

The Waste Wise Schools Program

Healthy Zero Waste Lunch Toolkit



Acknowledgments

Written by Danielle Ralph

Illustrations by Rod Waller

Designed by Su-Anne Lee, Design Brew

Edited by

Cara Williams

Jennifer Weston

Patrick Hamill

Wendy Aspden

This guide was developed by the Waste Wise Schools Program which is managed by the Department of Water and Environmental Regulation and supported by the Western Australian Waste Authority through the Waste Management and Recycling Account.

The Waste Wise Schools Program would like to thank Clayton Chipper, Health Promotion Officer, Department of Health for providing school healthy eating information as well as the Keep Australia Beautiful Council WA for granting the use of their litter education resources.

For more information about the program please contact:

The Waste Wise Schools Program

Department of Water and Environmental Regulation

Locked Bag 104

Bentley Delivery Centre, WA 6983

Phone: (08) 6364 7000

Email: wastewise@dwer.wa.gov.au

Web: www.wastewise.wa.gov.au

Contents

Introduction	4
Chapter 1 Waste Wise Schools Program	5
About the Waste Wise Schools Program	5
The Waste Wise Schools philosophy and its connection to (AuSSI)	5
Chapter 2 Healthy zero waste lunch	6
What is a healthy zero waste lunch?	6
Why should we have a healthy zero waste lunch?	6
The problem with litter	6
Contributing to a healthy diet	7
Chapter 3 How to conduct a healthy zero waste lunch day	8
Plan it	8
Set it up	8
Run it	9
Keep it going	9
Chapter 4 Healthy zero waste lunch day tools	10
Healthy zero waste lunch scope and sequence planner	10
Scope and sequence table	11
Lesson plans and resources	13
Data collection lesson plan	13
Waste Wise Schools Program – Healthy zero waste lunch class records	15
Inside the lunch box lesson plan	16
Sultana experiment lesson plan	18
Potato packaging lesson plan – One potato, two potato, three potato, more!	20
Food diary lesson plan	22
Message in a bottle lesson plan	23
Message in a bottle information sheet	25
The main stages of a materials life-line (pictorial)	27
Disposable culture lesson plan	28
KAB litter audit instructions – quadrant count	30
KAB litter audit record sheet	31
Example letter to advertise a healthy zero waste lunch day	32
Student certificate	33
Student badges	35
References	36

Introduction

The **Healthy Zero Waste Lunch Toolkit** is an operating practices manual that is intended to guide the development and implementation of healthy zero waste lunches in schools. These are an excellent way to educate the school community about how to reduce their waste production and develop sustainable behaviours that support this philosophy.

This toolkit has been designed to promote best practice however, there is no right or wrong way to conduct healthy zero waste lunches within a school setting. The key is finding what works for your school and every attempt has been made to offer ideas and suggestions that can be tailored for the needs of individual schools, classrooms and students.

Good luck and we hope you enjoy your journey to becoming more waste wise!

The Waste Wise Team



For more information, go to:
www.wastewise.wa.gov.au

Chapter 1

Waste Wise Schools Program

About the Waste Wise Schools Program

Waste Wise Schools throughout Western Australia (WA) are reducing waste by implementing the 3Rs – reduce, reuse, recycle – while developing positive environmental values in students and the whole school community. Waste Wise schools model responsible environmental behaviours through hands-on learning experiences that are linked to the Australian Curriculum. The program helps schools set up infrastructure and provides resources aimed at changing attitudes and behaviours in regards to sustainable waste management. The program is free and available to all schools in WA.

The Waste Wise Schools philosophy and its connection to Australian Sustainable Schools Initiative (AuSSI)

The Waste Wise Schools Program has been developed based on best practice Education for Sustainability (EfS) principles. The overarching message of the program is to reduce, reuse and recycle to promote the sustainable use of natural resources and minimise our collective environmental footprint.

Through participation in the Waste Wise Schools Program, your school has already begun participating in AuSSI-WA, and can formally register and learn more about it through the online toolkit. For further information regarding the Sustainable Schools Initiative WA, visit the project website www.det.wa.edu.au/curriculumsupport/sustainableschools.

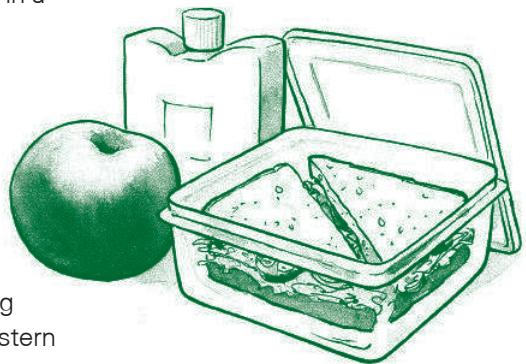


Chapter 2

Healthy zero waste lunch

What is a healthy zero waste lunch?

A healthy zero waste lunch does not contain throwaway packaging or produce food waste. It also reduces litter because there is less packaging. The typical healthy zero waste lunch is packed in a lunch box or bag. The food is put in reusable containers rather than wrapped in disposable packaging, a drink is in a refillable bottle and all containers are resealable so that leftover food and drink can be saved for later.



Why should we have a healthy zero waste lunch?

By bringing less waste into schools we can minimise litter, reduce waste going to landfill, save money and develop healthy eating habits. Producing excessive amounts of waste is a major problem in Australia, with Australia being the second highest producer of waste per person when compared to other western countries.

Australians produce 41 million tonnes of waste each year. This amount of waste would fill a line of garbage trucks from Perth to London.

Recent statistics also reveal that WA produces significantly more waste than the rest of Australia and diverts the smallest amount of waste from landfill (Hyder Consulting, 2008). These statistics highlight the need for an immediate reduction in our waste production.



The problems with litter

A significant proportion of the waste we produce also ends up as litter. This can be in the form of windblown waste from landfill sites or rubbish bins and from individuals incorrectly disposing their rubbish. The results from the National Litter Count for 2009–10 found that WA was the second most littered state in Australia. Figures from this research also indicated that although cigarette butts were the most frequently identified item across all sites, plastic items contributed the largest volume to WA's litter stream. Many items within this litter category have been identified as being used in the packaging and storing of food (Keep Australia Beautiful, 2010).

Research has also shown that 22 per cent of the total litter stream is packaging materials (Keep Australia Beautiful, 2008). By purchasing food products with less disposable packaging and by storing them in reusable containers, individuals can reduce the amount of waste produced and decrease the amount of plastic items found in our litter stream.

