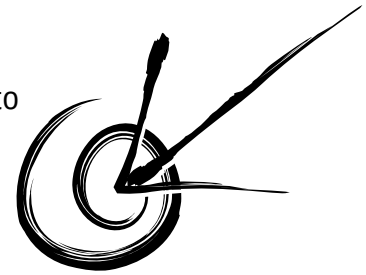
The Marine Menace

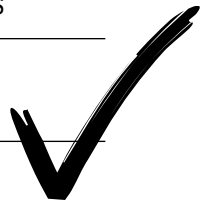
Lesson aims

Students will learn and develop an understanding of marine debris, what it is, where it comes from and what they can do to combat the problem.
Students will explore the effects of marine debris on people, marine animals and communities.



Learning outcomes

Studies of Society and the Environment	Place and Space	Features of places; People and places; Care of places
	Resources	Use of Resources; Management and enterprise
	Natural and Social systems	Natural systems; Economic Systems
Science	Life and living	Living together; Structure and function; Biodiversity, change and continuity
	Natural and Processed Materials	Materials and their uses; Structure and properties
Mathematics	Chance and Data	Collecting data; Displaying and summarising data; Interpreting data



Background information

Marine debris is the name given to rubbish that finds its way into our seas and oceans. Marine debris can have a range of environmental impacts on our marine animals and their environment.

Marine debris can come from a lot of different places, but the main reason that our creeks, rivers, lakes and beaches get dirty is from the water and other pollutants that flow into stormwater drains and irresponsible disposal of rubbish by beach-goers and campers. These land-based activities account for 60-80% of marine pollution. Ocean-based activities such as fishing and shipping account for the remainder of marine pollution.

The marine debris most likely to affect marine animals is plastic. Turtles, whales and some sea birds ingest plastic that they mistake for food. This can eventually cause the death of the animal. Smaller pieces of rubbish, like cigarette butts and fishing hooks can be confused with prey and swallowed by marine animals causing internal blockages. Fishing line and netting can trap and strangle animals. Large marine animals such as seals and dolphins can starve to death when muzzled by plastic rubbish.

Sources & further information

Clean Up Australia has developed a Marine Debris fact sheet.
www.cleanup.org.au

The Global Marine Litter Information Gateway website has a great kids page that provides useful information on marine debris and what action kids are undertaking around the world.
www.unep.org/regionalseas/marinelitter/

Project AWARE Foundation has an AWARE Kids Programme aimed at inspiring kids to take action to protect their marine environment.
www.projectaware.org/kids.

The Australian Marine Conservation Society website provides information on a wide range of marine issues throughout Australia including threatened species and land-based pollution.
www.amcs.org.au

Butts Out provides information on how to eliminate cigarette butt rubbish.
www.buttsout.net/australia

Classroom activities

1. Introduction

Ask students what they associate with marine debris and ask them for examples of what type of rubbish they might find at a beach or waterway.

2. Where does marine debris come from?

a) Draw a simple map on the board, showing the school and major roads. Talk about the nature of the catchment areas in your school neighbourhood. It will probably be necessary to remind students that water runs downhill, seeking the lowest level.

b) Take the class for a walk around the school neighbourhood. Look for higher land and ridge lines that form the catchment boundaries. Note the direction towards which the catchment is draining. Locate stormwater drains in the road gutters. Talk about where these drains might run. Perhaps some students will know of a discharge pipe at the local creek or beach that you could have a look at. Contact your local council to get a copy of your local drainage plan for upper primary students to study.

c) Assign students to follow as best they can the route of runoff from their school neighbourhoods after the next rain. Have them draw a diagram/map to show where the water goes. Also have them list possible pollution sources as the runoff water travels its course.

d) Discuss the idea that it is not always possible to see pollution in stormwater and that the most serious pollutants are actually invisible. Write a list on the board of visible stormwater pollutants (plastic bags, bottles, street rubbish, dog poo etc) and invisible stormwater pollutants (garden fertilisers, detergent, chemicals, oil). The invisible pollution usually involves long term, heavy-duty toxins!

