

## Lesson 8: The problem with plastic

### Objectives:

1. Analyze data from a graph.
2. Evaluate findings to create a fishbone diagram.
3. Share my viewpoints and listen to other people's viewpoints in a respectful way.
4. Support my ideas with scientific evidence.

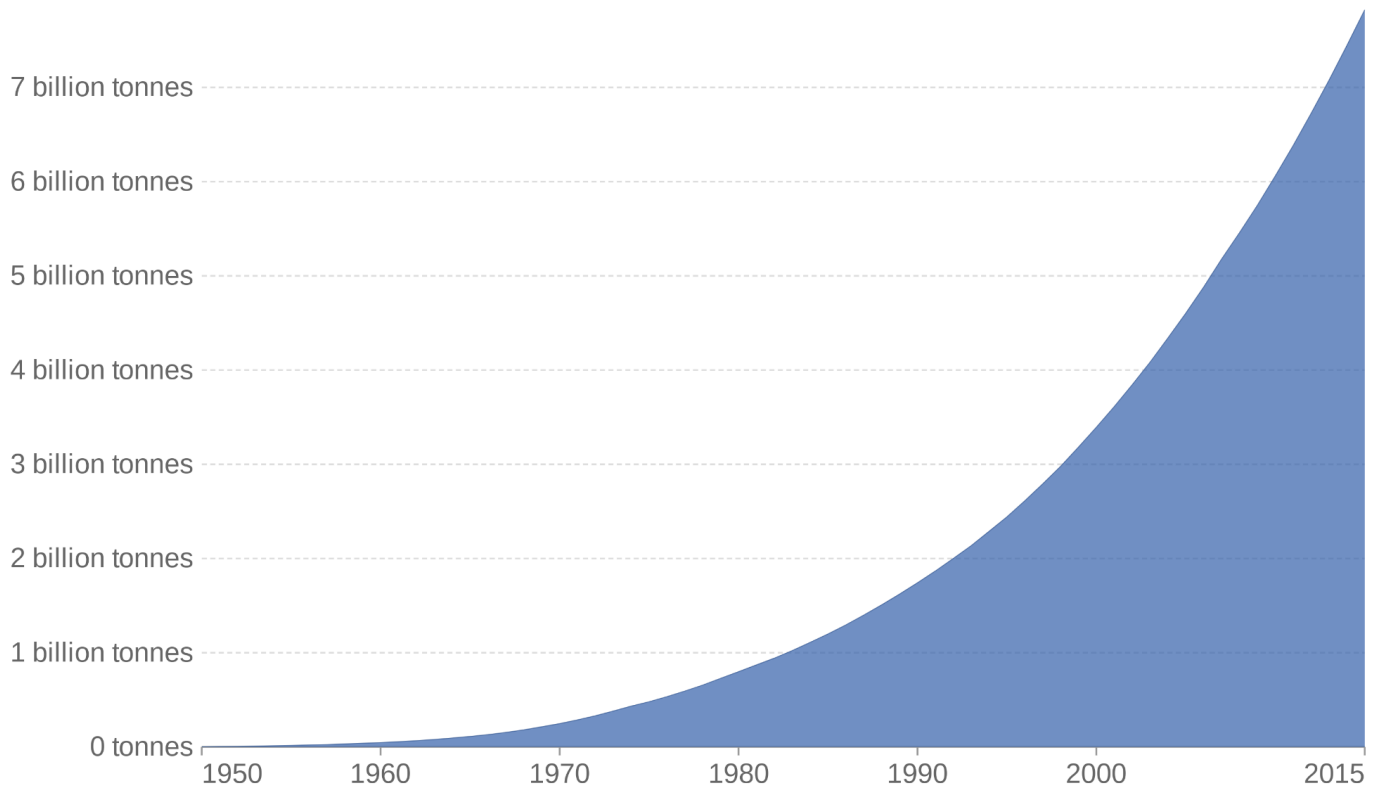
**Turn and talk:** Think about the last item you or your household bought. What is it made of? How did it come packaged? What are the most common materials in the items you use daily?

**Data Interpretation:** Observe each graph and respond.

### Cumulative global production of plastics

Plastic production refers to the production of polymer resin and fibers.

