

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

**78%**

GOES TO  
LANDFILL

**12%**

IS BURNT

**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**

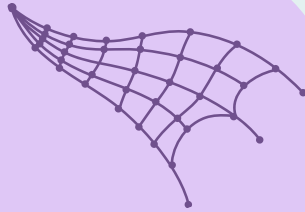
There are three main sources of ocean plastics.

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



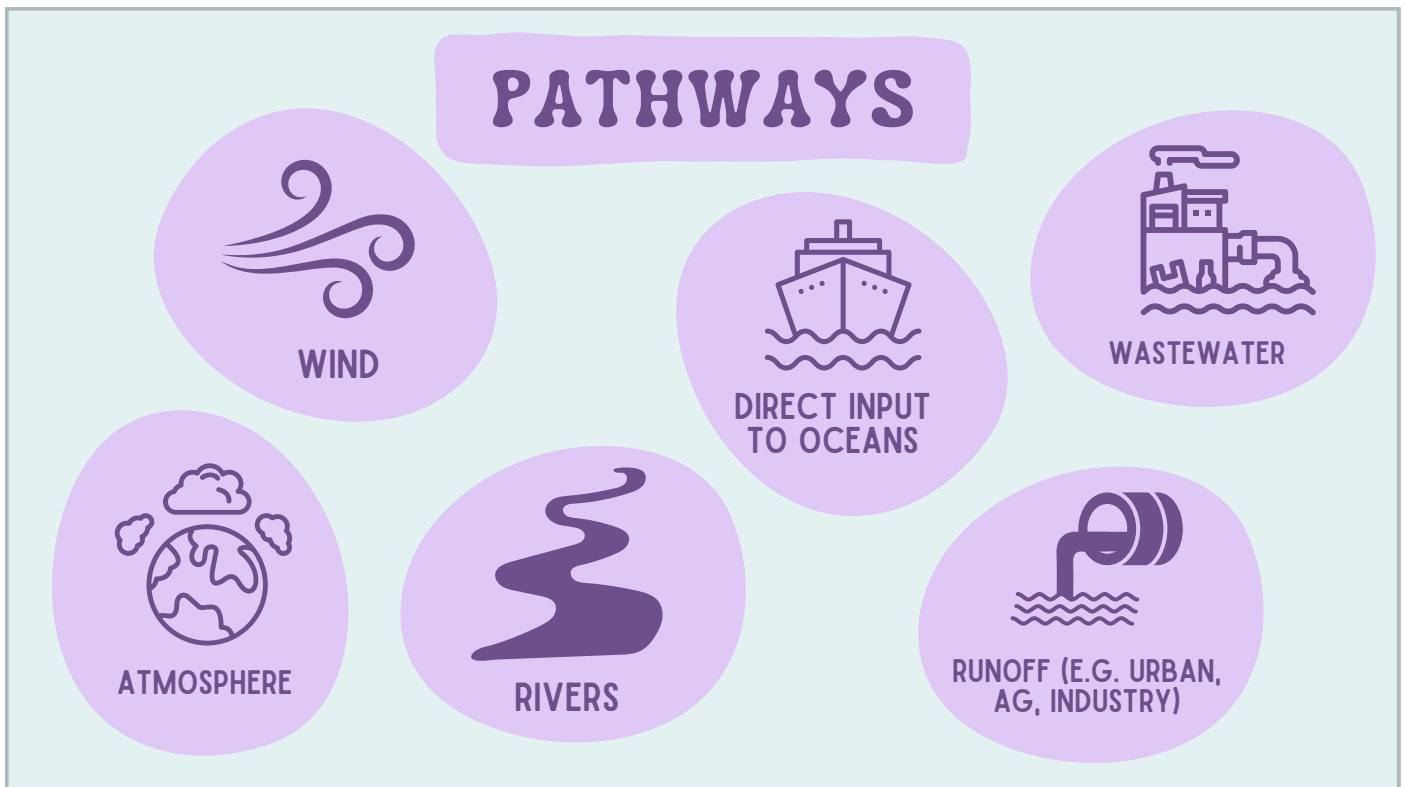
**CLOTHING**  
NEARLY 70 BILLION  
ITEMS ARE MADE OF  
PLASTIC EACH YEAR



**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?

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?

