Educator's Guide

Eco 360

Activity 5: Sources of Plastic Waste in the Environment
greenlearning.ca

Table of Contents

Backgrounder: Plastics in the Environment

Sources of Plastic in the Environment

Plastic waste enters the environment through two main sources – either through land-based sources or through marine-sources. Land based plastic pollution is caused by mismanagement of plastic waste on the land. This can happen on an individual level as people irresponsibly discard plastic waste directly into the environment; or through local management authorities (such as municipalities) mismanaging plastic waste due to lack of proper disposal channels such as waste bins taking plastic waste to a landfill; or in similar vein, corporations or other businesses discarding plastic waste improperly if there is no mechanism provided to responsibly discard plastic waste. Absence of a proper waste management system or lack of its implementation is the case in many countries around the globe, which causes plastic waste to enter the environment.

In many cases, a waste management system might be existing but it is poorly managed – as such if a landfill is not properly managed, plastic waste could be carried by wind from that landfill to a nearby stream, which then enters the waterways and ultimately enters our oceans. Given the durability and strength of plastics, once they enter the environment they remain there for hundreds of years, causing many hazards.

Marine-sources of plastic waste include plastic waste discarded directly into the oceans. This is typically caused when fishing nets and other plastic fishing gear is discarded irresponsibly directly into the oceans. Although there is still research going on to understand the sources of plastic waste in our oceans, the best estimates show that about 80 percent of plastic waste in our oceans come from land-based sources, while the remaining 20 percent of plastic is from marine-based sources (LI, Tse, & Fok, 2016).

Plastic in the Environment

Plastic production began some six decades ago in 1907, with estimates showing that to-date about 8.3 billion metric tons of non-recyclable plastic have been produced in the world. This has generated about 6.3 billion of plastic waste. Of this amount, only 9% has been recycled, 12% has been incinerated whereas the remaining 79% of the plastic has accumulated in landfills and the natural environment. To put things in context, if the current rates of plastic consumption were to continue then by 2050 there will be 12 billion metric tons of plastic in landfills – which amounts to 35,000 times as heavy as the Empire State Building (National Geographic Society, 2019).

This interactive tool from Our World in Data shows the amount of global mismanaged waste that ends up in landfills and the environment: https://ourworldindata.org/grapher/mismanaged-waste-global-total

Plastic waste that ends up in the environment makes its way to water bodies and eventually our oceans. Globally, around 8 million tons of plastic end up in our oceans every year, which make up about 80% of all marine debris surface waters to deep-sea sediments (IUCN, 2018).

"The most visible and disturbing impacts of marine plastics are the ingestion, suffocation, and entanglement of hundreds of marine species. Marine wildlife such as seabirds, whales, fishes, and turtles, mistake plastic waste for prey, and most die of starvation as their stomachs are filled with plastic debris. They also suffer from lacerations, infections, reduced ability to swim, and internal injuries. Floating plastics also contribute to the spread of invasive marine organisms and bacteria, which disrupt ecosystems" (IUCN, 2018).

Although much has been documented of the effects of plastic waste on marine life, there are also severe negative impacts of plastic pollution on land and air. Plastic pollution on land poses a severe threat to land animals, similar to the threats posed to marine life.

"Plastic waste that never makes its way to the ocean still ends up being very dangerous to both wild animals and domesticated ones...They can suffer from various forms of entanglements as well as accidental consumption which may be deadly" (Macklin, 2021). Plastic is being ingested by land animals by being mistaken for food, which is causing severe negative impacts. These effects include frequent headaches, bellyaches, suffocation, and starvation. Plastic pollution on land also causes limited mobility of land animals and birds due to plastic entanglement—as such plastic getting stuck in animal paws and birds not being able to fly getting caught in plastic trash (Macklin, 2021).

"Single-use plastics can have a significant impact on the terrestrial food chain. Plastic bags and food containers every so often carry food particles and smell that attract vermin to eat the plastic. The plastic becomes perpetually embedded in the animals' digestive tracts, blocking the passage of food, and leading to death by starvation or infection. Birds and large mammals especially farm animals are documented as being found dead after feeding on plastic bags. Furthermore, birds use pieces of plastic in building their nest. In a nest, freshly hatched chicks will peck away at pieces of plastic, which they may swallow up. Ecosystems are increasingly damaged when plastic litter mounds up along the shores of lakes, reservoirs, and inland waterways, disrupting the nesting patterns of waterfowl and other aquatic animals. This will have flow-on impacts on other animals along the food chain, such as tiny insects

and other small animals, which are a primary source of food for higher carnivores and reptiles occupying wetlands" (Kyeremanteng, 2020).

