



The Ripple Project



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Magazine created for:
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Topic:
The Water Project

Framework for:
The Ripple Project

November 2017

The Ripple Project

How important is the world to us? What are we doing to the Earth? Why should we be careful of our actions? How are our actions impacting the world? What are the consequences of our actions? What can I do as an individual in my community?

Foreword

I suppose, before we start, we should look at things we should be having a talk about. Before I started this project, I did not know a few things. Scratch that, I did not have knowledge of many things. As many projects aim to do, I learnt much from the research I had to undertake in the thirteen weeks of class. Thirteen weeks feels like a remarkably short period for me to be confident enough to speak out about what I'm trying to say here but it's a good place as any to start. While it might seem as if I were reiterating what has been said countless times, I would keep looking for a way to talk about what I have learnt. What can a University undergraduate have to say that many world renowned scientists have not said before? What's new?

My thoughts have made many circuits and many turns throughout the extensive amount of information and maze of external activities and life that happens while one is in school. Somehow here I am. I'm entirely sure my perspective is not a new one at all but it's a good place as any to start from.

I have something different; What I have is my voice, what I look for is the way I want to speak about water in *The Water Project*. What comes out would undoubtedly change over the years if it were a topic I come back to after these thirteen weeks but this voice I have now, it's small but it's forming and slowly, I hope it speaks out clear and loud to talk about the changes the world needs if we want to make it one that would still be liveable for future generations or even ourselves. I hold hope for the world and the people in it.

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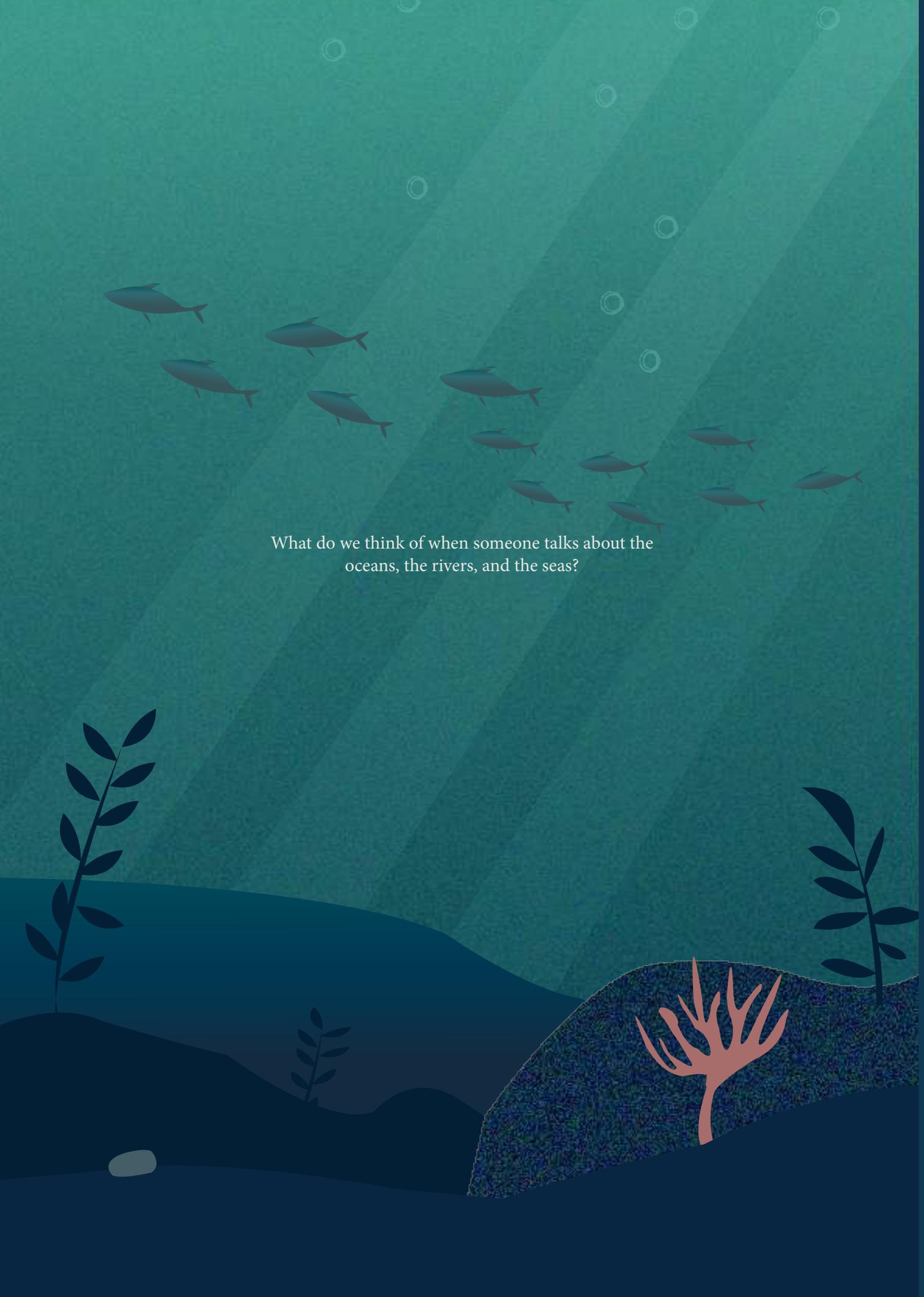
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An underwater scene with a teal background. Sunlight rays filter down from the top. A school of fish swims in the middle. Bubbles rise from the bottom. The seabed features various plants, including a large coral-like structure and several leafy plants. A small grey rock is on the left.

