

In today's lesson students will learn about the sources and pathways of plastic in the marine environment, as well as the life cycle of plastic.

DISCUSSION

HOW DO WE ALL USE PLASTIC?

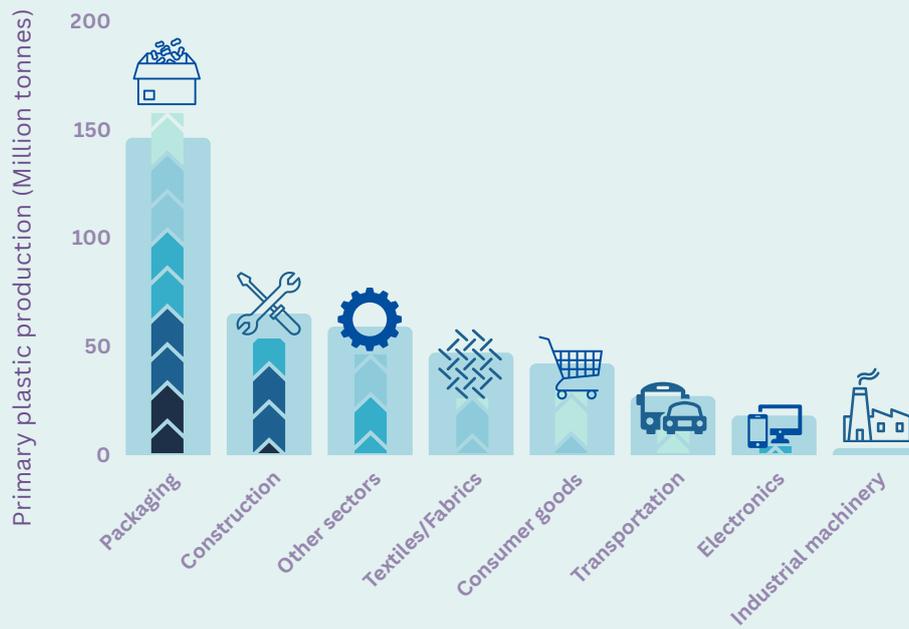
Begin today's lesson by asking the students to share how they use plastic in their everyday lives. Encourage students to share items that they may not have realised are plastic until they started to think critically about it.



If students require some encouragement to share different plastic uses, this slide will provide some great prompts. Students should try to think of plastic items that are both inside and outside the classroom.

Ask the students how they think Covid-19 may have affected the amount of plastic being used? Why might this be?

INDUSTRY PLASTIC PRODUCTION



Away from the household and individual plastic items that we use. Industry is also a huge source of plastic use.

The largest item that is produced by industry is plastic packaging. The students can be asked to name different types of plastic packaging that they commonly use.

Construction, textiles, consumer good, transport and electronics are all other major sources of plastic use within industry.

BUT WHERE IS ALL THIS PLASTIC GOING?

9%
IS RECYCLED

12%
IS BURNT

78%
GOES TO
LANDFILL

1%
GOES INTO THE
OCEAN

Around 1% of the total plastic produced globally ends up directly in the ocean each year.

This is based on the estimate that approximately 8 to 10 million metric tons of plastic enter the ocean annually out of the total plastic production, which exceeds 400 million metric tons per year.

SOURCES OF OCEAN PLASTIC



**MISMANAGED
PLASTIC WASTE
(LITTER)**



**SEA-BASED PLASTIC
DEBRIS**



MICROPLASTICS

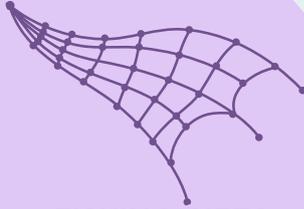
There are three main sources of ocean plastics.

The first, which is estimated to account for around ~80% of ocean marine plastic is mismanaged waste. During storms and other heavy rain events, plastic pollution can increase as much as tenfold as plastic is washed into waterways, and eventually the ocean.

Sea-based debris makes up the remaining ~20% of ocean plastics. This includes things like ghost nets (fishing nets which are dropped off fishing vessels), lost ropes and line and dropped fishing containers.

Microplastics make up the remainder of plastic entering the ocean, and although small in proportion to the other sources, can have worse effects as they are hard to remove.