There has been a growing interest in studying the effects of microplastics (small pieces of plastics) on air. A study done in the mountains of the French Pyrenees concluded clear evidence of airborne microplastic being deposited onto the ground every day. In this study, samples were collected and analyzed over a five-month period, which showed atmospheric microplastic depositing in both wet and dry conditions on land. They documented approximately 249 fragments, 73 films, and 44 fibres per square meter deposited on the study area (Allen, et al., 2019). Much like the problem of marine plastic pollution, this study shows the microplastic was able to travel up to a distance of 95 km with the wind. This study concludes that atmospheric microplastic can travel long distances to sparsely inhabited areas through the wind – taking plastic pollution to remote lands that have not generated the plastic pollution. This microplastic when ingested by terrestrial life enters the food chain, which severely affects human health as well.

Additional resources to learn about the effects of plastic pollution on the environment:

- Our World in Data: https://ourworldindata.org/plastic-pollution
- IUCN Brief: https://www.iucn.org/resources/issues-briefs/marine-plastics#why
- The Plastic Problem – A PBS Documentary: https://www.youtube.com/watch?v=1RDc2opwg0I
- Impacts of Plastic and Microplastic waste on the Dry Land Environment: https://solarimpulse.com/news/impacts-of-plastic-and-microplastic-waste-on-the-dry-land-environment#
- Plastic & Land: https://www.theconsciouschallenge.org/ecologicalfootprintbibleoverview/plastic-land
- An underestimated threat: Land-based pollution with microplastics: https://www.sciencedaily.com/releases/2018/02/180205125728.htm

Bibliography

IUCN. (2018). *Marine Plastics*. Retrieved from IUCN: https://www.iucn.org/resources/issues-briefs/marine-plastics#:~:text=At%20least%208%20million%20tons,causes%20severe%20injuries%20and%20deaths.

Kyeremanteng, P. (2020). *Impacts of Plastic and Microplastic waste on the Dry Land Environment*. Retrieved from Solar Impulse Foundation: https://solarimpulse.com/news/impacts-of-plastic-and-microplastic-waste-on-the-dry-land-environment#

LI, W., Tse, H., & Fok, L. (2016). Plastic waste in the marine environment: A review of sources, occurrence and effects. *Science of the Total Environment.*, 566, 333-349.

Macklin, M. (2021). *5 Ways Plastic Pollution Impacts Animals on Land* . Retrieved from One Green Planet: https://www.onegreenplanet.org/environment/ways-plastic-pollution-impacts-animals-on-land/

National Geographic Society. (2019). *A Whopping 91 Percent of Plastic Isn't Recycled* . Retrieved from National Geographic: https://www.nationalgeographic.org/article/whopping-91-percent-plastic-isnt-recycled/

Curriculum Connections

Activity 5: Sources of Plastic Waste in the Environment

Alberta

- Grade 9 Unit C: Environmental Chemistry
  - 1. Investigate and describe, in general terms, the role of different substances in the environment in supporting or harming humans and other living things
- Bio 20 and 30
  - All units in Bio 20 and 30 have an STS outcome (science, technology and society) - explain how science and technology have both intended and unintended consequences for humans and the environment

Ontario

- Grade 9 Geography
  - C3.Industries and Economic Development: assess the relative importance of different industrial sectors to the Canadian economy and Canada's place in the global economy, and analyze factors that influence the location of industries in these sectors (FOCUS ON: Spatial Significance; Patterns and Trends)
  - E1.The Sustainability of Human Systems: analyze issues relating to the sustainability of human systems in Canada (FOCUS ON: Interrelationships; Geographic Perspective)

Activity 5: Sources of Plastic Waste in the Environment

Overall Objective

Learners will explore the sources of plastic waste in the environment. Learners will learn about the countries and industries that produce the highest amount of mismanaged plastic waste ending in the environment.

