



Natural vs. Built Environment

UNIT OF ENQUIRY

Teacher Guide

The aim of this unit is for students to investigate the environmental benefits of natural wooded areas compared to built environments. The students will investigate this in relation to two main aspects, **biodiversity** and **human made materials**.

Key Questions

Key Questions

1. What are the differences between natural and built environments in your own community and the wider world?
2. Is one option more environmentally sustainable than the other?
3. Is there one environment that provides for more environmentally responsible choices?
4. How can people begin to make positive changes in their lives and contribute towards the sustainability of our natural resources?

Materials Utilised throughout the Unit

1. iPad's with Internet Access
2. Computers with Internet Access
3. Digital Camera's
4. Online Journals – Coggle It or something similar
5. Printers or Digital Storage for Presentations and Documentation

Outcomes

Upon completion of this unit students will have participated in research, investigations and activities, which will enable them to:

- Identify issues facing natural and built environments by using common focus questions as well as developing their own
- Plan investigations using the 5E inquiry model
- Collect and analyse information and evidence on natural and built environments from both primary and secondary sources
- Conduct scientific investigations into issues concerning natural and built environments using controlled variables, collecting and analyzing their results
- Evaluate sources of information and evidence on natural and built environments for relevance, reliability, origins and perspective
- Draw conclusions and make decisions based on information and evidence by identifying patterns and connections
- Communicate descriptions, decisions and conclusions, using different text types for specific purposes and the conventions of research-based texts
- Respond to investigation findings and conclusions by planning and implementing actions
- Apply strategies to contribute effectively to representative groups and to participate in civic activities surrounding topical issues relating to sustainability
- Reflect on and identify different perspectives on natural versus built environments
- Recognize and clarify different beliefs and values on sustainability
- Reflect on learning, apply new understandings and identify future applications of the knowledge they have gained surrounding natural and built environments



Context and Rationale

This unit progresses over four stages:

The first stage is based in research and gathering background knowledge. This also is used to establish pre-existing background knowledge and to ensure that there is a level of understanding among the students, before the investigations begin.

The second stage consists of two first hand investigations based on the two main aspects of inquiry: biodiversity and building materials. These two investigations are conducted in the school grounds.

The third stage will further build upon knowledge acquired in the school-based investigations, with two further investigations to be conducted in the field – an excursion to a local park, forest or plantation, if school resources allow.

The culmination stage compiles the students' findings into a final report that will be presented to the class as the final assessment. A key component of this final report includes suggestions for future research and investigations.

Future Inquiry

Future class inquiries may include:

- An investigation into sustainability management strategies of forests
- A study of renewable and non-renewable resources
- An investigation into future technologies with a focus on sustainability, for example the use of bio-fuels and waste management innovation
- A study of carbon storage and the role forests play in abating climate change

Inquiry Framework Overview

The 5E Inquiry Approach

Forest Learning has selected the 5E Inquiry approach to inform the teaching methodology behind this unit. The 5E instructional model has been used to inform quality investigative Science based units. It is a constructivist-teaching model, which enables students to create and build their own learning pathways by encouraging the exploration of new experiences and ideas. A pedagogical shift from traditional Science teaching methods is observed in this framework as the emphasis is on teacher facilitation of a unit where students have opportunities to construct their own key conceptual understandings. Forest Learning is committed to the creation of units, which can be used to engage students in open-ended, student-centred and hands-on activities.

