

Year 12 Earth and Environment

Module 8 Resource Management

Our goal for this term is to:

Australia is rich in both renewable natural resources (eg agricultural production, sunlight) and non-renewable natural resources (eg minerals, fossil fuels). Students examine how the extraction and disposal of waste can greatly impact on the surrounding environment, affecting the quality and availability of renewable resources such as water and living organisms. The extent of this impact is referred to as an 'ecological footprint'.

Scientific models of resource extraction, use and management have developed over time in response to new discoveries and through the incorporation of sustainable practices, many of which have been developed by Aboriginal and Torres Strait Islander Peoples. The world's population is increasing and more natural resources are being extracted to provide food, consumer goods, energy and infrastructure. Sustainable management of both natural resources and waste is vital for human long-term survival

In this module, students focus on collecting and representing data to analyse trends and patterns and solve problems while communicating ideas about resource management. Students should be provided with opportunities to engage with all Working Scientifically skills throughout the course.

We will achieve this by exploring the following inquiry questions:

- **Using Australia's Natural Resources-** How are Australia's natural resources extracted, used and managed?
- **Waste Management** - How is waste managed?
- **Sustainability-** How can humans manage the Earth's natural resources sustainably?

No. of Lessons	Learning Intention The goal of these lessons are to...	Lesson Activities To achieve this goal we will...	Success Criteria I will know I have achieved this goal when I can
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	<p>Inquiry question 1: How are Australia's natural resources extracted, used and managed?</p>	<p>Students design their own classification scheme for classifying the rubbish they have identified.</p> <p>Students design their own experiment to determine the composition of household waste or waste within the classroom. Students are to develop their own question to investigate in relation to the waste they are going to observe. Students develop a method and undertake the experiment to sort waste into different categories.</p> <p>Students analyse their results, in particular their discussion is to focus on the way they undertook the experiment and whether this could be improved and the difficulties faced when classifying different types of waste. Students are to think about ways in which the experiment could be improved.</p> <p>Students use Classification chart of rubbish (available in resources folder) to identify different types of rubbish. Students extend the image by providing at least 3 examples of each category of rubbish.</p> <p>Discussion about appropriate means of disposing of rubbish. Find out about the EPA philosophy of managing waste using the waste hierarchy.</p> <p>Students summarise ways of managing waste including recycling and landfill waste. Use the following website link to find out about what materials can be recycled</p> <p>Reference p248→ p251 Spotlight</p> <p>Fashion- War on waste The city of Sydney's Plan for Waste you can't recycle- jpeg Infographic in the resource folder. The document shows the amount of waste that is recycled in Sydney households and future plans for waste that cannot be recycled.</p> <p>Students recall recyclables and non-recyclable items. Show the PDF poster and students can mark their own lists.. Ask class why they think they were not able to correctly identify more recyclable materials than they did. Students recall the meaning of environmental sustainability.</p>	<ol style="list-style-type: none"> 1. Describe the different types of solid wastes that exist in Australia 2. Develop an inquiry question & hypothesis for their own household analysis then modify the hypothesis to reflect evidence during their investigation. 