

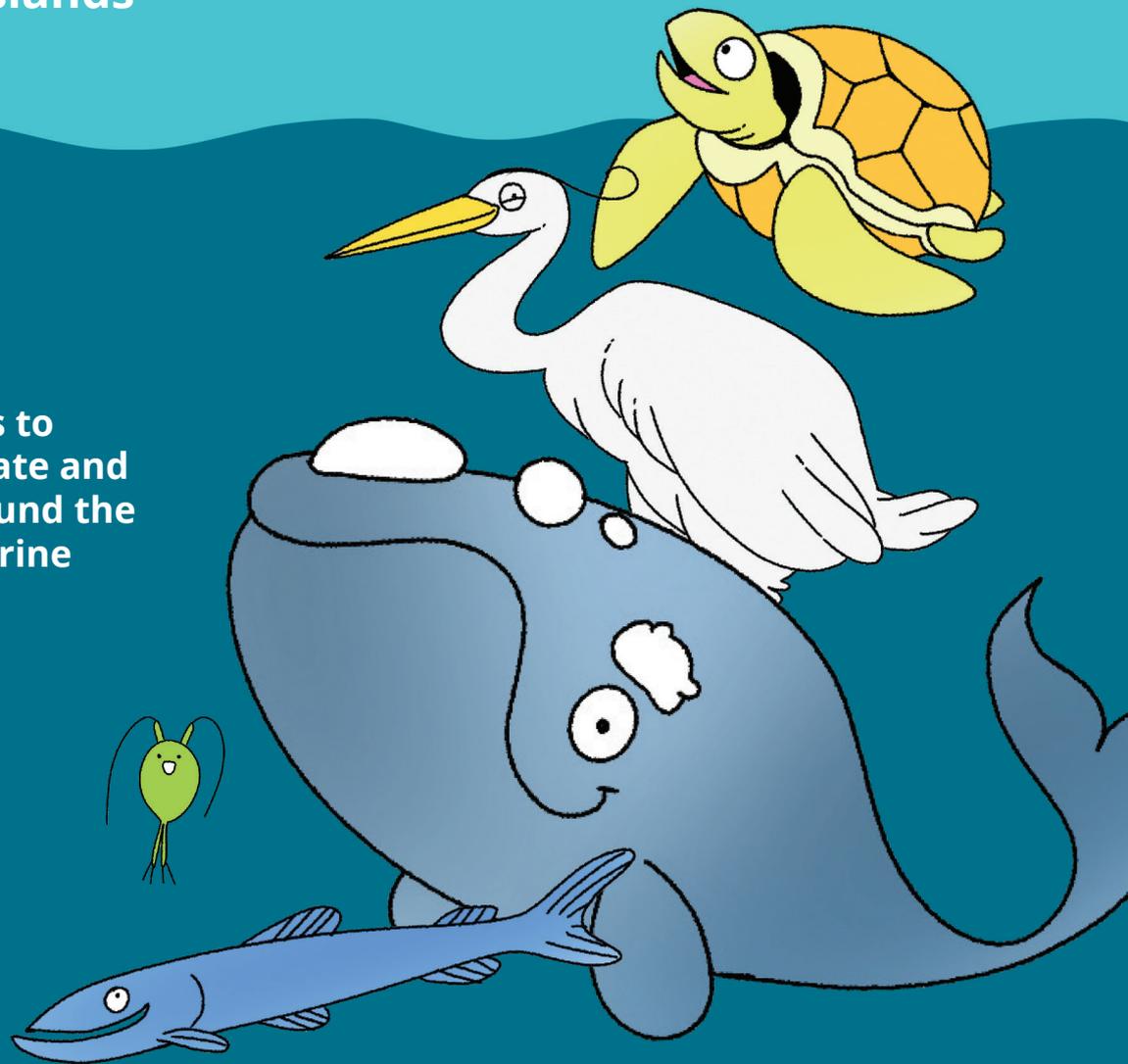


Community Pack

Solomon Islands

Level 2

4 lesson plans to engage, educate and influence around the subject of marine litter.



Department
for Environment
Food & Rural Affairs



Centre for Environment
Fisheries & Aquaculture
Science



Funded by
UK Government

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COMMONWEALTH
HEADS OF GOVERNMENT MEETING
LONDON 2018



Lesson 1: What is marine litter?

This lesson will introduce marine litter and the problems that it causes to marine ecosystems.

Marine litter or marine debris is defined as any persistent, manufactured or processed solid material discarded, disposed of, abandoned or lost in the marine and coastal environment.