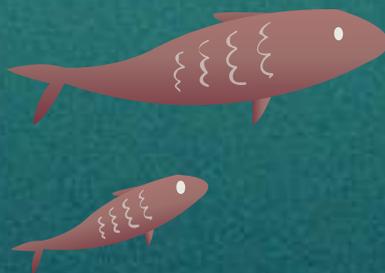
What do we think of when someone talks about the oceans, the rivers, and the seas?

Do we think of...

Corals?



Fishes?



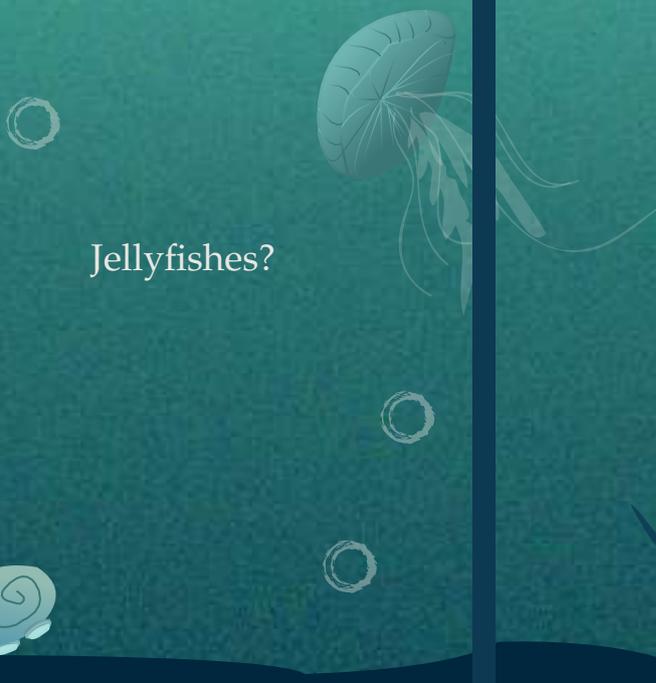
Seaweed?



Underwater animals?



Jellyfishes?



Seashells?



Islands?



Beaches?



...or trash?



How important are the seas, rivers, and oceans?

RIVERS

How important is water to humans? Humans are made of 70% water and this isn't going away. We are affected by the changes in

The earliest sources of water for human consumption were rivers, lakes, and ponds from which water was collected for drinking.