Our World  
in Data

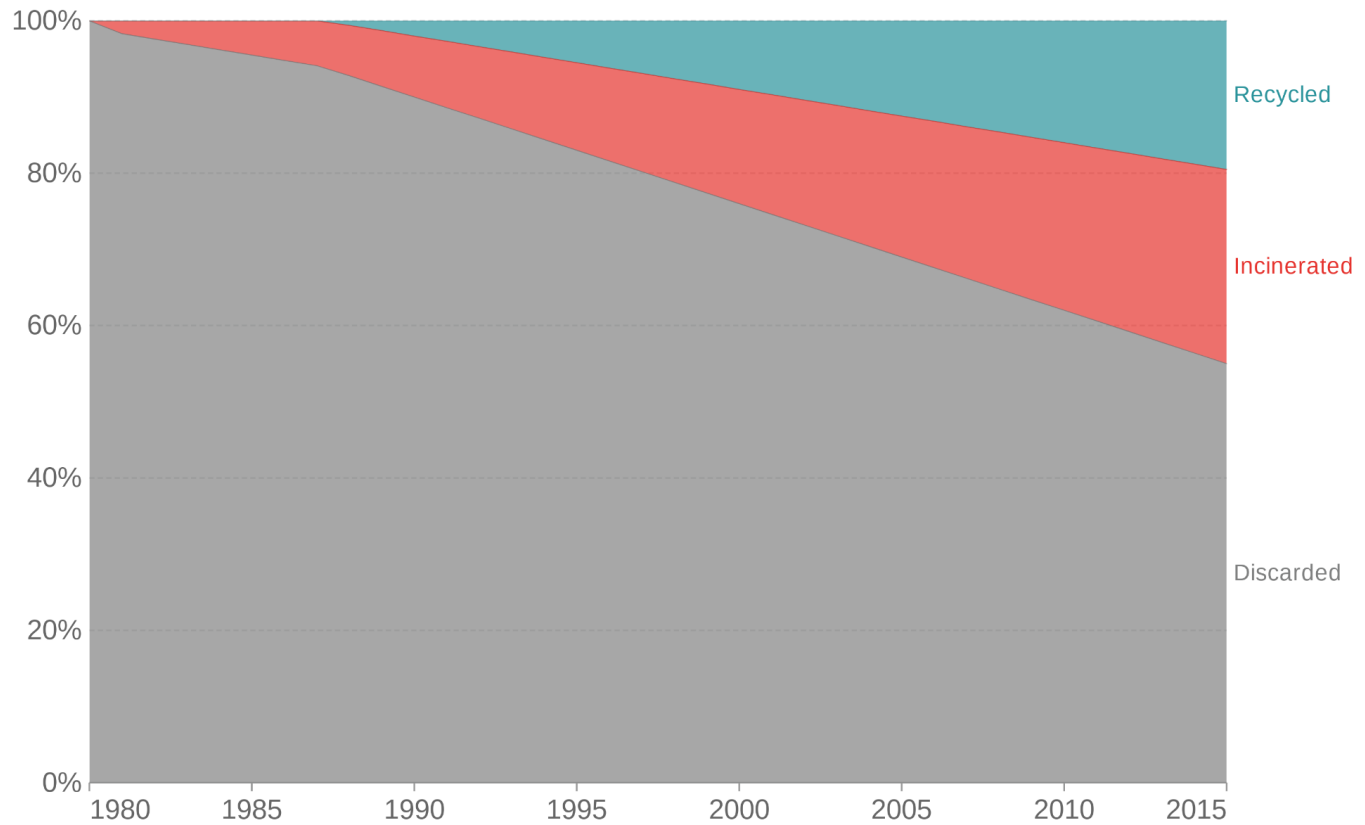


Source: Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*. OurWorldInData.org/plastic-pollution • CC BY

A. How much more plastic was produced in 2015 than 1990?

## Global plastic waste by disposal, 1980 to 2015

Estimated share of global plastic waste by disposal method.