You may ask, how does it get there? Litter ultimately comes from humans. We use something, discard it and unless it enters landfill or gets recycled, it ends up on the ground and could find its way to the sea. The most common way is by transport from rivers, sewage and storm outfalls. It can also enter the marine environment by being blown by winds or by being abandoned directly in the sea (as with fishing gear). Marine litter has been found in almost all marine environments on the planet and causes serious problems for marine life.

Animals often mistake litter for food, causing ill effects. Litter can cause habitat damage, entanglement and introduction of invasive species. Plastic is one of the most common materials found in the marine environment and over time, due to wave action and UV exposure, is broken down into smaller and smaller fragments called microplastics.

Microplastics are not only a concern for marine animals but also for humans as microplastics and toxins could be part of our diet through the fish we eat. This lesson will introduce students to marine litter, how marine litter enters our seas and the problems that litter cause to marine life.

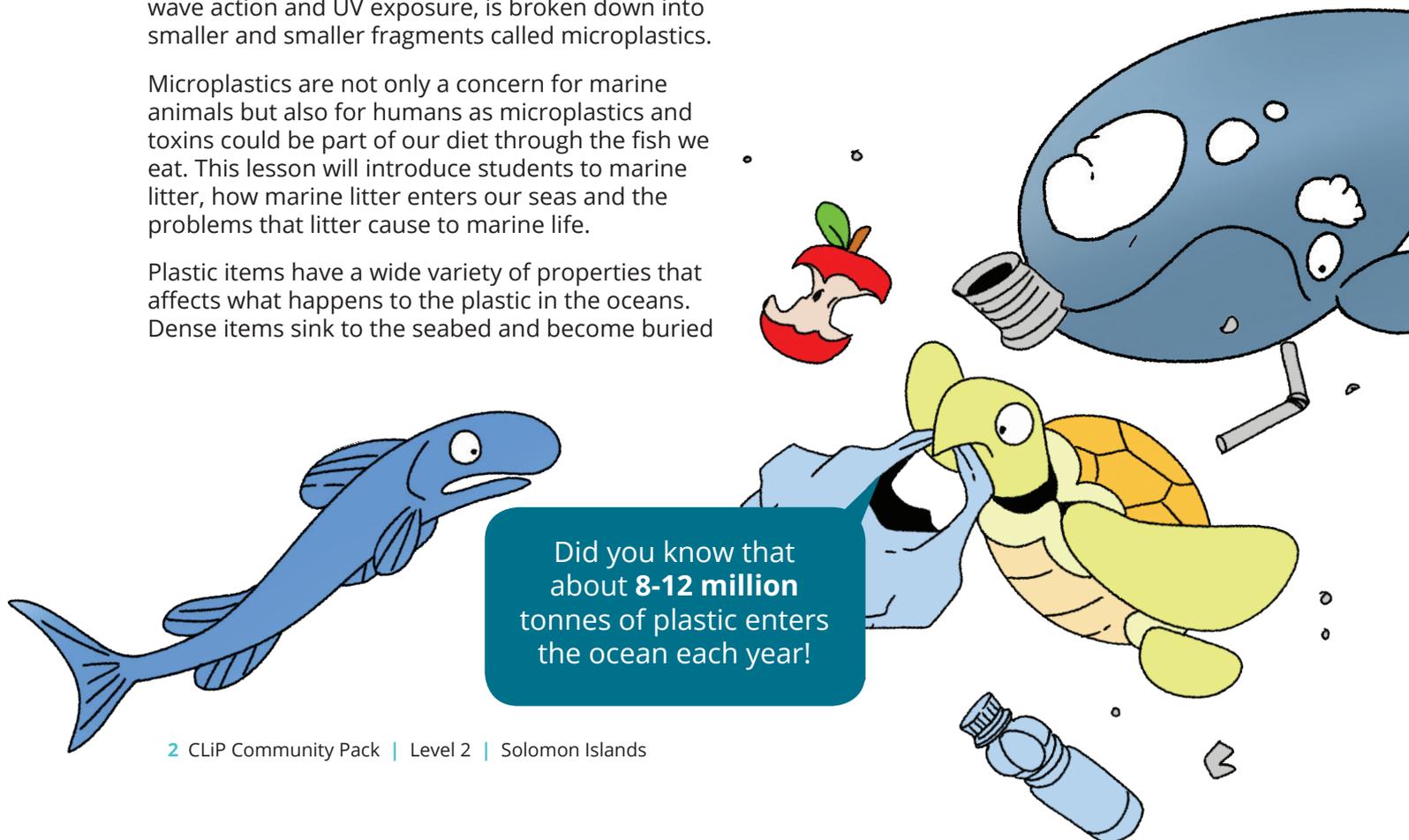
Plastic items have a wide variety of properties that affects what happens to the plastic in the oceans. Dense items sink to the seabed and become buried

in sediment, some items are suspended mid water column, while some items float on the surface. Oceanic currents and winds transport these items around the world, concentrating items in large oceanic gyres.

