

Unit 3 (5th-6th class)

Plastic: Problems and Solutions

Learning intentions:

We will learn to:

- Explore what happens to plastic waste
- Discuss the link between healthy oceans and sustainable development
- Consider what can be done at individual and political level to solve the problem of plastic pollution
- Make links between an Irish Aid supported plastic waste initiative in Tanzania and the United Nations Global Goals for Sustainable Development
- Agree a class definition of 'reduce', 'reuse' and 'recycle,' and discuss the pros and cons of each
- Reflect on what we found out and did in this Unit

Materials:

Activity One: Explaining Henderson

- Henderson Island: Pupil Worksheet (page 6)
- Henderson Island: Teacher Resource Sheet (page 7)
- Ducks and Frogs: Teacher Resource Sheet (page 8)
- Explaining Henderson: Teacher Resource Sheet (page 9)

Activity Two: No Blue / No Green

- No Blue / No Green: Teacher Resource Sheet (page 10)
- DID YOU KNOW?!?: Teacher Resource Sheet (page 11)

Activity Three: Plastic Pollution

- Plastic Pollution: Pupil Worksheet (page 12)
- UNEP/Clean seas campaign (2018) Plastic Pollution: How Humans are Turning the World into Plastic, video (9.01 mins):

<https://www.youtube.com/watch?v=RS7IzU2VJIQ&list=PLZ4sOGXTWw8FPeLxo5ImDRmCsPRT7RQYL>

Activity Four: Dunia Design brochure

- Dunia Designs: Teacher Resource Sheet (page 13)
- Dunia Photos: Pupil Resource Sheet (page 14)

Activity Five: Dunia and the 3Rs

- 3Rs think-pair-share: Pupil Worksheet (page 15)
- Dunia and the 3Rs: Teacher Resource Sheet (page 16)
- Voice Ireland's 'Do you know how to recycle? Are you sure?' video (3.00 mins): <https://voiceireland.org/recycling-ambassadors-programme/>

Step-by-Step instructions:

Activity One: Explaining Henderson

1. Divide the class into small groups.
2. Give each group a copy of [Henderson Island: Pupil Worksheet](#) (page 6).
3. Display **Part (A) only** of [Henderson Island: Teacher Resource Sheet](#) (page 7) on the board.
4. Invite groups to work together to answer the questions on [Henderson Island: Pupil Worksheet](#). Tell each group to write their answer to Question Two in column 1.
5. Explain that in 2017 scientists counted 38 million pieces of plastic litter the beaches of Henderson Island. They believe that the island is covered in more plastic rubbish per square km than anywhere else in our world.
6. Display Part (B) of [Henderson Island: Teacher Resource Sheet](#) on the board.
7. Invite pupils to revise their answer to Question Two on [Henderson Island: Pupil Worksheet](#), considering this new information. Tell pupils to write their revised answer in column 2.
8. Display [Ducks and Frogs: Teacher Resource Sheet](#) (page 8) on the board.
9. Ask for volunteers to read the text on the board.
10. Invite pupils to look at the map showing the route taken by the bath toys and answer the following questions:
 - What month were the bath toys lost from the container ship?
 - When were the bath toys spotted in Tacoma, a city in Washington State, USA?
 - In which two years did bath toys wash up on the coast of the United Kingdom?
 - How many years were there between the bath toys being washed overboard and the latest UK sighting?
11. Display [Explaining Henderson: Teacher Resource Sheet](#) (page 9).
12. Ask for volunteers to read the text on the board.
13. Invite pupils to again reconsider Question Two on [Henderson Island: Pupil Worksheet](#) and write their revised answer in column 3.

Activity Two: No Blue / No Green

1. Display [No Blue / No Green: Teacher Resource Sheet](#) (page 10) on the board.
2. Explain that Sylvia Earle is a famous American ocean explorer (oceanographer).
NOTE: See Sylvia Earle (2009) 'My wish: to save the ocean', TED Talk, 18.05 mins: www.ted.com
3. Invite pupils to rewrite the Sylvia Earle quote in their own words.
4. Explain that Sylvia Earle is saying that our oceans and seas, which cover 70% of our planet, are a type of life support system. Oceans and seas help to control our planet's weather and climate. They soak up, store and slowly release large amounts of heat from the sun. Ocean currents help to spread this heat around our world and shape

the climate of different continents. In addition, oceans absorb nearly 1/3 of carbon dioxide emissions and so act as a defence against further climate change. However, increasing carbon dioxide emissions, caused by man-made activities like the production and disposal of plastic or the burning of coal and other fossil fuels, are putting our oceans and seas under increasing pressure. For this reason, protecting our oceans is sustainable development because healthy oceans mean healthy people.