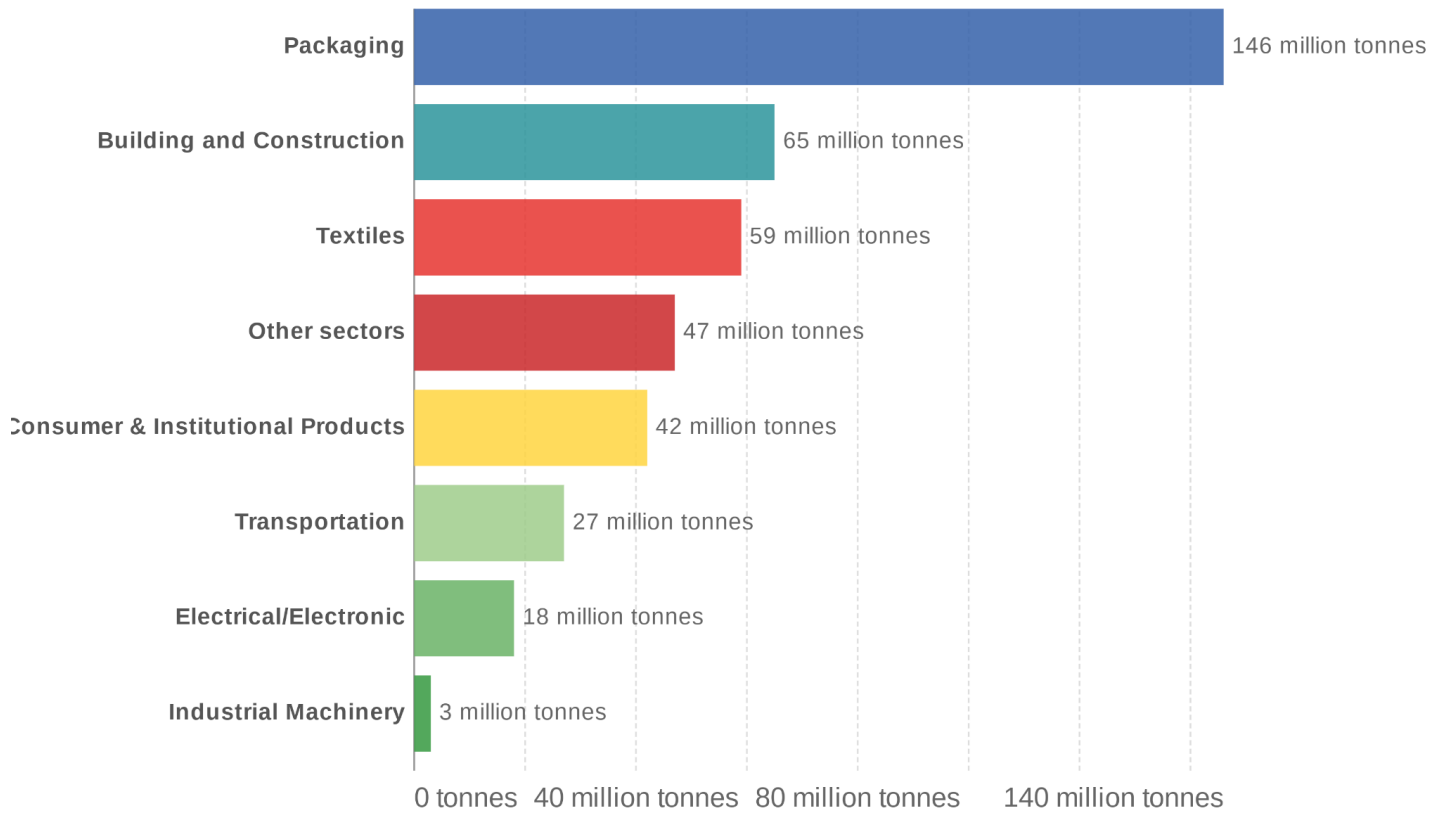
Source: Geyer et al. (2017)

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- B. What percentage of plastic waste is recycled as of 2015?
- C. What percentage of plastic is incinerated (burned) as of 2015?
- D. When plastic waste is 'discarded', what do you think this means?

## Primary plastic production by industrial sector, 2015

Primary global plastic production by industrial sector allocation, measured in tonnes per year.



