

Eco Champions Overview Cool Australia Units on Waste

Solid Waste – Years 1 to 10

Introduction

Cool Australia has developed units of work on a range of environmental topics, including energy, water, biodiversity and solid waste. All these activities can be downloaded free of charge from the following website: www.coolaustralia.org.au

These units have been designed to meet a wide range of educational needs throughout Australian schools covering:

1. Australian curriculum
2. Other state curricula
3. Latest innovations in learning and teaching practice e.g. Principles of Learning and Teaching (PoLT)
4. The Victorian e5 instructional model – engage, explore, explain, elaborate and evaluate
5. The curriculum component of AuSSI – the Australian Sustainable Schools Initiative
6. *Education for a Sustainable Future*, Australian Government

You will find everything you need to organise a curriculum unit on Solid Waste for Years 1 through to 10 in the teacher *Curriculum* section of the website. Student research materials can be found under *Student research* in the top menu bar and self directed activities and various tools can be found under *Toolbox* also in the top bar. Find what you need by selecting the year levels and topic. Otherwise, use the built-in search engine.

The screenshot shows the Cool Australia website interface. At the top, there are logos for Cool Australia (Educating for a sustainable future), Our school partner, and Bendigo Bank. The navigation bar includes links for Home, Curriculum, Toolbox, Professional Development, News, Take Action, and About Us, along with Dashboard and Logout buttons. The main heading is 'Curriculum Materials'. Below this is a search bar with filters for Resource Type, Year 7 to 8, Waste, and Subject (All). The search results display four units: 'Flipped Classroom – The Majestic Plastic Bag', 'Seal the Loop – Marine food webs – Year 7', 'Back to Earth – Green Waste Cycle – 7 & 8', and 'Back to Earth – Waste and Landfill – 7 & 8'.

All units of work developed on this site integrate English, Science, Geography and Mathematics.

Over the next few years, Cool Australia plans to fill the *Student research* and *Toolbox* sections of the website with hundreds of incredible learning resources. Please keep referring back to these areas.

Inquiry learning

A model of Inquiry learning was chosen for the design of the Cool Australia units of work, as it can be used to incorporate and accommodate all the various educational changes and innovations to curriculum and teaching practice that have occurred over the past ten years. It is also recommended by The Australian Government's current document *Education for a Sustainable Future, 2005*.

Cool Australia's Inquiry Learning approach has been divided into the following sections: Prior learning, Tuning in, Finding out, Drawing conclusions, Finding solutions, Considering social action and Reflection and evaluation. These are explained in more detail below.

Prior learning

Prior learning activities enable students to value what they already know about a topic. While they establish what students already know, they also help the teacher to identify some of a student's misconceptions. Prior learning activities can be used at the start of the assessment process.

Tuning in

Tuning in activities helps students to define and focus on the issues that they will be dealing with the unit of work.

Finding out

Finding out activities help students to obtain more information about the issues they are going to investigate. They can use them to identify questions of interest and research these either in small groups or on their own. Once information is gathered, it can be shared using chosen communication methods e.g. short presentations.

Students can continue finding out by completing a range of investigations, including gathering data. They can use appropriate methods to present and communicate what they have found out.

Drawing conclusions

Drawing conclusion activities provide students with tools that help them further develop their ideas and opinions. They can describe issues from different perspectives and identify, examine and justify different points of view.

Considering social action

Considering social action activities give students opportunities to apply their learning in real world situations, in the classroom, school, home or the local community.

Reflection and evaluation

Reflection and evaluation activities provide students with the time and opportunity to reflect on what they have learnt and the learning processes in which they have been involved.

Student actions

Units of work involving the environment enable your students to immediately apply their learning in the real

On the Cool Australia website, you will find links for each activity in each year level to the content descriptions in Science, Mathematics and English for the Australian Curriculum.

world, so that they have greater motivation and opportunities to excel. They become empowered as they discover their ability to create positive change for a better environmental future.

In designing the units of work, Cool Australia has identified the age appropriate actions for students so that as they grow older, they accept greater and more rewarding challenges, such as:

Foundations years: Students learn to be responsible for their actions and belongings.

Years 1 and 2: Students take responsibility for their classroom.

Years 3 and 4: Students start taking greater responsibility for environmental tasks around their school.

