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Secretariat of the Pacific Regional Environment Programme



**PacWastePlus**

PACIFIC WASTE MANAGEMENT

This initiative is supported by **PacWastePlus**-a 85 month project funded by the European Union (**EU**) and implemented by the Secretariat of the Pacific Regional Environment Programme (**SPREP**) to **sustainably and cost effectively improve regional management of waste and pollution.**

# Pacific Waste Curriculum Resource Toolkit



March 2024



This curriculum resource toolkit was prepared



THE UNIVERSITY OF  
**NEWCASTLE**  
AUSTRALIA



Education

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**Our vision:** A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures.

# Table of Contents

- 1. What is waste?**
  - a. What is waste?
  - b. Past and Present Survey
  - c. Waste Timeline
  - d. Why Should We Care About Waste?
  - e. Dramatic Connections
  
- 2. Waste in my country**
  - a. Waste in My Country
  - b. Types of Waste
  
- 3. Reducing Waste**
  - a. The Life Cycle of a Plastic Bag
  - b. The Product Life Cycle
  - c. Where Does the Waste Go?
  - d. The Circular Economy
  - e. The Four Rs Challenge
  
- 4. Waste as a Resource**
  - a. Waste Container Deposit Schemes
  - b. Caught on Composting
  - c. Make a Worm Farm
  
- 5. Waste at School**
  - a. School Waste Audit
  - b. School Survey
  - c. School Waste Action Plan
  - d. A Low Waste Lunch
  
- 6. E-Waste**
  - a. E-Waste Warrior
  
- 7. Waste in our Waterways**
  - a. Pollution and the Water Cycle
  - b. Stormwater Pollution Solution
  
- 8. Waste in the Ocean**
  - a. The Great Pacific Garbage Patch
  - b. Plastic Pollution
  - c. Beach Clean Up
  - d. Endangered Marine Species
  
- 9. Advocacy and Action for Change 1, What is Waste**
  - a. Take a Stand of Waste
  - b. Waste As Art
  - c. Write a Letter to the Editor

# PacWaste Plus Programme

The Pacific – European Union (EU) Waste Management Programme, PacWaste Plus, is a 85-month programme funded by the EU and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to improve regional management of waste and pollution sustainably and cost-effectively.

## About PacWaste Plus

The impact of waste and pollution is taking its toll on the health of communities, degrading natural ecosystems, threatening food security, impeding resilience to climate change, and adversely impacting social and economic development of countries in the region.

The PacWaste Plus programme is generating improved economic, social, health, and environmental benefits by enhancing existing activities and building capacity and sustainability into waste management practices for all participating countries.

Countries participating in the PacWaste Plus programme are: *Cook Islands, Democratic Republic of Timor-Leste, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu.*

## Key Objectives

### Outcomes & Key Result Areas

The overall objective of PacWastePlus is “to generate improved economic, social, health and environmental benefits arising from stronger regional economic integration and the sustainable management of natural resources and the environment”. The specific objective is “to ensure the safe and sustainable management of waste with due regard for the conservation of biodiversity, health and wellbeing of Pacific Island communities and climate change mitigation and adaptation requirements”.

### Key Result Areas

- **Improved** data collection, information sharing, and education awareness
- **Policy & Regulation** - Policies and regulatory frameworks developed and implemented.
- **Best Practices** - Enhanced private sector engagement and infrastructure development implemented
- **Human Capacity** - Enhanced human capacity

Learn more about the PacWaste Plus programme by visiting

[www.pacwasteplus.org](http://www.pacwasteplus.org)



## How to Use this Toolkit

Thinking about our waste, and where it goes once, we have thrown it away, is often the last thing on students' minds.

This toolkit aims to provide teachers across the Pacific with resources and activities that will allow them to increase awareness of the issues surrounding waste generation and disposal, as well as enabling students to plan and implement strategies appropriate to their schools, homes, and communities to reduce the amount of waste going to landfill.

This toolkit has been created for teachers/educators in the Pacific region. It has been designed to complement existing curricula in the region.

This curriculum package comprises of the following 9 Units:

1. What is waste?
2. Waste in my country
3. Reducing Waste
4. Waste as a Resource
5. Waste at School
6. E-Waste
7. Waste in our Waterways
8. Waste in the Ocean
9. Advocacy and Action for Change

Each unit comprises several lessons with lesson plans that outline the scope and sequence of lessons. Lessons progress by stages and subject matter. Lessons can be taught in a sequence, or lessons selected to suit your own teaching needs.

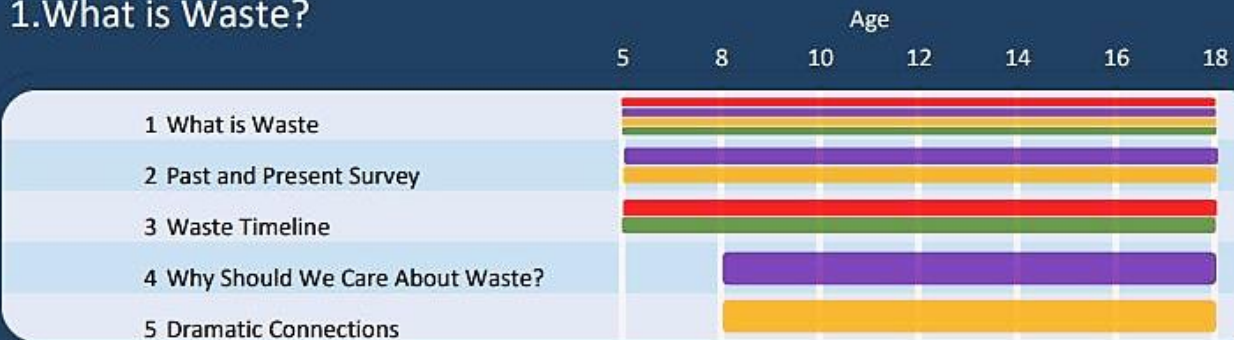
This Resource Guide provides an overview of the lessons, resources and activities, subject area, and age-group categories available to you under each unit. The activities provided have been developed with the Pacific teaching and learning context in mind.

# Waste Curriculum Resource Guide

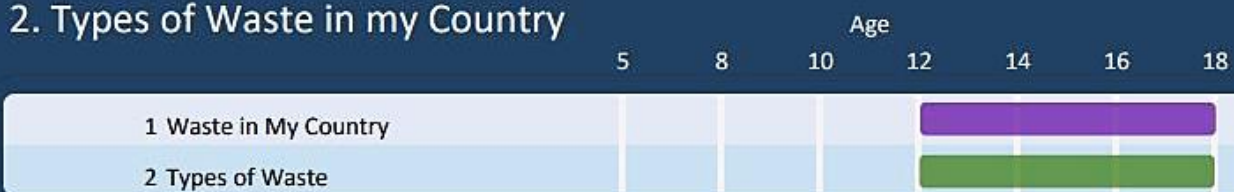
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English ■  
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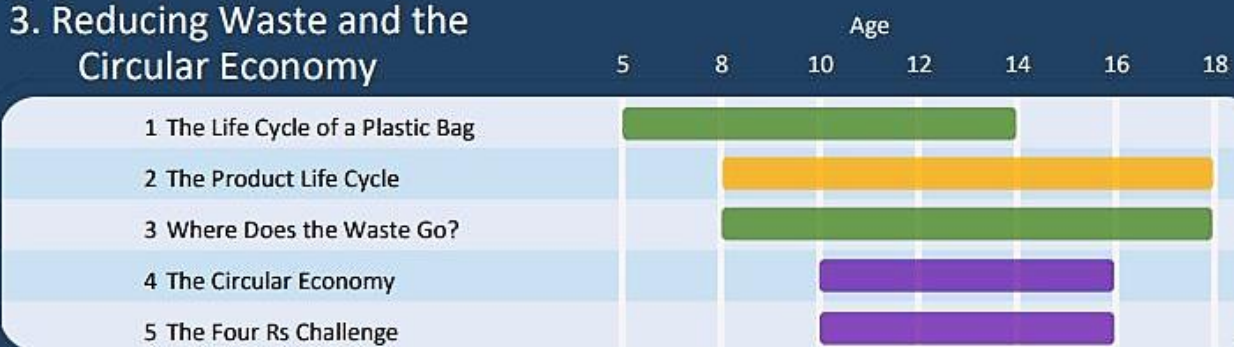
## 1. What is Waste?



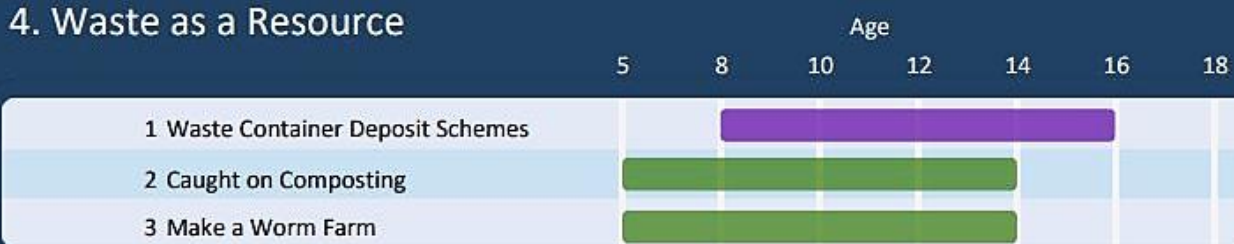
## 2. Types of Waste in my Country



## 3. Reducing Waste and the Circular Economy



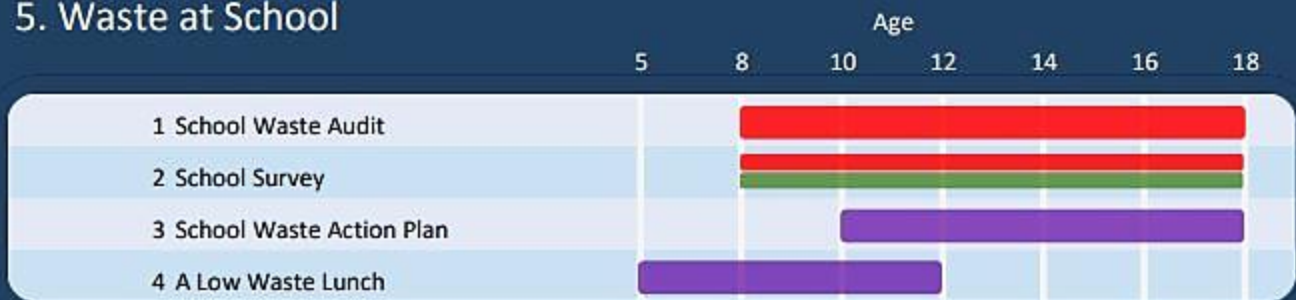
## 4. Waste as a Resource



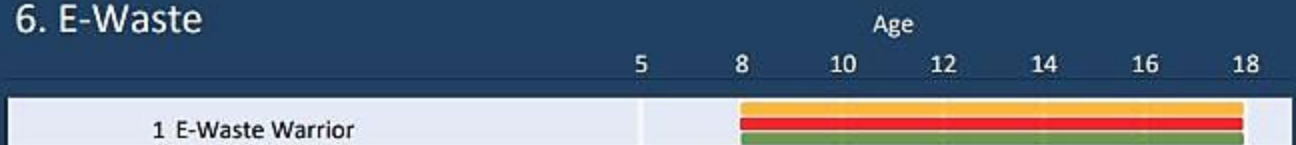
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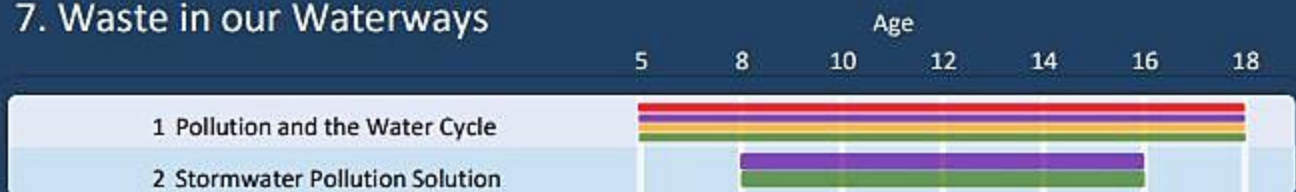
## 5. Waste at School



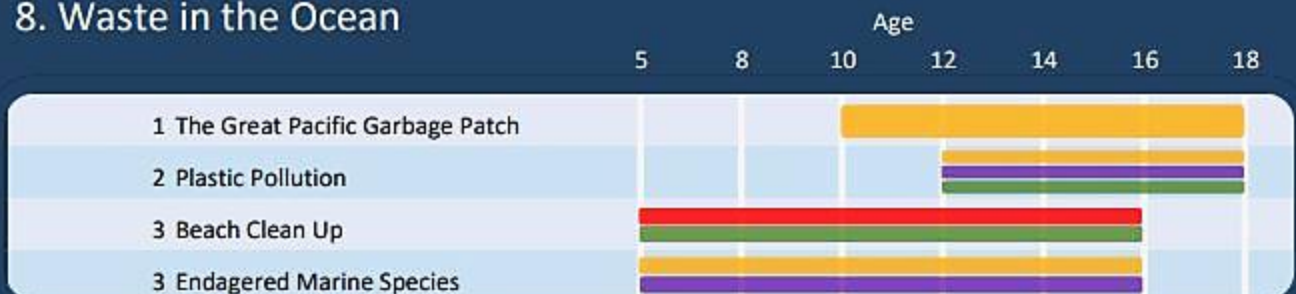
## 6. E-Waste



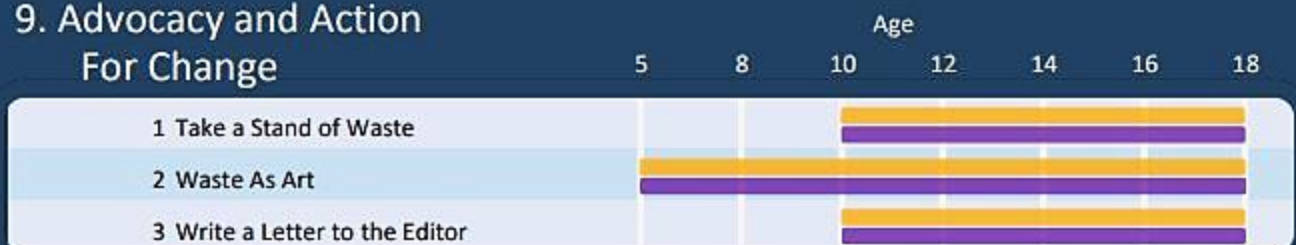
## 7. Waste in our Waterways



## 8. Waste in the Ocean



## 9. Advocacy and Action For Change









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## Pacific Waste Curriculum

# UNIT 1: What is Waste?



March 2024



This curriculum unit was prepared by:



Education

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## Unit Outline:

What is Waste? While everyone probably already has an answer to this question in their mind, it naturally leads to other, perhaps less obvious, questions. Was waste a big problem in the past, and if not, why is waste a problem now?

Where is the waste coming from? How long does it last? Are there different types of waste? Finally, the most important question, what ways can we responsibly manage our waste?

This unit aims to give students a clear definition of waste, as well as a basic understanding of the different types of waste, and where they come from.

# Lesson 1: What is Waste?

<b>Introduction</b>	<p>This lesson starts by investigating some of preconceptions that students may have about waste, where it comes from, and where it goes.</p> <p>It then goes on to give students useful information about the nature and origins of waste, to help guide the rest of the unit.</p>		
<b>Ages</b>	All ages	<b>Number of Periods</b>	1
<b>After this lesson</b>	<p>Students will have a clear definition of what the concept of waste means. They will also understand where waste goes, as well as past and present management strategies.</p>		
<b>Content Focus: English; Maths; Social Studies; Science and Technology</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• Print a copy of the “<b>What is Waste? Factsheet</b>” for every two students.</li> <li>• Print a copy of the “<b>What is Waste? Question Sheet</b>” for every student</li> </ul>		
<b>Lesson Outline</b>	<p><b>10-15 Minutes</b>- A guided discussion on these questions:</p> <ul style="list-style-type: none"> <li>• What is waste?</li> <li>• What makes up most waste?</li> <li>• What do we do with the waste?</li> <li>• Where does it come from?</li> </ul> <p><b>10-15 Minutes</b>- Students read through Factsheet as a class, discussing any issues as they arrive.</p> <p><b>15-20 Minutes</b>- Students work together in pairs to work through Factsheet and answer questions in the Question Sheet.</p> <p><b>5-10 Minutes</b>- Questions gone over as a class, discussing answers.</p>		
<b>Extension for Older Students</b>	<p>For more advanced students, use the “<b>What is Waste? Question Sheet (Extension)</b>” instead of the regular Question Sheet</p>		

## What is Waste? Factsheet

Waste occurs when materials are not or cannot be used again.

Waste doesn't really occur in nature – an animal or plant dies, it is 'eaten' by thousands of very small animals or microorganisms that live on or in the waste. For example, a decaying banana supports a rich variety of insects, bacteria and fungi which returns it to the soil. The "loop" is closed and the natural life cycle continues.

Waste is a byproduct of modern living. In the past, everything used in the Pacific was organic, made from natural fibres, vegetable or animal products that would break down over time and enrich the soil. We could throw our plants, scraps, and other material into the bush, or sea for nature to recycle it back into soil and water nutrients.

As Pacific countries have developed economically and grown in income and wealth, there has been increased consumption of manufactured goods and increased disposal of goods no longer needed or wanted. This produces more waste, with an associated increase in waste diversity (the types of waste produced), toxicity, and complexity.

Today, almost everything we do creates waste. Now there is much inorganic waste in our islands which is made from modern materials such as plastic, metals and chemicals. This waste takes a long time to break down (biodegrade), if it does at all, and pollutes our soil and lagoons. Humans are the only species on Earth that cannot rely on natural processes for managing our waste.

This is because much of our waste is inorganic. We must think about, and carefully manage, the waste we create. Reducing waste involves changing everyday behaviours and considering personal needs and product life cycle before consumption.

**FACT: In the Pacific Region, the amount of municipal solid waste produced generated per capita (per person) is approximately 8.5kg per week.**

## **What is Waste? Question Sheet**

1. What is waste? (What does waste mean to you?)
2. Who makes waste? What does the waste in your household and community consist of?
3. Are there different types of waste?
4. What happens to our waste? Where does it go after we throw it in the bin?
5. What problems are there with burning waste?
6. Can we just keep putting waste in landfill forever? What would happen?
7. What can we do to prevent our garbage going to landfill?

## **What is Waste? Question Sheet (Extension)**

8. What is waste? (What does waste mean to you?)
9. Who makes waste? What does the waste in your household and community consist of? Who are the highest and lowest polluters in our society?
10. Are there different types of waste?
11. Who is responsible for the 'waste' – the things we end up throwing in dumpsites or landfills, or incinerating? Is it you the consumers, the people who create the products, the supermarkets who stock them or the local governments who organise our waste disposal?
12. What happens to our waste? (Where does the waste from your home/ school/ community go?) What are our options for sorting our waste into bins? What happens to our recycling after we put it in the bin? Where does it go and how is it turned into other products? What happens to our landfill waste after we put it in the bin? Is landfill sustainable? Is incineration of waste safe? Is it sustainable? What happens to our food scraps after we put them into a compost bin? Is composting sustainable? Does all waste end up in our environment eventually? Does it degrade? Is it biodegradable?
13. Why is waste minimisation important?
14. What is a sustainable and unsustainable lifestyle?
15. How does mass advertising influence your consumer behaviour? How may you counter that by reflecting on actual needs and the impacts of over-consumption, careful consumption choices, repairing, and using products for as long as reasonable etc.?
16. How have changes to consumption, recycling, and re-use of materials changed over time? How has this impacted waste generation? For example, in Samoa, up until recently, soft drinks came in glass bottles that were returnable to point of sale. They are now manufactured in plastic bottles. What is the impact of this on the environment?

# Lesson 2: Past and Present Survey

<b>Introduction</b>	It's important for students to appreciate that the problem of waste exists in the real world, not just in books in their classroom. For this lesson, students are asked to go and talk to someone in their community about the impact of waste and how it has changed over a person's lifetime.		
<b>Ages</b>	All ages (although younger ones will need the interviewee to write answer to questions during the discussion)	<b>Number of Periods</b>	2-3
<b>After this lesson</b>	Students will have a better understanding of how waste issues have developed over time in their community. They will learn how their local community has changed, and how these changes impact on the type and amount of waste that is produced.		
<b>Content Focus: English; Social Studies</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• Print off a copy of the survey sheet for each student.</li> </ul>		
<b>Lesson Outline</b>	<p><b>Lesson 1:</b>  <b>10-15 minutes.</b> Explain the importance of learning from the past, from elders. You may wish to cover the following points:</p> <ul style="list-style-type: none"> <li>• Traditional knowledge is what our ancestors pass down to us: by word of mouth, through experience and observation, and sometimes through formal instruction.</li> <li>• We can learn a lot about the world we live in by asking people what the world was like when they were the same age.</li> </ul> <p><b>15-20 minutes.</b> Discuss with students the types of questions that they would like to ask an older person in their community. Get the students to think about who they could ask the questions of.</p> <p>Homework: Ask the participants to interview an elder in their community about what the village was like when they were the age of the students.</p> <p><b>Lesson 2:</b>  Ask the students to present their stories to the rest of the group. This could take place either as a class discussion or by taking turns.</p>		
<b>Extension for Older Students</b>	Older and more advanced students may wish to add their own questions to the survey sheet. Optionally, students may collect the data from all the surveys and try and identify any trends.		

## Past and Present Survey Sheet

- What was the village like when you were younger?
- Were there any shops nearby?
- Was there much plastic or waste?
- Was there mainly green or garden waste? What did you do with the waste?
- How has the village changed in the past 10 years, 20 years?
- What are the current shopping and waste habits.
- How have these changed over time?
- In your opinion, what has led to the changes?
- What's is better, what's worse about waste in your community today?



# Lesson 3: Waste Timeline

Introduction	Students have now developed an understanding of what waste is, and that it is an emerging problem that is changing over time. They have probably also learnt that the types of waste being produced has changed over time. This lesson introduces some of the different types of waste that there are, and how different types of waste take different amounts of time to break down.		
Ages	All ages (if multi-aged mix the ages in each group so they are a mix of younger and older students)	Number of Periods	1-2
After this lesson	After this lesson students will be able to describe different types of waste including organic, inorganic, and toxic waste. They will also be able to identify that different types of waste take different amounts of time to decompose.		
<b>Content Focus: Maths, Science and Technology</b>			
<b>What you Need to Prepare</b>	<p>Prepare the following materials:</p> <ul style="list-style-type: none"> <li>• 5 bits of rope 4-5 m long (a line in sand/dirt will do if rope isn't available)</li> <li>• 5 sets of timeline cards (see Timeline Cards below)</li> <li>• 5 sets of objects or picture cards which include pictures of the following objects (see Object Cards below):             <ul style="list-style-type: none"> <li>- Pear</li> <li>- Apple</li> <li>- PET bottle</li> <li>- Mobile phone (e-waste)</li> <li>- Glass bottles/jars</li> <li>- Cigarette butt</li> <li>- Disposable nappy</li> <li>- Fishing line</li> <li>- Paper/ Cardboard</li> <li>- Polystyrene cup</li> <li>- Aluminium can</li> </ul> </li> </ul>		
<b>Lesson Outline</b>	<p><b>10-15 minutes: Initial Group Discussion</b></p> <ul style="list-style-type: none"> <li>• When something dies in nature, what happens to it?</li> <li>• Is there any waste left over?</li> </ul> <p><b>15-20 Minutes: Reading.</b> The class reads through the "Waste Timeline: Factsheet"</p> <p><b>30-40 Minutes:</b> Placing items along a timeline</p> <p>Break the class into groups: Give each group a rope, a set of timeline cards, and a set of object picture cards.</p>		

	<p><b>Instructions:</b></p> <ul style="list-style-type: none"> <li>• Students put out the long rope in a straight line.</li> <li>• Along the line, in chronological order, place the cards 2 weeks, 1 year, 1 decade, 1 century, 1 millennium, 1 million years.</li> <li>• Students then work in their team to place the object or object picture cards along the timeline in the spot they feel indicates how long the object would take to FULLY BIODEGRADE.</li> <li>• There isn't one object for each time. The objects can be placed anywhere along the line. For example, you can have 2 objects between 10 years and 100 years, one at 600 years etc.</li> <li>• Let students discuss and place along the timeline with <b>no input from teachers.</b></li> <li>• When all groups have finished, get each group to sit near their line and ask. How long did your group think an apple took to break down? Then ask about the other items. Note: Tell the students about the facts of each item's break down times (from the "Waste Timeline: How Long Does It Take? Factsheet.") before moving onto next item.</li> </ul> <p><b>15-20 Minute:</b> Class Discussion</p> <ul style="list-style-type: none"> <li>• What items were your class correct about? What were they wrong about?</li> <li>• What surprised them?</li> </ul>
<p><b>Extension for Older Students</b></p>	<p>Discuss the Great Pacific Garbage Patch, a vortex of plastic that stretches for kms in the Pacific Ocean. Discuss how the fishing line and PET bottles you use today will still be around when your great, great, great, grandchildren will be alive. Whose problem is this? Who has the power to stop this?</p>

## Waste Timeline: Factsheet

Waste occurs when materials are not or cannot be used again. Waste doesn't really occur in nature – when an animal or plant dies, it is 'eaten' by thousands of very small animals or microorganisms that live on or in the waste. A decaying banana supports a rich variety of insects, bacteria and fungi which returns it to the soil. The "loop" is closed, and the natural "cycle" continues. How long does our waste last before breaking down? **Is it a closed loop?**

**There are 3 major types of waste – ORGANIC, INORGANIC and TOXIC waste.**

**Organic waste:** is natural and comes from animal and plant material. This waste will decay or break down into organic soil matter through insects, bacteria and microorganisms. In most Pacific Island countries, organic waste makes up over 50% (more than half) of the solid waste stream. Organic waste includes kitchen scraps, leaves, grass clippings, wood chips, sawdust and leftover meat and fish. Some things like bone and hardwood take a long time but others like paper or fruit decay very quickly or become food for other animals before returning to the soil.

**Inorganic waste:** is man-made and made of material other than plant or animal matter such as glass bottles, plastic, aluminium or steel/tin cans, packaging materials and building materials such as concrete and metal. Some inorganic waste like steel cans will oxidize or rust within a year or two but others like concrete and plastic are designed to last for a very long time. This is great when they are being used but causes a problem when their useful life is finished.

**Toxic waste:** is man-made waste that can poison or kill living creatures if they come into contact with it or eat even very small amounts of the material. They are sometimes called hazardous waste and are often difficult to dispose of safely. Toxic waste comes into your body in small amounts but don't pass through. They build up and increase up the food chain bio-accumulate until they can reach dangerous levels. Toxic waste can be found in many common household items such as car batteries, car oil, bleach, pesticides and weedkillers. There are even very small amounts of hazardous waste in computer monitors, televisions and other electronic equipment. In the Pacific, we produce very small amounts of toxic waste compared to organic and inorganic waste, but it can have a big, bad effect on our Environment!

Question: What is the concept of **Biodegrading**?

Answer: Breaking down until it is **completely** gone.

**Waste Timeline: Timeline Cards**

**1 day**

**1 week**

**2 weeks**

**2 months**

**6 months**

**1 year**

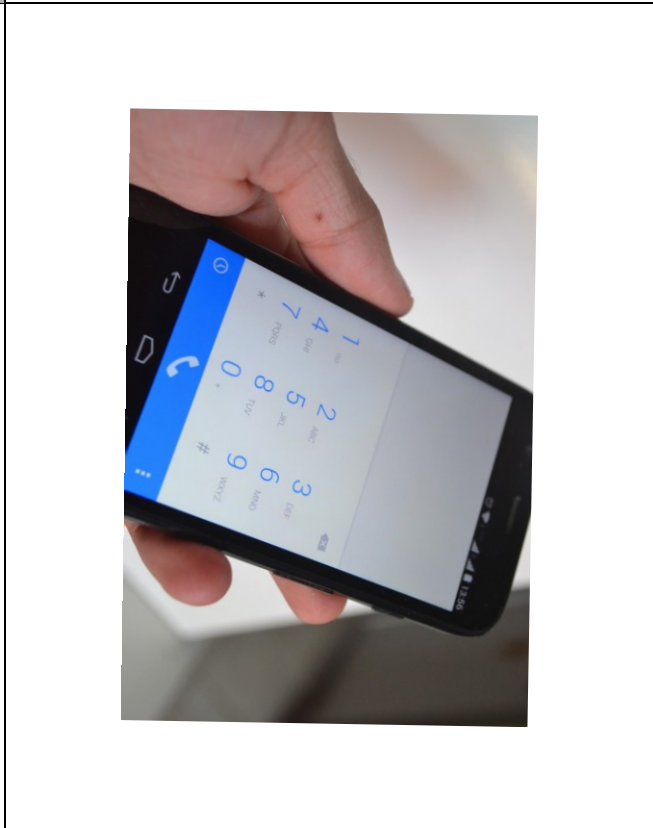
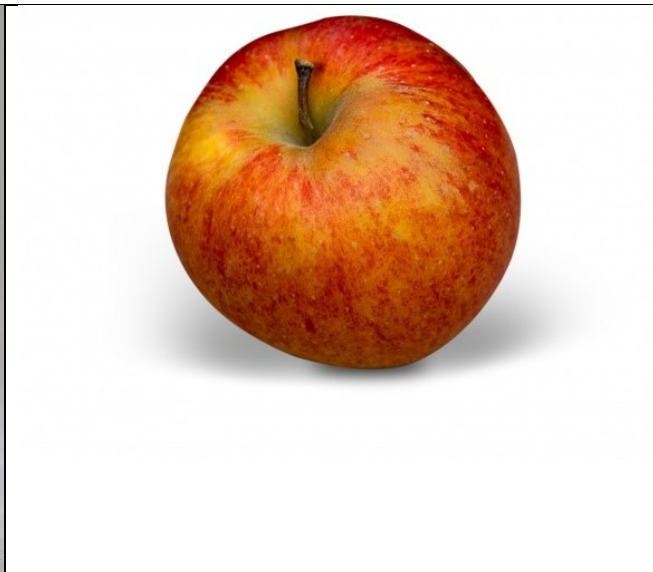
**1 decade  
(10 years)**

**1 Century  
(100 years)**

**1 millennium  
(1000 years)**

**1 million years**

## Waste Timeline: Object Cards





## Waste Timeline: How Long Does It Take? Factsheet

### Apple/Pear

Fruit is ORGANIC and can take **1-2 weeks to biodegrade**, faster if in a composting container. Some fruit skins (for example orange peel) can take a few years to biodegrade.

### Paper

Paper is made from plant fibres and therefore ORGANIC. It can take up to **2-4 weeks to biodegrade**, faster if in a composting container.

### Aluminium can

Aluminium is INORGANIC (man-made) and can take **50 years** to biodegrade.

Aluminium is a kind of metal made from bauxite ore that is mined from the ground. Ore is metal in its original state, before it has been processed. Ore is a non-renewable resource, which means that there is a limited amount of it in the Earth and when it is used up, there is no more. Manufacturing your drink can uses huge amounts of energy that causes global warming.

It is very important to limit our use of cans and to recycle metal whenever possible. When a factory makes a new aluminium drink can from an old drink can, it only takes about 5% of the energy it takes to make it from the original materials. The amount of energy you save could run your TV for up to three hours! After collection, aluminium cans are sorted, crushed and pressed into blocks. These materials are then shipped to a processing plant where they are heated to melting temperature. The recycled aluminium is then pressed and rolled out into large sheets that can be made into cans, car parts or a range of other products. **Aluminium can be recycled over and over again.** Most Pacific countries do not have facilities to re-manufacture aluminium cans, but some countries send their cans overseas to be made back into cans.

### Fishing line

Fishing line is INORGANIC and made from NYLON – a type of plastic. Plastic was invented in the late 19th century and possibly considered one of the world's greatest inventions. Lightweight, durable and produced cheaply from oil, it is used to make everything from cars to computers to plastic bags for our shopping. However, plastic poses a huge threat to the unique Pacific environment because of the long time it takes to decay or breakdown. Plastic bags, containers/bags and particles can kill sea animals that mistake them for food, and they breed mosquitoes which carry diseases like dengue and malaria.

**Plastic never fully biodegrades.** It just breaks into smaller and smaller particles called **Macroplastics** (greater than 5mm in size), **Microplastics** (smaller than five mm in size), and **Nanoplastics** (so small you need an electron Microscope to see them) - so small they can cross cell walls. Nanoplastics have been found in the flesh of fish, in the air we breathe, in the water we drink. Scientists are now working on the presumption that there are smaller again particles of plastic called Picoplastics (which we haven't yet invented a machine to see them with).



If the fishing line you used last weekend will be around when your great, great, great, grandchildren are alive, would you say that was fair for future generations? Plastic waste discarded in our environment also cost us money each year to clean up. Samoa has taken advantage of new technology to reduce the problems. Plastic can now be made from natural products like corn starch which will break down or bio-degrade into natural products relatively quickly. Samoa has banned non-biodegradable shopping bags and all shopping bags used must be able to break down within six months. Cloth bags may cost more initially but will be better for our future.

### **Disposable nappy**

A disposable nappy is INORGANIC and made from plastic and therefore **never fully biodegrades** (as above). Therefore, the disposable nappy you wore will last until after you pass away – ***do you think that is fair? What alternatives can we use that are still convenient but don't impact the environment in the same way?***

**Polystyrene** – Polystyrene is INORGANIC and made from plastic and therefore **never fully biodegrades** (as above).

**Cigarette butt** – A cigarette butt is INORGANIC and made from plastic and therefore **never fully biodegrades** (as above). It also contains toxic chemicals. Therefore, a fish can eat it, die from the toxins in the butt, fall to bottom of sea, break down over a few months, cigarette butt still on floor of ocean, eaten by another sea creature who also die and so on).

**Mobile phone** – Mobile phones are INORGANIC and made partly from plastic and therefore **never fully biodegrades** (as above). Minerals and metals contained in the mobile may be able to be recycled.

**Glass** is INORGANIC and made from heated sand and can last for a long time until it wears back down to silica. It is biodegradable. At least 500 years for things like bottles. Again, like an aluminium can, if you recycle glass, it uses significantly less energy to create a new can that starting from scratch.

# Lesson 4: Why Should We Care About Waste?

<b>Introduction</b>	This lesson focuses on the Pacific Region and informs students of the environmental, economic, and social impacts of waste in this region. In doing so, it aims to engage students and put them in a mindset that waste is an issue that deserves their attention because of this impact it has on their lives.		
<b>Ages</b>	8-18	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will have a better understanding of how the problem of waste has changed over time in their community. They will learn how their local community has changed, and how this has changed the type and amount of waste that has been produce.		
<b>Content Focus: Social Sciences</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>You may choose to print off a copy of the Factsheet for your students. Alternatively, it could be presented on a screen, or a single copy could be passed around.</li> </ul>		
<b>Lesson Outline</b>	<p>10-15 minutes. Class Discussion:</p> <ul style="list-style-type: none"> <li>What impact does waste have on our lives?</li> <li>Is its impact on the Pacific Region different to other regions?</li> <li>How many different impacts does waste have on us?</li> </ul> <p>15-20 Minutes- Class Read Through</p> <ul style="list-style-type: none"> <li>Taking it in turns, instruct the class to read through the material contained in the “Why Should We Care About Waste? Factsheet”</li> </ul> <p>10-15 minutes. Class Discussion:</p> <ul style="list-style-type: none"> <li>Do you litter?</li> <li>What are some of the impacts of waste in your community?</li> <li>After learning of the impacts, will you change your behaviour?</li> <li>If not, why not?</li> </ul>		
<b>Extension for Older Students</b>	Older and more advanced students may research their own information regarding the environmental, economic, and social impacts of waste.		

## Why Should we Care About Waste? Factsheet

### The environmental, economic, and social impacts of waste and pollution

The Pacific Islands region is a unique area in the world. It has many plants and animals that are not found in other parts of the world (endemic species). The region's rich biodiversity is integral to our culture and to our future. If we reduce the waste that ends up in the environment through prevention and good management, we can have a positive impact by creating a clean, healthy and rich Pacific region for our future. When waste isn't managed properly it ends up in our environment and this has many devastating impacts.