5. Display [DID YOU KNOW?!?: Teacher Resource Sheet](#) (page 11) on the board.
6. Once they have read the DID YOU KNOW facts, ask pupils to take a few minutes to think about the impact that living on an island surrounded by water has on all aspects of our lives in Ireland, i.e. from the perspective of our economy (prosperity/wealth), society (people) and environment (planet).
7. Invite pupils to work in pairs to come up with their own personal DID YOU KNOW fact(s) about oceans/seas. Reassure them that they don't have to live on the coast to do this. DID YOU KNOW facts can be based on something that they ate, saw, heard or experienced on a visit to the seaside, on holidays or something that they read about or saw on TV.
8. Facilitate feedback, and as pupils share, record their facts under the headings of economy (prosperity/wealth), society (people) and environment (planet) on the board.

Activity Three: Plastic Pollution

1. Divide the class into small groups.
2. Distribute one copy of [Plastic Pollution: Pupil Worksheet](#) (page 12) to each group.
3. Explain to the class that they are going to watch a video about plastic pollution.
4. Invite pupils to read through the tasks outlined on their worksheet before watching the video so that they know what information to watch out for.
5. Watch UNEP/Clean seas campaign (2018) 'Plastic Pollution: How Humans are Turning the World into Plastic', video (9.01 mins).
NOTE: for URL see Materials section at start of this Unit (page 1).
6. Once pupils have completed their worksheet, take feedback on each question from a sample of groups, recording pupil's answers on the board.
7. Conclude by facilitating a whole class discussion using the following statement as a prompt:

The solution to plastic in our oceans starts on land.

Activity Four: Dunia Designs

1. Tell the class that they are going to learn about an example of Irish Government investment in plastic waste infrastructure in Tanzania as a way of tackling the problem of plastic in the developing world.
2. Display [Dunia Designs: Teacher Resource Sheet](#) (page 13).
3. Ask for volunteers to read the text on the board.
4. Encourage pupils to make connections between the text about Dunia Designs and their own lives and/or to things they have read about or seen elsewhere, by completing one or more of the following stem sentences:
 - That reminds me of a time when...
 - That reminds me of another story in which...

- That reminds me of something I saw on TV or online...
5. Divide the class into small groups.
 6. Explain to pupils that they should imagine that they work for Dunia Designs and they have been asked to design a company brochure for prospective clients. The finished brochure must include: information about the problem of plastic and how Dunia Designs is responding to this problem; photos* of Dunia Designs operations and products with captions; an outline the links between what Dunia Design does (providing employment; reusing/recycling of plastic; tree planting; supporting children and young people to get an education etc) and the Global Goals for Sustainable Development. Pupils could also: include Global Goal icons (available: <https://www.globalgoals.org/resources>)
- ***NOTE:** You can either print a copy of [Dunia Photos: Pupil Resource Sheet](#) (page 14) for each group, or if you have internet access, pupils could go online and copy images from the gallery section of Dunia Design’s website (<https://www.duniadesigns.org/gallery/>). Encourage pupils to acknowledge Dunia Designs ownership (copyright) of the images by including the following statement in their brochures: *All images © Dunia Designs.*

Activity Five: Dunia and the 3Rs

1. Display [3Rs think-pair-share: Pupil Worksheet](#) (page 15) on the board. Read the instructions and ask pupils to copy the table on the board into their copies.
 1. Invite pupils to work on their own to come up with definitions of the words ‘reduce’, ‘reuse’ and ‘recycle’ (to be written in the first column of their table).
 2. Ask pupils to pair up, compare their definitions and write a revised definition for each word in their table (second column).
 3. Display [Dunia and the 3Rs: Teacher Resource Sheet](#) (page 16) on the board.
 4. Ask for volunteers to read the text on the board.
- NOTE:** The Dunia Designs pouffe reuses plastic bottles.
5. Write the following quote by Antonio Guterres, 9th General Secretary of the United Nations, on the board:

Refuse what you can’t reuse.

