The Problem with Garbage

What Do you SEE?

Spend a few minutes looking at the photograph and think about the following questions:

- What do you see?
- What does it make you think about?
- Are there any problems that you can identify?

And finally…

- What question does the photograph raise for you?

Waste pickers sort plastic under a bridge over the river Buriganga in Bangladesh.

Because plastic wasn't invented until the late 19th century, and production really only took off around 1950, we have a mere 9.2 billion tons of the stuff to deal with. Of that, more than 6.9 billion tons have become waste. And of that waste, a staggering 6.3 billion tons never made it to a recycling bin—a figure that stunned the scientists who crunched the numbers in 2017.

waste TIMELINE

Activity

- Look at the eight pictures.







- Place them in a timeline from the fastest to the slowest item to decompose.

2019 3019

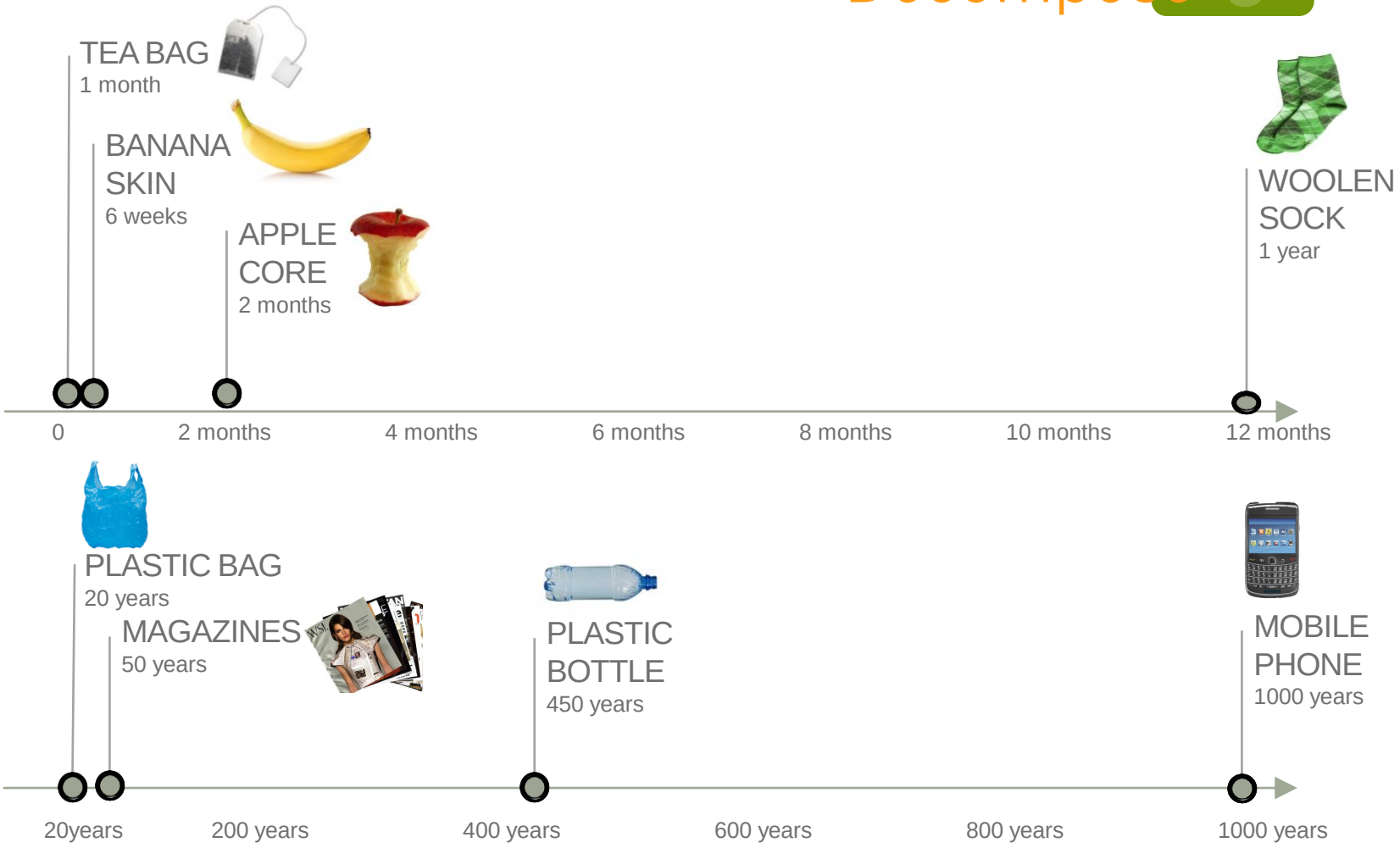
Check your timeline

Fastest to decompose → Slowest to decompose

Did you get them in the right order?

How long do you think it would take each item to decompose on a landfill site?

Time to Decompose



But the problem is clearer when we take a look at other places around the world.

Many experts agree that saving the environment is the biggest challenge we face.

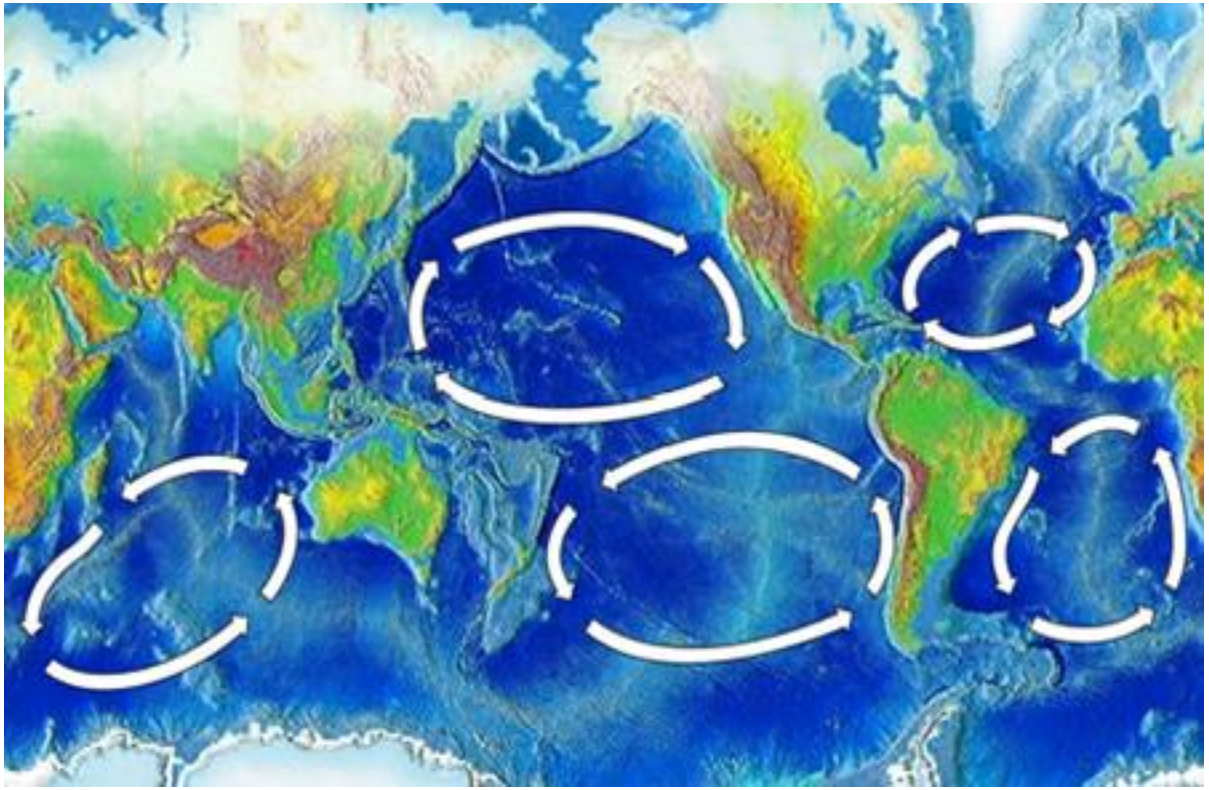
For many, there is no longer a connection with the natural environment and so they see no real need to work at saving it.