Materials

- Internet-enabled device
- Topic backgrounder
- Eco 360 notebook (we recommend asking learners to maintain a notebook for this program to write down reflections as they go through the program)
- Sources of Plastic Waste Worksheet

Time Required

1.5 hours - 2 hours

Learning Outcomes

By the end of this activity, learners will:

- identify the biggest plastic waste producing countries in the world
- identify the biggest plastic waste producing industries in the world
- analyze data on sources of plastic waste and make informed conclusions

Grade Level

Suitable for Grades 9 to 12

Activity Outline

Step One

Using the backgrounder, introduce the problem of plastic waste and its sources. Ask learners the following questions before beginning the activity (they are encouraged to take a guess before diving into the facts!) and write their answers on the board that can be seen by all learners:

a. In your opinion, which industrial sector generates the most plastic waste?
b. In your opinion, which country or region generates the most plastic waste?

Step Two

Distribute the Sources of Plastic Waste Worksheet to your learners. Review the instructions tab on the worksheet to help learners complete the activity.

Step Three

Ask learners to complete the activity on the tab “Plastic Waste by Sector”.

Step Four

Ask learners to complete the activity on the tab “Plastic Waste by Country or Region”.

Step Five

Ask learners to complete the activity on tab “Infographic” - after creating the infographics in the worksheet, learners can save them as PDF documents and share with the class and friends on social media.

Learner Assessment

Consolidation: Conduct a class discussion exploring the following questions:

a. Were you surprised by any of the findings? Educators can compare the new findings with the answers recorded before doing the worksheet activity.
b. Did you notice the list of top 10 countries that generate the highest plastic waste by capita, in total and by the share of

global mismanaged plastic waste are different? Can you explain the difference between the three?

c. What should Canada do to reduce its plastic waste?

Associated Worksheets

Eco 360

Activity 5: Sources of Plastic Waste in the Environment
greenlearning.ca

Sources of Plastic Waste Worksheet

Activity 5 - Sources of Plastic Waste in the Environment

So, where does the plastic waste really come from?

In this activity, learners will look at data on sources of plastic waste. They will analyze the data, answer questions afterwards and create an infographic on the information they have collected.

Instructions:

1. Go to tab "Plastic Waste by Sector". Complete steps 1 and 2 (analyzing data and creating charts). After you have done the first two steps, answer questions relating to the data you have anazlyzed in step 3.
2. Go to tab "Plastic Waste by Country or Region". Complete steps 1, 2, 3 and 4 (analyzing data and creating charts). After you have completed the first 4 steps, answer questions relating to the data you have analyzed in step 5.
3. Using the charts you have created in this activity, create an infographic titled "So, where does the plastic waste really come from?" to tell a visual story of where plastic comes from. Make sure to add comments beside your charts and add visuals to make your infographic appealing. Make sure to record the sources; you may use other sources if you like. After creating the infographic in this worksheet, save it as a PDF and share with your peers in class. You can also share it with your friends on social media to raise awareness around the issue of plastic waste in our environment.

Step 1: Look at the data in table 1, then separate out the data by industry and plastic type. Transfer the data by industry in table 2 and by plastic type in table 3.

Click on the + to ungroup rows and see activity details:

Table 1: Plastic Waste Generation by Industrial Sector and Plastic Type, 2015

Global plastic waste generation by industrial sector, measured in tonnes per year.

Entity	Year	Primary plastic waste generation (million tonnes)
Packaging	2015	141,000,000
LD, LDPE	2015	57,000,000
PP	2015	55,000,000
PP&A fibers	2015	42,000,000
Textiles	2015	42,000,000
HDPE	2015	40,000,000
Other sectors	2015	38,000,000
Consumer & Institutional Products	2015	37,000,000
PET	2015	32,000,000
Additives	2015	17,000,000
PS	2015	17,000,000
Transportation	2015	17,000,000
PUT	2015	16,000,000
PVC	2015	15,000,000
Building and Construction	2015	13,000,000
Electrical/Electronic	2015	13,000,000
Other polymer type	2015	11,000,000
Industrial Machinery	2015	1,000,000

Source: https://ourworldindata.org/grapher/plastic-waste-by-sector

Table 2: Plastic Waste Generation by Industrial Sector, 2015

Global plastic waste generation by industrial sector, measured in tonnes per year.

Industry	Primary plastic waste generation (million tonnes)

Table 3: Plastic Waste Generation by Plastic Type, 2015

Global plastic waste generation by industrial sector, measured in tonnes per year.

Plastic Type	Primary plastic waste generation (million tonnes)

Step 2: Create two bar or pie charts, one for data from table 2 and one for data from table 3, showing the plastic waste generation by industry and plastic type.

