

The purpose of this **exemplary teaching slide** is to help educators deliver information regarding marine plastic waste effectively.

You can include (or exclude) some of the slides in your teaching session as you deem necessary.

Below- is the color coded table for your attention



General slide (Suitable for all countries)
Specified slide (Please refer to the example on the next slide and make it unique for your hometown)

This material is developed in combination of slides from
ASEAN–Hiroshima Eco-School Project (2020-2021).
The reference slides were made and conducted by the following Fellows.

Fellows	Participated School	Link to the teaching session
Ms. Yasmin FAUZEE (Malaysia)	MRSM, Malaysia	https://www.asean.or.jp/en/c-entre-wide-info/20220203/
Ms. Valerie CORALES (The Philippines)	Valenzuela City School of Mathematics and Science	https://www.asean.or.jp/en/c-entre-wide-info/20220204/
Ms. Nurlatifah (Indonesia)	Nakamura School	https://www.asean.or.jp/en/c-entre-wide-info/20211130/

*Note: You can refer to the link above to see how our
Fellows conduct the teaching session*

Marine plastic waste (Country)





What is ASEAN?

Association of Southeast Asian Nations

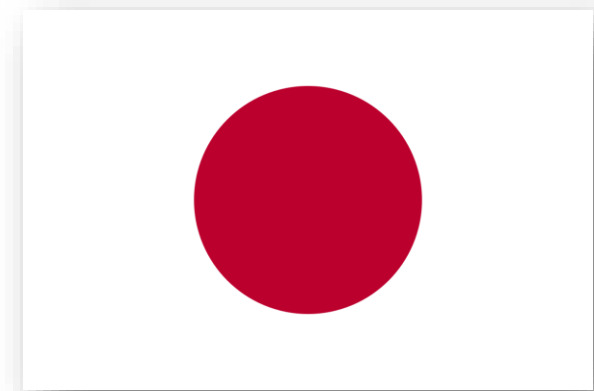
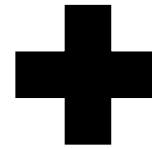
How many ASEAN countries are there?

A) 3

B) 7

C) 10

What is ASEAN?



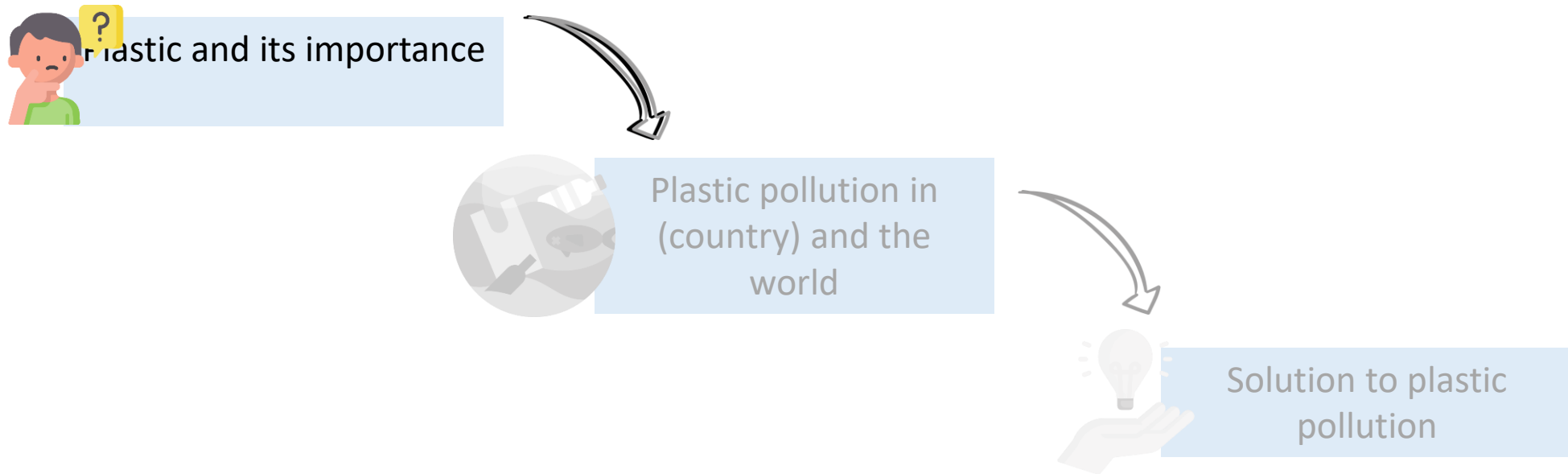
Japan

Association of Southeast Asian Nations

- **10 countries working together**

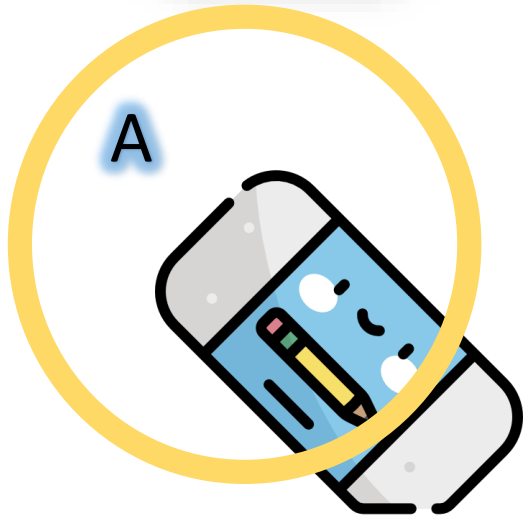
Motto: “One Vision, One Identity, One Community”.

Outline:



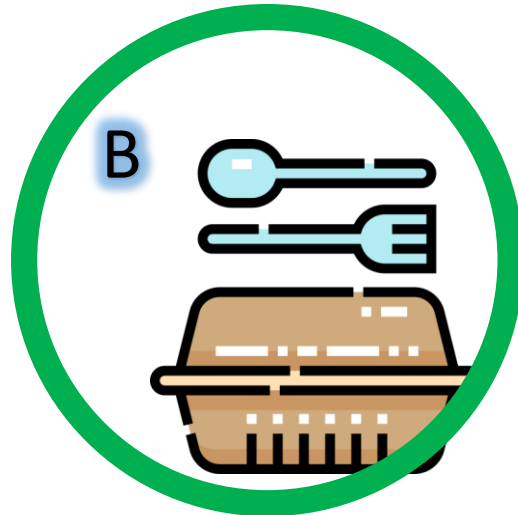


Which of these are plastics?

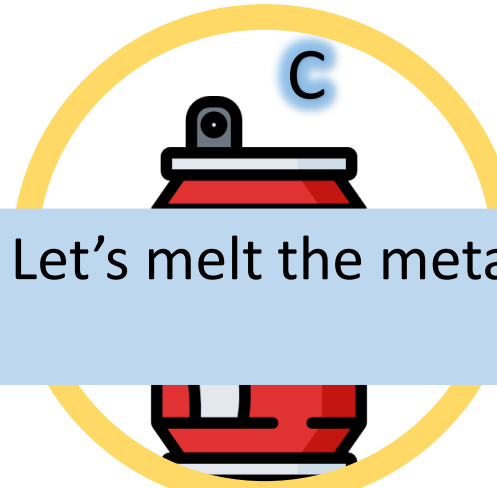


Eraser

- **Soft-elastic plastic made of Polyvinyl chloride (PVC)**



Takeout food container



Soda can

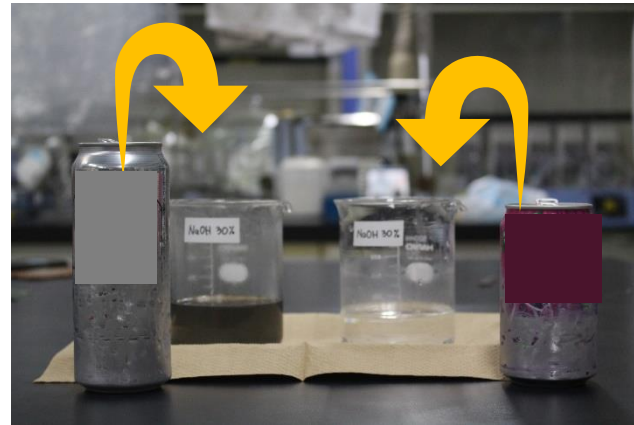
- **Aluminum lined with plastic!**



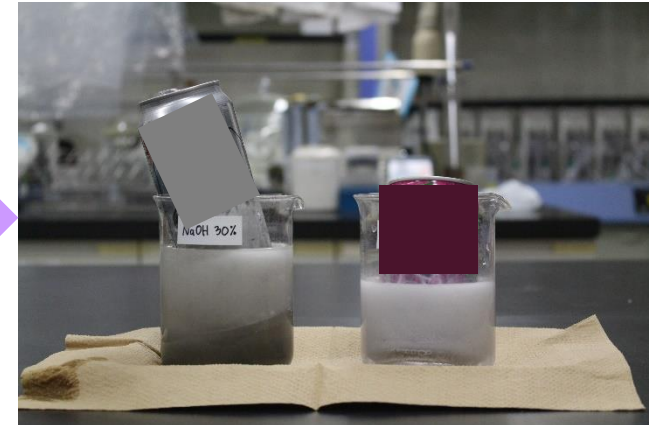
Milk carton

75% paper and thin layer of plastic!

Removing metal from can



2 cans and NaOH 30% solution



Metal is dissolved to NaOH solution (1.5 hours)

**NaOH or Sodium Hydroxide is a chemical used to dissolve/melt aluminum*



Plastic layer in cans!

After 1.5 hours

Plastic layer (part) in can





PLASTICS



Cheap



Easy to shape



Light in weight



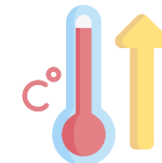
Poor electric conductor



Water resistant



(Some) resistant to chemical reaction



Not easily burn



What is the main ingredient in making plastic?

A. Rubber
(from rubber tree, etc.)

The earliest naturally occurring plastic used by humans from rubber trees (e.g. latex)

B. Mud

Mud have also been used to make things before plastic was invented. Today they are still used to create ceramics.

C. Fossil fuel
(natural gas, crude oil)

Through chemical separation and processing, fossil fuels become synthetic plastic

D. Jellyfish

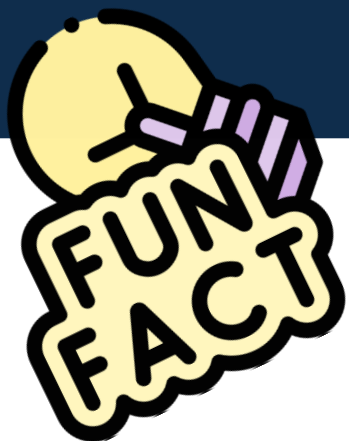
Just because they have a rubbery structure

ANSWER: C

How plastic is made?