Besides not looking very nice, what other problems does all this waste cause?

- Animals get caught in the garbage or eat the garbage and then die.
- Plastics are beginning to enter the food chain. People are eating, drinking and breathing in plastics.
- When materials are not recycled, new materials need to be made from raw resources like trees and that can cause further problems.
- Cutting down trees means less oxygen is being produced, for example.

Every minute, a garbage truck full of plastic is being dumped into the ocean.

- Imagine five plastic grocery bags stuffed with plastic trash sitting on every foot of coastline around the world—that would correspond to about 8.8 million tons, a conservative estimate of what the ocean gets from us every year.

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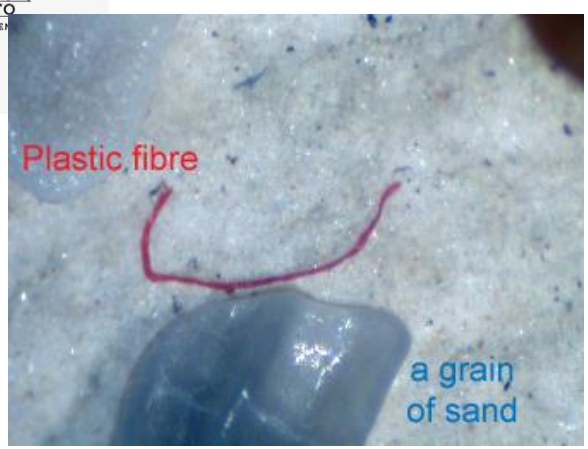
Surfrider
Foundation
EUROPE

By 2050, the weight of all the plastic in the ocean will be more than all the fish who live there.

Every water sample examined by scientists in the past year was contaminated with plastic.

- Enough plastic bottles are tossed each year to circle the planet four times.
- A million plastic bottles are bought every minute.
- In an Average Year, 8 billion pounds of plastic bottles are produced in the United States. If all of them had been recycled, the resulting material could have been used to create 22 million size XL T-shirts.
- More plastic was manufactured in the last ten years than in the last 100 years.

Are we eating plastic?



- In a study along the coast of Vancouver Island, every oyster that was harvested and then studied contained plastic.
- Plastic has been found in salt and both tap and drinking water.

Plastic Plastic Everywhere

- Plastic is found in shampoo, clothing, and many other products.
- Plastic is used in many products like shampoo to help keep the product smooth and spreadable.
- Plastic in clothing comes from some of the material which is actually made of plastic.
- For every shower a person takes, 90 000 pieces of microplastic goes down the drain.
- Unfortunately, filters at water treatment plants are not fine enough to stop these plastics from reentering the water system.
- Many of the fibres are so light that they float in the air, and we breathe them in.

We really need to reduce our use of plastic by avoiding using plastic in the first place and by recycling.

- 25 Billion Styrofoam Cups are Trashed Each Year
- It takes Styrofoam more than 500 years to decompose in a landfill. A coffee mug can be washed and reused for years generating no waste.
- Chemicals from decomposing materials in landfills can also make their way into the soil and water contaminating them.

When we don't recycle, we use up natural resources.

- Half a million trees have to be cut down just to produce the Sunday newspapers each week.
- Most people in America use at least seven trees each year, through wood, paper and other types of products that use trees. That is over 2 trillion trees throughout the course of the year when you think about it.
- Approximately 1 billion trees worth of paper is thrown out in the US every year.

