in small groups of six students to compare their observations of total number of species in the reports they generate. This provides the groups with more data to discuss and compare the parks' biodiversity.

Activities

Part 1: Visualising Victoria's Biodiversity – an introduction

Visualising Victoria's Biodiversity (VVB) is a place to discover and share spatial information on Victoria's environmental values, conservation activities and research. VVB brings together a lot of data from many sources. This website allows users to:

- generate a report with lists of environmental features, such as flora and fauna records, for a selected area of interest
- view map layers of environmental features and observations in any area of Victoria

The map layers include vegetation types, flora and fauna records, a variety of administrative boundaries, fire history and local government data sets.

How can the public contribute to biodiversity recording?

Watch this video by CSIRO that describes the valuable contributions made by the public in recording the diversity and distribution of plants and animals.

https://www.youtube.com/watch?v=c6H2Wu_znT0&index=20&list=PLC0787655BD7CDE54

1. a. What do you think is the most important function of VVB?
 - b. How might VVB be of use for scientific research?
 - c. Who is likely to use VVB?

Ecosystems in Victoria

Ecosystems are generally identified by the vegetation they support. Victoria's land area supports a wider range of ecosystems than any area of a similar size in Australia. These ecosystems include alpine, mallee, grasslands and grassy woodlands, forests, heathlands and heathy woodlands, inland waters and estuaries, and coasts.

Since European settlement, Victoria's ecosystems have undergone significant changes and only a proportion of native vegetation remains in its natural state. To understand the state of Victoria's ecosystems before European settlement, scientists have used modelling techniques to show the distribution of Victoria's ecosystem prior to the year 1750. Using spatial technology we can understand the diversity of Victoria's ecosystems and how these have changed over time.

TASKS

Open the Visualising Biodiversity portal at http://www.vvb.org.au/vvb_map.php

Zoom out to focus on the state of Victoria. Select Vegetation and habitat from the main menu on the right of the screen. Turn on the spatial layer *BVT - 1750* to display the range of vegetation types predicted to be present prior to the year 1750.

What are Broad Vegetation Types (BVTs)?

BVTs use a simplified view of vegetation and environmental and biophysical characteristics such as geology, rainfall, elevation, soil type and landform to develop a classification system. BVTs are mainly used to in conservation planning.

Explore these different ecosystems by clicking on the map and complete the following activities.

2. What are the most common and least common vegetation types found in Victoria? Complete an internet search in images to see what these vegetation types look like. Save these images in your notes.
3. What factors might be responsible for this variation?
4. Locate your home on the map of Victoria. What type/s of ecosystems were present around your home prior to European settlement?

Next, turn off the spatial layer *BVT - 1750* and turn on *BVT - 1987* (this spatial layer displays the most recent assessment of native vegetation distribution in Victoria).

5. Describe the 1987 distribution of native vegetation in Victoria. What are the main changes from pre-1750?
6. What types of ecosystems still remain? Why might this be?

Part B: Comparing the biodiversity of the Mallee and the Victorian Alps

No two regions in Victoria exhibit greater differences in the diversity of flora and fauna than the Mallee, in northern Victoria, and the Victorian Alps in the Great Dividing Range. A variety of animal and plant species have been recorded by scientists, government agencies, individuals and community groups. Using spatial technology these records can be observed to learn more about biodiversity in these regions. In this activity, diversity and distribution of species is observed in two significant national parks: the Baw Baw National Park and the Murray-Sunset National Park.

Baw Baw National Park

Baw Baw National Park contains a diverse array of vegetation types and plant species, occupying a range of habitats extending over an elevation range of 1100 metres. The Baw Baw Plateau is recorded as a site of national botanical and zoological significance, it features:

- wet alpine heathlands
- extensive sub-alpine woodlands dominated by snow gum
- tall open forests of Alpine Ash, Shining Gum and Tingaringy Gum on upper slopes of the range and forests of Mountain Ash, Messmate and Silver Wattle at lower altitudes.

Notable animals species include:

- the endangered Leadbeater's Possum, Victoria's state faunal emblem
- the critically endangered, endemic Baw Baw Frog
- other species include the Common Wombat, Swamp Wallaby, Greater Glider, Yellow-bellied Glider, Sugar Glider, Mountain Brush-tailed Possum, Brown Antechinus and Platypus



Murray-Sunset National Park

Murray-Sunset National Park, in Victoria's far north-west corner, is in one of the few remaining semi-arid regions in the world where the environment is relatively untouched. Mallee vegetation dominates the sandy loam soils with:

- pockets of Native Cypress-pine and Belah woodlands scattered throughout
- Victoria's largest flower the Murray Lily,
- the restricted Silvery Emu-bush and
- the rare Blue-leafed Mallee all grow within the park.

Apart from the more conspicuous mammals such as Western Grey and Red kangaroos, the park is home to a number of rare and threatened species. These include:

- the Paucident Planigale (a small carnivorous mouse-sized marsupial)
- the Regent Parrot and the Millewa Skink
- Other notable birdlife includes Malleefowl, Mallee Emu-wren, the Pink Cockatoo and Black-eared Miner.



Biodiversity in Baw Baw National Park

Select the Administration boundaries from the main menu on the right of the screen. Turn on the spatial layer *Parks and Reserves*.

Using the search function, found in the Tools tab at the top of the page, type in the name of Baw Baw National Park. Adjust the Zoom so that you can see the extent of the whole park. Click on the coloured pin to open an information panel about the park.