This unit also provides opportunities for students to participate in 'science as practice'. According to Harris & Rooks (2010) this involves being able to:

1. Know, use and interpret scientific explanations
2. Generate and evaluate scientific evidence and explanations
3. Understand the nature and development of scientific knowledge
4. Participate productively in scientific practices and discourse

The purposes of the five different phases are as follows (AAS, 2008a):

Engage

- Create interest and stimulate curiosity
- Set learning within a meaningful context
- Raise questions for inquiry
- Reveal students' ideas and beliefs, compare students' ideas

Explore

- Provide experience of the phenomenon or concept
- Explore and inquire into students' questions and test their ideas
- Investigate and solve problems

Explain

- Introduce conceptual tools that can be used to interpret the evidence and construct explanations of the phenomenon
- Construct multi-modal explanations and justify claims in terms of the evidence gathered
- Compare explanations generated by different students/groups
- Consider current scientific explanations

Elaborate

- Use and apply concepts and explanations in new contexts to test their general applicability
- Reconstruct and extend explanations and understanding using and integrating different modes, such as written language, diagrammatic and graphic modes, and mathematics

Evaluate

- Provide an opportunity for students to review and reflect on their own learning and new understanding and skills
- Provide evidence for changes to students' understanding, beliefs and skills

5E	Lesson	Content
Engage	1	What is biodiversity? What differs between the natural environment and the built environment?
Explore	2	What is biodiversity like in the school grounds? Explore what the biodiversity is like for the majority of the area in which you live or your school is located.
	3	Explore the difference between products made from natural resources versus human-made products. Explore the different materials used in the buildings at your school – the built environment.
Explain	4	Natural materials vs. human made resources: Which products are most sustainable? Why is wood more sustainable? Explain the use of the different materials used in and around your school. Integrate biodiversity and product sources a little closer.
Elaborate	5	What human made resources are relied on today? What are the newest human made resources? Are they biodegradable? Are they reusable?
	6	What is biodiversity like in the forest and your local area?
	7	What materials do animals use to create their habitats? Elaborate on the animals' use of biodegradable products and what happens when animals come into contact with non-biodegradable products.
Evaluate	8	Student assessment (final report)



Sequence of Learning		
Lesson	Lesson title, purpose and overview	Preparation/ Resources
Lesson 1	Engage – Stage 1 What is biodiversity? What is a natural environment? What are natural resources? Research and gathering background information: As a prelude to first-hand investigations and to create interest and stimulate curiosity, students will conduct an inquiry using contemporary methodologies and undertake research into the topics. Students will work in pairs to compile a research report based on a question or topic of their choosing. They will present their results digitally to their peers and teacher. What is biodiversity? What do ponds full of micro-organisms, a forest containing powerful owls, a mangrove area teeming with crabs, the local neighbourhood creek and a flock of galahs screeching overhead have in common? The answer is that they are all facets of Australia's rich biodiversity. <i>Biodiversity is the variety of all life forms on earth - the different plants, animals and micro-organisms and the ecosystems of which they are a part.</i> <i>Conservation of Australia's biodiversity, Australia Government; Department of the Environment and Energy, 2017.</i> The term biodiversity describes the immense variety of all living things: 'bio' = living, 'diversity' = variety. Biodiversity is the variety of plants, animals and micro-organisms, the genetic information they contain and the ecosystems they form. It is usually considered at three interconnected levels: genetic diversity, species diversity and ecosystem diversity. Biodiversity stresses the connectedness of the living world. Further information on the definition of biodiversity visit the Australian Museum website and explore the topic '<i>What is Biodiversity</i>'. Biodiversity – Background research lesson 1. Introduce the term 'Biodiversity' by writing it in the centre of the interactive whiteboard. Forming groups of 3-4, students spend a few minutes recording all words, ideas and questions they have about the term. 2. Regroup as a class and ask the students to share the ideas their group produced. Use a mind mapping software such as "<i>Coggle.It</i>" or your interactive whiteboard to develop a class brainstorm around the topic of biodiversity, recording all student suggestions. Allow there to be tangent discussions based around other topics that are flagged as connected to biodiversity and raise questions for inquiry. Students record the ideas they find interesting from the brainstorm into their science journals, with particular attention to any topics that intrigue	A collection of non-fiction books from the school library as well as digital images online based on: Australian native wildlife, endangered animals, national parks, and animal habitats. 1 Science Journal per student (either a paper copy or use a great online tool such as penzu.com) What is Biodiversity (Australian Museum) http://australianmuseum.net.au/What-isbiodiversity Mind mapping software such as https://coggle.it or Appendix 1 – 'Biodiversity Mindmap'