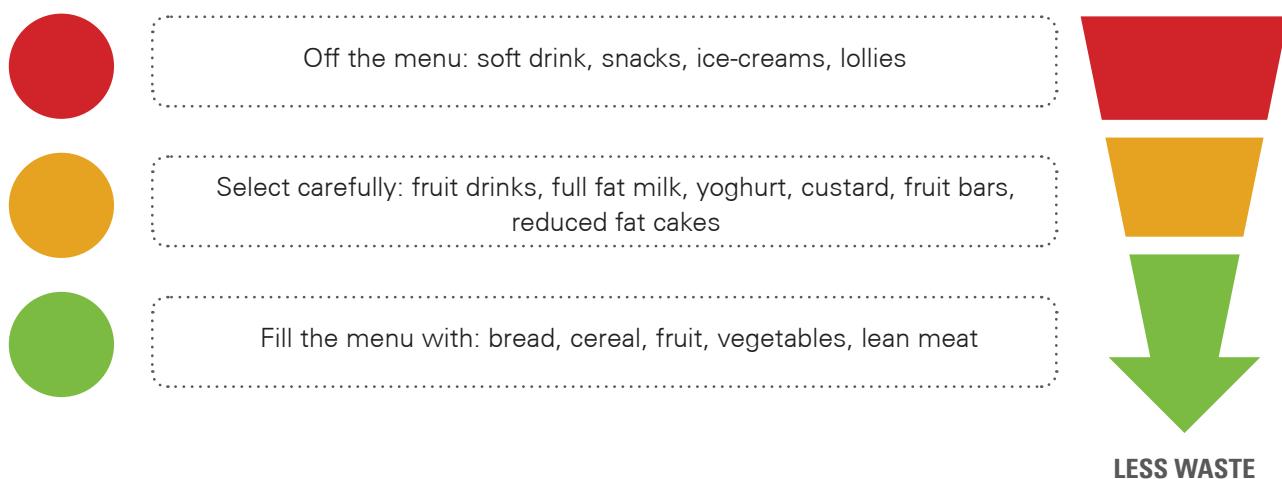
Contributing to a healthy diet

There is a growing concern about Australian children's poor diet, lack of exercise and weight gain. Recent research shows that many school aged children don't eat the daily recommended amounts of fruit and vegetables.

According to the Child and Adolescent Physical Activity and Nutrition (CAPANS) Survey in 2008, only 43 per cent of primary school children met the daily dietary guidelines for vegetable consumption. This figure decreased further for secondary students, with only 26 per cent meeting the guidelines.

The percentage of students meeting the recommended daily dietary requirements for fruit is also a concern with only 25 per cent of secondary students and 67 per cent of primary students meeting these requirements (Martin et al, 2009). By holding a healthy zero waste lunch, the consumption of unprocessed food such as fruit and vegetables is encouraged through behavioural change mechanisms and knowledge of healthy eating habits.

Healthy food and drink choices in school mean less waste and packaging. Follow the traffic light system of standards to ensure that you eat a wide range of healthy foods and reduce your waste (from the WA Department of Health).



Running a healthy zero waste lunch day is an excellent way to educate students, parents, school staff and the wider community about where our rubbish ends up and how we, as individuals, can reduce the amount of waste we generate.



Chapter 3

How to conduct a healthy zero waste lunch day

Healthy zero waste lunch days raise awareness in the school community about purchases made and the waste produced. They are also a very current and topical way of assisting the school community in developing more sustainable and environmentally friendly behaviours. Reducing waste by using reusable containers is a very accessible and affordable way of doing this.

A healthy zero waste lunch day can be held one day of each week or every day throughout a term or year. Many Waste Wise Schools have a healthy zero waste lunch day each week and see a dramatic reduction in their waste and litter, as well as an improvement in healthy food choices. The following section provides an overview of what is involved and some practical tips and ideas to consider on how to plan it, set it up, run it and keep it going.

This toolkit also contains a curriculum-linked scope and sequence table that provides supporting templates and lesson plans. This can be found in Chapter 4 as well as the resources below that are indicated by an asterix '*'.

"Many Waste Wise Schools have a healthy zero waste lunch day each week and see a dramatic reduction in their waste and litter, as well as an improvement in healthy food choices."

Plan it

A healthy zero waste lunch day can be planned with the help of a student committee, and a school waste audit could inspire staff to become involved as well. Students can plan the marketing and feedback for this project, which is a great challenge because it can have tangible results.

- Set up a healthy zero waste lunch student committee, or ask the school's Green Team or Environmental Monitors to take on some of the responsibility (student badges*).
- Discuss with the students the environmental effects of littering and producing waste.
- Investigate the kinds of litter and waste produced at school.
- Use your waste audit results data to identify the types of lunch packaging waste at your school.*
- Brainstorm with the students ideas about how to minimise waste and litter by looking at what they bring to school for lunch and/or what they buy from the canteen.
- Formulate a plan of action from the students' ideas.
- Plan the marketing: communicate to parents, students and teachers, through posters, an assembly, broadcasts, or a letter home with the plan the students have decided upon.
- Arrange reminders and an award system such as raffle tickets.

Set it up

Ensure important stakeholders, the principal, teachers, students and parents are aware of the project. Seek volunteers and get permission where needed.

- Send letters home to get parents involved.*
- Organise a poster contest advertising the day.
- Set up a demonstration table with examples of healthy zero waste lunch do's and don'ts at lunch time and recess for the whole school to see.



- Find recipes for and make lunch foods that don't require packaging.
- Have class competitions – which class generates the least amount of waste per student.
- Hold an environmental theme day or Waste Wise assembly.
- Advertise and explain how to 'Shop Smart' to reduce unnecessary packaging. Buy food and drink in bulk and bring to school in a reusable container.
- Organise different collection containers for the lunch waste, so it can be separated and measured. If you can not recycle or compost lunch waste at school, take it home and do it there.
- Conduct a selection of lessons from the scope and sequence in Chapter 4.*

Run it

Running the healthy zero waste day can be fun if enthusiasm has been generated through assemblies and announcements with prizes or points to be won. A student task force or teachers should be enlisted to monitor class lunches with a clear guide for judging.

- Emphasise the fun nature of the competition.
- Celebrate the students', staff and parents' efforts.
- Have prizes or reusable awards/trophies made from recycled materials.*
- Provide regular reminders on the day over the PA system and email teachers about the challenge and the benefits in waste reduction and healthy eating.
- Complete the class and school charts and graphs.*
- Provide spot prizes and certificates to students for their healthy zero waste lunch. *
- Track food in students' lunchboxes before and on the day of the challenge and consider whether it is healthier and has less waste.

Keep it going

To keep the project going, celebrate the students' successes and evaluate and monitor the healthy zero waste lunch procedure in order to make improvements.

Have some long term goals for the schools lunch waste, so that the students know what they are working towards. Provide feedback with an overview of the results in the school newsletter and at assemblies. You may also like to contact your local newspaper. Continue to provide prizes to exceptional classes and/or individuals.

- Set up an efficient system which can be easily repeated every week or month.
- Try rotating students or classes who participate to keep the competition fresh and to add variety.
- Maintain the newsletter snippets and feedback for parents.
- Maintain the students' involvement and feedback.
- Conduct waste audits at regular intervals, for example, one per term or semester to monitor and compare the normal lunch days with healthy zero waste lunch days.
- Chart and celebrate the school's progress.
- Seek media attention and other ways to celebrate your schools efforts.
- Reflect on and evaluate the process and be open to new ideas and change.



Chapter 4

Healthy zero waste lunch day tools

Healthy zero waste lunch scope and sequence planner

One way to organise a healthy zero waste lunch day is to embed it in the learning activities in which the students are involved. This scope and sequence outlines class activities that develop their skills, knowledge and understanding of the issues. As a teacher it is important to be sensitive about various socio-economic and body image issues faced by some young students, and to use the lessons appropriately.