### Waste is everyone's responsibility!

#### Economic Impacts: Wasting Money

- Waste costs money! Millions of dollars are spent each year by Pacific Island governments to keep our countries and ocean clean. If we minimised the waste we produced, and ensured its management, we could instead spend this money on improving other services such as education and health care.
- The main sector contributing to the economy of the Pacific region is tourism. We promote our region as a paradise of beautiful beaches and forests. Waste and pollution impact on the tourist industry negatively and means the money we could earn from tourism is reduced.

#### Environmental Impacts: Polluting land, water, oceans, air, and the atmosphere

- In most Pacific Island nations, landfills and dump sites contain organic, inorganic and even toxic waste. When waste is dumped in landfill sites it is sometimes buried to hide from vermin and spreading disease, or sometimes it is burned (incineration) to make more space. Because we are a Sea of Islands, we don't have infinite space for dumping rubbish!
- Landfills need land! The amount of land that is used by landfill sites impacts on the Pacific Islands' peoples. Some Pacific Islands are quite small and as the population grows, so does the amount of waste produced, and the size and costs of landfill sites. Reducing waste is important because land is a valuable resource. In the Pacific, the land and ocean hold our connections to our ancestors and traditional knowledge.
- As the impacts of climate change intensify and storms increased, atoll nations are at increased risk of their landfills being washed into their lagoons, threatening marine life. With sea level rising less land is available for countries to utilise.
- When we clear the land for landfill, we also remove the habitats or homes of many plants and animals. Discarding waste in our environment threatens all living things. Animals may get strangled and choke on our rubbish, for example.
- When waste ends up in our environment, buried near a stream, mangrove area or the ocean, it can flow into the water. The organic waste breaks down and contaminates the water with an oversupply of nutrients, changes habitats, uses up oxygen and threatens the life of plants and animals that live there.
- Toxic and inorganic waste may seep or leach into the soil destroying important soil organisms and contaminating ground water. Eventually this toxicity can pass through the food chain and may end up in our bodies.

### **Social Impacts: Human Health and Human Rights**

- In the Pacific, household waste is often burnt. Waste incineration can affect the quality of the air we breathe. The smoke particles can get stuck in our lungs which can cause diseases like cancer.
- Burning plastics has more harmful effects as it releases toxic chemicals into the air we breathe. These chemicals, called dioxins and furans, are highly toxic and remain in the environment for a long time. They can also build up in human body tissue. Obesity and diabetes are some of the health issues associated with toxic plastic.
- Because dioxins and furans accumulate (build up) in body fat, women tend to accumulate them more readily in their body tissue because biologically, women have more body fat used for pregnancy and breast-feeding. Babies are particularly at risk of absorbing toxic chemicals from plastics through their mothers' bloodstream and breast milk.
- Waste management is closely linked to gender inequality. Women across the Pacific region have traditionally been responsible for waste management in their households and communities. They undertake these roles for free as part of the household labour associated with Pacific gender roles and stereotypes.

### **Waste and pollution threaten Pacific biodiversity, human health and human rights!**

#### **A Healthy Environment is a Human Right!**

- On October 8, 2021, the UN Human Rights Council adopted a resolution recognising the right to a clean, healthy and sustainable environment as an important human right.

**FACT: Did you know that over 1 million marine animals (including mammals, fish, sharks, turtles, and birds) are killed each year due to plastic debris in the ocean?**

# Lesson 5: Dramatic Connections

<b>Introduction</b>	This activity highlights the connection between waste and its impacts on people, the economy, and the environment.		
<b>Ages</b>	8-18 years	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will have a better understanding of the interactions between waste, the people, the environment and the economy.		
<b>Content Focus: English</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>This task requires no preparation.</li> </ul>		
<b>Lesson Outline</b>	<ul style="list-style-type: none"> <li>60 minutes for activity</li> <li>Separate class into groups of approximately 6 students.</li> <li>Dramatic Connections activity as outlined in the <b>Instructions</b></li> <li>Allow class time to watch all the performances.</li> <li>Class Discussion Questions after <i>each</i> performance:             <ol style="list-style-type: none"> <li>What was the message in the performance?</li> <li>Do you agree with the links made between people and the environment?</li> </ol> <p>Ask the performers:</p> <ol style="list-style-type: none"> <li>Did you get your message across?</li> <li>What were the relationships that you were trying to show?</li> <li>Is this a realistic situation in your community?</li> </ol> </li> </ul>		
<b>Extension for Older Students</b>	<p>More advanced students could operate in larger groups to develop more intricate and longer performances. Optionally the lists could also be expanded to increase the complexity.</p> <p>High quality performances could be delivered to the whole school, or to a larger audience to draw attention to the issue.</p>		

## Dramatic Connections Instructions

1. Provide each group with one of the lists from the table below.

<b>List 1</b>	<b>List 2</b>	<b>List 3</b>
A supermarket or store	A baby	A drain filled with litter
A dead marine turtle	A well	An angry headmaster or principal
A happy jellyfish	A person drinking	A very bad smell
A plastic bag	Several dirty nappies	Junk food
A person shopping	An empty rainwater tank	A happy canteen lady
A sad, old man	A sick person	A child not feeling well

2. Ask each group to prepare a short drama role play that must include all the objects or people on their list. Participants are allowed to speak during their performance and may like to develop a script (this is optional).
3. Explain that the list can be arranged to tell a story that shows relationships between the environment and how people live. There is no right or wrong order to use the objects or people from the list in the drama.
4. Allow sufficient time for the groups to prepare a drama performance (20 mins) and 5 minutes for each performance.





**SPREP**  
Secretariat of the Pacific Regional  
Environment Programme



**PacWastePlus**  
PACIFIC WASTE MANAGEMENT

This initiative is supported by **PacWastePlus**-a 85 month project funded by the European Union (EU) and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to **sustainably and cost effectively improve regional management of waste and pollution.**

## Pacific Waste Curriculum

# UNIT 2: Waste in My Country



March 2024



This curriculum unit was prepared by:



THE UNIVERSITY OF  
**NEWCASTLE**  
AUSTRALIA



**Dorroughby**  
Environmental Education Centre



NSW  
Education  
**EZEC**  
Environmental and Zoo Education Centres



**NSW**  
GOVERNMENT

Education



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Learn more about the PacWaste Plus programme by visiting

[www.pacwasteplus.org](http://www.pacwasteplus.org)

## Unit Outline:

It's important to consider the unique waste situation in the Pacific region if students are to gain an understanding of the importance of effective waste management. Most manufactured items are imported into countries in the Pacific region, meaning that when those items reach the end of their life, the resulting waste is also imported.

Limited land space means there is usually insufficient infrastructure for the effective management of many different types of waste. The end result being that waste is management by exporting it out of the country which is an expensive option.

In this unit, students will gain an understanding of different types of waste, and how the management needs vary according to the type of waste. They will also look at the waste management capabilities of their own country, to help them appreciate the complex issue that is waste management in their own community.

# Lesson 1: Waste in My Country

<b>Introduction</b>	In this lesson students examine the waste challenges in their own country. Students will consider the major sources of income for their country and how those may be affected by waste. They will also look at what waste facilities are available in their country to deal with the problem.		
<b>Ages</b>	12-18 years old	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students can identify the major sources of income for their country and the potential impacts waste may have on these.		
<b>Content Focus: Social Sciences</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>● Print off a copy of the <b>Country Profile</b> per group of two students.</li> <li>● Print off a copy of the <b>Waste in my Country Worksheet</b></li> </ul>		
<b>Lesson Outline</b>	<ul style="list-style-type: none"> <li>● Class discussion around the following questions:             <ul style="list-style-type: none"> <li>- What kind of waste do you see when you walk around?</li> <li>- What do people in our country do for work? Where do they get their money from?</li> <li>- Could the waste have an impact on that work? How?</li> <li>- How do we get rid of waste in our country?</li> </ul> </li> <li>● Distribute to class <b>Country Profile</b>.</li> <li>● Students work through the <b>Waste in My Country Worksheet</b>.</li> <li>● After Discussion:             <ul style="list-style-type: none"> <li>- Go over answers.</li> <li>- What did students find surprising?</li> <li>- What did students learn about their country and waste?</li> </ul> </li> </ul>		
<b>Extension for Older Students</b>	For more advanced students, they may choose to research the answers to the questions without the country profiles, developing their researching skills.		

## Country Profile: Papua New Guinea



This initiative is supported by PacWastePlus—a 64-month project funded by the European Union (EU) and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to sustainably and cost effectively improve regional management of waste and pollution.

### PACWASTEPLUS PROJECT SNAPSHOT

# PAPUA NEW GUINEA

December 2020
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The PacWastePlus programme is being implemented across 14 Pacific island countries and Timor-Leste, and will address both the cost-effective and sustainable management of waste and pollution in the priority waste streams of:

- **Hazardous wastes** (*asbestos, healthcare waste, and e-waste*)
- **Solid wastes** (*organic waste, disaster waste, bulky waste, and recyclables*)
- related aspects of **Wastewater**

The programme will deliver positive social and environmental outcomes from the effective management of waste in the Pacific. PacWastePlus activities are tailored to address the specific needs of each country based on their identified priorities. **Papua New Guinea** is one of the 15 countries participating in the PacWastePlus programme.



Papua New Guinea is located in the Melanesia region of the South Pacific. It is the world's third largest island country, covering 462,840 km<sup>2</sup>, encompassing 22 provinces over the eastern half of New Guinea and over 600 offshore islands. Its exclusive economic zone covers an oceanic area of approximately 2,446,757 km<sup>2</sup>.



The capital of Papua New Guinea is Port Moresby, home to 5% of the 8,934,500 population.



Waste management is a challenge for Papua New Guinea, primarily due to the size and geographic distribution of its population. There is no regulatory framework or legislation on solid waste management and few public awareness programs or initiatives. Pollution from large-scale mining activities are also a growing concern with numerous studies directly attributing pollution of coastal ecosystems to discharges from mining activities. PNG has over 21 unregulated disposal sites and two controlled sites located in Lae and Port Moresby. The government does not implement formal recycling programs. However, there are recycling operators in Port Moresby that collect beverage bottles, ULABs, used motor oil, scrap steel, and small quantities of PET bottles.



Papua New Guinea has a remarkable diversity of natural resources and has promoted economic growth through investments in the agricultural, forestry, fisheries and mining sectors. The principal exports for Papua New Guinea are copper, gold and liquefied natural gas, which together account for nearly two-thirds of government revenue. The gross domestic product (GDP) is estimated at USD\$24.9 billion or USD\$2,854 per capita.



Papua New Guinea is currently one of the most rural countries in the world, with 87% living in rural areas, however it is also experiencing increasing urbanisation as people move from rural areas into urban centres. This, coupled with one of the Pacific's highest population growth rate of 2.1%, exerts pressure on urban environments, creating challenges with issues such as potable water, sanitation, waste generation, informal settlements and infrastructure.



Papua New Guinea is significantly impacted by climate change, with more than 80% of the population relying on rain for subsistence agriculture, so small changes in rainfall and temperature can have a significant impact on livelihoods. The sea level of Papua New Guinea is rising at 7mm per year, more than twice the global average<sup>6</sup>. This is expected to have a significant effect on the low-lying atoll islands.

# SUMMARY OF PACWASTEPLUS WASTE STREAMS AND COMMITMENTS



## Healthcare Waste

Waste generated by health care facilities includes used needles and syringes, soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices, and radioactive materials. Incorrect management of healthcare waste can expose health care workers, waste handlers, patients and local communities to infection and injuries, and risks polluting the environment. The volume of healthcare waste is increasing in the Pacific as populations grow and medical services expand.

### Activities implemented by PacWaste (2014-2018)



#### Baseline Survey

Cook Islands, Fiji, Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Papua New Guinea, Palau, Samoa, Solomon Islands, Timor Leste, **Tonga**, Tuvalu, Vanuatu



#### Incinerator Installation

Cook Islands, Fiji, FSM, Kiribati, Nauru, Niue, Palau, Solomon, **Tonga**, Tuvalu, Vanuatu



#### Training (Incinerator Operation)

Cook Islands, Fiji, FSM, Kiribati, Nauru, Niue, **Tonga**, Tuvalu, Vanuatu



#### Training (Healthcare Waste Management)

Cook Islands, Fiji, FSM, Kiribati, Marshall Islands, Nauru, Papua New Guinea, Palau, Samoa, Solomon Islands, Timor Leste, **Tonga**, Tuvalu, Vanuatu



#### Provision of Equipment

FSM, Nauru, Papua New Guinea, Timor Leste, Vanuatu



#### Policy and Regulation (Strategy)

Cook Islands, Fiji, FSM, Kiribati, Nauru, Papua New Guinea, Palau, Samoa, Solomon Islands, Timor Leste, **Tonga**, Tuvalu

PacWastePlus is working directly with two member countries, and has regional activities underway, to assist with the management of healthcare waste through:



#### Incinerator Assessment

Cook Islands, Federated States of Micronesia, Fiji, Nauru, Niue, Solomon Islands, **Tonga**, Tuvalu, Vanuatu, Timor-Leste, Kiribati



#### Incinerator Repair

Kiribati, Palau, Solomon Islands, **Tonga**, Vanuatu



#### Training

Timor-Leste, Papua New Guinea, Regional



#### Policy and Regulation

Timor-Leste, Papua New Guinea



#### Public Awareness

Regional



#### Remediation

Timor-Leste



#### Provision of Equipment

Timor-Leste



## Asbestos

Asbestos refers to six naturally occurring silicate minerals composing of long and thin fibrous crystals. Historically, asbestos was a common building material, but is now banned from most modern products as it is a known carcinogen. Numerous buildings in the Pacific contain asbestos, and risk of exposure is elevated due to the number of extreme weather events, which can damage asbestos containing materials (ACM) and release airborne fibres.

### Activities implemented by PacWaste (2014-2018)



#### Baseline survey

Cook Islands, Fiji, FSM, Kiribati, RMI, Nauru, Niue, Palau, Samoa, Solomon Islands, **Tonga**, Tuvalu, Vanuatu



#### Abatement

Abated = 27,873m<sup>2</sup>

Cook Islands, Fiji, FSM, Kiribati, RM, Nauru, Samoa Solomon, **Tonga**, Vanuatu



#### Training

Fiji, FSM, Kiribati, Nauru, Niue, Solomon, **Tonga**, Vanuatu



#### Public Awareness

Cook Islands, Fiji, Kiribati, RMI, Nauru, Niue, Palau, Solomon, **Tonga**, Tuvalu, Vanuatu



#### Policy and Regulation (Strategy)

Fiji, Nauru, Solomon, **Tonga**, Tuvalu

PacWastePlus is working directly with five member countries, and has regional activities underway, to assist with the management of asbestos through:



#### Survey/Investigation

Nauru, Kiribati, **Tonga**, Tuvalu



#### Abatement

Nauru, Niue, Kiribati, **Tonga**



#### Training

Nauru, Niue, Kiribati, **Tonga**, Tuvalu



#### Policy and Regulation (Asbestos Ban, Code of Practice)

Nauru, Niue, Kiribati, **Tonga**, Tuvalu, Regional



#### Public Awareness

Regional

The PacWastePlus programme brings together key organisations supporting waste and pollution sector in the region. Additionally, the programme is partnering with numerous other development partners operating waste management projects in the region, to ensure no duplication of efforts or wasted resources.

# SUMMARY OF PACWASTEPLUS WASTE STREAMS AND COMMITMENTS



## E-waste

The rapidly increasing use of electrical and electronic equipment globally is resulting in an increase in the volume of e-waste generated. E-waste contains a range of hazardous materials including heavy metals, brominated flame retardants and other toxic substances. Incorrectly managed e-waste has a risk to release toxic substances and has potential to contaminate the environment. E-waste management is an emerging issue in the Pacific due to the lack of recycling and disposal options available. Even though electrical and electronic items contain recoverable and valuable components, efforts to effectively manage e-waste are often faced with economical, logistical, and technical challenges.

### Activities implemented by PacWaste (2014-2018)



**Facility Design/Establishment (Pilot and processing)**  
Cook Islands, Kiribati, Palau, **Tonga**, Vanuatu



**Public Awareness**  
Cook Islands, Kiribati, RMI, **Tonga**



**Policy and Regulation (Strategy)**  
Tuvalu



**Collection System**  
RMI, Solomon

PacWastePlus is currently working directly with two member countries, and has regional activities underway, to assist with the management of e-waste through the:



**Facility Design/Establishment**  
Samoa



**Training**  
Samoa, Niue, Regional



**Policy and Regulation (ARF, Levy, Strategy)**  
Papua New Guinea, Samoa, Marshall Islands, Cook Islands, Nauru, Solomon Islands, Vanuatu, Kiribati, Regional



**Collection System**  
Samoa



**Public Awareness**  
Regional

### The four key result areas of PacWastePlus are:

- improved data collection, information sharing, and education and awareness,
- policies and regulatory frameworks developed and implemented
- best practices including enhanced private sector engagement and infrastructure development implemented
- enhanced human capacity



## Disaster Waste

Natural disasters generate a huge volume of intermingled waste types which have the potential to contaminate the natural environment and poses a risk to human health, and which often need to be cleared very quickly to allow for relief efforts to be undertaken. With natural disaster frequency and severity in the Pacific region increasing, the issue of disaster waste management has developed a higher profile and greater sense of urgency.

PacWastePlus is working directly with two member countries, and has regional activities underway, to assist with the management of disaster waste through the:



**Clean up**  
Vanuatu



**Training**  
Vanuatu



**Policy and Regulation (Management Plan)**  
Vanuatu, Regional



**Public Awareness**  
Regional



## Bulky Waste

Bulky waste is materials that are too large to be accepted by regular waste collection services (end-of-life vehicles, tyres, white goods, furniture, construction waste, and other large household goods). In the Pacific region, bulky waste is problematic to manage as it requires specialist equipment and a large area for effective collection and processing, and requires potentially cost-prohibitive transport to reach recycle markets. As a result, bulky waste items can often be seen disposed in landfills, dumps and discarded on vacant land.

PacWastePlus seeks to work directly with two countries, and has regional activities underway, to assist with the management of bulky waste through the:



**Survey/Investigation**  
Palau, Regional



**Provision of Equipment**  
Marshall Islands\*



**Training**  
Marshall Islands\*, Palau, Regional



**Policy and Regulation (ARF, Levy)**  
Samoa, Marshall Islands, Cook Islands, Nauru, Solomon Islands, Vanuatu, Kiribati, Regional



**Public Awareness**  
Regional

\*Project to be determined

# SUMMARY OF PACWASTEPLUS WASTE STREAMS AND COMMITMENTS



## Organic waste

Organic material is biodegradable matter such as kitchen scraps (food); garden cuttings, grass and branches; and paper. Up to 50% of waste disposed to landfill in the Pacific is organic material. When processed correctly (in an “aerobic” or oxygen-filled environment), organic materials can produce valuable nutrient rich products, such as compost, suitable for soil enhancement and food cultivation. However, when intermingled with other waste and disposed in a landfill or dump (an “anaerobic” environment), organic material can release toxic leachate and generate methane gas.

PacWastePlus has regional activities underway and will seek to work directly with countries to assist with the management of organic material through the:



### Survey/Investigation

Nauru\*, Solomon Islands, Vanuatu



### Facility Design/Establishment

Nauru, Solomon Islands, Vanuatu



### Training

Nauru\*, Solomon Islands, Vanuatu, Regional



### Policy and Regulation (Operating Procedure)

Nauru, Solomon Islands, Vanuatu, Regional



### Public Awareness

Regional



## Water impacted by Solid Waste

Pacific Island countries largely depend on the ocean and water bodies for daily sustenance and economic livelihood. Improper waste management can impact water bodies and poses a potential threat to the health of local communities.

PacWastePlus has partnered with The Pacific Community (SPC) to develop and pilot a wastewater pilot project.

Project to be designed and implemented by SPC



## Recyclables

Recycling is a process to convert “waste” items into new products. Globally, consumption patterns generally following a linear “buy, use and throw” model. This linear model is problematic in the Pacific as all recyclable items are imported into the region and the majority of recyclable waste is disposed into overflowing landfills, with associated cost borne by national and local governments. Managing recyclables in the Pacific region is challenging due to the relatively small volume of items received being unable to provide an economy of scale – resulting in challenges for the collection, processing and reverse shipping to reach recycle markets. As a result, discarded recyclable items are a prevalent sight in the Pacific.

### Activity implemented by PacWaste (2014-2018)



### Pilot Project on Integrated atoll waste management

Marshall Islands (Majuro)



### Recyclers Network

Cook Islands, Fiji, Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Papua New Guinea, Palau, Samoa, Solomon Islands, Timor Leste, Tonga, Tuvalu, Vanuatu

PacWastePlus is providing direct assistance to six member countries, and has regional activities underway, to assist with the management of recyclables through the:



### Facility Design/Establishment

Federated States of Micronesia, Solomon Islands, Cook Islands, Tuvalu



### Provision of Equipment

Marshall Islands, Niue\*, Vanuatu\*



### Seed Funding

Cook Islands, Marshall Islands, Niue\*, Vanuatu\*



### Training

Federated States of Micronesia, Solomon Islands, Cook Islands, Tuvalu, Marshall Islands, Vanuatu



### Policy and Regulation (ARF, Levy)

Samoa, Cook Islands, Nauru, Solomon Islands, Marshall Islands, Vanuatu, Regional



### Public Awareness

Regional

PacWastePlus activities were selected either:

- 1) directly by countries as part of their chosen country projects; or
- 2) to respond to a key topic or action area brought to the attention of the PacWastePlus Programme Management Unit

Wherever possible country specific projects will be converted into regional resources, so all countries and territories in the region can benefit from the investment.

# PACWASTEPLUS REGIONAL KEY RESULT AREAS

In addition to activities directly related to the waste streams, PacWastePlus will undertake regional activities under each key result area. These activities are designed to respond to needs identified by member countries and to inform and support implementation of country specific activities.

## Data Gathering



- Waste Audits to inform decision making
- Research into Gender and Social Inclusion issues in waste management throughout the region
- Development of a decision support tool to assist management option assessments
- Research into possible Small Scale Technology options suitable for use in the region
- Research into the management options for used tyres
- Research into alternatives to the use of disposable diapers
- Research into the impacts of different types of landfill designs
- Research to understand social and technical barriers and opportunities for managing organics
- Research into the management options for bulky waste (ELV/Construction waste)

## Policy and Regulation



- Review and assessment of national legislative frameworks as they relate to waste management
- Specific Legislative assistance to each country to strengthen waste management legislative instruments\*

\* Currently utilised for ARF = Samoa, Marshall Islands, Cook Islands

## Education and Awareness



- Development and implementation of a Regional Education and Awareness Plan
- Assistance to develop National Education and Awareness Plans that will support the implementation of PacWastePlus in each participating country
- Implementation of three pilot Behavioural Change/Social Marketing Campaigns

## Capacity Building



- Identify skills countries feel their staff and waste management workers should have and provide the up-skilling
- Developing a sustainable capacity building program for waste management in the Pacific

For more information please contact:

The PacWastePlus team on [pwd@sprep.org](mailto:pwd@sprep.org)  
Or visit - <https://www.sprep.org/pacwaste-plus>

(post project please email [sprep@sprep.org](mailto:sprep@sprep.org))

### Disclaimer

This publication was produced with the financial support of the European Union. Its contents are the sole responsibility of SPREP and do not necessarily reflect the views of the European Union.

\*Countries mentioned in this publication are as at December 2020



# Waste in My Country

My Country: \_\_\_\_\_

**Instructions:** Read over the first page of the country profile for your country. Use the information to answer the questions.

**HINT:** The pictures might help you find the correct section to look at.



What are some of the major sources of income for your country?

---

---



Do you think that these income sources might be affected by pollution and waste in the future? Why?

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---

---

What are the environmental issues of concern in your country? What is causing these problems?



---

---

What waste services are there in your country?

---

---

What do they do with the waste?

---

---

Where is the landfill/dump sites?

---

---

**Challenge Question!**

What is something that you learnt about your country that you didn't know before?

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## Lesson 2: Types of Waste

<b>Introduction</b>	In this lesson, students continue to develop an understanding of different types of waste that exist in their country. In later units, different types of waste will be further developed		
<b>Ages</b>	12-18 years old	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students can identify the major sources of income for their country and the potential impacts waste may have on these.		
<b>Content Focus: Science and Technology</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>● Print off a copy of the <b>Country Profile (From Lesson 1)</b> per group of two students.</li> <li>● Print off a copy of the <b>Types of Waste Worksheet</b></li> <li>● Take a photo of the inside of a bin at school to present to your students for final discussion.</li> </ul>		
<b>Lesson Outline</b>	<ul style="list-style-type: none"> <li>● Class discussion: What different kinds of waste are there?</li> <li>● Distribute to class <b>Country Profile</b>.</li> <li>● Students work through the <b>Types of Waste Worksheet</b></li> <li>● Class discussion:             <ul style="list-style-type: none"> <li>- What types of waste are the most difficult for our country to deal with? Why?</li> <li>- What can we deal with most easily? Why?</li> <li>- Activity: Present to students the photo of the school bin. Students then list the items they see in the bin and categorise them according to the categories just listed.</li> </ul> </li> </ul>		
<b>Extension for Older Students</b>	For more advanced students, they may choose to research the answers to the questions without the country profiles, developing their researching skills.		

# Types of Waste

**Instructions:** Use the information on **pages 2,3 and 5** of your country profile to answer these questions.



What are some examples of Healthcare Waste?

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Why is it important to correctly dispose of Healthcare Waste?

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What was asbestos used for in the past?

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Why is it now banned?

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What is the risk of incorrectly managed E-waste?

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Can you think of any E-waste you or your family have thrown out recently?

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## Disaster Waste

What is disaster waste?

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Can you think of a disaster that occurred in your country in your lifetime? What kind of waste was created?

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## Bulky Waste

What are some examples of bulky waste?

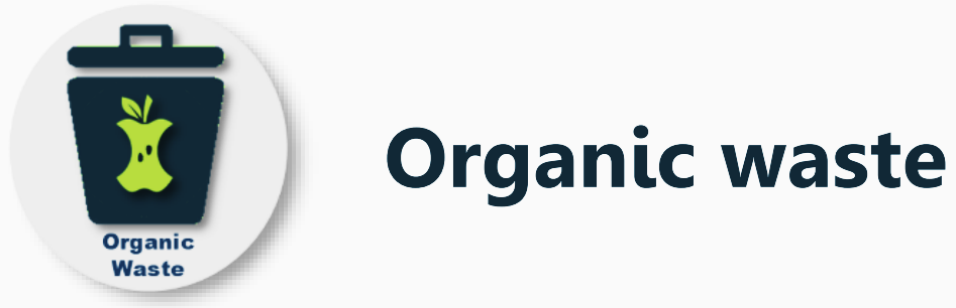
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Why is bulky waste problematic to manage in the Pacific Region?

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What percentage of waste in the Pacific region is organic waste?

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What is the risk of disposing of organic waste in a landfill?

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What is recycling?

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Where is most of the recyclable waste disposed of?

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Environment Programme







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Secretariat of the Pacific Regional  
Environment Programme



This initiative is supported by **PacWastePlus**-a 85 month project funded by the European Union (EU) and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to **sustainably and cost effectively improve regional management of waste and pollution.**

## Pacific Waste Curriculum

# UNIT 3: Reducing Waste



March 2024



This curriculum unit was prepared by:



THE UNIVERSITY OF  
NEWCASTLE  
AUSTRALIA



Education

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Learn more about the PacWaste Plus programme by visiting

[www.pacwasteplus.org](http://www.pacwasteplus.org)

## **Unit Outline:**

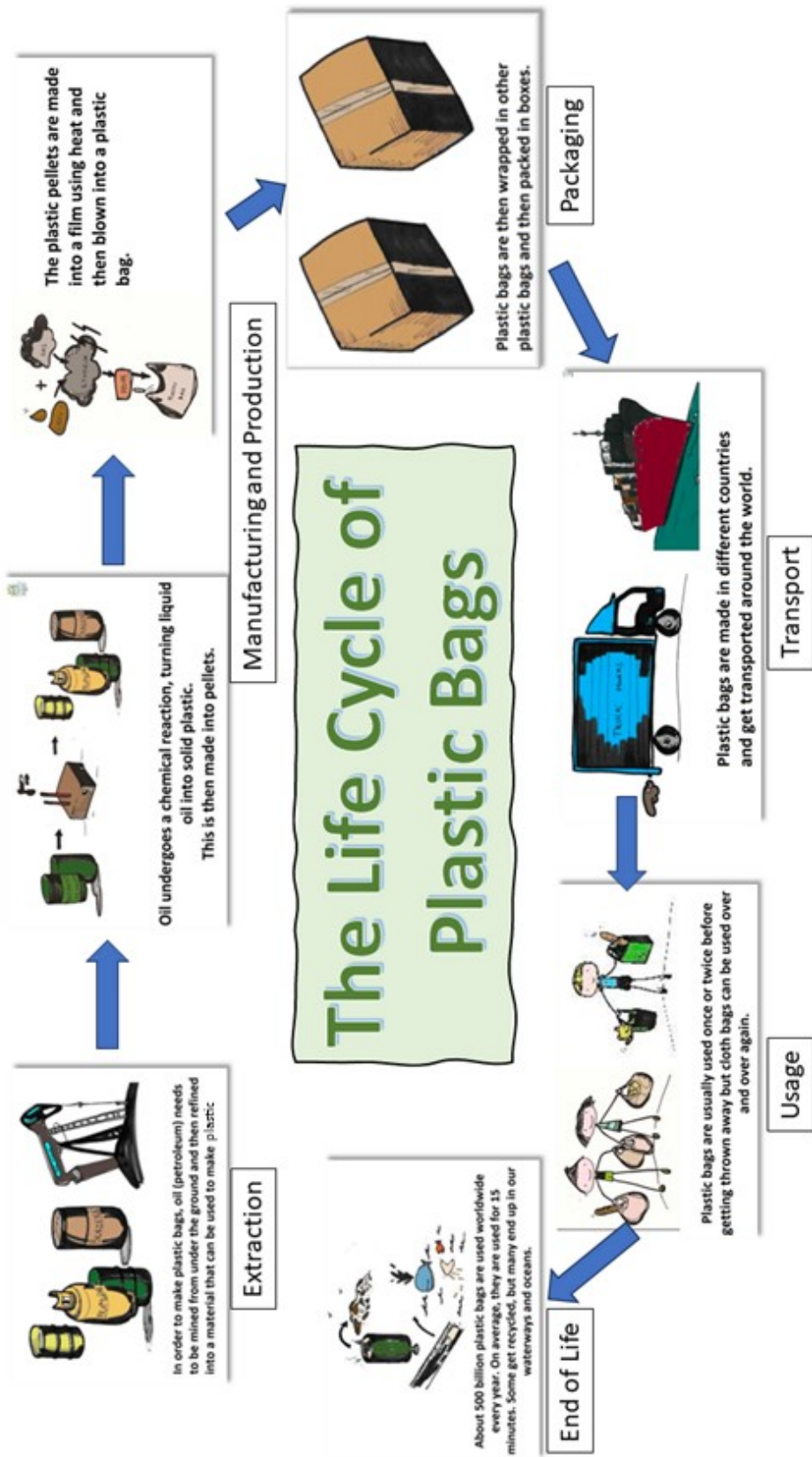
They are made from things that are mined from the ground, they are used, and when they are done, they are thrown away. But is there a different way of doing things?

This unit will investigate the current model for production of items in our society and attempt to answer the question of whether there is a better way.

# Lesson 1: The Life Cycle of a Plastic Bag

<b>Introduction</b>	This lesson introduces students to the life cycle of a disposable plastic bag. The purpose of this lesson is to make it clear to students that many products in our modern life are considered disposable, with no plan for the end of the products life. This is designed to contrast with the later lessons, which will highlight the concept of a circular economy, which is the opposite of a linear, disposable economy.		
<b>Ages</b>	5-14 years old	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will have a understanding of the life cycle of a plastic bag, and by extension, what we mean by disposable goods.		
<b>Content Focus: Science and Technology</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• Print a copy of the “<b>The Life Cycle of a Plastic Bag: Picture Cards</b>” for every group of 4-5 students.</li> <li>• Print a copy of the “<b>The Life Cycle of a Plastic Bag: Stage Cards</b>” for every group of 4-5 students</li> </ul>		
<b>Lesson Outline</b>	<p><b>10-15 Minutes</b>- Class discussion:</p> <ul style="list-style-type: none"> <li>• Do we all use reusable bags for our shopping?</li> <li>• What are they made of?</li> <li>• How often do we use them?</li> <li>• What is plastic made from?</li> </ul> <p>Divide student into groups of 4-5 students.</p> <p><b>20-25 minutes</b>-Distribute to each group a set of “<b>Picture Cards</b>” and “<b>Stage Cards</b>” but not the answer sheet!</p> <ul style="list-style-type: none"> <li>• Instruct students to try and arrange the activity cards in order and match them to the labels, some labels are for more than one activity card.</li> <li>• When students are complete, discuss any differences between answers. Show them the answer sheet.</li> </ul> <p><b>10-15 minutes</b>--Class Discussion:</p> <ul style="list-style-type: none"> <li>• Were they surprised to learn where plastic comes from?</li> <li>• Why are disposable bags now banned?</li> <li>• Wouldn't it be good if we could “close this circle” and turn old bags back into new bags?</li> </ul>		
<b>Extension for Older Students</b>	For more advanced students, consider getting them to make their own cards to look at the life cycle of other products. e.g., mobile phones, plastic water bottles, tinned food.		