Click on the + to ungroup rows and see activity details:

Chart 1 - Plastic Waste Generation by Industry

Chart 2 - Plastic Waste Generation by Plastic Type

Step 3: Answer the questions below individually or in groups:

Click on the + to ungroup rows and see activity details:

1. Which industrial sector generates most plastic waste? Why do you think that is the case (think about consumer products and choices)?

1. Which plastic type makes the biggest portion of plastic waste? What are the common products made out of this plastic type? What are some eco-friendly alternatives that we can use for the products made out of this plastic type?

Step 1: Look at the data in table 1 on plastic waste per capital by country and create a bar chart of the data.

Click on the + to ungroup rows and see activity details:

Table 1: Plastic Waste Generation per Capita by Country, 2010

Entity	Year	Per capita plastic waste (kg/person/day)
Albania	2010	0.069
Algeria	2010	0.144
Angola	2010	0.062
Anguilla	2010	0.252
Antigua and Barbuda	2010	0.66
Argentina	2010	0.183
Aruba	2010	0.252
Australia	2010	0.112
Bahamas	2010	0.39
Bahrain	2010	0.132
Bangladesh	2010	0.034
Barbados	2010	0.57
Belgium	2010	0.08
Belize	2010	0.172
Benin	2010	0.043
Bermuda	2010	0.252
Bosnia and Herzegovina	2010	0.144
Brazil	2010	0.165
British Virgin Islands	2010	0.252
Brunei	2010	0.026
Bulgaria	2010	0.154
Cambodia	2010	0.066
Cameroon	2010	0.046
Canada	2010	0.093
Cape Verde	2010	0.065
Cayman Islands	2010	0.252
Channel Islands	2010	0.252
Chile	2010	0.119
China	2010	0.121
Christmas Island	2010	0.252
Cocos Islands	2010	0.252
Colombia	2010	0.144
Comoros	2010	0.201
Congo	2010	0.069
Cook Islands	2010	0.144

Chart 1: Plastic Waste Generation per Capita by Country, 2010

Costa Rica	2010	0.258
Cote d'Ivoire	2010	0.103
Croatia	2010	0.252
Cuba	2010	0.089
Curacao	2010	0.252
Cyprus	2010	0.248
Democratic Republic of Congo	2010	0.045
Denmark	2010	0.047
Djibouti	2010	0.103
Dominica	2010	0.149
Dominican Republic	2010	0.144
Ecuador	2010	0.147
Egypt	2010	0.178
El Salvador	2010	0.147
Equatorial Guinea	2010	0.144
Eritrea	2010	0.045
Estonia	2010	0.176
Faeroe Islands	2010	0.252
Falkland Islands	2010	0.252
Fiji	2010	0.189
Finland	2010	0.234
France	2010	0.192
French Guiana	2010	0.144
French Polynesia	2010	0.252
Gabon	2010	0.054
Gambia	2010	0.048
Georgia	2010	0.068
Germany	2010	0.485
Ghana	2010	0.04
Gibraltar	2010	0.252
Greece	2010	0.2
Greenland	2010	0.252
Grenada	2010	0.325
Guadeloupe	2010	0.144
Guam	2010	0.252
Guatemala	2010	0.28
Guernsey	2010	0.252
Guinea	2010	0.03
Guinea-Bissau	2010	0.054
Guyana	2010	0.586
Haiti	2010	0.09

Honduras	2010	0.189
Hong Kong	2010	0.398
Iceland	2010	0.281
India	2010	0.01
Indonesia	2010	0.057
Iran	2010	0.144
Iraq	2010	0.103
Ireland	2010	0.43
Israel	2010	0.297
Italy	2010	0.134
Jamaica	2010	0.034
Japan	2010	0.171
Jordan	2010	0.144
Kenya	2010	0.027
Kiribati	2010	0.103
Kuwait	2010	0.686
Latvia	2010	0.124
Lebanon	2010	0.094
Liberia	2010	0.084
Libya	2010	0.144
Lithuania	2010	0.132
Macao	2010	0.368
Madagascar	2010	0.016
Malaysia	2010	0.198
Maldives	2010	0.322
Malta	2010	0.214
Marshall Islands	2010	0.192
Martinique	2010	0.252
Mauritania	2010	0.045
Mauritius	2010	0.23
Mexico	2010	0.087
Micronesia (country)	2010	0.103
Monaco	2010	0.252
Montenegro	2010	0.144
Montserrat	2010	0.144
Morocco	2010	0.073
Mozambique	2010	0.015
Myanmar	2010	0.075
Namibia	2010	0.144
Nauru	2010	0.144
Netherlands	2010	0.424