EXAMPLES



FISHING NETS
ENOUGH LOST AT SEA
EVERY YEAR TO
CIRCLE EARTH MORE
THAN 18 TIMES



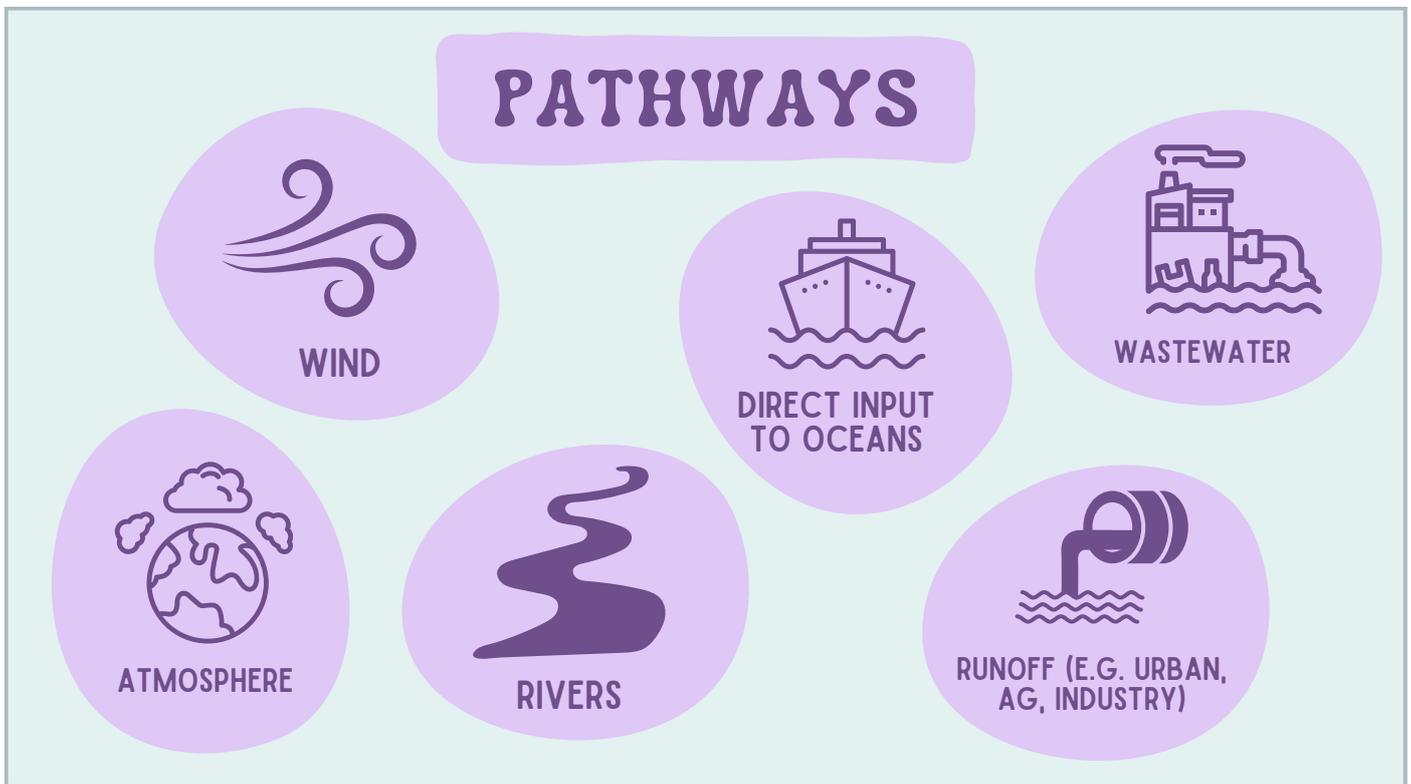
CLOTHING
NEARLY 70 BILLION
ITEMS ARE MADE OF
PLASTIC EACH YEAR



FIBRES
ONE MILLION
MICROPLASTICS PER
LOAD OF WASHING

Some examples of plastic entering the marine environment includes fishing nets, clothes and fibres from clothing.

To make sustainable choices to reduce the plastic entering the environment, students can think about way to reduce the amount of clothing that they buy. Trying to buy clothes made of natural fibres such as cotton and wool is a great way to attack this. Likewise, we can purchase items second hand, or only buy items that will last a long time.



Plastic can end up in the ocean via a number of pathways. Some of these pathways are more direct than others.

When litter is left on the streets, it doesn't just remain there. Rain and wind transport plastic waste into streams, rivers, and eventually into drains, which flow into the ocean.

Everyday items like wet wipes, cotton buds, and sanitary products that we dispose of end up flushed down toilets. Additionally, microfibres are released into water bodies when we launder our clothes in washing machines.

Microplastics can even be evaporated up during the water cycle, entering the atmosphere and then eventually landing in the ocean.

DISCUSSION POINTS

LOCAL SOURCES

HAS ANYONE EVER FOUND PLASTIC ON THE BEACH
THAT THEY CAN RECOGNISE THE SOURCE OF?

WHERE IS MOST OF THE PLASTIC ON THE BEACHES
AROUND ARNHEM LAND COMING FROM?

Students can be asked about plastic items that they have found on the beach, and if they have been able to recognise where they are from?

Where in Arnhem Land is most of the plastic coming from?