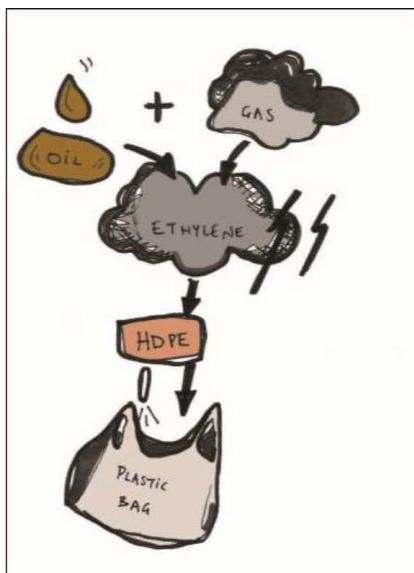
# The Life Cycle of a Plastic Bag: Answer Sheet



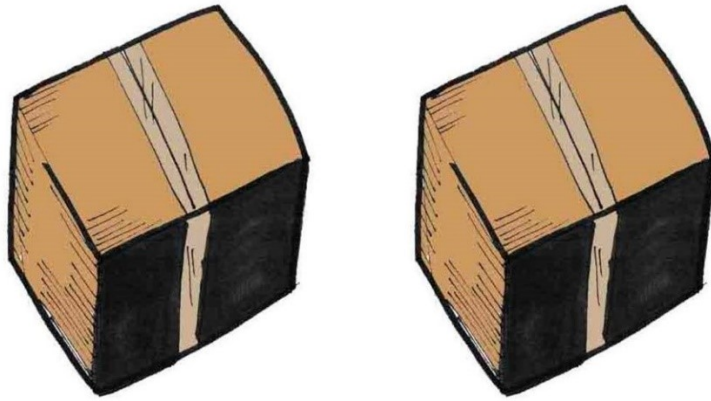
## The Life Cycle of A Plastic Bag: Picture Cards



**In order to make plastic bags oil (petroleum) needs to be mined from under the ground and then refined into a material that can be used to make plastic.**



**The plastic pellets are made into a film using heat and then blown into a plastic bag.**



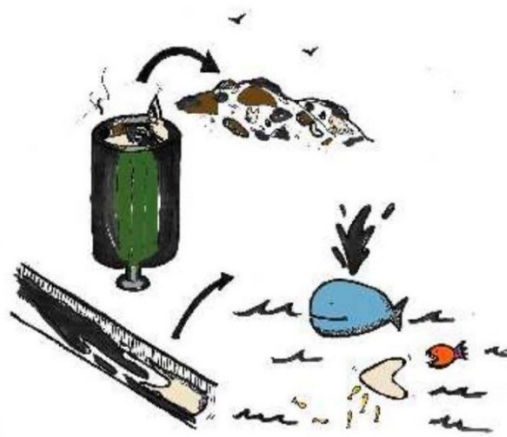
**Plastic bags are then wrapped in other plastic bags and then packed in boxes.**



**Plastic bags are made in different countries and get transported around the world.**



**Plastic bags are usually used once or twice before getting thrown away but cloth bags can be used over and over again.**



**About 500 billion plastic bags are used worldwide every year. On average, they are used for 15 minutes. Some get recycled, but many end up in our waterways and oceans.**



**Extraction**

**Manufacturing  
& Production**

**Packaging**

**Transport**

**Usage**

**End of Life**

## Lesson 2: The Product Life Cycle

<b>Introduction</b>	This lesson continues to build on the concepts of last lesson. It expands to examine plastic in a broader sense, giving students a firmer understanding of what plastic is, where it comes from, and what happens to it when its usefulness is over. It also introduces students to the Great Pacific Garbage patch, which is composed largely of plastic.		
<b>Ages</b>	8-18years old	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will have a good understanding of the life cycle of a plastic product. Students will be able to describe the Great Pacific Garbage Patch.		
<b>Content Focus: English</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• This lesson requires showing the students a video. The videos can be downloaded beforehand if internet access is not fast enough for streaming. Alternatively, the scripts can be downloaded and printed from <a href="http://wp2020.storyofstuff.org/wp-content/uploads/2020/01/StoryofStuff_AnnotatedScript.pdf">http://wp2020.storyofstuff.org/wp-content/uploads/2020/01/StoryofStuff_AnnotatedScript.pdf</a> and <a href="https://www.storyofstuff.org/wp-content/uploads/2021/04/SoSP.Movies.SOP_short.Script.pdf">https://www.storyofstuff.org/wp-content/uploads/2021/04/SoSP.Movies.SOP_short.Script.pdf</a></li> <li>• If you do not have access to appropriate equipment, we have attached the scripts.</li> <li>• Print off a set of the “<b>The Story of Stuff: A Critical Analysis</b>” question sheets</li> </ul>		
<b>Lesson Outline</b>	<p><b>10-15 Minutes</b>- Class discussion:</p> <ul style="list-style-type: none"> <li>• Everything we consume goes through a life cycle, and each stage of the life cycle has environmental impacts.</li> <li>• By reducing the use of materials in every stage of the life cycle from materials extraction, manufacturing, distribution, usage and end-of-life management or disposal, we can help to minimise the environmental impact associated with the products we use.</li> <li>• Linking waste education to product lifecycle provides a powerful message to students of all ages around purchasing behaviour, product use and re-use, disposal, or recycling.</li> </ul> <p>Hand out to each student a copy of “<b>The Story of Stuff: A Critical Analysis</b>” question sheets. Explain to them that they will be answering the questions as they watch the video.</p> <p><b>15-20 minutes</b> - Watch the video: <b>The Story of Stuff</b> - a downloadable film available here: (<a href="https://www.storyofstuff.org/movies/story-of-stuff/">https://www.storyofstuff.org/movies/story-of-stuff/</a>).</p> <ul style="list-style-type: none"> <li>• It provides an overview of product life cycle and links to environmental management and conservation. Teachers can select a section of the Story of Stuff to show students followed by discussion and activity, we suggest the following approach:</li> <li>• Watch up to approximately 1:34 minutes of The Story of Stuff.</li> </ul>		

<b>Lesson Outline</b>	<ul style="list-style-type: none"> <li>• Write labels for each of the steps described in the video. Choose a common item from the classroom such as paper and describe how it gets from the original product (trees) to the piece of paper they are writing on, then...</li> <li>• Watch from 16:45 minutes (the section on disposal). Revise your product life cycle using the steps outlined in the video that include recycling. This will encourage your students to analyse the issue and apply it to their context.</li> <li>• Consider linking to the life cycle of a plastic bag that was done in Lesson 1 of this Unit.</li> </ul> <p><b>10-15 minutes</b>-Class Discussion:</p> <ul style="list-style-type: none"> <li>• How did you feel after learning about the Great Pacific Garbage Patch?</li> <li>• What can we use beside plastic for different things?</li> </ul> <p><b>5 minutes:</b> Watch the Video <b>The Story of Plastic</b>, available here:  <a href="https://www.storyofstuff.org/movies/story-of-plastic-animation/">https://www.storyofstuff.org/movies/story-of-plastic-animation/</a></p>
<b>Extension for Older Students</b>	<p>For more advanced students, consider getting them to develop alternative strategies to reduce the amount of plastic in their lives. More resources surrounding these videos may be found at <a href="https://www.storyofstuff.org/">https://www.storyofstuff.org/</a></p>

## The Story of Stuff: A Critical Analysis

1. What is the overall message of The Story of Stuff?
2. What audience do you believe Annie Leonard is trying to reach?
3. What persuasive techniques does Annie use to convince people of this message?
4. Why do you think Annie uses the format of a 20-minute video rather than another format, such as a report, web blog, or poster?
5. What bias does Annie have?
6. Who might disagree with Annie's message? Why do you think they would disagree?
7. What is your analysis of The Story of Stuff—do you believe it makes a convincing argument? Explain why you think the video is convincing or not.
8. Has The Story of Stuff affected the way you think about consumption? If so, how?

## Lesson 3: Where Does the Waste Go?

<b>Introduction</b>	This lesson explores where waste goes after we are done with it. Many people don't think too hard about this problem; the waste goes "away", so it doesn't matter but it's important to make the places where the waste ends up more visible in the minds of students.		
<b>Ages</b>	8-18 years old	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will have an understanding of the life cycle of a plastic bag, and by extension, what we mean by disposable goods.		
<b>Content Focus: Science and Technology</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>You may choose to print off a copy of the Factsheet for your students. Alternatively, it could be presented on a screen, or a single copy could be passed around.</li> </ul>		
<b>Lesson Outline</b>	<p><b>10-15 minutes.</b> Class Discussion:</p> <ul style="list-style-type: none"> <li>Do you think about where the waste goes when you are done with it?</li> <li>Do you consider where it's going to go when you throw it in the bin?</li> </ul> <p><b>15-20 Minutes-</b> Class Read Through</p> <ul style="list-style-type: none"> <li>Taking it in turns, instruct the class to read through the material contained in the "Why Should We Care About Waste? Factsheet"</li> </ul> <p><b>10-15 minutes.</b> Class Discussion:</p> <ul style="list-style-type: none"> <li>How does the place the waste go depend on where you dispose of it?</li> <li>Is this a sustainable way of dealing with waste?</li> <li>What are the alternatives?</li> </ul>		
<b>Extension for Older Students</b>	Older and more advanced students may do their own research on where the waste goes. For instance, students could research what percentage of waste in their country ends up in incinerators, or landfill, and what percentage is recycled.		

## **Where does waste go? Factsheet**

### **The mythical place called 'away'**

Where does your rubbish go? Does a truck take it away or do you have to burn and bury it in your community? What if the rubbish truck never came? What would happen to all the household waste in towns?

When the rubbish truck takes waste 'away' we forget about it but where does it go? Where is 'away'?

Nearly all villages have a landfill or dumping site that holds the entire communities collected or dumped rubbish. A landfill is like a huge rubbish bin where waste from villages and cities is deposited. If the landfill is poorly managed, the pollution can sometimes escape into the surrounding environment. If the rubbish is burned this will cause air pollution and can release dangerous toxic chemicals into the environment.

People who live near rivers often decide to dump their rubbish in the waterway so that it will be washed away. This spoils the river ecosystem. Some waste will float and travel downstream and some will sink and persist in the environment for many years. Households further inland often throw waste into a corner of their yard and burn it. Even though this is on a smaller scale, it causes the same problems as burning waste at a landfill site.

In the end there is no magical place called 'away'. In our environment everything is connected, and we all live with the consequences of the waste we produce. That's why minimising our waste is so important. By reducing our use of plastic bags, by composting organic waste, and recycling containers when we can, we can reduce the amount that needs to go 'away'. This reduces both cost and negative environmental impacts.

### **The Waste Stream**

The waste stream is the flow of all movement of waste from the point of disposal, such as household or commercial premises, to its final destination (for example a landfill site). Think of it like a giant river of waste flowing from all the houses and shops back into the environment somewhere. The volume, or amount, of waste in the waste stream may be significantly reduced overtime if valuable items are separated for recycling and are recovered to become resources for future re-manufacturing. Waste can also be reduced by decreasing the number of products we consume.

## **Disposing of Waste**

### **Open dumps**

Many Pacific Islands use open dumps that are just like big piles of rubbish outside the village. They smell and look awful. They also leak leachate into the streams and oceans. This can damage or kill the fish and other organisms.

They often catch on fire because of methane, a flammable gas produced by rotting organic material. This makes them very unpleasant and makes it even harder to salvage any usable resources. Open dumps allow litter like paper and plastic to blow with the wind and spoil everything nearby, including polluting the land, rivers, streams and oceans. Quite often, due to convenience, these dumps are made in mangroves or creek banks. This has a negative impact on our environment. Open dumps are an environmentally irresponsible way to get rid of waste.

### **Landfills**

Landfills exist in every country in the Pacific region. Here waste is usually covered with soil to reduce rats, dogs, and birds, and the leachate leaking from the waste is collected and treated. Some landfills are holes in the ground. Once all oxygen in the rubbish is used up (anaerobic) the landfills start to produce methane - a greenhouse gas and a very strong contributor to global warming. Some new landfills in the Pacific are semi-aerobic which means they let oxygen into the waste pile. These landfills then produce carbon dioxide instead of methane which is much safer and cleaner. Carbon dioxide is also, however a major greenhouse gas. All landfills are expensive to build and run and require large amounts of land. Reducing our waste makes landfills last longer therefore saving money and allows our land to be used for safer, healthier, and more productive purposes.

### **Incinerators**

Some places in the Pacific region burn their rubbish using special equipment called incinerators. Incinerators are more expensive than landfills and some chemicals they produce pollute our air and/or contribute to global warming. Making incinerators safer by filtering the chemicals is even more expensive.

You can see why reducing our waste in the first place and avoiding disposal is a good idea!

# Lesson 4: The Circular Economy

<b>Introduction</b>	<b>This lesson introduces students to the concept of a circular economy. It teaches students about its value in our community.</b>		
<b>Ages</b>	10-16 years old	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will be able to: <ul style="list-style-type: none"> <li>• Define the terms “circular economy” and “linear economy”</li> <li>• Explain the benefits of a circular economy as opposed to a linear economy.</li> <li>• Make suggestions to create personal changes in response to information presented.</li> </ul>		
<b>Content Focus: Social Studies</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• A set of “<b>Circular Economy Cards</b>” per team (at least 5 per team.</li> <li>• Water bottles (suggested 4-6 per team)</li> </ul>		
<b>Lesson Outline</b>	5 Minutes: Discussion <ul style="list-style-type: none"> <li>• Why is a circle better than a line?</li> <li>• Encourage students to discuss this in pairs before sharing with the group.</li> </ul> 30 Minutes- Run Relay- Follow “ <b>Relay 1 Instructions</b> ”  30 Minutes- Run Relay- Follow “ <b>Relay 2 Instructions</b> ”		
<b>Extension for Older Students</b>	Ideas for extension students: <ul style="list-style-type: none"> <li>• How would the circular economy work with:               <ul style="list-style-type: none"> <li>- Food</li> <li>- Fashion</li> <li>- Something else... furniture? Cars</li> </ul> </li> </ul> Students come up with as many ideas as possible for how the bottles could be repurposed.		



## Relay 1 Instructions

Groups of 5

- Each student takes a card. Order the students Manufacturer, Transport, Wholesaler, Retailer, Consumer. (You can add more people by adding extra Transport people)
- The water bottles start at the *Manufacturer*.
- Each student must do what it says on the card before handing it to the next student in the line.
- The first team to get 6 bottles through their relay wins.

## Discussion Questions

- What would happen if our relay kept going?
- How many water bottles do we buy in the world every minutes? (In April 2022 Scientists believe that *Humans approximately use about 1.2 million plastic bottles every minute.*)
- What could we do to change this?
- What would this look like in our relay?

## Relay 2 Instructions

Groups of 5

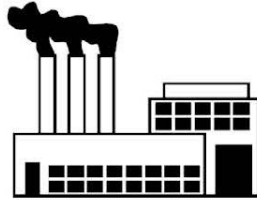
- Relay 2 is the same as relay 1, except the consumer runs the bottle back to the manufacturer.
- Once the manufacturer has a bottle to recycle, they only need to spin 3 times, because recycling uses less energy.
- Don't tell students how long they need to continue to do the relay to finish.
- Let them continue until they realise it never ends

## Discussion

- What would happen if we kept going this time?
- Why didn't we finish?
- What's one small change you will make to keep the circle going?

Explain that a circular economy keeps material out of landfill, uses less energy and costs less money. It is beneficial for our environment and our community.

# MANUFACTURER



Spin around 5 times

# TRANSPORT



Hold your arms out in front of you.

# WHOLESALER



Hold your arms up like reaching the top shelf.

# RETAILER



Smile as you sell your bottle to the consumer.

# CONSUMER



Pretend to drink the bottle, throw in bin.

# Lesson 5: The 4 Rs Challenge

<b>Introduction</b>	<b>The objective for this lesson is to introduce students to the 4Rs concept: Refuse, Reduce, Reuse, and Recycle and put these ideas into action.</b>		
<b>Ages</b>	10-16 years old	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will be able to: <ul style="list-style-type: none"> <li>Recall the four Rs of waste production.</li> <li>Identify which of the four Rs can be used to reduce different kinds of waste.</li> </ul>		
<b>Content Focus: Social Studies</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>Bag of rubbish. Ask students to bring in rubbish from home for this.</li> <li>Five containers per team (buckets, baskets, or boxes), Teams should be roughly 5 students, but can vary.</li> <li>Scrap paper or cardboard to make labels.</li> <li>Print a copy of <b>The Four Rs Factsheet</b> per team.</li> </ul>		
<b>Lesson Outline</b>	<p>5 Minutes: Discussion</p> <ul style="list-style-type: none"> <li>What can we do to reduce the amount of waste that ends up in landfill or is incinerated?</li> <li>Introduce students to the four Rs concept of waste: Refuse, Reduce, Reuse, and Recycle.</li> </ul> <p>Split class into teams of roughly 5 or so students.            Give each team 5 containers, get them to label the containers Refuse, Reduce, Reuse, and Recycle or Waste.            Explain to them the rules of the game set out in <b>The Four Rs Challenge Game Instructions</b>.            Give them each a copy of the <b>The Four Rs Factsheet</b>.            Give each team a bag of unsorted rubbish</p> <p>20-30 minutes. Allow students to sort the rubbish into the 5 bins.</p> <p>10-15 Minutes. Class Discussion</p> <ul style="list-style-type: none"> <li>Discuss each team's choices. Why did some rubbish end up in some bins and not others?</li> </ul>		
<b>Extension for Older Students</b>	Ideas for extension students: In cases where teams disagree, open up an impromptu debate about the best option. In some cases, multiple options are viable.		

## The Four Rs Factsheet

It is important that we all help to reduce the amount of waste in our country that enters the environment. There are four actions that individuals can do to help reduce the amount of waste that enters the environment: **Refuse, Reduce, Re-use and Recycle**. We refer to these actions as the 4Rs.

The 4Rs is a way to manage our waste and can be applied to our daily routine in many ways. This is one way that you can help to keep your homes and communities free of waste.

**REFUSE to use or purchase items that you know are bad for the environment and are unnecessary.**

As a consumer you have a lot of power and influence by what you select to buy.

- *Refuse* to buy items with too much packaging
- *Refuse* plastic shopping bags - bring your own reusable bag
- *Refuse* to buy over processed food – whole foods are better, cheaper, often unpackaged and any waste can be composted
- *Refuse* to use items that contain toxic materials if alternatives are available
- *Refuse* to use toxic household cleaners – choose alternatives such as vinegar, lemon juice, and baking soda. Some stores now stock environmentally friendly cleaning products, for example, laundry detergent that has reduced or is phosphate free.
- *Refuse* plastic utensils when buying takeaway - carry your own or use your fingers
- *Refuse* straws.

**REDUCE the amount of waste you create**

When you go shopping, consider how much waste will result from each purchase. We can reduce the amount and type of waste we produce in the following ways:

- *Reduce* your consumption in general ask yourself if you really need what you buy
- *Reduce* your purchase of items that are not recyclable
- Buy quality items that will last a long time – cheaper items will be thrown out much sooner
- Choose products with less packaging or buy in bulk
- Always choose environmentally friendly products when available

**REUSE = use again**

When you wear your older sister's clothes or are given your brother's old bike, you are reusing. Sometimes you can reuse goods in ways different to their original use, for example, used car tyres can be used to flowers in, and old jam jars can be used to store food in the kitchen.

A huge amount of waste that goes to the landfill could have been reused, if not by you, then by someone else.

The following list gives some ideas about how we can reuse items in our daily lives:

- Use both sides of paper to write or print on
- *Reuse* plastic containers and bags
- Consider reusable products when shopping
- Maintain and repair durable products (products that will last) – consider the environmental impact of disposal or producing a replacement when making decisions about the cost of repair etc
- *Reuse* glass jars to store food
- Use reusable shopping bags or local baskets to carry groceries
- Buy used items instead of new ones and save money
- Use old newspaper to clean windows or turn other paper into cool gift wrap
- Sell or donate goods instead of throwing them out
- Borrow or share items that you don't use much
- Use handkerchiefs instead of tissues
- Use cloth diapers or nappies as much as possible, instead of disposable ones

### **RECYCLE whenever possible**

Depending on what country you live in there are probably some products that are recyclable.

- Find out what can be recycled in your area
- *Recycle* everything you are able to
- Purchase items made from recycled materials (look at the labels)
- *Recycle* garden trimmings as compost for your fruit and vegetables
- Ask your politicians why some countries can recycle but yours can't

### **Take the 4Rs challenge!**

We all produce waste and therefore we are all part of the waste problem AND the solution. Of all the environmental issues we face today, waste is one thing that we can all do something about. Waste is OUR responsibility.

The choices we make every day affect the amount and types of waste we produce. When we rethink the way we live, reduce what we buy, reuse things instead of getting new ones, recycle and compost; we not only make less waste, but we also save valuable natural resources and energy, and create less pollution.

Take responsibility for the waste you produce. Make a difference at home, school, and when shopping. It's easy and every little bit helps!

### **At School**

Students can make a difference by working together to manage the waste in and around their school.

Students can:

- Work with teachers to develop a waste system for their class, school, or community.
- Consider how to get other people in the community involved.
- It's better to start small and then expand when you know how to manage the waste problems in or around your school.
- Reuse paper on both sides - establish recycled paper boxes in classrooms and offices.
- Do a waste audit then map where most of the litter is and what it is made of. Consider putting bins in those places and requesting people produce less waste.
- Organise a school litter clean up each week
- Create a compost heap and learn how to manage it
- Put out separate rubbish bins for different kinds of rubbish, for example: organic waste, inorganic waste, recyclable materials.
- Create partnerships with companies that recycle bottles or aluminium cans so that they will collect the recycled materials from your school
- Tell your friends and family members about the 4Rs
- Write letters to people working in waste management requesting them to visit your school and explain how their actions are helping the environment

### **In the village**

People who live in villages can also take action to ensure that all the waste produced in the village and nearby is properly managed.

You can:

- Build a compost pile or banana circle
- Encourage others not to burn their plastic rubbish. If you do need to burn your rubbish, take the plastics out before you start to burn
- Recycle what you can
- Ask your chief and elders to put a taboo or ban on dumping waste in the ocean, streams, in rivers, in mangroves, or in other empty spaces
- Talk about any waste management practices of towns or industries that are situated nearby and discuss the options for reducing this waste. Tell your friends and family that littering isn't cool!

### **When you are shopping**

You, the consumer, have a lot of influence when selecting products which have recyclable or minimal packaging. If good products are not available in your supermarket, ask the shopkeeper to get them in so you can buy them. Here are some ways you can reduce your waste when you go shopping:

- Some supermarkets now stock environmentally friendly cleaning products, for example, laundry detergent that has reduced or is phosphate free
- Use a reusable bag or local basket that is reusable instead of plastic shopping bags
- Talk to your supermarket about selling reusable bags to encourage other people to buy and use these bags
- Reduce the plastic bags for the fruit and vegetable produce. Do you need a bag for every item?
- Buy paper products that are made from recycled paper

## The Four Rs Challenge Game Instructions

1. Ask students to collect the rubbish that would have been thrown out from their home and bring it to the class. Ask them to bring organic and inorganic waste but make sure they do not bring anything dangerous or unhygienic, for example, no dirty nappies! If it is too difficult for students to bring in their waste from home, get waste from the school or nearby village.
2. Organise students into small teams. Provide each team with an equal amount of the waste that was collected by students, and five containers in which to sort the waste. The containers should be labelled: refuse, reduce, reuse, recycle or waste.
3. Explain the rules of the game to players:
  - The object of this challenge is to be the fastest team to sort their rubbish into the categories that they believe the waste fits under. For example, if students have a glass bottle, the need to decide if it will be placed in the refuse, reduce, reuse, recycle or waste containers.







**SPREP**  
Secretariat of the Pacific Regional  
Environment Programme



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## Pacific Waste Curriculum

# UNIT 4: Waste as a Resource

March 2024



This curriculum unit was prepared by:



THE UNIVERSITY OF  
**NEWCASTLE**  
AUSTRALIA



Education

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Learn more about the PacWaste Plus programme by visiting

[www.pacwasteplus.org](http://www.pacwasteplus.org)

## Unit Outline:

Most people don't value waste – that's why they throw it away.

Most things we call waste, and throw into landfill, are not waste – they are things that can be reused, recycled, or repurposed. In other words, they are not waste items but items with a value and a use.

This unit investigates the different ways that waste can have value, and what our students can do to try and make use of waste as a valuable resource.

# Lesson 1: Waste Container Deposit Schemes

Introduction	<p>What some people think is rubbish can be useful to others. Taking these resources out of the waste stream and making them back into something useful is known as recycling. This lesson teaches students about recycling and encourages them to find out about any container deposit schemes that may exist in their local area.</p>		
Ages	8-16	Number of Periods	1
After this lesson	<p>Students will be able to describe what recycling is and how it is beneficial for the world. They will be able to identify what materials can be recycled and will be able to identify any recycling program that exist in their local area.</p>		
<b>Content Focus: Social Studies</b>			
What you Need to Prepare	<ul style="list-style-type: none"> <li>• You may choose to print off a copy of the <b>Factsheet</b> for your students. Alternatively, it could be presented on a screen, or a single copy could be passed around.</li> <li>• Print off a class set of the <b>Container Deposit Schemes Question Sheet</b></li> <li>• You will need to prepare resources so that students can learn about any container deposit schemes that may exist in your local area. This could be a video, they could use laptops or computers if they have access to them, or you could print off some information sheets.</li> </ul>		
Lesson Outline	<p><b>10-15 minutes.</b> Class Discussion:</p> <ul style="list-style-type: none"> <li>• What does recycling mean?</li> <li>• What can and can't be recycled?</li> <li>• Why is it beneficial to recycle?</li> <li>• Can you make any money by recycling?</li> </ul> <p><b>15-20 Minutes-</b> Class Read Through</p> <ul style="list-style-type: none"> <li>• Taking it in turns, instruct the class to read through the material contained in the <b>“Waste as a Resource Factsheet”</b></li> </ul> <p>Distribute the <b>Container Deposit Schemes Question Sheet</b></p> <p><b>10-15 minutes.</b> Class Discussion:</p> <ul style="list-style-type: none"> <li>• How much can get per container?</li> <li>• Do you think you could gather containers in your local area?</li> <li>• Why would people pay for garbage?</li> </ul>		
Extension for Older Students	<p>Older and more advanced students could develop a container collection program at the school, which could be used to help fundraise for the school.</p>		

## **Waste as a Resource: Factsheet**

What some people think is rubbish can be useful to others. Taking these resources out of the waste stream and making them back into something useful is known as recycling.

In a sustainable world, every country would have a great recycling programme. Everything that could be removed from the waste stream would be. Unfortunately, recycling is most effective in countries with bigger populations in companies that can recycle they collected materials. In Pacific Island countries, some countries are too small to support recycling industries.

An alternative is to collect recyclable materials such as cans, bottles, paper, and plastic containers and ship it to the closest country that is able to recycle it into new material. This is also difficult because of the high shipping costs. In the Pacific, some countries have their own systems for ensuring that recyclable materials are not sent to the landfill.

Many Pacific island countries collect aluminium cans to recycle since aluminium is worth more than it costs to recycle. A crusher or Baker is required to flatten the cans into an easy Lee transportable block to make it cheaper to ship overseas (as it takes up less space in the containers when pressed into smaller blocks).

### **Glass**

Glass is a heavy, low valued material that is difficult to handle and expensive to ship. Many pacific island countries reuse glass beer and soft drink bottles. Beer bottles can be used approximately 10 times before disposal to landfills or other reuse/disposal means. After a bottle has been used to its capacity, the glass can then be crushed. Glass crushers crush the glass into gravel or sand size pieces so the material can be used in construction projects as fill or to replace rocks in concrete. Even if glass was crushed prior to landfilling, a lot of space could be saved.

### **Lead acid batteries**

Lead is the valuable but poisonous component in the battery to be recovered through recycling. Batteries can be shipped overseas, whether lead can be recovered and reused. The best form of collection is through a deposit slash refund system. Kiribati has removed a vast number of dangerous batteries from the local environment through a \$5 deposit at import that is mostly refundable on return.

### **Lithium-ion batteries**

Disposal of Lithium-Ion batteries is becoming an increasingly common problem as the number of battery-powered high-tech devices in our lives grows. Lithium-Ion batteries are found in a large range of devices including mobile phone, tablets, laptops, power tools, electric scooters and more. Lithium-Ion batteries contain various valuable metals such as cobalt, nickel, and manganese, which if disposed of properly can be recycled into new batteries. Unfortunately, these metals are toxic, and if the batteries are disposed of in landfill, these metals can leach into nearby water supplies. As well as this, Lithium-Ion batteries are highly flammable, with Lithium-Ion battery fires being very difficult to put out without proper equipment.

## **Paper and cardboard**

Both paper and cardboard are technically easy to recycle, with the material being turned into paper pulp and used to make new paper products. Paper and cardboard require a large machine to compress the material into solid enough blocks to be viable for export. Where there is a large population of paper users such as Fiji, paper recycling works well. Small nations will have difficulty producing enough wastepaper and cardboard to make recycling programmes possible. As paper and cardboard are organic, they can easily be turned into compost, but they have to be ripped into small pieces and mixed with other materials like grass or leaves.

## **Plastic**

The plastic in Pacific waste stream is primarily PET bottles and packaging for food and consumer goods. Plastic containers and bottles are low value for export and are light, so it's difficult to pack enough into a shipping container without expensive equipment. Plastic packaging is lightweight and can blow into streams and the ocean choking animals and fish. The best way to reduce plastic waste is to refuse it (don't buy it in the first place where possible) and use alternatives.

## **Scrap metal recycling**

Scrap metal is one of the most recyclable products as it can be recycled over and over again. By doing this, landfill space is saved, and the world's resources are conserved. The main source of scrap metal for Pacific Island countries is old vehicles, tin cans, and household appliances. Vehicles can be dismantled and many of the parts recycled.

## Container Deposit Schemes Question Sheet

One way the Pacific is working to prevent waste and pollution is through Container Deposit Schemes. Container Deposit Schemes are a recycling scheme that enables people to take glass, aluminium or plastic drink containers to deposit or return points and receive a small amount of cash back per container.



Container Deposit Schemes are part of a waste management strategy to reduce the number of beverage containers that enter the environment, landfill, and oceans of the Pacific region.

**Does your country have a Container Deposit Scheme?**

**Where are the return points?**

**How much can you earn per beverage container?**



# Lesson 2: Caught on Composting

Introduction	Organic waste may be thought of as useless, but it can be a valuable source of nutrients for growing food or other plants. Not only that but sending organic waste to landfill can be more detrimental to the environment, as it can release methane, a potent greenhouse gas. This lesson educates students about the benefits of composting and includes instructions to help the students set up their own compost at home.		
Ages	5-14 years old	Number of Periods	2-3
After this lesson	Students will be able to describe what composting is and how it is beneficial for the world. They will be able to describe how to correctly set up a composting at home.		
<b>Content Focus: Science and Technology</b>			
What you Need to Prepare	<ul style="list-style-type: none"> <li>• You may choose to print off a copy of the <b>Factsheet</b> for your students. Alternatively, it could be presented on a screen, or a single copy could be passed around. Similarly, students could be simply asked to copy the focus questions into their books, or it could be answered through class discussion.</li> <li>• For the <b>Composting at home or school Activity</b>, you will need a compost bin. This could be a purpose bought bin, or any large container with holes in the bottom and a lid would also work.</li> <li>• For the Banana Circle, please see the <b>Banana Circle Instructions</b>.</li> <li>• For the Minicompost activity, each student (or group of students) will need to reuse their own clear plastic bottle. You will also need a range of compostable waste.</li> </ul>		
Lesson Outline	<p><b>10-15 minutes.</b> Class Discussion:</p> <ul style="list-style-type: none"> <li>• Who has a compost bin at home?</li> <li>• What do you put in it?</li> <li>• Why do you put things in compost? Why not just the bin?</li> </ul> <p><b>15-20 Minutes-</b> Class Read Through</p> <ul style="list-style-type: none"> <li>• Taking it in turns, instruct the class to read through the material contained in the <b>“Caught on Composting: Factsheet”</b></li> <li>• Students can answer the Focus questions either in their books, on the fact sheet if it was printed off, or verbally through class discuss. Answers can be found in the <b>“Focus questions Answers”</b></li> <li>• Work through either:  <b>Composting at home or school Activity Instructions</b>  <b>OR</b>  <b>Banana Circle Instructions</b>  <b>OR</b>  <b>Mini Compost in a bottle activity</b>  at school or encourage students to take the instructions home and do it at home.</li> </ul>		
Extension for Older Students	Older and more advanced students could implement a school wide composting program, which in turn could be used to grow food at school.		

## Caught on Composting: Factsheet

### Background information

The amount of waste we produce each year is growing, not just in the Pacific Islands but all around the world.

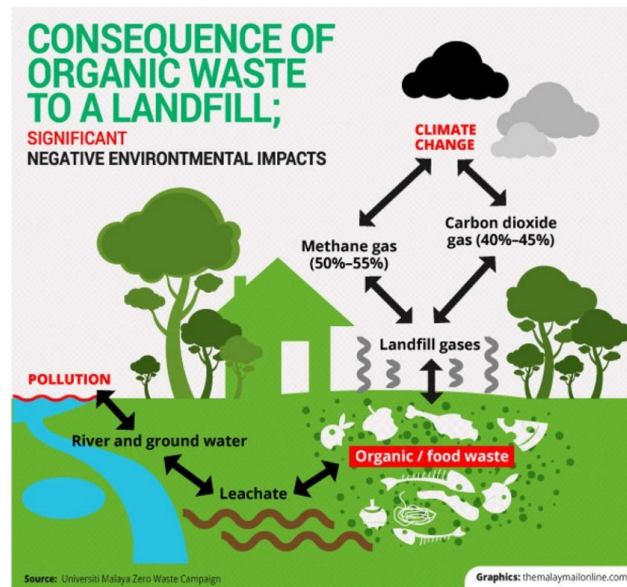
- The average family of 4 people makes enough waste in one year to completely fill a 3-bedroom house from the floor to the ceiling.
- Over half of what you put in your general waste bin is food waste or other organic material that could be composted or fed to your worm farm.
- Households throw away billions of dollars worth of edible food per year. Most of our food waste ends up in landfill. When organic material goes to landfill it generates methane, a really nasty greenhouse gas, 25 times more powerful than carbon dioxide. Local governments have to look at ways of reducing the amount of organic material that goes into landfill so that the amount of methane gas produced can be reduced.

### We can help as well by setting up a compost or worm farm.

- Many people think that sending organic material to landfill is not a problem because it will break down into soil anyway. Sadly, this is not the case as waste buried in landfill is tightly compacted and covered so there is little or no air, and the organisms that break down the food and garden waste need air to survive.

### Focus questions:

1. What is compost?
  
  
  
  
  
  
  
  
  
  
2. Who has a compost in their backyard at home or knows someone who has a backyard compost?
  
  
  
  
  
  
  
  
  
  
3. Why is composting good for the environment?



## Composting With ADAM

There are lots of different ways to compost, just like there are lots of different ways to cook a cake. Composting with **ADAM** is an easy way to compost (see below)

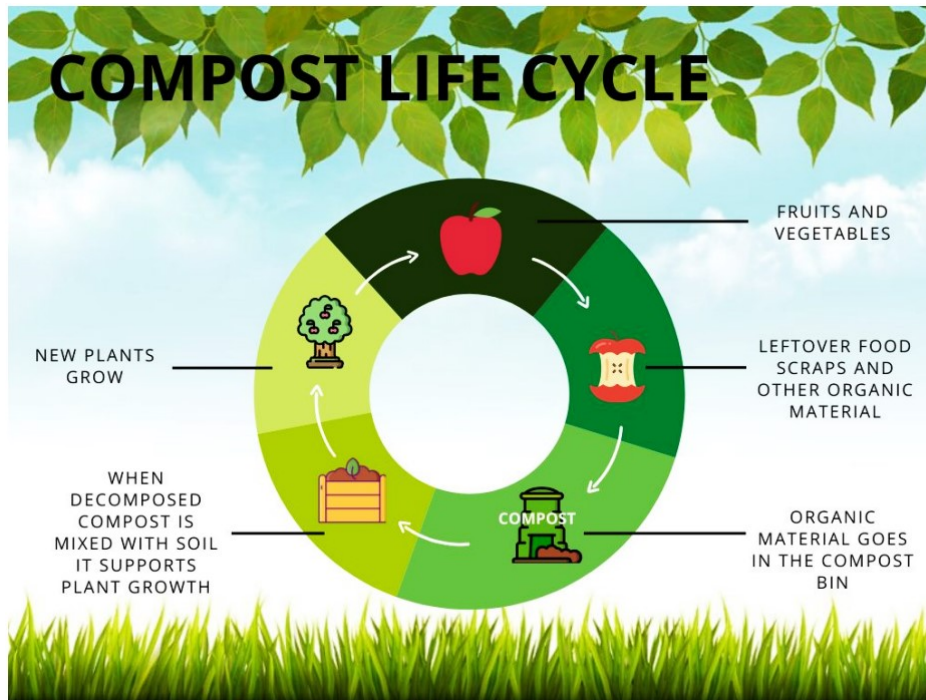
**A – Aliveness** – A compost pile is a living system and home to billions of microorganisms that work to break down and help kitchen and garden waste decompose.

**D – Diversity** – A rich and healthy compost pile needs a diverse range of materials. Make sure you include a mix of green (nitrogen-rich) and brown (carbon-rich) materials. Examples of green materials include – fruit and vegetable scraps, fresh grass clippings, manure, coffee grounds and tea bags. Brown materials include straw and sugarcane mulch, dry leaves and grass, cardboard and paper.

**A – Aeration (or air)** – Good aeration is important in helping waste break down and keep the compost pile smelling sweet rather than stinky. You can help aerate your compost pile by turning it regularly.

**M – Moisture** – Compost needs moisture to help materials break down. You don't want it to be too wet though or it will become smelly. Ideally compost should be as wet as a damp sponge. If you are adding dry material you may need to add additional water.

**If you remember ADAM when you are looking after your compost you will keep your compost healthy and working well.**



## Focus questions Answers

**1. What is compost?** – Compost is made up of dead or broken-down organic material. Organic material is anything that was once living such as leaves, newspaper, cut flowers, lawn clippings etc.

### **2. Why is composting good for the environment?**

Allows us to put our food waste or garden waste to good use; reduces the amount of waste going to landfill and prevents greenhouse gas emissions; helps the soil hold water, which is very important especially during dry times; compost will help replace nutrients in the soil and reduces the need for chemical fertilizers and pesticides; saves money.