Ask pupils which of the 3Rs are left out of this quote and why?

NOTE: Refuse (**REDUCE**) what you can’t **REUSE**. There is **no mention of RECYCLE**.

6. Watch Voice Ireland’s ‘Do you know how to recycle? Are you sure?’ video (3.00 mins).
- NOTE:** for URL see Materials section at start of this Unit (page 2).
7. Explain that each of the 3Rs is important, but recycling is the least beneficial of the three, because:
 - Recycling requires energy. Even though recycling uses less energy than making brand new products, making recycled goods still produce emissions and adds to the challenge of climate change.
 - Only certain types of plastic can be recycled. Of the 8.3 billion metric tonnes of plastic ever produced: only 9% has been recycled; 12% has been incinerated or burned (which releases emissions and contributes to climate change); and, 79% has gone to landfill (from where it often ends up in our oceans).

8. Facilitate a whole class discussion to agree class definitions of the words 'reduce', 'reuse' and 'recycle'. Invite pupils to write these class definitions in their table (third column).
9. Explain that 2018 was the year that hashtags like #beatplasticpollution and #sickofplastic went viral.
10. Conclude by asking pupils to come up with a hashtag# which sums up what they have learned about in this Unit. Recommend that their hashtags are 30 characters or less and that they use capital letters if needed to make their hashtag easier to understand.

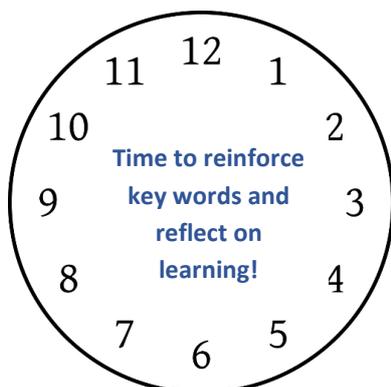
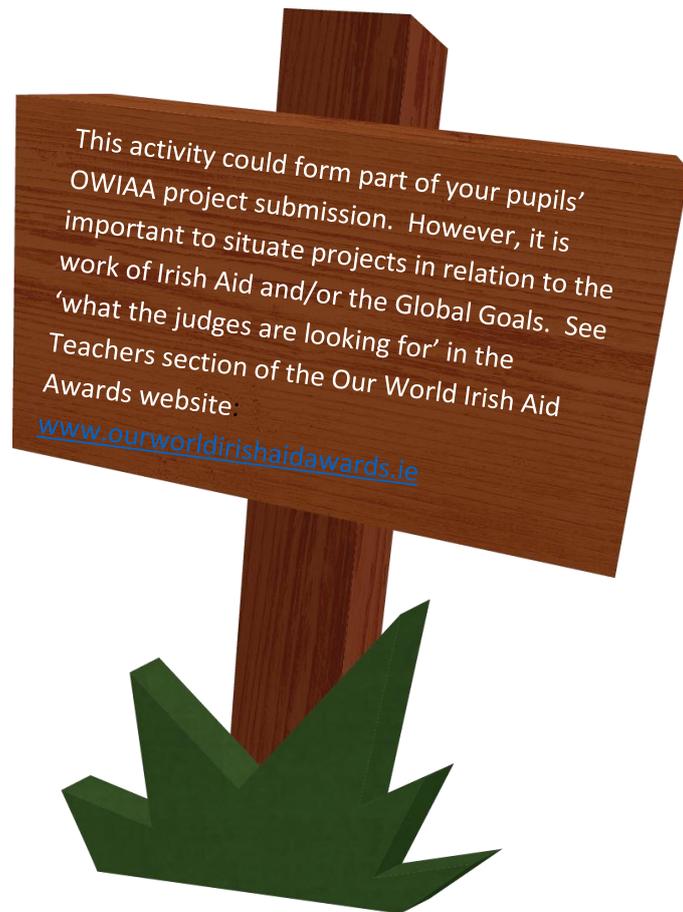
EXTENSION ACTIVITY:

Invite pupils to search PINTEREST or other appropriate online platforms for craft ideas reusing plastic (e.g. bird feeders made from plastic bottles, plaited bracelets or crochet rugs made from plastic bags etc).