This lesson will introduce marine litter, how marine litter enters our seas and the problems that litter causes to marine life.

Resources

- [Tangaroa Blue marine debris fact-sheets](#)
- [What does Marine Debris Mean for our Oceans- Tangaroa Blue Foundation](#)
- [Ocean Heroes: 5 Gyres - Problem With Plastics](#)



Did you know that about **8-12 million** tonnes of plastic enters the ocean each year!

Marine Litter Factsheet

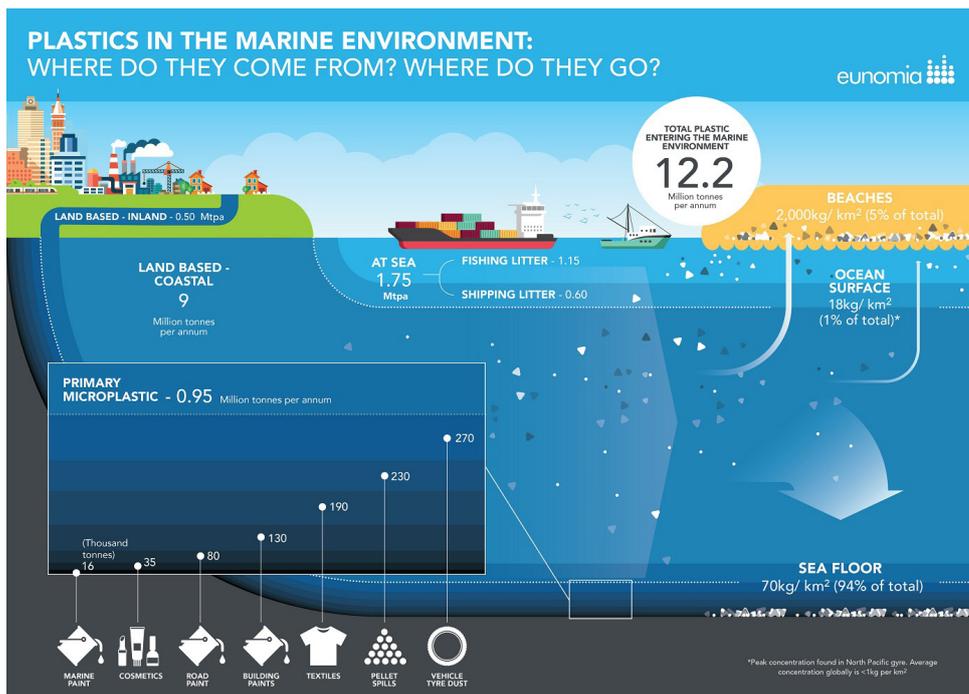
What is marine litter?

Marine Litter is any item that humans have discarded that ends up in on our beaches, rivers, seas or oceans. This is a huge problem as around the world, approximately 8 million pieces of marine litter enter the marine environment every day!

1. Plastic makes up 80% of marine litter. The term 'plastic' covers a wide range of polymers that can be moulded into many shapes. Plastic bottles, food wrappers and abandoned fishing gear are among the most common items globally that are found in the marine environment. In the sea, UV exposure, wave and wind action break down larger plastic items into small fragments called microplastics and even smaller nanoplastics.
2. Glass is the second most common material found on beaches. It mostly comes from bottles and when broken can be a hazard to beach users.
3. Aluminium drinks cans and other metal objects are another common item found on the beach and in our seas.

Where does it all go?