## Composting at home or school Activity Instructions

**1. Purchase a compost bin** or make one from recycled materials - a lid is important.

**2. Choose a spot**

- **easy to get to** so that you don't forget to use it;
- **warm** but not too hot in summer and sheltered from the cold in winter. Your compost won't work so hard in winter, which means that the compost food will break down much slower. In summer if you remember ADAM, you should have compost within 4 to 6 weeks;
- **well drained** so water can drain through, and the compost creatures can get in and out.

**3. Adding the compost food:**

- use a layering technique to get the compost started and combine a mixture of **BROWN** and **GREEN** food. (**BROWN** food carbon rich and includes things like brown and dry straw, dry grass, or cardboard. **GREEN** food is nitrogen rich and includes things that are fresh and alive fruit and vegetable scraps, manure, fresh lawn clippings.)
- **3 parts BROWN to 1 part GREEN**. This technique, combined with ADAM will help make sure that your compost breaks down quickly and doesn't get smelly! Keep the layers thin, about the width of a finger is ideal and if you break up any large pieces of food as your compost will be ready much quicker.

**First layer** – BROWN. An ideal first layer is a coarse material such as small twigs. This will help with the circulation.

**Second and third layer** – BROWN. Dry straw, grass, leaves or dead flowers.

**Add some water along the way.**

**Fourth layer** – GREEN. Fresh fruit or vegetable scraps, grass or garden clippings.

**Fifth, Sixth and Seventh layer** – BROWN.

**Eighth layer** if you keep going this far – GREEN.

**Finish** with a layer of thick, wet newspaper that will help keep your compost moist. You can add a final cover of some sort of natural fiber such as hessian sack or carpet underfelt to your compost to help keep the air circulating.

## Banana Circle Instructions

Making a Banana Circle is an easy way to reduce our waste at home. The Banana Circle is a shallow pit or pile and filled with any organic waste that is available. Bananas are planted around the waste pile; the roots grow and feed on the naturally composting organic waste, and the banana trees become strong and healthy and produce lots of fruit. Some people pipe their wastewater from their kitchen and washing onto the pile. These speeds up the composting, and helps the bananas, and treats wastewater at the same time. Other plants can be used instead of bananas depending on what you can grow in your country.

**Materials:** Cardboard, yard waste, organic household waste, water.

### What to do:

**Step 1: The Pit:** Dig a shallow round hole about two meters across

**Step 2: Add cardboard:** Line the hole with flattened cardboard or newspaper. These create a mat of roots to catch and hold water that runs through the waste.

**Step 3: Pile up wastes:** Fill the hole with organic material (leaves, palm fronds, etc.) to about one meter high, and wet it with several buckets of water to start. Spread some soil over the pile to get the composting started.

**Step 4: Plant Banana Suckers:** Plant four banana plants around the edge and water them! it will be a few weeks before the compost heap can start feeding the plants.

**Step 5: Maintain your Banana Circle:** Add organic waste everyday, including left over food scraps and yard wastes. NEVER put meat or fish waste on the banana circle, but animal manure is ok! Cover any food or manure with soil or other green waste to make sure there are no flies. Use water from your kitchen or shower to water the banana circle.

### Reflections

- How useful do you think Banana Circles would be in your community or other rural communities?
- How do you think communities could benefit from knowledge about how to make a Banana Circle?
- How long do you think you should use a Banana Circle before making a new one?
- How do you think the food crops grown from a Banana Circle would compare to ordinary crops?

Now that you know more about Banana Circles and their advantages, what will you do with this knowledge? Participants could start a Banana Circle in their own household. Alternatively, they could train other people in their community to make Banana Circles.

## Mini Compost in a bottle activity:

This is an activity to do with students that demonstrates the process of ADAM composting in a bottle. After mastering this, making a compost at home or at school will be easier.

1. Ask each student to bring to school a clear plastic bottle (no bigger than 1.25 litres) with a lid to reuse as a small compost.
2. Cut around the top of each soft drink bottle, leaving it hinged.



3. You will also need 5 buckets to put compost food ingredients in and a water spray so that the students can add water.
4. Put compost food in each bucket, 3 buckets of brown waste and 1 bucket of green waste.
5. Fill the spray bottle with water.
6. Put newspaper in the final bucket.
7. Ask students to start at the opposite end to the newspaper bucket and fill their bottles with layers of ingredients, making sure that they break up any larger pieces.
8. Students add 1 spray of water between each bucket. Remind them that the food should be moist, not wet.
9. Seal the bottle with tape. Make sure it is sealed well because students will need to shake the bottle to make sure air is circulated throughout the compost food.
10. Ask students to mark on the bottle where the top layer of compost food finishes and to write their name so that everyone knows which compost belongs to them.
11. Ask students to think about where to keep their compost bottles. The window sill is a good spot.
12. Remind students about **ADAM** and check that you haven't forgotten anything
13. Observe as compost food breaks down and take note of how long the process takes. To add some variety to the process, change the conditions in the compost bottles to see what difference it makes to the breaking down process: ask some students to add a worm to their compost; some students could leave the lid off and let their compost dry out and others could make the ingredients too wet.

# Lesson 3: Make a Worm Farm

<b>Introduction</b>	A compost is probably the most common way people think of more effectively disposing of organic waste, but there are a range of related options. Another method that is easy to implement is a Worm Farm. This lesson educates students about the important role that worms have in our ecosystem and includes instructions to help the students set up their own worm farm at home.		
<b>Ages</b>	5-14 years old	<b>Number of Periods</b>	2-3
<b>After this lesson</b>	Students will be able to describe the importance of worms. They will be able to describe how to correctly set up a composting at home.		
<b>Content Focus: Science and Technology</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• You may choose to print off a copy of the <b>Factsheet</b> for your students. Alternatively, it could be presented on a screen, or a single copy could be passed around.</li> <li>• First aid kit, sunscreen, protective footwear, allergy plans</li> <li>• Hard plastic (or wood) box (option: two stackable boxes)</li> <li>• Scissors or screwdriver to create a hole in the box</li> <li>• Gravel or small rocks (enough to fill in the bottom layer of the box)</li> <li>• Geotextile fabric or fly wire and hessian fabric (enough for one layer)</li> <li>• Garden soil mixed with organic matter such as compost and coconut fibre or both (enough for one layer)</li> <li>• Composting earthworms, including castings (buy, or ask a friend)</li> <li>• Straw mulch – sugar cane or lucerne</li> <li>• Lime or dolomite</li> <li>• An available water source, watering cans</li> <li>• Bucket for collecting ‘worm wee’</li> <li>• Food scraps</li> <li>• Old house bricks (approximately 4 bricks)</li> </ul>		
<b>Lesson Outline</b>	<p><b>10-15 minutes.</b> Class Discussion:</p> <ul style="list-style-type: none"> <li>• Why are worms good? Why do we want them in our soil?</li> <li>• What do worms eat?</li> <li>• Emphasise that a worm farm is a different option to a compost.</li> </ul> <p><b>15-20 Minutes-</b> Class Read Through</p> <ul style="list-style-type: none"> <li>• Taking it in turns, instruct the class to read through the material contained in the “<b>Worm Farm: Factsheet</b>”</li> <li>• Work through the <b>Create your Own Worm farm Instructions</b> at school or encourage students to take the instructions home and do it at home.</li> </ul>		
<b>Extension for Older Students</b>	Similarly to <b>Lesson 2: Caught on Composting</b> the older and more advanced students could implement a school wide worm farm program, which in turn could be used to grow food at school.		





## **Worm Farm: Factsheet**

- There are about 4,000 species of worms known worldwide. There are many more in our oceans.
- Worms are among the most ancient of terrestrial animal groups. They play a vital role in the formation and maintenance of fertile soils and are thus essential for primary production.
- In an area the size of a football field there can be over a million earthworms.
- Worms cannot hear, but they can feel the vibrations of animals moving nearby.
- Worms are hermaphrodites. Each worm has both male and female organs.
- Worms can eat half their weight each day. They possess very strong mouth muscles, but they do not have teeth. Some worms can eat their weight in a day.
- Worms have up to 5 hearts, yet no lungs or eyes.
- Under favourable conditions, mature worms will produce egg capsules every 7 to 10 days.
- Each egg capsule contains from 2-20 baby worms.
- The Australian Gippsland Earthworm is the biggest worm. It grows to 4 metres and can weigh 3/4 kilo.
- The largest earthworm ever found was in South Africa and measured more than the length of a cricket pitch from its nose to the tip of its tail.

### **Vermiculture (Worm Farming)**

- Vermiculture or worm farming is an environmentally friendly, cost-effective method of removing urban waste and converting it into a valuable resource.
- Waste from our large cities can be fed to worms and who convert it into a natural fertiliser – vermicast - that can then be used by farmers.
- Vermicast contains millions of beneficial microbes that restore life to dying soils and help farmers to grow more crops and to use fewer chemicals.

Worms - nature's perfect recyclers - can help to solve three great problems facing the world:

1. Safe disposal of rubbish
2. Restoration of dying soils
3. Reduction in the use of chemical fertilisers

## Create your Own Worm Farm Instructions

### Checklist:

- First aid kit, sunscreen, protective footwear, allergy plans
- Hard plastic (or wood) box (option: two stackable boxes)
- Scissors or screwdriver to create a hole in the box
- Gravel or small rocks (enough to fill in the bottom layer of the box)
- Geotextile fabric or fly wire and hessian fabric (enough for one layer)
- Garden soil mixed with organic matter such as compost and coconut fibre or both (enough for one layer)
- Composting earthworms, including castings (buy, or ask a friend)
- Straw mulch – sugar cane or lucerne
- Lime or dolomite
- An available water source, watering cans
- Bucket for collecting 'worm wee'
- Food scraps
- Old house bricks (approximately 4 bricks)
- Pencils (optional)
- Clipboards (optional)

### Instructions

#### STEP 1

On one side (use the smallest side) of your box, carefully cut or drill some holes in the bottom of your box. This will form the drainage so our worms don't drown. If you have stackable boxes, cut the holes in one box and it can drain into the other!



To further assist with drainage, place the gravel or small rocks over the base of your polystyrene box. Next, place your geotextile fabric or fly wire and hessian over the rocks.



## STEP 2

- Add bedding materials for the worms- this may be garden soil mixed with organic matter such as compost and coconut fibre.
- Water this layer.
- Add a layer of composting earthworms to the bedding. The worms will congregate in the scraps or tunnel beneath the surface.
- Add an insulation of damp straw mulch on top of this layer.
- Water this layer to moisten.
- Make sure you have a bucket to catch the 'worm wee' coming out of the garden hose/pipe. This liquid gold 'worm wee' would be good to irrigate your existing garden beds.
- Place the lid on your box. Make sure you place a couple of aeration holes on the lid.

Find a nice shady place for your worm farm. Rest your worm farm on bricks.



### STEP 3

Now that your worm farm has been built, it can be good to wait a couple of weeks before feeding your worms with food scraps.

Ensure that your worm farm is kept moist, about the consistency of a wet sponge.

In the meantime, discuss what type of food scraps your worms would enjoy. What is good for them? Why?

Complete the activity sheet to create a poster to raise awareness of your worm farm and the food scraps that you are collecting!



#### **STEP 4**

After a couple of weeks, add small pieces of food scraps in heaps on areas of the bedding surface.

To maintain your worm farm, you will need to:

- Ensure that citrus peel, onions, garlic, and artichokes are NOT given to the worms.
- Ensure that the bedding remains a neutral environment, around pH 7. Sprinkling the surface with lime or dolomite will help keep the pH neutral.
- Keep the worm farm in a cool well-protected shady place, this can be either inside or outside.





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This initiative is supported by **PacWastePlus**-a 85 month project funded by the European Union (EU) and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to **sustainably and cost effectively improve regional management of waste and pollution.**

## Pacific Waste Curriculum

# UNIT 5: Waste at School



March 2024



This curriculum unit was prepared by:



THE UNIVERSITY OF  
**NEWCASTLE**  
AUSTRALIA



Education

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# Unit Outline:

This unit acts as an integrated way to investigate waste in the school environment, and then encourages students to enact change to improve the situation. In doing so, it requires students to combine knowledge across different subjects to investigate, plan, and then implement changes. The suggested subjects that could be included as part of this unit include:

## Mathematics

Waste audits require students to work mathematically in collecting, analysing and representing data. Students measure mass and volume and use multiplication and division to analyse data.

## English

Students use literacy skills in interviewing, collaborating, and communicating proposed waste reduction strategies.

## Geography

Investigations into managing waste sustainably uses geographical inquiry skills in support of the Geography Syllabus

## Science and Technology

Investigating sustainable resources in design and production processes supports learning in the Science and Technology Syllabus.

## PDHPE

Undertaking personal actions that reduce waste such as not littering, recycling, bringing low waste lunches and re-usable containers are actions that contribute to healthy and safe lifestyles and communities.

# Lesson 1: School Waste Audit

<b>Introduction</b>	A waste audit tells us the quantity and types of waste generated in a school. This can lead to developing strategies to reduce waste sent to landfill, such as increased recycling. A hands-on waste audit is a memorable experience that links across key learning with students developing skills in:		
<b>Ages</b>	8-18 years old	<b>Number of Periods</b>	2-3
<b>After this lesson</b>	Students will understand what different types of waste are created at the school.		
<b>Content Focus: Mathematics</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• Scales</li> <li>• Kitchen tongs</li> <li>• Gloves</li> <li>• Labelled sorting buckets</li> <li>• Large tarpaulin or ground sheet</li> <li>• Data recording sheet</li> <li>• Clipboard and pencil</li> <li>• Contact cleaners and ask that garbage from the day before the audit be saved and labelled with the location it was collected from.</li> <li>• Print off a set of the “<b>Waste Audit Recording Sheets</b>” for the students to record their results on.</li> </ul>		
<b>Lesson Outline</b>	<p>5-10 Minutes-Class discussion:</p> <ul style="list-style-type: none"> <li>• What types of waste do we think the school produces?</li> <li>• Are some types of waste preferable to others?</li> <li>• Why is it important to do a waste audit before trying to improve the waste generated by the school?</li> </ul> <p>Follow <b>Waste Audit Instructions</b> for detailed instructions.</p> <p>Follow up discussion:</p> <ul style="list-style-type: none"> <li>• Ask students what waste items they think the school has the biggest problems with.</li> <li>• Ask students how they think they could have the biggest impact on reducing the amount of waste that ends up in landfill?</li> <li>• Discuss more sustainable alternatives to some of the common waste items found.</li> </ul>		
<b>Extension for Older Students</b>	For more advanced students, consider getting them to make their own cards to look at the life cycle of other products. E.g. mobile phones, plastic water bottles, tinned food.		

## Waste Audit Factsheet and Instructions

### Why do a waste audit?

A waste audit tells us the quantity and types of waste generated in a school. This can lead to developing strategies to reduce waste sent to landfill, such as increased recycling. A hands-on waste audit is a memorable experience that links across key learning with students developing skills in:

- numeracy – measuring, charting, costing
- literacy – discussing, presenting, reporting
- working scientifically – planning and conducting investigations, processing and analysing data
- design and production – problem solving, planning and implementing

- geographical inquiry – acquiring, processing, communicating geographical information
- personal and social capability – self-management, collaborating

### **Benefits of reducing waste**

Reducing waste is a simple way of making our resources last longer. New landfill sites are hard to find and transporting waste is costly. Schools can save money by reducing the number of skip bins of waste that they send to landfill.

### **Planning to reduce waste**

The hands-on waste auditing experience is an effective way of raising awareness of waste issues. In addition to a waste audit, surveys can be used to ascertain people's attitudes and behaviours to school waste management, which will be covered in **Lesson 2**.

Procedure for reducing waste:

1. Conduct a waste audit to measure how much and what types of waste are generated by your school.
2. Analyse the waste audit results.
3. Survey school staff and students to ascertain attitudes and behaviours to waste.
4. Research and discuss ways of reducing waste.
5. Prepare a brief report on waste at your school and include proposals for improvements and proposed waste reduction targets.
6. Present the report to the school environment committee, student representative council or to the school executive.
7. Seek approval from the principal to approve waste reduction strategies and targets.
8. Implement strategies to meet targets.
9. Evaluate the implementation through the conduct of another audit

### **Preparing for a waste audit**

1. Make prior arrangements with cleaners to collect the waste from a day before the audit in labelled garbage bags. Make sure waste from different areas such as playground, classrooms, offices and the canteen are kept in separate bags and labelled as such. Don't choose to do the audit on a Monday because waste would have to be kept over the weekend. Choose a typical day, not one when a year group is away on excursion. Provide marker pens and labels. In a large school consider sampling waste, for instance, only take waste from half the rooms and playground.
2. Store the bags near where you will be sorting and weighing during the audit. This location should be comfortable, sheltered and fairly close to the skip bin pick-up site.

3. Arrange for a number of class groups to participate, for example, one class at a time for about 30 to 40 minutes.

### Equipment list

- Scales
- Kitchen tongs
- Gloves
- Labelled sorting buckets
  - **office white paper** – office paper, photocopies on white paper
  - **recyclable paper and cardboard** – newspapers, magazines, paper bags, coloured paper
  - **compostable organic waste** – fruit and vegetable scraps, tea bags, lawn clippings
  - **recyclable containers** – plastic containers, PET bottles, metal cans such as aluminium or steel cans, glass bottles (you will need to be aware of what can or cannot be recycled in your community)
  - **mixed waste (non-recyclable)** – chip packets, plastic lunch wrap, dust, drink poppers, straws, styrofoam cups, takeaway coffee cups.organic waste; metals; paper; plastics
- Large tarpaulin or ground sheet
- Data recording sheet
- Clipboard and pencil

Figure 1 – secondary students sorting waste into labelled buckets



Image: Rumbalara Environmental Education Centre

### Conducting a waste audit

Thorough preparation enables a waste audit to run smoothly. It is recommended that one class size (approx 30 or less) undertake an audit at a time, for 30 to 40 minutes each.

1. Prepare the sorting area by:

- laying out one or more tarpaulins, each approximately 3 metres by 3 metres
- placing labelled sorting buckets around the tarpaulins

Figure 2 – tarpaulin and labelled buckets set up for sorting waste



Image: Rumbalara Environmental Education Centre

2. Prepare the weighing and recording area by:

- setting up a desk for the scales and chairs for the recorders
- printing the waste recording sheets and attaching to clipboards

Figure 3 – suggested set up of the weighing and recording area



Image: Rumbalara Environmental Education Centre

3. When the class arrives explain the:
  - purpose of the waste audit
  - procedure of the audit
  - categories of waste
4. Demonstrate the waste audit process to the students:
  - empty a bag of rubbish onto the ground sheet
  - sort individual items of rubbish into the buckets using gloved hands and tongs
  - ensure students understand each of the categories
5. Categories of waste for the purpose of the waste audit:
  - office white paper – office paper, photocopies on white paper
  - recyclable paper and cardboard – newspapers, magazines, paper bags, coloured paper
  - compostable organic waste – fruit and vegetable scraps, tea bags, lawn clippings
  - recyclable containers – plastic containers, PET bottles, metal cans such as aluminium or steel cans, glass bottles
  - mixed waste (non-recyclable) – chip packets, plastic lunch wrap, dust, drink poppers, straws, styrofoam cups, takeaway coffee cups
6. Explain health and safety precautions.
7. Allocate equipment and jobs:
  - two recorders
  - two weighers
  - four carriers
  - sorters – remainder of students
8. Carriers:
  - bring the bags of waste to be sorted
  - ensure that waste from different collection areas doesn't get mixed
  - take the sorting buckets to be weighed
  - tell the recorders where the waste came from, for example, the playground
  - take waste to the skip bin after weighing and return promptly to the sorting area
9. Weighers:
  - weigh each bucket of waste and provide a net weight (contents only) to the recorders
  - provide a volume estimate to the recorders. Note: Waste should be measured by both weight and volume. Volumes relate to the number of skip bins for which the school pays. Volume is recorded in litres and is the capacity of the container
10. Recorders:
  - sit or stand near the weigher and makes sure all results get recorded
  - record quantities on the waste audit recording tables

# Waste Audit Recording Sheet

**Table 1: Volume of waste** (Use tally marks to record the number of containers of each type of waste.)

Location	Volume of each container (litres)	Office white paper	Recyclable paper and cardboard	Organic waste (compostable)	Recyclable containers	Mixed waste (non-recyclable)
		Tally total	Tally total	Tally total	Tally total	Tally total

**Table 2: Weight of waste** (Use table 2 to record the weight of each type of waste collected. Record in kilograms (kgs))

Location	Office white paper	Recyclable paper and cardboard	Organic waste (compostable)	Recyclable containers	Mixed waste (non-recyclable)
	Total	Total	Total	Total	Total

## Lesson 2: School Survey

<b>Introduction</b>	In this lesson, students will survey many members of the school community including the principal, teachers, executive staff, and students, in order to gain information regarding waste production at the school. This information can then be used to complement the information gathered as part of the waste audit in order to inform the areas to target with the Waste Action Plan in Lesson 3.		
<b>Ages</b>	8-18 years old	<b>Number of Periods</b>	2-3
<b>After this lesson</b>	Students will have a deeper understanding of what different types of waste are created at the school.		
<b>Content Focus: Social Studies, Mathematics</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>● Clipboards, paper and pencils</li> </ul>		
<b>Lesson Outline</b>	<p><b>5-10 Minutes-Class discussion:</b></p> <ul style="list-style-type: none"> <li>● What types of waste do we think the school produces?</li> <li>● Are some types of waste preferable to others?</li> <li>● In order to get more information aside from the waste audit, we will be interviewing people around the school to better understand the school’s waste.</li> </ul> <p>Divide the class up into groups or 2-3. Assign a different person or people for each group to interview from the list below:</p> <ul style="list-style-type: none"> <li>● Principal or Executive Staff</li> <li>● Administrative staff (office staff)</li> <li>● Teachers</li> <li>● Technology Advisor</li> <li>● Students</li> <li>● Cleaner</li> <li>● General Assistant</li> <li>● Canteen supervisor.</li> </ul> <p>Encourage students to develop their question, using the list from the “<b>Question List</b>” as guidance. Students then go out and perform interviews,</p> <p>Gather students after interview, compile information into the <b>Interview Summary Sheet</b>.</p> <p><b>Discussion Questions</b></p> <ul style="list-style-type: none"> <li>● Are there enough garbage bins around the school? Are they in the best places</li> <li>● Are there enough recycling bins and are they in good places?</li> <li>● What were the main suggestions to improve recycling in the school?</li> <li>● What were the main suggestions to reduce waste in the school?</li> </ul>		
<b>Extension for Older Students</b>	Use summary tables, mind maps and other graphic organiser to organise, categorise and represent the data gathered through the interviews. Analyse the data looking for patterns and trends. Compile suggestions for improved waste management and recycling systems.		



# School Survey Question List

## Principal or executive staff

- Are you satisfied with the school's current waste disposal procedures?
- Is the school's waste management cost-effective?
- Do school waste management decisions consider environmental sustainability?
- Is educating students about waste management important in the school?
- Does the school have any policies or procedures for reducing waste, for example, low waste lunches?
- Can you suggest ways of reducing waste at school?

## Administration staff

- Are printers set to print on double-sided mode?
- Does the school purchase recycled copy paper? If so, what percentage recycled content? If not, why not?
- Is there a system to recycle office white paper?
- Is there a system for recycling cardboard and coloured paper?
- Is there a system for recycling used ink cartridges?
- Can you suggest a better method for recycling waste at school?

## Teachers

- How do students best learn to reduce waste?
- Is there a system to collect for recycling all office white paper in the classroom?
- Do you re-use one-sided copy paper?
- Is there a problem with litter in the school playground?
- Are there enough bins in the school and are they in appropriate locations?
- Can you suggest better methods for recycling waste at school?
- Are there any good reasons for not recycling waste at school?
- Can you suggest ways of reducing waste at school?

## Technology advisor

- Are printers set to print on double-sided mode?
- Do you re-use one-sided copy paper?
- Is there a system to collect for recycling all office white paper?
- Is there a system for recycling used ink cartridges?
- Is there a system for recycling old mobile phones?
- How does the school dispose of old computers?
- When purchasing new computers is preference given to companies that take back old computers?
- Can you suggest a better method for recycling e-waste at school?

## **Students**

- Is there a problem with litter in our school playground?
- Are there enough bins in the playground and are they in the most appropriate locations?
- Do you, or would you, assist with any recycling systems in the school, for example, emptying class recycling bins?
- What is being recycled at school?
- What do you recycle at home?
- Can you suggest a better method for recycling waste at school?

## **Cleaner**

- Where in the school are the areas with the most litter?
- What items present the greatest litter problem?
- Is there a problem with pests, for example, birds, rats or other animals?
- Are there enough bins in the school and are they in the most appropriate locations?
- Is there a system for recycling cardboard boxes?
- Can you suggest a better method for recycling waste at school?

## **General assistant**

- How do you dispose of garden waste?
- Is there a problem with litter thrown on the ground?
- Are there enough bins in the school and are they in the most appropriate locations?
- Are there opportunities for more recycling at school? If so, what and how?
- How do you dispose of toxic waste, for example, old paint tins and chemicals?
- What happens with old school furniture?

## **Canteen supervisor**

- Is there a system for recycling cardboard boxes?
- How do you dispose of fruit and vegetable scraps?
- Is there a system for recycling cans and PET bottles?
- How is food wrapped, in plastic or paper?
- Are there any purchasing policies regarding low waste products?

## Interview Summary Sheet

Waste Type	Is it recycled?	What organisation collects it or could collect it?	Annual cost of collection
Office white paper			
Recyclable paper and cardboard			
Organic Waste (compostable_			
Garden Waste			
Recyclable containers			
E-waste (computers)			
Ink and toner cartridges			
Mobile phones			

# Lesson 3: School Waste Action Plan

<b>Introduction</b>	In this lesson, students will combine the knowledge that they gained from the previous two lessons and develop an action plan to help reduce waste in their school.		
<b>Ages</b>	10-18 years old	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will have felt a sense of contribution to reducing the waste problem in a setting that is deeply familiar to them.		
<b>Content Focus: Social Studies,</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• Paper and pencils</li> </ul>		
<b>Lesson Outline</b>	<ul style="list-style-type: none"> <li>• If students have not completed Lesson 1 and 2 from this Unit, students are asked to brainstorm the biggest waste problems that they have at the school.</li> <li>• Once these problems have been identified then they are written up on a whiteboard.</li> <li>• If students have done Lesson 1 and 2 from this unit, revisit the list of waste problems at the school. If necessary, choose 2 or 3 of the problems to focus on. Choice should focus on the problems that if solved would make the biggest impact on reducing waste to landfill, or the ones that are the easiest to solve at the school.</li> </ul> <p>Work through with students the instructions given in <b>School waste action plan Instructions</b></p>		
<b>Extension for Older Students</b>	<p>This activity can be extended or reduced in complexity by changing the number of issues that can be addressed by the action plan.</p> <p>As a simpler alternative, instead of developing an action plan, students could develop a Waste Warrior Mascot following the instructions laid out in <b>Waste Warrior Instructions</b>.</p>		

## School waste action plan Instructions

Discuss the results of the waste audit and interviews and identify potential challenges. Use brainstorming and research to come up with ways of reducing waste guided by the 5Rs: rethink, refuse, reduce, reuse, recycle. Work collaboratively to agree on solutions and waste reduction targets. Consider other advantages of improved school waste management, for example, fewer pest species, helping the community reduce waste sent to landfill and conserving resources. Use the format given in the **school waste action plan template** to develop a school waste action plan. Present the plan to the school using a suitable format – for example - addressing school assembly; digital format such as PowerPoint or Keynote slides; creatively through the arts such as a dramatic play or sculpture.

## Waste action plan contents

### Waste facts

- State the problems with not managing waste sustainably, for example, toxicity and limited availability of landfill sites, the waste of energy and resources when recyclable items are sent to landfill.
- Provide some general facts about waste generation and disposal in your community/country/Pacific Islands

### Recycling facts

- List and illustrate what waste streams or items can be recycled.
- List and illustrate what items can't be recycled

### Waste audit results

- State the total volume of waste generated by the school over a year.
- State the volume of waste generated per person at school per school year.
- Include a pie graph representing the percentage of total waste of each of the school's waste streams.
- Include a column graph representing the annual disposal costs of each of the school's waste streams. Provide an estimate of the savings if waste was diverted from landfill.
- List what waste streams or items are currently being recycled at school

### Interview results

- Provide key comments from people interviewed about waste.
- List suggestions made by interviewees on school waste management.

### **Our waste reduction ideas and targets**

- List the main issues identified through the waste audit and interviews.
- List the proposed solutions, for example:
  - introduction of drink container recycling for fundraising through the Return and Earn scheme
  - each year group to have a worm farm for organic waste
  - improve recycling of office white paper
  - introduction of waste mobile phone collection for recycling
- State the approved annual waste targets, for example:
  - recycle 100% of office white paper
  - 20% reduction in mixed waste sent to landfill

# School waste action plan template

## School Waste Management Action Plan

**WHAT:**

**WHY:**

- 1.
- 2.

**WHO:**

- 1.
- 2.
- 3.

**HOW:**

- 1.
- 2.
- 3.

## Waste Warrior Instructions

There are many waste and pollution problems in the Pacific but not everyone will have the same motivation or ideas to help solve the problem. It is important to understand that people will support changes (such as banning single-use plastics) and others will resist change. The aim of this lesson is to get students to design a 'waste warrior' campaign that will appeal to their diverse student population.

### Why is change difficult?

Look for examples of how things have changed e.g., mobile phones. Show pictures and talk about process of change from only a very few people owning mobile phones to now nearly everyone owning phones.

Use an example of a movie – If only one person tells you about a movie do you go and see it? If nearly everyone you talk to tells you about the same movie, are you more likely to go and see it?

Change takes time, but the more people that change, the easier it is to get others to change too.

**CREATE your own waste warrior identity your school will love, so people can't resist wanting to join in.**



- Write down all the things your campaign stands for, use a Thesaurus and look for more words that describe what your campaign stands for
- Choose two independently great things and put them together e.g. STRAWkelling (combining picking up littered straws and snorkelling)
- Choose a name that rhymes - "Good for the Hood" "Take 3 for the Sea"
- Choose a name with similar starting sounds (alliteration) - "Seaside Scavenge" "Trashless Takeaway"
- Use your community as part of your identity "So Suva" "Plastic Free Pacific"
- Go for a pun "The Last Straw" or keep it positive "Keep Samoa Beautiful"



# Lesson 4: A Low Waste Lunch

<b>Introduction</b>	Low Waste Lunches are a great way to get young people to begin to think about “Rubbish” or “Waste” and what they are throwing in the bin. In this lesson, students will consider their own lunch box, and examine whether there are steps they could take to reduce the amount of waste it produces.		
<b>Ages</b>	5-12 years old	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will gain an appreciation that their own actions can reduce the amount of waste produced.		
<b>Content Focus: Social Studies</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>Two lunch boxes. The contents are given in <b>Low Waste Lunch Instructions</b></li> </ul>		
<b>Lesson Outline</b>	<p><b>10-15 Minutes, Class Discussion</b></p> <ul style="list-style-type: none"> <li>What is in their lunch box right now?</li> <li>When they’ve eaten their food, how much goes in the bin after?</li> <li>Can we improve on this?</li> </ul> <p><b>10-15 Minutes.</b></p> <ul style="list-style-type: none"> <li>Show the students the two lunch boxes described in <b>Low Waste Lunch Instructions</b>.</li> <li>Get the students to count how many items are thrown out after both meals are eaten.</li> <li>Discuss with the students the types of things they can do to reduce the amount of waste in their lunch. Use the <b>Low Waste Lunch Instructions</b> for a list of things to avoid and use to produce a low waste lunch.</li> </ul>		
<b>Extension for Older Students</b>	This activity can be extended or reduced in complexity by changing the number of issues that can be addressed by the action plan.		

## Low Waste Lunch Instructions

**Background Information:** “Rubbish” is made from valuable resources, for example paper is made from trees, plastics are made from crude oil, coal and natural gas. It takes a lot of water, raw materials and energy to make “Rubbish”, so it’s important to try and REFUSE, REDUCE, REUSE and RECYCLE wherever possible. All of us throw things out every day without considering the environmental impact of what we are doing. Packing a low waste lunch is easy.

Here’s how.....

### Low Waste Lunches to AVOID (REFUSE):

- Plastic wrap and foil
- Disposable items like plates knives and forks
- Paper lunch wrap
- “Gimmicky” packaged items e.g. chips, biscuits, small yoghurts, individually wrapped serves of food

### Low Waste Lunches REUSE:

- Use re-useable containers that can be washed out
- Use a re-usable drink bottle which can be used many times
- Use recyclable and/or compostable packaging over disposable packaging (e.g. Plastic wrap)
- Cheese and biscuits or yoghurt which are taken from larger containers and repacked into a re-useable smaller container will avoid extra packaging waste and ensure that your child can reseal the food if needed are often much healthier. They can encourage children to eat more fresh food packed in suitable quantities, instead of eating “gimmicky” snack foods

### Activity: A Low Waste Lunch Comparison

Teacher to bring in two lunch boxes with different items based on the two lunch boxes below and compare the lunch boxes in a class discussion.

Lunch Box 1: Low waste lunch	Lunch Box 2: Waste-ful lunch
Sandwich (cloth serviette/reusable container)	Sandwich (wrapped in plastic wrap)
Yoghurt (from 2 kg tub in re-useable container)	Yoghurt (60g disposable container)
Sultanas (from 250g packet in re-useable container)	Sultanas (15g disposable box)
Piece of fruit/cut up (scraps can go in the compost or worm farm)	Packet of chips/muesli bar (in non-recyclable packaging)
Cheese & Crackers (in re-useable container)	Cheese & Crackers (individual serve in disposable container)
Juice or water (In a re-useable drink bottle)	Popper style drink (125ml disposable pack)
<b>What do you throw out?</b>	

<b>Lunch Box 1: Low waste lunch</b>	<b>Lunch Box 2: Waste-ful lunch</b>
10 items, nothing thrown out! All containers are taken home and washed	10 items, throw out...plastic wrap, yoghurt container, sultana box, chip packet and muesli packer, plastic individual serve pack, popper pack.
* As well as minimising waste, the low waste lunch option costs less because items are bought in larger (bulk) quantities rather than individual serves.	





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# Pacific Waste Curriculum

## UNIT 6: E-Waste



March 2024



This curriculum unit was prepared by:



THE UNIVERSITY OF  
**NEWCASTLE**  
AUSTRALIA



**Dorroughby**  
Environmental Education Centre



NSW  
Education

**EZEC**  
Environmental and Zoo Education Centres



**NSW**  
GOVERNMENT

Education

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## **Unit Outline:**

E-Waste is a term used to describe any kind of electrical product that has reached the end of its life and become waste. This includes such products as mobile phones, computers, tablets and other similar high-tech devices, but also includes appliances such as fridges, microwaves, TVs, and so on.

With the increased marketing of electronic devices as consumer devices that are designed to be replaced every few years, e-waste is becoming a significant waste concern.

This unit will inform students about the nature of e-waste, and what can be done to reduce the impact of it.