OCEANS

The oceans are a major water body that covers about 71% of the Earth surface. Boundaries are established by continental land masses, or the equator, and ridges in the ocean floor. The ocean is home to millions of species in the world.

Did you know there are seven oceans in the world? They are the Arctic, North Atlantic, South Atlantic, North Pacific, South Pacific, Indian, and Antarctic Oceans.



SEAS

Most people use the word sea and oceans interchangeably but seas are usually smaller than oceans. They are bodies of salt water usually located where the land and ocean meet. Seas are typically enclosed by land.



What water bodies do we have in Singapore?

RESERVOIRS

Known also as water catchment areas, the reservoirs does exactly that – it collects rainwater that will then be treated and used as drinking water.

Since 2011, the water catchment area has increased from half to two-thirds of Singapore's land surface. Currently there are 17 reservoirs, the first three being MacRitchie Reservoir, Peirce Reservoir, and Seletar Reservoir. With a growing population, Singapore also needs a higher volume of water.



MANGROVE WETLANDS

Mangroves are trees or shrubs that grow in coastal saline or brackish water. Mangroves in Singapore are under threat due to the external pressures against them caused by urbanisation.

The largest patch of mangroves in Singapore is located in the Sungei Buloh Wetland Reserve. It is recognised as a site of international importance for migratory birds. It provides food, fibre, and medicine to people, physically protecting coastlines, and also providing an ecosystem as source of food and nursery ground to local fisheries.



NEWater

Singapore has scarce resources due to its increasing population and small land mass. After a messy conflict with neighbouring countries, Singapore has ventured in 2001 into water sustainability and NEWater now meets up to 40% of the nation's current water needs.

NEWater source stems from used water that is treated and presented as high-grade reclaimed water.

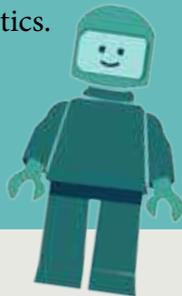


What is the issue we are facing?

While there are many contributors to pollutions in the water bodies in Singapore, we look at one of the major offender in this book – plastic.

Where did plastic come from?

While the history of plastic started way back, the birth of the modern plastic era was arguably started in 1907 with the invention of Bakelite by Belgian-born American scientist Leo Hendrik. Created with a cheap and viable synthesis method, it was the first plastic to be created not with plants or animals, but fossil fuel. His work now opened the floodgates to a torrent of now-familiar plastics.



What drove the industry was the war effort. Plastic was used in military vehicles to radar insulation. Companies built plants to turn oil into petrol, resulting in an abundance at the end of the War in 1945. To keep production running, the companies turned towards producing for the mass market. What came out of it were products such as Tupperware, fizzy drinks bottles, milk bottles, toys, amongst others.

Below are some of the things that has plastic in them:

- Plastic fibres (Nylon, Polyester, Lycra, Spandex etc)
- Spectacles
- Computers
- Cutleries

How many else can you identify? It's almost impossible to think of a world without plastics now. Yet how has this affected us?



“

Plastics have become the ubiquitous workhorse material of the modern economy — combining unrivalled functional properties with low cost. Their use has increased twenty-fold in the past half-century and is expected to double again in the next 20 years.

”

Quote taken from
Ellen MacArthur Foundation

What is the deal about plastics then?

1

Strong, lightweight, durable. These are some of the advantages plastic possesses. It is used in thousands of products that add comfort and convenience to our daily lives.

Plastic comes in many forms, according to the needs of the consumers. It can be rigid to keep fragile items secure and safe. It can be flexible to make easy-to-carry bags. It can be used in packaging to allow food to stay fresh longer and reduce the amount of food waste in a world where food wastage is an imminent issue in developed countries.

If plastic is that amazing, why are there people against it?