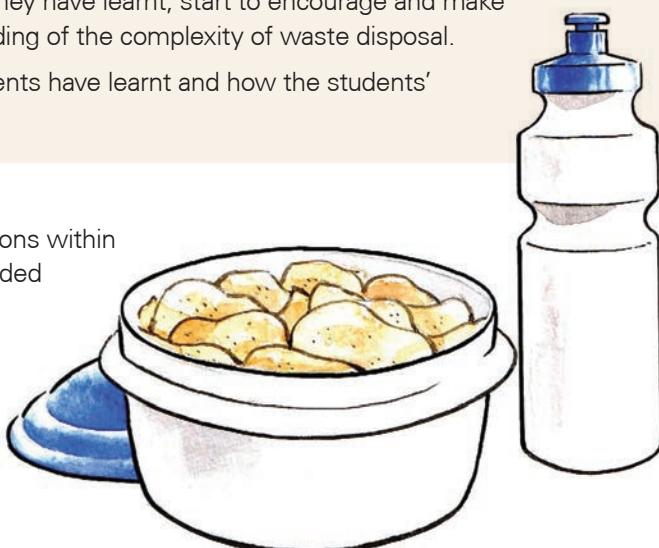
How to use the scope and sequence

Although a whole school approach is recommended, the planner can also be used within a single or a couple of classrooms.

This program of work can easily be adapted to your classes' specific needs and time constraints. It is based on the inquiry approach and is broken into sections which involve students as active learners, involved in real life skills. Some lesson plans are provided in greater detail later in the chapter with hyperlinks.

1. In the first phase the students become **ENGAGED**. The lessons in this section aim to capture their interest, allow them the opportunity to display their prior knowledge about waste and provide a meaning and context for their learning.
2. Within the second phase students are provided with the opportunity to **EXPLORE** the problems of waste and how we dispose of it. The students are provided with hands on activities which develop a greater understanding of the waste they produce.
3. In the third stage the teacher provides opportunities where the problems and amount of waste produced by the school and society as a whole are **EXPLAINED**.
4. The fourth stage provides opportunities for the students to **ELABORATE** on the concepts and skills they have learnt. They begin to apply the knowledge they have learnt, start to encourage and make behavioural changes and develop a deeper understanding of the complexity of waste disposal.
5. The fifth stage involves **EVALUATING** what the students have learnt and how the students' behaviour and attitudes towards waste have changed.

It is recommended that at least one of the suggested lessons within each of the above phases is conducted. Highly recommended activities are highlighted. More detailed lesson plans and tools found in Chapter 4 of this toolkit are indicated by an asterix '*' and hyperlinked.



Scope and sequence table

Cross-curricular programming: reduce, reuse and recycle

Time frame: one term or as needed

Values: A pursuit of knowledge and a commitment to achievement of potential, social and civic responsibility, environmental responsibility.

Australian Curriculum over-arching principle: Sustainability

Aim: To educate students and the school community about the need to reduce the amount of school waste going to landfill, while developing the behaviours and knowledge base that enable them to do this.

Phase	Lesson	Brief lesson overview	Resources	Curriculum links
Engage	Data collection	Students record the amount of packaging they have in their lunch before and after having a healthy zero waste lunch day. A range of mathematical operations are used.	Data collection lesson plan*	Maths
	Looking at packaging	<ul style="list-style-type: none"> Inside the lunch box activity 1: Develop students' recognition that food packaging is made of different materials. Inside the lunch box activity 2: Understand the 3Rs concept in relation to the packaging of lunches. All wrapped up: Students identify problems with packaging materials and discuss alternatives. Keep Australia Beautiful Council (KABC). School lunch in the 1950s: Compare the packaging in a typical lunchbox in the modern age with a lunch from the 1950s (KABC). 	Inside the lunch box lesson plan* Learning about Litter resource www.kabc.wa.gov.au .	English Art Science Society & Environment Mathematics
	Visit a landfill site or watch the KABC DVD	<ol style="list-style-type: none"> Students discuss where they think waste goes after it is put into a bin and identify the benefits or problems of putting waste in a bin. Watch landfill DVD or visit a landfill site. Draw a flow chart, diagram or describe how waste is disposed of. 	DVD can be obtained from www.kabc.wa.gov.au	English Society & Environment Technology and Enterprise Science
Explore	Explore packaging	<ul style="list-style-type: none"> Sultana experiment: Identify the environmental and monetary costs involved in packaging alternatives. Potato packaging: Students learn about the advantages and disadvantages of packaging when they examine different potato products and compare the amount of packaging, the price and the waste produced. 	Sultana experiment lesson plan* Potato packaging lesson plan*	Maths Society & Environment Technology and Enterprise Science
	Packaging problems	<ul style="list-style-type: none"> Brainstorm the problems associated with plastics and single use packaging. Students develop a report based on the Waste Wise fact sheets. 	Waste Wise fact sheets	English
	Conduct a waste or litter audit	<p>Students record what type and how much waste or litter is produced by the school.</p> <ul style="list-style-type: none"> Waste Wise can provide detailed directions on how to conduct a waste audit. KABC WA can provide detailed directions on how to conduct a litter audit. 	Waste Wise waste audit toolkit (Contact Waste Wise) Litter Audit Instructions* Litter Audit Record Sheet*	Maths Society & Environment Science



Phase	Lesson	Brief lesson overview	Resources	Curriculum links
Explore	Newsletter item	Students write a newsletter article or a letter explaining the healthy zero waste lunch day to parents.*	Waste Wise fact sheets	English
	Recycled art	Create artwork or a fashion show from recycled material, for example, beads, notebooks, trinket trays and calendars made from recycled paper and magazines.	Waste Wise 3Rs curriculum guide www.wastewise.wa.gov.au	Art T&E
	Disposable culture	Interview a grandparent to see how waste disposal has changed over time. Present the results as an assembly item.	Disposable packaging lesson*	Society & Environment Science English
Explain	Waste audit reflection	Look at the school's waste audit results and consider how much is from food packaging. Present to the school the problems of single use packaging	Waste Wise waste audit toolkit or contact Waste Wise for your school results.	Maths English
	Healthy zero waste lunch day	Refer to Chapter 3 How to conduct a healthy zero waste lunch day.	Example letter to advertise a Healthy Zero Waste Lunch day*	English Health Art Maths
Elaborate	Making reusable lunch wraps	Create your own lunch wraps as a craft activity. These lunch wraps are a nifty idea as an alternative to glad wrap or aluminium.	Instructions for making your own lunch wraps	Art Maths
	Focus on health	<ul style="list-style-type: none"> • Track food in students' lunchboxes before and after the challenge and consider whether it is healthier and has less waste. • Discuss the healthy eating pyramid and how this relates to what the students are currently eating. • Design a healthy zero waste lunch menu 	Food diary lesson plan * Food pyramid Nutritional fact sheets	Health and Physical Education English
Evaluate	Disposable plastic bottles	<ol style="list-style-type: none"> 1. Watch the 'Story of Stuff' water bottles movie. Students take notes. 2. Create a T chart with myths and reality of using bottled water. The myths and reality download is found on the story of stuff website. 3. Students debate why or why not plastic bottles should be banned. 4. Create a movie or animation storyboard similar to the 'Story of Stuff' concept based on a popular drink from the canteen or common lunch packaging. Present as an assembly item. 	Bottled water movie Note: in Western Australia incineration is not currently used for waste disposal.	English ICT Society & Environment Maths Science
	Message in a bottle lesson and the 3Rs	<ul style="list-style-type: none"> • Students consider the life-line of a disposable water bottle, alternatives and its disposal in landfill. Product lifeline image is in Chapter 4. • Examine the lifeline of various types of packaging focusing on the reduce, reuse,recycle (3Rs) concept. 	Message in a bottle lesson plan* Waste Wise fact sheets	Society & Environment Science Technology and Enterprise English
	Monitor the learning	<ul style="list-style-type: none"> • Use the Waste Wise behaviour and attitudes survey or design your own. Explore how and why attitudes may be 'green' but actions are contradictory. • Ask students for anonymous feedback on what they liked, didn't like or would like to change about the healthy zero waste lunch day. 	Waste Wise attitude and behaviour survey	English
Evaluate	Recount of the healthy zero waste day	Students develop a recount of the healthy zero waste lunch day. They may like to include pictures or photos and develop it into a picture book or power point presentation. Present as an assembly item.		English ICT Art
	Back to the future	Students write a story or play set 50 years in the future where there is no more space for landfill sites. Schools are burying their waste in the school oval or have to store it at home. The time traveler returns to the present time and helps their school to deal with their waste in a more sustainable manner. Present as an assembly item.		English