3. Conduct a practical investigation - plan and undertake their own data collection on their home household waste with safety 4. Organise the waste from an organization or home into categories 5. Record data using appropriate units/ method 6. Identify a number of waste management strategies 7. Identify the impact of waste disposal to landfill on the environment 8. Identify that Sydney does not have sufficient space for landfill at our current rate of production 9. Identify waste management facilities in their local area 10. Explain why Australia is facing a waste management crisis 11. Select one strategy for waste management from the local area & evaluate its sustainability into the future using data & evidence to support the argument
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		<p>Discussion: What can we do with all the waste plastic generated by modern society? Watch video clip Can Plastic Roads save the planet</p> <p>Discuss what happens to the rubbish that gets collected from our homes each week. Watch video. This site also has an interactive game for sorting rubbish. Read article Where does all the rubbish go Discussion about how good or poor our production and management of waste is.</p> <p>Small group activity: groups select one of the options provided in the syllabus content and working in groups, gather and process available information about the sustainability of the way we manage our waste. Group presents findings to class. Possible jigsaw (expert) group activity.</p> <p>Available resources for identified examples Students examine the environmental impacts of sending waste to landfill Sustainability of Sydney's current level of reliance on landfill. Sydney running out of space for landfill Waste management Landfill Outline the ecological problems produced by landfill sites, Assess whether landfill is a sustainable solution for rubbish disposal vs other methods. Energy savings from recycling https://lbre.stanford.edu/pssistanford-recycling/frequently-asked-questions/frequently-asked-questions-benefits-recycling http://www.wm.com/location/california/ventura-county/west-hill/s/recycle/facts.jsp</p> <p>Explain that much of our waste has traditionally been sent to China for disposal, but that recently China has greatly reduced the amount of rubbish imported from 1st world countries. This has created a problem for us in that we now have to come up with more sustainable ways of dealing with our rubbish.</p> <p>Students read the ABC article: Australia needs to start recycling and reusing its own waste, says industry struggling under China's ban Class discussion about the implications of the what Australia manages its waste.</p>	
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	<p>Inquiry question 2: How is waste managed?</p>	<p>Students write a list of what they believe they throw out on a daily basis and then compile a list of the rubbish they throw out in a day. Students design their own classification scheme for classifying the rubbish they have identified.</p> <p>War on Waste- Sydney Harbour waste dive War on waste- Waste Sorting clip to assist with identifying items that can be recycled.</p> <p>Students design their own experiment to determine the composition of household waste or waste within the classroom. Students are to develop their own question to investigate in relation to the waste they are going to observe. Students develop a method and undertake the experiment to sort waste into different categories.</p>	<ol style="list-style-type: none"> 1. Describe the different types of solid wastes that exist in Australia 2. Develop an inquiry question & hypothesis for their own household analysis then modify the hypothesis to reflect evidence during their investigation. 3. Conduct a practical investigation - plan and undertake their own data collection on their home household waste with safety 4. Organise the waste from an organization or home into categories 5. Record data using appropriate units/ method 6. Identify a number of waste management strategies 7. Identify the impact of waste disposal to landfill on the environment