Source: Emma Bryce (April, 2015). What really happens to the plastic you throw away – TED-Ed, Full video at: https://youtu.be/_6xINyWPPB8



Types of plastics

 PET	 HDPE	 PVC	 LDPE	 PP	 PS	 OTHER
POLYETHYLENE TEREPHTHALATE	HIGH-DENSITY POLYETHYLENE	POLYVINYL CHLORIDE	LOW-DENSITY POLYETHYLENE	POLYPROPYLENE	POLYSTYRENE	OTHER
WATER BOTTLES; JARS; CAPS	SHAMPOO BOTTLES; GROCEY BAGS	CLEANING PRODUCTS; SHEETINGS	BREAD BAGS; PLASTIC FILMS	YOGURT CUPS; STRAWS; HANGERS	TAKE-AWAY AND HARD PACKAGING; TOYS	BABY BOTTLES; NYLON; CDS
						



Which industry uses plastic the **most**?

A) Textile

B) Packaging

C) Building & Construction

D) Automotive

Plastic Importance



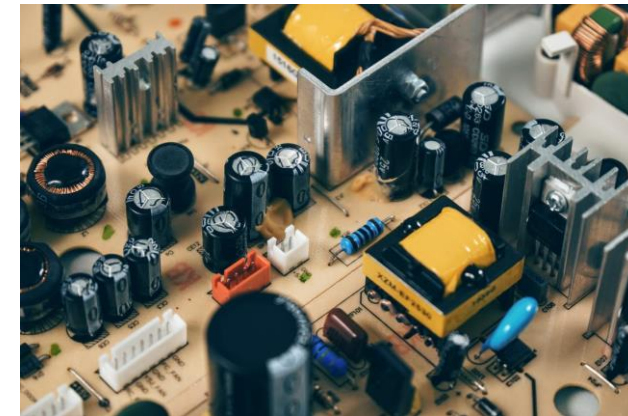
36% packaging



16% Building & Construction



7% transportation



4% Electronics



14% Textile



23% Others



<https://www.straittimes.com/asia/se-asia/malaysia-graftbusters-probe-contractors-amid-abuse-allegation-in-buying-of-covid-19> (Photo: EPA-EFE)

<https://www.nst.com.my/opinion/columnists/2022/01/759795/understanding-high-courts-decision-constitutionality-vernacular>

<https://www.thestar.com.my/metro/metro-news/2021/08/21/open-air-markets-get-green-light> (Photo:FilePic)

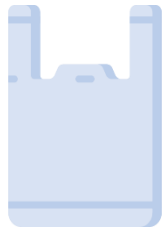
<https://www.nst.com.my/news/nation/2021/12/755993/floods-kl-similar-1971-disaster-king> (Photo:Bernama)

Photo by [Kelly L Pok Rie Pixabay](#) and [Ksenia Chernaya](#) from [Pexels](#)

Did plastic cause problems?

Very strong

Take a longer time to breakdown



Plastic bag
20 years



Plastic straw
200 years



Styrofoam
500 years



Tortoise:
150 years



Bowhead whale:
~200 years

The average lifespan of the longest living animal



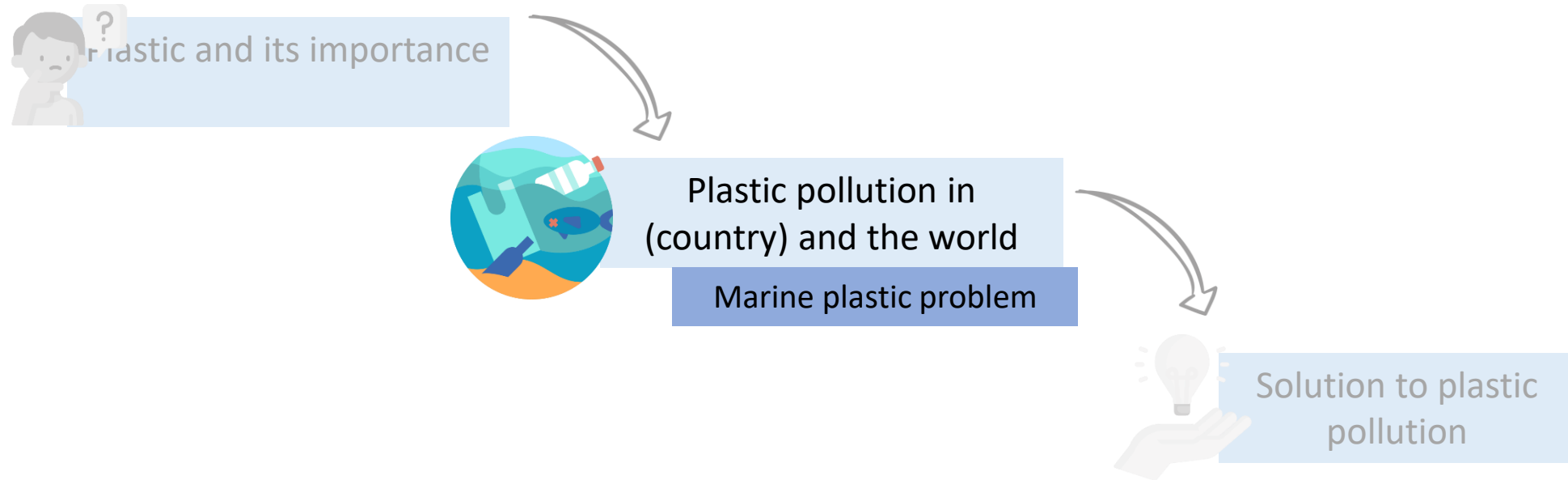
Which characteristics of plastic cause a problem to the environment?

A) Cheap

B) Easy to shape

C) Long Lifespan

Outline:



Which of this you have seen?



Source:

Figure A,C : Photograph from EcoWaste Coalition for the January 2017 Post-New Year Revelry: Waste and Pollution Watch Group Decries "Basura Everywhere"

Figure B: Photo by Thirdman from Pexels:

Figure D: Photo by Lucien Wanda from Pexels

Single-use plastic in
(country)



Single-use plastic in the Philippines



Tingi culture



Source:
 Spot.ph (2018). Top 10 milk tea places in Manila 2018. <https://www.spot.ph/entdrink/the-latest-eat-drink/7452/1/best-milk-tee-manila-2018-00198-20180724.html>
 Jendry (2015). Drinking soda out of a plastic bag. <https://twitter.com/mjasaanille/status/621901261557576192>
 Sclater, R. (2018). These 10 companies are flooding the planet with throwaway plastic. <https://www.greenpeace.org/international/story/12876/these-10-companies-are-flooding-the-planet-with-throwaway-plastic/>
 Sari Sari Store (2018). <https://business.facebook.com/872053779666310/photos/a.872053779666310/72053779666310/>
 Wuak, R. (2020). In China's rising prices crush Manila's urban poor during pandemic. <https://www.rappler.com/business/china-rising-prices-crush-urban-poor-manila-019-genderic/>
 Carmona, R. (2019). House panel OKs P20 excise tax on single-use plastics. <https://www.pna.gov.ph/articles/108836>
 Carmona, R. (2021). England intends to ban single-use culinary plastics—very slowly. <https://www.mustyrgames.com/environment/2021/08/england-intends-to-ban-single-use-culinary-plastics-very-slowly/>
 Senior Enrique (2008). Samalning vendor in Quapo. <http://unonoreinqua.blogspot.com/2008/07/samalning-vendor-in-quapo.html#m=0>



Single-use plastic in Malaysia

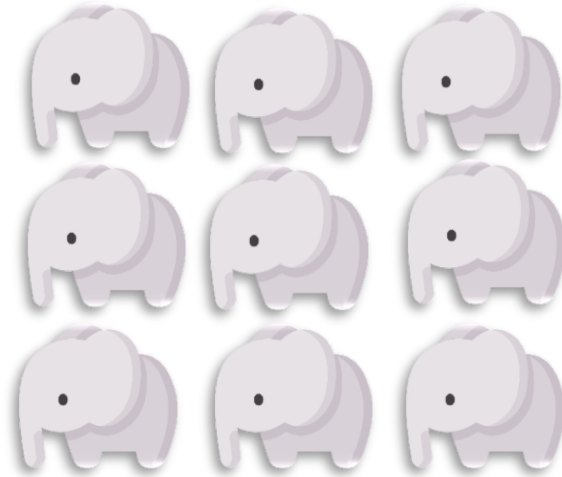


How much plastic we've made so far?



1950-2017:
8300 million metric tons!

=



Weight of elephant: ~6 tons
1380 million elephants!

=

Weight of the XXX building

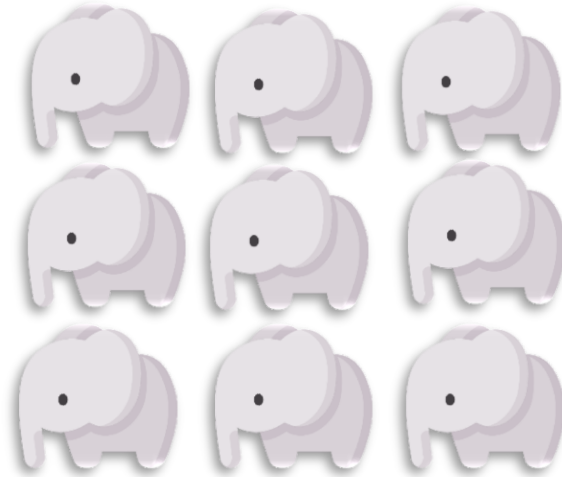
By 2050, we will produce 12 000 million metric tons!
As heavy as ~XXX building!



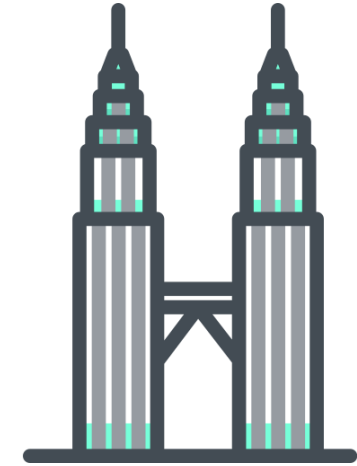
How much plastic we've made so far?