Due to the fact that people aren't recycling as much as they should, the rainforests are actually being cut down by about 100 acres a minute.

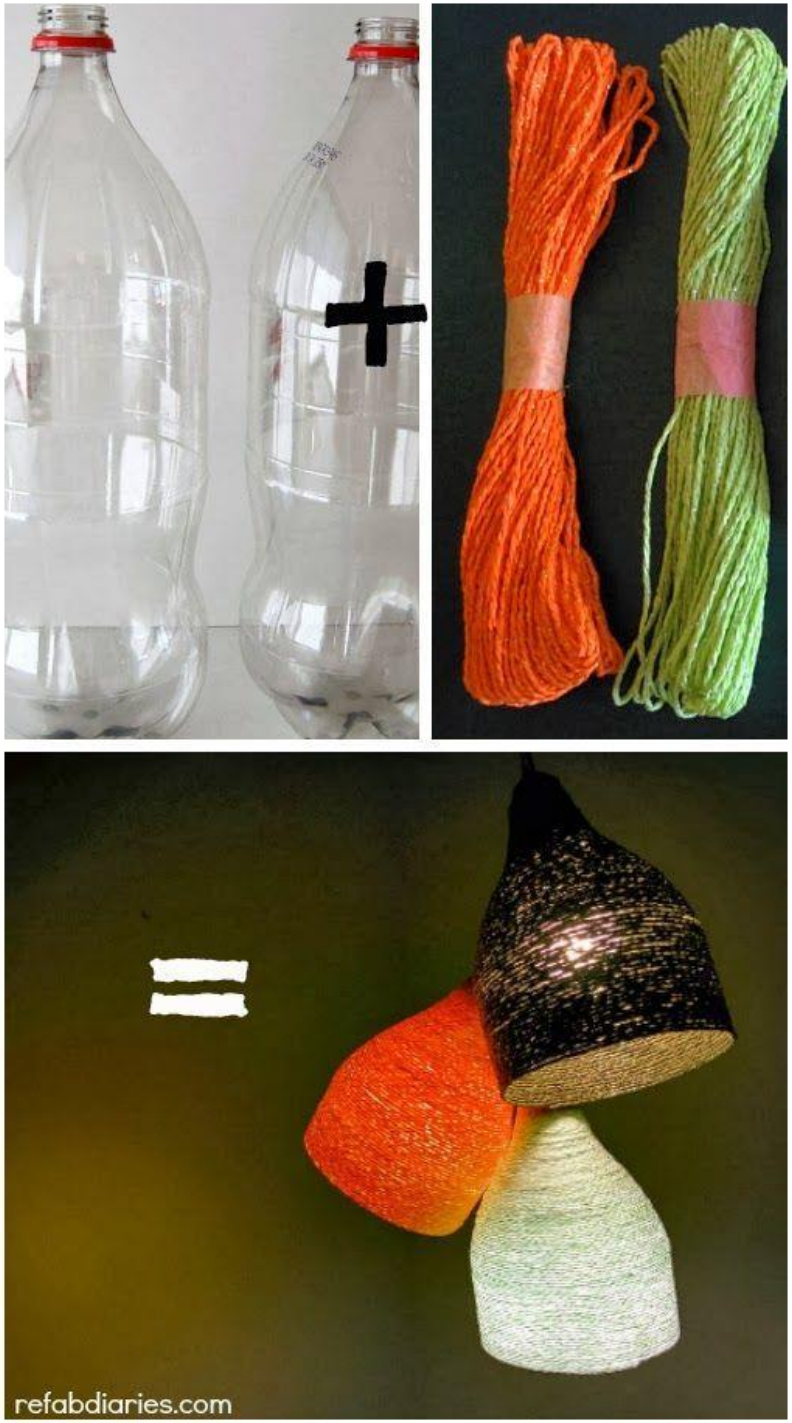
Aluminum Cans

- There are over 80 billion aluminum cans used each and every year around the world.
- Recycling Aluminum Cans Saves 95% of the Energy Used to Make New Cans
- Recycling an aluminum can helps to save a great deal of energy, in fact, enough to run your home television for about three hours!
- You can recycle aluminum over and over again, and there is really no limit.
- If you throw away your aluminum cans, they can stay in that can form for up to 500 years or more- so recycling is the way to go.