3. Worksheet: The Plastic Menace

Part 1: Requires students to investigate and record the plastic contained within their lunch boxes or commonly found in the school playground. Alternatively, teachers could collect some plastic rubbish prior to the activity.

Part 2: Involves using drawing or painting materials to create a picture of a marine animal. Books, videos and posters of marine animals will assist students with their ideas and artwork. These pictures will be collated to form a mural. Plastic rubbish will also be stuck onto the mural to visually demonstrate the effects of plastic rubbish on marine animals.

Part 3: As a class, go through the answers to Part 3 of the worksheet. Discuss the student's suggestions on how they can prevent, reduce, reuse and recycle the amount of plastic in their lunch box.

Did You Know?

Plastic rubbish is one of the most common types of marine debris. Plastics take hundreds of years to breakdown and may continue to trap and kill marine animals year after year.

4. Worksheet: How Harmful Is It?

This worksheet is aimed at middle and upper primary students.

- Make sure students are familiar with the types of debris in the table. Students could download the Clean Up Marine Debris fact sheet for detailed information. www.cleanup.org.au
- Review with students the instructions at the top of the worksheet. Then have students fill out the table and calculate the subtotals.
- Collect the worksheets and calculate class subtotals for each type of debris on the worksheet (add together the students' subtotals and divide by the number of students in the class.) Note: you can do this with the class or on your own and present the totals the next day. Pass back to students their original worksheets.
- Write the class subtotals on the board. As a class, analyse the results of the tally. Initiate discussion by asking questions such as the following:

  - According to class results, which types of marine debris are most harmful to people, animals and places;

  - According to class results, which types of marine debris are the most harmful overall? Do you agree? Why or why not?

  - According to these results, which type of debris is the least harmful? Do you agree? Why or why not?
- Discuss with students how their individual results might have varied from the class results. Help them to understand that people may have different opinions about how harmful certain debris is based on their own attitudes.
- Note: The numbers that students arrive at by doing this exercise do not represent objective data on marine debris effects. Instead, they help students explore the many ways that debris can harm the different components of marine and coastal communities.

5. Roll Playing Game

a) **Give each student** (or pair of students) a role-play card (see *Worksheet: Role Playing Cards*). Younger children will need help reading and understanding their role.

b) **Ask each student** or pair to find pictures from a magazine or draw a picture of the impacts of their role.

c) **Seat the students** in a circle and explain that they are the catchment area for their local creek. Comment on how clean the creek looks and that when it's clean, it's a good home for marine animals and a healthy place to play and swim. Explain that the water in the creek will eventually drain into the ocean and the marine debris that is in the local creek will find its way into the ocean and onto our beaches. Vary the circumstances to suit your local conditions.

d) **Go around the class** and have each student read (or help them read) their role. Discuss how that role would affect the water and then place the picture/s into the circle.

As more pictures accumulate, comment on how the water is looking, e.g. Who would want to swim in /drink that water? Would it be a good home for marine animals?

e) **When everyone has had a turn**, discuss the problems of a polluted creek or beach – not fit for swimming or fishing, poor habitat for marine animals, could be smelly, could look bad. BUT for every problem, there is a solution!

f) **Go around the circle again** – and for each problem, brainstorm solutions. Hints are given on the Worksheet: Role Playing Cards. As a solution is found, pull the related pollutant pictures out of the circle so that at the end, the creek or beach is clean again.

g) **Sum up by asking the class** what they and their family can do to help keep marine debris from entering our waterways.

6. Excursion

If it is possible, arrange a visit to your local beach or waterway. Taking students to a beach or waterway helps them become more aware of marine debris and its effects on the environment. If it is not possible to arrange the excursion, examples of the rubbish found along beaches or riverbanks can be collected from the playground or be brought into the classroom.