While plastic does offer a range of advantages, it has a slew of disadvantages that does not seem to offer credit to its advantages. Here are some of the points we will be looking at in the following page:

- Plastic is made from oil.
- Plastic is usually not recycled properly.
- Plastic is one of the main pollutant of the oceans.
- Plastic in water bodies affects marine and land creatures.
- Plastic affects human through marine life

2

3

Plastic is not biodegradable. It cannot be broken down; Instead it breaks down into smaller pieces that eventually becomes microplastic. With most plastic waste ending up in the ocean or the landfill, our Earth is slowly being polluted. It is estimated that plastic would outweigh fishes in the ocean by 20150. There have also been studies showing that plastic has indeed been found in our drinking water and seafood.

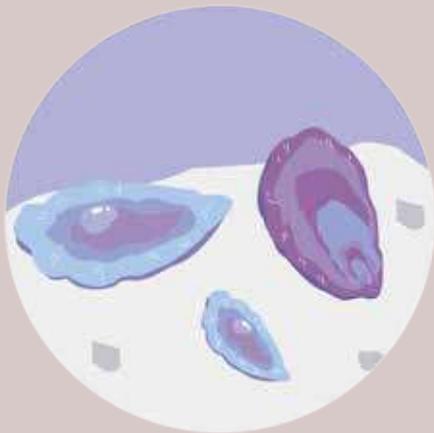
Plastic does not go away. It comes back in a cycle to affect our lives and it is upon us, as change-makers and the source of the ripple, to start a change.

What are the effects of plastic?

What are the harmful effects of plastics?

Plastic made from oil

Plastic are made from polymers, large molecules made of repeating units of smaller molecules known as monomers. Some plastics are made from monomers that require the hydrocarbons from crude oil. It is also important to note that not all polymers are plastic. Oil-based plastics do not degrade hence the move to look into bioplastic as an important industry.



Fertility of Wildlife

Bisphenol-A, most commonly known as BPA, is a chemical that could be found in plastics. According to a major study released by the American Society for Reproductive Health in 2008, BPA can, and does, inhibit an embryos ability to attach to the uterine lining which show risk to male and female fertility. It can also keep cells from dividing properly which might cause birth defects and even developmental problems in children.

Garbage Patch

The oceans are home to five garbage patches – North Atlantic, South Atlantic, North Pacific, South Pacific, and Indian Ocean – that have a significant impact. Gyres are large systems of circulating ocean currents, like slow-moving whirlpools. The plastic present in these gyres are mostly made up of microbeads and plastic fibres that get washed out to sea through daily activities such as showering or doing the laundry.



What are the effects of plastic?

Microplastic and microfibres

An article released by The Guardian revealed that microplastics are found in tap waters around the world. More than 80% of the samples collected on five continents were shown to contain microplastics- tiny plastic fibres from us through abrasion of clothing, paints, tire dusts, microbeads in facial cleansers, and secondary microplastics. Microplastics have been to absorb toxic chemicals linked to cancer and other illnesses and these are released when they are consumed by fishes and mammals.



Ingestion of plastic

Some of the most shocking images of animals ingesting plastic features birds with plastic bits in their stomach. The birds have been shown to contain plastic such as bags, bottle caps, and tiny rice-sized plastics. Some birds and mammals eat so much plastic, that are non-biodegradable, that there is little room left in their gut for food. With the increasing amount of plastic produced is the result of a higher number of animals ingesting plastic. Other mammals most affected are sea turtles, sea lions, fishes, whales, and dolphins.

Danger to wildlife

While plastic can be as tiny as microplastic and microfibres, it also exists in large sizes such as fishing nets that contributes to the phenomenon of “ghost fishing” where marine animals are trapped in lost, abandoned, or discarded fishing gear. This creates problems where the animals are unable to escape from the nets and die. Scavengers will then be attracted by the bodies and in turn, be caught in the similar net thus creating a vicious cycle in which animals get trapped.



How does this affect Singapore?