NOTE: Sometimes craft projects where plastic is reused are incorrectly labelled as recycled plastic projects. As pupils search, encourage them to critique 'reuse' and 'recycle' definitions.

Depending on your class you could either support pupils to:

- recreate and exhibit their favourite craft idea
- present their favourite reused plastic craft ideas to another class



End of unit literacy and reflection activities are available in the lesson plan section of the Our World Irish Aid Awards website: www.ourworldirishaidawards.ie

Activity One

Henderson Island: Pupil Worksheet



Question One:

What do you see on the beach?

Question Two:

How do you think these items ended up on this beach?

Column 1

(complete after the photo of the beach on Henderson Island)

Column 2

(complete after the map showing where Henderson Island is)

Column 3

(complete after the story about the ducks and frogs)

Activity One

Henderson Island: Teacher Resource Sheet

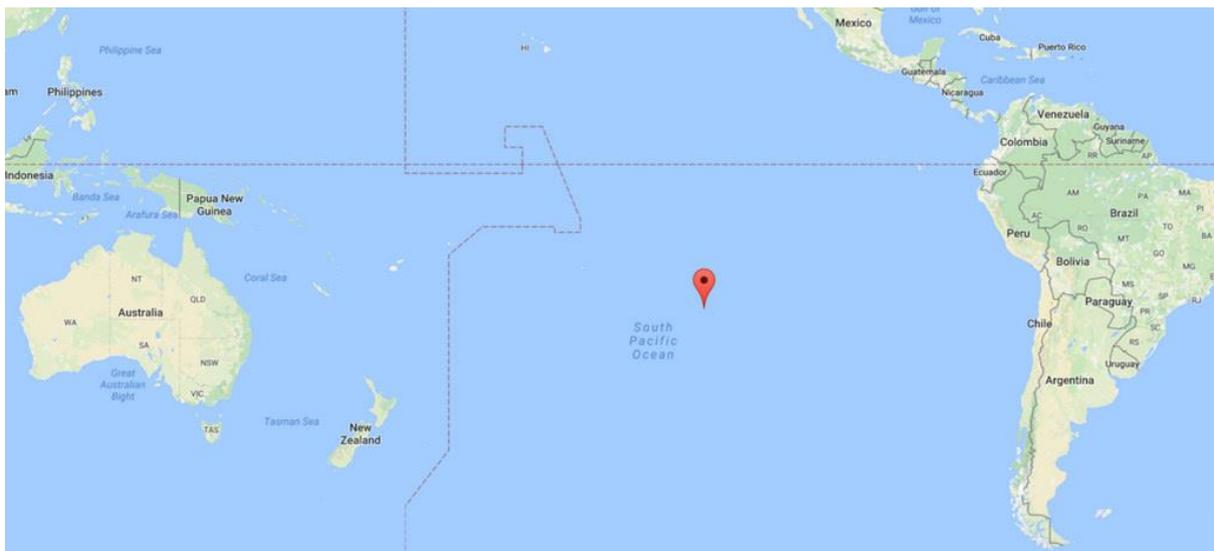
Part (A)



Beach on Henderson Island, in the Southern Pacific

Source: <https://www.smithsonianmag.com/smart-news/henderson-island-covered-37-million-pieces-your-trash-180963322/>

Part (B)



Henderson Island, in the Southern Pacific

Source: <https://www.theweathernetwork.com/news/articles/one-of-earths-most-remote-islands-hides-a-troubling-fact/82312>