Netherlands Antilles	2010	0.252
New Caledonia	2010	0.252
New Zealand	2010	0.331
Nicaragua	2010	0.143
Nigeria	2010	0.103
Niue	2010	0.252
Norfolk Island	2010	0.103
North Korea	2010	0.054
Northern Mariana Islands	2010	0.252
Norway	2010	0.28
Oman	2010	0.084
Pakistan	2010	0.103
Palau	2010	0.144
Palestine	2010	0.063
Panama	2010	0.145
Papua New Guinea	2010	0.103
Peru	2010	0.144
Philippines	2010	0.075
Poland	2010	0.097
Portugal	2010	0.265
Puerto Rico	2010	0.252
Qatar	2010	0.16
Reunion	2010	0.144
Romania	2010	0.042
Russia	2010	0.112
Saint Helena	2010	0.144
Saint Kitts and Nevis	2010	0.654
Saint Lucia	2010	0.522
Saint Pierre and Miquelon	2010	0.252
Saint Vincent and the Grenadine	2010	0.221
Samoa	2010	0.103
Sao Tome and Principe	2010	0.103
Saudi Arabia	2010	0.156
Senegal	2010	0.103
Seychelles	2010	0.358
Sierra Leone	2010	0.041
Singapore	2010	0.194
Sint Maarten (Dutch part)	2010	0.252
Slovenia	2010	0.145
Solomon Islands	2010	0.103
Somalia	2010	0.054

South Africa	2010	0.24
South Korea	2010	0.112
Spain	2010	0.277
Sri Lanka	2010	0.357
Sudan	2010	0.103
Suriname	2010	0.163
Sweden	2010	0.048
Syria	2010	0.178
Taiwan	2010	0.252
Tanzania	2010	0.023
Thailand	2010	0.144
Togo	2010	0.057
Tokelau	2010	0.103
Tonga	2010	0.223
Trinidad and Tobago	2010	0.29
Tunisia	2010	0.144
Turkey	2010	0.212
Turks and Caicos Islands	2010	0.252
Tuvalu	2010	0.144
Ukraine	2010	0.103
United Arab Emirates	2010	0.199
United Kingdom	2010	0.215
United States	2010	0.335
Uruguay	2010	0.252
Vanuatu	2010	0.295
Venezuela	2010	0.252
Vietnam	2010	0.103
Yemen	2010	0.103

Source: https://ourworldindata.org/grapher/plastic-waste-per-capita?tab=chart

Step 2: Look at the data in table 2 on plastic waste generated (total) by country and create a bar or pie chart of the data.

Click on the + to ungroup rows and see activity details:

Table 2: Plastic Waste Generation (total) by Country, 2010

Entity	Year	Plastic waste generation (tonnes, total)
China	2010	59079741
United States	2010	37825550
Germany	2010	14476561
Brazil	2010	11852055
Japan	2010	7993489
Pakistan	2010	6412210
Nigeria	2010	5961750
Russia	2010	5839685
Turkey	2010	5596657
Egypt	2010	5464471
Indonesia	2010	5045714
United Kingdom	2010	4925590
Spain	2010	4709157
France	2010	4557128
India	2010	4493080
South Africa	2010	4465798
Iran	2010	3919268
Mexico	2010	3725463
Thailand	2010	3532495
Vietnam	2010	3268227
Italy	2010	2899258
Argentina	2010	2753550
Venezuela	2010	2669998
Sri Lanka	2010	2621606
Netherlands	2010	2571398
Philippines	2010	2565766
Colombia	2010	2413455
Malaysia	2010	2031675
South Korea	2010	2025772
Algeria	2010	1898343
Bangladesh	2010	1888170
Trinidad and Tobago	2010	1745123
Ukraine	2010	1724509
Saudi Arabia	2010	1561618
Peru	2010	1543879
Guatemala	2010	1495229
Myanmar	2010	1373018