Years 5 and 6: Students assist in creating change in their school and local communities.

Years 7 and 8: Students instigate and plan environmental projects and campaigns in their school and local community.

Year 9 and 10: Students take initiatives in sustainability projects in their school and local community.

Summary of the learning outcomes of the units on Solid Waste

The following table lists the learning outcomes of the unit of work for each year level.

Year levels	Learning outcomes The action-based activities will enable students to:
Years 1 and 2	<ul style="list-style-type: none"> ➤ distinguish between reusing, recycling, rubbish and composting ➤ explain where different sorts of waste go in the classroom and in the school ➤ sort their own solid waste ➤ produce bar charts showing the different types of waste they produce at school ➤ write a “book” about cardboard recycling ➤ produce a plan to improve the waste collection system in the classroom ➤ set up an improved waste collection system for the classroom
Years 3 and 4	<ul style="list-style-type: none"> ➤ manage the use of materials and production of solid waste in the classroom by developing class rules and strategies about minimising the use of paper and other resources, sorting waste into various categories (e.g. can be reused, for recycling, for chooks, worm farms or composting and rubbish) ➤ identify other ways students can reduce solid waste around their school ➤ produce a resource saving and solid waste reduction plan ➤ write to a company that sells a product with excessive packaging
Years 5 and 6	<ul style="list-style-type: none"> ➤ develop a class safety plan for working with waste ➤ conduct a solid waste assessment of the school ➤ explore the 4Rs of minimising solid waste and how this relates to their school ➤ investigate the solid waste management systems in their school ➤ identify new ways for students and teachers to reduce solid waste around their school ➤ produce ideas for reducing solid waste in the school and communicate these to the Principal

Year levels	Learning outcomes The action-based activities will enable students to:
	<ul style="list-style-type: none"> ➤ design and complete a waste reduction project for the school
Years 7 and 8	<ul style="list-style-type: none"> ➤ map the distribution and composition of litter in their school ➤ conduct an experiment to determine the rate of decomposition of different types of carry bags ➤ investigate the number of different types of carry bags by their families ➤ together with their families, undertake a home waste challenge ➤ identify ways to reduce litter around their school ➤ design and complete a communication project to cut litter in the school ➤ prepare a plan to put to the school to cut litter in the school
Years 9 and 10	<ul style="list-style-type: none"> ➤ map the pathways of different types of waste ➤ undertake a school waste assessment ➤ undertake a significant waste challenge using guidelines for five topical projects: <ul style="list-style-type: none"> – conduct a school litter survey – build a model of a landfill – design a school waste app – design a Pacific island waste system – design and present a <i>Science of Waste</i> show ➤ undertake a role play on container deposit legislation ➤ plan and complete a project that will reduce waste in either their school or the local community

Assessment and curriculum links

Assessment

Assessment background: Many schools will have very prescriptive assessment policies. Having assessment processes in place throughout a unit of work and involving students in their own assessment, will assist teachers to meet these expectations. The current overarching understanding of assessment is:

- **Assessment for learning** will help teachers respond to students' learning needs during the unit of work.
- **Assessment as learning** occurs when students monitor their own progress and make learning choices.
- **Assessment of learning** occurs when teachers use evidence of what students have achieved. Teachers are often obliged to measure this against Learning Outcomes or Standards.

To assist teachers, activities have been identified to assist with assessment. Teachers will first need to decide what aspects of their curriculum they wish to assess. This will be determined by their state or territories' official curriculum policies and documents. This in time may be superseded by the Australian Curriculum. Teachers that use Cool Australia activities often use the following process to develop their assessment:

1. Once the unit of work has been chosen, choose which learning outcomes, standards etc. that are going to be assessed. Often this is around five items.
2. Link the appropriate activities throughout this unit with the areas to be assessed
3. Decide how students will be assessed during their learning
4. If students are develop learning goals, then link the goals to the assessment
5. Decide how individual student's learning goals will be assessed
6. Modify communication activities, so they are a neat fit with your assessment needs
7. As the unit develops, choose self-assessment tools with which students are familiar for self-assessment
8. Inform students at the start of the unit about their assessment requirements

Assessment ideas

A unit of work on an environmental topic will provide a range of tasks suitable for assessment. Identify the tasks that best assist with the learning outcomes / standards etc you wish to assess.