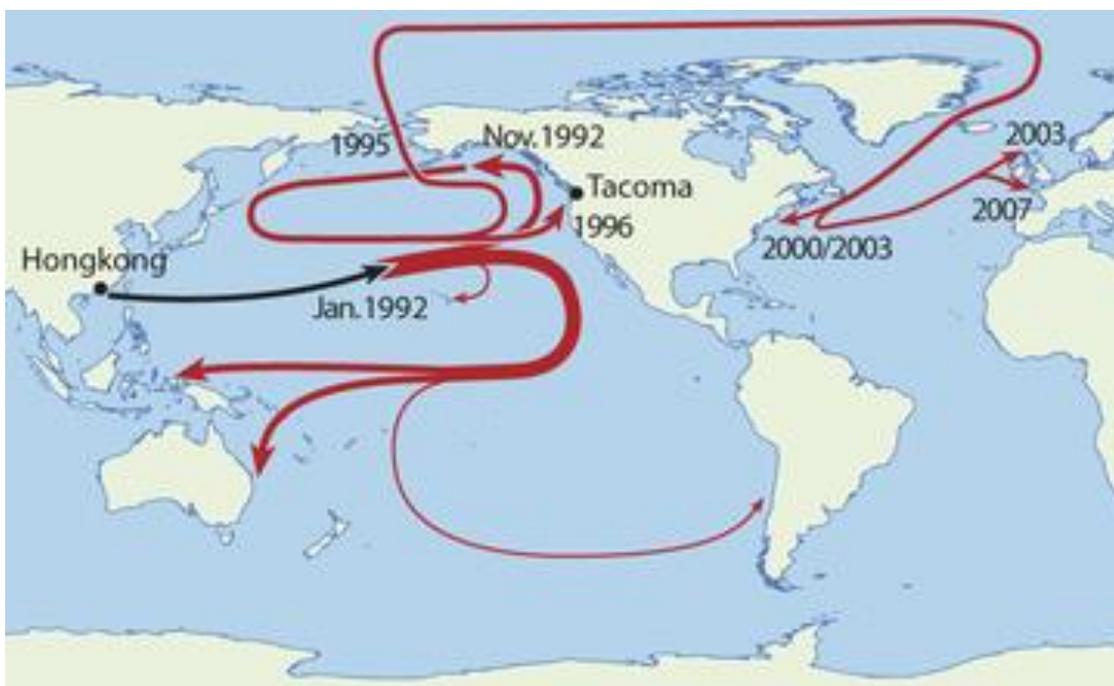
Activity One

Ducks and Frogs: Teacher Resource Sheet

In 1992, a container ship travelling from Hong Kong lost 28,800 rubber bath toys 1,000 miles off the coast of Alaska during a storm.



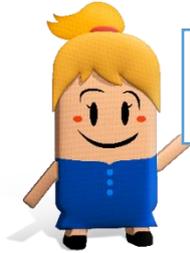
At first, these red beavers, green frogs, blue turtles and yellow ducks travelled with the strongest currents in the direction of Australia. Some travelled north and spent years frozen in Arctic ice, before making their way to the shores of the United Kingdom to be recovered most recently in 2007.



Activity One

Explaining Henderson: Teacher Resource Sheet

Approximately 79% of the 8.3 billion metric tonnes of plastic produced since the 1950s has ended up in our oceans.



8.3 billion metric tonnes weigh roughly the same amount as one billion elephants.

Most of this waste, comes from:

- flushing or washing plastic *microfibers* or *microbeads* into our drains
- bigger plastic rubbish that is collected and buried in landfill sites

From drains and landfill the plastic waste is blown or washes into our rivers and from there travels into our seas and oceans.

Plastic waste never biodegrades (unlike an apple that rots, turns to compost and eventually turns into soil). Instead, plastic breaks into smaller and smaller pieces, called *microplastics*. Eventually, with the combined effects of the sun, waves and marine life these pieces get so small they cannot be seen with the naked eye. This makes them very difficult to clean up and they can end up in the food chain and from there on your plate!

Henderson Island is in an area or zone known as the South Pacific *gyre*. This is one of the five *gyres* in our oceans where plastic and other rubbish accumulates because of *ocean currents*.

As plastic goes, single-use plastics, like the soft, light weight plastic packaging on meat, fruit and vegetables; plastic knives, forks and spoons; plastic bags; take-away coffee cups; straws; cotton buds; the filters in cigarette butts; chewing gum; cotton buds; balloons and balloon sticks; and, menstrual products like tampons or sanitary pads, are the most problematic. But the good news is that lots of single use plastics are easy to refuse and there are alternative and more sustainable products available.