# Lesson 1: E-Waste Warrior

<b>Introduction</b>	<b>This lesson will inform students where our electronic waste goes and how we can dispose of it more mindfully. They will participate in a hot seat role play and create a TV ad to educate other teens on mindful disposal of mobile phones, batteries, computers and old electronic waste.</b>		
<b>Ages</b>	8-18 years old	<b>Number of Periods</b>	1-2
<b>After this lesson</b>	Students will be able to identify some of the many materials that go into technological devices such as mobile phones. They will be able to describe problem associate with incorrect disposal of mobile phones and what can be done to prevent that.		
<b>Content Focus: Mathematics, Science and Technology, English</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• Print off one per group of 4-5 students either the <b>Phone facts for Primary School OR Phone facts for High School</b></li> <li>• Print off one copy of the <b>Group Cards</b> per group. Cut the cards out.</li> <li>• Students will need a way or recording a video, a phone is sufficient.</li> </ul>		
<b>Lesson Outline</b>	<p><b>5 mins Introduction</b></p> <ul style="list-style-type: none"> <li>• E Waste Intro- Present Facts found in the <b>E-Waste Warrior Instructions</b>.</li> <li>• Distribute <b>Phone facts for Primary School OR 3.4 Phone facts for High School</b> to students</li> </ul> <p><b>15 mins.</b> ‘Thank You for being Here’ community meeting</p> <ul style="list-style-type: none"> <li>• Divide into groups of 4-5 students, then hand out instruction cards <b>Group Cards</b> on how to participate in mock meeting about Phone waste</li> </ul> <p><b>20 mins.</b> Small groups work to create a television Advertisement about Mobile Phone E waste issue.</p> <p><b>10 mins.</b> Take One! - Perform and film the ADS</p> <p><b>5 mins.</b> Reflection on the product and the process</p> <p><b>5 mins.</b> Into the future – how to be an E-waste warrior Who thinks they can find some E-waste to recycle at home? Hand out mobile phone collection and return envelopes</p> <p><b>NOTE:</b> More detailed instructions can be found in <b>E-Waste Warrior Instructions</b>.</p>		
<b>Extension for Older Students</b>	Older and more advanced students may wish to further develop their Advertisement and show it to the rest of the school or the broader community.		



## E-Waste Warrior Instructions

### **5 minutes. Introduction - PRESENT THE FACTS**

We will be learning where our technological waste goes and how we can dispose of it more mindfully. We will participate in a hot seat role play and create a TV ad to educate other teens on mindful disposal of mobile phones, batteries, computers and old electronic waste.

### **Questions to Ask**

Who has a mobile? Who has had more than one? What did you do with your old one?

### **Who knows what mobiles are made of?**

Mobiles and E-waste contain concentrations of toxic heavy metals or other metals including cadmium, lead, nickel, mercury, manganese, lithium, zinc, arsenic, antimony, beryllium, and copper.

### **Are mobile phones dangerous for humans?**

If phones are incorrectly disposed of, the chemicals may end up in the environment and our food chain. This could be very harmful. Metals in phones are considered as 'bioaccumulative', that is, they build up in fatty tissue and can reach toxic levels in our body over time, causing dangerous health problems.

### **What is the solution to getting rid of old phones in a useful and healthy way?**

The solution is to reuse, recycle OR return them to collection points! This activity is about learning what could happen to your phone when you're ready to ditch it!

### **15 minutes 'Thank You for being Here' To Solve E-waste**

We are re-creating a fictional meeting about the issue of mobile phone waste and who is responsible for changing a very bad situation, where millions of phones go to garbage dumps and are not recycled and also release toxins into the environment.

We are setting up a community debate where people with different points of view are coming together to try and find a solution to this problem. You will belong to one of four interest groups, and you will be given a card which tells you which group you belong to. The card will suggest some points that you might use for your argument. It would be great if you can think of some more and get ready to prove that your point of view is the right one! Of course, you are only pretending to have these views-naturally you would be doing the right thing with *your* phone.

**Divide into groups of 4-5 students**, then hand out group identity and fact card they will be

- 1) mobile phone company,
- 2) local council,
- 3) health victim,
- 4) environmental group,

Each group takes their card away and spends time absorbing the information and getting into character-they will need to be able to express their point of view, argue that they are right and develop counter arguments.

### **Whole group gathers together for the debate.**

Facilitator chairs the informal debate. (Use Facilitator Card). The facilitator will call on each group to put their point of view. Other groups raise their hands and then the chairperson can allow them to offer a different opinion if they disagree with something someone says. Catcalling to be discouraged- "order in the house!"

**There are many ways that we can explore and share ideas about important environmental activities. Another way of doing this would be to make AN ADVERTISEMENT about this issue –an eye-catching, clever , unforgettable AD that will motivate people to do the right thing with their unwanted phones..and that is your next mission.**

### **20 minutes      CREATE AD**

In groups of 4 you are going to create a community education ad aimed at teaching young people about disposing of phones in a way that helps the planet. Your advertisement can be filmed if you have an appropriate device. You will be given a card with instructions about how to make your ad, and a fact sheet. (There is different fact sheet for Primary or High School groups). Each ad should have at least one music line that is a jingle with a catchy tune, this may be sung or rapped during the ad. Don't forget to use the fact sheets and include details about the E-waste issue.

### **10 minutes      Take One! - Perform and film the ads.**

Groups come together to watch each other perform the ads (as the ads are filmed if possible). First ask the group to discuss what makes a good supportive audience. Ask the group to clap at the beginning of each group's sharing of work-this assists the whole group to become quiet and pay attention to the performers.

### **5 mins. Reflection on the product and the process**

### **10 mins. Into the future – how to be an E-waste warrior**

**It is also important to realise that mobile phones are just one of the electronic items creating significant e-waste problems in the World. Who thinks they can find some E-waste to recycle at home?**

**Hand out Resource 3.5** - Students read and discuss this fact sheet about E-Waste management in the Pacific. Discuss how the countries are working towards more environmentally responsible solutions.

### **Conclusion:**

Students perform their ads for a wider school community or, if the ads were filmed, upload them onto the school community social media platforms.

## **E-waste Thank You For Being Here! ENVIRONMENT Group CARD**

**We are setting up a community debate where people with different points of view are coming together to try and find a solution to this problem. You represent green groups, and here are some points that you might use for your argument.**

Dumping mobile phones creates long term pollution risk to the environment.

Recycling mobile phones is the only sensible and conscientious alternative.

Citizens need to take more responsibilities for disposing of their E-waste correctly.

Councils need to help people to easily dump E-waste with kerb side collection and mobile phone companies need to use fewer toxic chemicals and educate their customers on how to dispose of old /outdated phones.

A lot of precious resources go into making a phone and if the phone is not recycled then those resources must be taken from the earth again and again and this is a terrible waste!

**It would be great if you can think of some more and get ready to prove that your point of view is the right one! Of course, you are only pretending to have these views-naturally you would be doing the right thing with your phone.**

### **E-Waste Warrior Group Cards**

## **E-waste Thank You For Being Here! COUNCIL Group CARD**

## **E-waste Thank You for Being Here! HEALTH EXPERTS Group CARD**

**We are setting up a community debate where people with different points of view are coming together to try and find a solution to this problem. You represent health experts, and here are some points that you might use for your argument.**

Mobile phones and accessories contain concentrations of toxic heavy metals. If these phones end up at the dump there can be a range of seriously bad health effects.

Cadmium for example is considered as the 7th most dangerous substance known to man. It is a toxic heavy metal that can harm humans and animals that ingest it. It can cause cancer.

Lead is another toxic material found in phones and it can cause serious liver and kidney damage in adults and disability in children, so once again we have to be extremely careful about where we dispose of phones.

Council should help people to easily dump E-waste with kerb side collection. Mobile phone companies need to educate their customers on how to dispose of old/outdated phones.

**It would be great if you can think of some more and get ready to prove that your point of view is the right one! Of course, you are only pretending to have these views-naturally you would be doing the right thing with your phone.**

## **E-waste Thank You For Being Here! MOBILE COMPANIES Group CARD**

**We are setting up a community debate where people with different points of view are coming together to try and find a solution to this problem. You represent the mobile phone companies, and here are some points that you might use for your argument.**

We are doing everything we can!

We have paid millions of dollars into recycling.

We add a recycling tax to each new phone, and we use it to pay for recycling.

We are also experimenting with using less toxic chemicals, materials and better batteries.

The biggest problem is people are not recycling them- they are holding onto them, only 3% of phones are recycled!

It would be great if local councils did kerb side collection of all E waste!

**It would be great if you can think of some more and get ready to prove that your point of view is the right one! Of course, you are only pretending to have these views-naturally you would be doing the right thing with your phone.**

**Spend time absorbing the information and getting into character. You will need to be able to express your point of view and argue that your ideas are the best!**

## Phone Facts for Primary School Groups

Materials used to make electronic equipment like phones contain valuable resources that can be reused. They also contain hazardous materials that could pose a threat to the environment if they are not disposed of in a responsible manner. Just over 17% of the world's e-waste is properly recycled - but the United Nations International Telecommunication Union has set a target to raise that to 30% by 2023.

### What is in your phone?

Many components of mobile phones are considered toxic and don't break down naturally. Some of the highly toxic elements contained in a single mobile phone can include:

***Lead, Arsenic Lithium, Beryllium Manganese, Cadmium Mercury, Copper Nickel and Flame-Retardant Zinc.***

These can make us very sick if released into the environment. Poisonous substances which leach from decomposing waste in landfills can seep into groundwater, contaminate the soil and enter the food chain. Health problems in humans caused by exposure to these toxins include breathing problems, birthing healthy babies and even cancer!

It is essential that these millions of unwanted phones do not end up in landfill. It is also important to realise that mobile phones are just one of the electronic items creating a significant e-waste problem around the World.

### The Solution = Reuse and Recycling

Reuse is the most important part of the solution. In reusing a mobile phone, you avoid the need for a new one to be produced – which overall has the best environmental benefit.

Recycling is important where phones cannot be reused as the components or substances of the phone can be recovered.

#### Why recycle?

- prevent pollution and protects our environment
- minimise solid and hazardous waste going to landfill
- recover resources to manufacture new products
- reduce the need to use raw materials and save our natural resources

### ***What can be recycled***

Over 90% of the materials in mobile phones can be recovered and used as raw materials for new products;

- **Batteries** include nickel to make stainless steel and cobalt and cadmium to make new batteries.
- **Circuit boards** include small amounts of gold and silver that is used in jewellery and other applications.
- **Handset housings and casings** include plastics that are shredded and used to make fence posts and pallets.
- **Accessories** include plastics and metals that are shredded, sorted and then used to make new plastic or metal products.

***200 mobile phones can be used to make one gold ring- that's recycling and avoiding mining!***

### **Mobile Phones and Climate Change**

The energy and raw materials used to produce millions of new mobile phones every year contributes significantly to CO2 emissions and global warming. By reusing items such as mobile phones, you have avoided the need to produce a new one, which in turn generates savings in energy use, water use and greenhouse gas emissions.

### **What you can do?**

Investigating E-waste collection opportunities. You can call or visit your local landfill or environment department and find out if they have any solutions.

## Phone Facts for High School Groups

Materials used to make electronic equipment like phones contain valuable resources that can be reused. They also contain hazardous materials that could pose a threat to the environment if they are not disposed of in a responsible manner.

Just over 17% of the world's e-waste is properly recycled - but the United Nations International Telecommunication Union has set a target to raise that to 30% by 2023.

**There is an amazing amount of valuable stuff inside mobile phones;** Over 90% of the materials in mobile phones can be recovered and used as raw materials for new products.

**Recycling** Phones to reuse materials avoids the release of large amounts of greenhouse gases that would otherwise be generated if the metals had to be dug up.

- **Batteries** include nickel to make stainless steel and cobalt and cadmium to make new batteries.
- **Circuit boards** include small amounts of gold and silver that is used in jewellery and other applications.
- **Handset housings and casings** include plastics that are shredded and used to make fence posts and pallets.
- **Accessories** include plastics and metals that are shredded, sorted and then used to make new plastic or metal products.

The problem with recycling phones is that so **few people want to part with them**. Most people keep them after they have broken or been outdated.

Between 14 to 16 million old mobile phones are currently stored in cupboards and drawers.

There is also an amazing amount of **toxic and dangerous chemicals** inside mobile phones.

Mobile phones and accessories contain concentrations of toxic heavy metals or other metals including cadmium, lead, nickel, mercury, manganese, lithium, zinc, arsenic, antimony, beryllium, and copper.

Metals such as these are considered as persistent (i.e. don't degrade in the environment), and bio-accumulative (i.e. build up in fatty tissue so can reach toxic levels over time).

If any of these metals are allowed to leak into the environment, e.g. in a landfill when NiCd battery cases rupture or corrode, in significant quantities, they may leach into the water courses or contaminate the soil.

Metals build up in the soil and they can then enter the food chain and in sufficient concentrations may cause health problems. Chemicals such as these are associated with a range of adverse human health effects, including damage to the nervous system, reproductive and developmental problems, cancer and genetic impacts.

Cadmium, for example, is considered as the 7<sup>th</sup> most dangerous substance known to man. It is a toxic heavy metal that can harm humans and animals that ingest it. It is also carcinogenic. If lead is absorbed in sufficient quantities, it will cause serious liver and kidney damage in adults and neurological damage in children. Nickel and mercury are toxic and are classed as hazardous substance. Although Li-Ion batteries are free of heavy metals, lithium's high degree of chemical activity can create environmental problems. When exposed to water, which is present in most landfills, the metal can burn, causing underground fires that are difficult to extinguish.

Dumping mobile phones in landfill sites is not sustainable as it creates long term pollution risk to the environment. Recycling mobile phones is the only sensible and conscientious alternative. Recycling mobile phones is easy and anyone can get involved.

Instead of letting your old mobile phones sit around, waiting to be sent to landfill, return them for reuse and recycling. Reuse is the most important part of the solution. In reusing a mobile phone, you avoid the need for a new one to be produced – which overall has the best environmental benefit.

Recycling is important as the components or substances of the phone can be recovered. It is also important to realise that **mobile phones are just one of the electronic items creating a significant e-waste problem in the Pacific and around the World.**

### **Mobile Phones and Climate Change**

The energy and raw materials used to produce millions of new mobile phones every year contributes significantly to CO<sub>2</sub> emissions and global warming. By re-using items such as mobile phones, you have avoided the need to produce a new one, which in turn generates savings in energy use, water use and greenhouse gas emissions.







**SPREP**  
Secretariat of the Pacific Regional  
Environment Programme



This initiative is supported by **PacWastePlus**-a 85 month project funded by the European Union (EU) and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to **sustainably and cost effectively improve regional management of waste and pollution.**

## Pacific Waste Curriculum

# UNIT 7: Waste in our Waterways



March 2024



This curriculum unit was prepared by:



THE UNIVERSITY OF  
**NEWCASTLE**  
AUSTRALIA



**Dorroughby**  
Environmental Education Centre



NSW  
Education

**EZEC**  
Environmental and Zoo Education Centres



**NSW**  
GOVERNMENT

Education

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Learn more about the PacWaste Plus programme by visiting

[www.pacwasteplus.org](http://www.pacwasteplus.org)

## Unit Outline:

If waste is stored or buried near a waterway – e.g., a stream, mangrove area or the ocean, it can flow into the water and move through the water cycle. The organic waste breaks down and contaminates the water with too many nutrients which grows algae that uses up all the oxygen and may kill the animals that live there.

Waste getting into the waterways can be a very damaging problem with repercussions that can be global in their scope.

This unit aims to build upon students understandings of the water cycle to make them think about the impacts of waste entering the waterways and the damage that could cause.

# Lesson 1: Pollution and the Water Cycle?

<b>Introduction</b>	This lesson links to students pre-existing knowledge of the water cycle to illustrate that pollution can be collected anywhere along that cycle. This helps students understand that pollution on land can easily be spread throughout the world, carried by water.																						
<b>Ages</b>	All ages	<b>Number of Periods</b>	1-2																				
<b>After this lesson</b>	Students will have a better understanding of how waste enters the water cycle and is distributed by it.																						
<b>Content Focus: Science and Technology; Social Studies</b>																							
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>Having a map of the local area would be beneficial to this lesson and make it more authentic and relevant. Make sure the map shows the local rivers and creeks.</li> <li>The Danny the Drip Activity requires:             <table border="1" data-bbox="354 680 1350 1308"> <tr> <td>1. Plant food – Bicarb soda</td> <td>11. Leaves – leaves</td> </tr> <tr> <td>2. Animal Poo - Coffee beans</td> <td>12. Oil - Cooking oil</td> </tr> <tr> <td>3. Algae - Chopped green leaves</td> <td>13. Cement - Flour/ baking soda</td> </tr> <tr> <td>4. Dead animals - Plastic toy animals</td> <td>14. Petrol - Brown vinegar/soy sauce</td> </tr> <tr> <td>5. Soil - Soil</td> <td>15. Rubber - Chopped rubber bands or black plastic bits</td> </tr> <tr> <td>6. Salt – White Sugar</td> <td>16. Cigarette butts - Butts</td> </tr> <tr> <td>7. Pesticides – Bicarb soda</td> <td>17. Detergent - Detergent</td> </tr> <tr> <td>8. Fishing line - Fishing line</td> <td>18. Toxic chemicals- Lime cordial</td> </tr> <tr> <td>9. Rubbish - Small items of litter</td> <td>19. A large clear 20L container</td> </tr> <tr> <td>10. Grass clippings - Grass</td> <td>20. A small spoon for adding some pollutants; A large spoon for stirring</td> </tr> </table> </li> </ul>			1. Plant food – Bicarb soda	11. Leaves – leaves	2. Animal Poo - Coffee beans	12. Oil - Cooking oil	3. Algae - Chopped green leaves	13. Cement - Flour/ baking soda	4. Dead animals - Plastic toy animals	14. Petrol - Brown vinegar/soy sauce	5. Soil - Soil	15. Rubber - Chopped rubber bands or black plastic bits	6. Salt – White Sugar	16. Cigarette butts - Butts	7. Pesticides – Bicarb soda	17. Detergent - Detergent	8. Fishing line - Fishing line	18. Toxic chemicals- Lime cordial	9. Rubbish - Small items of litter	19. A large clear 20L container	10. Grass clippings - Grass	20. A small spoon for adding some pollutants; A large spoon for stirring
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	<b>Lesson Outline</b>																						
<b>15-20 minutes-</b> Discussion. Use the <b>What is a catchment? And what is the Water Cycle? Factsheet</b> for reference <ul style="list-style-type: none"> <li>What is a catchment?</li> <li>What is the water cycle?</li> <li>Where are the local creeks/rivers/sea in relation to the school/students' homes?</li> </ul> <p>Optional: Do the water cycle dance (most suitable for younger students)</p> <ul style="list-style-type: none"> <li>Refer to the <b>Water Cycle Dance Instructions</b></li> </ul> <p><b>30 - 40 mins -</b> Danny the Drip Activity.</p> <ul style="list-style-type: none"> <li>Refer to <b>Danny the Drip Activity Instructions</b></li> </ul>																							
<b>Extension for Older Students</b>	Older and more advanced students may wish to develop a more complex water cycle dance.																						

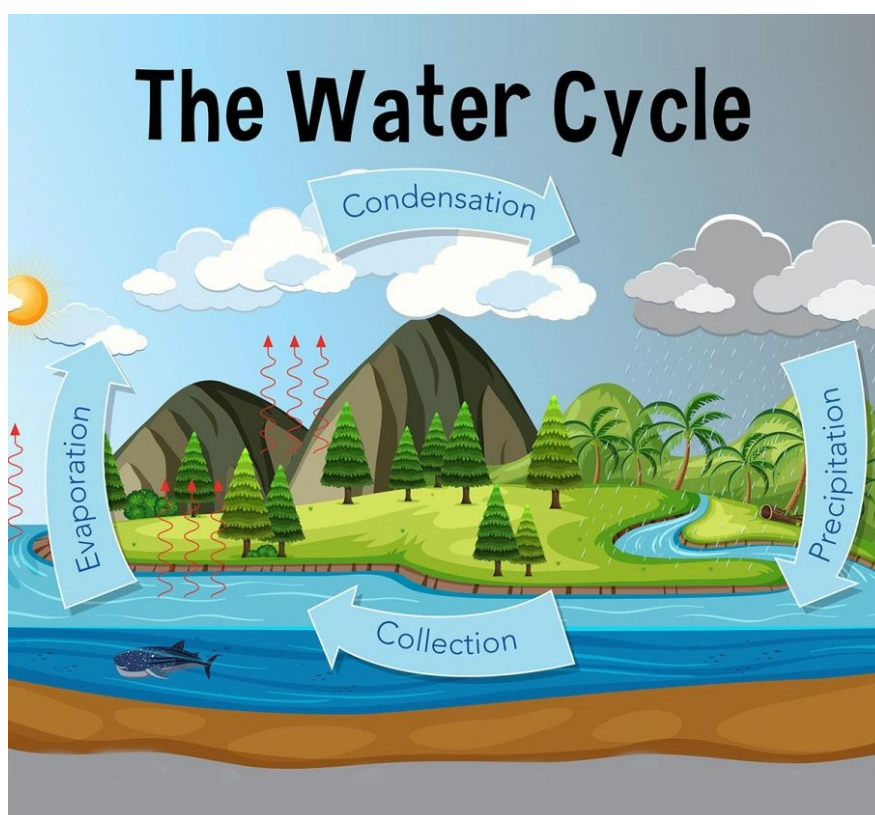
## What is a catchment? And what is the Water Cycle? Factsheet

### What is a Catchment?

- A catchment is an area where water is collected by the natural landscape. For example, imagine cupping your hands together in a downpour of rain and collecting water in them. Your hands have become a catchment, just like the natural landscape.
- Discuss a map of your local area – where are the high points – where are the low points? Where are the creeks and rivers? Are there farms? Villages? Towns along the rivers? Where do the creeks and rivers come out into the ocean?
- Discuss how gravity has the raindrops travel from the highest point to the lowest?

### What is a Water Cycle?

- Water is a finite resource which means we can't make it – What we have is all we will ever have – and it goes around in a cycle. The current scientific hypothesis is that water came to Earth via a meteor a long time ago.
- Water evaporates in the sun – forms a cloud (condensation) – when the clouds get full the water comes down as rain (precipitation) – water hits the ground, makes a creek, joins a river – makes it way to the ocean – where it evaporates.
- The water cycle (sometimes referred to as the hydrological cycle) is the continuous transfer of water from air, sea, land and water in a continuous cycle. This continuous movement of water is sufficient to provide good living conditions on the planet while at the same time transferring the water to places where it is needed.



There are many Water Cycle resources – a simple drawing like the one above can show how the water cycles around our planet.

### **Water Cycle Dance Instructions**

This is a simple dance routine to help students remember the different stages of the water cycle. *It is most appropriate for younger students, approximately of the ages 12 and below.* It is designed to demonstrate the cyclical nature of water.

Students start in a circle, such that they can join hands with their arms outstretched to their sides.

**Step 1:** Students form a cloud with hands over head –  
Students all say “**condensate**” three times.

**Step 2:** Then students make rain happen with their fingers from the cloud to their feet.  
Students all say “**precipitate**” three times

**Step 3:** Students hit the ground with their hands  
Students all say “**make a creek**”

**Step 4:** Students all move their hands on the ground like a snake  
Students all say, “**join a river, get to the ocean.....** and then Tadah!”

**Step 5:** Student stand, spreading their arms out to their side to join hands with the students beside them to make a large circle.  
Students all say “**the sun comes out**”

**Step 6:** Students break hands, lifting their arms up to reform the cloud above their head.  
Students say “**evaporate**” three times.

*Repeat the cycle as many times as you want.*

## 5.2 Danny the Drip Activity

### Background:

Danny the Drip is an active visual exercise emphasising the variety of pollutants that can enter waterways and how they accumulate. It shows the progressive deterioration of a river as it makes its way from the hills, through the catchment and out towards the sea.

**Prior to Activity:** gather and name pollutants as per list below:

- Fertiliser (Plant food) – Bicarb soda
- Animal Poo - Coffee beans
- Algae - Chopped green leaves
- Dead animals - Plastic toy animals
- Soil - Soil
- Salt – White Sugar
- Pesticides – Bicarb soda
- Fishing line - Fishing line
- Rubbish - Small items of litter
- Lawn clippings - Grass
- Leaves – leaves
- Oil - Cooking oil
- Cement - Flour/ baking soda
- Petrol - Brown vinegar/soy sauce
- Rubber - Chopped rubber bands or black plastic bits
- Cigarette butts - Butts
- Detergent - Detergent
- Toxic chemicals- Lime cordial
- A large clear 20L container
- A small spoon for adding some pollutants
- A large spoon for stirring



### The Activity:

Three quarter fill the container with water. Read the story (below) and when prompted, have students add pollutants into the water. At the end of the story, all the pollutants will have accumulated into a mess, visually demonstrating that different types of pollution can add up to cause significant problems in waterways. The words in **bold are the cue for adding the pollutants into the 'catchment'**. Use the *italicised* questions to prompt discussion about catchment friendly alternatives.

### Story:

This is the story of a drop of water called Danny

Danny the Drip's journey begins high up in the hills where the rain first falls onto the slopes and runs off the hills into creeks and rivers. Danny falls from the sky into one of the rivers and here begins his long and exciting journey to the sea.

As Danny the Drip travels down the river, he passes through farms and towns and sees many things that make him very sad and sick. Danny is cross because these things are polluting the water and making it a yucky, smelly place for him to live but Danny knows that it's easy for people to look after the river and to prevent polluting it.

As Danny the Drip moves down through the hills, he enters some farming country. Here Danny meets a farmer Joe who is growing some crops to provide food for his community. The farmer has recently fertilised his crops to make them grow. After fertilising there was a downpour of rain, and the extra plant food was washed into the river. **Add Fertiliser (plant food)**

Next door to the crop farm is a farm that keeps lots of cows. On this farm the cows are allowed to drink from the river and eat the river plants. While they are eating and drinking, the cows poo straight into the river. The poo smells horrible and makes the water dangerous to drink for people and animals. **Add Poo**

The cow poo adds nutrients and along with the fertiliser makes the water plants grow more quickly. One kind of water plant grows out of control because of all the poo. Poor Danny the Drip, his water is now yucky, smelly and full of slimy algae. **Add algae** *Should the crop farmer throw lots of fertiliser on his crops or should he only put on what is needed? How can the cow farmer stop animals from weeing and poeing in the river? Leave the cows to drink near the river, or put up a fence and keep them out?*

There is also an old cow that has passed in the river, and Danny must swerve around the animal. **Add plastic animals.** *Should dead animals be put in the river? What else could be done with them? Would burying them be a better solution?*

Further along Danny passes another farm. When this farmer bought their farm, they decided to cut down all the trees to make way for their sheep. With all the trees gone, the birds and the native animals lost their habitat (homes). Even the sheep would like lots of trees for shade in summer and shelter for their little lambs from cold and rain. Without plants to hold the riverbanks together, the soil comes loose. When it rains, the riverbanks collapse into the water dumping lots of into the river making the water turbid (full of soil sediment). **Add soil** How can Danny see where he's going if his river is full of mud? Without trees, the soil and the river gets very salty **Add salt**. Many of the plants and animals don't drink salty water and lots of them die. The soil clogs up the gills of some of the fish and aquatic insects (water bugs) making them very sick. ***What could the farmer do to fix this problem? Keep cutting down trees or plant native trees and shrubs? What is the difference between a native and an introduced tree? Can you name any native trees, bushes or shrubs?***

Poor Danny the Drip is very unhappy now his home is getting more polluted as he makes his journey to the sea. After a long and winding journey through the hills, Danny the Drip finally reaches the edge of a large village. Here, there are a number of small farms, where people grow vegetables and fruits. To keep the weeds and insects away from their crops, many people spray chemicals, called pesticides onto their plants. When it rains, the pesticides get washed into the gutters, down the stormwater drains and into the river, poisoning many of the plants and animals that live there. **Add pesticides**. ***What should be done about these toxic chemicals? Let it drain into the river or take it to a chemical dump? What should these people do to stop nasty chemicals getting washed into the river? Overload the garden with chemical sprays or use small amounts of spray or even have organic gardens?***

As he continues his journey to the sea, Danny the Drip passes some people making use of the river. A man is fishing on the banks. Unfortunately, his fishing line gets caught around a rock and is left in the water. "OH NO!!" thinks Danny the Drip "what would happen if a fish or a bird got caught up in that fishing line?" **Add fishing line** ***What should the fisherman have done with his fishing line? Leave it there or untangle it?***

Around the next bend, Danny the Drip sees a group of people enjoying a picnic on the edge of the river. A gust of wind blows some rubbish off the table and down into the river. **Add rubbish** ***What could the people have done with their rubbish, so it didn't end up in the river? Leave it lying around or put it in a bin or recycle it?***

Danny the Drip is really sad now; he can't believe how careless some people can be.

At the park Danny the Drip sees a gardener cutting the grass. Danny also sees an old exotic tree dropping all its autumn into the gutter. If the leaves and lawn clippings are left to rot on the ground, they will make their way into the gutters, down the stormwater drains and into the river. **Add lawn clippings and leaves**. In the river they'll use up all the oxygen and Danny's plant and animal friends could suffocate and die. ***What could the gardener do with these grass clippings and leaves? Could composting them help? What is compost good for?***

As he passes into the town, Danny the Drip spots an old school bus taking kids home. The bus driver has not serviced the bus for a long time and its engine is leaking straight onto the road. "Oh dear!" thinks Danny the Drip "that oil will be washed into the gutters, down the stormwater drains and into the river. **Add oil** The ducks and other birds are not going to like this yucky, sticky oil polluting their homes. It makes their feathers stick together and it hard for them to fly. *Do you think it would be better if the driver serviced his car so the oil wouldn't leak? What should the bus driver do when he gets back to the depot? Get the oil leak fixed or let it keep dripping?*

A man is doing some work on a path leading from his house to the river and he needs to clean the cement mixer. If he washes it onto the path, it will flow into the gutters, down the stormwater drains and into the river where it will pollute the water with nasty cement mix. **Add cement** *Where should he put the water, he washes the mixer with? Wash it onto the path or dispose of it safely?*

The roads near the river are full of traffic. Petrol drips out of cars and if they brake in a hurry, they leave from their tyres on the road. **Add petrol and rubber** *What could motorists do to stop the damage they do to the river?*

Danny sees one woman in a car who has just finished smoking a cigarette. **Add cigarette butts** The woman flicks her out of the window and onto the road. If left on the road, the cigarette butts will wash into the gutters, down the stormwater drains and into the river. Danny will have to swim around in the dirty, smelly cigarette butts, petrol and rubber because every time it rains these pollutants are carried down the gutter into the stormwater drains and straight into the river which flows to the local beach. *Is this OK or should she do something else with her butts?*

As Danny moves towards the sea, he notices someone washing their car on the driveway. Detergent is running into the gutters, down the stormwater drains and into the river. **Add detergent** The detergent has lots of chemicals in it that helps make more slimy algae grow. "OOOH! Oh No!" thinks Danny the Drip "My poor animal friends are not going to like more algae in the water. The algae uses up oxygen and they won't be able to breathe. *Should the car be washed in the driveway or on the lawn? Where should the dirty washing water go? Would washing on the grass be better? Are some detergents better than others?*

Danny the Drip notices that one of the factories near the river has a pipe coming from it that leads straight into the river. When he takes a closer look he sees that there are all sorts of coming out of the pipe. "This is just terrible," thinks Danny the Drip "don't people realise what they are doing to my home?" **Add toxic chemicals** What could the factories do with their chemicals to stop damaging the river? Could they use less or alternative chemicals or dispose of their waste in a better way?

With one final bend in the river Danny the Drip finally arrives at the sea BUT LOOK AT THE WATER that flows into the sea with him - it is full of yucky, smelly, slimy, and poisonous pollution. The pollution can hurt the animals and plants in the river and the animal and plants that live in the sea.

***Can you remember what pollutants Danny saw enter the river on his way through the catchment? What other ways could humans handle the waste? Can the animals other than humans and plants fix this problem? So, whose responsibility, is it?***

# Lesson 2: Stormwater Pollution Solution

<b>Introduction</b>	This lesson gives a short activity that educates students about the many pollutants that could end up in the local water catchment, as well as what can be done to prevent it. This lesson could be done as a standalone activity, or could be an extension to lesson 1.		
<b>Ages</b>	10-16	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will have a better understanding of how waste enters the water cycle, and what can be done to prevent it.		
<b>Content Focus: Science and Technology; Social Studies</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>For each group of students (4-5 groups per class) print off a set of <b>the Stormwater Pollution Solution Cards</b>.</li> <li>For each group, make a pin board or a large sheet of paper with three columns on it. The columns should be labelled "Pollutant", "Where does it come from?" and "How do I prevent it?"</li> </ul>		
<b>Lesson Outline</b>	<p>Total Game Time: 10-15 Minutes</p> <ul style="list-style-type: none"> <li>Divide class up into 4 or 5 groups</li> <li>Each group has a pin board or large sheet with 3 columns: A "Pollutant" column, a "Where does it come from" column and a "How do I prevent it?" column. Create headings for each column.</li> <li>Have 3 piles of cards for each group. One pile contains pollutants, one pile contains the source of the pollutants and the other pile contains preventative measures for the pollutants (listed below). You may like to write the column headings on the back of each of the corresponding cards.</li> <li>Students must identify which source and preventative measure matches with the pollutants. Make it a race against the clock with the first team to finish with the correct answers win a prize.</li> </ul>		
<b>Extension for Older Students</b>	Older and more advanced students could develop their own version of the game, including for situations beyond storm water pollution.		

## Stormwater Pollution Solution Cards

Pollutant	Where does it come from?	How do I prevent it?
Detergent (car)	I am used in car cleaning and drain into the creek if you wash your car on paved surfaces	Wash your car on the lawn or take it to a car wash where they use recycled water
Litter	I can be from your lunch box or your fast food dinner	Always put it in the bin!
Soil	I am in lots of places. I can be washed from gardens or eroded from stream banks	Don't leave large amounts uncovered. Don't remove plants from stream banks
Fertilisers	I am used when the plants need some food to grow in the garden	Don't use it too much or don't apply it before rains
Poo	When you take the dog for a walk and don't use a pooper scooper	Use a pooper scooper
Pesticides	When there are nasty insects on the plants, I am used to kill them	Try to get rid of insects without poison (use organic methods)
Oil	I leak from cars	Regularly service cars for leaks
Leaves	I fall from trees. In Autumn, I fall from deciduous trees	Don't plant deciduous trees in your backyard. Rake them up.





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# Pacific Waste Curriculum

# UNIT 8: Waste in the Ocean



March 2024



This curriculum unit was prepared by:



THE UNIVERSITY OF  
**NEWCASTLE**  
AUSTRALIA



Education



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Learn more about the PacWaste Plus programme by visiting

[www.pacwasteplus.org](http://www.pacwasteplus.org)

## Unit Outline:

The Pacific Ocean is not just a vast and beautiful body of water; it's a lifeline for many Pacific Island nations, including yours. But it's also facing a serious problem as it becomes filled with waste like plastic and old fishing gear.

In this unit, we'll explore where this trash comes from, how it impacts the ocean and your community, and most importantly, what can be done to address this issue. The goal is to understand why the Pacific Ocean is so vital for your way of life and how we can work together to protect it.

By the end of this unit, students will have the knowledge and ideas to make a difference in their own Pacific island nation and help keep the ocean clean and healthy.

# Lesson 1: The Great Pacific Garbage Patch

<b>Introduction</b>	In this lesson, students will learn about marine debris, or marine plastic pollution, and the Great Pacific Garbage Patch. Students will undertake a reading comprehension activity, where they are asked to read an article about the Great Pacific Garbage Patch, and then answer questions related to it.		
<b>Ages</b>	Ages 10-18	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will be able to define marine debris and describe the Great Pacific Garbage Patch. They will be able to identify what has caused it, and why cleaning up the Patch is a difficult endeavour.		
<b>Content Focus: English;</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>You may choose to print off a copy of <b>The Great Pacific Garbage Patch Factsheet</b> for your students. Alternatively, it could be presented on a screen, or a single copy could be passed around.</li> <li>Optionally, if the students have internet access, they could access it online at <a href="https://education.nationalgeographic.org/resource/great-pacific-garbage-patch/">https://education.nationalgeographic.org/resource/great-pacific-garbage-patch/</a></li> <li>Print a copy of the <b>“The Great Pacific Garbage Patch Question Sheet”</b> for every student</li> </ul>		
<b>Lesson Outline</b>	<p><b>10-15 Minutes-</b> A guided discussion: Use the <b>Marine Debris Factsheet</b> to guide the discussion. Some questions to consider:</p> <ul style="list-style-type: none"> <li>Where does plastic go when it gets blown into a creek or river and washed out to sea?</li> <li>What is marine debris?</li> <li>Where does it come from?</li> <li>What impacts does it have?</li> <li>How can we clean it up?</li> <li>Has anyone ever heard of the Great Pacific Garbage Patch?</li> </ul> <p>Distribute Question sheets to the students.</p> <p><b>20-25 Minutes-</b> Students read through Factsheet in pairs and answer the questions in the Question Sheet. (HINT: The pictures in the question sheet correspond to where the answers can be found in the Factsheet)</p> <p><b>10-15 Minutes-</b> Questions gone over as a class, discussing answers.</p>		
<b>Extension for Older Students</b>	At the website given above, this article is available at multiple different reading abilities. The copy included here is based on the grade 4 reading ability, but more advanced students will gain more information by reading a version with a higher reading level.		