Take with you: paper, pencils, clipboards, rubber gloves, plastic garbage bags, a camera, sun protection and extra adults.

When you get there: divide students into groups of 3 or 4 and assign an adult to each group. Each group is to look around the area and find as many sources/types of marine debris as possible. Designate one member of the group as recorder and give them the paper, pencil and clipboard.

Record: the different types of marine debris found.

Re-group: after 10 minutes and discuss the marine debris that is seen. Since the visible debris is often in the form of rubbish, discuss with your students the debris that may be present, but not seen.

Cleanup: by putting the students back into groups and passing out gloves and bags. Then have the students pick up the rubbish and take it back to school and dispose of it correctly.

Use the camera: as a visual record of the trip. It jogs the memory of students if there is some gap between the excursion and excursion-based activities. It's also great to communicate the experience to students who were unable to attend.

After the Excursion: In the classroom draw two columns on a chalkboard or whiteboard. In the first column of the table write down all the types of marine debris found during the excursion or brought into the classroom. In the second column ask students to think about the effects of the marine debris on the environment.

You may like to record your results at Clean Up Australia's Coastal Rubbish Website – www.cleanup.org.au/coastal/

7. Brainstorming Activity

Record on the board ideas about how people can help reduce the amount of debris in our waterways. Some ideas include:

If you live near the beach or a waterway –

a) Make sure you **take all your rubbish home** with you when visiting the beach or going fishing;

b) Make sure your **line is secure and in good condition** when fishing;

c) Keep **stormwater drains clear** and don't use them as rubbish bins – remember they flow straight into our waterways;

d) Using a bucket, **wash the car on the garden** because if you wash on the road or driveway the detergent and oil will wash down the stormwater drain and flow into the ocean.

Even if you don't live close to a beach or waterway –

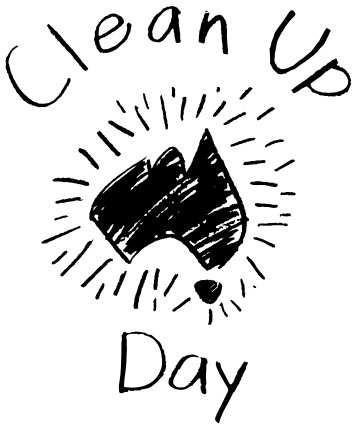
a) Be **responsible** with your rubbish;

b) Always **dispose of rubbish**, cigarette butts, plastic bags etc properly;

c) Make sure you **use reusable bags** to reduce the number of plastic bags and packaging you take when buying goods;

d) **Pass on the message to others** about the dangers of rubbish to marine animals and encourage them to dispose of rubbish properly;

e) **Participate** in the annual Clean up Australia Day.



8. Website Activity

Ask students to visit the Clean Up Australia's Coastal Rubbish Website

www.cleanup.org.au/coastal/

which contains information about the types and amounts of rubbish being collected from various Australian beaches.

Select a beach on the website and record the following information from the website:

- Name of the beach.
- Most commonly collected rubbish item?
- How many of these items were collected?
- How many plastic items were collected on this beach in total?
- How many items were collected from the beach in total?

Ask students to present the information to the class. Students could research where the beach is located and pinpoint this on a map of the region, state or Australia.

Extension / Home-based activities

As a home based activity, students can encourage their family to join or register a Clean Up Australia Day beach or waterways site. As part of the activity they could write a story on their experience. Visit www.cleanup.org.au or call 1800 282 329 for more information.

Lower Primary

Students can design a poster to make people aware of what they can do to help reduce the problem of marine debris based on the brainstorming activity.

Middle Primary

Marine debris can be caused from rubbish that has escaped from rubbish bins. Design a rubbish bin for your school that makes it difficult for rubbish to escape.

Write a poem from the point of view of a marine animal and how they feel about all the plastic in their home.