	<p>Students analyse their results, in particular their discussion is to focus on the way they undertook the experiment and whether this could be improved and the difficulties faced when classifying different types of waste. Students are to think about ways in which the experiment could be improved. <i>Spotlight Text p 246 Activity 11.1</i></p> <p>Students use the data from Australian National Waste Report to create a graph showing the amount of waste per capita in 2015 to 2016 in Australia (page 9).</p> <p>Types of waste http://edugreen.teri.res.in/explore/solwaste/types.htm</p> <p>Students use Classification chart of rubbish (available in resources folder) to identify different types of rubbish. Students extend the image by providing at least 3 examples of each category of rubbish.</p> <p>Discussion about appropriate means of disposing of rubbish. Find out about the EPA philosophy of managing waste using the waste hierarchy.</p> <p>Students summarise ways of managing waste including recycling and landfill waste.</p> <p>Use the following website link to find out about what materials can be recycled</p> <p>Reference p248 → p251 Spotlight Energy From waste - Suggested teacher Resource. https://www.cefc.com.au/media/222701/cefc-energy-from-waste-market-report-november-2016.pdf</p> <p>Fashion- War on waste</p> <p>The city of Sydney's Plan for Waste you can't recycle- jpeg Infographic in the resource folder. The document shows the amount of waste that is recycled in Sydney households and future plans for waste that cannot be recycled.</p> <p>Recycling quiz: Students recall recyclables and non-recyclable items. Show the PDE poster and students can mark their own lists..</p> <p>Ask class why they think they were not able to correctly identify more recyclable materials than they did.</p> <p>Students recall the meaning of environmental sustainability.</p> <p>Discussion: What can we do with all the waste plastic generated by modern society?</p> <p>Watch video clip Can Plastic Roads save the planet</p> <p>Discuss what happens to the rubbish that gets collected from</p>	<ol style="list-style-type: none"> 8. Identify that Sydney does not have sufficient space for landfill at our current rate of production 9. Identify waste management facilities in their local area 10. Explain why Australia is facing a waste management crisis 11. Select one strategy for waste management from the local area & evaluate its sustainability into the future using data & evidence to support the argument 12.
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		<p>our homes each week. Watch video. This site also has an interactive game for sorting rubbish.</p> <p>Read article Where does all the rubbish go Discussion about how good or poor our production and management of waste is.</p> <p>Small group activity: groups select one of the options provided in the syllabus content and working in groups, gather and process available information about the sustainability of the way we manage our waste. Group presents findings to class. Possible jigsaw (expert) group activity.</p> <p>Available resources for identified examples Students examine the environmental impacts of sending waste to landfill Sustainability of Sydney's current level of reliance on landfill. Sydney running out of space for landfill Waste management Landfill Outline the ecological problems produced by landfill sites, Assess whether landfill is a sustainable solution for rubbish disposal vs other methods. Energy savings from recycling https://lbre.stanford.edu/pssistanford-recycling/frequently-asked-questions/frequently-asked-questions-benefits-recycling http://www.wm.com/location/california/ventura-county/west-hill/s/recycle/facts.jsp</p> <p>Explain that much of our waste has traditionally been sent to China for disposal, but that recently China has greatly reduced the amount of rubbish imported from 1st world countries. This has created a problem for us in that we now have to come up with more sustainable ways of dealing with our rubbish.</p> <p>Students read the ABC article: Australia needs to start recycling and reusing its own waste, says industry struggling under China's ban Class discussion about the implications of the what Australia manages its waste.</p> <p>Investigate</p> <ol style="list-style-type: none"> 1. the opening of a new waste facility in Wetherill Park for turning waste into fuel 2. Using plastic for building roads in Sydney 	
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	<p>Inquiry question 3: How can humans manage the Earth's natural resources sustainably?</p>	<p>Brainstorm what it means to be</p> <ul style="list-style-type: none"> - environmentally, socially and economically sustainable <p>Use venn diagram</p> <p>Have We Already Used Up Earth's Resources For The Year? https://www.youtube.com/watch?v=ffMRyV7V_8c</p> <p>Sustainability for visual learners</p> <p>Spotlight NSW Module 5-8 textbook page 246 -248 read through environmental, social and economic sustainability and complete to think about questions.</p> <p>Students explore definitions for economic, social and ecological sustainability and discuss similarities between them.</p> <p>Students use video and text to write definitions of sustainability.</p> <p>Sustainability explained through animation https://www.youtube.com/watch?v=B5NiTN0chj0</p> <p>Students use text and website link to explain how human activities affect sustainability</p> <p>Refer Spotlight text pages 254-265</p> <p>Students summarise notes from texts and additional resources https://courses.lumenlearning.com/boundless-biology/chapter/threats-to-biodiversity/</p>	<ol style="list-style-type: none"> 1. Define sustainability 2. Outline the three pillars of sustainability 3. Define sustainable development 4. Outline the principles/programs to achieve ecologically sustainable development 5. Analyse (check the definition of analyse) human activities that affect sustainability including overharvesting, water pollution and habitat removal or destruction. 6. Appreciate how interactions within and between the environment and the impacts of human activity influence the region, including Australia, and have significance for the rest of the world through the article at https://theconversation.com/even-as-more-new-species-are-found-southeast-asia-is-in-the-grip-of-a-biodiversity-crisis-67700 7. Engage with issues requiring cultural sensitivity, and learn that scientists work in culturally diverse teams to address issues and solve problems of national and international importance through the article at: http://www.unesco.org/new/en/brasil/culture/culture-and-development/culture-in-sustainable-development/ 8. Describe the land management practices used by Aboriginal and Torres Strait Islanders to maintain sustainability of native

