

LESSON 8

Plastic in the Sea

In this activity, students consider the items found on the beach in Lesson 7, and learn of the potential impacts of many of those littered items. Students propose personal actions that people can do to reduce this impact.

Meets Science ACSSU072 Living things have life cycles

Science ACSSU073 Living things, including plants and animals, depend on each other and the environment to survive

Maths ACSMP095 Select and trial methods for data collection, including survey questions and recording sheets

Maths ACSMP096 Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values

Sustainability OI.1-OI.9 In summary, sustainable patterns of living rely on the interdependence of healthy social, economic and ecological systems. Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments



Method

ENGAGE

Back in the classroom, surmise about how the litter from your clean-up came to be on the beach. (It could be from the land via stormwater drains, from beach-goers, from merchant ships or cruise ships, from fishing boats, from recreational fishers). Have a discussion about any of the litter that seems to be from overseas countries. Follow the fate of 28,000 **rubber duckies** lost at sea and the amazing story of where they ended up around the world, due to ocean currents.

Discuss how the litter might affect a person's enjoyment of the beach. Was the beach 'clean' after the collection? If so, how did it make you feel after the collection? Was there a storm-water drain nearby? Could it have been *your* litter?

EXPLORE

If you haven't already done this on the beach, sort through the litter and divide waste into categories, such as plastic (containers/rope/strapping/bags), aluminium, cloth etc. Record according to the datasheets at <http://www.tangaroablue.org/resources/data-sheet.html>. Count the number of items in each category and graph them. What was the most common type of rubbish on the beach?

Explain that this data could be used as part of a national dataset, useful for organisations who want to help deal with the litter problem.

Gather one of each of the following items, if possible: aluminium can, cardboard, fishing line, leather, nylon fabric, plastic bag, plastic bottle, polystyrene, steel can, woollen item. Add an apple or a piece of fruit.

If you have, say 6 items, choose 6 children and give each of them one item collected. Ask the children to arrange themselves in front of the class in order of the rate that these items take to decompose. For example, 'quickly decompose' on the left and 'slowly decompose' on the right.

Share the following tabulated information, and rearrange the children (above) accordingly.

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continued

ITEM	HOW LONG TO DECOMPOSE AT SEA
Apple core	2 months
Cardboard box	2 months
Orange/banana peel	Up to 2 years
Wool socks	1-5 years
Plastic coated paper	5 years
Nylon fabric	30-40 years
Leather	up to 50 years
Tin can	50 years
Aluminium can	200-500 years
Plastic bottle	450+ years*
Plastic Bag	500+ years
Fishing line	600 years (in water)

* a six-pack ring is estimated to take 450 years to decompose (Conner, D. K and O'dell, R., 1988), so it is estimated that a plastic bottle will take longer than 450 years, depending on the polymer type and sea conditions

EXPLAIN

Lead a class discussion on the different types of rubbish and the timeline each takes to degrade. Were students shocked by how long some everyday objects take to degrade? If so which ones?

ELABORATE

Ask the students what they know about the dangers to marine life of **plastic** in the sea. Answers could include:

LONGEVITY: plastic lasts a long time at sea. It is robust and strong.

ENTANGLEMENT: Animals/birds can become entangled in plastic such as rope, fishing line. This can

- cause the animals to drown
- disrupt their feeding
- restrict movement or ability to swim
- increase vulnerability to predators
- cause a restriction that results in infection or loss of limbs
- decrease their hunting and movement efficiency

INGESTION: Animals and birds can ingest plastic, thinking is it food.

- plastic can block the oesophagus and intestinal tract of birds and animals
- sharp objects can cause injuries and infections
- toxins can accumulate in an animal's tissues affecting the health of the animal
- birds mistakenly eat plastic, then feed their chicks via regurgitation, then the stomachs of the chicks get filled with plastic and they effectively starve
- plastic breaks down into miniscule particles, which are consumed by zooplankton, which are eaten by bigger fish then this goes up the food chain, affecting the health of each predator

Show video <http://aries.mq.edu.au/videos/kill-plastic-not-wildlife/> . Discuss.

Estimates are that many thousands of sea birds and animals are killed every year from ingesting marine litter, especially plastic, at sea.

EVALUATE

What *personal* actions can we take to reduce beach litter? (reduce disposable packaging, take care at the beach not to leave litter behind, bring rubbish home from fishing or boating, do not let litter get into stormwater, pick up litter at the beach).

(Save and store the remainder of the litter for the next lesson and/or for making marine animals from marine litter in Lesson 12. If you are not doing the activities below, sort the waste into two categories, recyclable and non-recyclable. Discuss the importance of reducing, re-using and recycling. Discuss what is recyclable and non-recyclable. Organise for the recyclable items to be recycled).

References

Australian Research Institute for Environment and Sustainability (ARIES) 2016, Kill Plastic not Wildlife, viewed on 16 January 2018, <http://aries.mq.edu.au/videos/kill-plastic-not-wildlife/>

Conner D.K and O'dell, R (1988) The Tightening Net of Marine Plastics Pollution, Environment: Science and Policy for Sustainable Development, 30:1, 16-36, viewed 16 January 2018, <http://dx.doi.org/10.1080/00139157.1988.9930865>

Mother Nature Network (2011) What can 28,000 rubber duckies lost at sea teach us about our oceans?, viewed on 16 January 2018, <http://www.mnn.com/earth-matters/wilderness-resources/stories/what-can-28000-rubber-duckies-lost-at-sea-teach-us-about>

Tangaroa Blue 2018, Protect Our Oceans, viewed on 16 January 2018, <http://www.tangaroablue.org/>