Plastic bag usage

Plastic bag levy and banning are one of the hottest topics in Singapore in 2016 and 2017. In 2011, 3 billion plastic bags were used. This amounts to 36 million kg of crude oil and 12 million kg of natural gas. The debate brings into account issues such as lower income families abilities to afford the levy.

Intercoastal Microplastics

A study in 2005 studying the presence and abundance of microplastic identified six different microplastic in four out of seven different sediment samples.

How does this affect Singapore?

Mangrove Microplastics

A 2013 study in the Marine Pollution Bulletin indicates that microplastics were present in all seven sediment samples collected, showing a rise in concentration of microplastics in the coastal environment of Singapore.

Waste & Recycling

In the Waste Statistics and Recycling Rate table provided by the National Environment Agency, the amount of plastic disposed of increased significantly in 2012, from 656,000 tonnes to 721,300 tonnes. The recycling rate has also dropped in 2015 and 2016.

Single use plastics

With an abundance of takeaways come the problem of single use plastics. Usually created in the forms of cutleries, plastic bags, cups, straws and stirrers, these plastics are designed for a one-time use before they are promptly discarded. Their cost of production far outweighs its one-time use.

A global problem

Plastic pollution is a global problem that affects everyone living in the world. Singapore is no exception. Every thing we do can and do contribute to the problem of the growing amount of plastic here.

What can we do to help alleviate the situation? Is it even possible to solve this? While we do not know the extent of the impact of plastic pollution at this point, we should attempt to ensure that the situation does not become more dire than its current situation.

What can we, as citizens of the world, do?

How has this affected Singapore?

“

In Singapore, the amount of waste disposed has increased about 7 times over the past 45 years, from 1,200 tonnes/day in 1970 to 8,284 tonnes/day in 2015. Each person disposed about 0.86 kg of domestic waste per day in 2015.

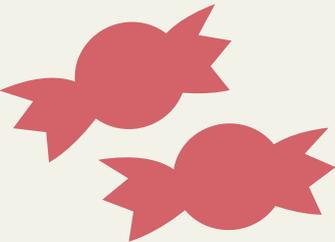
If this continues, the projected lifespan of our Semakau Landfill would be about 35 years, and additional incineration plants would have to be built every 7 to 10 years.

”

Quote taken from zerowastesg

What are the main plastic usages in Singapore?

Plastic has, however, become an integral part of our life. What are the most frequently used plastics? We look at what the plastics are used for and where they enter the waste system.

	<p>Plastic Bags</p>	<p>The ubiquitous plastic bag is used to bag rubbish or for shopping, and it takes years to break down. Even then it produces chemicals and materials that gets eaten by wildlife and has detrimental effects on them.</p>
	<p>Food wrappers/containers</p>	<p>Plastic packaging is used mostly in food packaging in the supermarkets. The food and soft drinks sector contribute the most to the annual cost of using plastics.</p>
	<p>Plastic bottles</p>	<p>Plastic bottles are typically used to contain liquids. Although plastic has a superior resistance to breakage, it has contributed to the environmental waste and leaching of toxins in the oceans.</p>
	<p>Caps/ lids</p>	<p>Plastic cup and lids are made from petroleum based additives and are non-biodegradable. It can be a disadvantage to environmental protection and can be toxic and harmful to our health.</p>
	<p>Disposable cutlery</p>	<p>While plastic cutlery provides a convenient way of eating out without the hassle of washing up, its single use status meant that</p>

What happens now?

The Ripple Project aims to provide information and a framework upon which an individual gets the information to be better choice-makers in their daily lives for a better and healthier environment.

What is the Ripple Project?

The Ripple Project is conceptualised with the idea of The Ripple Effect, which is the notion that a single action has several effects spreading out from a single small action. Our actions have consequences, unintended or otherwise and we are here to research on the consequences while highlighting the effects that has been felt across the world. We seek to look at ways in breaking the ripple we have created over the years while starting new ones that work to save the Earth.



What has the Ripple Project done so far?