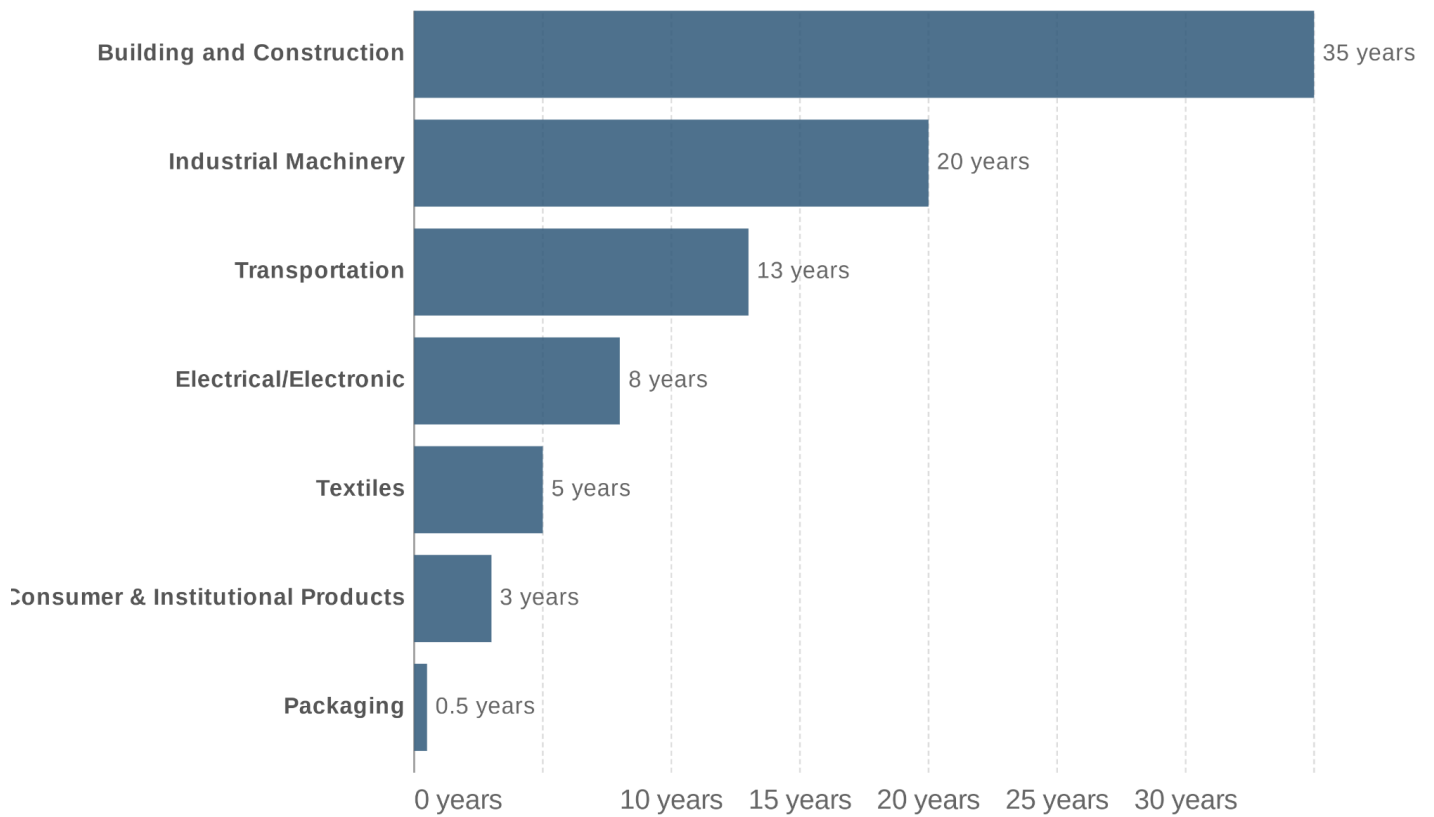
Source: Geyer et al. (2017)

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- E. What are the largest sectors which use plastic? How much plastic is produced?
- F. How much more plastic does the Packaging sector use plastic than Building and Construction?

## Mean product lifetime of plastic uses, 2015

Mean product lifetime (from production to disposal) of different uses of plastic products, measured in years.



Source: Geyer et al. (2017)