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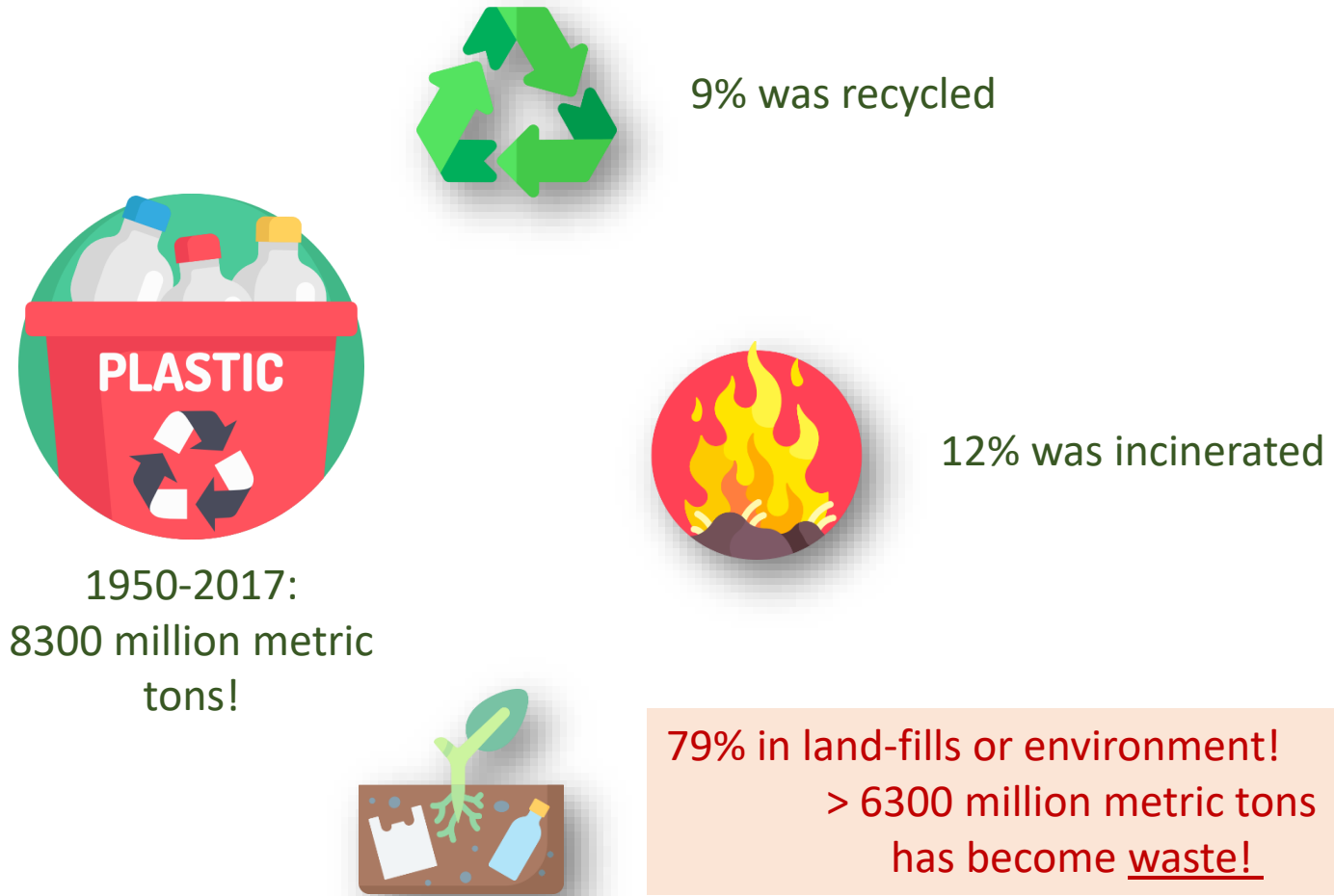


Weight of elephant: ~6 tons
1380 million elephants!



Weight of the KLCC: ~ 300k tons
27,666 KLCCs!

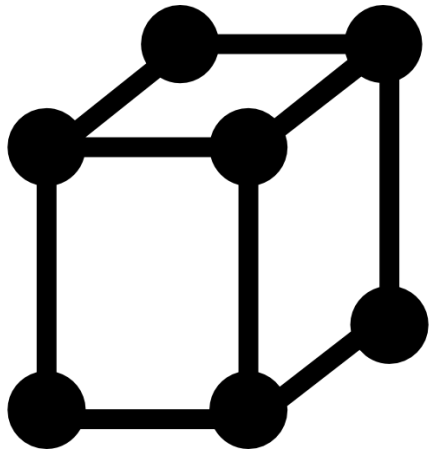
By 2050, we will produce 12 000 million metric tons!
As heavy as ~40 000 KLCCs!



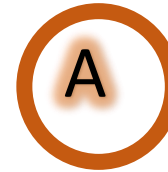
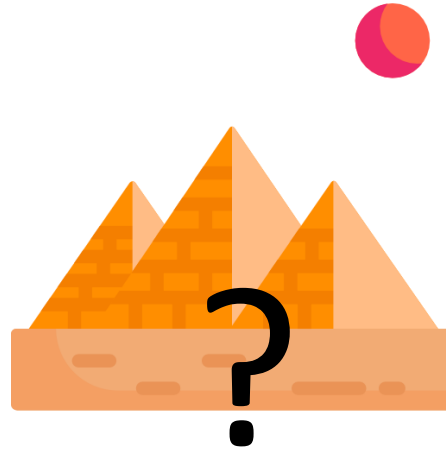
Sources: <https://www.science.org/doi/10.1126/sciadv.1700782>
Icon made by Freepik from www.flaticon.com
Video by Tom Fisk from Pexels
Video by TheMarcKnight from Pexels



If we place ~6300 million metric tons in one place, it makes about $6.9km^3$ of plastic waste!



=



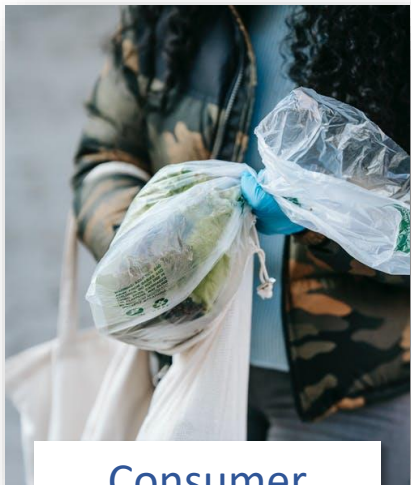
~3000x the size of Giza pyramid



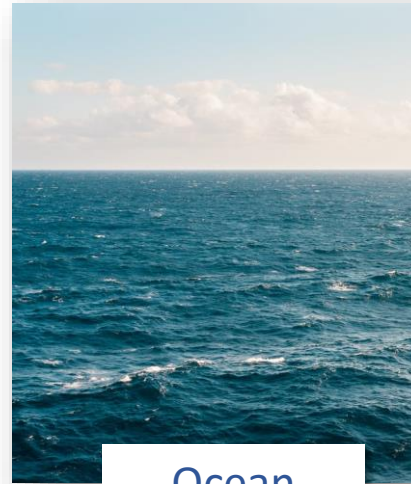
~1000x the size of Giza pyramid

~ $6.9km^3$ of plastic waste.

Marine plastic problem



Consumer



Ocean



How does plastic
travel from the city
into the ocean?



- Portion of land that catches rain and drains into rivers, lakes, wetlands or underground
 - Foot of the mountains

River basin = many watersheds combined

River

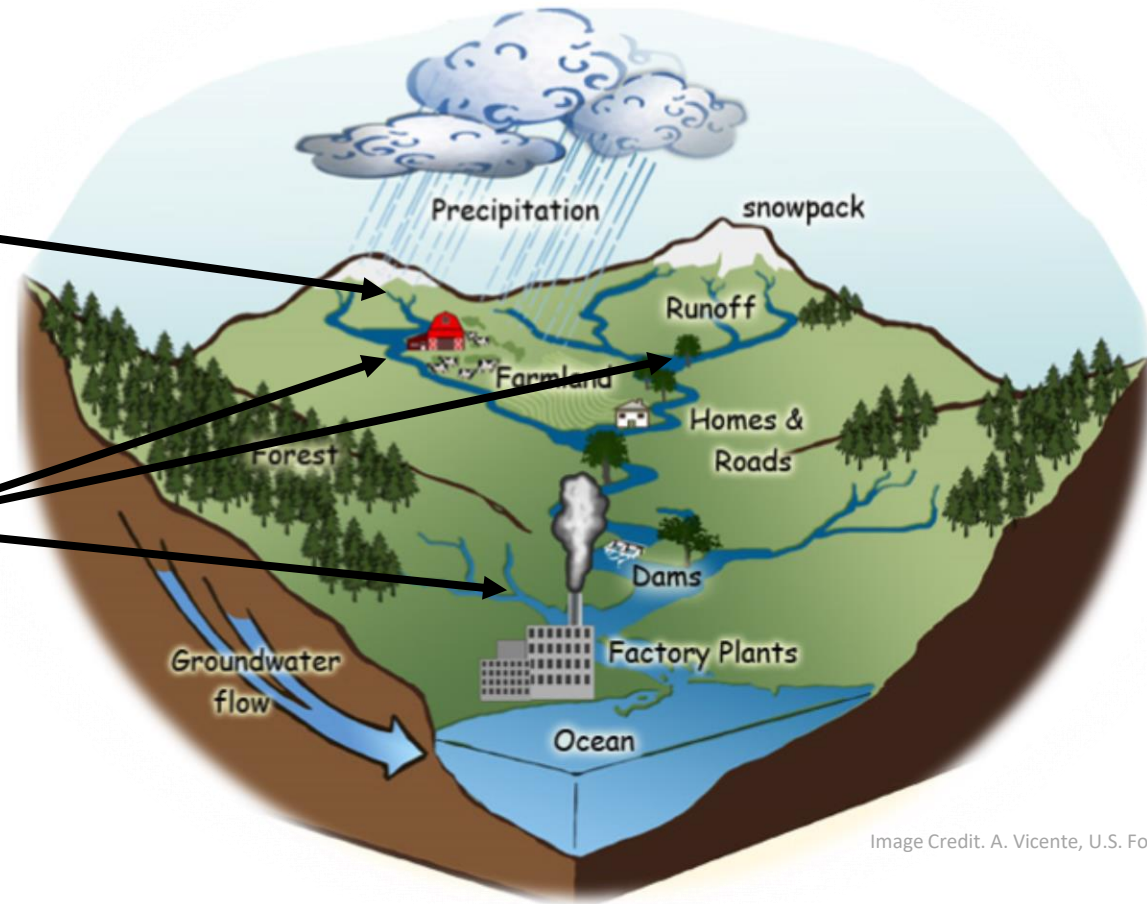


Image Credit. A. Vicente, U.S. Forest Service.