Develop two lists as follows:

1. **General** – could apply to any unit of work on the environment using an inquiry learning approach
2. **More specifically** – identifies activities in this unit of work that has tasks suitable for assessment

General

- Use a prior learning activity to both find out what students already understand at the beginning of the unit, and to find out any misconceptions they may have.

- When doing activities, students are able to respond to questions and can compare and explain other's opinions.
- Students produce informative texts.
- Students present information or findings in a variety of ways, sometimes choosing the media.
- Students use mathematical language and concepts to explain environmental issues and solutions.
- Using the 'Considering social action activities', students apply their new understandings

More specifically

- Use the activity sheets as you go through the unit to find out if students are learning new concepts.
- As students collect data, ask them to explain what the data means.
- Use the presentation on the website to find out about a student's research skills and their ability to present information.
- Students design a solid waste reduction plan for the school.

Opportunities for leadership in the waste units

The table below gives some examples of how your students could take on leadership tasks and roles and show other examples of leadership. Some of these would arise while students were taking part in Cool Australia activities.

Year levels	Possible leadership tasks and roles (Progressive)	Opportunities for leadership (Progressive)
Years 1 & 2	<ul style="list-style-type: none"> ➤ Sort their rubbish, organics and recyclables in the classroom ➤ Help design a system for containers for different waste streams for the classroom ➤ Take turns to empty and wash the different waste containers ➤ Help design a waste safety code for the class and use this code in the classroom 	<ul style="list-style-type: none"> ➤ Take the initiative to research waste topics on the Internet ➤ Explain their point of view to others in the group ➤ Give a short talk to the rest of the class about their groups' waste project ➤ Contribute ideas for solving problems in group projects ➤ Allow others to have their say ➤ Complete their share of work in a group project ➤ Help and encourage others in their group
Years 3 & 4	<ul style="list-style-type: none"> ➤ Sort their rubbish, organics and recyclables in the school yard ➤ Take on the role of a team leader of group activities ➤ Help pack a low waste lunchbox at home 	<ul style="list-style-type: none"> ➤ Buddy with younger children to explain the school yard waste system ➤ Give a presentation on their findings to other students in their year level
Years 5 & 6	<ul style="list-style-type: none"> ➤ Join the SRC, raising issues of waste and litter ➤ Sort their rubbish and recyclables on school excursions and camps ➤ Help set up a process for collecting and sorting different waste streams when on excursions and camps ➤ Join the school Resource/Smart Schools AuSSI Vic committee 	<ul style="list-style-type: none"> ➤ Design and organise a game to reduce litter in the school yard ➤ Contribute to a significant year level project to raise awareness waste and litter in the school ➤ Give a presentation on their findings to other students at a school assembly ➤ Write articles for the school newsletter about the success of the new school initiatives to reduce waste and litter
Years 7 & 8	<ul style="list-style-type: none"> ➤ Sort their rubbish, organics and recyclables at home ➤ Join a school environment club or committee 	<ul style="list-style-type: none"> ➤ Initiate the "Down with waste home challenge" in their home ➤ Report back the results of their home challenge to the rest of the class ➤ Assist older students who are running environmental projects in the school
Years 9 & 10	<ul style="list-style-type: none"> ➤ Sort their rubbish and recyclables went out in the community and in the workplace ➤ Take on a position of responsibility of a school environment club or 	<ul style="list-style-type: none"> ➤ Report the findings of the "The big picture school waste plan" to the Principal, the school Council and others teachers ➤ Negotiate with the Principal and

Year levels	Possible leadership tasks and roles (Progressive)	Opportunities for leadership (Progressive)
	<p>committee</p> <ul style="list-style-type: none"> ➤ Join a youth group in the local community, suggesting projects and activities around reducing waste and litter 	<p>teachers to work out how to best incorporate all, or elements of, the proposed school waste plan into standard school practice</p> <ul style="list-style-type: none"> ➤ Give a presentation on their “Waste challenge” at a youth science environmental conference ➤ Conduct an interactive activity at a youth environmental conference ➤ Work with teachers and other students to submit the school waste plan and / or challenges for environmental awards ➤ Help to write a waste and litter policy for the school ➤ Mentor younger students about running environmental projects

Safety

The teacher needs to be aware of possible hazards in a unit on solid waste. It is recommended that the teacher prepares a risk assessment plan with common sense precautions, before starting the unit to minimise any risk to the teacher and the students. The students should be reminded of any relevant hazards before undertaking an activity. The students should also develop a class safety code. (The activity, *Be safe with waste*, has been designed for this purpose.)