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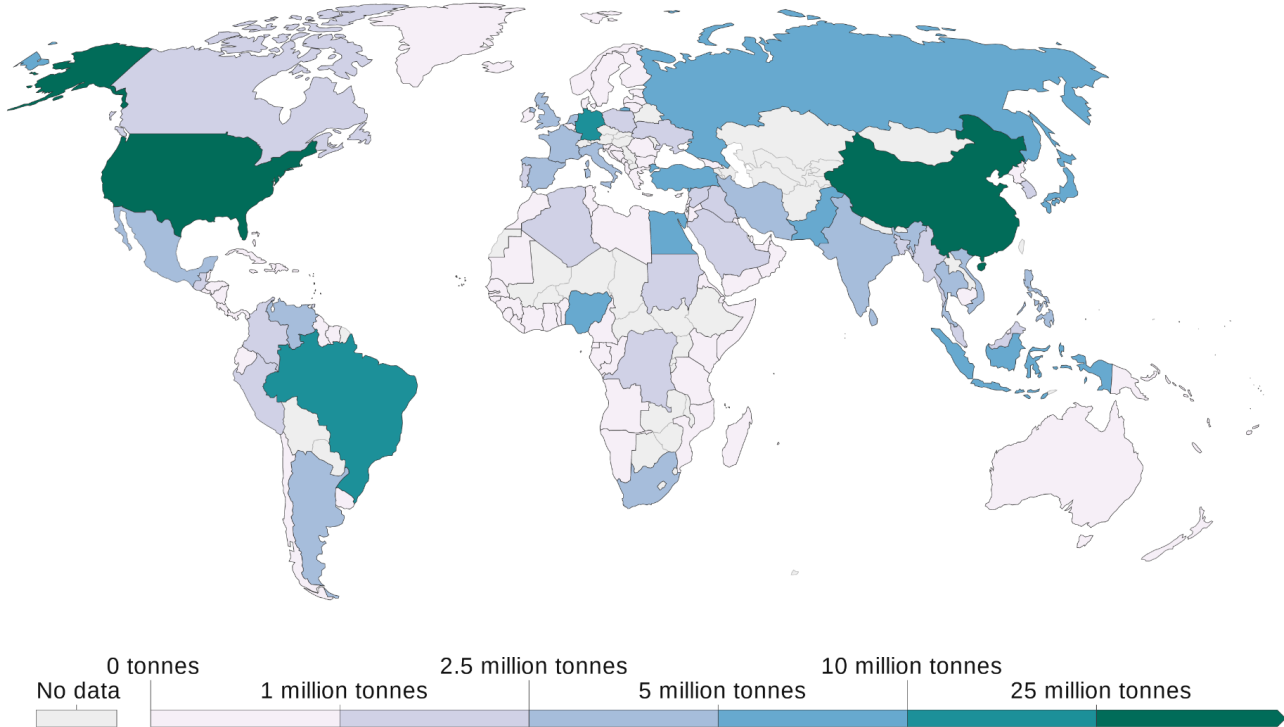
G. What is the product lifetime of plastic that is used as packaging?

H. What is the product lifetime of plastic that is used in textiles (clothing)?

I. Polyester is a common plastic used for textiles. Do you have any textiles made of polyester?

## Plastic waste generation, 2010

Total plastic waste generation by country, measured in tonnes per year. This measures total plastic waste generation prior to management and therefore does not represent the quantity of plastic at risk of polluting waterways, rivers and the ocean environment. High-income countries typically have well-managed waste streams and therefore low levels of plastic pollution to external environments.



Source: OWID based on Jambeck et al. (2015) & World Bank

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J. Which countries produce the highest amounts of plastic waste?

# The pathway by which plastic enters the world's oceans

Estimates of global plastics entering the oceans from land-based sources in 2010 based on the pathway from primary production through to marine plastic inputs.