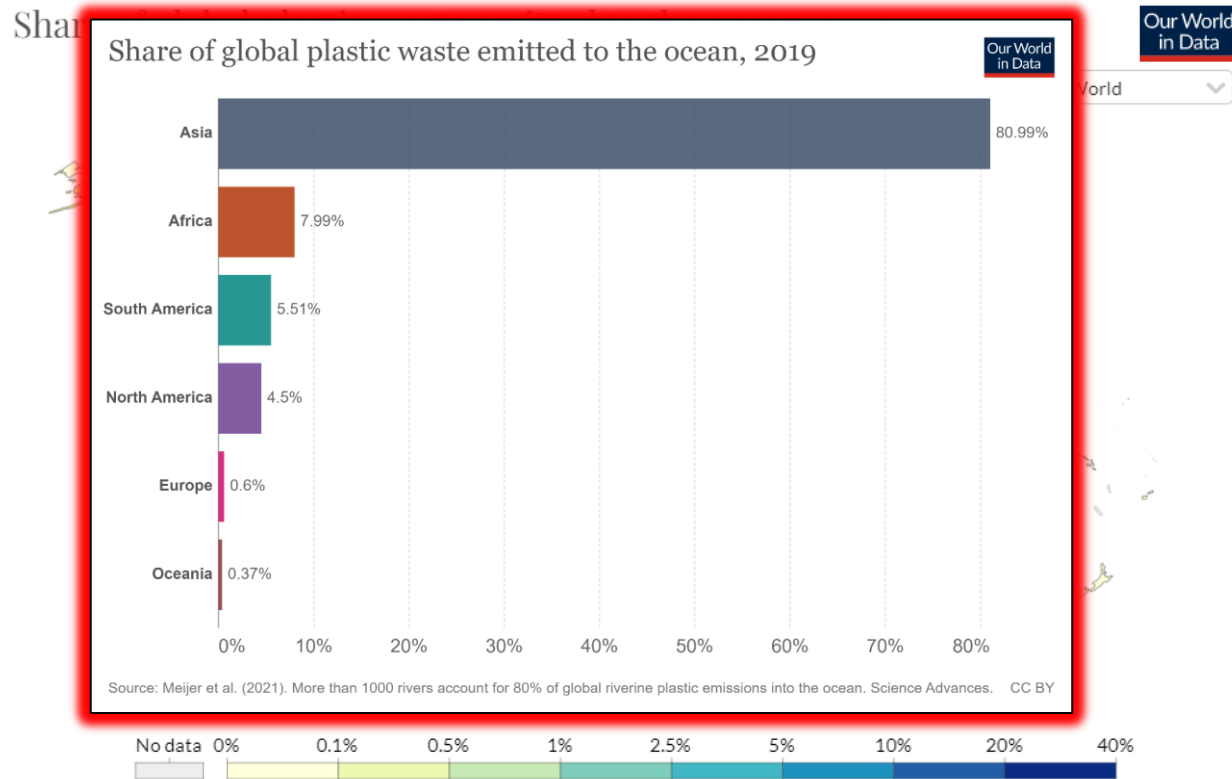
Plastic from the city contributes to marine plastic waste through rivers!

Asia contributes 81% of plastic waste into the ocean

(Country)

The XXX river :

One of the largest emitters of global plastic waste into the ocean!

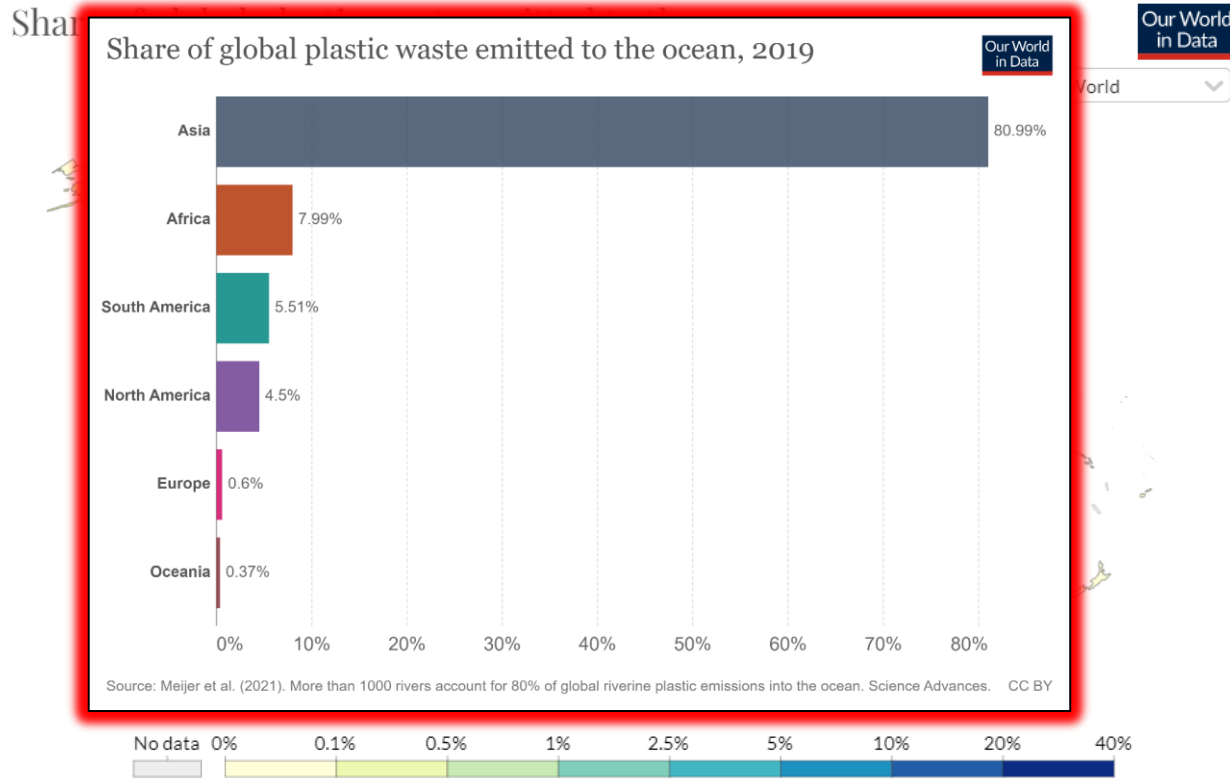


Source: Meijer et al. (2021). More than 1000 rivers account for 80% of global riverine plastic emissions into the ocean. Science Advances.

CC BY



Asia contributes 81% of plastic waste into the ocean



Source: Meijer et al. (2021). More than 1000 rivers account for 80% of global riverine plastic emissions into the ocean. Science Advances.

Malaysia

The Klang river :

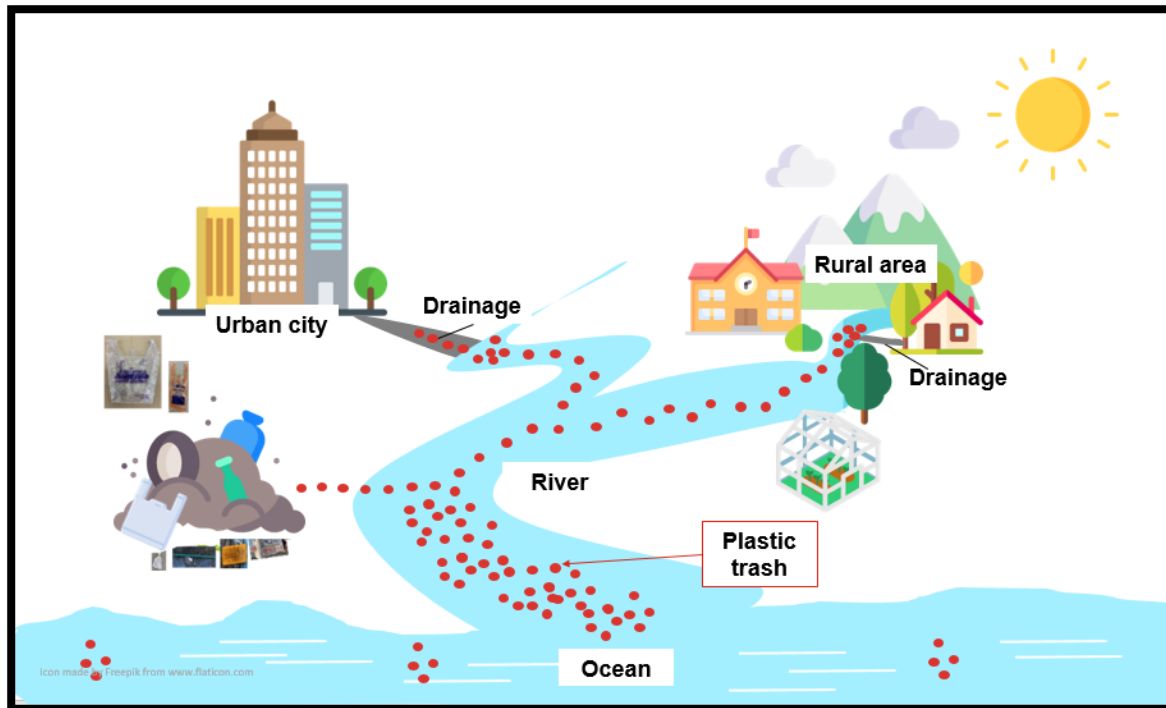
One of the largest emitters of global plastic waste into the ocean!



Source: Our World in Data



How does plastic travel into the rivers?



Natural factors

- Wind
- Rain
- Storms



Littering or poor waste management



Urban population near the rivers

How does plastic travel to the **XXX river** and into the ocean?