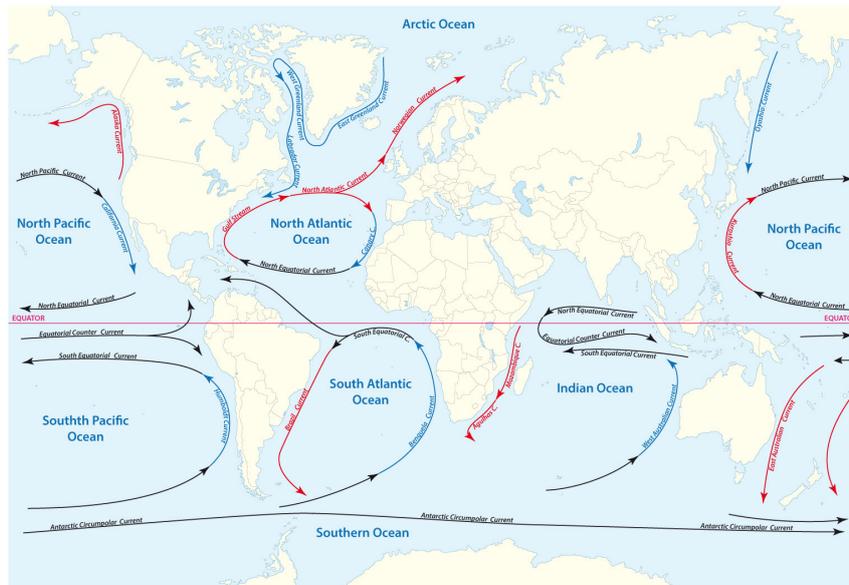
Different items have different densities which affects whether they sink or float. Large items may initially trap air and float, but over time the material can get brittle and break up into smaller pieces. Research now suggests that 94% of plastics in the marine environment end up on the sea floor.



© Eunomia <http://www.eunomia.co.uk/reports-tools/plastics-in-the-marine-environment/>

Marine Litter Factsheet

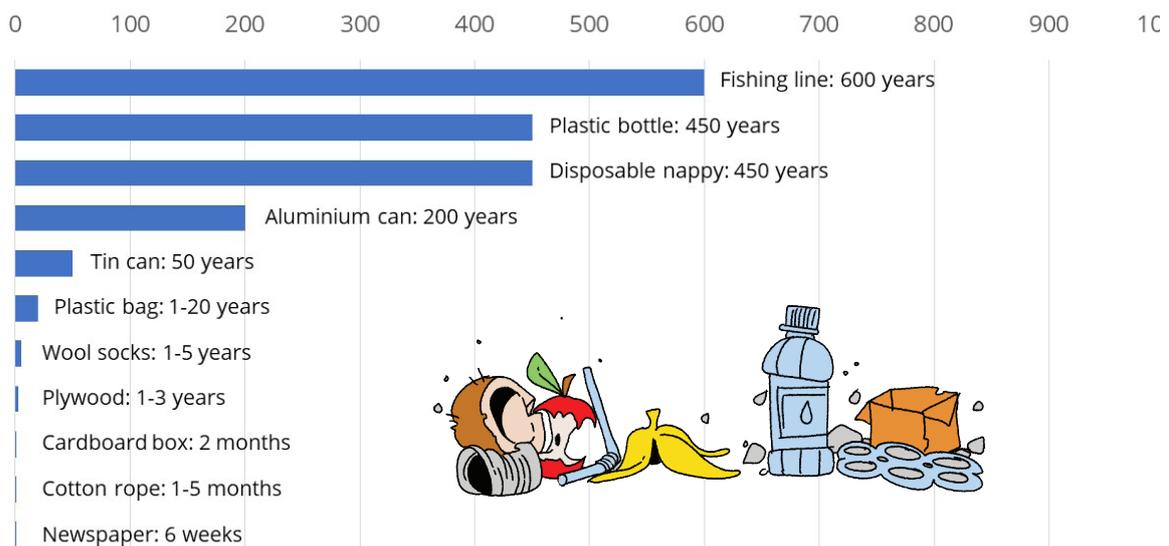
Winds, waves and currents move litter around our globe, depositing items onto our shoreline. Large oceanic currents move items around the oceans like conveyor belts. These currents form five oceanic gyres which bring together large amounts of marine litter. The most famous of these is the Great Pacific Garbage Patch where it is estimated that there are 1.8 trillion bits of plastic!



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How long does it last?

Scientists have estimated how long items take to break down in the marine environment, although the exact times are unknown and depend on the conditions. Times are likely to be longer in cold, wet conditions like the sea. Plastic is one of the most durable materials with harder items like bottles thought to last 450 years!



Marine Litter Factsheet

Can Marine Litter Harm Animals?

Marine Litter can cause serious damage to marine life. Over one million animals are killed each year from marine litter. Here are the most common causes:

Animals can mistake litter for food which can harm them and cause death. A recent whale washed up in Indonesia had 6kg of plastic in it's stomach, including 100 plastic cups!



© Alamy

Marine litter can cause damage to animals' surroundings. Large litter items, especially lost or abandoned fishing pots can damage fragile areas like coral reefs, particularly during bad weather.