**Global primary plastic production:  
270 million tonnes per year**

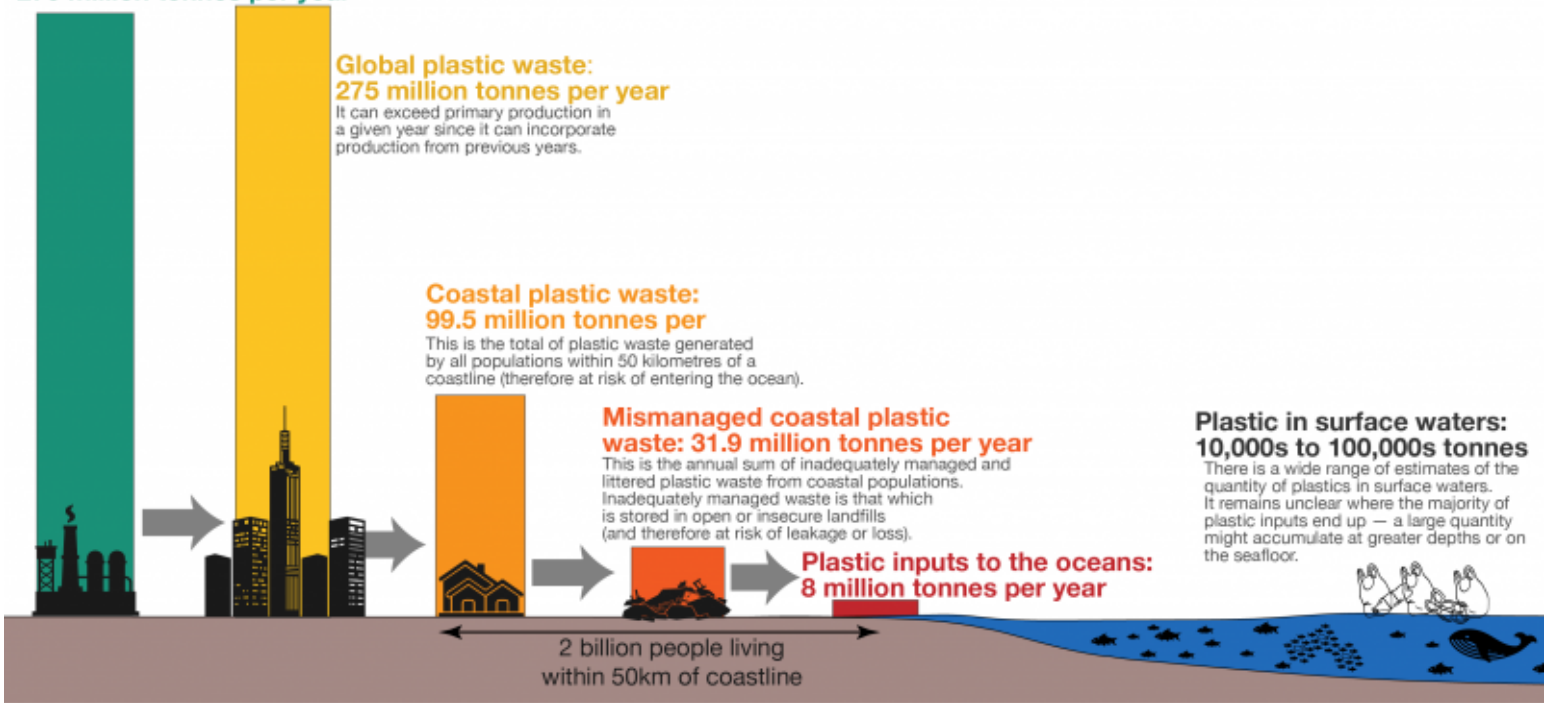
**Global plastic waste:  
275 million tonnes per year**  
It can exceed primary production in a given year since it can incorporate production from previous years.

**Coastal plastic waste:  
99.5 million tonnes per year**  
This is the total of plastic waste generated by all populations within 50 kilometres of a coastline (therefore at risk of entering the ocean).

**Mismanaged coastal plastic waste:  
31.9 million tonnes per year**  
This is the annual sum of inadequately managed and littered plastic waste from coastal populations. Inadequately managed waste is that which is stored in open or insecure landfills (and therefore at risk of leakage or loss).

**Plastic inputs to the oceans:  
8 million tonnes per year**

**Plastic in surface waters:  
10,000s to 100,000s tonnes**  
There is a wide range of estimates of the quantity of plastics in surface waters. It remains unclear where the majority of plastic inputs end up — a large quantity might accumulate at greater depths or on the seafloor.