Lesson plans and resources

Data collection lesson plan

Aim:

Students use a range of mathematical operations to estimate and calculate how much waste is produced by their class prior to holding a healthy zero waste lunch to compare to the amount of packaging waste produced on a zero waste lunch day.

Curriculum links:

Learning area

Maths

Strand

Number and Algebra

Sub-strand

Number and place value

Statistics and Probability

Data representation and interpretation

Background

Food packaging is a common waste product in schools. Often it is a challenge to reduce this waste as many snacks and meals are individually packaged for hygiene, convenience and to save precious time.

Information

This activity raises awareness about lunch packaging waste. It can be used as a one off activity carried out before and on a healthy zero waste lunch day or as a term long monitoring activity where a trend is established through graphing the results.

The results from another class could possibly be used for the students to calculate averages or graph as an assessment piece.

Please note it is not the intention of this lesson to isolate or make students feel uncomfortable about how much waste they may have, the focus is on the whole class results and to simply compare waste from a 'normal' lunch with a zero waste lunch.

Resources

- A class copy of healthy zero waste lunch class records for display (see page 15).
- Students work books.

Activity:

1. Collect the packaging from all students' lunches into a pile.
2. Ask students to estimate the total number of pieces of packaging for the class(optional).
3. Review students' results and discuss techniques for estimating
4. Now count the total number of packaging items in the class. Record the class total on the class record.
5. Ask students to estimate the average number of items of packaging per person(optional).
6. Review students' results and discuss techniques for estimating averages.
7. Calculate the average and record the result on the class record.



If your class is conducting the packaging audit over the whole term then you can graph the results.

8. Provide students with graph paper.
9. Students to create the outline for a graph of the class results throughout the term.

Healthy zero waste lunch day

10. Repeat the procedure on a zero waste lunch day.
11. Complete the zero waste lunch section of the class record.
12. Compare the results from a 'normal' lunch day with a zero waste lunch day.
13. Discuss or note which lunches were healthy.

To simplify

Create a picture graph of how many pieces of packaging each student or the class had. Discuss the most common amount.

To extend

Analyse the results of the whole school. Provide class results as a percentage of the school results and display results as a pie graph.





Waste Wise Schools Program

Healthy zero waste lunch class records

Collect the class's lunchbox packaging and record how many pieces below:

	Total number of lunchbox packaging pieces (class)	Average number of lunchbox packaging pieces (per person)	Food count	
			Healthy	Not healthy
Before the zero waste lunch day				
Zero waste lunch results				

- Was there an improvement in the number of pieces of packaging on the zero waste lunch day?
- Was there an improvement in the healthy food choices on the zero waste lunch day?

Ongoing monitoring (optional)

	Total number of lunchbox packaging pieces (class)	Average number of lunchbox packaging pieces (per person)	Food count	
			Healthy	Not healthy
Week 1				
Week 2				
Week 3				
Week 4				
Week 5				
Week 6				
Week 7				
Week 8				
Week 9				
Week 10				

Reflection:

What changes did you make after participating in the zero waste lunch?

What did you learn?

Inside the lunch box lesson plan

Aim:

The first activity identifies the different packaging materials used for different lunch items. The second activity then develops the students' understanding of the 3Rs, reduce, reuse, recycle as alternatives to sending waste to landfill.

Curriculum links:

Activity 1

Learning area	Strand	Sub-strand
English	Literacy Language	Interacting with others Expressing and developing ideas
Art	Visual art	Valuing the arts
Science	Science understanding	Earth and space sciences

Activity 2

Learning area	Strand	Sub-strand
Society and environment	Resources Active citizenship	Management and enterprise Respect and concern for the environment
Science	Science as a human endeavour Science understanding	Use and influence of science Earth and space sciences
Mathematics	Statistics and probability	Data representation and interpretation

Background

An average school's waste is made up of paper and cardboard, food scraps and garden waste (organics) as well as common recyclables, such as plastic, liquid paper board, aluminium, and some glass. Residues such as broken school equipment and contaminated recyclables are also thrown out.

Information

This lesson is designed to raise awareness among students as to the large amount of disposable products that can be found in a school lunch box. The 3R philosophy is that if one reduces the use of packaging in school lunches, reuses lunch containers and recycles food scraps, the waste from a lunch can be negligible.

Resources

A range of items that make up a typical lunch and use different forms of packaging can be:

- juice boxes
- a fake sandwich/piece of cardboard wrapped in glad wrap
- a fake sandwich/piece of cardboard wrapped in aluminium foil
- some fresh whole fruit
- a lunch box
- a sandwich wrap
- a reusable drink bottle
- muesli bars
- snack foods like sultanas and chocolate



Activity 1:

1. Show students the pile of items from a typical school lunch.
2. Ask students to choose several items from the pile to make up an imaginary lunch and to draw them in a rectangle (lunch box) in their work books.
3. Ask students what they have in their drawings and pull out the items from the pile.
4. Draw a table with four columns on the board and make a list of the items in column one, followed by 'why', 'what' and 'where' as the titles in the other columns. Ask student to draw up this table in their work books (optional). Add some items so that there is a good sample of different packaging types including whole fruit.
5. Ask the students the following evaluative questions to fill in the rest of the table:
 - Why do we package food? (the 'why' column)
 - What is the packaging made from? (the 'what' column)
 - Where does packaging come from? (the 'where' column)
6. Add other packaging items to the table if needed.

To extend:

1. Compare packaging used now to packaging in the past. Carry out a survey to find out how parents/caregivers and grandparents packed their lunches when they went to school.
2. Sort the packaging items into three groups:
 - **Green** – good for the environment e.g. fruit skins
 - **Orange** – can be recycled but should be substituted for something better (e.g. juice container could be a drink bottle)
 - **Red** – not good for the environment and should be kept out of your lunch box (plastic wrap, foil, chip packets).

Activity 2:

1. Set up the packaging lunch items in the centre of the class for all to see (the same items from activity one).
2. Use the packaging list created in the previous lesson.
3. As a class discuss how lunch waste is currently disposed of.
4. Ask if there could be other ways to dispose of our lunch waste.
5. Show the students the Waste Wise 3R poster or play the 3R song by Jack Johnson.
6. Ask students what they think reduce, reuse and recycle means. Introduce the idea of composting or worm farming fruit and vegetable scraps as a form of recycling.
7. Have students draw a table in their workbooks and label the columns as reduce, reuse, recycle and ask students to categorise how they could dispose of the lunch waste displayed in the class and on the board.
8. To conclude ask students to create a healthy zero waste lunch poster or collage, a poem or persuasive text, to be used for showing students what to do about their lunch waste.