Video

Sources: <https://theoceancleanup.com/sources/>

(please refer to the above link to make your own unique video)

XXX



XXX



XXX



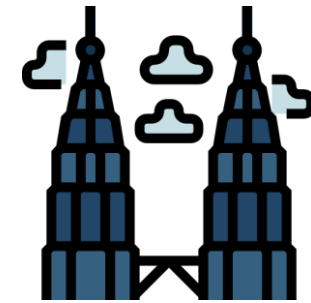
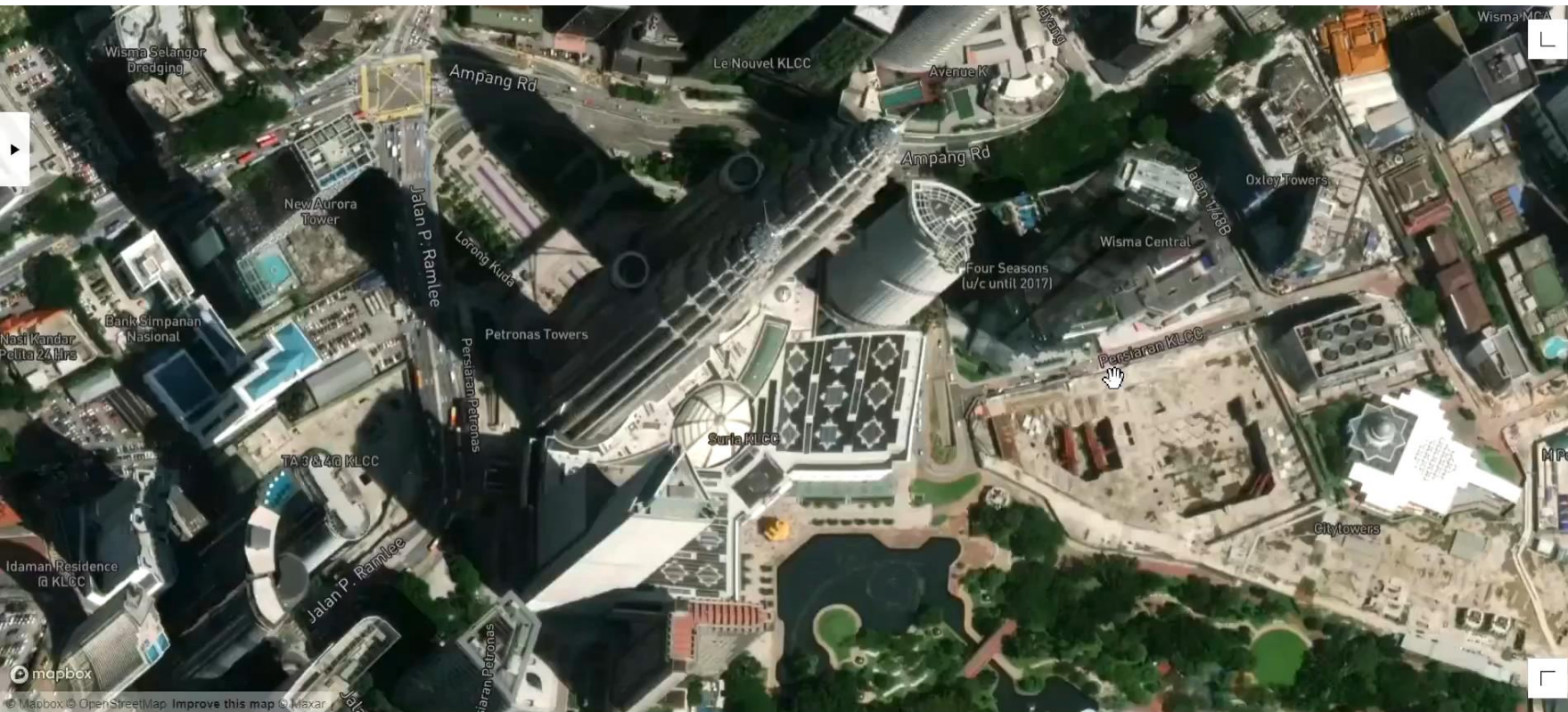
XXX



XXX



How does plastic travel to the **Klang river** and into the ocean?



Petronas Twin Tower



Petaling Jaya



Subang Jaya



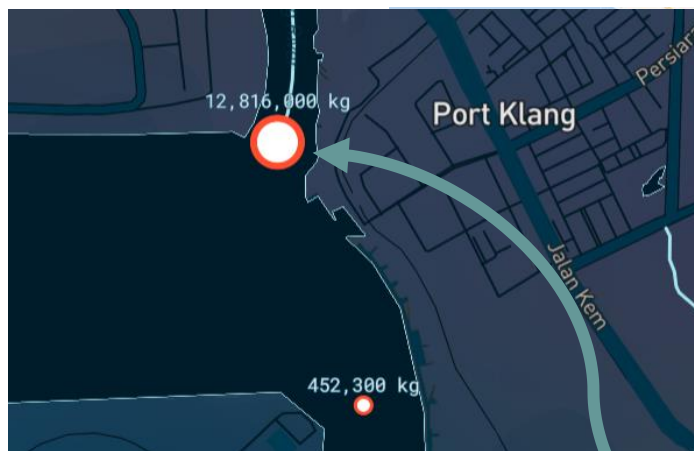
Klang



Port Klang



How does plastic travel to the Klang river and into the ocean?



Klang River alone emits
12800 tonnes plastic/year

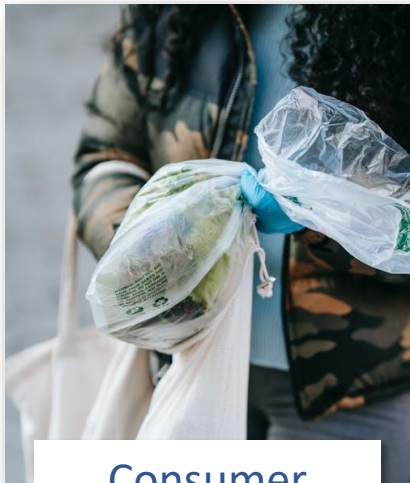


= 2133 elephants

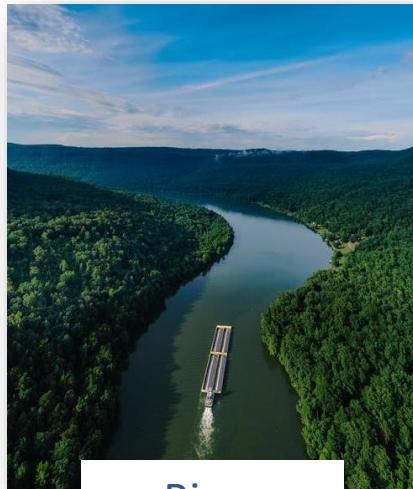
Outnumber the number of elephant in
Peninsular Malaysia!

Sources: <https://theoceancleanup.com/sources/>
Icon made by Freepik from www.flaticon.com
Icon made by Wichai.wi from www.flaticon.com

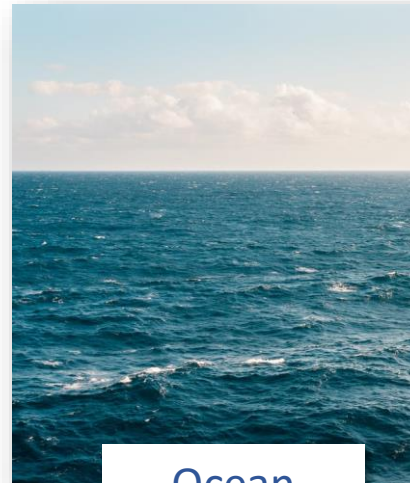
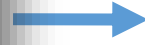
Marine plastic problem



Consumer



River



Ocean



Link to plastic tracker website

You can input your hometown and see where plastic might end up!

Insert Web Page

This app allows you to insert secure web pages starting with `https://` into the slide deck. Non-secure web pages are not supported for security reasons.

Please enter the URL below.

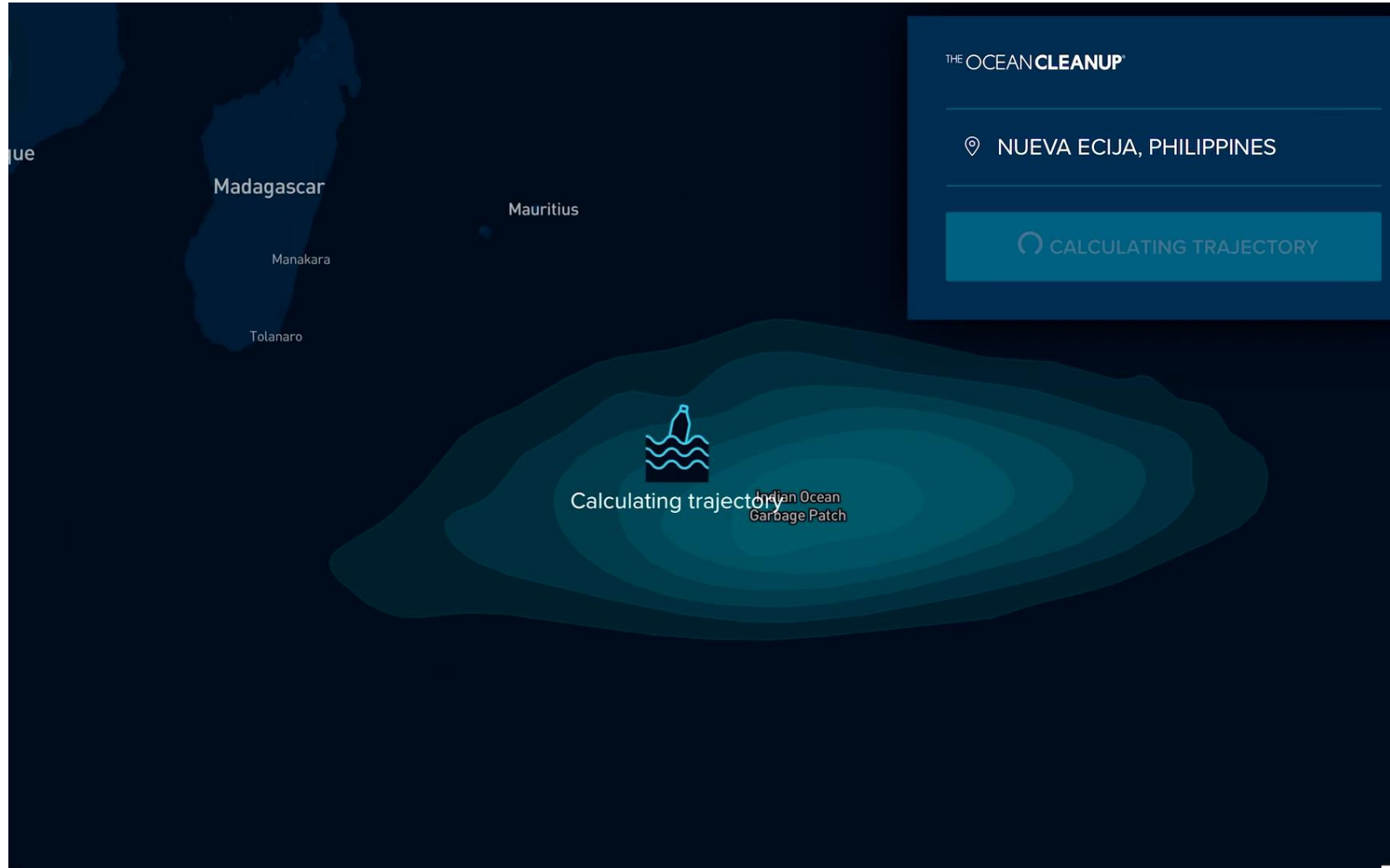
`https://`

Note: Many popular websites allow secure access. Please click on the preview button to ensure the web page is accessible.