## Marine Debris Factsheet

### What is marine debris?

The National Marine Sanctuary of American Samoa defines marine debris as, “persistent solid material that is manufactured or processed and directly or indirectly intentionally or unintentionally disposed of or abandoned into the marine environment”.

### Where does it come from?

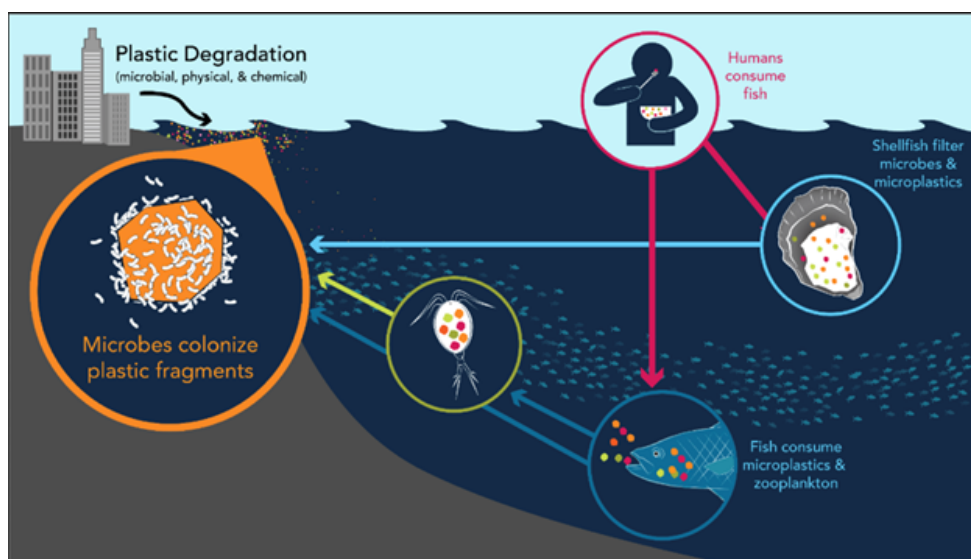
80% of debris is waste that comes from land-based activities and is made up of plastics. If the plastic we use on land is managed properly it can end up in our ocean. Plastic breaks up over time into small pieces we call macro or micro plastics. 20% of marine debris is waste that is dumped by ships, boats, or offshore rigs. This includes fishing nets which are also made of plastics.

### What impact does it have? Marine debris or marine plastic pollution causes devastating impacts for marine life and our Pacific Ocean. Impacts include:

- Entanglement of marine species in plastic pollution
- Starvation or ruptured organs because marine species mistake plastic for food or can't access food because plastic pollution is in the way!
- The blocking of sunlight. The Great Pacific Garbage Patch stops sunlight getting through the water below.
- Marine species absorbing harmful pollutants that can also be passed onto humans if humans eat these species.
- Accumulation of plastic pollution and other marine debris on our beaches, causing them to lose their beauty. This may affect tourism.

### What Can we Do to Help (Prevention of Marine Debris)?

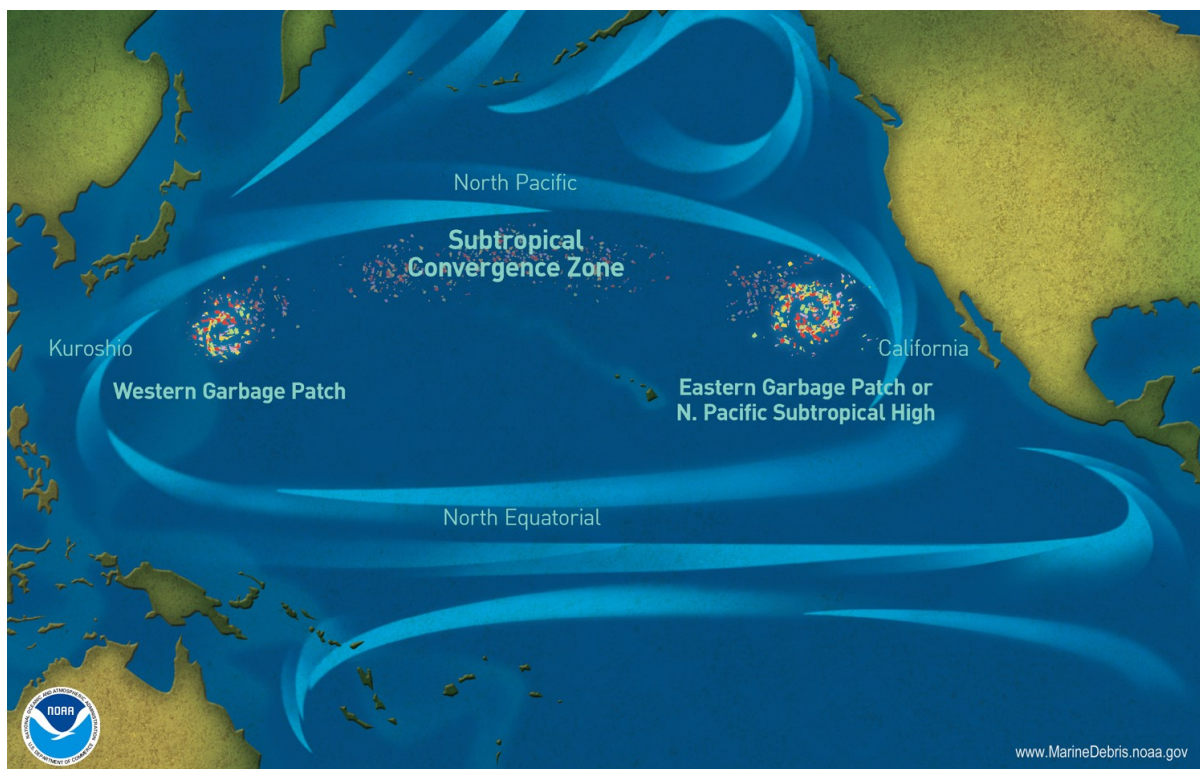
1. Laws and Regulations that prevent the world polluting our oceans
2. Access and use science to assess and monitor floatable debris
3. Education and Awareness Raising to Change Behaviour
4. Refuse single use plastic
5. Management – Conduct Beach Clean Ups



# The Great Pacific Garbage Patch

The Great Pacific Garbage Patch is a huge area of marine debris. Marine debris is garbage in the ocean. The Great Pacific Garbage Patch is the world's biggest area of marine debris. It is in the North Pacific Ocean.

The Great Pacific Garbage Patch stretches from the West Coast of North America to Japan. It is made up of two parts. One is the Western Garbage Patch, near Japan. The other is the Eastern Garbage Patch, between Hawai'i and California.

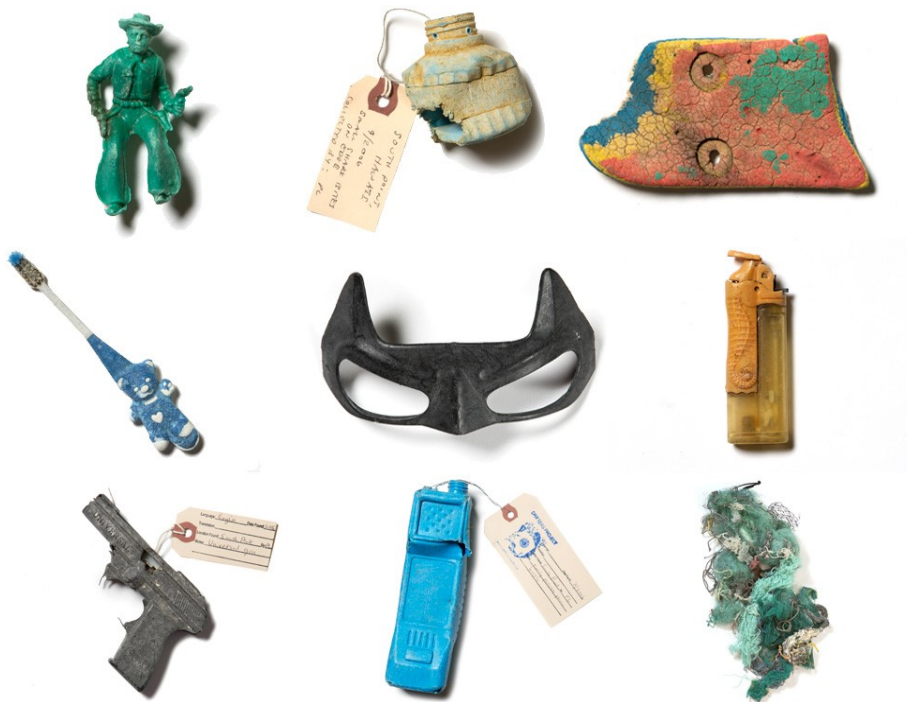


Strong ocean currents carry marine debris into the Great Pacific Garbage Patch. Once there, the trash builds up over time. Plastics are the biggest problem. They do not wear down completely. They only break into smaller and smaller pieces.

The Great Pacific Garbage Patch is mostly tiny bits of plastic. These small pieces are called microplastics. They cannot always be seen. Often, they just make the water look like a cloudy soup. Larger things, like fishing nets or shoes, are mixed into this soup.



It doesn't get any better beneath the surface of the water. The seafloor under the Great Pacific Garbage Patch is an underwater garbage heap. Over time, most marine debris sinks to the bottom.



## Marine Debris Litters the Ocean

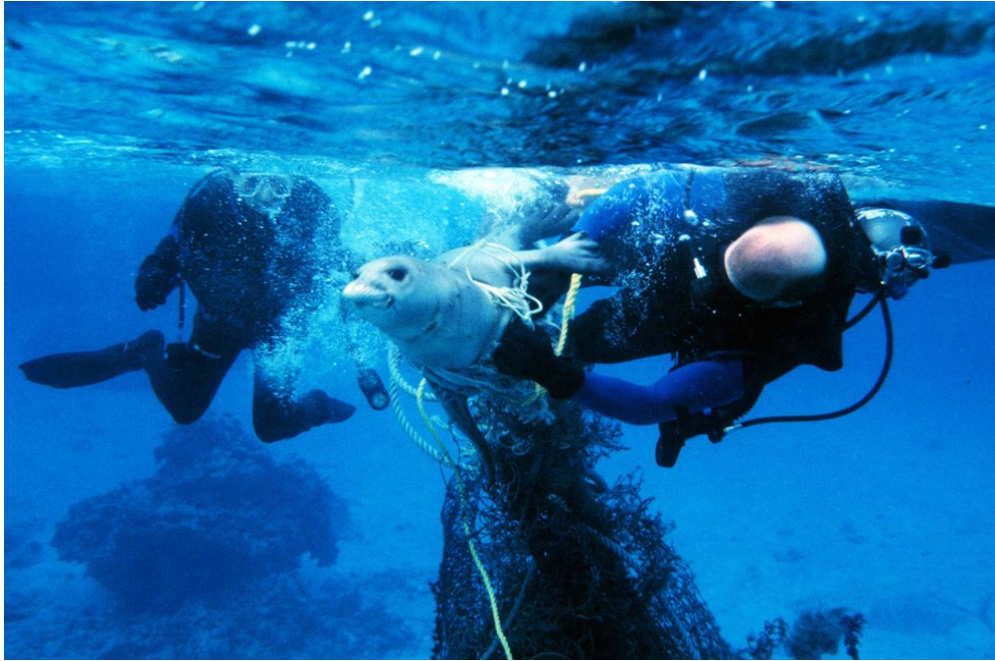
A lot of the debris in the Great Pacific Garbage Patch comes from fishing boats. Some also comes from distant cities and towns.

Plastics are the most common kind of marine debris. Most of this debris comes from plastic bags, bottle caps, plastic water bottles and Styrofoam cups. The sun breaks these plastics into smaller and smaller pieces. Even if they can't be seen, they are still there.

Marine debris can be very harmful to marine life. For example, turtles often mistake plastic bags for jellies, their favorite food. Albatrosses mistake plastic pellets for fish eggs. They then feed the pellets to their chicks. Often, the chicks die.



Seals are also in danger. They can get tangled in plastic fishing nets. Seals often drown in these nets.



Marine debris is affecting the entire food chain. For example, algae are underwater plants. Plankton are tiny critters that eat algae to survive. Plankton get eaten by other animals, like whales. But microplastics stop sunlight from reaching underwater algae. Without sunlight, the algae won't grow and spread. Without algae, plankton won't have enough food. And without plankton, whales won't have any food either.

Plastics also contain harmful pollutants. These dangerous chemicals are poisoning the water. They are also making fish and marine mammals, such as whales and seals, very sick.

### **What to do About the Patch**

Cleaning up marine debris is not easy. Many microplastics are the same size as small sea animals. Nets that can scoop up garbage would catch these animals too. In any case, the ocean is just too big to clean. Scientists say it would take one year for 67 ships to clean up just a tiny part of the North Pacific Ocean. They say the best answer is to stop throwing away so much plastic.

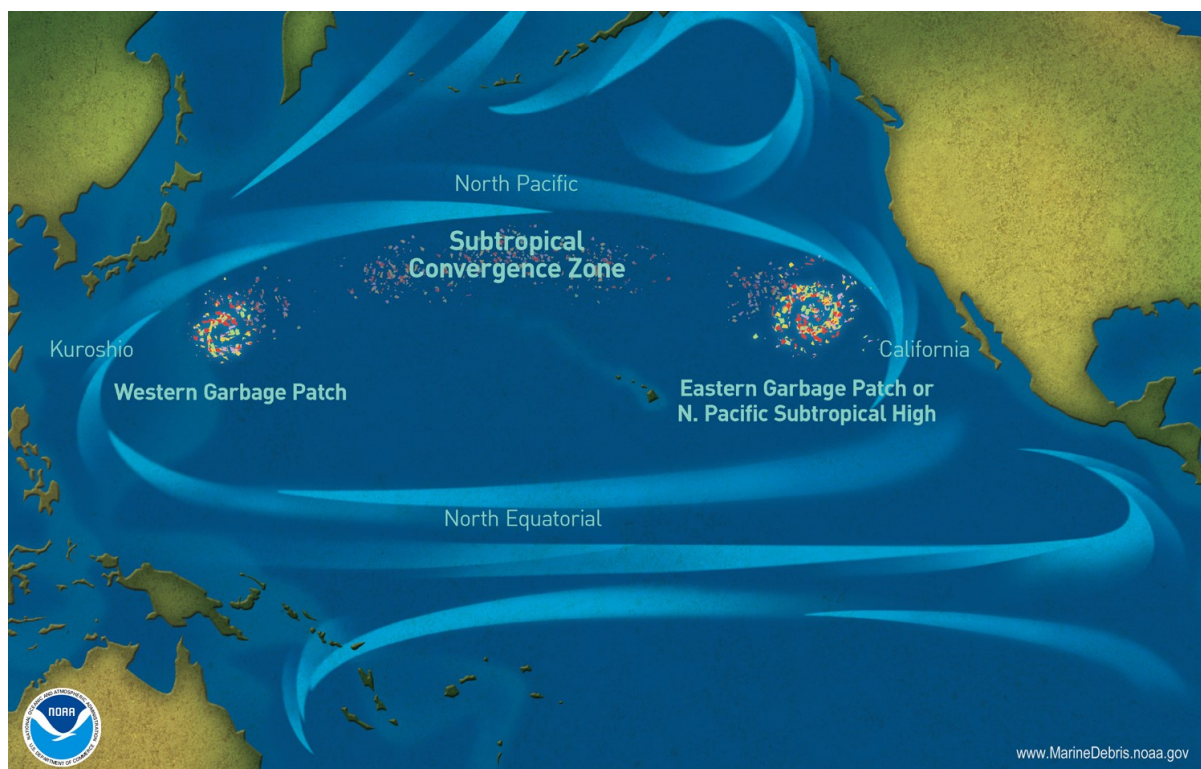
Credit:

*Great Pacific Garbage Patch.* (n.d.). Education.nationalgeographic.org.  
<https://education.nationalgeographic.org/resource/great-pacific-garbage-patch/4th-grade/>



5.4 The Great Pacific Garbage Patch Question Sheet (National Geographic)

## The Great Pacific Garbage Patch



**Instructions:** Read the National Geographic Article given you by your teacher. Use it to answer the questions below.

**HINT:** The pictures might help you find the correct section to look at.

**Where are the two main parts of the Great Pacific Garbage Patch?**

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**What type of debris is the biggest problem in the ocean? Why?**

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Is the garbage patch just on the surface of the water?

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Does the waste just come from boats and nearby islands? Where else does it come from?

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**Why is marine debris harmful to marine life? Give some examples.**

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**Why is it difficult to clean up the garbage patch?**

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**What is the best solution?**

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# Lesson 2: Plastic Pollution

Introduction	Plastic debris in the water has many different effects. During this lesson, students will investigate many of the different aspects of the plastic debris in the Pacific Region problem. This lesson is using a style of lesson known as a jigsaw lesson. Students work in groups, where each member of the group goes and investigates one aspect of the problem, before returning to their group to share their findings.		
Ages	Ages 14-18	Number of Periods	1
After this lesson	Students will be able to describe some of the negative impacts of plastic debris in the ocean.		
<b>Content Focus: English; Social Studies, Science and Technology</b>			
What you Need to Prepare	<ul style="list-style-type: none"> <li>• Print of 4 copies each of the <b>Pollution in the Pacific Region Fact Sheets</b></li> <li>• Print of one copy of <b>Pollution in the Pacific Region Worksheets</b> for every group of 5 students. Cut them into half sheets.</li> </ul>		
Lesson Outline	<p><b>Before Lesson:</b> Place each set of fact sheets at a separate desk around the room. At each desk all the fact sheets should be the same.</p> <p><b>5 Minutes:</b> Break class into groups of at least 5. Every group must have at least 5 students, but 6 or 7 is ok. These groups are the <b>HOME GROUPS</b>.</p> <p><b>3-5 Minutes:</b> Give each <b>HOME GROUP</b> one copy of the set of worksheets. The group distributes the worksheets so that each member has a work sheet. If there are more than 5 members in the group, 2 students can share a worksheet.</p> <p><b>15-20 Minutes.</b> The <b>HOME GROUPS</b> then split up and sit at the desk with the Fact sheet matching their worksheet. They then work with the people from the other Home groups to answer the questions on their worksheets. These are now the <b>EXPERT GROUPS</b>.</p> <p><b>15-20 Minutes.</b> Students leave their <b>EXPERT GROUPS</b> and return to their <b>HOME GROUPS</b>. Students share with their home group what they learnt.</p> <p><b>10 Minutes:</b> Whole class discussion. What did we learn about the impact of plastic? Is it a simple or complex problem? Can the problem be solved locally or does it need government intervention?</p>		
Extension for Older Students	Extension students may pursue further research on any of the particular issues they choose.		

# A safe(r) circular economy for plastics in the Pacific Region

Plastics pollution, including marine litter, is a global social, economic, and environmental emergency requiring urgent attention. Plastics are produced from fossil fuels, and once released into the environment, they never disappear. Instead, they degrade into physical and chemical forms, leading to the contamination of all biophysical systems. If we carry on business-as-usual this will culminate to 1.1 billion tonnes having entered the world's oceans by 2030.<sup>1</sup>

<sup>1</sup> Borrjelle, S.B. et al., (2020). Science 369, (65110), 1515-1518.

Small Island Developing States, which include Pacific Island nations, have strong cultural, economic, and social ties to their ocean. While traditionally self-sufficient, the current economy has made Pacific communities import dependent. They are threatened by the transboundary movement of plastics (Trade, tourism, the fishing industry, and marine litter that flows in on ocean currents), and by climate change exacerbated by the full life cycle impacts of plastics.

Pacific nations are currently ill-equipped to manage the costly and harmful impacts of the externally generated problem of plastic pollution. Fortunately, robust policy and best practice solutions exist to prevent negative impacts on future generations.

**Develop a plastic pollution policy framework that supports a safe(r) circular economy for plastics in the Pacific region.** A safer circular economy for plastics will help protect Pacific Islands peoples and their marine and terrestrial environments from the chemical and physical harms of plastics, including marine litter. It will protect communities from the harmful impacts on livelihoods, food security and culture. It will also support state obligations to adopt and implement legal and institutional frameworks that protect the right to a healthy environment for current and future generations.

## Recommendations:



# Safe(r) Economy for Plastics

## A Safe(r) Circular Economy for Plastics will

- prevent problematic plastics entering the region and becoming marine litter. Problematic plastics are avoidable, unnecessary, non-recyclable, toxic, and non-durable and include primary/intentionally added microplastics;
- prioritise safe reuse, refill, repair and return systems, materials, and infrastructure, offering local employment opportunities and social benefits;
- remove legacy plastics including marine litter from the environment;
- set targets to reduce the overall volume of plastics in circulation;
- acknowledge that no circular economy for plastics is 100% safe;
- minimise the leakage of plastics and toxicants into the environment and of marine litter into the oceans;
- establish protocols to minimise microplastics and chemical (liquid and gas) leakage; and
- support the realisation of the human right to a healthy environment, safe working environments, and sustainable livelihoods.



### Safe Supply

- Pre-production pellets and plastic products and packaging
- Toxic and hazard free
- Energy efficient
- Regulated renewable feedstocks
- Caps on virgin plastics and plastic products



### Safe Supply and Safe Design and Manufacture

- Plastic products and packaging
- Toxic and hazard free
- Essential
- Durable
- Reusable
- Recyclable
- Targets for recycled content



### Safe Work

Protection of the health, safety, and rights of formal and informal workers along the full lifecycle of plastics (supply, design and manufacture, recycling, tourism, fishing, and retrieval)



### Safe Transport

- Standardised protocols, monitoring, and reporting
- Energy efficiency
- Short supply chains
- Reverse logistics



### Minimal Leakage

- Minimise material leakage
- Minimise CO<sub>2</sub> emissions
- Minimise toxic chemical emissions



### Safe Consumption

- Ecolabelling (inform consumer about toxic content, safe handling, and recycling post-consumption)
- Toxic and hazard free plastics
- Safe, convenient, affordable, and accessible reusables



### Safe Recycling

- Hazardous plastic monomers and additives in plastics minimized or removed
- Recyclability and recycled content of materials maximized and targets set



### Safe Tourism

- Targets set to reduce overall volume of plastics materials in circulation
- Toxic chemical, energy, water, and material leakage minimized
- Ecolevies
- Bans on single-use plastics on ships and planes
- 'Pack it in, pack it out' policy
- Plastics pollution prevention information
- Incentives for retrieval



### Safe Reuse, Refill, Repurpose, and Repair

- Prioritised investment in safe plastic-free delivery systems and products
- Energy and water efficient
- Durability and safety standards
- Short supply chains
- Accessible
- Incentivised
- Affordable
- Non-profit managing agency



### Safe Fishing

- Durable fishing gear
- Marked fishing gear
- Incentivised indigenous plastic-free fishing gear
- Reporting of lost and discarded fishing gear
- Incentivised retrieval and repair
- Regulated fish aggregating devices
- Standardised auditing of plastics onboard
- Container return schemes (e.g., for fish bins)
- Port reception facility upgrades
- Reduced, reused, repaired and recycled plastics in land and sea-based operations



### Safe Retrieval

- Standardised protocols, monitoring, and reporting
- Incentivised retrieval
- Energy efficiency
- Port reception facility upgrades
- Repatriation/ safe end-of-life management

# Plastics Impacts on Human Health in the Pacific Region

Once produced, plastics never disappear. They are released into the environment, where they break up into tiny (micro and nano-sized) fragments. They leach toxic chemicals and gases at every stage of their life cycle and they attract and transfer additional toxic chemicals, pathogens, and invasive species. Toxic plastics-related chemicals and nano- and microplastics contaminate soil, food, marine and freshwater sources, air, and the bodies of animals and humans.<sup>1</sup> Many of the harmful chemicals associated with plastics can interfere with gene expression across generations, causing a wide range of diseases. Plastic pollution, including marine litter, threatens food security and safety, human health, and the right to a healthy environment.

## Direct health impacts

- Inhalation** of micro/nano plastics and toxic and hazardous emissions particularly when plastics are burned.<sup>2</sup>
- Inhalation** of airborne micro/nanoplastics from, among others, tires, and synthetic fabrics.
- Inhalation, ingestion, and skin contact:** EDCs increase risk of cancers and other diseases
- Ingestion** of micro/nanoplastics and their associated chemical additives in all exposed food sources (marine, freshwater, avian, and agricultural).
- Ingestion** of toxins leached from plastics packaging into food and beverages and from other plastic products such as plastic teething toys.
- Skin contact** when using cosmetics, and other products containing EDCs, micro/nano plastics and acrylates copolymer.<sup>3</sup>

1. Microplastics (<5 mm) and nanoplastics (< 1000 nm according to some authors or < 100 nm according to others).
2. POPs including heavy metals, dioxins and furans, polycyclic aromatic hydrocarbons (PAHs), carcinogens, EDCs, microplastics, and ash (which may also contain per- and polyfluorinated substances (PFAS)).
3. Nano- plastics can pass through cell walls and can result in the death of cells.
4. <https://www.healthmicroplastic.org/en/et-to-know-microplastics-in-your-cosmetics-2/>
5. See <https://www.foodpackagingforum.org/food-packaging-health/non-intentionally-added-substances-risks>
6. Acknowledging that no circular economy for plastics can be 100% safe.

## Indirect and direct health hazards from plastics pollution include

Inhalation and ingestion of, and skin contact with, microplastics, nanoplastics, acrylates copolymer,<sup>4</sup> monomers, additives, and contaminant sorption (including persistent organic pollutants (POPs), endocrine disrupting chemicals (EDCs), carcinogens, and heavy metals, and Non-Intentionally Added Substances (NIAS)).<sup>5</sup>

### Human organ systems affected

- Cardiovascular
- Renal
- Gastrointestinal
- Neurological
- Reproductive
- Respiratory

### Resultant diseases and developmental disorders include

- Cancers
- Diabetes
- Neuro-, reproductive and developmental toxicity

The genetic effects of EDCs and POPs can pass on from parent to child for several generations.

## Recommendation

A policy framework supporting a safe(?) circular economy for plastics in the Pacific region would help protect its peoples from the indirect and direct hazards posed by marine litter and plastics pollution.<sup>6</sup>



# Indirect Human Health Hazards From Plastics Pollution

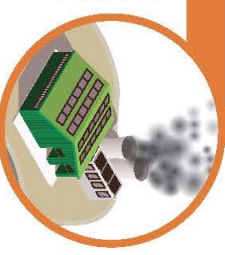
## Threats to marine and freshwater food sources



Pacific communities depend on a safe and abundant supply of seafood as their main protein source. Plastics pollution, including marine litter, threatens safe, clean, healthy, and sustainable ecosystems and, therefore, human food safety and food security in the following ways:

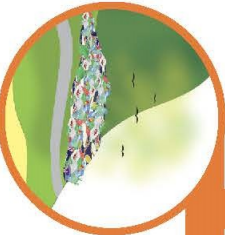
- Strangulation, entanglement, and ingestion of wildlife from plastic litter (e.g., from abandoned, lost or otherwise discarded fishing gear).
- Rafting<sup>7</sup> of POPS on litter and microplastics and entry into human food chains (contaminant sorption).
- Rafting of invasive species and pathogens on marine and freshwater litter and microplastics across territories (biofouling).
- Leaching of toxic plastic monomers<sup>8</sup> and additives<sup>9</sup> from marine and freshwater litter and microplastics into marine organisms.
- Bioaccumulation and biomagnification<sup>10</sup> (trophic transfer) of microplastics and associated chemical additives in the marine food web.
- Plastic litter, microplastics, and toxic leachate from landfill failure, flooding, transboundary tidal flows, or waste management/circular system failure.

## Climate change



Globally, 8% of fossil fuels are used for plastics production yet plastics are not produced in the region. The Pacific region is disproportionately impacted by climate change impacts all along the global plastics supply chain as well as the transboundary flows of plastics into the region exacerbate climate change impacts. Plastics exacerbate climate change impacts, and ozone depleting chemicals found in some plastics compromise access to a safe, clean, healthy, and sustainable environment.

## Agricultural impacts



- Agricultural plastics (including microplastics in controlled release fertilizers and degraded or mulched plastic films) degrade soil health and contaminate produce.
- Leachate and plastic fragments from poorly lined and failing landfills can contaminate arable soils and water supplies.

## Manufacturing and recycling



- Manufacturing and recycling of plastics expose waste workers and nearby communities to plastics pollution.
- Toxic NIAS<sup>11</sup> are introduced in the manufacturing and recycling of plastic products.

## Mosquito-borne diseases



Discarded plastics offer ideal breeding conditions for mosquitoes which can act as vectors for diseases such as dengue fever.

7. When organisms attach themselves to litter, particularly marine litter, and travel.
8. The building blocks of plastic polymers.
9. Additives in plastics can include plasticizers, flame retardants, antioxidants, acid scavengers, light and heat stabilizers, lubricants, pigments, anti-static agents, slip compounds and thermal stabilizers.
10. Bioaccumulation takes place in a single organism over its lifetime, resulting in a higher concentration in older individuals. Biomagnification takes place as chemicals transfer from lower trophic levels to higher trophic levels within a food web, resulting in a higher concentration in apex predators.
11. See <https://www.foodpackagingforum.org/food-packaging-health/non-intentionally-added-substances-nias>

## Further reading

[Plastic and Human Health: A Lifecycle Approach to Plastic Pollution](#)  
[Plastic Ingestion by Fish in the South Pacific](#)  
[A Comparison of Microplastic in Fish from Australia and Fiji](#)  
[Non-intentionally added substances \(NIAS\)](#)

This factsheet has been developed by **Dr Trisia Farrelly, Massey University, New Zealand**, and **Dr Sascha Fuller, The University of Newcastle, Australia**, in collaboration with the **Center for International Environmental Law** and the **United Nations Environment Programme**, **Nadya Vaa**, and representatives from Pacific Island nations.



# Plastics Pollution Policy Gaps in the Pacific Region

Pacific Islands policy frameworks do not capture the full life cycle of plastics. Yet, plastics emit greenhouse gases and ozone depleting chemicals, create marine litter, shed microplastics, and leach toxic chemicals throughout their full life cycle. For example, these toxic chemicals include carcinogenic monomers, additives, and persistent organic pollutants. These plastics and chemicals impact the enjoyment of the right to a healthy environment.<sup>1</sup>

The zero-waste hierarchy which prioritises waste prevention over waste management does not guide Pacific Islands' policy frameworks. There is weak horizontal and vertical integration, few commitments to the long-term elimination of marine litter and discharges of plastics, and the safe retrieval of plastics from the environment.

The absence of the precautionary principle in Pacific Islands' policies exposes human health and marine, freshwater, atmospheric, and terrestrial environments to plastic toxicants. Microplastics do not feature as a hazardous material and environmental standards, including standards for labelling, monitoring and reporting, seldom mention plastics.



Without robust policy frameworks, the volumes of problematic plastics and marine litter entering, and remaining, in the region and the marine environment, are forecast to increase rapidly over the coming decades. This will continue to compromise intergenerational environmental and human rights and exacerbate plastics-related climate change impacts.

<sup>1</sup> Determined by a policy gap analysis of ten Pacific countries: The Republic of Fiji, Papua New Guinea, Solomon Islands, Vanuatu, The Independent State of Samoa, the Kingdom of Tonga, Tuvalu, The Republic of Kiribati, the Republic of the Marshall Islands and the Republic of Palau. Farrelly, T.A., Borrillo, S.B., Fuller, S., The Strengths and Weaknesses of Pacific Islands Plastic Pollution Policy Frameworks, Sustainability 2021, 13, 1252).

## Weak plastics policy cannot protect Pacific communities

### Recommendation:

- Consider the development of a robust plastics pollution prevention policy framework for a safe(r) circular economy for plastics to
- help protect present and future generations of Pacific Islands peoples and environments from the chemical and physical harms of plastics; and
- support state obligations to adopt and implement legal and institutional frameworks protecting the human right to a healthy environment.



# Policy instruments needed to achieve a safe(r) circular economy for plastics in the Pacific

## PREVENTION

**Eliminate hazards along the entire life cycle of plastics.** All plastics policy should draw explicit links between plastics pollution and

- climate change
- biodiversity loss
- microplastics
- toxic chemicals
- human rights

**Restrict importation of pre-production pellets and plastic products, and packaging including the following:**

- Best practice on pellet handling
- National reduction targets, caps, and graduated taxes on imports of pre-production pellets and problematic plastic products
- Incentives for traditional and plastic-free reusable and refillable alternatives and systems.

**Regulate domestic manufacturing of plastic products and tourist services including the following:**

- Caps on virgin plastics
- National targets for recycled content
- Toxic additive restrictions
- Eco levies for tourist services
- Incentives for durability, reuse, refill, repurpose, repair, and eco-design

## MANAGEMENT

- Invest in reduce, reuse, refill, repurpose, and repair infrastructure
- Establish safe(r) recycling alternatives
- Develop sustainable financial mechanisms
- Legislate extended producer responsibility
- Standardise monitoring, evaluation, and reporting of plastics imports, plastics manufacture, and plastics pollution and marine litter (including impacts on economic development)
- Safety remove, retrieve, and repatriate plastics, including marine litter supported by mandatory backloading/reverse logistics

## Definitions

**Backloading/Reverse logistics:** A supply chain mechanism to ensure post-consumption plastics are returned to point of production. Eg., filling empty shipping containers with plastics waste and repatriating for safe and environmentally responsible management.

**Evaluation of impacts on economic development:** Plastics pollution is presented as a potential business risk and the costs of pollution on business is evaluated.

**Extended producer responsibility:** An environmental protection policy approach that shifts the bulk of responsibility and costs to the producer for the full life cycle impacts (including economic, social, and environmental) of plastics pollution.

**Horizontal integration:** Coordination and integration of plastics pollution prevention and management policies and legislation across government departments and ministries.

**Long-term elimination of discharges:** Sustainable long-term policy mechanisms aimed to eliminate plastics pollution along the full life cycle of plastics.

**Precautionary principle:** Lack of scientific data or certainty is an inadequate excuse for failing to prevent serious or irreversible damage.

**Primary microplastics:** Intentionally added microplastics in products such as cosmetics, marine and other paint, and industrial abrasives.

**Problematic plastics:** Avoidable, unnecessary, hard to recycle, toxic plastics including primary (intentionally added) microplastics, and non-durable products.

**Safe(r) recycling:** There is currently no 100% safe circular economy for plastics including plastics recycling. However, the following can minimize hazards: eliminate substances of concern, establish ecolabelling schemes informing consumers about chemical/recycled content, establish handling and recycling standards, maximize recyclability and recycled content of materials and set targets (exceptions include food and beverage contact materials); set targets for reduction of overall volume of materials in circulation; minimize material (including microplastics) CO<sub>2</sub>, water, and toxic emissions.

**Sustainable financial mechanisms:** Eg., waste-management fees, deposit-refund schemes, plastics taxes and levies, graduated taxes, advanced disposal fees, polluter pays, and user pays.

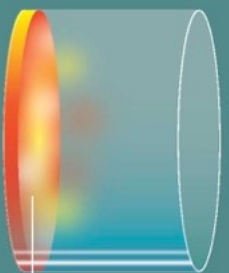
**Vertical integration:** Faithfully domesticate obligations to international and regional agreements into coherent plastics pollution prevention policy frameworks.

**Zero Waste Hierarchy:** Designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. The zero waste hierarchy prioritises prevention over management.

**Healthy environment:** Includes a safe climate, clean air, clean water and adequate sanitation, healthy and sustainably produced food, non-toxic environments in which to live, work, study and play, and healthy biodiversity and ecosystems.