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Marine animals can become entangled in litter. Fishing nets and six-pack can rings are common items that cause harm. Animals become tangled and are unable to get out which can cause death.



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Marine litter can carry 'alien' invasive species to new shores that can disrupt ecosystems, causing losses in biodiversity. Following a earthquake and tsunami in Japan in 2011, large amounts of litter washed up on the US coastline. Many of these items were carrying Japanese mussels, barnacles and sea squirts.



© Matt Ecklund

Activity: Sink or float?

The aim of this activity is to create awareness of different materials and what happens to these items in water and over time (e.g. break-up, rust, biodegrade) and record this in a table.

You will need:

- A variety of materials found from around the community centre. These should include a mix of man-made and natural items, hard and soft, flexible and stiff.
- A large container or tank filled with water
- Pencils and Paper

Instructions:

Set up a tank of water in the community centre. Gather a variety of items that might make their way into the marine environment and test what will happen over time when they enter the water. Make initial estimates as to whether they will sink or float and test this out by timing how long they take to sink to the bottom. Try to simulate ocean currents by swirling the water- does this affect what happens to the items?

Item description	Estimate- sink or float?	Time taken to reach bottom of tank (seconds)	Describe how the item is affected by water movement

When completed: Answer these questions

1. What are the characteristics of items that sank or floated?
2. Which items sank so slowly that they would be suspended in the water column for possibly days?
3. Research some marine animals that would feed on plastic litter at or near the surface, suspended in the mid-water column, and on the bottom. How might your items affect these animals?

Lesson 2: Marine Litter in the Solomon Islands

This lesson will explore marine litter in the Pacific, focused around a field trip and beach clean

Beach cleans are a great way to make people aware of the marine litter that is present on local beaches. Not only do they help remove the marine litter that has washed up on the beach, but recording the type and number of litter items found can also be fed into national and global programmes to help understand the sources of litter to the area. There are a number of apps on your smartphone that can be used to record this information.

Resources

- <https://www.mcsuk.org/beachwatch/organisers>
- https://www.ospar.org/ospar-data/10-02e_beachlitter%20guideline_english%20only.pdf



Activity: Beach field-trip and categorisation exercise

The aim of this exercise is to get out and about to a local beach to see marine litter first hand and record the types of litter that can be found there.

Instructions:

You will need:

- Beach
- Notebooks and pencils
- Completed Health and Safety Risk Assessment

Select a local beach, ensuring that you have permission from the land owner. Check the tide times and select a date and time for 2 hours or more after high tide, and not on an incoming tide.

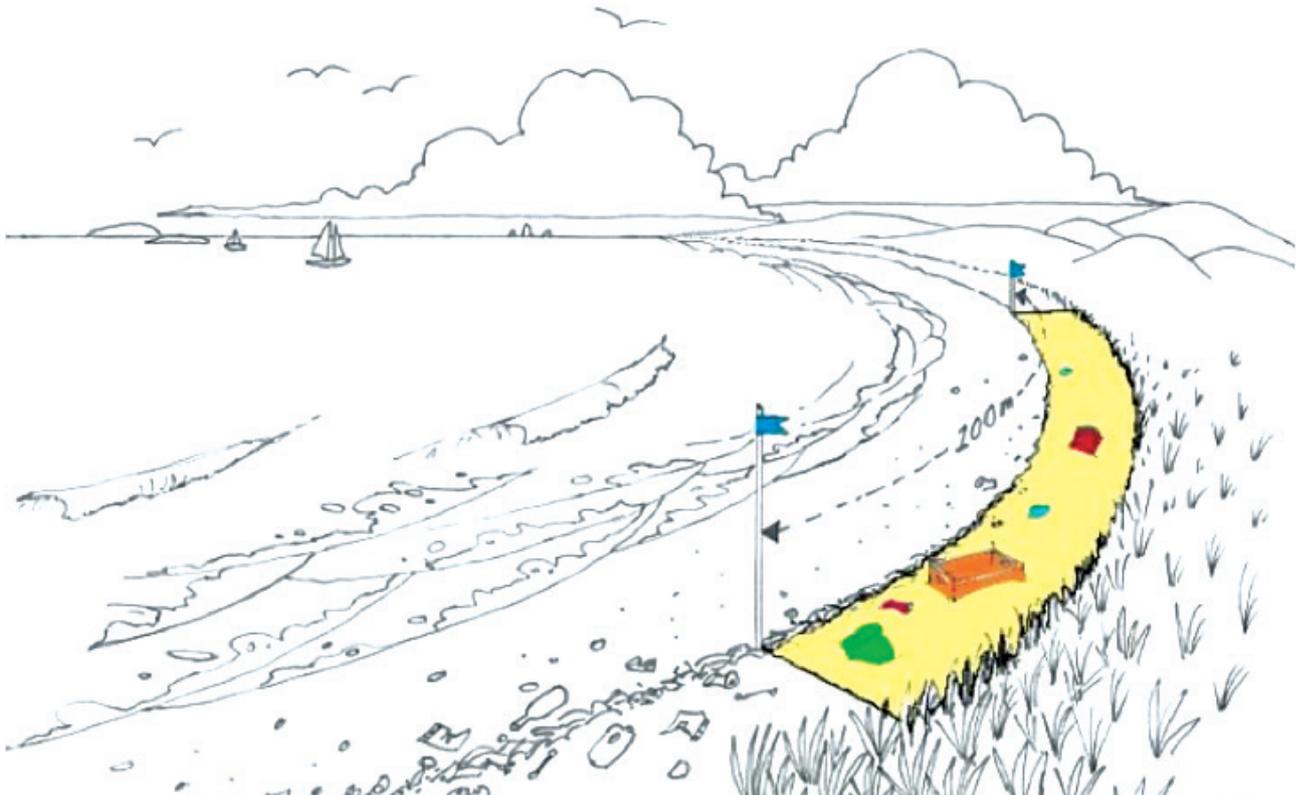
At the beach, select a 100m stretch of beach and mark out the area to survey. This should