<https://theoceancleanup.com/plastic-tracker/>
(please refer to the above link to make your own unique video)

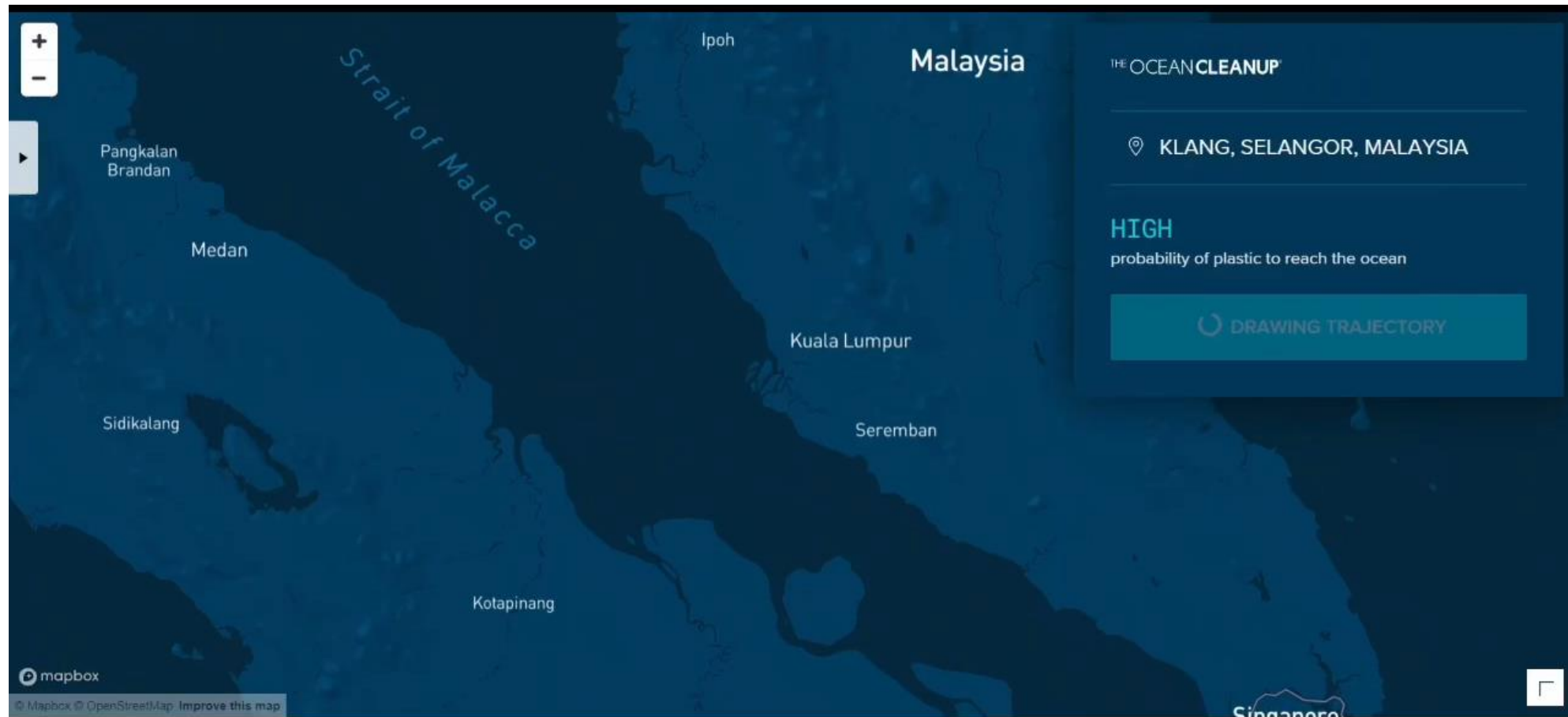


After it enters the ocean, where it might go?





After it enters the ocean, where it might go?






The end route of plastic depends on oceanic current

Ocean plastic

Mismanaged plastic waste, tonnes

0  5 million

 Gyres-Whirlpools of water which trap huge collections of waste in their currents

Source: Jambeck et al, Science Feb 2015, UNEP/NCEAS

©2018 The Sankei Shimbun / JAPAN Forward

The Great Pacific Garbage Patch in Numbers

The GPGP holds ocean plastic concentrations ranging from 10s to 100s kg per km²

KG KM²
0.1 1 10 100



How does the Great Pacific Garbage Patch looks like?

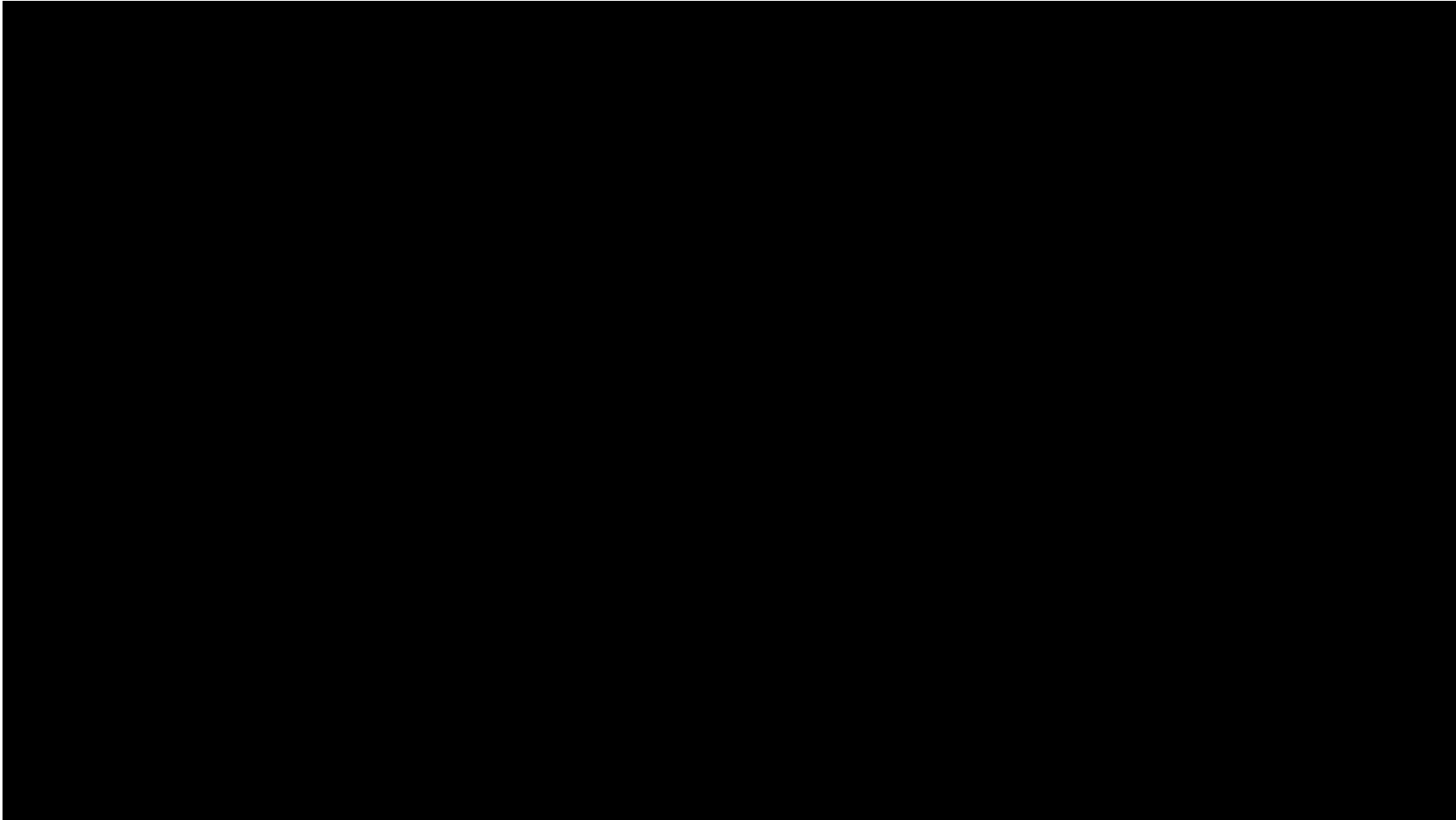


Source: *The Ocean Clean up* (September, 2021). "That's A Big A** Catch", Full video at: <https://www.youtube.com/watch?v=Ea9RIFpugdo>

Look familiar isn't it?

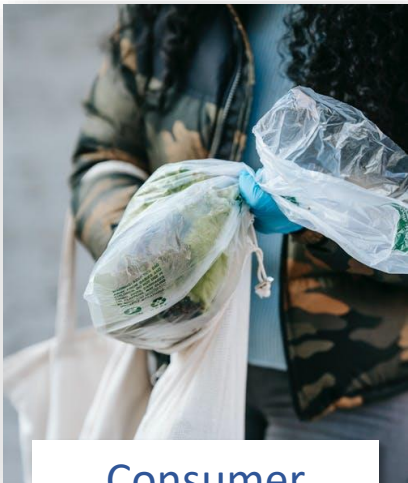


The Great Pacific Garbage Patch Lost and Found

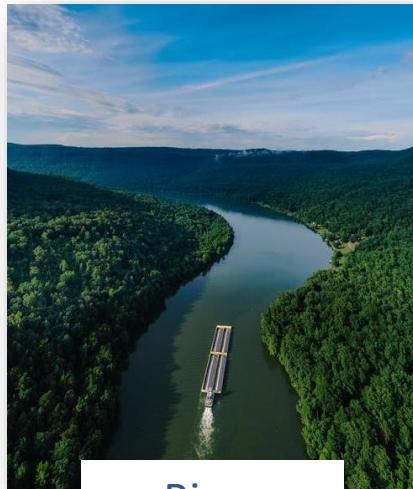


*Source: Vox (April, 2021). "Why 99% of ocean plastic pollution is "missing"", Full video at:
<https://www.youtube.com/watch?v=fsjvwQclGLo>*

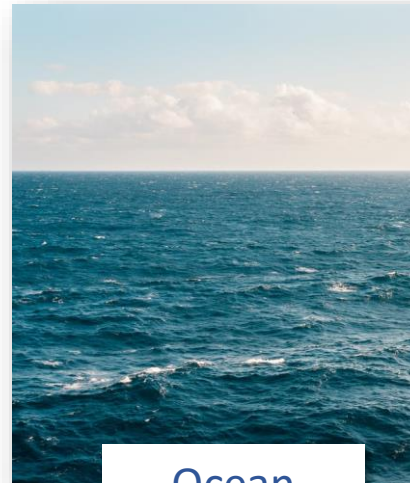
Marine plastic problem



Consumer
(Pengguna)



River



Ocean



The Great
Pacific
Garbage
Patch



What are the top 3 plastic items found in coastal clean-ups?