	them. Explain the purpose of this is to use the ideas as a launch platform to guide their self-directed learning. 3. Reveal these questions on the interactive whiteboard: - Where are the highest density populations of endangered Australian animals and why? - What have been the main causes of decreasing biodiversity in Australia and why? - How are the locations of national parks and state forests decided and who determines this? - What is the difference between a national park and a state forest? What are the different approaches to managing the biodiversity in state forests and national parks? - What types of animals rely on our local state forest for their habitat and in what ways are they protected/at risk? Find your closest using the Forest Learning forest locator website: http://forestlearning.edu.au/links.html to set learning within a meaningful context. The students must collate research into each of the questions using their journals, encourage the use of both primary and secondary resources. Encourage students to reveal the current state of their ideas and beliefs then compare the students' similarities and differences. 4. As a class, view the Forest Learning video '<i>Going Bush - SA's Pine Tree Experts</i>' exploring South Australian plantation forests. The video explores: - geographical location of plantation forests in South Australia - the oldest planted forests in South Australia - history of the plantation industry - plantation species - selective breeding - the science of growing pine trees - innovative harvesters - high tech management processes in the industry - interviews with experts in the industry sector.	Forest locator website http://www.forestlearning.edu.au/useful-info/school-visits Forest Learning video '<i>Going Bush - SA's Pine Tree Experts</i>' http://forestlearning.edu.au/find-a-resource/article/33/going-bush-south-australia-s-pine-tree-experts.html A class set of digital tablets such as iPads International Year of Biodiversity 2010 video. http://www.youtube.com/watch?v=V1VYmpTikgw
--	--	---

	Encourage students to record in their journals any areas of relevance to the key questions and their noted topics of interest. - Split the class into pairs, half using the digital tablets and half using the library books. On the tablets students view the official video of the 'International Year of Biodiversity 2010'. Using the books, students read and record in their journals any areas relating to the key questions. - After 15 minutes, the groups swap between books and iPads and continue their research. - Conclude the research activities by regrouping and sharing answers, new questions and ideas that the students have discovered during the lesson.	
Lesson 2	Explore – Stage 2 Natural materials vs metals and plastics. Which products are most sustainable? Background research lesson - Display these titles on the interactive whiteboard: - Raw materials - Production processes - Uses - Waste products Discuss and brainstorm the differences and similarities for these four topics in relation to wood versus built environments. Explore and inquire into students' questions and test their ideas, asking students to record notes in their science journals. - Reveal these questions to the class and discuss their predicted answers. (The students to watch the PlanetArk Wood Stores carbon video on ForestLearning website – link: http://forestlearning.edu.au/find-a-resource/article/32/planet-ark-schools-tree-day.html) - Are there difficulties in getting metals and plastics to produce products? - In comparison, what are the main environmental benefits of growing timber and using it in buildings? - What is the process renewable versus non-renewable materials	A class set of digital tablets such as iPads Forest Learning video 'Going Bush - Various demand for native and plantation forests' https://www.youtube.com/watch?v=olJyoey9p8c Forest Learning article 'Carbon and its storage in wood products' (pages 1-6) http://forestlearnin