To extend:

- Create definitions of the 3Rs.
- Develop a speech or PowerPoint presentation for an assembly explaining the 3Rs and how to dispose of your waste correctly.



Sultana experiment lesson plan

Aim:

Students learn about the differences in packaging and the related pros and cons. They also determine the benefits of buying in bulk.

Curriculum links:

Learning area

Strand

Sub-strand

Maths

Measurement and geometry
Number and algebra

Using units of measurement
Money and financial mathematics

Society and environment

Resources

Management and enterprise
Resources are used to satisfy needs and wants

Background

There are many benefits to packaging. However, packaging waste in many parts of the industrialised world makes up about one third of total waste. Recycling has generally been seen as the solution to dealing with this waste. Improvements can, however, be made along every step of the packaging chain (Imhof, 2005).

Packaging waste, especially chip and confectionary wrappers, constitute a large proportion of a school's waste. Exploring the different ways products are packaged and possible alternatives to them can stimulate students to think about consumer choices made in their home and perhaps lead to the family choosing options with less packaging.

Information

This activity could be used as an assessment to test students' knowledge of measurement and number in a real life context.

Resources

- One large box of sultanas (for the teacher to use as a demonstration).
- One multi pack of mini sultana boxes. Enough for one pack per pair of students.
- A set of scales.

Activity:

1. The teacher sets up the demonstration bulk pack of sultanas. Volunteer students write the volume and size, in terms of amount of packaging, of the bulk packet on the board.
2. In pairs, the students are given a mini pack of sultanas. The students answer the following questions, comparing the packet of individually packed mini sultana packets to the teacher's demonstration of the bulk container:
 1. Which packet looks the biggest?
 2. Which packet contains the most sultanas?
 3. Which packet contains the most packaging waste? Students can determine how they would work this out.

For example, they could weigh packaging or could cut the sides of the pack and flatten it to work out the area etc.

4. Which packet costs the most?
5. Which packet gives you the best value for money?
6. Why is it a good idea to buy items in bulk rather than individually packed?



To extend:

- Have students examine their own lunch boxes. What items could be bought in bulk to reduce their lunch waste?
- When students have completed the above activity, encourage them to produce a poster depicting the results of their work. Glue the packaging onto the poster to clearly illustrate the difference between the two items. List the statistics next to each i.e. amount of product, price, pieces of packaging included with each item etc. Consider giving different groups of students different products to compare and then have each group present their findings to the class. Hang posters around the school to educate others.
- Ask the students to estimate the number of sultanas in the bulk container on the teacher's desk. Save the result until the end of the class and the students with the closest estimate wins a prize.



One potato, two potato, three potato, more!

Aim:

Students learn about the advantages and disadvantages of packaging when they examine different potato products and compare the amount of packaging, the price, and waste produced.

Curriculum links:

Learning area	Strand	Sub-strand
Mathematics	Measurement and geometry Number and algebra	Using units of measurement Money and financial mathematics
Science	Science understanding Science inquiry skills	Earth and space sciences Questioning and predicting
Technology and Enterprise	Materials	The nature of materials The selection and use of materials
Society and environment	Resources	Management and enterprise Resources are used to satisfy needs and wants

Background

Packaging performs a valuable function in our global economy. The functions of packaging include product protection, transportation, convenience, hygiene, spoilage protection information and branding. Despite the benefits, packaging waste in many parts of the industrialised world makes up about one third of total waste. Recycling has generally been seen as the solution to dealing with this waste. However, improvements can be made along every step of the packaging chain (Imhoff, 2005).

The students are able to discover for themselves the waste produced from packaging, with emphasis being placed on the 'reduce' aspect of the 3R philosophy. Reducing packaging can save resources and there are many food products that can be bought with less packaging.

Resources

- Various potato products (fresh, chips, dehydrated mashed potato mix frozen).
- Scales for weighing.

Activity:

Place a different potato product at stations around the room next to a label which has the price of that product. As groups of students rotate to each station, they will examine the different forms of potato, its packaging and cost.

In their notebooks, students will record:

- the name of the product
- the size (processed mass in grams)
- the cost of the entire product
- the price per kilogram
- a description of the type of packaging
- a description of the waste produced after the product is used
- how the waste will be disposed of – recycled, landfill etc.



Product	Mass (g)	Cost	Price per kg	Description of packaging	Waste produced	Method of disposal

When students are done examining the potatoes, discuss the following with the class:

- Which potato product was the least expensive?
- Which potato product had the least packaging?
- Which potato product produced the least waste?
- What effect does processing and packaging have on the cost of the product and the amount of waste produced?
- Which items have packaging that can be recycled? Which don't?
- Can any of the products not be packaged in recyclable materials?
- Why do you think certain items are packaged in a wasteful way? Why would people buy these packages?
- How can you minimise waste when you shop?

To simplify

Do the activity as a whole class, discuss the different forms potatoes come in, the packaging and the cost. Write the ideas on the board and discuss. In pairs students discuss the questions above, and present their ideas.

To challenge

Link this activity with a discussion about nutrition.

- Which potato product was the healthiest?
- Is there a connection between packaging and nutrition?
- Look at the contents of lunchboxes and compare nutritional value with the amount of packaging and waste.

Going further

- Design a new and less wasteful package for one of the potato products. How will you reduce the amount of waste produced? What materials will you use?
- Grow potatoes in your school garden and make baked potatoes, homemade chips or potato soup (a slow cooker in the classroom is a great way to prepare soup and the smells will make everyone hungry). How much waste was produced and how much money did it cost to prepare this meal?



Food diary lesson plan

Aim:

Students explore what makes up a healthy lunch.

Curriculum links:

Learning area	Strand	Sub-strand
Health and physical education	Knowledge and understanding	The meaning and dimensions of health
English	Language	Text structure and organization Expressing and developing ideas

Background

Students should have some knowledge of what constitutes a balanced, healthy diet.

Resources

- A notebook to record the food notes.
- Information or data collected from the healthy zero waste lunch days.

Activity:

1. Before starting the healthy zero waste lunch day, students will record the following information in their notebooks:

Food Diary

Day/Date	Morning Snack	Lunch
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		

2. At the end of the week, students should reflect upon:
 - Whether they think their diet is healthy and the available evidence to support this.
 - How they could further improve their diet.
3. Conduct a Healthy Zero Waste lunch day and other lessons on packaging and waste. Keep a food diary again throughout this week of the challenge. Record the same information (date and food eaten). The students should indicate which days were healthy zero waste days.
4. At the end of the week students will need to reflect upon:
 - Whether they believe their diet has become healthier and the available evidence to support this.



Message in a bottle lesson plan

Aim:

To develop the students' understanding of the reduce, reuse, recycle (3Rs) concept in regards to the plastic bottle's life-line.

Curriculum links:

Learning area	Strand	Sub-strand
Society and environment	Resources Active citizenship Natural and social systems	Resource availability and distribution Respect and concern for the environment Elements and interrelationships in natural systems People care for natural systems
Science	Science understanding Science inquiry skills	Earth and space sciences Communicating
Technology and enterprise	Materials Technology in Society	Form and attributes Context and impact Materials Systems

Background

The life line of the materials that make a disposable plastic bottle can be broken down into several stages, extraction, manufacturing/production, distribution, consumption and disposal. This activity looks at the life-line and invites students to consider alternative options to disposal with the reduce, reuse and recycle philosophy.

