

Hastings Cave and Thermal Springs



Introduction to the Cave (5-10)

This generic unit provides an introduction to the unique environment of a cave, and to the cave flora and fauna which have adapted to live there. Students also learn about how the caves were formed and how scientists study the cave environment. They may conduct their own environmental investigation as part of their visit and take digital photos as they go.

Summary of Cave Visit Program

Ecological study techniques	Newdegate Cave Field Visit	Assessment for learning	
<ul style="list-style-type: none"> • Conducting an ecological inquiry • Data collection 	<p>Some possible activities:</p> <ul style="list-style-type: none"> • Look at evidence of how the caves were formed. • Examine the rock and scientifically test for calcium content. • Look at evidence of how the speleothems have formed, and their age. • Measure environmental factors outside and inside the cave. • Perform a linear transect survey of the cave with the Guide, looking at the various speleothems, and plants and animals present in the various zones. • Collect evidence to identify what kinds of animals use the area, e.g. tracks and traces. • Take digital photos to record types of speleothems, animals and plants, and human interactions. • Discuss physical adaptations of biota to cave habitats and the fragility of the cave environment. • Research human activity around the cave (wood-felling and log extraction). 	<p>Assess students' ability to :</p> <ul style="list-style-type: none"> • work as part of a team to conduct an ecological study • collect, record and interpret data 	<p>One-day field trip</p>



Recommended Worksheets

Primary

- My Cave Food Web (1 and 2) worksheet
- What is that called? worksheet
- Do you know their names? worksheet
- What have we done to our cave?
- Measuring the cave environment recording sheet
- What have they done to my cave?

Secondary

- Measuring the Cave Environment
- Biodiversity
- Cave development
- The underground world

Unit Reference

Standard	3–5
Stages	7–15
Year level(s)	5–10
Curriculum areas	Science
Strand(s)	<ol style="list-style-type: none"> 1. Science as a human endeavour (SHE) 2. Scientific inquiry (SI) 3. Scientific communication(SC) 4. Science as a body of knowledge(SBK) <ul style="list-style-type: none"> • Living things (LT) • Earth and space (ES) • Matter • Energy
Understanding goals	<ol style="list-style-type: none"> 1. Students will understand some ways in which scientists study cave environments, and why this work is important. (SHE) 2. Students will understand how to quantifiably measure environment factors in a cave environment. (SI) 3. Students will understand how to record and communicate the results of an ecological study. (SC) 4. Students will understand the geological time frame and the composition of rocks. (ES) 5. Students will understand that organisms have different characteristics which make them suited to living in particular cave environments. (SBK - LT) 6. Students will understand the effect of humans' impact on the cave ecosystem. (SBK – LT)

Links to the Science Strands and Substrands

Strand/substrand	Possible key questions
Science as a human endeavour (SHE)	What do geologists and ecologists do? Why is their work important? How does human activity impact on biodiversity in the cave system?
Scientific inquiry (SI)	What kinds of questions can be answered by ecological studies?
Scientific communication (SC)	How do we identify different plants and animals? How can we record the results of ecological studies? How can we communicate our findings in similar ways to scientists?
Energy and force (EF)	How does energy flow through the cave ecosystem? What are the energy needs of animals with different lifestyles (e.g. inside/outside the cave)? What impacts can human energy production have on biodiversity in the short term and long term?
Matter (M)	How is matter cycled through the cave ecosystems?
Life and living (LL)	What adaptations do particular cave organisms have that suit them to their way of life/environment? What are some ways in which cave organisms interact with each other and the non-living parts of their environment? Have humans affected the population numbers of different cave organisms (e.g. extinctions, introduced species)?
Earth and space (ES)	How do changes that are occurring on Earth impact on the cave environment? What are rocks made of and how?

Suggested Unit Plan

Pre-visit

- How sedimentary rocks are formed and the concept of geological time
- When and how the caves were formed and the way speleothems develop
- Factors that make up an environment
- How plants and animals are able to live in a cave



Post-visit follow-up

- Develop a food/energy web for the cave system.
- Analyse the adaptations of biota to the cave environment.
- Review human impact in the short/long term, including inside and outside.
- What positive and negative impacts have humans had/are they having on the cave ecosystem environment?
- Why are cave reserves important, globally and in Tasmania?
- Prepare presentation of work using multimedia (Facebook, PowerPoint, video, digital photos, artwork and written reports)

Suggested Pre- and Post-visit Teaching Plan

Activity • concepts/main ideas	Learning opportunities	Assessment and Teacher Notes	Length
I. Pre-visit • What do geologists and ecologists do? • Introduction to cave formation and structure	<ol style="list-style-type: none"> 1. Ask class to brainstorm the question ‘What do geologists and ecologists study?’ 2. Divide class into groups. Give each group a field of study related to cave science, e.g. cave exploration, finding out how caves are formed, working out how speleothems are formed, finding out how animals adapt to cave life, what makes up a cave environment, food webs in caves 3. Use the internet to research what scientists in their field of study do. <p>Some useful sites for conducting research:</p> <p>http://www.abc.net.au/catalyst/stories/by-date/2010/default.htm</p> <p>http://www.abc.net.au/science/ozfossil/megafauna/caves/default.htm</p> <p>http://www.abc.net.au/science/ozfossil/megafauna/caves/activity-stalactites.htm</p> <p>http://www.abc.net.au/local/audio/2010/05/10/2895127.htm?site=kimberley</p> <p>http://www.abc.net.au/rural/sa/stories/s1291222.htm</p> <p>http://jenolancaves.org.au/index.php?pr=fun_school_field_trips#studyguides</p> <p>Each group chooses a method of sharing their information with the rest of the class and reports back to the class (possibly as a role play, PowerPoint or photo story)</p>	Assessment for learning Assess students’ understanding of: <ul style="list-style-type: none"> • the work of cave scientists • cave formation • speleothems 	Two x 50min lessons
2 .Optional: guest speaker – researcher • How cave scientists work	Invite a guest speaker from Southern Tasmanian Caverneers (http://www.lmrs.com.au/stc/) , Parks and Wildlife (http://www.parks.tas.gov.au/) or Forestry Tasmania (http://www.forestrytas.com.au/) to come and talk about their work.	Assessment for learning Assess students’ understanding of: <ul style="list-style-type: none"> • the role of guide, forester, scientist 	One x 50min lesson