		<p>Research a sustainability initiative in your local area Reference: Activity - Spotlight Text 2019 - Science Press-Hefferan & Mahon Modules 5-8 page 269-270</p> <p>Why there is no definition for sustainability yet Ss explore the reasons behind no one definition for sustainability and the rationales that underpin sustainable living. (refer to venn diagram above)</p> <p>Students examine a graph of world population. Students discuss the contribution of world population to our increasingly unsustainable use of resources</p> <p>-</p> <p>What do you know about Aboriginal culture and beliefs? https://www.gocongr.com/p/2345577-indigenous-australians--aboriginal--culture-quiz-quizzes</p> <p>The land owns us https://www.creativespirits.info/aboriginalculture/land/meaning-of-land-to-aboriginal-people Caring for the Country - A Road trip https://www.youtube.com/watch?v=izRWHqR-zXI&feature=youtu.be</p> <p>Good film to develop a worksheet https://www.youtube.com/watch?v=uvqqqJVccdw&feature=youtu.be</p> <p>Pilbara National Park Ranger Program https://www.dpaw.wa.gov.au/parks/aboriginal-involvement/504-aboriginal-ranger-program</p> <p>Explore the discussion around increasing Aboriginal land management practices for managing public lands in NSW https://docs.google.com/document/d/1z5BMqpwSS4K6riyHLn7tu78A9SFdUF5NFNeSckbsPI0/edit</p> <p>Aboriginal Land Rights - from Little things Big things Grow. https://www.youtube.com/watch?v=vut1ntcRMdQ&feature=youtu.be</p> <p>Teacher invites a local Elder to provide the content required to understand how the Aboriginal peoples of the area have acted as resource managers.</p>	<p>plants and animals.</p> <ol style="list-style-type: none"> Outline the role of Government and Community groups in consultation with Aboriginal groups in maintaining resources Describe some local cultural traditions used by Aboriginal peoples in the area. Describe legislations & actions taken to protect significant places of local country. Define the term Country & Place Broaden their understanding of aspects of civics and citizenship related to the application of scientific ideas and technological advances, including ecological sustainability and the development of environmental and sustainable practices at a local, regional and national level. Meet a local Aboriginal elder to discuss sustainable practices of the local people Describe the purpose and function of the land council that works in their local area
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		<p>Teacher Resource for Aboriginal History, Culture and Land Practices. https://docs.google.com/document/d/1USfYxk0WK4icy6FGDivOfdl6ogQo0uHuXRsyDOpilJM/edit</p> <p>Spotlight HSC Modules 5-8 pages 266</p> <p>Investigating the importance of Environment Impact Statements. https://www.lawhandbook.sa.gov.au/ch19s06s01.php</p> <p>https://www.planning.nsw.gov.au/policy-and-legislation/under-review-and-new-policy-and-legislation/environmental-impact-assessment-improvement-project</p> <p>Aboriginal knowledge needed for fighting bushfire https://www.sbs.com.au/news/indigenous-australians-have-key-role-to-play-in-fighting-bushfires</p> <p>Resources</p> <p>https://theconversation.com/even-as-more-new-species-are-found-southeast-asia-is-in-the-grip-of-a-biodiversity-crisis-67700</p> <p>http://www.unesco.org/new/en/brasil/culture/culture-and-development/culture-in-sustainable-development/</p> <p>Have We Already Used Up Earth's Resources For The Year? https://www.youtube.com/watch?v=ffMRyV7V_8c</p> <p>Sustainability for visual learners</p> <p>Spotlight NSW Module 5-8 textbook page 246 -248</p> <p>Sustainability explained through animation https://www.youtube.com/watch?v=B5NiTN0chj0</p> <p>Spotlight text pages 254-265 and additional resources https://courses.lumenlearning.com/boundless-biology/chapter/threats-to-biodiversity/</p> <p>Sustainability initiative in your local area - Spotlight Text 2019 - Science Press- Hefferan & Mahon Modules 5-8 page</p>	
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		<p>269-270</p> <p>Additional resources</p> <p>Overharvesting</p> <p>Overfishing</p> <p>Water Pollution</p> <p>Australia's Water</p> <p>Habitat loss and degradation</p>	
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