

Hastings Cave and Thermal Springs



Focus Topic: Cave Development

Topic Introduction

There are many types of caves – including rock shelters and sea caves – in Tasmania, but the largest caves have formed in limestone and dolomite.

This unit is designed to enable students to examine the factors contributing to the formation of the cave over millions of years and how the cave formations have developed

Students also learn about ways in which humans are impacting on the cave, both inside and out, and the most recent changes that are occurring in the cave environment.

It is recommended that students also include Focus Topics **Measuring the Cave Environment** and **Cave Biodiversity** in their program.



Photograph: Richard Bennett

Summary of Cave Visit Program

Focus topic core	Hastings Cave – cave development	Assessment for learning	Time
<p>Cave development</p> <ul style="list-style-type: none"> conducting a site visit data collection and reporting 	<p>Some possible activities</p> <ul style="list-style-type: none"> Review evidence for glaciation outside the cave. Perform a walking linear transect survey into the cave with the Guide, recording evidence of erosion, weathering and solution/deposition present in the zones. Collect evidence to identify the time-scale of formation growth. Take digital photos to record formations and evidence for mineral staining. Collect evidence of recent changes in the cave caused by major tectonic movements. Look at human activity around the cave (wood-felling and log extraction) and discuss possible effects on the cave. <p>Discuss the need for cave reserves.</p>	<p>Assess students' ability to:</p> <ul style="list-style-type: none"> work as part of a team to conduct a site visit collect, record and interpret data 	<p>One-day field trip</p>



Topic Reference

Standard	4–5
Stages	10–15
Year level(s)	7–10
Curriculum areas	Science
Strand(s)	<ol style="list-style-type: none"> 1. Scientific inquiry (SI) 2. Scientific communication(SC) 3. Science as a body of knowledge(SBK) <ul style="list-style-type: none"> • Energy and force(EF) • Earth and space (ES)
Understanding goals	<ol style="list-style-type: none"> 1. Students will understand how to record and communicate the results of a site investigation. (SC) 2. Students will understand the effect of weathering and erosion on calcareous rocks and the time-scale of cave development. (SBK – EF) 3. Students will understand the effect of recent climatic changes on the cave formation and humans' impact on the cave development. (SBK – ES)

Links to the Science Strands and Substrands

Strand/sub-strand	Possible key questions
Science as a human endeavour (SHE)	<ul style="list-style-type: none"> • How does human activity affect cave-forming processes? • How are caves mapped and explored?
Scientific inquiry (SI)	<ul style="list-style-type: none"> • How do we measure geological time and what evidence is there for scientifically measuring rate of formation growth?
Scientific communication (SC)	<ul style="list-style-type: none"> • How can we record the results of geological studies? • How can we communicate our findings in similar ways to scientists?
Energy and force (EF)	<ul style="list-style-type: none"> • What are the energy sources for change in the cave system? • What impacts can humans have on the availability of energy in the cave in the short and long term?
Matter (M)	<ul style="list-style-type: none"> • How is matter weathered and eroded in the cave system?
Earth and space (ES)	<ul style="list-style-type: none"> • How do tectonic changes that are occurring on Earth impact on the cave?

Suggested Topic Plan

Pre-visit

- Kinds of rocks that caves develop in and the make-up of dolomite?
- Dating rocks and the geological time-scale
- Where calcareous rocks or karst scenery are found in Tasmania
- Solution, and dissolving substances, and deposition and testing for calcareous rocks
- The water cycle and the importance of the water table
- Acidity and alkalinity
- Glaciation in Tasmania



Hastings Cave

- Visit to the Hastings Caves State Reserve to conduct site investigation; evidence of solution, action of water and major earth movements
- Types of formations and rates of growth
- Karst scenery
- Evidence of glaciation



Post-visit follow-up

- Develop a PowerPoint report on types of formation and/or evidence for cave formation.
- Review human impact in the short/long term, including inside and outside.
- Review why cave reserves are important globally and in Tasmania.
- Discuss the importance of karst scenery as a water resource (40% of water worldwide is from karst areas).
- Prepare presentation of work using multimedia (Facebook, PowerPoint, video, photos, artwork and written reports)

Suggested Pre- and Post-visit Teaching Plan

Pre-visit • concepts/main ideas	Optional learning opportunities	Assessment and Teacher Notes	Time
The cave <ul style="list-style-type: none"> Introduction to geology and the geological time-scale Basic types of rock 	1. Groups examine: <ul style="list-style-type: none"> how old the rocks are and the geological time-scale the water cycle and the importance of the water table glaciation in Tasmania. 2. Each group chooses a method of sharing their information with the rest of the class and reports back to the class (possibly as a PowerPoint or photo story).	Assessment for learning Assess students' understanding of: <ul style="list-style-type: none"> the work of cave scientists cave formation 	Two x 50min lessons
2. Cave chemistry <ul style="list-style-type: none"> Investigations into the chemical structure of dolomite 	1. Series of investigations into: <ul style="list-style-type: none"> acidity and alkalinity dissolving substances, solution and deposition. 2. Calcareous rocks (see Additional Activities and Teachers Fact Sheets) <ul style="list-style-type: none"> Testing for calcareous rocks (dilute HCL or vinegar etc) What are caves made of and what is dolomite/karst scenery in Tasmania? Growing a stalagmite. 	Assessment for learning Assess students' skills in: <ul style="list-style-type: none"> conducting laboratory investigations 	Two x 50min lessons
3.Optional: guest speaker – researcher <ul style="list-style-type: none"> 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

Pre-visit • concepts/main ideas	Optional learning opportunities	Assessment and Teacher Notes	Time
4. Tasmanian cave reserves Develop an understanding of why Tasmania has declared cave reserves, to conserve structures and formations, and for research, education and recreation	<ol style="list-style-type: none"> 1. Discuss with students: <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? 2. Ask students to research one cave reserve, and develop a guide for visitors (either PowerPoint or brochure), that shows: <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, (include photos or video as possible) • why it was declared • activities that are and are not permitted in the reserve (e.g. logging, mining) and why they might affect the biodiversity <p>NB If internet is not available for students, print pages from the Parks and Wildlife website and copy for students as necessary.</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. 	Assessment for learning Assess students' ability to: <ul style="list-style-type: none"> • identify some of the different cave components that occur in Tasmania 	Two x 50min lessons
Post-visit follow-up	Optional learning opportunities	Assessment and Teacher Notes	Time
1. Develop an understanding of the way caves have formed	<ol style="list-style-type: none"> 1. Develop a PowerPoint report on types of formation and/or evidence for cave formation. 2. Review human impact in the short and long term, including inside and outside. 3. Review the water cycle and the importance of karst areas as water sources for animals and humans. 4. Discuss why cave reserves are important globally and in Tasmania, and how global warming is likely to affect them. 5. Prepare presentation of work using multimedia (Facebook, PowerPoint, video, photos, artwork and written reports). 6. Undertake an investigation from Additional Activities. 	Assessment for and of learning Assess students' ability to: <ul style="list-style-type: none"> • collect data that will allow them to answer the question they posed • communicate their scientific information • undertake an investigation. 	Two x 50min lessons

Possible 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, G1-5 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)

See also: Teachers Resources