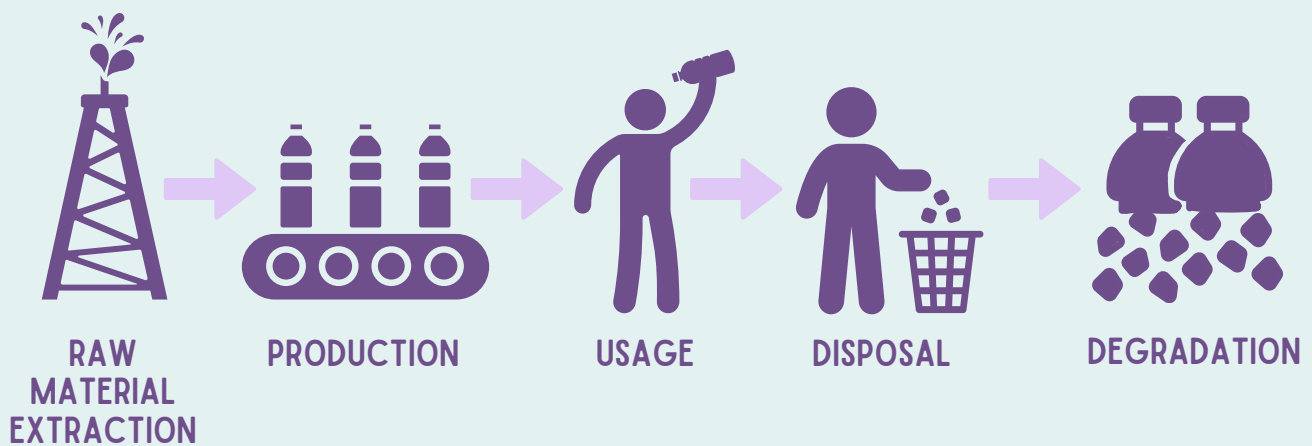
## SEA SHEPHERD & DHIMURRU ABORIGINAL CORPORATION



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 Arnhem Land, Northern Territory in 2022. Audio will be required, although there are audio cues.

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

# LIFE CYCLE OF PLASTIC



Plastic often has a quite linear lifecycle.

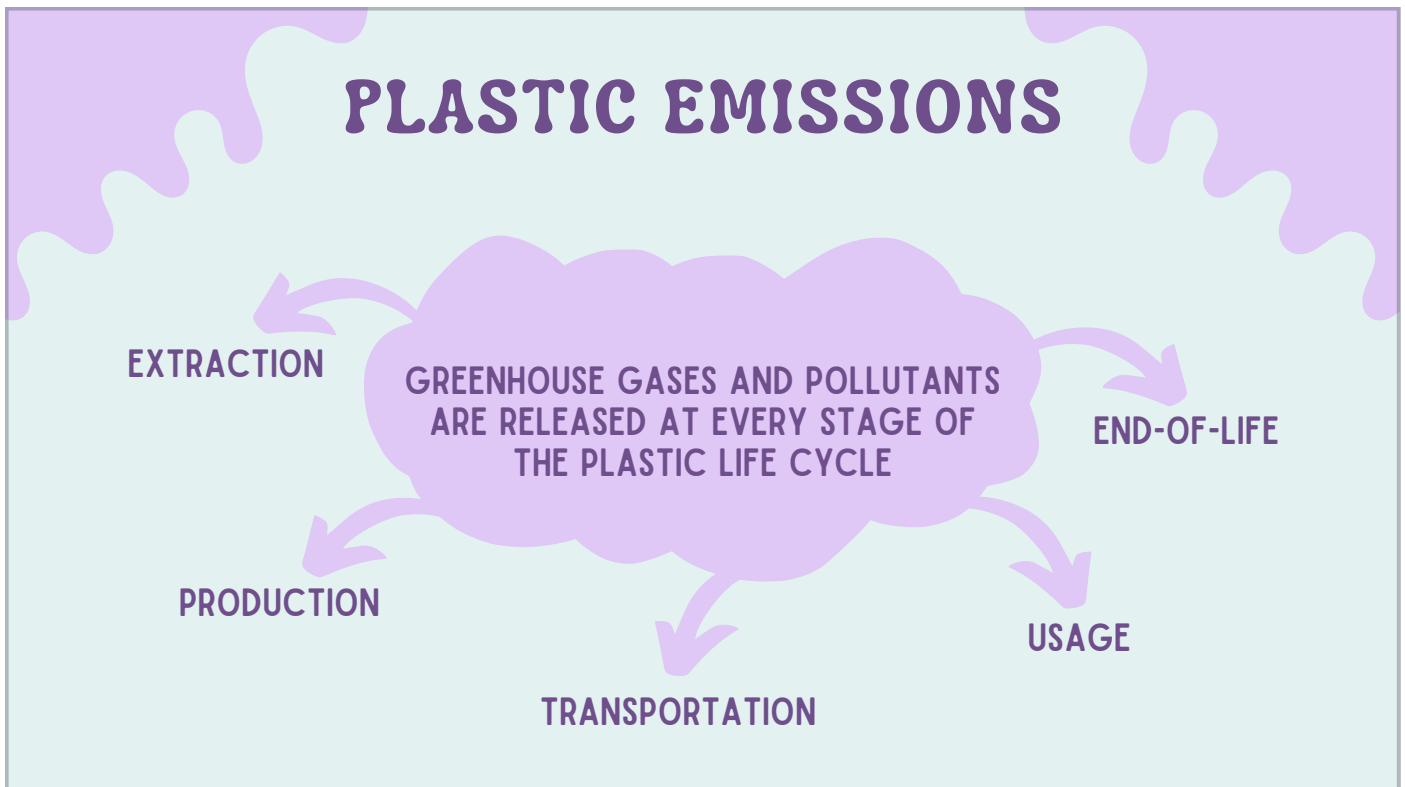
It begins with the extraction of raw materials, which for the most part are fossil fuel based. Oil and gas are extracted from the earth and transported to refineries.