Some possible hazards include:

Where	Possible Hazards	Precautions
Compost bins and worm farms	<ul style="list-style-type: none"> There are naturally occurring organisms, which can cause illnesses in people, in compost bins and worm farms. (People with allergies (e.g. asthma) and compromised immune systems are especially vulnerable.) 	<ul style="list-style-type: none"> Students with allergies (e.g. asthma) and compromised immune systems should not play around nor do any activities with compost bins and worm farms. All students should wash their hands after handling compost or working with worm farms.
	<ul style="list-style-type: none"> There are many invertebrates that inhabit compost bins and worm farms. These are a normal part of the food chain in the bin. However, some of these invertebrates, such as spiders, scorpions and centipedes can bite if annoyed. The bite from a Red Back Spider is especially nasty and would require urgent medical attention. 	<ul style="list-style-type: none"> All students should wear gloves when working around compost bins or worm farms. Use compost bins and worm farms with lids.
	<ul style="list-style-type: none"> Sometimes mice and rats can be found in compost bins and worm farms, where it is dark and warm and where there is an abundant food supply. 	<ul style="list-style-type: none"> With compost bins, bury a ring of chicken wire or mesh (about 20 cms) below the bin to prevent rats and mice digging up into the bin. Always cover food scraps in a compost bin or worm farm with a layer of soil. If rats and mice appear, use appropriate rodent eradication treatments.
Bags of compost or mulch	<ul style="list-style-type: none"> As for compost bins or worm farms 	<ul style="list-style-type: none"> Follow instructions on the bags of compost – moisten compost before use, wear a face mask, wash hands after use
Using garden tools	<ul style="list-style-type: none"> Obviously, garden tools are very useful, but they can be 	<ul style="list-style-type: none"> Train students to use tools safely and supervise their use

Where	Possible Hazards	Precautions
	dangerous if used carelessly.	
Waste audits / assessments	<ul style="list-style-type: none"> • In the past, many schools commenced waste studies by estimating the amounts and composition of the solid waste in a school. This is called a <i>waste audit</i>. However, to do a waste audit safely, a person needs to undergo formal training, as there are many health hazards in working with waste. Examples of such hazards are viruses from paper tissues and cuts from sharp glass objects or needles. • A <i>waste assessment</i> is a much safer way of estimating waste amounts and composition, as the students are not touching the material. Explain to your students that these are just common sense steps, not undue cause for concern and worry. 	<ul style="list-style-type: none"> • It is strongly recommended that students do not do waste audits, which involve manually touching waste, even with gloves. (Students should never touch waste from unknown sources. The only exception to this would be when the class teacher provides clean and safe waste objects for an activity.) • Students should only do a waste assessment. Examples of an assessment could include taking photographs of rubbish and counting the number of objects in the top layer of a rubbish bin. • Students should always wear protective plastic gloves when doing a waste assessment. • With young children, the teacher may choose to do the assessment him or herself, demonstrating safe practices.
Outdoor observations	<ul style="list-style-type: none"> • Rubbish in bins 	<ul style="list-style-type: none"> • Students should not touch the material in rubbish bins. This is because you cannot be sure what is in the bin and who placed it there. • Careful supervision by teachers
	<ul style="list-style-type: none"> • Injury from falls or touching sharp or hazardous waste • Harm from outsiders to the school 	<ul style="list-style-type: none"> • Develop outdoor safety code, especially a code if a student spots a syringe in the school yard • Students should always work outdoors in groups of 2 or more • Careful supervision by teachers
Outdoor observations near school skips	<ul style="list-style-type: none"> • Rubbish in skips 	<ul style="list-style-type: none"> • Students should not touch the material in rubbish skips. You cannot be sure what is in the skip and who placed it there.
	<ul style="list-style-type: none"> • Traffic – cars and collection trucks 	<ul style="list-style-type: none"> • Clear rules that students should not go into areas where there may be vehicles • Careful supervision by teachers

Glossary

Biodegradable – materials that can be broken down by natural organisms, such as bacteria and fungi
e.g. food scraps

Co-mingled – means all mixed up. The term is used to refer to co-mingled recycling collections in which paper and cardboard, bottles and cans are all placed in the same recycling bin.