Information

This activity is suitable for upper primary students. The end of a plastic bottle's life-line is explored.

For more information on the general product lifecycle please refer to the 'message in a bottle' information sheet for this lesson.

It is suggested that the students watch the 'Story of Stuff' prior to conducting this lesson and/or that the students have some prior knowledge of what landfill, reduce, reuse and recycle mean.

Resources

- Message in a bottle information sheet.
- Waste Wise Plastic fact sheet www.wastewise.wa.gov.au.
- 'Story of Stuff' on line animation www.storyofstuff.com (optional).
- Single use plastic bottle.
- A class whiteboard.
- Images of the lifeline of a plastic bottle or simple sketches can be used on the board. Extraction, manufacturing/ production, distribution, consumption and disposal (landfill, recycling). Please see the images in the information sheet for this lesson.
- Whiteboard markers.



Activity:

Introduction/Explanation

1. Ask how many students have used a plastic bottle before (this could be extended to periods of time, how many times...).
2. Show students a single use plastic bottle and ask whether they see any problems/benefits in drinking water from these.
3. Explain or discuss what a life-line and a life-cycle is.

Waste activity:

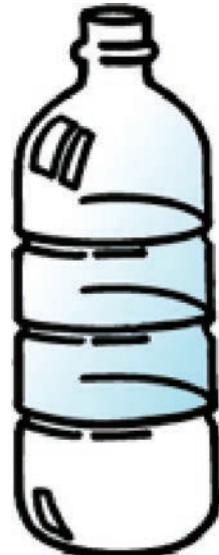
1. Hand out the images from each stage, extraction, manufacturing, distribution and consumption of the plastic bottle life-line and ask students to stick them up on the board in order.
2. Discuss the order and ask students what happens once a plastic bottle is finished with (at the consumption stage).
3. Stick up the landfill picture, or write the word at the end of the life-line on the board. This is where the bottle normally goes if we don't recycle.
4. Discuss and record the problems/benefits with landfill below the image.
5. Brainstorm what else we could do with the plastic bottle (recycle and reuse) and write these options.
6. Ask the students where reusing and recycling links back to the life-line. Use arrows to show where reusing and recycling link up (recycling links it back to manufacturing, reusing bottles takes them back to the house and then to landfill if it becomes contaminated).
7. Discuss what could be used instead of a plastic bottle (reduce) and record what alternatives there are to using a disposable plastic bottle.
8. Discuss which option is better, reduce, reuse or recycle.
9. Students can then create a persuasive text, brochure or poster to present their opinions.

To simplify:

- Students draw a simplified version of the plastic bottle life-line and show where the 3Rs fit in.

To extend:

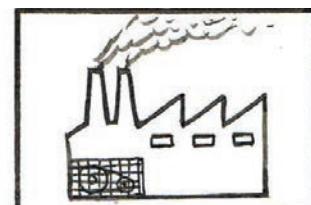
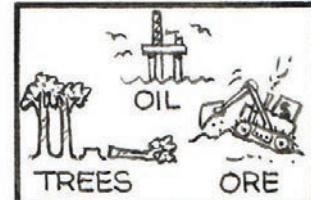
- Brainstorm the lifeline of a plastic bottle in groups. Imagine what is happening at each stage in the bottles life-line.
 - i. What products are needed at this stage?
 - ii. What waste might be produced?
 - iii. What do you think could be the environmental impacts (such as water waste, fossil fuel waste and solid waste)?
- Students consider areas for further research and provide their findings to the class as an interactive activity or presentation.
- Students consider the energy used and created in the life-line of a plastic bottle. They may instead consider how each stage affects our water and the amount of water used.
- Use an on-line ecological calculator to work out the actual savings and benefits involved in recycling a plastic bottle.
- Investigate the environmental benefits of using a reusable drink bottle as opposed to a disposable drink bottle. This can be estimated by calculating how many students would use a disposable bottle at the canteen each day, multiplying this by the school days and number of students, to work out the bottles used and the cost per year. Then work out the cost of a reusable drink bottle, how long it would last, and compare.



Message in a bottle information sheet

A typical product life-line or life-cycle

1. **Extraction:** all products use inputs of raw materials, such as ore, petroleum and trees. Extracting and transporting these materials entails the combustion of fossil fuels for energy, which results in emissions of carbon dioxide. These fossil fuels must be extracted themselves, which requires additional energy use. In addition material does not always exist in the pure form we use, so the residue is often wasted, e.g. mine tailings.
2. **Manufacturing and/or production:** the processes that transform raw materials into products require the combustion of fossil fuels for energy. Again, energy use produces greenhouse gas emissions both directly from the combustion of fossil fuels (mainly in the form of carbon dioxide) and from the energy used to obtain and transport those fossil fuels. In addition, some manufacturing processes release other greenhouse gases, although the type and amount of these emissions are specific to the manufacturing processes for each material. Apart from the fossil fuels for energy there are often other resources required in the manufacturing process, particularly water; this can become a waste product from some manufacturing processes.
3. **Distribution:** according to the Macquarie Concise Dictionary (2003), distribution is the transporting, marketing, merchandising and selling of a product. Many products are transported to WA from overseas or from eastern Australia which entails the burning of fossil fuels. The marketing of a product is the process in which goods are put on the market. Merchandising is the promotion and planning of the sale of a product using display, advertising and marketing (Macquarie University 2003). A company conducts market research to work out how to make a product appeal to consumers. Research has shown that a product's packaging incorporating specific materials, graphics and gimmicks boosts sales. With competition for consumer attention, packaging, or 'the skin of commerce', can be produced in excess, resulting in a lot of waste (Imhoff, D. 2005).
4. **Consumption:** is a big part of our everyday lives. We buy products to feed, clothe and house ourselves, but many of us also buy much more than we need. Our economy encourages our consumption habits, reasoning that economic growth stimulates jobs and income. However, in our continual growth there are many sustainability challenges where important factors such as the environment and our social well-being should be considered (David Suzuki Foundation, 2009).
5. **Disposal**
Recycling: once a product has been used, it can be recycled into new products, closing the loop on a material's life cycle. While manufacturing products from recycled inputs still requires energy, fewer raw materials are necessary. Greenhouse gas emissions are therefore offset by the avoided fossil fuel use for raw material acquisition. In addition, for products that require wood or paper input, recycling reduces the need to cut down trees, increasing carbon sequestration (re-absorption of carbon dioxide and storage of carbon) in forests. Last but not least, a large amount of water can be saved by recycling many materials. Often there is more water used in manufacturing the raw material than in recycling it.



Composting: an option for organic materials such as food scraps and yard waste, releases some carbon dioxide. However, some of the carbon contained in organic materials is returned and stored in the soil and therefore not released into the atmosphere. On a small scale, people compost their own fruit, vegetable scraps and garden clippings and use it on their garden. Composting on a large scale is an alternative waste treatment (AWT) technology and there are various methods which can be used to speed up the composting process. Some councils collect food waste and green waste and turn this into compost that is then used on council land or sold back to the community.