Each recycled, re-purposed or reused item is an item that does not end up in a landfill. We have one earth, and we all should work together to take care of it.

Some people have created unique ways to use the world's waste.


Si reciclamos papel
tendriamos más árboles.
Se crean fuentes de
trabajo.


refabdiaries.com


1
2
3
4
5
6

- This bridge is composed of over 250 recycled cardboard tubes with recycled paper and plastic comprising the stairs. Amazingly, this recycled bridge can hold up to 20 people at once.


Remarkable
I was once 3 plastic cups...
Turning junk into something Remarkable™


I used to be a car tyre...
recycled


I used to be a plastic box...
Remarkable
Recycled into something Remarkable
I used to be a juice carton...
recycled
Remarkable
Recycled into something Remarkable

https://www.youtube.com/watch?v=EI6AU3riRI8

But what if we could get rid of that waste?

And say bye bye to plastic forever?

Will we ever find a solution to our plastic problem?

Perhaps we need to find a new plastic.

Can you guess what material these products were made from?

Did you guess Casein Plastic?

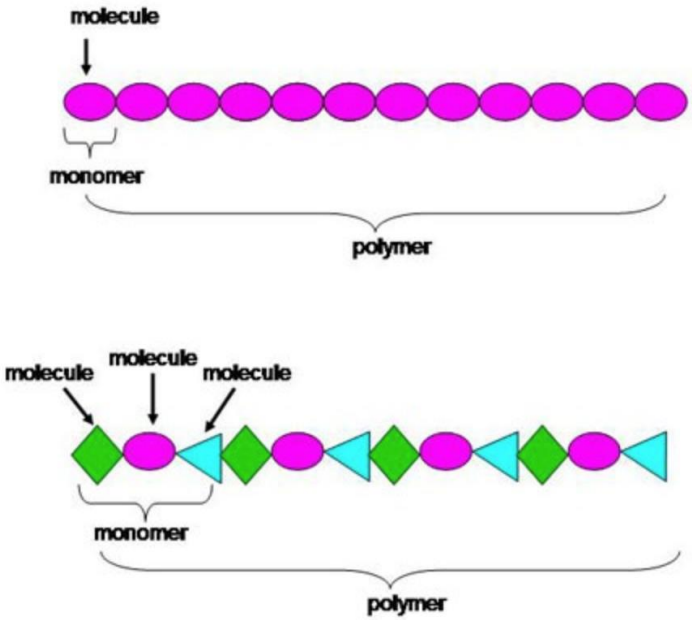
- All of these items were made from Casein plastic.
- Casein plastic is made from the casein protein found in milk
- Ancient Egyptians used Casein from milk to make paint
- Using the casein protein in milk as a plastic became popular in the early 1900's

Making Plastic From Milk

- The milk protein casein is separated out from the milk by adding vinegar.
- The casein curds are then kneaded together to form a ball
- The ball can be rolled out and then shaped into objects.