	undergo when they are disposed of in landfill? d) What is good about using wood products? 3. As a class, watch the Forest Learning video 'Going Bush - Various demand for native and plantation forests'. 4. In their Science journals, students take notes from the video regarding information relating to the posed questions. This video explores the use and value of native and plantation forests including: • roles they play providing a valuable source of materials and products • the way timber is sourced from forests • contributions and benefits of plantation and native forests • types of forests including hardwood, softwood and plantation forests • pine plantations • timber production • the sustainable management of forests. The section on pine plantations includes the many uses of radiata pine and the use of herbicides and pesticides. The resource also includes interviews with experts in the industry sector. 5. Using the digital tablets, students read through the information fact sheet on 'Carbon and its storage in wood products' (pages 1-6) on the Forest Learning website. This is a useful student resource about carbon and its storage in wood products. It includes links to the Australian Curriculum and explores: • the carbon cycle • biosequestration • how to calculate the amount of carbon stored in trees • student questions, class activities and problems to solve • text, diagrams, photos and charts. Whilst reading the article, students note any relevant information to the key questions and create a section in their journal for new vocabulary, recording any terms they need further clarification on. Discuss as a class and define any new terms. 6. In pairs or small groups, students use the digital tablets to view the Forest Learning website link 'Going Bush - Innovative ways of keeping the home fires burning'. This resource is a video about innovation in the timber industry. It explores: • a manufacturing pellet mill that turns waste into pellets • the manufacturing process • pellet heaters versus wood heaters • engineered wood products • environmental advantages • rayon production for clothing • interviews with experts in the industry sector.	g.edu.au/find-a-resource/article/2/carbon-and-its-storage-in-forest-and-wood-products.html Forest Learning video 'Going Bush - Innovative ways of keeping the home fires burning' http://forestlearning.edu.au/find-a-resource/article/35/going-bush-innovative-ways-of-keeping-the-home-fires-burning.html
--	--	--

	Students repeat the note taking activity, remembering to record any new vocabulary. Again, discuss as a class and define any new terms. 7. Conclude the research activities by regrouping and sharing answers, new questions and ideas that the students have discovered during the lesson.	
Lesson 3	Explore – Stage 2 continued What is biodiversity like in the school grounds? School Based First Hand Investigations This is the lesson to provide experience of the phenomenon or concept by taking the students outside where they can explore, observe and discover. This initial biodiversity survey will focus on plant variety and vegetative layers, explain to students that plants are the foundation upon which most ecosystems are based. It is designed to get the students to view their school grounds from a different perspective, a biodiversity focus, and establish a sense of place. - Using Google Earth on your interactive whiteboard, fly in to your school site and bring the image to full screen size. Copy and paste the image onto a blank page using your whiteboard's software then overlay a grid. This can be a table that is 10 rows by 10 columns, preferably square. Alternatively, print the satellite image and overlay a grid then provide students with a paper copy. - Identify the various land uses and ground cover within the school grounds. For example; mowed turf, asphalt and buildings, trees and shrubs etc. Create a coloured key for each land use then fill the grid squares with the appropriate colour over each different section. - Count the grid squares for each land use and convert to percentages. What percentage of the school grounds provides wildlife habitat? Using the example Habitat Scorecard (Appendix 2), fill out the score of the school's current habitat state. This will be used as a comparison in lesson 7. - Walk around the school grounds with the students. Using the Bio Survey Data Record (Appendix 3), students have a set amount of time to identify as many species as possible belonging to one of the vegetative layers in an identified area on the grid. - Students must describe and sketch the species and vegetation on the data sheet and where possible, take digital photos of each area and their findings. If using an online journal, these images can be uploaded for use in their final presentation during lesson 8. The variety of plant species counted will help the students make predictions about the possible number of animal species at a later date. Encourage them to look for evidence of animals in each area such as droppings, chewed leaves, scratch marks, webs, etc. noting these on the data sheet.	Google Earth Website https://www.google.com/earth/ Appendix 2 – Habitat Scorecard Class set of Appendix 3 -Bio Survey Data Record Digital Cameras Science journals