Chart 2: Plastic Waste Generation (total) by Country, 2010

Syria	2010	1365594
Poland	2010	1346905
Sudan	2010	1292740
Iraq	2010	1156524
Canada	2010	1154309
Democratic Republic of Congo	2010	1059795
Portugal	2010	1022683
Hong Kong	2010	1020406
Australia	2010	900658
Yemen	2010	887497
Morocco	2010	863555
Israel	2010	826436
Greece	2010	811858
Ecuador	2010	801321
Cote d'Ivoire	2010	766988
Kuwait	2010	750690
Chile	2010	738106
Ireland	2010	715716
United Arab Emirates	2010	600741
Honduras	2010	565317
Tunisia	2010	559235
Angola	2010	528843
New Zealand	2010	525630
Dominican Republic	2010	520238
Norway	2010	499682
Senegal	2010	485586
North Korea	2010	484700
Finland	2010	458084
Costa Rica	2010	428029
Bulgaria	2010	415707
Kenya	2010	407506
Croatia	2010	406347
Tanzania	2010	386998
Jordan	2010	377506
Cuba	2010	368154
Singapore	2010	359483
Ghana	2010	357877
Cambodia	2010	344698
Puerto Rico	2010	342306
Cameroon	2010	335305
El Salvador	2010	330763

Haiti	2010	328487
Libya	2010	324250
Belgium	2010	318151
Romania	2010	310385
Uruguay	2010	310379
Nicaragua	2010	299480
Papua New Guinea	2010	267234
Somalia	2010	237569
Bosnia and Herzegovina	2010	195633
Panama	2010	192818
Sweden	2010	164305
Guyana	2010	159681
Lithuania	2010	149227
Lebanon	2010	148807
Benin	2010	144382
Togo	2010	135294
Mozambique	2010	132612
Madagascar	2010	123526
Liberia	2010	121050
Guinea	2010	118196
Namibia	2010	114222
Congo	2010	110479
Slovenia	2010	108421
Mauritius	2010	104971
Qatar	2010	103933
Cyprus	2010	100713
Georgia	2010	97443
Sierra Leone	2010	96655
Denmark	2010	95171
Latvia	2010	94935
Oman	2010	93251
Palestine	2010	87636
Estonia	2010	85534
Albania	2010	73364
Macao	2010	72126
Eritrea	2010	72120
Bahrain	2010	59785
Fiji	2010	59324
Mauritania	2010	59287
Barbados	2010	58164
Bahamas	2010	51364

Comoros	2010	50599
Equatorial Guinea	2010	49990
Maldives	2010	43134
Jamaica	2010	34962
Saint Lucia	2010	32882
Iceland	2010	32620
Montenegro	2010	32557
Malta	2010	32377
Gabon	2010	32329
Djibouti	2010	31999
Suriname	2010	31300
Guinea-Bissau	2010	30666
Gambia	2010	29646
Vanuatu	2010	25443
French Polynesia	2010	24634
New Caledonia	2010	22995
Antigua and Barbuda	2010	22804
Belize	2010	20191
Solomon Islands	2010	19842
Channel Islands	2010	14678
Guam	2010	14666
Curacao	2010	13678
Grenada	2010	12417
Saint Kitts and Nevis	2010	12280
Cape Verde	2010	11919
Seychelles	2010	11730
Aruba	2010	9352
Saint Vincent and the Grenadine	2010	8818
Tonga	2010	8476
Samoa	2010	7000
Sao Tome and Principe	2010	6571
Bermuda	2010	5990
Greenland	2010	5234
Cayman Islands	2010	5106
Northern Mariana Islands	2010	5006
Faeroe Islands	2010	4466
Micronesia (country)	2010	3895
Dominica	2010	3885
Kiribati	2010	3859
Brunei	2010	3688
Marshall Islands	2010	3674

Monaco	2010	3412
Sint Maarten (Dutch part)	2010	3263
Gibraltar	2010	3053
Turks and Caicos Islands	2010	2851
British Virgin Islands	2010	2504
Palau	2010	1076
Tuvalu	2010	554
Nauru	2010	527

Source: https://ourworldindata.org/grapher/plastic-waste-generation-total?tab=chart

Step 3: Look at the data in table 3 on global mismanaged waste and create a bar or pie chart of the data.