Compost – the material produced from a compost bin or heap. This makes wonderful fertiliser for the garden.

Compost bin or heap – a container or area to hold food and garden scraps while they compost

Composting – Composting is the natural process of breaking down food scraps and garden waste in a bin or heap, turning it into humus (rich soil) that can be used on the garden

Containers – things used for holding waste material (these can be boxes, bins, buckets or skips)

Contamination – occurs when the wrong materials are placed in a recycling bin or green waste bin. This can cause major problems for the recycling company or composter. For example, if a china cup is mixed in with glass drink bottles for recycling, it can ruin the batch of new glass. Pieces of old fencing placed in a green waste bin may get tangled in the machinery at the composting plant.

Decompose – to breakdown. This occurs in compost bins where food scraps and garden waste is broken down by naturally occurring microbes (bacteria and fungi).

Garbage – solid materials that are discarded to a landfill site

Green waste – waste produced from the garden – leaves, small branches, prunings and grass clippings

Hazardous waste – waste that is considered to be harmful to people or the environment and which must be disposed of separately, either by incineration or to special hazardous waste landfills

Humus – rich soil

Landfill site – a large hole or quarry where rubbish is buried. These sites are carefully managed to prevent pollution of the air and waterways.

Litter – materials that are either thrown away or dropped by people. Litter can end up on the ground, or in creeks, rivers and the ocean where it can look messy and can harm people and animals.

Litter hot spot – a place where there is an unusually large number of items of litter

Materials recovery facility (MRF) – a factory that takes materials that people put out in recycling bins and sorts them into different groups, bales them up and then sends them off to recycling factories where they are used to make new goods.

Midden – a mound where Australian aborigines placed their waste – shells, bones, old tools and weapons, etc.

Mulch – material used in a thick layer over the garden to prevent water loss. Mulch can be made from a variety of materials, including pebbles, chipped wood, bark and leaves. Mulch made from plant materials is different from compost, as it is not broken down.

Municipal solid waste – waste that is collected by local councils from the council operations and from homes

Non-biodegradable – materials that cannot be broken down by natural organisms, such as bacteria and fungi e.g. metals

Non-recyclable – an item that at, at the present time, cannot be recycled back into either the same product or something different e.g. some plastics, nappies, tissues etc.

Organic waste – waste that is made up of either plant or animal matter – food scraps and garden waste

Recover – to collect something and either recycle, compost or reuse it, preventing it from going to landfill

Recyclable – an item that, at the present time, can be recycled back into either the same product or something different e.g. a sheet of paper can be recycled into another sheet of paper or into a cardboard box

Recycle – the process of making something new from something that has been thrown away. The new product can be the same as the old one or something quite different. For example, a sheet of photocopy paper could be made into another sheet of photocopy paper (same) or it could be made into a cardboard box (different).

Recycling factories – factories that make new products out of recycled ones. Sometimes the new goods are made out of all recycled material (as with some photocopy paper) and sometimes out of a mix of virgin (new) materials and recycled materials (as with cardboard boxes).

Reduce – buying and using things more carefully so that you produce less waste overall. For example, if you buy one large box of cereal instead of two small ones, that means you will have less cardboard packaging overall. Packing the right amount of food for your school lunch means that you will have less uneaten food to throw away after lunch.

Refuse – means to not do something in order to cut the waste you will produce. A simple example of this is to not accept a plastic shopping bag from a shop assistant when you have bought only one small item. Another example is to not use aluminium foil to roast potatoes in their jackets in the oven

Reuse – to use more than once for the same or a different purpose. For example, a girl might use a resealable bag for some biscuits for lunch one day and then take it home, rinse it out and use it over and over again to hold different sorts of snacks.

Rubbish – same as garbage

Solid waste – solid materials that are discarded. This can include materials for recycling, green waste collection and for rubbish collections.