PLASTIC IN NORTHEAST ARNHEM LAND

MARINE DEBRIS AND GHOST NET CLEAN UP OVERVIEW FOR 2022

DEBRIS WEIGHT
31,491 kg

DEBRIS VOLUME
232 m³

DISTANCE
87.5 km

PEOPLE WHO
HELPED
217

GHOST NETS
9

Here is where we can share with the students some of the local statistics about plastics in NE Arnhem Land.

This data is an overview of the marine debris and ghost net clean up completed by the Dhimurru rangers and Sea Shepherd in 2022. The total weight of all the debris collected was more than 31,000 kilograms. A lot!

SEA SHEPHERD & DHIMURRU ABORIGINAL CORPORATION



This video can be played to provide another style of learning for the students. This video showcases the efforts of Sea Shepherd and the Dhimurru rangers at Djulpan beach clean in 2022. This is a great way to see a local angle of the plastic pollution problem. Audio will be required, although there are audio cues.

<https://www.youtube.com/watch?v=b4mgZq4YLPA>

DJULPAN 2022 BEACH CLEAN

SEA SHEPHERD AND DHIMURRU ABORIGINAL CORPORATION

DEBRIS REMOVED
10.4 TONNES

FISHING NETS
1.1 TONNES

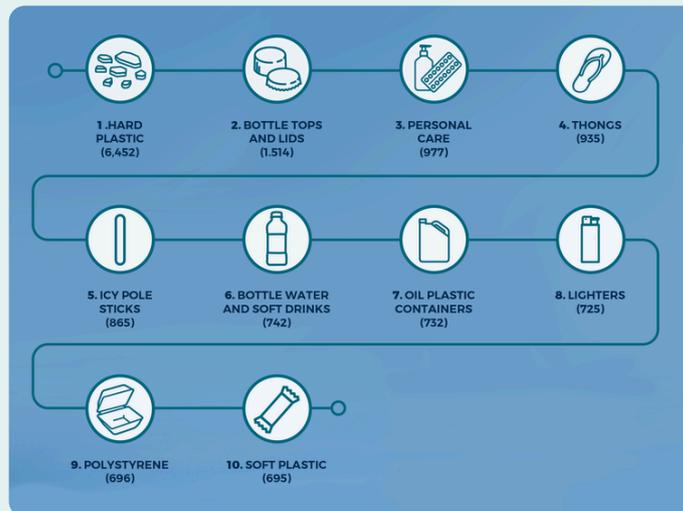
CLEAN-UP BAGS
1440

Sea shepherd and the Dhimurru rangers removed over 10 tonnes of marine debris during the Djulpan 2022 beach clean.

These beach cleans are continuing to happen each year.

Students could be asked if they think there would be as much plastic waste at this years beach clean up compared to what was found in 2022? The answer is - most likely - yes. The ocean plastic will continually wash up on the beach across NE Arnhem Land until the source of the problem is stopped.

TOP 10 ITEMS COLLECTED



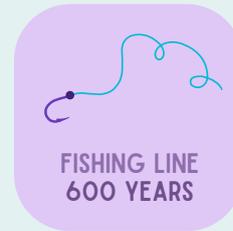
SOURCE: SEA SHEPHERD AUSTRALIA, DJULPAN IMPACT REPORT 2022

The top 10 items collected can be seen in this figure. Hard plastic, such as buckets and tubs was the most common item collected.

The 2nd most common item collected was bottle tops and lids, many of which we are using in our plastic recycling machines. It is great that we can use one of the most common plastic collected in our machines.

Hard plastic, if the correct type, and cleaned and sorted correctly, can also be put in the plastic recycling machines!

LIFE CYCLE OF PLASTIC



Plastic takes a long time to break down. Different items can vary in the time they take to break down, from as little as 20 years to as long as 600 years.

Students can be quizzed as to how long they might think different types of plastic will take to break down.

A question for the students may be what is causing the different plastics to break down at different rates? Is it the plastic type? The thickness? The durability?

An activity idea for students would be to make a timeline of plastic items and how long they take to degrade. This can be completed with print out place cards, or if possible real life items.

LIFE CYCLE OF PLASTIC



This video can be played to provide another style of learning for the students. Audio will be required, although there are audio cues. The video goes for 4 minutes.

https://www.youtube.com/watch?v=_6xINyWPpB8

PRACTICAL

LOCAL BEACH CLEAN EXCURSION

OR

**CONTINUE SORTING BOTTLE LIDS
AND USE THE RECYCLING MACHINES**

There are a number of practical sessions that would tie into this session.

Firstly, a local beach clean would be a great way to look at the different types of plastic, and where they have come from. Plastic items could then be sorted and counted into the plastic item groups.

We have created a beach pack that is available on our website. This includes various activity sheets for the beach clean, as well as ways to collect and use data.

If a beach clean is not feasible, the lids can continue to be sorted into plastic type and colour.