Click on the + to ungroup rows and see activity details:

Table 3: Share of Global Mismanaged Waste by Country, 2010

Entity	Year	Mismanaged waste (% global total)
China	2010	27.6966
Indonesia	2010	10.1019
Philippines	2010	5.9153
Vietnam	2010	5.7588
Sri Lanka	2010	4.9968
Thailand	2010	3.2274
Egypt	2010	3.0367
Malaysia	2010	2.9419
Nigeria	2010	2.674
Bangladesh	2010	2.4725
South Africa	2010	1.9784
India	2010	1.8836
Algeria	2010	1.6347
Turkey	2010	1.526
Pakistan	2010	1.5089
Brazil	2010	1.4804
Myanmar	2010	1.4391
Morocco	2010	0.9739
North Korea	2010	0.9557
United States	2010	0.8649
Senegal	2010	0.8001
Iran	2010	0.7769
Tunisia	2010	0.7358
Cote d'Ivoire	2010	0.611
Peru	2010	0.6106
Yemen	2010	0.531
Syria	2010	0.4959

Chart 3: Share of Global Mismanaged Waste by Country, 2010

Argentina	2010	0.4955
Haiti	2010	0.4628
Japan	2010	0.4494
Ukraine	2010	0.4044
El Salvador	2010	0.3729
Dominican Republic	2010	0.3713
Ecuador	2010	0.3435
Venezuela	2010	0.3214
Somalia	2010	0.3188
Mexico	2010	0.3182
Honduras	2010	0.3003
Trinidad and Tobago	2010	0.2954
Colombia	2010	0.2895
Ghana	2010	0.2876
Guatemala	2010	0.2875
Cuba	2010	0.2846
Papua New Guinea	2010	0.2821
Nicaragua	2010	0.2651
Russia	2010	0.2536
United Kingdom	2010	0.2121
Angola	2010	0.1964
Comoros	2010	0.1822
Liberia	2010	0.1781
Mauritius	2010	0.176
Libya	2010	0.1657
Fiji	2010	0.1547
Tanzania	2010	0.1526
Lebanon	2010	0.1502
Mozambique	2010	0.1444
Spain	2010	0.144
Taiwan	2010	0.1436
Benin	2010	0.1351
Costa Rica	2010	0.1322
Guyana	2010	0.1319
Sierra Leone	2010	0.1143
Togo	2010	0.1112
Madagascar	2010	0.1084
Panama	2010	0.108
South Korea	2010	0.106
Italy	2010	0.1029
Maldives	2010	0.0988

Germany	2010	0.0981
Albania	2010	0.0933
Cambodia	2010	0.0932
Hong Kong	2010	0.0895
Cameroon	2010	0.087
Netherlands	2010	0.087
France	2010	0.0757
Sudan	2010	0.072
Kenya	2010	0.0712
Vanuatu	2010	0.0706
Chile	2010	0.0683
Uruguay	2010	0.0677
Saudi Arabia	2010	0.0645
Solomon Islands	2010	0.064
Guinea-Bissau	2010	0.0636
Gambia	2010	0.0616
Israel	2010	0.0597
Bulgaria	2010	0.0588
Guinea	2010	0.0581
Djibouti	2010	0.0544
Congo	2010	0.0527
Puerto Rico	2010	0.0519
Croatia	2010	0.0517
Portugal	2010	0.0515
Eritrea	2010	0.0511
Poland	2010	0.0493
Iraq	2010	0.0489
Democratic Republic of Congo	2010	0.0478
Georgia	2010	0.0454
Greece	2010	0.0447
Australia	2010	0.0436
Mauritania	2010	0.0435
Bosnia and Herzegovina	2010	0.0407
Ireland	2010	0.0368
Kuwait	2010	0.0361
Latvia	2010	0.0323
Jamaica	2010	0.0315
Cape Verde	2010	0.0294
New Zealand	2010	0.0292
Norway	2010	0.0264
Canada	2010	0.025