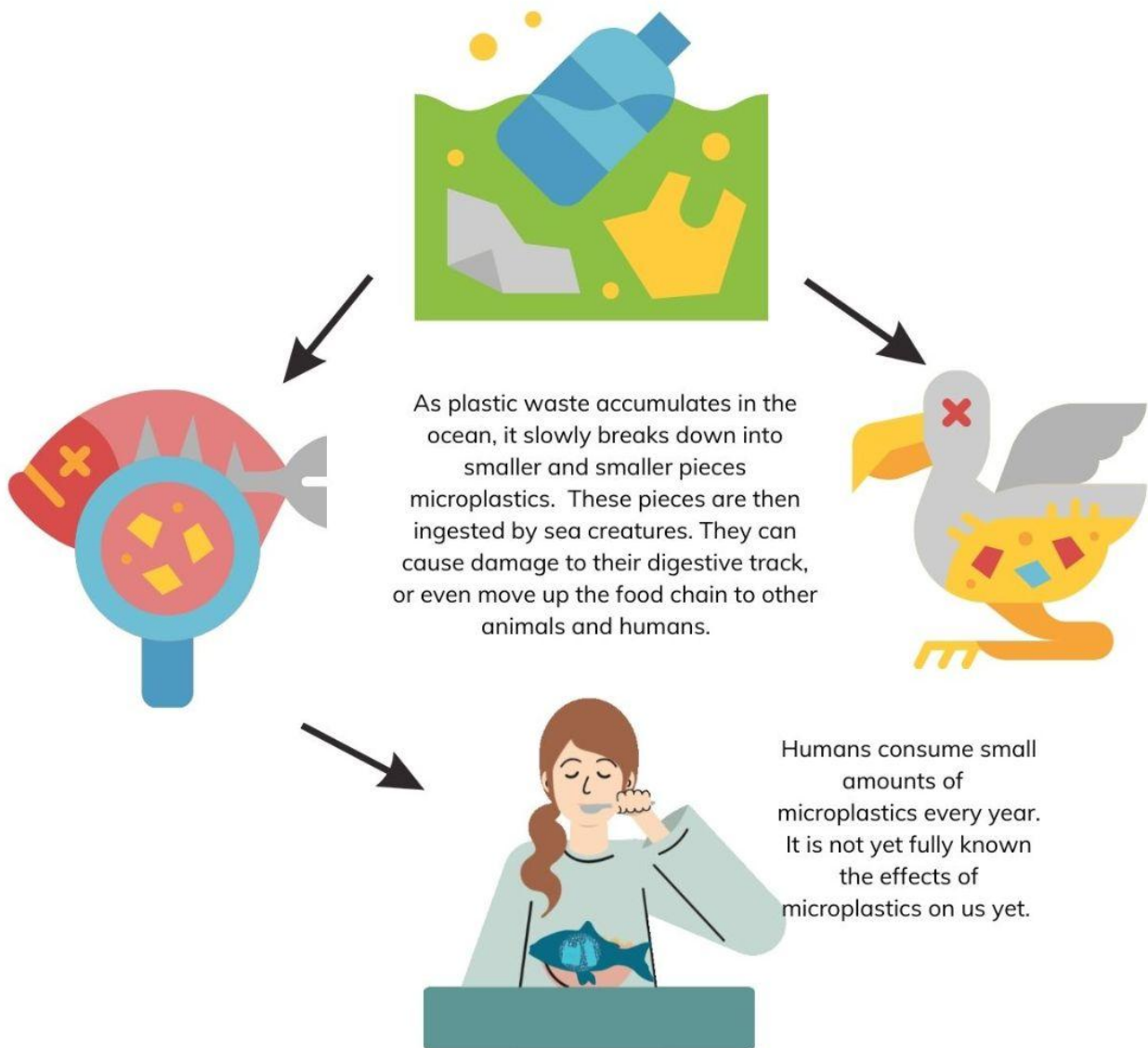
Source: based on Jambeck et al. (2015) and Eriksen et al. (2014). Icon graphics from Noun Project.

Data is based on global estimates from Jambeck et al. (2015) based on plastic waste generation rates, coastal population sizes, and waste management practices by country

This is a visualization from OurWorldinData.org, where you will find data and research on how the world is changing.