Upper Primary

To help students understand that clear water isn't necessarily free of pollutants conduct an experiment. Place five clear liquids in portion cups. Things to include should have a definite taste that students would recognise, for example sugar, vinegar, and salt. Using cotton swabs, have students taste each liquid (dispose of swab after each taste) and record what they taste after each. After students have all had a chance to taste discuss that some kinds of pollution can't be seen.

Organise and conduct a cleanup of a local beach, lake, or river. Students can keep track of the types and amounts picked up and analyse this information in the classroom.

They could also contribute to national and international efforts monitoring marine debris by recording rubbish collected in Clean Up Australia's coastal rubbish survey:

www.cleanup.org.au/coastal/

Did You Know?

Sea turtles mistake plastic bags for jellyfish, one of their favourite foods. Even whales have been found dead with plastic bags and sheeting in their stomachs.

Worksheet: The Plastic Menace

Part 1: Do you bring plastic to school in your lunch box?

Collect the plastic found in your lunch box. If you do not have any plastic in your lunchbox visit the playground and collect as many plastic items that you can find. Write a list of the items you find below.

Did You Know?

Birds, fish and mammals often mistake plastic for food. Some birds even feed it to their young. With plastic filling their stomachs, animals have a false feeling of being full, and may die of starvation.

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Part 2: Draw or paint a picture of your favourite marine animal. Hang the picture of your marine animal on the classroom mural.

Now take the plastic that you collected from your lunchbox or playground and stick it onto the mural. The plastic may be found in your animal's stomach, floating in the water or washed up on the sand.

Part 3: How can you prevent, reduce, reuse and recycle the amount of plastic in your lunch box? Fill in the blanks using the following words: **recycled, packaging, reused, bottles, paper.**

Wrap your sandwiches in _____ , which can be recycled.

Use reusable drink containers instead of plastic _____ .

Use packaging that is made from _____ materials.

Pack fresh foods such as bananas that do not need _____ and compost the scraps.

Use food containers that can be taken home, washed and _____ the next day.

Can you think of any other suggestions?

_____

_____

_____

_____

_____

_____

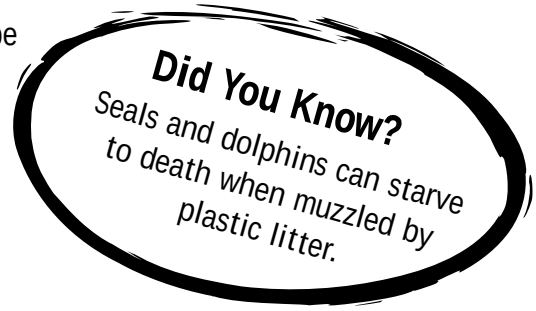
Worksheet: How Harmful Is It?

Instructions:

a) Research the different types of marine debris and the effect it has on marine animals, people and places. The Clean Up Australia Marine Debris fact sheet is a good place to start – www.cleanup.org.au

b) Decide how harmful each type of marine debris would be if it came into contact with marine animals, people and places listed below. Write the number that best reflects your opinion in the appropriate box.

1 – rarely or never harmful
2 – sometimes harmful
3 – very harmful



c) When you have completed the chart, calculate the subtotals for each type of debris. Then calculate the grand totals at the bottom of the page.

	Fishing line	**Plastic bottle ring**	**Oil**	**Plastic bag**	**Rope**	**Lost fishing net**
Marine Animals						
Turtle						
Dolphin						
Seabirds						
Subtotal						
People						
Surfer						
Sailor						
Fisherman						
Subtotal						
Places						
Fishing beach						
Swimming beach						
River						
Gutter						
Subtotal						
Grand Total						

Worksheet: Role Playing Cards

Instructions: Copy the following role playing worksheet and cut out the individual cards. Paste the cards onto pieces of cardboard. The Solution Hints can be pasted to the reverse side of the cardboard depending on student ability to brainstorm solutions.