run from the standline (the tide mark where you often get a collection of seaweed) to the back of the beach.

Organise yourselves in groups and pick up and record all the marine litter you find. Tally each litter item to one of the categories in the included table.

Once completed, make sure you dispose of the rubbish responsibly and bring a selection of clean safe litter items back for additional activities and lesson 4.

Back inside, collate all the records from the groups. Older members can draw graphs to identify the most common categories. Reflect upon your findings- Is this what you were expecting? What was the most commonly recorded item? Is this item something that your students use from day to day?



OSPAR ID	Items	Tally	Total
Plastic/Polystyrene			
1	4/6-pack yokes		
2	Bags (e.g. Shopping)		
3	Small plastic bags, e.g., freezer bags		
112	Plastic bag ends		
4	Drinks (bottles, containers and drums)		
5	Cleaner (bottles, containers and drums)		
6	Food containers include. Fast food containers		
7	Cosmetics (bottles & containers e.g. sun lotion, shampoo, shower gel, deodorant)		
	Cosmetics - Pharmaceutical packaging		
8	Engine oil containers and drums <50cm		
9	Engine oil containers and drums >50 cm		
10	Jerry cans (square plastic containers with handle)		
11	Injection gun containers		
12	Other bottles, containers and drums		
13	Crates		
14	Car parts		
15	Caps/lids		
16	Cigarette lighters		
17	Pens		
	Markers		
	Other plastic stationary		
18	Combs/hairbrushes		
	Toothbrush		
	Hair ties		
19	Crisp/sweet packets and lolly sticks		
20	Toys & party poppers		
21	Cups		
22	Cutlery/trays/straws		
	Plates		
23	Fertiliser/animal feed bags		
24	Mesh vegetable bags		
25	Gloves (typical washing up gloves)		
113	Gloves (industrial/professional gloves)		
	Plastic wrap non food (bubble wrap etc)		
26	Crab/lobster pots		
114	Lobster and fish tags		
27	Octopus pots		
28	Oyster nets or mussel bags including plastic stoppers		
29	Oyster trays (round from oyster cultures)		
30	Plastic sheeting from mussel culture (Tahitians)		

31	Rope (diameter more than 1cm) - Rope less than 1 metre		
32	Rope (diameter more than 1cm) Rope greater than then 1 metre, (estimated length in metres)		
32	String and cord (diameter less than 1cm)		
115	Nets and pieces of net < 50cm		
116	nets and pieces of net > 50cm		
33	Tangled nets/cord/rope and string		
34	Fish boxes		
35	Fishing line (angling)		
36	Light sticks (tube with fluid)		
37	Floats/Buoys		
38	Buckets		
39	Strapping bands - scraps		
	Strapping bands - whole (record as single item)		
40	Industrial packaging, plastic sheeting		
41	Fibre glass		
42	Hard hats		
43	Shotgun cartridges		
44	Shoes/sandals		
45	Foam sponge - Foam Buoys		
	Foam sponge - Foam cups, food packs and trays		
	Foam sponge - Foam insulation & packing (whole and remnants)		
	Bait & tackle bags & packaging		
	Bait containers & lids, bait savers		
	Recreational fishing items (lure, floats, rods, reels)		
117	Plastic/polystyrene pieces 0-2,5cm		
46	Plastic/polystyrene pieces 2,5cm > <50cm		
47	Plastic/polystyrene pieces > 50cm		
48	Other plastic/polystyrene (please specify in box*)		
Rubber			
49	Balloons, including plastic valves, ribbons, strings etc.		
50	boots		
52	tyres and belts		
53	other rubber pieces (please specify in box)		
Cloth			