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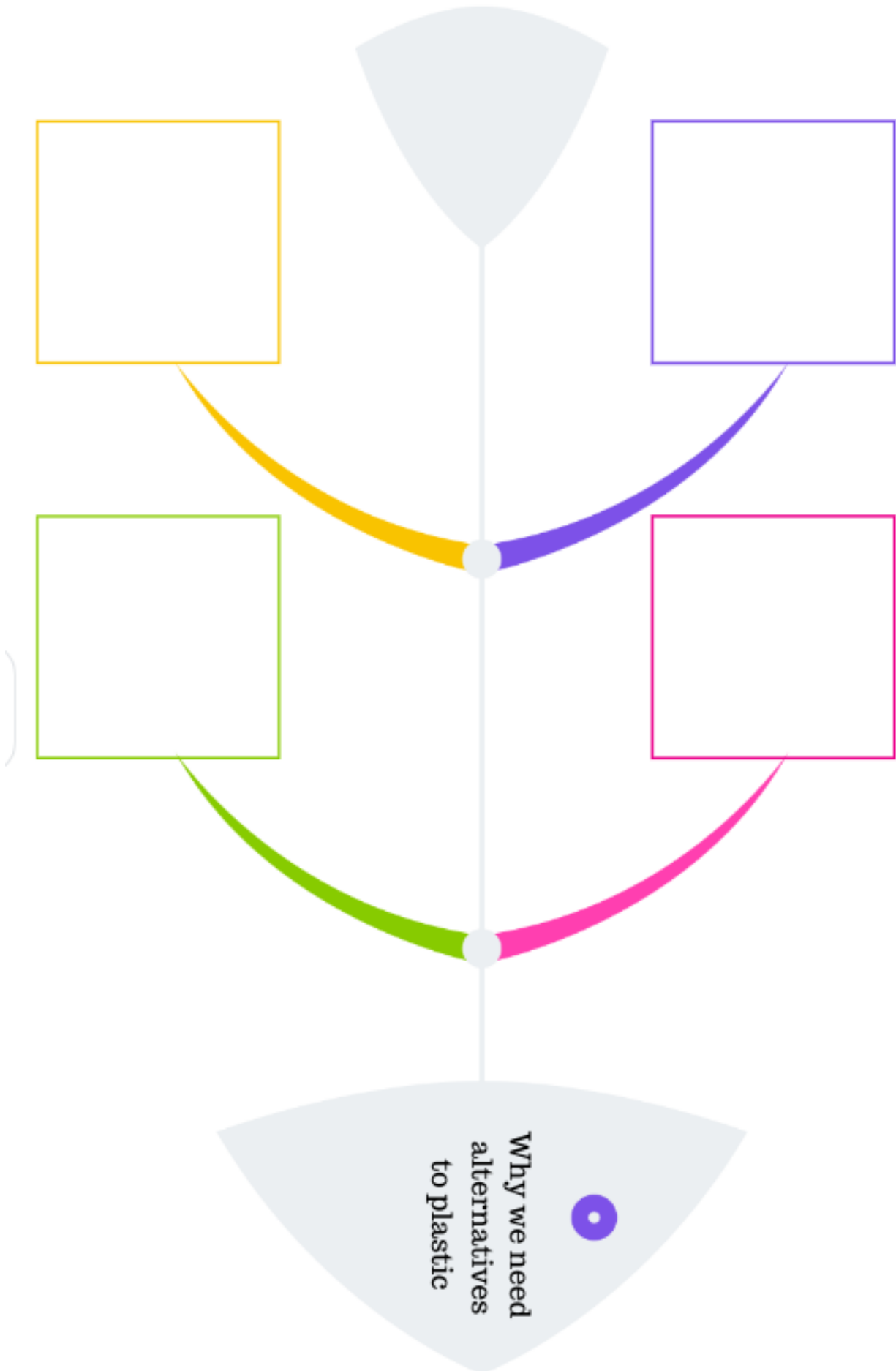
K. How might you summarize how plastic ends up in the oceans?



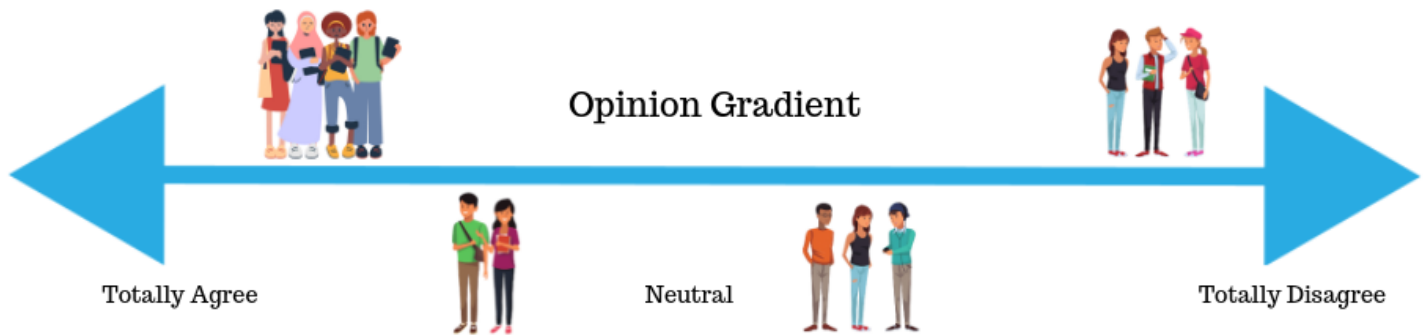
K. What do you think might be more harmful to the environment, macroplastics or microplastics? Why?

Use what you've learned from the graphs to complete the Fishbone activity on the following page. Record along the 'bones of the fish' what you think are the four most important reasons for why we need alternatives to plastic.





## Opinion Gradient:



Notice in the classroom there are locations marked as seen above on the Opinion Gradient. Listen to the statements read aloud. Think about where you fall on the gradient regarding this statement. Feel free to stand in different positions along the gradient, judging by how strongly or mildly you feel. Be prepared to justify your choice!

### Opinion gradient statements:

- A) Each individual citizen is responsible for the pollution of plastic in the ocean.
- B) The benefits of having plastic available outweigh the damage they are doing to the environment.
- C) It is impossible for the world to consume 90% less plastic in the future.
- D) Scientists have yet to find any real alternatives to plastic.
- E) Single-use plastics should be banned worldwide.