	6. Begin a discussion with the students as they compare the areas they are exploring. Introduce questions such as: - Do you think this garden area would have greater biodiversity than the bush corner? - What invertebrates and other animals would you expect to find in this area (invertebrates are a good indicator of biodiversity)? Encourage students to begin formulating their own questions, noting them down for entry into their journals. 7. Encourage students to start searching for small-scale ecosystems. Provide examples including the bark of a tree, under a log, in the mulch or leaf litter and even the accumulated leaves at the entrance to a drain. Using a small stick or similar, students gently explore the biodiversity within this small ecosystem. They take digital photos or sketch their small-scale ecosystem and list or label the variety of species within it. 8. Once back in the classroom, students label the map or satellite image with information from Appendix 2, 3 and their digital photos. Students must identify the richest source of biodiversity within the school grounds, justifying their reasoning using examples from their investigations.	
Lesson 4	Explain – Stage 3 Natural materials vs metals and plastics: Why is wood the sustainable choice? Investigate the process of how plastics and metals are manufactured, if short on time set this as either an individual task or homework assignment. Students consider current scientific explanations and research to record points for discussion in their science journals around the pollutants created during these processes such as mining, refining, melting, molding etc. They will then turn their attention to how the plastics and metals, as well as by-product materials are disposed of once they are no longer in use. Encourage students to pay particular attention to and draw conclusions from; the environmental, financial and social impact of landfill. Once this task is complete, students repeat the research process this time with a focus as to how timber and wood products are manufactured from growing wither in forests or plantations, harvesting, milling, drying etc. Discuss the environmental benefits of having the carbon dioxide transformed into a solid carbon, rather than creating carbon dioxide output. Encourage students to construct multi-modal explanations and justify their claims in terms of the evidence gathered. 1. Introduce this lesson by watching the Forest Learning video ‘<i>Going Bush – A plan to energise NSW south coast with woodchip waste</i>’. This resource discovers in detail the South East Fibre Exports and their process of converting woodchip waste into sustainable fibre and energy. It explores: - the company and its mill - conversion processes	Forest Learning video ‘Going Bush – A plan to energise NSW south coast with woodchip waste’ http://forestlearning.edu.au/find-a-



	• efficient and effective use of waste • production of pellets and kitty litter • production of electricity from biomass • interviews with experts in the industry sectors. 2. As a class, read through the questions outlined in Appendix 4 and discuss student predictions to what the answers for the questions will be. Compare predictions generated by different students and form like-minded groups based on these differences in predictions. 3. As a class, view the Forest Learning video 'Wood as a renewable and energy efficient resource' paired again with Appendix 4. This video is an excellent resource to introduce the concepts of renewable and non-renewable resources and the energy used to produce various every day materials and products. In the prediction groups formed before watching the video, students then answer the questions posed, noting any differences in their original predictions using their science journal. 4. To further consolidate students' understanding and interpretation of the phenomenon, read through Appendix 5 on 'Forest Regeneration,' and Appendix 6 on the 'Sustainable yield of Australia's forests'. Regroup together as a class discussing different ways that sustainability benefits our planet, using the evidence collated from the videos and fact sheets to construct explanations of the phenomenons.	resource/article/9/forests-and-forestry-in-nsw.html Appendix 4 - Wood as a renewable and energy efficient resource. Printed out for all students Forest Learning video 'Wood as a renewable and energy efficient resource' http://forestlearning.edu.au/find-a-resource/article/27/wood-as-a-renewable-and-energy-efficient-resource.html Science journals Appendix 5 - 'Forest Regeneration' Appendix 6 - 'Sustainable yield of Australia's forests'
Lesson 5	Elaborate – Stage 4 Which products are biodegradable? In this lesson students will use and apply the concepts and explanations already consolidated, towards a new context. They will learn about the replenishing nature of trees and natural materials once they are discarded and no longer in use and how they can be broken down and returned to the soil, testing the general applicability of this concept. This comparison will be demonstrated using a biodegradability experiment which will incorporate several samples of timber and wood products, natural materials, plastics and metals. This experiment will require the students to test eight different materials. Each one will be placed on the bottom of a clear plastic takeaway food container then carefully, soil or potting mix is layered over the top of these materials ensuring each material sample is visible through the underside of the container. Over the course of three weeks, the results will be observed, recorded and collated. The experiment's aim is to demonstrate how the natural materials break down and	



return their nutrients to the soil whilst the manufactured plastics and metals do not.