54	Clothing		
	Cloth, hats & towels		
55	Furnishing		
56	Sacking		
57	Shoes (leather)		
	Fabric shoes		
59	Other textiles (please specify in box)		
Paper Cardboard			
60	Bags (e.g. Shopping)		
61	Cardboard		
118	Cartons e.g. tetra Pak (milk)		
62	Cartons e.g. tetra Pak (other)		
63	Cigarette packets		
64	Cigarette butts		
65	Cups		
66	Newspapers & Magazines		
	Brochures		
67	Other paper items (please specify in box)		
Wood (machined)			
68	Corks		
69	Pallets		
70	Crates		
71	Crab/lobster pots		
119	Fish boxes		
72	Ice Lolly sticks/chip forks		
	Pencils, matches		
73	Paint brushes		
	Brooms, brushes		
74	Other wood < 50cm (please specify in box)		
75	Other wood > 50cm (please specify in box)		
Metal			
76	Aerosol/Spray cans		
77	Bottle caps		
	lids/pull tabs		
78	Drinks cans		
120	Disposable BBQ's		
79	Electric appliances		
80	Fishing weights		
81	Foil wrappers		

	Packets/bladders & aluminium foil		
82	Food cans		
83	Industrial scrap		
84	Oil drums		
86	Paint tins		
87	Lobster/crab pots and tops		
	metal fishing items		
88	Wire, wire mesh, barbed wire		
89	Other metal pieces < 50cm (please specify in box)		
90	Other metal pieces >50cm (please specify in box)		
Glass			
91	Bottles - Glass beer stubbies & pre-mixed alcohol bottles		
	Bottles - Glass jars & source bottles		
	Bottles - Glass wine, spirit and similar bottles		
92	Light bulbs/tubes		
93	Other glass items		
	Glass & ceramic broken		
Pottery Ceramics			
94	Construction material e.g. tiles		
94	Octopus pots		
96	Other ceramic/pottery items (please specify in box)		
Sanitary waste			
97	Condoms		
98	Cotton bud sticks		
99	Sanitary towels/panty liners/backing strips		
100	Tampons and tampon applicators		
101	Toilet fresheners		
102	Other sanitary items (please specify in box)		
Medical waste			
103	Containers/tubes		
104	Syringes		
105	Other medical items (swabs/bandaging etc.) (please specify in box)		
Faeces			
121	Bagged dog faeces		

Lesson 3: Solutions?

This lesson will help explore solutions to the marine litter problem and help us understand how our actions can help.

It is really important that we all help to reduce the amount of litter in our country that enters the marine environment. In the first lesson, we learnt the difference between natural and synthetic materials. Years ago, our ancestors would drop their rubbish on the ground, but they were using natural materials like leaves and coconut husks that over time would biodegrade and become one with the soil. Materials we use these days are increasingly synthetic, which can last a really long time so we must put these items in the bin. Plastic can take up to 1000 years to disappear!

There are three actions that individuals can do to help reduce the amount of plastic that enters the marine environment: Reduce, Re-use and Recycle. Start the lesson by introducing these ideas that can be implemented in the Solomon Islands.

Reduce:

You can reduce the number of single-use items that you use. Simple ways to do this are:

- bring a reusable bag to the shop when you buy your groceries
- bring water from home in a reusable water bottle
- don't use plastic straws

Reuse:

There are many ways that you can creatively use things that you may otherwise throw away. Can you think of someone else that would be able to use it? Can you re-purpose it for another use?

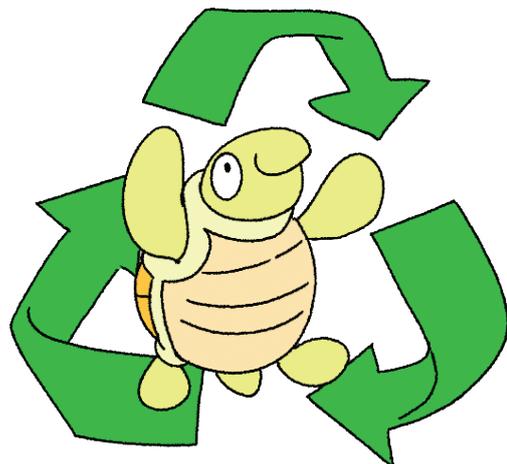
Recycle:

Many of the items that end up in our landfill sites can be re-made into other items. Check with your local area which items can be sent for recycling and make sure to separate these from your rubbish.