A



Cigarette butts



Food wrapper



Plastic bottles

B



Plastic bottles

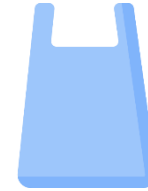


Lunch box



Straws

C



Plastic bag



Plastic cup



Straws

Where does the rest of plastic go?

It becomes **“MICROPLASTIC”**

What?



Small plastic pieces less than 5mm long

Size of strand of hair, dust or sand granules

How?

Human



Cosmetic



Nylon fabrics

Many others

Natural factors

Breakdown of larger plastic by nature



UV radiation



Wind

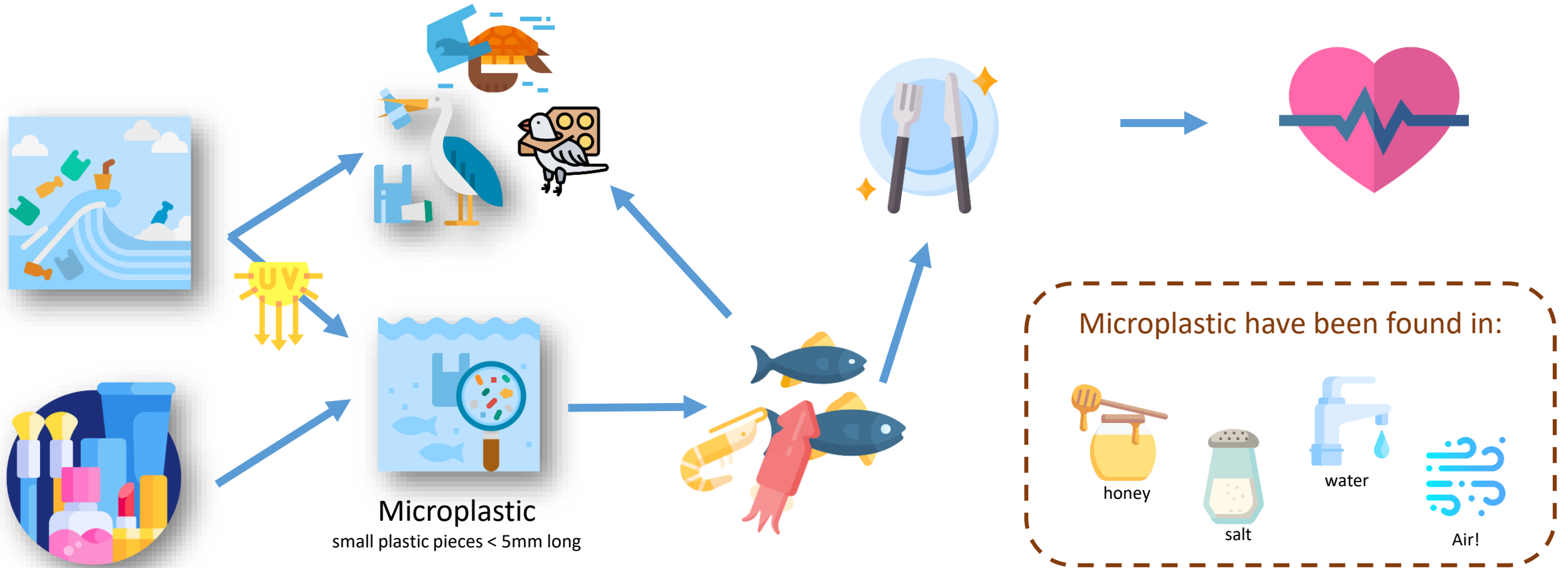


Wave

IMPACTS

“By 2050, there will be more plastics than fish in the ocean”

Plastic travels up the Food Chain!



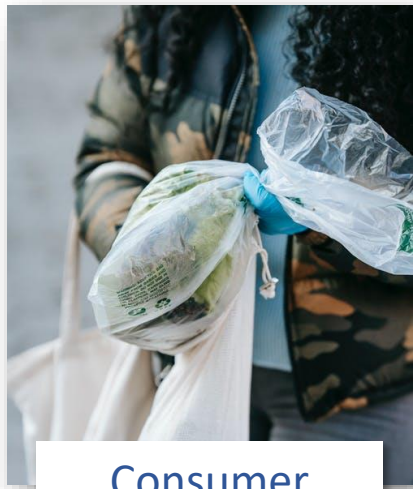
Microplastic
small plastic pieces < 5mm long

Microplastic have been found in:

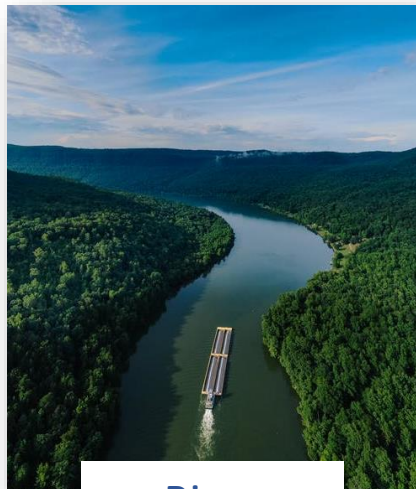
- honey
- salt
- water
- Air!

Icon made by Freepik from www.flaticon.com
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Icon made by photo3idea_studio from www.flaticon.com
Icon made by Eucalyp from www.flaticon.com

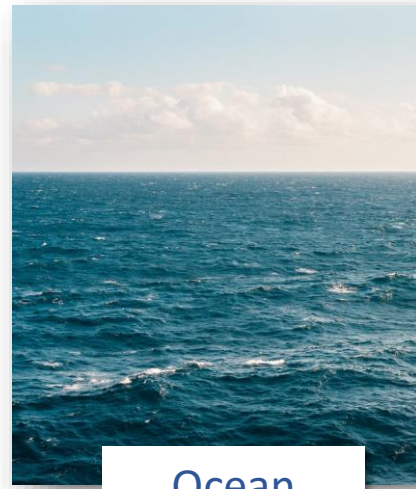
Marine plastic problem



Consumer



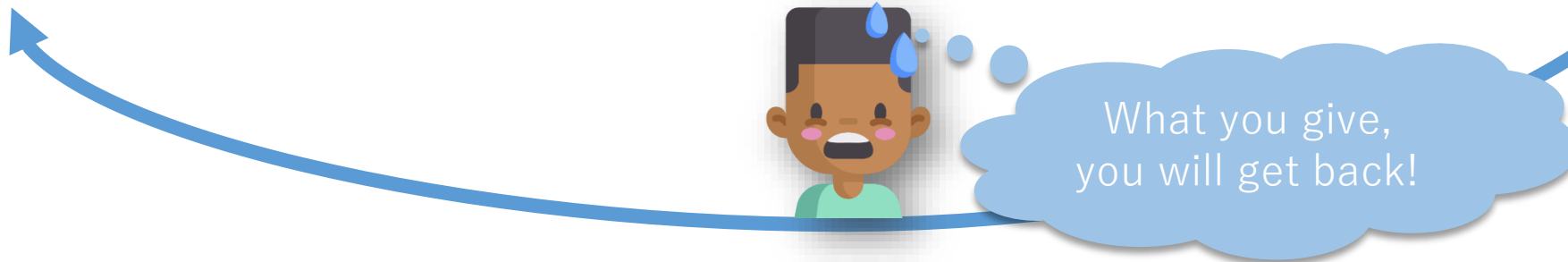
River



Ocean



The Great Pacific Garbage Patch



What you give,
you will get back!



1. Which of these related to microplastic?

A) Causes by UV radiation

B) small plastic pieces < 5mm long

C) Exist in the air

2. How does plastic travel into the rivers?

A) Littering

B) Wind

C) Dense population



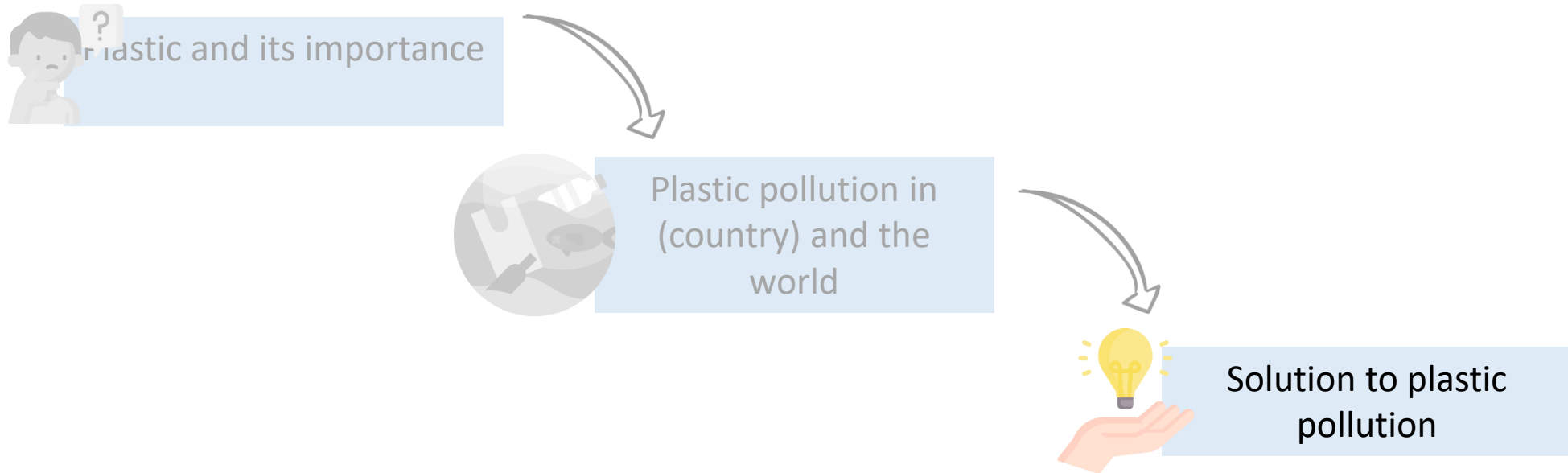
3. What is the impact of marine plastic problem?

A) Enter the food chain

B) Health problem

C) Threaten the wildlife







Outline:







Plastic Footprint

Based on plastic categories below. **write the number** of plastic garbage you throw within one day!