Saint Lucia	2010	0.0211
Tonga	2010	0.0208
Guadeloupe	2010	0.0206
Singapore	2010	0.0203
Gabon	2010	0.0191
Equatorial Guinea	2010	0.0188
Estonia	2010	0.0188
Palestine	2010	0.0176
Namibia	2010	0.0172
Samoa	2010	0.0161
Sao Tome and Principe	2010	0.016
Finland	2010	0.0157
Micronesia (country)	2010	0.0151
Oman	2010	0.0146
Seychelles	2010	0.0145
Montenegro	2010	0.0139
Bahrain	2010	0.0137
Suriname	2010	0.0124
Belize	2010	0.0122
Romania	2010	0.0113
Barbados	2010	0.0109
Lithuania	2010	0.0109
Marshall Islands	2010	0.01
Kiribati	2010	0.0096
United Arab Emirates	2010	0.0095
Belgium	2010	0.0086
Malta	2010	0.0082
French Guiana	2010	0.0074
Grenada	2010	0.0071
Saint Vincent and the Grenadine	2010	0.007
Sweden	2010	0.0068
Cyprus	2010	0.0057
Denmark	2010	0.0056
Jordan	2010	0.0055
Bahamas	2010	0.0042
French Polynesia	2010	0.004
Antigua and Barbuda	2010	0.0039
Reunion	2010	0.0027
Dominica	2010	0.0025
Martinique	2010	0.0024
Qatar	2010	0.0024

Macao	2010	0.0022
Palau	2010	0.0022
Saint Kitts and Nevis	2010	0.0022
Iceland	2010	0.0019
Nauru	2010	0.0017
Slovenia	2010	0.0017
New Caledonia	2010	0.0015
Tuvalu	2010	0.0014
Cook Islands	2010	0.0013
Netherlands Antilles	2010	0.0013
Aruba	2010	0.0012
Guam	2010	0.0012
Channel Islands	2010	0.0009
Curacao	2010	0.0008
Northern Mariana Islands	2010	0.0007
Bermuda	2010	0.0004
Brunei	2010	0.0003
Cayman Islands	2010	0.0003
Faeroe Islands	2010	0.0003
Greenland	2010	0.0003
Guernsey	2010	0.0003
Saint Helena	2010	0.0003
Anguilla	2010	0.0002
British Virgin Islands	2010	0.0002
Gibraltar	2010	0.0002
Monaco	2010	0.0002
Norfolk Island	2010	0.0002
Sint Maarten (Dutch part)	2010	0.0002
Turks and Caicos Islands	2010	0.0002
Montserrat	2010	0.0001
Tokelau	2010	0.0001
Christmas Island	2010	0
Cocos Islands	2010	0
Falkland Islands	2010	0
Niue	2010	0
Saint Pierre and Miquelon	2010	0

Source: https://ourworldindata.org/grapher/mismanaged-waste-global-total

Step 4: Look at the data in table 4 on plastic ocean input from top 20 rivers and create bar or pie chart of the data.

Click on the + to ungroup rows and see activity details:

Table 4: Plastic Ocean Input from Top 20 Rivers, 2015

Entity	Year	Plastic mass input from rivers (tonnes)
Africa	2015	109200
Amazon (Brazil, Peru, Colombia,	2015	38900
Asia	2015	1210000
Australia-Pacific	2015	300
Brantas (Indonesia)	2015	38900
Central & North America	2015	13400
Cross (Nigeria, Cameroon)	2015	40300
Dong (China)	2015	19100
Europe	2015	3900
Ganges (India, Bangladesh)	2015	115000
Hanjiang (China)	2015	12900
Huangpu (China)	2015	40800
Imo (Nigeria)	2015	21500
Irrawaddy (Myanmar)	2015	35300
Kwa Ibo (Nigeria)	2015	11900
Magdalena (Colombia)	2015	16700
Mekong (Thailand, Cambodia, La	2015	22800
Pasig (Philippines)	2015	38800
Progo (Indonesia)	2015	12800
Serayu (Indonesia)	2015	17100
Solo (Indonesia)	2015	32500
South America	2015	67400
Tamsui (Taiwan)	2015	14700
World	2015	1404200
Xi (China)	2015	73900
Yangtze (China)	2015	333000
Zhujiang (China)	2015	13600

Source: https://ourworldindata.org/grapher/plastic-top-20-rivers

Chart 4: Plastic Ocean Input from Top 20 Rivers, 2015

Step 5: Answer the questions below in groups or individually:

Click on the + to ungroup rows and see activity details:

1. How does Canada compare to the rest of the world in producing plastic waste? Comment on per capita and total plastic waste generated (table 1 and 2)

2. In light of this activity, what is the importance of collecting data on tracking plastic waste? How can data help formulate solutions on tackling the issue of plastic waste?

3. Based on the data you have seen, what steps can the global community take to eliminate all plastic waste, in particular the top sources adding most plastic waste to oceans?

So, where does plastic waste really come from?