We have launched a campaign with posters posted in MRT stations to encourage change in Singaporeans. Such posters are there to link the viewers back to the website where one can take the Ripple Challenge, a one-week log of the single use plastics one has used so far. This activity helps to create mindfulness amongst its participants which would be carried forward in their lives.

How can I be a part of it?

You can visit our website and take part in the Ripple Challenge to practice mindfulness about our behaviours in the usage of single use plastics.

Alternatively you can also reach up on the impacts that the plastic have on the environment and choose to learn more about it yourself. Ultimately it is our knowledge and actions that will help make the world a better place.



What can we do as individuals?

Wrap dry waste, including food waste such as vegetable peel, in old newspapers before throwing them down the chute

Reuse plastic packaging, such as those that come with a loaf of bread, to bag wet food waste. To minimise leaks, drain liquids from the waste before bagging.

Get reusable options instead of single use plastics. This can work for many items such as straws, cutleries, cups, sandwich boxes, and shopping bags. Join the Ripple Challenge in learning how to identify single use plastics in your life and how to be mindful of them.

Recycle through the various recycling programmes available, such as the National Recycling Programme near your house, recycling programmes in schools or at your work place.

Ensure the plastic is clean or not contaminated with food waste before recycling them.

Every little counts!

What else can we do as individuals?

Buy boxes instead of bottles, For example, laundry detergent do come in cardboard boxes that are easier to recycle.

Practice mindfulness in our lives, of our own habits and be critical of where each and every part of our plastic waste goes to.

Opt for fresh food and vegetables and bulk items instead of products that come in single serving cups.

“
There are certain commons that connect us all to each other, air, water, soil, and what we have universally found time and time again is if you contaminate any of those commons, it gets in everything.
”

Quote taken from Sherri A. Mason,
PhD. Chair, Department of Geology and
Environmental Sciences
The State University of New York at Fredonia

How can I help on a community level?

There are initiatives in Singapore that you can take part in. We aim to provide you a comprehensive list of initiatives you can join in Singapore and be a part of. Click through the QR code to find out more about them.

Intercoastal tidal cleanup

An annual event conducted in 70-100 countries co-ordinated by the Ocean Conservancy, a US-based agency. Organised by volunteers from NUS, it is a good way to volunteer your time for our local water bodies.



Zero Waste SG

Zero Waste SG is a new non-profit and non-governmental organisation dedicated to help Singapore eliminate the concept of waste, and accelerate the shift towards zero waste and the circular economy.



Singapore Environment Council (SEC)

Established in 1995, the SEC is a non-profit and non-government organisation (NGO) that influence thinking on sustainability issues and coordinate environmental efforts in Singapore.



Green Drinks Singapore

Founded in November 2007, Green Drinks (Singapore) is a registered non-profit environment-focused society that connects the community. They hold discussion panels, documentary screenings and workshops.



Environment Challenge Organisation (ECO Singapore)

ECO Singapore is a leading non-government youth environmental social enterprise promoting and supporting youth engagement in sustainability and environmental decision-making.



Waterways Watch Society

WWS is an environmental non-profit organization that was formed in 1998 with a mission to bring people together to protect our waterways. It advocates public education to promote individual responsibility and shared ownership of our water resources and environment.



How can I help on a global level?

Want to go bigger or not living in Singapore? We have also compiled a non-exhaustive list of initiatives you can be involved in globally. Like a ripple, every small bit counts!

Global Microplastic Project

A global community project by researchers Lots and Bosker from Leiden University College, this aims to get people from all over the world to collect a sample of sand at beaches near them and send it back to be analyzed.



GESAMP

The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) is an advisory body, established in 1969, that advises the United Nations (UN) system on the scientific aspects of marine environmental protection.



Orbmedia

Orbmedia is a team of experts in journalism and data science looking to build a digital journalism organization. Orb aims to provide a new perspective, a refreshing type of journalism that resonates with and is accessible to a diverse, global audience.