Wood cutter Cuts down trees for firewood. Destroys habitat for native animals.	**Grape grower** Takes water from the creek. Uses chemicals and manure.	**Fisherman** Fisherman digs holes in the creek bank to catch worms. Leaves fishing line in the water. Leaves plastic bait bags behind.
Gardener with exotic trees Trees lose their leaves in autumn and winter. Leaves wash or blow into the creek. Rotting leaves make the water dirty and smelly.	**Car driver** Leaks oil onto the road. Brakes quickly and leaves tyre rubber on the road. Creates air pollution.	**Builder** Lets sand and gravel wash into the gutter. Sand and gravel increase water cloudiness.
Picnickers Leave rubbish behind. Throw fruit into the bushland and spread weeds.	**Gardener using fertiliser** Fertiliser washes into the creek. Fertiliser causes algal blooms that can make the water slimy and poisonous.	**Dog owner** Lets dog chase ducks in the creek. Doesn't pick up dog poo. Dog manure in creek adds nutrients that cause algal blooms.
Cat owner Lets cat roam outside. Cats kill native birds, frogs and lizards.	**Gardener dumping weeds** Dumps weeds into bushland or stormwater drain. Weeds spread and kill native plants and take over habitat.	**Apple grower** Uses fertilisers to help trees grow. Fertilisers run into the creek and cause algal blooms. Uses chemicals to kill insects. Takes water out of the creek to water the crop.
Dairy farmer Lets cows into the creek to drink and they trample the water plants. Cow manure in creek adds nutrients that cause algal blooms. Cows break up creek banks and send soil into the water.	**Car washer** Washes car on the driveway. Detergent runs down the gutter into the drain. Detergents pollute the water and can be toxic to animals	**Swimmer** Swimmer leaves plastic bag behind.

Worksheet: Role Playing Cards

Worksheet Solution Hints

Wood cutter Alternatives to cutting down native trees: using plantation timber, using heating alternatives such as gas/ electricity, recycling timber off cuts. Plant native trees to replace those felled.	**Grape grower** Never use chemicals when rain is forecast and always follow instructions; use drip irrigation instead of sprinklers to lower water use; use organic methods of pest control. Use mulch and plants between rows to prevent soil erosion.	**Fisherman** Never leave rubbish, line, tackle or bait behind.
Gardener with exotic trees Plant local native plants instead or exotics (avoids potential weed problems too!); collect fallen leaves and add to compost heap or garden beds.	**Car driver** Fix oil leaks; avoid leaving rubber on road by not braking suddenly or doing 'donuts'; avoid driving on sensitive areas such as riverbanks; find alternatives to car travel, e.g. walking, cycling etc.	**Builder** Cover sand and gravel heaps with reusable plastic sheets to prevent it washing away. Put a barrier between the building site and the gutters/drains
Picnickers Always put rubbish in bin or take away if no bin is provided. A lot of rubbish can be recycled or reused. Never throw fruit away as it can spread germs or weeds.	**Gardener using fertiliser** Only use minimal amount; never use garden chemicals when rain is forecast; recycle kitchen and garden scraps into compost as an alternative to fertilizers.	**Dog owner** Keep dog on lead in bushland/waterway areas; always pick up dog poo and dispose of in a bin.
Cat owner Keep indoors all the time or at least from dusk-dawn; build an enclosed cat playground; have a collar with at least 2 bells.	**Gardener dumping weeds** Never dump weeds in or near bushland or waterways. Dispose of in bins; some weeds can be destroyed by deep burial or composting.	**Apple grower** Never use chemicals when rain is forecast and always follow instructions; use drip irrigation instead of sprinklers to lower water use; use organic methods of pest control.
Dairy farmer Don't let cows into waterways to drink; fence off waterways and provide trough or dam instead. Re-vegetate damaged riverbanks.	**Car washer** Wash car on lawn and use a bucket so the water and detergents get used by the garden rather than go down drain; use a car wash (many use recycled water).	**Swimmer** Always take plastic bags home, reuse and recycle them.