Here the oil and gas is transformed into plastic polymers, which are then moulded into new items such as fishing gear, or water bottles.

The plastic items are then used by consumers in either a single-use (e.g. food packaging) or multi-use (clothing) manner.

Once the items have fulfilled their purpose they are disposed of, with majority ending up in landfill.

Here the plastic degrades and releases harmful chemicals into the environment.



greenhouse gases and pollutants are released at every stage of the plastic life cycle.

The extraction process of oil and gases releases large amount of carbon dioxide and methane into the atmosphere.

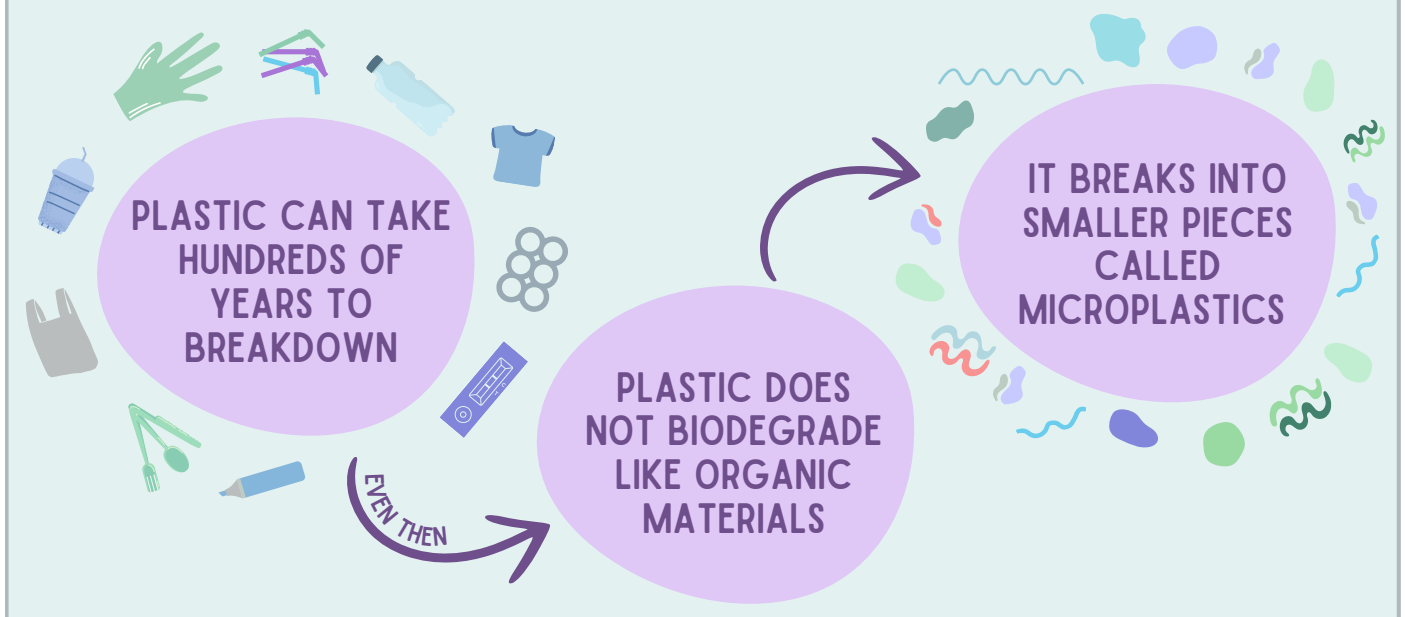
Manufacturing plastic generates emissions through energy use and chemical processes.

The transportation at every stage involves burning fossil fuels.

Some plastics, such as those in clothing, release microplastics while they are used.

Once plastic has reached the end-of-life, emissions are released through either incineration or through degradation.

# THE END-OF-LIFE CYCLE OF PLASTIC



Plastic takes decades to century's to breakdown, and even then it still exists as micro and nano plastics.

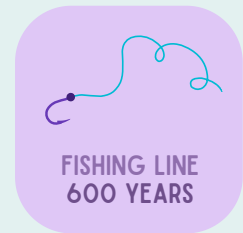
This is because plastic does not biodegrade like organic materials. Plastic is made of chemicals that most bacteria cannot consume, therefore the main way for the material to break up is through processes like UV degradation and mechanical degradation.

This leaves behind micro and nano plastics that persist as long-term pollution, which can cause harm to the environment.

The life cycle of most plastic is long and linear, which is why it is important to practice 'reduce, reuse, recycle'.

\*We will introduce the idea of circular economy in lesson 5

# BREAKDOWN TIMES FOR COMMON ITEMS



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

# **PRACTICAL**

**COMPLETE THE WORKSHEET ABOUT  
PLASTIC SOURCES**

Students can fill in the worksheet provided in the lesson pack