7. What is the area of Baw Baw National Park in hectares?

Next, turn on the spatial *BVT – 1987* in the Vegetation and habitat folder.

Adjust the transparency on either layer to better visualise the overlay.

8. List the types of vegetation types that exist within the Baw Baw National Park. Do an internet image search to record some images of these types of vegetation.
9. Open the fauna folder and select each fauna type, one by one (bird, fish, invertebrate, mammal and reptile and amphibian). By clicking once on the record, an information box appears to let you know the species and when the sighting was recorded. List three species you find in each category in Baw Baw National Park.
10. Locate and name one endangered mammal that has been sighted in the park. Conduct some research and write one paragraph about this mammal.

How to generate a Natural Values Report

This report tool summarises information for a selected area from the spatial datasets compiled in the VVB and from the Atlas of Living Australia. To generate a report for an area:

- Zoom/pan to area of interest.
- Select choose a drawing tool (polygon' buffered line or buffered point)
- Click on map to define area - double click to finish
- Select 'Generate Report'
- Report results will be loaded and displayed in the panel window

Click on individual results (blue text) for more information and lists of results

Creating a natural values report of a sample within the Baw Baw National Park

Click on the 'Reports' tab at the top of the page.

Choose the drawing tool as Point (buffer radius) with a radius of 5km (5000m).

Select a site within the National Park, then generate report.

11. How many occurrences of flora and fauna have been recorded in your sample? What are the total occurrences in the Atlas of Living Australia?

Explore the diversity of flora and fauna by clicking on the Atlas of Living Australia (ALA) records.

12. List the most common animals and plants found in your selected survey area. Find pictures on the internet to accompany these species names.
13. Did your sample discover any rare or threatened species? (Hint: Click on the Fauna link of Natural Values Report)

Choose a species from each list in the Atlas of Living Australia to learn more about it. For each one, describe each species physical description, habitat, feeding habits, and distribution within Victoria.

Biodiversity in Murray-Sunset National Park

TASKS

Following the same steps as in the Baw Baw National Park activity, select the Administration boundaries from the main menu on the right of the screen. Turn on the spatial layer *Parks and Reserves*.

Using the search function, found in the Tools tab at the top of the page, type in the name of Murray-Sunset National Park. Adjust the Zoom so that you can see the extent of the whole park. Click on the coloured pin area to open an information panel about the park.

14. What is the area of Murray-Sunset National Park in hectares? How does it compare with the size of Baw Baw National Park?

Next, turn on the spatial *BVT – 1987* in the Vegetation and habitat folder.

Adjust the transparency on either layer to better visualise the overlay.

15. List the types of vegetation types that exist within Murray-Sunset National Park. Do an internet image search to record some images of these types of vegetation.
16. Open the fauna folder and select mammals and reptile and amphibian. By clicking once on the record, an information box appears to let you know the species and when the sighting was recorded. List three species you find in each category in different parts of Murray-Sunset National Park.
17. Locate and name one endangered mammal or reptile/amphibian that has been sighted in the park. Conduct some research and write one paragraph about this mammal or reptile/amphibian.

Creating a natural values report of a sample within the Murray-Sunset National Park

Click on the 'Reports' tab at the top of the page.

Choose the drawing tool as Point (buffer radius) with a radius of 5km (5000m).

Select a site within the national park, then generate report.

18. How many occurrences of flora and fauna have been recorded in your sample? What are the total occurrences in the Atlas of Living Australia?

Explore the diversity of flora and fauna by clicking on the Atlas of Living Australia (ALA) records.

19. List the most common animals and plants found in your selected survey area. Find pictures on the internet to accompany these species names.

20. Did your sample discover any rare or threatened species? (Hint: Click on the Fauna link of Natural Values Report)

Choose a species from each list in the Atlas of Living Australia to learn more about it. For each one, describe each species physical description, habitat, feeding habits, and distribution within Victoria.

Comparing biodiversity

The following activities ask you to compare the biodiversity between Baw Baw and Murray-Sunset National Parks. It would be beneficial for students to work in groups and compare the total observations made when generating reports for each national park.

21. Write a summary paragraph comparing the numbers and types of animals and plants inhabiting the Baw Baw National Park compared to the Murray-Sunset National Park? What similarities and differences can you observe?
22. Did you observe any species that occur in both habitats? (Hint: look at bird lists). What might this suggest about the adaptability of these species to their environment?
23. Did you notice a difference in the number of mammals and amphibian species in both regions? Why are there more/ fewer mammals and/or amphibians in Baw Baw National Park?
24. What environmental factors are responsible for the distribution and diversity of the flora and fauna of these regions? You may like to visit the Bureau of Meteorology website (<http://www.bom.gov.au/climate/data/>) and look at the climate for each location.
25. How useful is spatial technology (the use of GIS maps) to understand biodiversity?
26. How can these maps and data be used to help monitor changes to environments and environmental change? How can they be used to help manage an environment e.g. developing a vegetation corridor?

Extension activity

1. Investigate and compare the biodiversity of other national parks of interest to you.
2. The Visualising Victoria's Biodiversity web portal can be used for scientific research and also as a tool used by environmental managers. Is there something that you would like to know about Victoria's biodiversity?

Work in groups to develop some hypotheses about Victoria's biodiversity. Use the web portal to test these hypotheses. Examples could include:

- communities of coastal bird species will be different in urban versus rural areas
 - nationally-significant wetlands (Ramsar wetland sites) will contain more threatened species than non-Ramsar wetlands.
3. Alternatively, investigate whether a wildlife corridor should be established at [insert a location of interest to you]?