Keywords:

microfibres = tiny plastic strands that are released when we wash manmade (synthetic) textiles, like polyester

microbeads = tiny plastic beads used to add texture to cosmetic or cleaning products

biodegrade = when something breaks down and returns to the environment without causing harm

ocean currents = the movement of the ocean water from one place to another

Activity Two

No Blue / No Green: Teacher Resource Sheet

No water

No life

No blue

No green

Sylvia Earle

Activity Two

DID YOU KNOW?!?: Teacher Resource Sheet

FACT

Fish and seafood are the main source of protein (important for a healthy balanced diet) for four out of ten people in our world.

FACT

50-80% of the oxygen in the earth's atmosphere comes from tiny ocean plants, called *phytoplankton*, that live near the surface of the water. This means that every breath you take includes oxygen made in our oceans.

FACT

The ocean provides an income for every 10th person in the world, working in industries like fishing, tourism and shipping.

FACT

Approximately 90% of the trade in our world is possible because of our oceans and seas. Much of the food you eat and clothes you wear have travelled by ocean/sea to get to you.

FACT

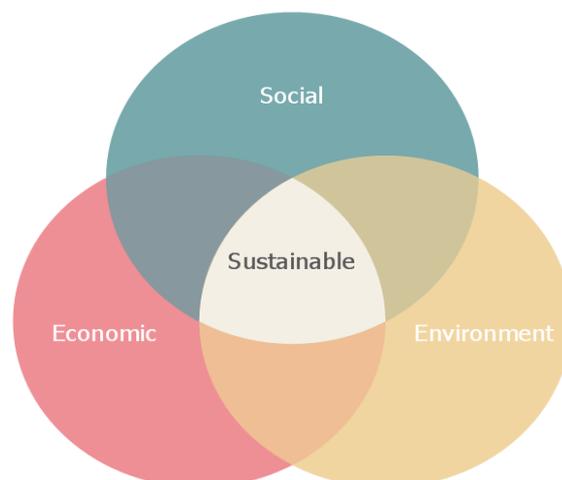
More than 1/3 of all oil and gas used to heat your homes and school and run your cars and buses come from offshore rigs (given the scale of the threat of climate change the fact that we are still taking fossil fuels from the ground or seabed isn't a good thing!)

FACT

80% of all tourism in our world is based near oceans/seas.

FACT

Oceans and seas shape the culture and traditions of the people who live on coastlines. The 2016 census data showed that 1.9 million people in Ireland live within 5kms of the coast. That's 40% of our population!



Activity Three

Plastic Pollution: Pupil Worksheet



BEFORE WATCHING: read through the tasks outlined below so that you know what information to watch out for.

WHILE WATCHING: take rough notes.

AFTER WATCHING: work together to agree and write your answers.

List **3** positives about plastic:

1.



2.



3.



List **3** negatives about plastic:

1.

2.

3.

Explain **2** things you can do to fight the problem of plastic:

Summarise **1** thing that politicians in Europe should do to address the global challenge of plastic pollution:

Activity Four

Dunia Designs: Teacher Resource Sheet



Duniadesigns

Dunia Designs is an eco-friendly design company that specialises in the reusing/recycling of plastic bottles, bags and other plastic waste to create furniture and construction material. The company is based in the city of Arusha, in the Northern highlands of Tanzania.

This business was set up in 2014, after Irish couple Evanna Lyons and Alexis Cronin, concerned about the lack of recycling facilities and the amount of plastic ending up in rivers and on beaches, decided to try to make furniture from the plastic waste found on the city streets.

Ireland's aid programme has supported Dunia Designs since 2016. This funding has helped the company to employ a full-time production manager; set up a network of plastic waste collection points in Arusha; buy new equipment, such as a circular saw, a grinder and a shredding machine; and, research new products, like greenwood (a timber-like material made from recycled plastic waste) and a building brick made from plastic waste.

Dunia Designs gets donations of plastic waste and employs local people as collectors. These workers are paid per kilo of plastic collected from the streets. The plastic is washed and dried. Depending on the type of plastic, it is then either shredded to be used as furniture stuffing, or it is recycled and turned into greenwood, which can be used to make furniture frames and other products, such as school desks.

Across Tanzania primary schools have too few school desks. An estimated 1.4 million children sit on their classroom floors. This is uncomfortable and affects school attendance and how well pupils can learn. Traditionally school desks have been made from timber, but Dunia Designs has produced a cost effective, sturdier and more sustainable alternative, made with a steel frame and greenwood seat and table.