Landfill: disposing of waste in landfill is a common waste-management practice, resulting in the release of bio-gas containing methane from the anaerobic decomposition of organic materials. Methane is a greenhouse gas, 21 times more potent a greenhouse gas than carbon dioxide. However, landfill methane is also a source of energy, and some landfills capture and burn it for energy releasing carbon dioxide. In addition, many materials in landfills do not decompose fully, and the carbon that remains is sequestered in the landfill and not released into the atmosphere (U.S. Environmental Protection Agency, 2007). With pressure for space and improvements in landfill technology, there are various AWT technologies which are used in some landfills to increase waste decomposition. Some landfills re-filter the leachate through the landfill to speed up the breakdown of organic waste. Other landfills treat the waste to reduce its volume before adding it to landfill.



Some facts

Extraction

- (The plastic used in single use plastic bottles (PET) is typically produced from fossil fuels (natural gas & petroleum), but also relies on energy sources (thermal & electric).

http://www.pacinst.org/topics/integrity_of_science/case_studies/bottled_water_factsheet.pdf

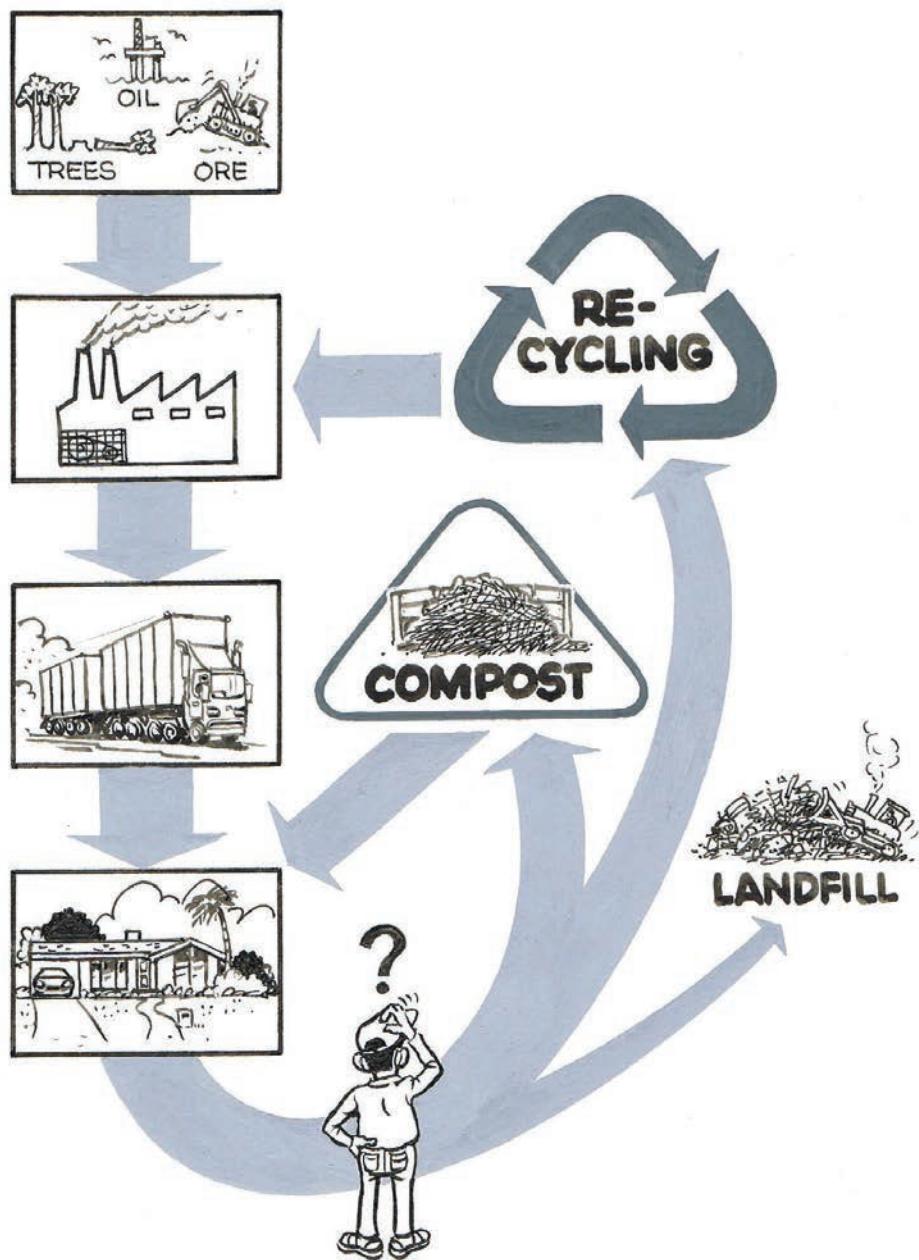
Disposal

- In Australia, the proportion of total waste being diverted from landfills to recycling facilities increased from 36% in 1999-2000 to 52% in 2006-07. [http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0~2010~Chapter~Diversion%20rate%20\(6.6.5\)](http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0~2010~Chapter~Diversion%20rate%20(6.6.5))
- Recycling of waste materials reduces the volume of waste disposed in landfills, reduces greenhouse gas emissions, helps eliminate non-biodegradable waste and promotes a clean and healthy environment to live in. [http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0~2010~Chapter~Diversion%20rate%20\(6.6.5\)](http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0~2010~Chapter~Diversion%20rate%20(6.6.5))



The main stages of a materials life-line

- Where does 'reduce' and 'reuse' fit in?



Disposable culture lesson plan

Aim:

Students will learn that behaviour and attitudes in relation to waste have changed over time.

Curriculum links:

Learning area	Strand	Sub-strand
Science	Science understanding Resources	Chemical sciences
Society and environment	Time continuity and change Natural and processed materials	Resources are used to satisfy needs and wants Resource availability and distribution Management of resources People events and ideas Continuity and heritage are features of all societies Different materials have different properties and these properties can be related to their uses

Background

In today's society we seem to have a disposable culture, although it hasn't always been this way. If you speak to parents and grandparents you may find that products were not as disposable as they are today and that we didn't produce as much waste then as we do now.

This activity can be done as part of a homework assignment or you can organise for parents and grandparents to visit the class to be interviewed or even take students to visit retirees at the local retirement village.

Resources

- Paper, pens
- Tape recorder
- Camera (optional)

Activity:

1. Introduce the activity by encouraging students to brainstorm the disposable items that are available to buy compared to reusable and recyclable items. Talk to students about the amount of waste we have now and about how it hasn't always been this way.
2. Ask the students if they have ever spoken to their older family members about what life was like when they were young. Ask students to think of some questions they could use to ask people about the waste they produced when they were young. Consider questions similar to the following:
 - How was food packaged?
 - Did you grow your own food?
 - What happened when something was broken?
 - What did you do with your food scraps?
 - What did you carry your groceries in?
 - How was your lunch packed for school?



3. The students should write a list of questions in a logical sequence and practice them in preparation for their interview.
4. The students carry out the interview and record it if possible.
5. The students then analyse their answers to see how things are different in their lives when compared to the lives of the people they interviewed.

To simplify

Invite one or two grandparents into the classroom and ask them to speak to children. Children can ask questions. Students then create a drawing to illustrate what waste management was like in the past and what it is like today.

To challenge

Have students analyse the responses they got to their questions. What can they learn about society and how it has changed from their interview? Are there changes that the students can make to the way they live that will result in the production of less waste?



KAB litter audit instructions – quadrant count



What is it?

Quadrant counts use a one metre by one metre real or virtual 'frame' to count the number of litter items on the ground (as a representation of a larger area).

What does it measure?

When data is compared pre and post-project, quadrant counts measure behaviour change through percentage reduction (or change) in littering.