Plastic Category	Day 1	Day 2	Day 3	Day 4	Day 5	Total
 Plastic Bag	1					1
 Plastic Package						
 Plastic Bottle					1	1
 Food Tray	2			1		3
 Plastic Cutlery						
 Plastic Straw						

Plastic Category	Day 1	Day 2	Day 3	Day 4	Day 5	Total
 Plastic Wrap	2			1		3
 Plastic Cup						
 Can*						
 Boxed Beverage *		1			1	2
 Mask	1					1
 Others						

Individual level

I produced 11 plastic waste in 5 days

*Note: Can and Boxed Beverage are usually coated with plastic polymer (i.e. PET or Epoxy resin)

Practice 3R's

Reduce

Reuse

Recycle



Reduce

- Use less plastic in our daily life
- Decrease the amount of trash we generate



Reuse

- Use again plastic
- Finds new ways to use things that should be thrown away

Recycle

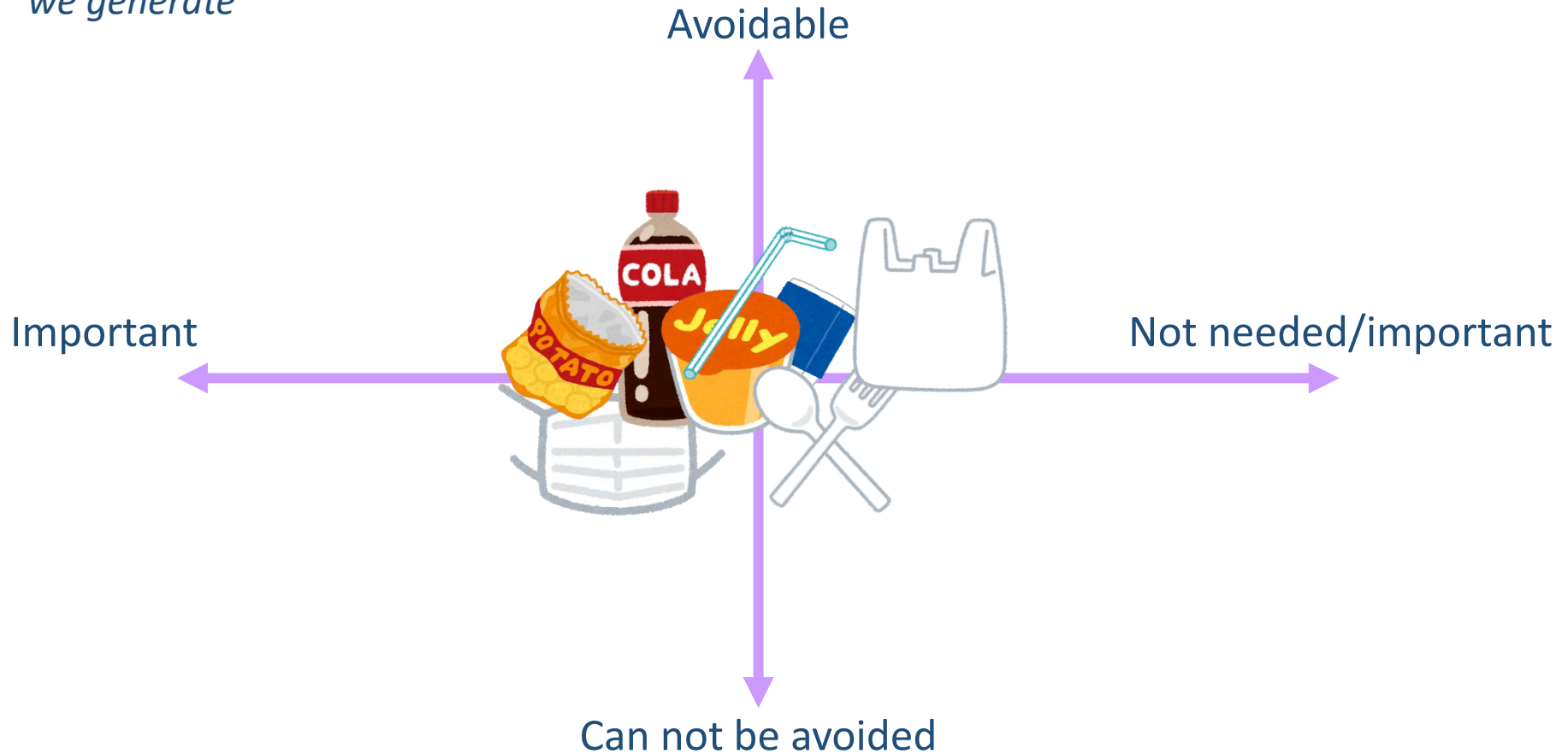
- Turn something old or trash into something new and useful





Reduce

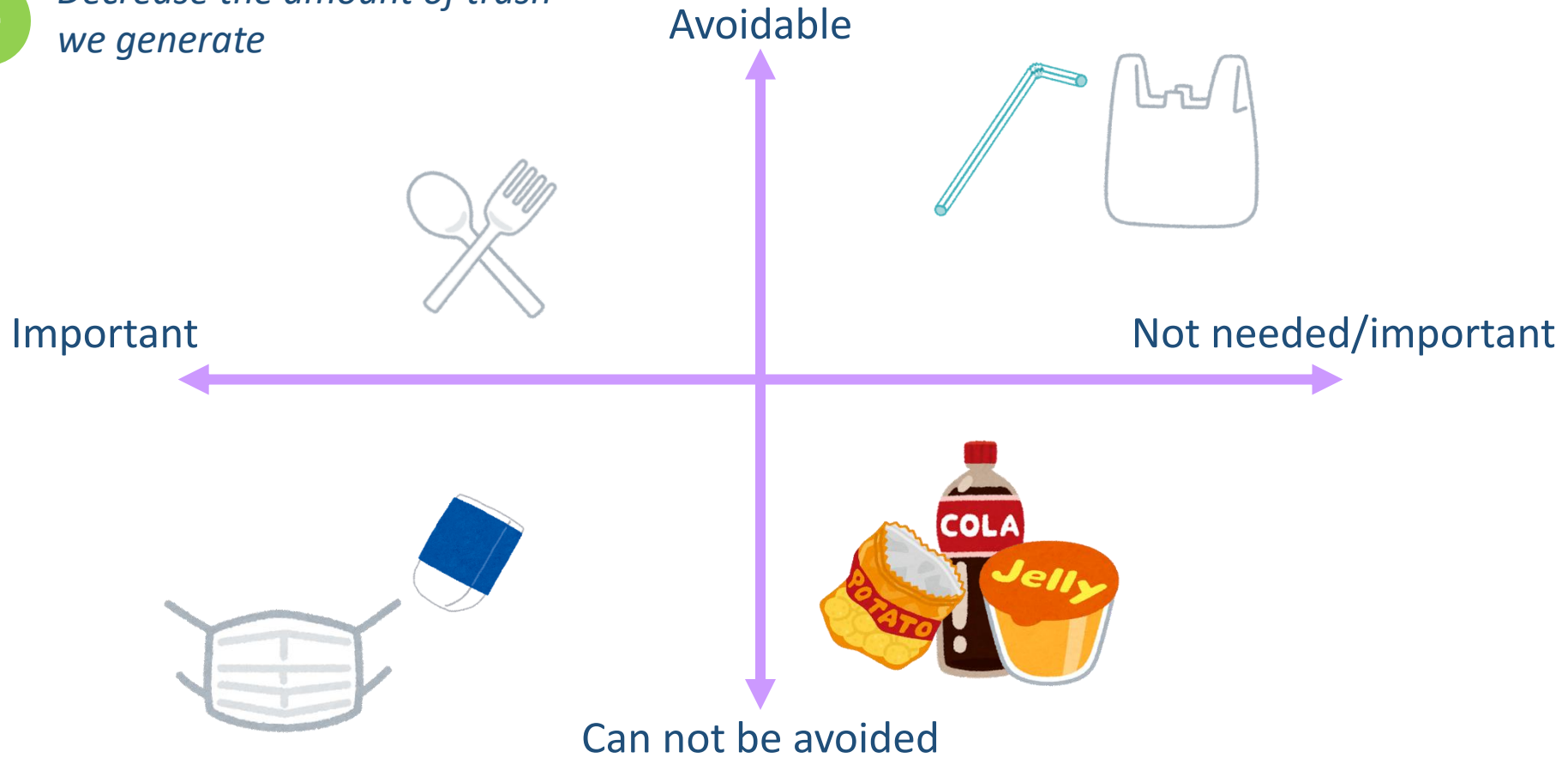
*Use less plastic in our daily life
Decrease the amount of trash
we generate*





Reduce

*Use less plastic in our daily life
Decrease the amount of trash
we generate*



Now you know that...



High amount plastic and plastic waste are produced and used everyday



8 million tons = as heavy as 1,400,000 of elephants
plastic waste entered the ocean every year

This makes our **fishes are in danger**



Everyone can make a change!
Be aware of **plastic waste you generate!**
Remember **3R!** Reuse, Reduce, Recycle

Ongoing action



Interceptor™ 002

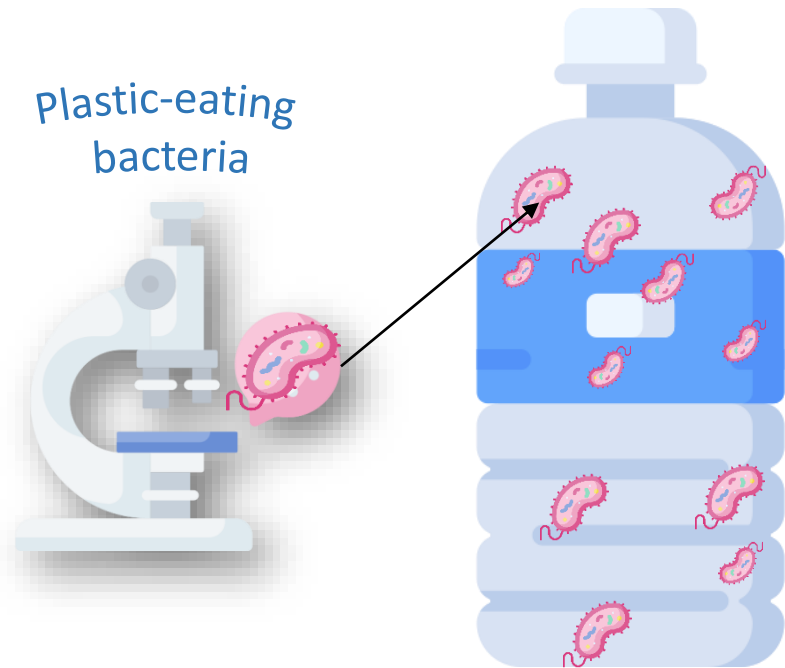
Sources: <https://theoceancleanup.com/media-gallery/interceptor-002-in-operation-malaysia/>
<https://www.youtube.com/watch?v=NrYwjJafStc>
Video by [Mikhail Nilov](#) from [Pexels](#)



So Reimagine Plastic project actually is working on plastic waste upcycling

Volunteering

Science and innovation



Plastic-eating
bacteria

Speed up plastic
breakdown



Recycle plastic waste into bricks

Let's take actions now!

Thank you