The nearby country Vanuatu introduced laws banning some single use plastic items in 2018. Ask the group to think of ways that they could help their communities reduce, re-use and recycle.

Resources

- [Reduce, Reuse, Recycle lesson ideas](#)
- [Reduce, Reuse and Recycle, to enjoy a better life](#)
- [The Three R's for Kids](#)



Activity: Make your own marine litter solutions

The aim of this activity is to make people aware of the three ways that they can make sustainable everyday choices to help combat marine litter by implementing the three R's- Reduce, Reuse and Recycle.

Instructions:

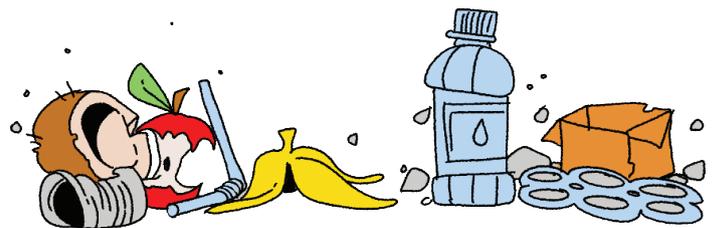
Introduce the activity by discussing Vanuatu's recent ban on single use plastic items and littering. <https://environment.gov.vu/images/Waste-awareness-v4-.pdf>. Ask the group to create three lists of solutions: what we can do as individuals; what can we do in our communities and what can the government can do in our country.

Extension:

Use the list you came up with to action some of the suggestions. Write a letter to businesses or governments to carry out your suggestions.

You will need:

- Worksheet
- Pencils



What can we do as individuals?	What can we do as a community?	What can the government do?

Lesson 4: What are the issues around the Globe?



This lesson will raise awareness of the global issue of marine litter and innovative solutions.

Around the world, there are some great examples of innovative solutions to solve the global marine litter crisis. Here, we introduce 5 of these solutions:

Name: Anna Du

Country: America

Invention: 12 year old Anna has created a prototype for an underwater rover that identifies microplastics using ultra-violet technology

<https://www.youngscientistlab.com/index.php/entry/1669>

Name: The Seabin Project

Countries: Europe

Invention: The Seabin is a floating rubbish bin that is located in the water at marinas, docks, yacht clubs and commercial ports.

<https://www.seabinproject.com/>

Name: Ocean Cleanup

Country: Netherlands

Invention: Boyan Slat started the Ocean Cleanup when he was just 18. The concept involves a huge 600m inflatable tube that floats in oceanic gyres, collecting litter items in a net below.

<https://www.theoceancleanup.com/>

Name: 4Ocean

Countries: Bali & America

Invention: This simple idea involves selling bracelets made from recycled plastic to commit to remove one pound of marine litter per bracelet sold.

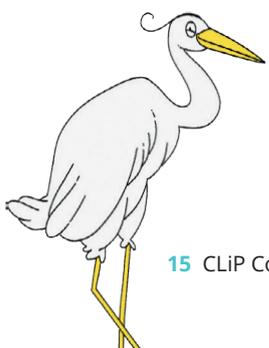
<https://4ocean.com/pages/our-story>

Name: SeaVax Robotic Ship

Country: United Kingdom

Invention: The robotic ship vacuums up plastic particles in the water column and uses energy from solar panels.

http://www.bluebird-electric.net/oceanography/Ocean_Plastic_International_Rescue/SeaVax_Ocean_Clean_Up_Robot_Drone_Ship_Sea_Vacuum.htm



Activity: Invent a marine litter solution

The aim of this activity is to get your group to invent a solution to help combat marine litter. Use the examples on the previous page and make a plan or drawing of your invention.

You will need:

- Paper
- Pencils

Instructions:

Use the previous examples to inspire students to develop a concept to tackle marine litter

Activity: Spread the word!

One crucial way you can help tackle marine litter is to spread the word to friends and family about the issues with marine litter.

You will need:

- Creativity

Instructions:

Work in groups to develop a method to communicate what you have learnt in the last 4 lessons and to educate your community. This could be a poster, a song, a dance or artwork. Be creative! You could even use some of the litter you saved in lesson 2.