1. As a class, discuss the term biodegradability. Students record their thoughts around this term in their science journals.
2. Display the sample materials for the test experiment. Explain that this lesson will demonstrate the experiment but they will be responsible for recreating it, changing the material variables. The students will predict, observe and hypothesise, then reconstruct and extend their explanations and understanding by reenacting the experiment exploring the biodegradability of various household materials they have selected.
3. Display the following table on the interactive whiteboard, students to prepare a copy for their science journal.

Aim	What are you trying to achieve in this experiment? What is your goal in conducting the experiment? Phrase your aim as a question.
Prediction	What do you predict the results will be? For example, which material will decompose first/last and why.
Method	Step by step procedure on how the experiment will be conducted with a labeled diagram of how the experiment is set up.
Results	Record in a table, convert data into graph format.
Discussion	What do the results tell students about the tested materials?
Conclusion	What have you learned from the experiment? Your conclusion should answer your aim.

4. Discuss predictions and reasoning amongst the class, then allow time for them to record their aim and prediction into their science journal.
5. Discuss how to write the process of the experiment into a procedure. Provide time to create their method.
6. Display the results graph below on the interactive whiteboard and ask students to prepare a copy in their student journal. Discuss how to rate each result from 1-5, with 5 being entirely decomposed and 1 being not decomposed at all.

	Materials			
Time Frame	Foil	Clingfilm	Paper	Tissue
Week 1 Mon				
Week 1 Fri				
Week 2 Mon				

Science journals

Clear plastic take away food containers X10

3X3cm squares of:
foil, glad wrap, paper, tissue, cardboard, wax paper, cellophane, and cotton cloth

Bag of soil or potting mix

	<table><tr><td>Week 2 Fri</td><td></td><td></td><td></td><td></td></tr><tr><td>Week 3 Mon</td><td></td><td></td><td></td><td></td></tr><tr><td>Week 3 Fri</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td>Cardboard</td><td>Wax paper</td><td>Cellophane</td><td>Cotton Cloth</td></tr><tr><td>Week 1 Mon</td><td></td><td></td><td></td><td></td></tr><tr><td>Week 1 Fri</td><td></td><td></td><td></td><td></td></tr><tr><td>Week 2 Mon</td><td></td><td></td><td></td><td></td></tr><tr><td>Week 2 Fri</td><td></td><td></td><td></td><td></td></tr><tr><td>Week 3 Mon</td><td></td><td></td><td></td><td></td></tr><tr><td>Week 3 Fri</td><td></td><td></td><td></td><td></td></tr></table> 7. Split the class into groups of three and allow them time to prepare, set up and label their group experiment. 8. Explain that the discussion and conclusion section will be written once the results have been collected. 9. Students are to repeat the experiment changing the material and time frame variables. This is to be done as an individual task over a set period of time and could be conducted as a home or in class task.	Week 2 Fri					Week 3 Mon					Week 3 Fri						Cardboard	Wax paper	Cellophane	Cotton Cloth	Week 1 Mon					Week 1 Fri					Week 2 Mon					Week 2 Fri					Week 3 Mon					Week 3 Fri					
Week 2 Fri																																																				
Week 3 Mon																																																				
Week 3 Fri																																																				
	Cardboard	Wax paper	Cellophane	Cotton Cloth																																																
Week 1 Mon																																																				
Week 1 Fri																																																				
Week 2 Mon																																																				
Week 2 Fri																																																				
Week 3 Mon																																																				
Week 3 Fri																																																				
Lesson 6	Perhaps an option here is to compare the natural homes of animals to our homes – this section is great about biodiversity but not connected to overall topic very well Elaborate – Stage 4 continued What is biodiversity like in the forest? Local park/forest based first-hand investigation – Part 1 The next two lessons involve an excursion to a local national park or state forest. See the Forest Learning website for useful excursion planning information for your state. If this is not logistically possible, try to visit a local park with a wooded area. Students will use and apply concepts and explanations they have consolidated in the unit thus far to test their knowledge of general applicability in the new context of a park or forest. Simple invertebrate collecting equipment includes: • small plastic containers with lids or specimen containers or bug jars • magnifiers e.g. hand lenses or magnifying glasses • trowels • old sheets • butterfly nets or sweep nets • gloves* <i>*For safety, it is important that students do not touch invertebrates with their hands.</i> 1. This lesson will require students to continue the recording method from lesson 3, see Appendix 3 - Bio Survey Data Record. The students	<i>Organise an excursion to a local state forest, or national park.</i> Forest Learning website http://www.forestlearning.edu.au Small plastic containers with lids, specimen containers or bug jars, magnifiers, e.g., hand lenses or magnifying glasses, trowels, old sheets, butterfly nets or sweep nets, specimen collection gloves for students Class set of Appendix 3 -Bio																																																		