Trash – same as garbage

Upcycle – the process of converting waste material into a product of high value, e.g. glass bottle into a work of art

Waste – materials that are discarded– these can be a solid, liquid or gas

Waste management system – the containers in the school used to collect different types of waste and the processes used to deal with them

Wheelie bin – a special form of rubbish bin with two wheels, a lid and a handle. They are very convenient for people to store solid waste materials and to wheel the bins to the kerb for the contents to be collected.

Worm farm – a special bin or mound that contains soil and compost worms. Food scraps that are added to the worm farm are first broken down by microbes (bacteria and fungi) and then eaten by the compost worms, to produce worm castings that make wonderful fertiliser for the garden.

Solid Waste: Summary of activities

Years	Focus	Prior learning	Tuning in	Finding out	Drawing conclusions, Finding solutions	Considering social action
1-2	Students take responsibility for their classroom	What waste do I make? Be safe with waste	Compost cycle Compost cycle worksheet <i>Recycle cycle</i> <i>Recycle cycle worksheet</i> <i>Reuse</i> <i>Sorting our waste</i> <i>Sorting our waste worksheet</i> What happens to our waste?	Our classroom waste Our classroom worksheet	Our classroom waste plan Our classroom waste plan worksheet	<i>Setting up our classroom waste containers</i>
3&4	Students start taking greater responsibility for environmental tasks around their school	Where does it go?	Be safe with waste <i>What is waste?</i> <i>What is waste? worksheet</i>	<i>4Rs focus</i> <i>4Rs focus worksheet</i> 4Rs game 4Rs game worksheet Cool questions waste Doorways to waste Doorways to waste worksheet Lunchbox leftovers Lunchbox leftovers worksheet Waste spotto Waste spotto worksheet <i>Waste watchers</i> <i>Waste watchers worksheet</i> <i>Why waste it</i>	Down with waste	4Rs communication challenge

Years	Focus	Prior learning	Tuning in	Finding out	Drawing conclusions, Finding solutions	Considering social action
				<i>Why waste it worksheet</i>		
5 & 6	Students assist in creating change in their school and local communities	A quote a day 4Rs brainstorm	Be safe with waste That's rubbish That's rubbish worksheet 1 That's rubbish worksheet 2	<i>4Rs of waste*</i> <i>4Rs of waste Answer sheet</i> <i>4Rs of waste worksheets</i> A picture of litter A picture of litter worksheet Looking at our organic waste <i>Not in there</i> <i>Not in there worksheet*</i> <i>School waste assessment</i> <i>School waste assessment worksheet</i> What's in your bin What's in your bin worksheet Where does our waste go?	Cutting the waste line	Graffiti mural message Litter communication challenge <i>Our new waste reduction project</i> <i>Our new waste reduction project: worksheet</i>
7&8	Students instigate and plan environmental projects and campaigns in their school and local	From start to finish	Be safe with waste Down with waste home challenge Down with waste home challenge: Activity sheet	Bag breakdown Bag breakdown record sheet Don't waste it Don't waste it Worksheet	Down with waste home challenge Down with waste home challenge: Activity sheet	A litter free school Down with waste home challenge Down with waste home challenge:

Years	Focus	Prior learning	Tuning in	Finding out	Drawing conclusions, Finding solutions	Considering social action
	community		That's rubbish That's rubbish worksheet 1 That's rubbish worksheet 2	Down with waste home challenge Down with waste home challenge: Activity sheet In the bag In the bag worksheet Mapping the litter in the school Mapping the litter in the school Record sheet		Activity sheet
9&10	Students take initiatives in sustainability projects in their school and local community	Waste Q&A	Be safe with waste 5 minute school waste tour Waste pathways	The big picture school waste assessment <i>Waste Challenges</i> <i>Waste Challenge 1</i> <i>Conduct a school litter survey</i> Waste Challenge 2 Build a model of a landfill Waste Challenge 3 Design a school waste web pages Waste Challenge 4 Design a Pacific island waste system	The big picture school waste plan <i>Waste challenges</i>	<i>Waste challenges</i> Cut the waste project Cut the waste project: Planners

Note that the highlighted activities can be found on the Cool Australia website. The activities marked in italics have not yet been placed on the website. Contact TLfS if you would like a copy of any of these additional activities on info@leadersforsustainability.com.