<p>3. Post-visit follow-up Tasmanian cave reserves</p> <ul style="list-style-type: none"> Tasmania has declared cave reserves to conserve habitat and species, and for research, education and recreation 	<p>1. Discuss with students:</p> <ul style="list-style-type: none"> What is a cave reserve? Has anyone visited a cave reserve? Where was it? Where are the cave reserves in Tasmania <p>2. Ask students to research one cave reserve, and develop a guide for visitors (either PowerPoint or brochure), that shows:</p> <ul style="list-style-type: none"> location and directions to get there (include map) what is special about the reserve, including details of notable formations and history, flora and fauna found there (include photos or video as possible) why it was declared activities that are and are not permitted in the reserve (e.g. logging, mining, fossicking) and why they might affect the biodiversity. <p>NB If internet is not available, print pages from the Parks and Wildlife website and copy for students as necessary.</p> <p>3. Give students a scenario in which it has been proposed a local area become a cave reserve. Ask students to list pros and cons of the proposal, and then justify their personal opinion.</p> <p>4. Select an Additional Activity for each group.</p>	<p>Assessment for learning</p> <p>Assess students' ability to:</p> <ul style="list-style-type: none"> identify some of the different cave habitats/ ecosystems that occur in Tasmania undertake a scientific experiment 	<p>Two x 50min lessons</p>
<p>4. Food chains and webs</p>	<p>1. Use the online food web activities from the sites listed below to develop an understanding of food chains and webs.</p> <p>http://www.ecokids.ca/pub/eco_info/topics/frogs/chain_reaction/index.cfm</p> <p>http://www.gould.edu.au/foodwebs/kids_web.htm</p> <p>http://teacher.scholastic.com/activities/explorer/ecosystems/be_an_explorer/map/form.htm</p> <p>2. Select a Tasmanian cave species and create a food web which demonstrates the energy flow through the ecosystem it is part of. Check out the Hastings Cave website for information and photos. A printable worksheet for this activity is available.</p> <p>Students may then present their food web as a poster.</p> <p>Optional: Play the Food Chain Checkers game at http://www.windows.ucar.edu/teacher_resources/checkers_20march.pdf</p>	<p>Assessment of learning</p> <p>Living things. Humans interact with ecosystems, and this raises ethical and sustainability issues. Assess the accuracy and complexity of food webs created by the students.</p>	<p>Two or three x 50min lessons</p>

<p>5. Reporting Back</p>	<ol style="list-style-type: none"> 1. Develop a comprehensive, illustrated food/energy web for the cave system. 2. Summarise how animals and plants you have seen adapt to the cave environment. 3. Investigate and present a report on the effects of human impact in the short/long term, including inside and outside. 4. Review the water cycle and the importance of karst areas as water sources for animals and humans. 5. Why are cave reserves important, globally and in Tasmania, and how is global warming likely to affect their biodiversity? 6. Prepare a detailed report using a Futures Wheel or Diamond Ranking (use diamond ranking form) on the biodiversity of caves using a variety of media. (http://www.globaleducation.edna.edu.au/globaled/go/pid/1845) 7. Prepare presentation of work using multimedia (Facebook, PowerPoint, video, digital photos, artwork and written reports). 8. Undertake Additional Science Activities in Activities Folder on caves and cave formation. 	<p>Assessment for and of learning</p> <p>Assess students' ability to :</p> <ul style="list-style-type: none"> • identify a question that can be investigated as an ecological study • collect data that will allow them to answer the question they posed • communicate their scientific information 	<p>Several lessons</p>
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Additional Web Resources

<http://waitomocaves.com/newwebpages/EDlessons.htm>

<http://www.reec.nsw.edu.au/geo/cave/caves/textcave/10cavewb.htm> (worksheet)

<http://www.reec.nsw.edu.au/geo/cave/caves/textcave/3acavecl.htm> (climates in caves)

http://www.blm.gov/wo/st/en/res/Education_in_BLM/Learning_Landscapes/For_Teachers/science_and_children/caves/index.html

(good American information on caves)

http://www.jenolancaves.org.au/jenolan_facts.php

(Jenolan Caves, NSW)

<http://www.goodearthgraphics.com/virtcave/> (Virtual Cave – good selection of photos etc)

<http://www.capricorncaves.com.au/pdf/schoolprogram.pdf> (Capricorn Caves, Qld)

<http://www.howecaverns.com/live-in-the-cave> (Howe Caverns, USA, educational information)

http://www.marengocave.com/schools/cave_map.php (Marengo Cave, USA, GI-5 materials)

http://www.caves.org/committee/education/science_topics.htm#hydro (National Speleological Society, USA – lots of topics and useful links)

<http://cavingintro.net/science.html> (Provides many links to cave-related sites)

Other Resources available:

- **Teachers Fact Sheets** (see www.parks.tas.gov.au and refer to fact sheets)