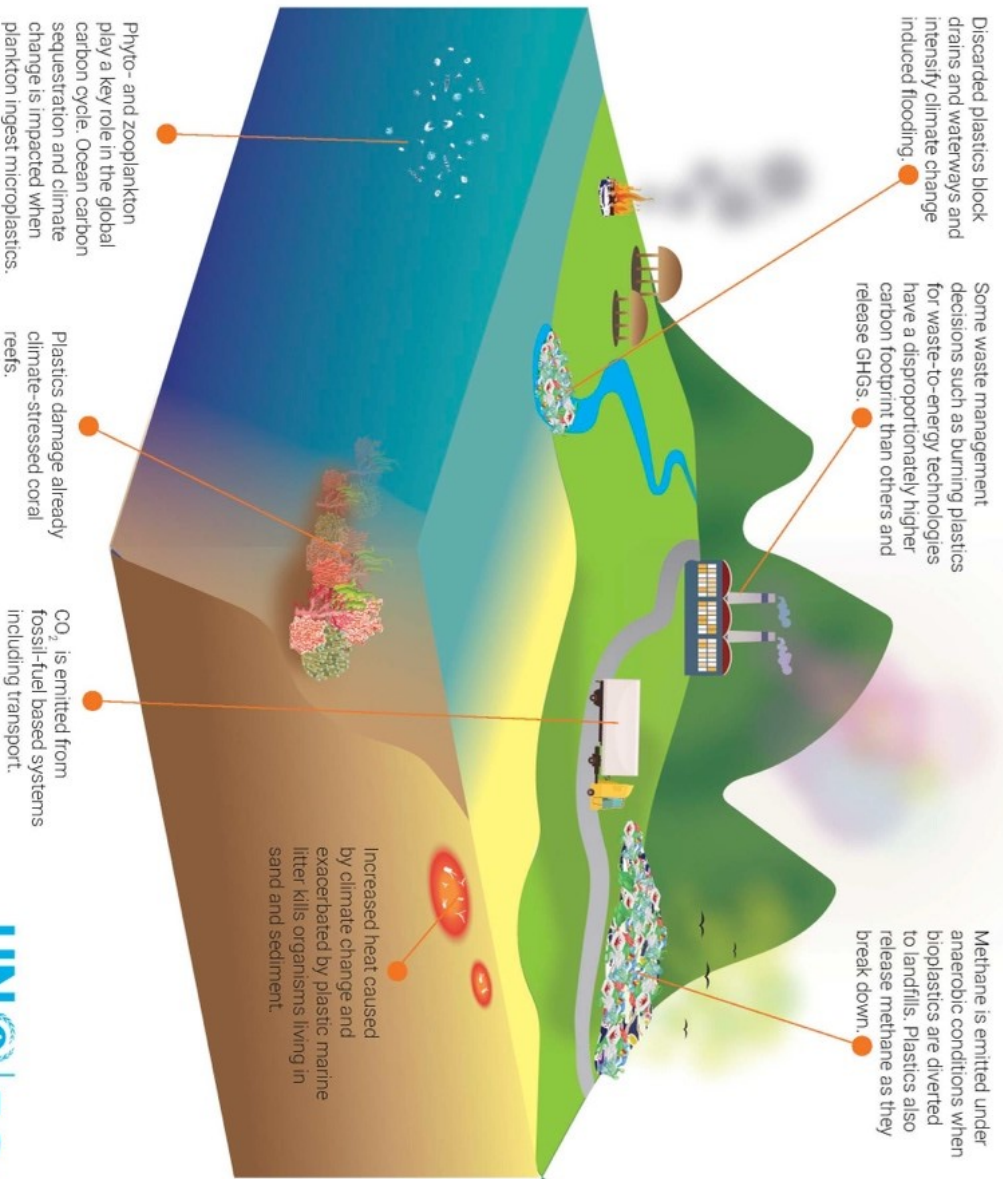
# Plastics, Marine Litter, and Climate in the Pacific Region

Global plastics production is a significant contributor to climate change impacts in the Pacific Islands region. Ninety-nine percent of plastics come from fossil fuels, and plastics production is estimated to produce >400 million tonnes of greenhouse gases (GHGs) per year. This figure does not include emissions from waste management (including transport), mismanagement, and degradation of plastic products. Plastics pollution, including marine litter, magnifies climate impacts in the Pacific region and threatens the right to a safe, clean, healthy and sustainable environment.



**CARBON BUDGET**  
2050

By 2050, it is estimated that GHG emissions from plastics could reach over 56 gigatons: 10–13 percent of the entire remaining carbon budget.





## RECOMMENDATIONS

An urgent and coordinated global response is needed that reflects the needs of the Pacific Islands as one of the regions most affected by climate change. The priority is for the world's major producers to cease the production of unnecessary and toxic fossil-fuel based plastics. Pacific Islands countries can also protect themselves by developing robust plastic pollution prevention policy frameworks which

Restrict the importation of problematic plastics including pre-production pellets and plastic products

Shorten plastics supply chains within the region

Legislate container return schemes (prioritising reuse/ refill)

Regulate the 'light weighting' of plastics<sup>1</sup>

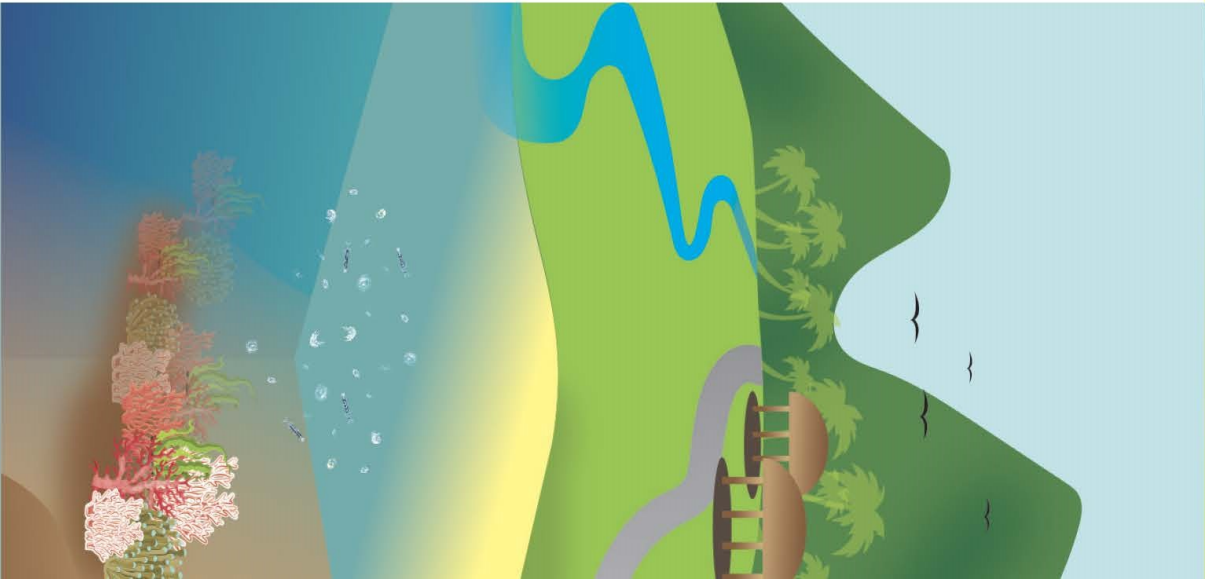
Legislate reverse logistics such as backhauling within the region

Legislate extended producer responsibility schemes that repatriate post-consumer plastics back to site of production for responsible management outside the region

Strengthen compliance and enforcement of waste dumping (including lost and discarded fishing gear)

Ban waste-to-energy incineration

<sup>1</sup> 'Light weighting' becomes a false solution when it involves reducing the weight of each packaging unit while increasing overall production units. Light weighting can undermine the reusability and recycling and can distract from the need to scale refill and reuse models.



## Further reading:

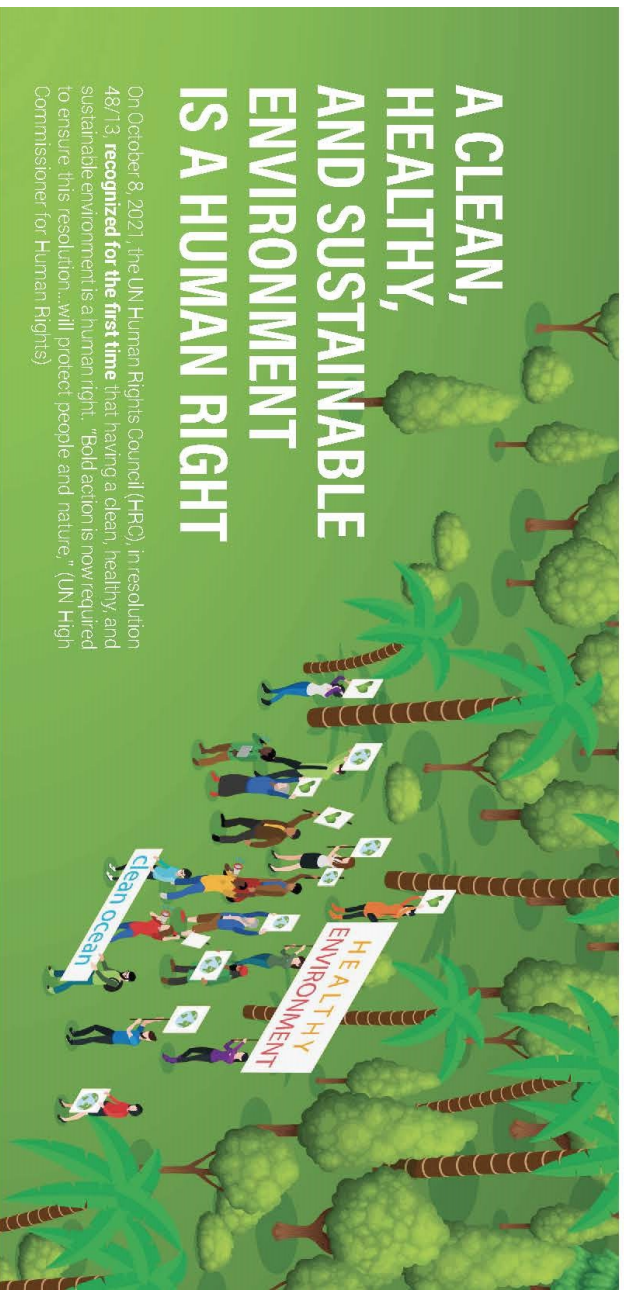
- The Clean Seas Campaign on Marine Litter (UNEP)
- Global Partnership on Marine Litter (UNEP)
- Plastic and Climate Change: The Hidden Costs of a Plastic Planet (CIEL)
- UNEP's Beat Pollution Campaign

# The Business of Plastics:

## The impacts of plastics pollution on human rights in the Pacific Region

Despite the known environmental and human health harms of plastics, the Pacific Islands are under tremendous pressure to continue to import plastic products, to meet the high consumption expectations of tourists, and to manufacture plastics domestically. Current legal and policy frameworks in the region either exclude or include limited **trade-related provisions, production, manufacturing, importation, packaging, and end-of-life standards**, and **technical regulations** for plastics, persistent organic pollutants, and chemical additives.

This creates conditions for the unrestricted transboundary movement of problematic plastics and subsequent contamination of air, soils, freshwater systems, and the ocean with plastics pollution, including marine litter and microplastics. These legislative and enforcement gaps provide loopholes by which international trading partners and domestic manufacturers can choose to avoid their human rights responsibilities, in particular, those related to a healthy environment.



## A CLEAN, HEALTHY, AND SUSTAINABLE ENVIRONMENT IS A HUMAN RIGHT

On October 8, 2021, the UN Human Rights Council (HRC), in resolution 48/13, **recognized for the first time** that having a clean, healthy, and sustainable environment is a human right. "Bold action is now required to ensure this resolution...will protect people and nature." (UN High Commissioner for Human Rights)

Once produced and released into the environment, **plastics never disappear**; they break down and disperse into physical, chemical, and gaseous forms.<sup>1</sup> The long-term contamination of all ecological systems involves food and water sources, soils, air, humans, and animals. Due to the transboundary nature of plastics, particularly marine litter, nation states and businesses have obligations and responsibilities to cooperate to prevent, reduce, and control sources of, and exposure to, plastics pollution, and to remediate leakage to the environment (see next page).

**All nation states will continue to fail to protect citizens from human rights abuses if they allow plastics production and manufacturing companies to devastate the health of the Pacific Islands.**

<sup>1</sup> Plastic & Health: The Hidden Costs of a Plastic Planet (CLEU), Plastic and Climate: The Hidden Costs of a Plastic Planet (CLEU)

# Plastics pollution threatens human rights<sup>2</sup>

**THE RIGHT TO A HEALTHY ENVIRONMENT**  
since plastics pollution contaminates all elements of the natural environment.

**THE RIGHT TO THE ENJOYMENT OF THE HIGHEST ATTAINABLE STANDARD OF PHYSICAL AND MENTAL HEALTH**  
since plastics and their additives have the potential to harm human health all along their life cycle, and that eco-anxiety has increased alongside the rapidly growing scale and impacts of global plastics pollution.

## State Obligations to Protect and Promote a Healthy Environment

In addition to environmental laws and regulations, human rights laws, norms, and standards also obligate governments to take effective measures to protect and respect the right to a healthy environment. In the Pacific Region, this does not yet include obligations related to the full lifecycle of the plastics they import and manufacture including safe end-of-life management.

## These obligations are not currently reflected in Pacific Islands' policy frameworks

**Assessing environmental impacts of plastics on human rights.** No national or regional monitoring, reporting, harmonised definitions, inventories, targets, nor standards for plastics and plastic products.

**Making environmental information public.** No ecolabelling nor certification schemes to ensure only safe and easily recyclable<sup>3</sup> or reusable materials are imported or manufactured in the region and to inform consumers of toxic content and safe handling and treatment.

**Facilitating participation in environmental decision-making.** No community consultation framework for decision-making regarding plastics and plastics pollution.

**Providing access to effective remedies.** Minimal protocols and plans to support landfill remediation and upgrade; no strategic plan for the safe recovery of legacy plastics and no repatriation supported by extended producer responsibility (EPR) schemes.

**Adopting and implementing legal and institutional frameworks that protect against environmental harm.** Policy frameworks lack a precautionary approach to plastics and associated toxic chemicals. Preventative measures are not the primary investment focus resulting in a failure to capture the full life cycle of plastics including primary and secondary microplastics, human health, human rights, biosecurity, biodiversity, and climate change impacts.

**Regulating private actors.** Policy and legislative frameworks do not incentivise corporate responsibility, enforce responsible business practices and models, and disincentivise externalisation of costs, including compliance with mandated EPR such as container deposit legislation.

**Protecting members of groups particularly vulnerable to environmental harm (i.e., protecting the rights of women, children, indigenous peoples, and local communities).** No recognition that plastics pollution disproportionately harms individuals, and groups of people in vulnerable situations. Therefore, policy frameworks do not adequately protect these populations from the harms of plastics pollution.

**International cooperation on global environmental problems such as plastics pollution.** While Pacific Island nations have joined global collective action to address plastics pollution through the Pacific Regional Declaration on the Prevention of Marine Litter and Plastic Pollution, national policy frameworks do not faithfully domesticate and integrate international obligations related to plastics making international cooperation difficult.

<sup>2</sup> Report of the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes

<sup>3</sup> Excluding "false solutions" including downcycling.

**THE RIGHT TO AN ADEQUATE STANDARD OF LIVING**

since Pacific Islands' populations depend on natural resources for economic sustainability, health, and wellbeing. Plastics also contribute to, and exacerbate climate change impacts, which threaten an adequate standard of living including the right to food and the right to water.

**THE RIGHT TO WATER**  
since plastics contaminate freshwater sources including rain and ground water.

**THE RIGHT TO FOOD**

since plastic pollution contaminates agricultural soils; and marine, freshwater, and terrestrial food sources

**THE RIGHT TO LIFE**

since microplastics and plastics-related toxicants inhibit fertility and reproduction, have been found the placentas of unborn babies, and many of the human health impacts of plastics include the disruption of inter- and transgenerational genetic expression.

If countries do not put in place and enforce the legal and policy frameworks needed to effectively regulate the operations of production and manufacturing companies, the health and rights of Pacific Islands people will be increasingly negatively impacted as global plastic production volumes rise, along with the social and economic costs of remedy (including landfill remediation, clean-ups from polluting events, and legacy pollution).

## The world's worst offenders for plastics pollution

Metric tonnes of plastic packaging produced annually.

As of 2020. Based on companies that have disclosed their packaging figures. Source: Changing Markets Foundation



2,900,000



820,000



2,300,000

P&G

714,000



1,700,000

## Business Responsibilities to Respect Human Rights, in particular, the Right to a Healthy Environment

### The UN Guiding Principles on Business and Human Rights (2011)

recognise the responsibilities of business to address (identify, prevent, mitigate, and remediate) the adverse human rights and environmental impacts of their activities, products and services, and business relationships. They apply to all business enterprises, both transnational and others, regardless of their size, sector, location, ownership, and structure. In the Pacific Region, national policies and plans need to be strengthened to incorporate these principles to prevent plastics pollution, including marine litter.

### Businesses policy commitments

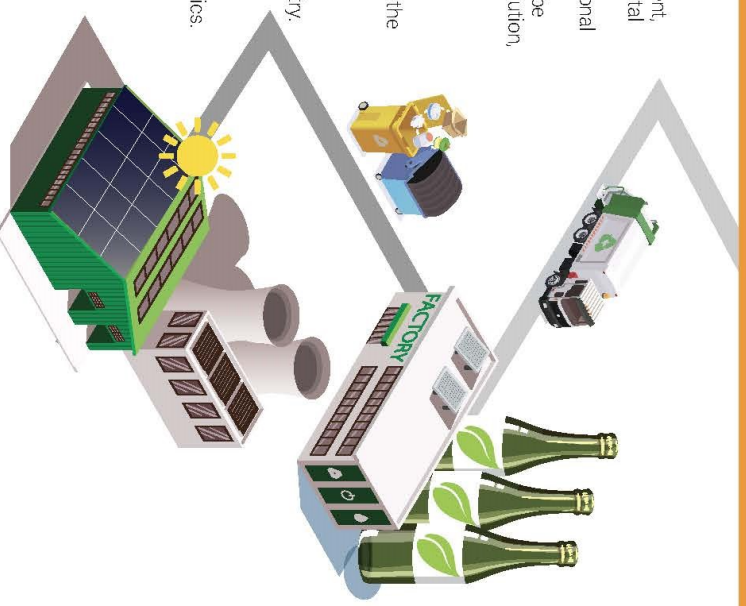
Despite public commitments and voluntary pledges, businesses continue to focus on, and invest in, waste management almost to the exclusion of preventative commitments.

### Human rights and environmental due diligence process

There is a lack of due diligence processes within the plastic industry.

### Remediation processes

Policy and legislative frameworks do not provide mechanisms for accountability ensuring effective reparations for harms from plastics.





## RECOMMENDATIONS

To meet their human rights obligations, and to actualise the Pacific Regional Declaration on the Prevention of Marine Litter and Plastic Pollution States should:

**These measures will strengthen discussions on the global governance of plastics**



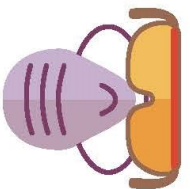
Develop National Action Plans on Business and Human Rights that include specific policies and commitments related to tackle plastic pollution.



Adopt or update National Plastics Pollution Prevention Plans (NPPs) with measurable targets required to faithfully domesticate international obligations related to plastics across legal and policy frameworks. These must include human rights obligations related to a healthy environment, whilst ensuring inclusive design, adoption, and implementation measures.

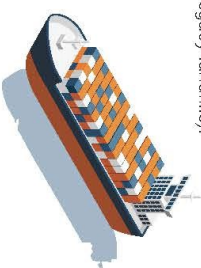


Ensure that the right to an effective remedy for human rights infringements for affected people including communities in vulnerable situations, is guaranteed, and that fair, long term and timely compensation is offered, (e.g., clean ups and safe remediation of legacy landfills).



Businesses should ensure that their operations, including their global supply chains, disclose and address human rights and environmental risk related to plastics pollution. Corporate responsibility action plans should also include due diligence statements that reflect commitments to the environment and human rights.

Voluntary or mandatory EPR schemes should include take-back schemes whereby all the plastics that enter the Pacific region at end of life, are returned to producers for responsible management<sup>4</sup>



**These measures ensure Pacific Island communities and their environments, are protected from the human rights threats presented all along the lifecycle of plastics**

<sup>4</sup> Responsible management does not include false solutions such as waste-to-energy technologies

## Additional Resources

2021 UNGA Report of the Special Rapporteur on toxics and human rights, on the stages of the plastics cycle and their impacts on human rights

2018 UN HRC Report of the Special Rapporteur on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment

Special Rapporteur on Toxics and Human Rights  
Special Rapporteur on Human Rights and the Environment  
Working Group on Business and Human Rights



## A Safe(r) Circular Economy

### Key Points:

How much plastic will enter the world's oceans if we continue business as usual?

What is meant by a "circular economy"?

How will a circular economy for plastics help the Pacific Region?

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## Plastics Impacts on Human Health in the Pacific Region

### Key Points:

What size of plastic are most dangerous to human health?

List 3 diseases that are caused by plastics.

What is one major indirect human health hazard from plastics?

# Plastics Pollution Policy Gaps in the Pacific Region

## Key Points

What is the risk of not having robust policy frameworks regarding plastic pollution?

Does the zero-waste hierarchy prioritise prevention or management?

What is one thing that Pacific governments could do to better prevent plastic waste?

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# Plastics, Marine Litter, and Climate in the Pacific Region

## Key Points

Where does 99% of plastics come from?

List 3 impacts of plastic on our environment.

What is one recommendation that could be done to limit the impact of plastic on the environment?

# **The Business of Plastics: The impacts of plastics pollution on human rights in the Pacific Region**

## **Key Points**

When was having a clean, healthy and sustainable environment recognised as a human right by the UN?

What other human rights do plastics potentially violate?

What are some of the worst companies for plastic pollution? Can you think of some of the products they make that have plastics?

## Lesson 3: Beach Clean Up

<b>Introduction</b>	The aim of this exercise is to get out and about to a local beach to see marine litter firsthand and record the types of litter you find. Remember if you don't live near a beach, you can clean a riverbank or even your community area.		
<b>Ages</b>	Ages 5-16	<b>Number of Periods</b>	1
<b>After this lesson</b>	Students will be able to describe some of the negative impacts of plastic debris in the ocean.		
<b>Content Focus: Mathematics, Science and Technology</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• Beach, river, or village field site</li> <li>• Notebooks and Pencils.</li> </ul>		
<b>Lesson Outline</b>	<ul style="list-style-type: none"> <li>• Check the tide times and select a date and time for two hours or more after high tide, and not on an incoming tide.</li> <li>• Enter at the beach, select a 100-metre stretch of beach and mark out the area to search. This should run from the the high tide mark (where you often get a collection of shells and where the sand changes colour) to the back of the beach.</li> <li>• Organise your students in groups and ask them to pick up and record and tally all the marine litter they find in the designated area described above.</li> <li>• Ask the students to tally on the tables provided.</li> <li>• The <b>Beach Clean Up table</b> on the following page can be used as inspiration for primary school children.</li> <li>• <b>The Tangaroa Blue data sheets</b> (6 pages) can be used for secondary school children.</li> <li>• Once completed make sure you dispose of the rubbish responsibly and bring a selection of clean, safe litter items back to the classroom for your ephemeral art project (lesson ?)</li> </ul> <p>Once back in the classroom collate all the records from the groups of students, creating counts from the tallies of items. Older students can go draw graphs to identify the most common categories.</p> <p>Reflect upon your findings. Is this what you were expecting? What was the most commonly recorded item? Is this something that your students used from day today? What was the most surprising waste form?</p> <p>The waste can be kept and used again in <b>Lesson 4: Endangered Marine Species</b></p>		
<b>Extension for Older Students</b>	Older for Extension students should use the Tangaroa Blue data sheets instead of the <b>Beach Clean Up table</b> .		

# What did you find on the beach?

Plastic	Plastic food container	
	Plastic bottles	
	Plastic straws	
	Fishing gear	
Metal	Drinks can	
Rubber		
Glass		
Wood		
Cloth		



## COMPREHENSIVE DATA COLLECTION SHEET

Tangaroa Blue Foundation

PO Box 1235, Dunsborough, WA 6281 | www.tangaroablue.org



Name of clean-up location			
Clean-up locality		Locality postcode	
Nearest town		Nearest road or landmark	
Date	Start time	Finish time	Number volunteers
Contact name		Phone or email	
Organisation/ School (if applicable)			
Total filled bags	Total weight (kg)	Length of site cleaned (m)	
Average width of site (m)		Type of adjoining land	

**Country of origin and barcode information from intact labels can be entered in the tally and note section against the particular item or in the section at the end of the datasheet.**

Plastic Items - Consumer		Total	Tally and note
Cigarette butts & filters			
Cigarette lighters			
Pens, markers & other plastic stationary			
Straws, confection sticks, cups, plates & cutlery	Straws		
	Confection sticks		
	Cups		
	Cutlery		
	Plates		
Toothbrushes, brushes & combs, hair ties etc			
Toys, party poppers, ribbons, clips & similar			
Childcare items			
Drug paraphernalia			
Fibreglass fragments			
Plastic ceremonial & festive (wreaths, flowers, wrist bands)			
Plastic first aid materials & equipment (band aids)			
Plastic furniture outdoor & camping			
Plastic gardening items, implements & fittings			
Plastic housewares, tablewares, house fittings			
Recreation & outdoor equipment			
Plastic Items - Packaging		Total	Tally and note
Bleach & cleaner bottles			
Lids & tops, pump spray, flow restrictor & similar			
Personal care & pharmaceutical packaging			



## COMPREHENSIVE DATA COLLECTION SHEET

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Plastic bags (supermarket, garbage, dog poo, ice)		
Plastic containers non-food (oil, sealant, chemical)		
Plastic drink bottles (water, juice, milk, soft drink)		
Plastic packaging food (wrap, packets, containers)		
Plastic wrap non-food (bubble wrap, cigarette packaging etc)		
Strapping band scraps		
Strapping band whole (record as single item)		
Bleach bottle KKK type		
Mesh bags (vegetable, oyster & mussel bags)		
Packaging accessories (seals, reels, spools, handles)		
Plastic bottles, drums, jerrycans & buckets over 4 litres		
Plastic drink package rings, six pack rings, ring carriers		
Plastic sheeting (tarpaulin, woven bags, pallet wrap)		
Synthetic cardboard (coreflute) signs & packaging		
<b>Plastic Fishing Items</b>	<b>Total</b>	<b>Tally and note</b>
Bait & tackle bags & packaging	Bait bags	
	Tackle bags & packaging	
Bait containers & lids, bait savers		
Commercial fishing remnants (float, pot, crate bits)		
Chemical light sticks/ glow sticks		
Fishing line in metres (recreational)		
Recreational fishing items (lures, floats, rods, reels)		
Rope & net scraps less than 1 metre		
Rope (estimated length in metres)		
Aquaculture items		
Baskets, crates & trays		
Commercial fishing traps, pots & intact parts		
Fishing line in metres commercial (monofilament)		
Fishing net over 1m <sup>2</sup> ( in square metres - m <sup>2</sup> )		
Plastic buoys and floats		
<b>Plastic Items - Remnants</b>	<b>Total</b>	<b>Tally and note</b>
Plastic bits & pieces hard & solid		
Plastic film remnants (bits of plastic bag, wrap etc)		
Remnants burnt plastic		

V21.1101

Page 2 of 6



## COMPREHENSIVE DATA COLLECTION SHEET

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ReefClean

Plastic Items - Industrial, Commercial, Shipping & Miscellaneous	Total	Tally and note
Blasting items		
Cable ties & plastic fasteners		
Carpet & lino household, boat deck & padding		
Marine safety, survival & boating equipment		
Medical waste		
Municipal activities (tree guard, barrier fence etc)		
Occupational health & safety items (face masks, gloves etc)		
Plastic electrical cable, connectors & fittings		
Plastic farming implements, devices & fittings		
Plastic oddments		
Plastic pipe PVC, irrigation & reticulation		
Plastic tubes & hoses		
Plastic vehicle parts		
Research items oceanic		
Shotgun cartridges and wadding		
Syringes medical		
Syringes veterinary		
Tags		
Tape adhesive, electrical, duct, hazard marker & rolls		
Foamed Plastic (Polystyrene) Items	Total	Tally and note
Foam buoys		
Foam cups, food packs & trays		
Foam insulation & packaging (whole and remnants)		
Drift net floats		
Foam sponge sheeting (mattress & similar)		
Other Materials	Total	Tally and note
Oil globules & tar-balls		
Sanitary (tissues, nappies, condoms, cotton buds)		
Appliances, electronics & batteries		
Boat parts, wreckage & remnants		
Building & trades materials, fixings & fittings		
Container contents intact & spilt content		





## COMPREHENSIVE DATA COLLECTION SHEET

Tangaroa Blue Foundation

PO Box 1235, Dunsborough, WA 6281 | [www.tangaroablue.org](http://www.tangaroablue.org)



Food scraps		
Organic materials		
Personal effects (wallets, money, keys, jewellery)		
Pets handling & care items		
Soap, dry lubricant & glue		
Wax (surf wax, candles, paraffin and similar)		
Weather balloon parts (radiosonde, target, balloon neck, torch)		
<b>Glass &amp; Ceramic Items</b>	<b>Total</b>	<b>Tally and note</b>
Fluorescent light tubes and bulbs		
Glass beer stubbies & pre-mixed alcohol bottles		
Glass jars & sauce bottles		
Glass or ceramic broken		
Glass wine, spirit and similar bottles		
Construction material (brick, cement, pipe)		
Glassware & ceramic items		
<b>Cloth Items</b>	<b>Total</b>	<b>Tally and note</b>
Binding, thread, string & cord natural		
Cloth, clothing, hats & towels		
Canvas, sailcloth & hessian materials		
Rope natural (estimated length in metres)		
<b>Metal Items</b>	<b>Total</b>	<b>Tally and note</b>
Aerosol cans		
Aluminium cans		
Foil wrappers, packets, bladders & alfoil		
Metal bottle caps, lids & pull tabs		
Metal fishing items (sinkers, lures, hooks, traps, pots)		
Tins under 4 litres (food, drink tins and similar)		
Gas & volatile liquid capsules & cans		
Gas bottles		
Metal bicycle, shopping trolley and similar		
Metal drums, cans & buckets over 4 litres		
Metal building & trades materials, fixings & fittings		
Metal buoys & Floats		



## COMPREHENSIVE DATA COLLECTION SHEET

Tangaroa Blue Foundation

PO Box 1235, Dunsborough, WA 6281 | [www.tangaroablue.org](http://www.tangaroablue.org)



Metal marine engine & boat parts & fittings			
Metal motor vehicle parts & batteries			
Metal outdoor equipment, implements, furniture			
Metal scrap & remnants			
Metal signs and sheeting			
Metal tools			
Metal unspecified			
Small machinery & electric motors			
White goods			
Wire, metal stakes & pipes			
<b>Paper &amp; Cardboard Items</b>		<b>Total</b>	<b>Tally and note</b>
Newspaper, magazines & brochures			
Paper & cardboard packaging (boxes, food, takeaway etc.)			
Tetra packs & drink cartons			
Miscellaneous paper, labels & tickets (paper remnants)			
<b>Rubber Items</b>		<b>Total</b>	<b>Tally and note</b>
Balls & toys, elastic straps & bands	Rubber balloons		
	Balls		
	Toys		
	Elastic straps		
	Bands		
Rubber footwear & thongs			
Rubber remnants			
Rubber buffers, tyres, seals & similar			
Rubber sheeting			
<b>Wood Items</b>		<b>Total</b>	<b>Tally and note</b>
Brooms, brushes & paint brushes			
Processed timber, pallets & other wood			
Wooden confection sticks, pencils, matches etc			
Wooden fishing items			
Wooden furniture			



# COMPREHENSIVE DATA COLLECTION SHEET

Tangaroa Blue Foundation

PO Box 1235, Dunsborough, WA 6281 | www.tangaroablue.org



ReefClean

Additional Information	Check	Comments
Did you observe any plastic resin pellets?	YES <input type="checkbox"/> NO <input type="checkbox"/>	
Did you observe any dead/ injured animals or birds?	YES <input type="checkbox"/> NO <input type="checkbox"/>	
Did you observe any highly unusual beach conditions?	YES <input type="checkbox"/> NO <input type="checkbox"/>	

Use this space for items unable to be placed above and for recording foreign label details

Other comments and feedback

v21.1101

CLEAR

EMAIL

PRINT

Page 6 of 6

# Lesson 4: Endangered Marine Species

Introduction	In this lesson, students will learn about marine debris, or marine plastic pollution, and the Great Pacific Garbage Patch. Students will undertake a reading comprehension activity, where they are asked to read an article about the Great Pacific Garbage Patch, and then answer questions related to it.		
Ages	Ages 5-16	Number of Periods	1
After this lesson	Students will be able to define marine debris and describe the Great Pacific Garbage Patch. They will be able to identify what has caused it, and why cleaning up the Patch is a difficult endeavour.		
<b>Content Focus: English; Social Sciences</b>			
What you Need to Prepare	<ul style="list-style-type: none"> <li>• Collected marine debris (could be from <b>Lesson 3</b>)</li> <li>• Bags (old fish food bags are ideal)</li> <li>• Gloves</li> <li>• Tarp</li> <li>• Need washed marine debris, E</li> <li>• Option: print <b>Endangered Marine Species Photopack</b></li> <li>• Option: a camera or smartphone for photographing the artwork.</li> </ul>		
Lesson Outline	<p><b>5 Minutes: Opening discussion</b></p> <ul style="list-style-type: none"> <li>• What does everyone know about endangered species in the oceans?</li> </ul> <p><b>10-15 Minutes: Class Reading</b></p> <ul style="list-style-type: none"> <li>• As a class, or individually, students read through the <b>Endangered Marine Species Factsheet</b></li> </ul> <p><b>10 Minutes: Discussion</b></p> <ul style="list-style-type: none"> <li>• What can we do about this? How can we raise awareness of this?</li> <li>• Lead the discussion to the idea of making an artwork of endangered species out of waste.</li> </ul> <p><b>Ephemeral art means an artwork that is designed to be short lived.</b></p> <p>Using Objects gathered during <b>Beach Clean Up (Excursion):</b></p> <ul style="list-style-type: none"> <li>• Wash and dry collected objects - removing cigarette butts, sharps, broken glass, band aids etc.</li> <li>• Students empty dried, washed collection onto a tarp.</li> <li>• Students then do the Activity: <b>Ephemeral Art using Microplastics</b> make art using the washed items - can make a statement - stop single use plastics; or create an endangered animal using the pictures as stimulus.</li> <li>• Can use the images in <b>Endangered Marine Species Photopack</b> to inspire their creations</li> </ul>		
Extension for Older Students	Students could photograph their collections and create an exhibition of their work at school or the local community to raise awareness of the problem of waste..		

## **Endangered Marine Species Factsheet**

The Pacific Islands are characterized by their immense biodiversity and endemism (where species are found only in one location, i.e., the Pacific Islands). They are home to at least 44,000 marine species. Of these species, around 11% are threatened species, which means they are under threat of extinction.

Threatened and migratory marine species are the iconic, often beloved, or revered species, that have provided generations of Pacific Islanders with inspiration and are embedded in culture, stories, and as totems.

The Pacific islands region supports over 33 species of whales and dolphins - 40% of the world's known species of cetaceans (whales, porpoises and dolphins). The region is home for six out of the seven known species of marine turtles, it is habitat for many sharks and ray species, and 100 species of breeding seabirds in the region. The Pacific Ocean supports some of the world's largest remaining populations of dugong.

## **Pacific Islands Regional Marine Species Programme 2022 - 2026 Vision**

A healthy Pacific Ocean with thriving populations of whales, dolphins, marine turtles, dugongs, sharks, and rays and seabirds, and the associated ecosystems on which they depend and contribute which assures the aspirations of Pacific island peoples and protects their natural and cultural heritage

## **What is happening? Conservation Challenges**

Marine species face a wide an increasing range of human induced threats to their survival including overfishing marine pollution and climate change. This lesson we will concentrate on marine pollution or marine debris.