Plastic Pollution Coalition

Plastic Pollution Coalition is a growing global alliance of individuals, organizations, businesses, and policymakers working toward a world free of plastic pollution and its toxic impacts on humans, animals, waterways and oceans, and the environment.



The Story of Stuff

"We have a problem with Stuff: we have too much of it, too much of it is toxic and we don't share it very well. But that's not the way things have to be." challenges founder Annie Leonard. The team aims to inspire and encourage the civic engagement of the global community.



#Break free from plastic

#Breakfreefromplastic is an international group of nongovernmental organizations (NGOs) is coming and working together to stop plastic pollution. They aim to build solidarity between people around the world and impacted communities in pursuit of a future free from plastic pollution.

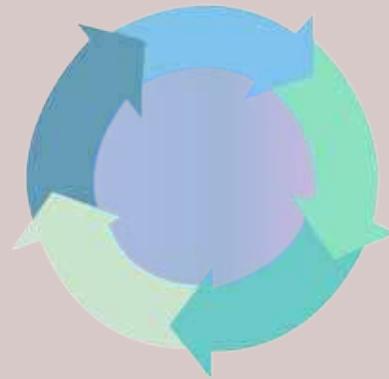


Circular Economy

Are there alternative methods of looking at production in this world? We look at a different model of functioning beyond the linear model we have now – the circular economy.

What is the circular economy?

Looking beyond the current “take, make and dispose” extractive industrial model, the circular economy is restorative and regenerative by design. Current design for plastic has an inherent design failure: its intended useful life is typically less than one year; however, the material persists for centuries, which does not bode well for the Earth. Relying on system-wide innovation, the circular economy aims to redefine products and services to design waste out, while minimising negative impacts.



Is the Circular Economy Concept applicable to all?

The circular economy concept focuses heavily on the changes within the industrial production cycles and by association seems to focus primarily on companies. However we, as individuals, can seek to look at the lessons the concept can teach us before and seek to utilise it in our daily lives. Questions such as “What are better ways to package or design a certain product?” can be asked of ourselves and through that, we can suggest or look at alternative ways of thinking.

Where can I go to find out more information about the Circular Economy?

One excellent source of study is the Ellen MacArthur Foundation report found via the Qiura Code provided at the side. With the mission of accelerating the transition to a circular economy, The Ellen MacArthur Foundation works with business, government and academia to build a framework for an economy that is restorative and regenerative by design.



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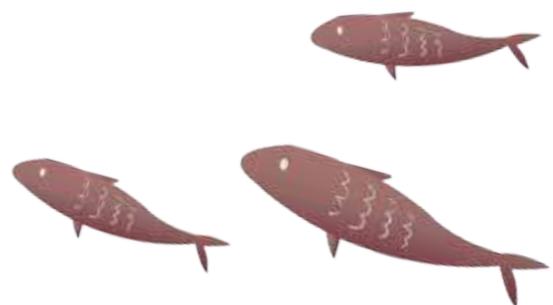
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End

Thank you for your time and patience. Without my Visual Communication teacher, Ms Nanci Takeyama's guidance, I would not have been able to even start my own research on the topic of water, simply because I did not think about it as much as I did the past thirteen weeks. In attempting to find an angle about water, a topic that is broad enough in order to encompass a whole range of sub-topics that I have the privilege of seeing from my classmates, I had the opportunity to find a topic I was passionate about and was something I could genuinely say I advocate for. This has given me the energy and drive to speak out about it and even look at the changes that I could start taking in my life. In the end, design is about the process as much as it is about the end products, and for this, I am grateful for the opportunity to learn about myself and the possibility of my contribution in the world.

I certainly hope that the book has given you information about the current state of plastic pollution in the world. I would not say that the resources here are the only ones out there. Yet there is only so much a brochure can give you. I hope that this has provided you more knowledge and a curiosity that you would like to fulfill. That is the least I can hope to inspire in others. Go forth, and let's help disrupt the ripples of plastic pollution in as many ways as we can while planting the seeds for a better future.