Method

One metre by one metre quadrants are allocated to specific areas (generally, in order to achieve robust results, eight quadrants should be used for a project area of your school or up to 20 quadrants across a large campus). Quadrants are best chosen in identified littering 'hot spots'.

Existing litter is removed (wearing gloves) and disposed of two weeks before the project commences. A week later return to the site and remove and count the litter that has accumulated in the space of one week. This number for each quadrant will set your baseline for your pre-project assessment. At the end of the project, visit each site and remove and count the litter for each quadrant. Divide the number of items of litter found at each site by the number of weeks of the project. Compare this number to the baseline number of litter items. If the project has been effective the number of items should have reduced.

Another very good option, if you have the resources, is to count and remove the litter weekly during the project to see if a trend in decrease is apparent as the project progresses.

Record your information on the litter audit record sheet (rule up in workbook).

It is important to make sure that your counts are not affected by cleaning regimes. It may be best to talk to cleaners and explain the project and that you need the area to remain as is for the duration of the project so as not to bias results.

Where's best to use it?

This method is advised for bigger areas where it is unreasonable to count all litter (for example a school oval, large eating area, beach, park or town). If your school litter 'hot spots' are small enough you can collect and count all the litter and not use the quadrant method.

Suggestion

You may want to complement your quadrant count with a litter map. A map can be drawn and areas where littering hot spots are present are shaded. A map adds value and context to a quadrant count.

Printed with permission from Keep Australia Beautiful WA



KAB litter audit record sheet

Name of school: _____

Area audited (location on school grounds): _____

Date: _____ Time of audit: _____



Litter category	Tally of item	Total of item	% of total items	Litter category	Tally of item	Total of item	% of total items				
PAPER											
Boxes				Bottles							
Tissue paper				Jars							
Bags				Broken pieces							
Newspaper				Other							
Magazines				TOTAL							
Writing / copy paper				MIXED MATERIALS							
Take away containers				Take away containers							
Other				Drink cartons							
TOTAL				Chips/ice-cream packets							
PLASTIC				Other							
Bottles				TOTAL							
Straws				ORGANIC							
Bags				Fruit/vegetables							
Food wrap				Cakes/biscuits							
Take away containers				Bags							
Pens, rulers				Pastry							
Other				Bread							
TOTAL				Other							
METAL				TOTAL							
Aluminium foil				MISCELLANEOUS							
Aluminium cans				Chewing gum							
Tin cans				Cigarette butts							
Other				Other							
TOTAL				TOTAL							
TOTAL ALL ITEMS											

How many of these items were:

From home? _____

From the canteen? _____

Recyclable? _____

Compostable? _____

Printed with permission from Keep Australia Beautiful WA



Example letter to advertise a healthy zero waste lunch day

Dear Parent/s – Guardian/s

Our class is planning a healthy zero waste lunch day on _____.

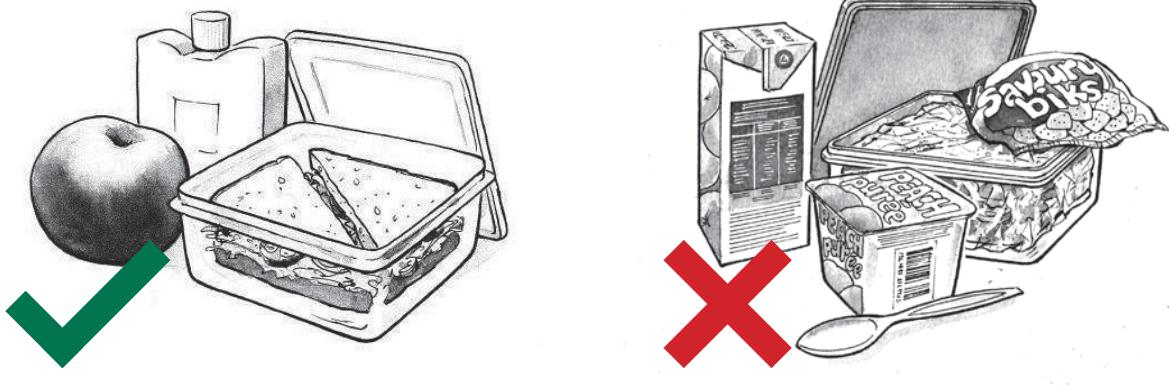
The healthy zero waste lunch day encourages our students and school community to reduce the amount of waste we produce.

A zero waste lunch contains no throwaway packaging and produces no food waste. It also reduces the amount of litter, as there is less waste to become litter. The typical homemade zero waste lunch is packed in a lunch box or bag. The food is put in reusable containers rather than wrapped in disposable packaging. A drink is in a refillable bottle. All containers are resealable, so that leftover food and drink can be saved for later.

By bringing less waste into schools we can minimise litter, create less waste, save money, and develop healthy eating habits. The intention is to reduce the amount of waste we would normally throw away, and to look for alternative packaging for our food.

Although the main goal is to educate the students about the need to reduce waste, parents are the ones who often buy the food and pack the lunches. Please consider using reusable containers and avoiding disposable packaging.

Thank you for your support



Reduce Reuse Recycle Reduce Reuse Recycle Reduce Reuse Recycle

Zero Waste Champion

**has excelled in waste
minimisation by consistently
having a healthy zero waste lunch**

Sign: _____ Date: _____



Reduce Reuse Recycle Reduce Reuse Recycle Reduce Reuse Recycle

Zero Waste Champion

has excelled in the
Zero Waste Lunch Day Challenge

Sign: _____ Date: _____



Student badges



References

Department of the Environment and Heritage, 2005, Educating for a Sustainable Future: A National Environmental Education Statement For Australian Schools, Curriculum Council, Vic.

Department of Health, *Healthy Options WA: Food and Nutrition Policy*, viewed 1 April 2011.
www.healthyoptions.health.wa.gov.au

Hyder Consulting, 2008, *Waste and Recycling in Australia: Final Report*, Department of Environment, Water Heritage and the Arts, ACT.

Keep Australia Beautiful, 2008, *Learning about Litter: A Teacher's Guide. Resource for WA Primary Schools*, Department of Environment and Conservation, WA

Keep Australia Beautiful, 2010, Litter Prevention Strategy for Western Australia 2009-2014, Department of Environment and Conservation, WA.

Leonard, A, *The Story of Stuff*, viewed 1 April 2011.
www.storyofstuff.com

Martin, K., Rosenberg, M., Miller, M., French, S., McCormack, G., Bull, F., Giles-Corti, B., Pratt, S., 2009, *Child and Adolescent Physical Activity and Nutrition Survey 2008: Key Findings*, Western Australian Government, WA.

Macquarie University, 2003, *Macquarie Concise Dictionary*, Macquarie Library Pty Ltd, Australia.

Ralfs, A., 2002 *Youth Environment Council of South Australia –Educating for a Sustainable Future*, Curriculum Council, Vic.

The U.S Environmental Protection Agency 2007, *Lifecycle of Waste Image and Description*, viewed 17 July 2009.
www.epa.gov/climatechange/wycc/waste/index.html



For more information about the program please contact:

The Waste Wise Schools Program
Department of Water and Environmental Regulation
Locked bag 104
Bentley Delivery Centre, WA 6983

Phone: (08) 6364 7000
Email: wastewise@dwer.wa.gov.au
Web: www.wastewise.wa.gov.au