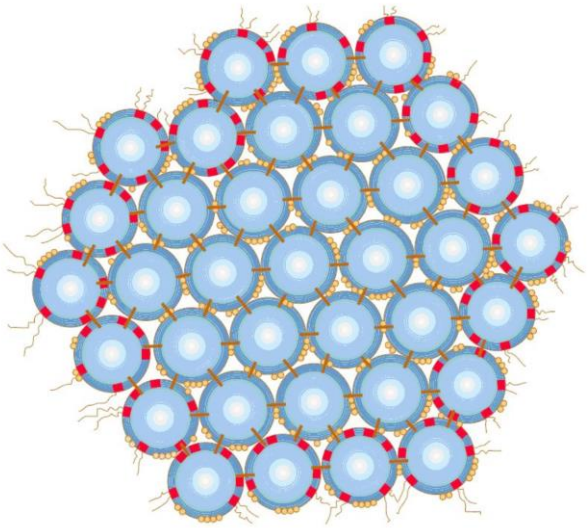
How can milk be changed into plastic?

- The word **plastic** is used to describe a material that can be molded into many shapes. Plastics do not all look or feel the same.
- Plastics are similar because they are all made up of molecules that are repeated over and over again in a chain. These are called **polymers**, and all plastics are polymers.
- Sometimes polymers are chains of just one type of molecule, as in the top half of the model on the right. In other case, polymers are chains of different types of molecules (as in the bottom half of the model) that link together in a regular pattern.



Heat is often needed to create a chemical change.

- Milk contains many molecules of a protein called **casein**. When you heat milk and add an **acid** (in our case vinegar), the pH of the milk changes. The pH change causes the casein molecules to unfold and reorganize into a long chain.
- The polymer can be scooped up and molded, which is why it is a plastic.



Casein-based plastics are not effective against moisture, and so were not developed widely. However, a new version combines milk casein with glycerol and citrus pectin to form a soft but structurally sound bio-polymer that protects food from light, oxygen, and some humidity.

- Two of the most likely uses of these bio-polymers, are as single-serving wrappers and as dissolvable packets.
- String cheese and some refrigerated snack foods are often packaged in individual plastic wrappers, ideal for packed lunches. But the amount of waste for these items is a huge concern.
- Likewise, dehydrated soup packets could be waste-free with casein film pouches replacing traditional paper or plastic packaging. Packets can be dropped into warm water and the film dissolves within seconds.
- In both of these instances, edible casein bio-polymers would minimize waste, and could also add nutritional value as vitamins and supplements could be added to the films during manufacturing.

In Life magazine in 1955, an American family celebrates the dawn of "Throwaway Living", the beginning of disposable plastic.

There are many other solutions out there.

Will you be the one to find them?

- Creating new forms of plastic that might biodegrade is only part of a potential solution. We have to change our "throwaway" culture.
- That way we would stop using so much plastic.
- Here are six things you can do to help stop the flow of plastic.

- **1. Give up plastic bags.** Take your own reusable ones to the store. A trillion plastic shopping bags are used worldwide every year, and 100 billion in the United States alone—that's almost one per American per day. The average Dane, in contrast, goes through four single-use bags *per year.* Denmark passed the first bag tax in 1993.

- **2. Skip straws.** Americans toss 500 million plastic straws every day, or about 1.5 per person.

- **3. Pass up plastic bottles.** Invest in a refillable water bottle. Around the world, nearly a million plastic beverage bottles are sold every minute.

- **4. Avoid plastic packaging.** Buy bar soap instead of liquid. Buy in bulk. Avoid produce sheathed in plastic. And while you're at it, give up plastic plates and cups.

- **5. Recycle what you can.** Even in rich countries, recycling rates are low. Globally, 18 percent of all plastic is recycled. Europe manages 30 percent, China 25—the United States only 9.

- **6. Don't litter.** The Ocean Conservancy has run beach cleanups for 30 years. Of the top 10 types of trash they find, the only non-plastic item is glass bottles. Worldwide, 73 percent of beach litter is plastic: cigarette butts (the filters), bottles and caps, food wrappers, grocery bags, polystyrene containers. In 2016 the conservancy collected 9,200 tons of trash in 112 countries—around a thousandth of what enters the ocean each year.

A pint jar holds two years' worth of Kathryn Kellogg's waste (items she couldn't recycle or, compost).