	will now input data in the second column under the State Forest column to allow for direct comparison. 2. Explain the following search techniques to the class. a) Search type 1: Arboreal invertebrates - A tree shake is used to collect and observe invertebrates that live in trees and shrubs. This involves placing a large sheet under the branch of a tree or shrub while another student gently shakes or beats the branch over the sheet. Any insects on the branch should fall onto the sheet for collection or observation. b) Search type 2: Leaf litter invertebrates - To collect and observe leaf litter invertebrates, use a trowel to scoop up some leaf litter and spread it out onto an old sheet or into a tray. Use a stick to very gently sift through the leaf litter looking for invertebrates. Gently tap them into collection containers for further observation. c) Search type 3: Ground cover layer invertebrates - Depending on the area, sweep nets can be used to capture invertebrates that live in or near the ground layer of plants. Nets are swept side to side, through low soft foliage plants and grass. Captured animals are transferred from the net into a collection jar. 3. Once arrived at the excursion location, briefly recap the three search techniques and allocate the class into groups to begin their surveys. 4. Once students have completed their surveys, regroup to discuss the similarities and differences from their result in lesson 3, recording their findings and justifications in their science journals. (If time and location does not permit discussion at the end of the survey investigation, complete this back in the classroom).	Survey Data Record Science journals
Lesson 7	Elaborate – Stage 4 continued What materials do animals use to create their habitats? Local park/forest based first-hand investigation – Part 2 Part two of the excursion will involve students exploring an area of the forest or park to discover the types of materials animals use to make their habitats. They will compare these materials with the materials humans use in building and construction, identifying the similarities and differences as well as assessing the environmental impact of each. 1. Revise the school ground results recorded in lesson 3 on Appendix 3, Bio Survey Data Record. 2. Discuss predictions for the similarities and differences to be found in the park or forest you are conducting your excursion in, compared to the built environment of a school. 3. Review the results of the biodegradability experiment so far and discuss the cyclical nature of forestry and the natural environment	Class set of Appendix 3 -Bio Survey Data Record Class set of binoculars

	compared to the wasteful nature of plastic and metal manufacturing. - In small groups, students then explore, identify and observe animal habitats within the allocated area. They should discuss and record materials used for their construction and write comparison to the materials used by humans. - Once regrouped, discuss the students' findings and introduce the concept that the benefits of using natural products and resources versus. Manufactured products. - Once class results are compiled, compare to the results from lesson 3 and discuss. Students must then start to give thought to how they wish to complete a study of their findings over the past seven lessons. Explain that they must reconstruct and extend their explanations and understanding using and integrating different modes, such as written language, diagrammatic and graphic modes and mathematics.	
Lesson 8	Evaluate – Stage 5 Final Report The final report will require students to develop and respond to a hypothesised question which they are to create. This question should relate directly to the research and investigations they have conducted over the past seven lessons. Drawing conclusions from their learnings, the question posed must address the experiences of the concept they choose to explore. It must provide an opportunity for students to review and reflect on their own learning and new understanding and skills, whilst allowing them freedom to revisit their journals and formulate a question based on the concepts that were of most intrigue throughout the unit. The report criteria must encourage the students to summarise their findings from the three stages of investigation within this unit of inquiry and provide evidence for changes to their understanding, beliefs and skills. Although freedom to select a presentation method should be catered for, the finished reports should be presented digitally to the class in order to create a blog site for future years' student reference. The finished reports should be published using an online blog format, such as Edmodo. This also provides a resource for other schools to access. It should be anticipated that the report will take some time for the students to assemble and it is recommended that time both in class and as homework be catered for, with a due date towards the end of term. Plan time for each student to present their report to the class. As a final revision exercise: - Revisit the student journals, covering one lesson at a time. Discuss what was learned in each lesson and whether the unit of inquiry challenged or changed their understanding, beliefs and skills on sustainability and natural versus built environments. - Collect the final results from the biodegradability experiment and	Student journals Student assessment criteria and rubric Online blogging software such as Edmodo https://www.edmodo.com