Dunia Designs is developing an education programme to teach about the challenge of plastic in our world and encourage children and young people to solve this problem from an enterprise (business) and design perspective. The company uses 50% of their profits for tree planting projects and to support children and young people to stay in or return to education. Since 2014, Dunia Designs has supported six pupils to attend primary school, two secondary school students and two university students. In this way, and by providing jobs for local people, Dunia Designs is contributing to the Global Goals for Sustainable Development pledge to Leave No One Behind.

Activity Four
Dunia Photos: Pupil Worksheet



All images © Dunia Designs

Activity Five

3Rs think-pair-share: Pupil Worksheet



THINK – in the ‘THINK’ column write what you think the words ‘reduce’, ‘reuse’ and ‘recycle’ mean.

PAIR – when you have finished, discuss your definitions with one other person, agree a joint definition, and write this in the ‘PAIR’ column.

SHARE – Take part in a class discussion, and write the definition agreed by the class in the ‘SHARE’ column.

	THINK <i>I think it means</i>	PAIR <i>We think it means</i>	SHARE <i>As a class, we agree it means</i>
REDUCE →			
REUSE →			
RECYCLE →			

Activity Five

Dunia and the 3Rs: Teacher Resource Sheet

Reduce: Dunia Designs education programme is making children and young people more aware of the plastic problem in our world so that they will consume less plastic, especially single use plastic items.

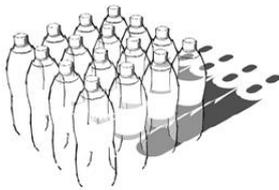
Reuse: reusing can be about using an item for the same purpose more than once (e.g. reusing wrapping paper from your birthday present on a present for someone else), or it can be about using the same item for different purposes (e.g. wrapping a present with an old scarf instead of using paper). Some Dunia Designs products use repurposed plastic bottles, and there is a plastic bottle wall at the company offices in Arusha.

Recycle: this means changing waste goods, like mixing different types of hard plastic together and moulding them into greenwood for furniture frames and other products. Dunia Designs products are made from up to 80% recycled plastic.

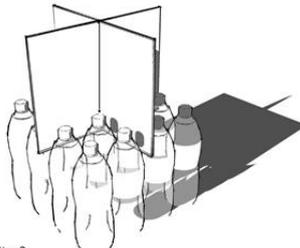


Is the Dunia Designs pouffe (below) an example of reducing, reusing or recycling plastic bottles?

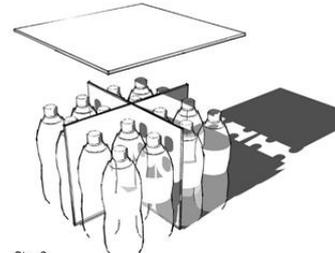
6 Steps to Creating Plastic Bottled Furniture.



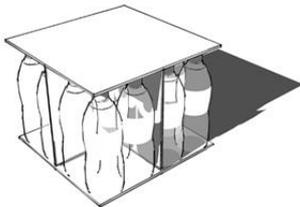
Step1.
Organise the empty plastic bottles as per the desired arrangement.



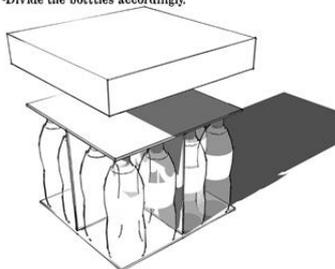
Step2.
Using 2no. MDF sheets (which have been fitted together)
-Divide the bottles accordingly.



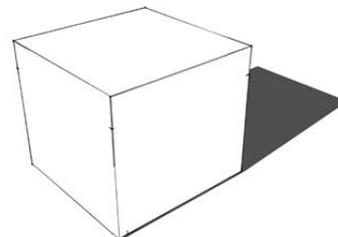
Step3.
Using 2no. MDF sheets to create a top & base.



Step4.
The MDF is securely fixed together holding the plastic bottles in place, which will support the weight applied onto the furniture.



Step5.
A cushioned material is then applied to the top and side of the structure.



Step6.
The Structure is then Upholstered with the desired Fabric / Material.

Duniadesigns