## **Marine Pollution**

Impacts from marine pollution are continuing to increase. Marine species are directly affected through consumption and interactions causing mortality or long-term health impacts including from:

- point sources of pollution
- poor catchment management and coastal development
- discharges from shipping and accidents
- plastic pollution (of great concern to Pacific Island Member states)
- poorly designed marine tourism infrastructure development

## **Tourism and Marine Pollution**

Marine tourism can provide much-needed income for Pacific Island countries and local communities. However, the impacts from developing tourism infrastructure and the direct impacts of operations to view marine species need to be carefully managed.

## **Endangered Marine Species in the Pacific**

It is estimated that 11% of marine species in the Pacific are threatened species. Marine animals in the Pacific that are critically endangered and threatened include the Largetooth Sawfish, Pondicherry Shark, Futuna's Emperor, Beck's Petrel, Fiji Petrel, Hawksbill Turtle, Mottled Eagle Ray, Ornate Eagle Ray, Blue Whale, Sei Whale, Speartooth Shark, Scalloped Hammerhead, Finetooth Rockclimbing Goby, Indian Yellow-nosed Albatross, Humphead Wrasse and the Vanderloos Angelfish.

## Activity: Ephemeral Art using Microplastics

One way we can raise awareness of the problem of marine plastic pollution threatening our marine species is by creating and publishing ART.

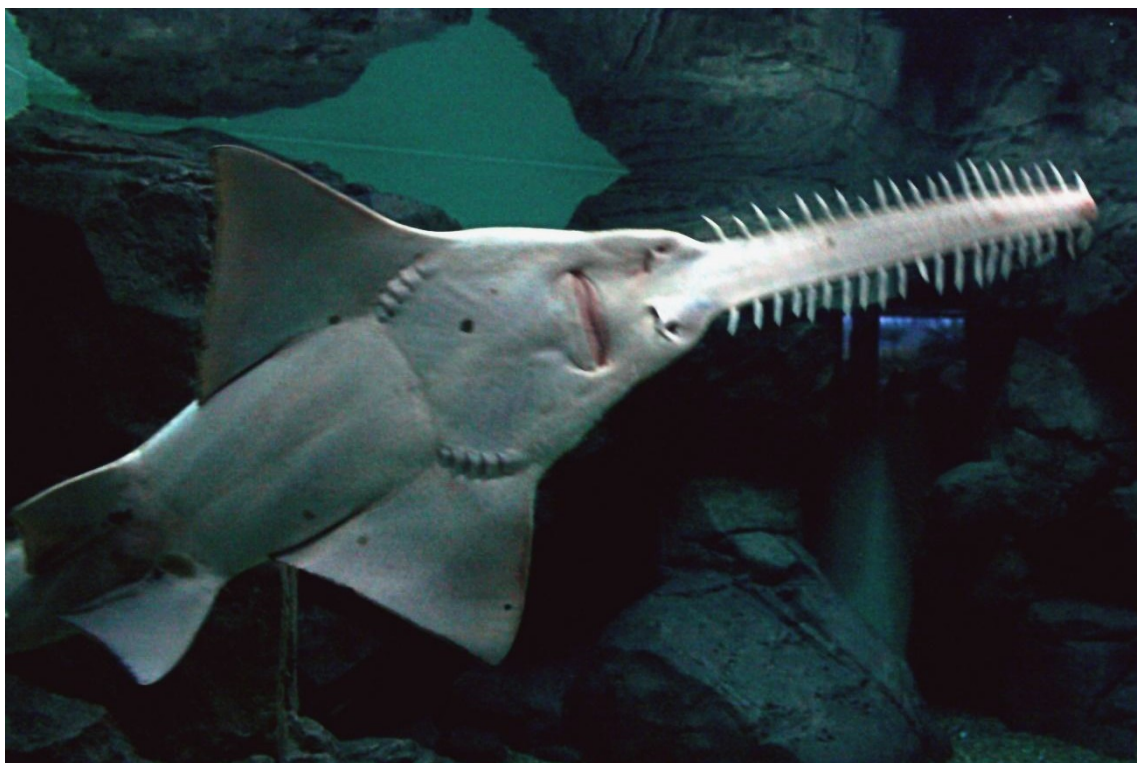
### Task:

- Create an ephemeral (lasting for a short time) artwork. Note, the artwork may last for a short time, but the plastic pollution may last forever!
- Create it out of plastic that has been collected from the beach
- Make the subject a marine animal or a message for taking action against plastic in the sea or saving our endangered marine species. We have provided pictures of critically endangered and threatened marine species found in the Pacific Ocean for inspiration.

### Artwork examples:



Endangered Marine Species Photopack



**Figure 1** Largetooth Sawfish (*Pristis microdon*)

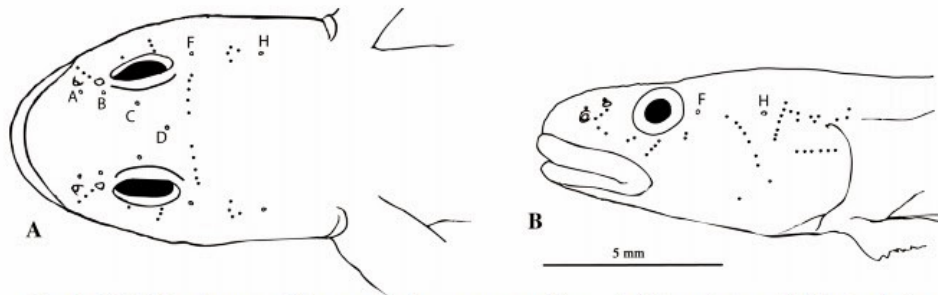


**Figure 2** Pondicherry Shark (*Carcharhinus hemiodon*)



**A**

*Akihito futuna*. **A**: Male, paratype MNHN 2006-0776; Futuna Island, Vanifao River; 15 Oct. 2004; Keith, Marquet, Sasal, Labrousse coll. (picture by P. Keith)



head of *Akihito futuna* with pores and sensory papillae. **A**: Dorsal view; **B**: Lateral view.

*Figure 3 Futuna's Emperor (Akihito futuna)*



*Figure 4 Beck's Petrel (Pseudobulweria becki)*





**Figure 5** Fiji Petrel (*Pseudobulweria macgillivrayi*)



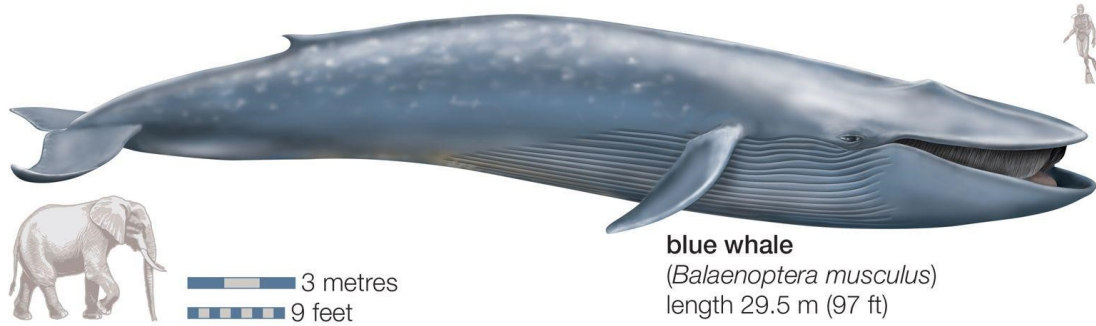
**Figure 6** Hawksbill Turtle (*Eretmochelys imbricata*)



**Figure 7** Mottled Eagle Ray (*Aetomylaeus maculatus*)



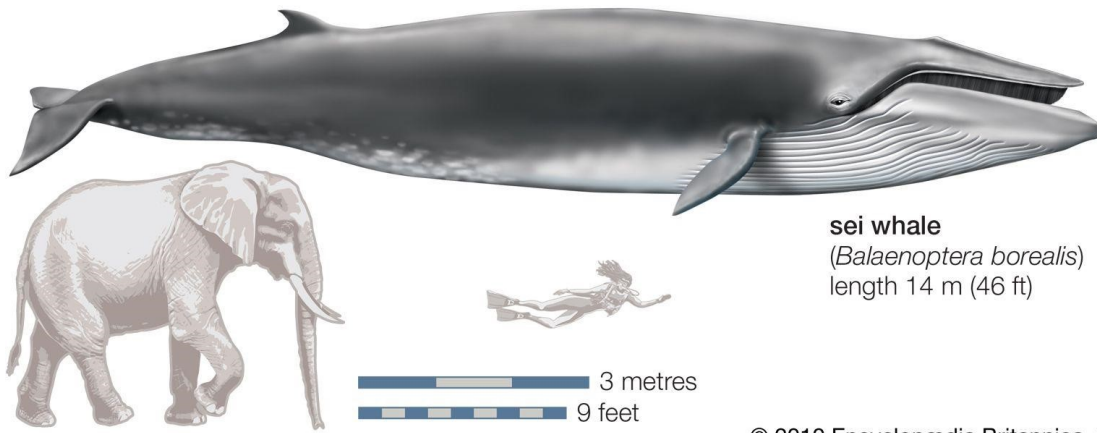
**Figure 8** Ornate Eagle Ray (*Aetomylaeus vespertilio*)



**blue whale**  
*(Balaenoptera musculus)*  
length 29.5 m (97 ft)

© 2010 Encyclopædia Britannica, Inc.

**Figure 9** Blue Whale (*Balaenoptera musculus*)



**sei whale**  
*(Balaenoptera borealis)*  
length 14 m (46 ft)

© 2010 Encyclopædia Britannica, Inc.

**Figure 10** Sei Whale (*Balaenoptera borealis*)



**Figure 11** Scalloped Hammerhead (*Sphyrna lewini*)



**Figure 12** Finetooth Rockclimbing Goby (*Sicyopterus eudentatus*)



**Figure 13** Indian, Yellow-nosed Albatross (*Thalassarche carteri*)



**Figure 14** Humphead Wrasse (*Cheilinus undulatus*)



**Figure 15** Vanderloos Angelfish (*Chaetodontoplus vanderloosi*)





**SPREP**  
Secretariat of the Pacific Regional  
Environment Programme



This initiative is supported by **PacWastePlus**-a 85 month project funded by the European Union (EU) and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to **sustainably and cost effectively improve regional management of waste and pollution.**

# Pacific Waste Curriculum

## UNIT 9: Advocacy and Action for Change



March 2024



This curriculum unit was prepared by:



THE UNIVERSITY OF  
**NEWCASTLE**  
AUSTRALIA



Education



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Learn more about the PacWaste Plus programme by visiting

[www.pacwasteplus.org](http://www.pacwasteplus.org)



## **Unit Outline:**

The preceding units have been developed to educate students of the nature of waste, the product life cycle, and the issues presented as a combination of these factors. They have also aimed to provide students with practical solutions for how they can help at home, and at school.

This unit encourages students to become more active in their broader community, to help educate others about waste and the issues it causes. By encouraging students to become more active in their communities, the waste problem can be better addressed by everyone collectively.

# Lesson 1: Take a Stand on Waste

Introduction	This activity encourages students to think critically about who is responsible for waste issues, listen to and consider a range of views, and develop and express opinions about taking responsibility for waste.		
Ages	10-18	Number of Periods	1-2
After this lesson	Students have an understanding about the different views and opinions about taking responsibility for waste.		
<b>Content Focus: English, Social Sciences</b>			
What you Need to Prepare	<ul style="list-style-type: none"> <li>• A sign that reads ‘strongly agree’ and one that reads ‘strongly disagree’.</li> </ul>		
Lesson Outline	<p><b>5-10 Minutes- Class discussion:</b></p> <ul style="list-style-type: none"> <li>• Open question to the students “Who is responsible to bring about the change we need?”</li> </ul> <p><b>10-15 Minutes. Class reading</b></p> <ul style="list-style-type: none"> <li>• Individually or as a class, students read through <b>Campaigning and Advocating for Change Factsheet.</b></li> </ul> <p><b>5-10 Minutes- Class discussion</b></p> <ul style="list-style-type: none"> <li>• Outline “<b>Take a Stand</b>” activity to students.</li> <li>• Highlight to students that there is no “Right” or “Wrong” answer, this lesson is about investigating opinions.</li> </ul> <p><b>15-20 minutes.</b></p> <ul style="list-style-type: none"> <li>• Work through the activity outlined in “<b>Take a Stand Instructions</b>” with students.</li> </ul> <p><b>10–15-minute Class discussion.</b></p> <ul style="list-style-type: none"> <li>• If you changed your minds, what were some of the things that made you change?</li> <li>• Why is it important to hear a range of views or opinions about an issue such as waste?</li> <li>• In what ways has this discussion increased your understanding about the waste issue?</li> </ul>		
Extension for Older Students	<ul style="list-style-type: none"> <li>• Repeat the activity using other statements that you develop. Here are some more examples: ‘Teachers are responsible for the school environment,’ ‘Business and industry are responsible for waste,’ ‘Rubbish dumping is a more important issue than water quality.’</li> <li>• Now that you have discussed who is responsible, what should you do to make sure these responsibilities are fulfilled? Work together to undertake a community action against waste.</li> </ul>		

## Campaigning and Advocating for Change Factsheet

Sometimes we get frustrated because we don't think enough attention is given to an issue that we feel is important. When we try to influence the regulations or laws of our governments or try to convince a local industry to improve its waste management practices then this is called advocacy.

Advocacy is the act of publicly recommending a course of action or being actively supportive of a cause. It is done when people are not satisfied with the status of something in their community or country and they want to do something more targeted than voting in an election.

If you feel there are some important changes to make in your community that will improve the way waste is managed, you may want to convince the public, leaders, or decision makers to consider your ideas.

People are turning to advocacy to improve society by influencing decision makers who have more power to make changes happen. We must let our politicians, village leaders, church officials, women's groups, and business owners know what we value and how they can help to preserve the environment and keep waste to a minimum.

Through public awareness campaigns, we can get together with other members of our community and discuss the impacts of how we currently manage our waste. Once they understand the problems, we can all move on to the more difficult challenge of changing the way we live and work. This approach also works for other issues, not just to protect the environment.

**Remember, it is better to make small changes rather than waiting to change the whole situation.**

**Here are some of the ways we can advocate for change:**

**Talk to people:** Tell them how you feel. Maybe they will agree with you. Maybe they know something that you don't. Try to speak to people in positions of authority who have some kind of influence in decision making. Talk to your parents, the school principal, the manager, the chief, your mayor, or even your Member of Parliament. See how you can work together to begin change.

**Education:** Educating children and adults is a very effective way of advocating for change. Young people are the future of your community and your country. What they learn when they are young will become an accepted part of society when they grow up.

**Public awareness campaign:** The more people aware of the issue you are concerned with, the more support you will have. The media is an effective tool for educating the public. You can write articles for your local newspaper and use the radio or television for announcements or interviews. Other ways that you can get your message to the public is through pamphlets, posters, workshops, special events, a song or play.

**Stakeholder group:** Form a committee made up of people who represent different aspects of your community who are also concerned about the same issues. As a group you can work together and have more influence. You can also you also get different views and ideas.

**Political:** Support and Vote for political candidates who share your views and support your ideas for improvement.

## Take a Stand Instructions

1. At one end of the room place the sign that reads 'strongly agree' and at the opposite end place the sign that says 'strongly disagree.' Draw a line between the two signs using chalk or masking tape.
2. Start with some questions that will show the participants how this exercise works. Ask questions like, "You have brown hair and blue eyes", "You like ice-cream for breakfast" or "School is great!". Encourage participants to stand along the line depending on how strongly they agree or disagree with this statement.
3. Present participants with the statement "we are all responsible for fixing waste problems on our island" and tell them that they must decide if they support it or reject it.
4. If they strongly agree they should stand closest to the 'strongly agree' sign, if they strongly disagree they should stand at the opposite end of the room, next to the 'strongly disagree' sign. They can also choose to stand anywhere on the line in-between the two extreme opinions which represents a continuum (e.g. agree to some extent), or in the middle (agree and disagree to the same extent).
5. Ask the participants to provide their reasons for why they have decided to stand in their position on the line. If the participants are clustered in groups, you may give them time to discuss their reasons amongst themselves and then select a spokesperson.
6. After each participant or group speaks the others should be encouraged to ask them questions. Allow each student or group the opportunity to have their say.
7. Having considered a range of opinions, encourage the participants to change their point of view (where they stand on the line and on the issue). Explain the importance and value of considering a range of ideas and being prepared to change their mind.

## Lesson 2: Waste as Art

<b>Introduction</b>	<p><b>This activity aims to educate, inform and challenge the way we look at waste in our communities. Students are encouraged to create artworks that are inspired by issues surrounding waste or made from materials that would normally be discarded as waste. By exhibiting student artworks in public spaces, Waste To Art can help to raise awareness and knowledge about issues surrounding waste in society. The Waste To Art projects provides a unique opportunity for students to:</b></p> <ul style="list-style-type: none"> <li>• develop their creative art making skills;</li> <li>• express their thoughts and feelings about the environment around them;</li> <li>• develop enquiry-based learning skills around environmental sustainability issues through addressing targeted questions;</li> <li>• develop knowledge and understanding about environmental sustainability issues;</li> <li>• develop critical and creative thinking skills while considering environmental issues;</li> <li>• develop personal and social capability by becoming involved in displaying and discussing artworks and their environmental messages; and</li> <li>• cultivate environmental ethics individually and among peers</li> </ul>		
<b>Ages</b>	All Ages	<b>Number of Periods</b>	1
<b>After this lesson</b>	<p>Students are encouraged to create artworks that are inspired by issues surrounding waste, or made from materials that would normally be discarded as waste. By exhibiting student artworks in public spaces, Waste To Art can help to raise awareness and knowledge about issues surrounding waste in society.</p>		
<b>Content Focus: English, Social Sciences</b>			
<b>What you Need to Prepare</b>	<ul style="list-style-type: none"> <li>• Remember to always consider the end-of-life processes associated with artworks. How can the components of the artwork be reused, recycled, re-imagined? We encourage you to include a lifecycle approach in the planning phases of your project. This will be an important consideration in closing the loop on waste.</li> <li>• Read through the <b>“Waste to Art Detailed Teacher Instructions”</b> below.</li> <li>• Gather, and clean if necessary, a diverse range of non-organic waste products</li> <li>• Scissors, glue, glue gun, tape etc.</li> </ul>		
<b>Lesson Outline</b>	<p><b>10-15 Minutes- Class discussion:</b></p> <ul style="list-style-type: none"> <li>• Discuss the concept of Waste to Art.</li> <li>• Can Waste be Art?</li> <li>• Can it raise awareness of the prevalence of waste?</li> </ul> <p>Show students some examples from the <b>“Examples Photos”</b></p>		
<b>Extension for Older Students</b>	<p>For more advanced students, consider getting them to collect their own waste products. Because this is an art project, the nature and scope of the artwork can be expanded to match the abilities of the students.</p>		

## Waste to Art Detailed Teacher Instructions

**Materials used in Waste To Art projects** have had their own production cycles prior to being used as a material for the art work. Students are encouraged to investigate these production processes, and encourage them to select materials for their projects that can be readily dismantled or deconstructed and re-used or recycled further.

**Demonstrating good environmental practice in the artwork:** There are opportunities for environmental sustainability within every part of a Waste To Art project. When designing a project the sustainable use of resources and waste reduction practices can be incorporated. For example, brushes can be cleaned in a small bucket of water rather than under a running tap. Left over clay can be softened and used again and students could be encouraged to use recycled or discarded materials wherever possible. Showcase environmental sustainability by ensuring artworks can be dismantled and their components reused, recycled or composted at the end of the project. This requires some planning and can present an opportunity for more creative thinking.

The following six ideas may help inspire students to produce innovative artworks which have minimal environmental impact.

1. Artworks could be made from fully compostable materials such as waste paper, card, or other natural fibres. Components of the artwork could be fastened together by sewing with natural yarns or cottons.
2. Artworks can be made from fully recyclable materials that can be dismantled and recycled at the end of the project.
3. Encourage students to consider how their artworks could be re-purposed or exhibited elsewhere rather than thrown away. If artworks must be disposed of to landfill, encourage participants to include a reflection statement in their entry as to the impact of this process.
4. Where possible encourage students to avoid the use of synthetic glues and otherwise hard to undo methods of joining. Where glue is used, it should be used sparingly.
5. Encourage students to practice folded paper techniques to provide structure, using tying or weaving rather than glue.
6. To help students understand product life cycles, teachers could encourage students to research what raw materials are used in the manufacturing of common art materials such as acrylic paints, coloured pencils and other art materials.

**Sustainability is a Cross-Curriculum Priority** Cross-curriculum priorities provide students with the tools and language to engage with and better understand their world at a range of levels. The priorities provide dimensions which will enrich the curriculum through development of considered and focused content that fits naturally within learning areas.

Incorporation of the priorities will encourage conversations between learning areas and between students, teachers and the wider community. Waste To Art provides an opportunity to incorporate the cross-curriculum priority sustainability.

Waste To Art projects can deepen our understanding of sustainability and the challenge waste presents to a sustainable future. Waste is an issue that has personal, local, national and global sustainability contexts and can be addressed by a range of years and learning areas.

The issue of waste has intergenerational impacts also which students could explore. Students can:

- research the items of waste they are using to construct their artworks;
- identify, research and analyse why material in the artwork may represents a risk to the environment or human health;
- state the case for why a more sustainable and environmentally sensitive material could be used in place of this material in our everyday lives;
- research options and processes for how this material should be returned to a waste stream for recycling at the end of its life as an artwork and
- investigate materials used in the past that have now become significant waste issues for current and future generations.

**Providing inspiration from the art world** Waste To Art encourages creativity and originality, and the best way to inspire this within students is to provide examples of what other artists are creating using recycled waste materials.

Some contemporary artworks that could be used as stimulus to provide students with inspiration and ideas for their own artworks are below and were sourced from The Guardian: <https://www.theguardian.com/environment/gallery/2023/jun/08/flip-flop-boats-trashion-and-the-bag-monster-the-art-of-discarded-plastic-in-pictures>



## Example Photos



*Image: A 12m-high whale sculpture created from five tons of plastic from the Pacific Ocean on display in the Catharijnesingel, Utrecht, 2019. Photograph: Hollandse Hoogte/Rex/Shutterstock*

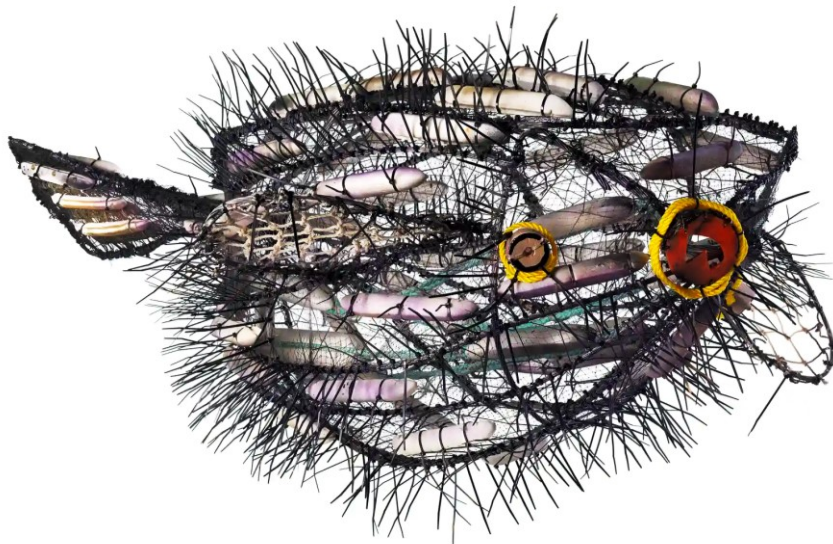


*Image: Delegates take photos of a giant sculpture of a tap pouring out plastic bottles picked up in Nairobi's Kibera neighbourhood during the UN environment assembly in 2022. The assembly met in Kenya to discuss a binding international framework to address the growing problem of plastic waste in the world's oceans, rivers, and landscapes. The sculpture represents the need to 'Turn it off at the tap'. i.e. to reduce plastic production.*



**Image:** *Plastic Paradise*, by Australian artist Kathy Allam, was part of the *Sculpture by the Sea* exhibition along the Bondi Beach to Tamarama coastal walk in Sydney in 2017. She says: 'By reusing and revaluing discarded bottles I am exploring our own current dilemma of living with plastic. Can detritus be transformed into something joyous, sublime and beautiful?'

Photograph: Dean Lewins/AAP



**Image:** *Pufferfish* by Mylene Holroyd, 2017. The artist uses materials woven with recycled ghost net – which chokes the life out of marine creatures in the Gulf of Carpentaria, off the northern coast of Australia – to raise awareness of the environmental impact of discarded fishing nets.

Photograph: Supplied: NGV



**Image:** *Plastic Tree*, 2014, by Cameroon artist Pascale Marthine Tayou, on display in Basel, Switzerland.  
*Photograph:* Georgios Kefalas/EPA



**Image:** *Sculptures made from recycled materials in Hanoi, Vietnam. Sixteen artworks made out of materials such as plastic bottles, barrels and old wheels are displayed along the street to raise environmental awareness among residents.*  
*Photograph:* Luong Thai Linh/EPA



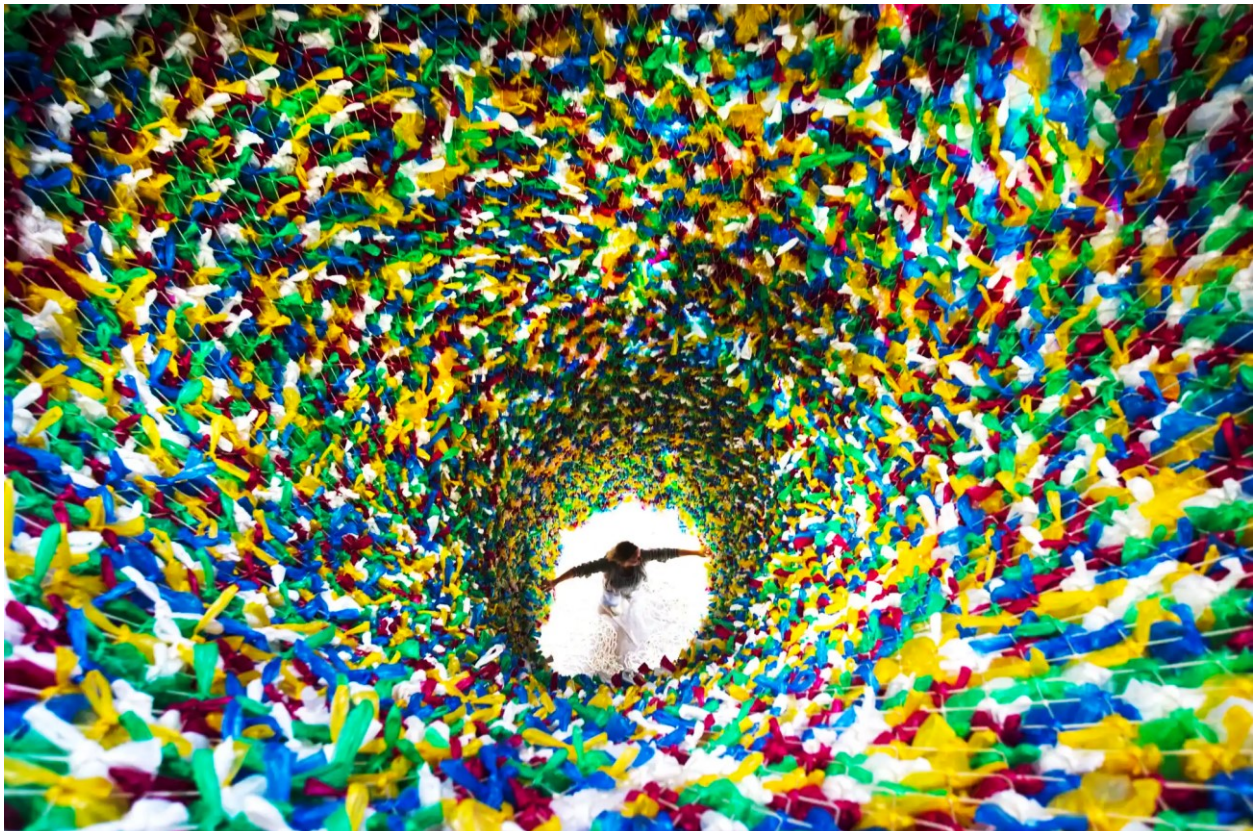
**Image:** Ivorian artist Aristide Kouamé, who creates art from plastic waste, works on a piece made of abandoned flip-flops collected from a beach in Abidjan, Ivory Coast. The country hosted World Environment Day 2023 on 5 June with more than 150 countries taking part, which focused on 'solutions to plastic pollution'.  
 Photograph: Legnan Koula/EPA



**Image:** A visitor poses for photographs at the eco-art exhibition Anima Mundi: Soul of the World in Bangkok, Thailand, by Indonesian artist Mulyana, August 2019. Specialising in fabulous seascapes, Mulyana uses discarded metal, fabrics and materials such as rubber and plastic in his work to raise awareness of the environment. Photograph: Mladen Antonov/AFP/Getty Images



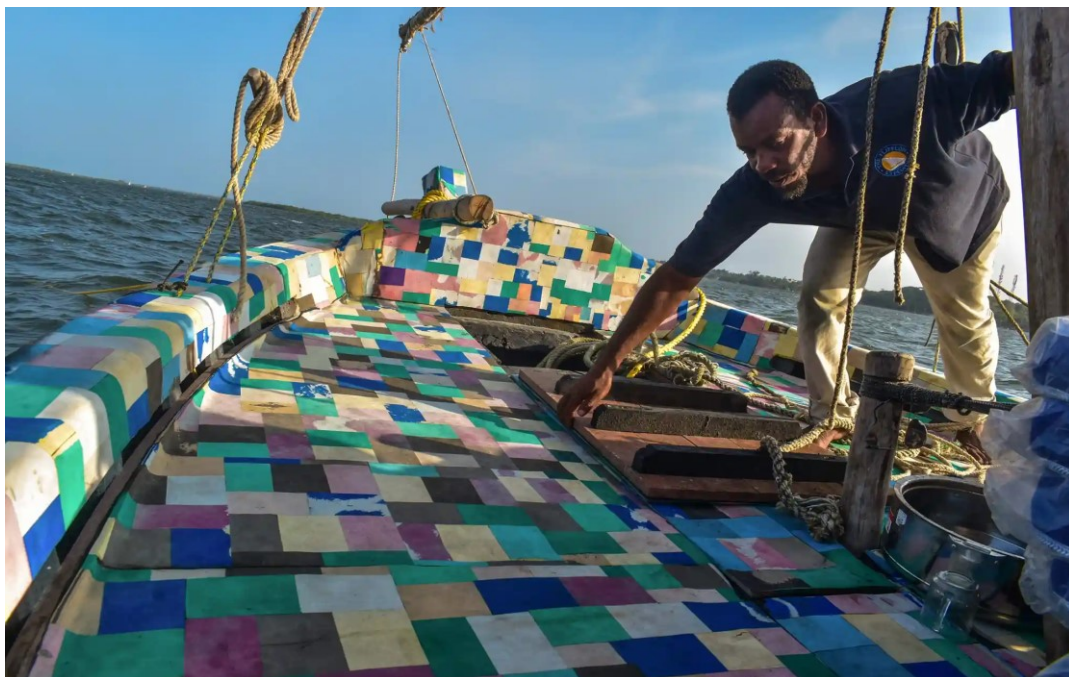
**Image:** A model wears clothing by Australia-based artist Marina DeBris, who creates intricate 'trashion' from discarded material washed up on the beach to raise awareness of marine pollution.  
**Photograph:** Monching Flores/Marina DeBris



**Image:** Volunteers help during the construction of the artwork Plastic Bags by Cameroon artist Pascale Marthine Tayou in Leiden, the Netherlands, June 2015. **Photograph:** Jerry Lampen/EPA



**Image:** An aerial photo from 2019 showing a 68-metre whale image formed by plastic waste collected from the ocean to raise awareness on marine conservation at Rudong Yangkou harbour in Jiangsu province, China, June 2019. Photograph: AFP/Getty Images



**Image:** Flipfopi, the world's first 100% recycled plastic dhow, embarks on its 500km maiden voyage from Lamu, Kenya, to Zanzibar, in January 2019, visiting schools and communities, sharing solutions and changing mindsets along the way. Supported by the UN Clean Seas programme, the expedition aimed to raise awareness of the more than 12m tonnes of plastic being dumped in the ocean every year. Photograph: Andrew Kasuku/AFP/Getty Images



**Image:** The world's largest waste pyramid – made from 18 tonnes of plastic from the Nile – was unveiled before Cop27 in Sharm el-Sheikh, Egypt, in 2022. It marked the beginning of a movement called the 100yr Cleanup – an initiative seeking to fund large-scale rubbish cleanups for the next century and drive accountability for the single-use plastic problem.

Photograph: Cover Images



**Image:** A sculpture of a dead whale choked by plastics on the beach at Naic, south of Manila, May 2017. Through the art installation, Greenpeace Philippines highlighted the huge problem of plastics polluting the ocean.

Photograph: Greenpeace

## Lesson 3: Write a Letter to the Editor

Introduction	<p>The media plays an important role in raising awareness of issues facing our communities and countries. In this lesson, students write a letter to the Editor of their local Newspaper, explaining why it is important to minimise waste in their community. Instead of the editor of the local newspaper, students could instead write to their local government representative, elder, representative, or any other appropriate person.</p>		
Ages	10-18	Number of Periods	1
After this lesson	<p>Students have an understanding about the role of the media and how the media can help promote an issue in their community.</p>		
<b>Content Focus: English, Social Sciences</b>			
What you Need to Prepare	<ul style="list-style-type: none"> <li>• Pen and paper</li> <li>• The “<b>Instructions</b>” below can either be printed off, or alternatively written up on a whiteboard or blackboard, or presented to students on a screen or projector.</li> </ul>		
Lesson Outline	<p><b>10-15 Minutes- Class discussion:</b></p> <ul style="list-style-type: none"> <li>• Revise what students have learnt so far about Waste.</li> <li>• Talk about what students can do, or have done, at home, and at school.</li> <li>• Talk about the need to create change not just in our own lives, but in the entire community.’</li> <li>• Identify sending a letter to an appropriate more senior member in the community, like the Editor of the local newspaper, might be an effective way of implementing change.</li> </ul> <p><b>5-10 minutes.</b></p> <ul style="list-style-type: none"> <li>• Go over “<b>Instructions</b>” with students.</li> </ul> <p><b>20-40 minutes</b></p> <ul style="list-style-type: none"> <li>• Students write their letters.</li> </ul>		
Extension for Older Students	<p>Instead of the editor of the local newspaper, students could instead write to their local government representative, community leaders, representative, or any other appropriate person.</p> <p>For more junior students, it may not be necessary to send the letters. For more advanced students, it might be possible to send the letters to the appropriate people or have them published in a local newsletter/publication.</p>		



## Letter to the Editor Instructions

The media plays an important role in raising awareness of issues facing our communities and countries. Write a letter to the editor of your local newspaper, explaining why it is important to minimise waste in our communities.

Highlight how we can all make a difference by taking small steps to reduce waste. Highlight that one of the easiest things we can do is to throw our green waste in our garden, and to take our own bags to the supermarket.

Here are some tips to help with the letter writing:

- Be brief and to the point. A good length for a Letter to the Editor is approximately 100 words.
- Do not personally attack people. Provide a rational and practical argument for what you are advocating. Who should do it? How will it be paid for? Why is it a good idea?
- Include your name, address, and phone number with the letter. An anonymous letter probably will not be published, and the editor might need to call to confirm that you are the author before printing it. Send a copy to your local politician.
- Your letter is likely to be edited or shortened to fit the space available. Try to edit the letter and keep it simple and to the point. Remember to look out for your letter in the paper.