analyse the results table. Once again display this on the interactive whiteboard and allow time for students to determine their own conclusions through class discussion.

National Curriculum Outcomes Assessment Rubric				
KLA Descriptor:	A	B	C	D
Science Understanding ACSSU112 ACSSU116 ACSSU225	Comprehensive knowledge and understanding of concepts, facts and procedures of chemical changes that involve substances reacting to form new substances and that some of Earth's resources are renewable, but others are non-renewable.	Thorough knowledge and understanding of concepts, facts and procedures of chemical changes that involve substances reacting to form new substances and that some of Earth's resources are renewable, but others are non-renewable.	Satisfactory knowledge and understanding of concepts, facts and procedures of food chains and food webs and that human activity can affect these interactions. Explains that some of Earth's resources are renewable, but others are non-renewable.	Developing knowledge and understanding of concepts, facts and procedures of food chains and food webs and that human activity can affect these interactions. Explains that some of Earth's resources are renewable, but others are non-renewable.
Science as a Human Endeavour ACSHE121 ACSHE134 ACSHE136	Comprehensive knowledge and understanding that science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management. Explains that scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's	Thorough knowledge and understanding that science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management. Understands that scientific knowledge changes as new evidence becomes available.	Satisfactory knowledge and understanding that science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management.	Developing knowledge and understanding that science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management.

	understanding of the world.			
Science Inquiry Skills ACSIS124 ACSIS125 ACSIS126 ACSIS129 ACSIS131 ACSIS133 ACSIS139 ACSIS140 ACSIS144 ACSIS146 ACSIS148	Comprehensive ability to construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method, and communicates ideas, findings and solutions to problems using scientific language.	Thorough knowledge and understanding of procedures such as identifying questions and problems that can be investigated scientifically and make predictions based on scientific knowledge, measure and control variables, and select equipment to collect data with accuracy appropriate to the task and summarise data, from students' own investigations and secondary sources.	Satisfactory knowledge and understanding of procedures such as identifying questions and problems that can be investigated scientifically and make predictions based on scientific knowledge, measure and control variables, and select equipment to collect data with accuracy appropriate to the task and summarise data , from students' own investigations and secondary sources.	Developing knowledge and understanding of procedures such as identifying questions and problems that can be investigated scientifically and make predictions based on scientific knowledge, measure and control variables, and select equipment to collect data with accuracy appropriate to the task and summarise data, from students' own investigations and secondary sources.

References:

Forest Learning

Planet Ark: <http://forestlearning.edu.au/find-a-resource/article/32/planet-ark-schools-tree-day.html>

Biodiversity: <http://www.environment.gov.au/biodiversity>

Edmodo: <https://www.edmodo.com>

Google Earth Website: <https://www.google.com/earth/>

Coggle It: <https://coggle.it> or Appendix 1 – 'Biodiversity Mindmap'

Australian Museum: <http://australianmuseum.net.au/What-isbiodiversity>



Creative Commons License:



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).

About ForestLearning

ForestLearning.edu.au an initiative of Forest and Wood Products Limited. All resources have been developed by qualified educators and designed to assist teachers deliver the Australian Curriculum.