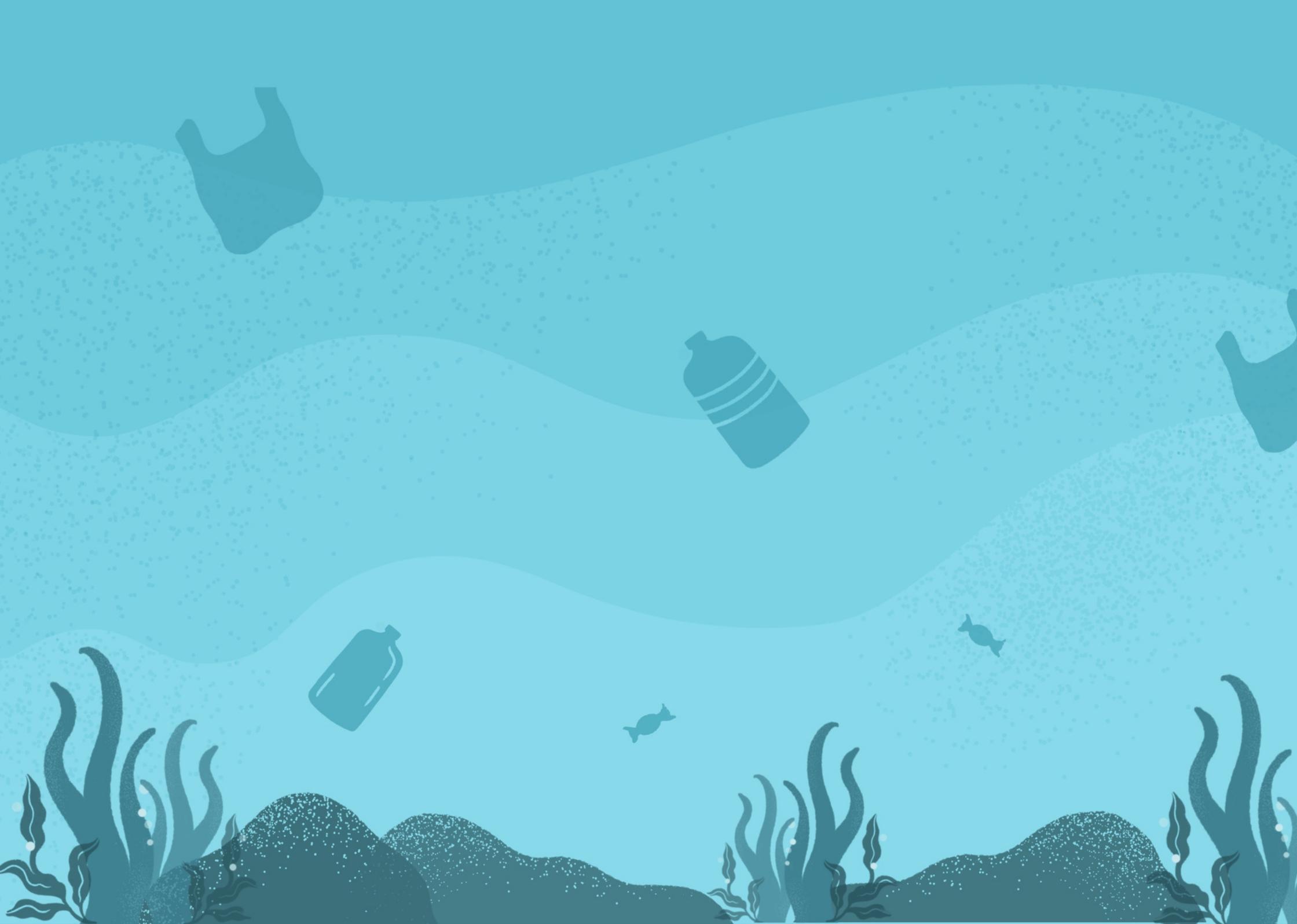


# Marine Litter Learning Kit

• A Facilitator's Guide •



Authors

Koji Takakura,<sup>1</sup> Kohei Hibino,<sup>2</sup> Vesna Lavtizar,<sup>2</sup> Anna R. Oposa,<sup>3</sup> and Virginia Marinel F. Salazar<sup>3</sup>

Contributors

Roanne Duran,<sup>4</sup> Voltaire Acosta,<sup>4</sup> and Shiko Hayashi<sup>2</sup>

Layout & Illustrations

Clarissa Cruz<sup>3</sup>

1. Takakura Environment Research Institute
2. Institute for Global Environmental Strategies

3. Save Philippine Seas
4. UN-Habitat Philippines

Published by

United Nations Human Settlements Programme (UN-Habitat)  
Regional Office for Asia and the Pacific  
Copyright © 2022 UN-Habitat. All rights reserved.  
September 2022

Disclaimer

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the secretariat of the United Nations concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries regarding its economic system or degree of development. Excerpts may be reproduced without authorization, on condition that the source is indicated. Views expressed in this publication do not necessarily reflect those of the United Nations Human Settlements Programme, the United Nations and its member states.

Further, the information and views set out in this report are those of the authors and do not necessarily reflect the official opinion of the Institute for Global Environmental Strategies (IGES) and Save Philippine Seas (SPS). Responsibility for the information and views expressed in the report lies entirely with the authors.

Acknowledgement

This handbook was prepared by the IGES with the support of SPS and UN-Habitat. It was developed as part of the Healthy Oceans and Clean Cities Initiative (HOCCI) project funded by the Government of Japan and implemented by the UN-Habitat in cooperation with global, national, and local partners. The project aimed to strengthen institutional capacity to support the operationalization and localization of the Philippine National Plan of Action for the Prevention, Reduction, and Management of Marine Litter in the Philippines. The project partnered with six cities: Cagayan de Oro, Calapan, Davao, Legazpi, Manila, and Ormoc. IGES was among the global partners and led the education and awareness-raising component, and the capacity building of the private sector and partner cities to implement or strengthen circular economy practices for plastics, among other roles and responsibilities.

The authors would like to thank the HOCCI Project Advisory Committee (PAC): Chair, the Department of Environment and Natural Resources; Co-chair, the Department of the Interior and Local Government; and members, the National Solid Waste Management Commission, the League of Cities of the Philippines, and above mentioned partner cities; as well as all relevant partners and peer reviewers who took part in the HOCCI project and provided valuable insights and feedback to test, improve, and develop this educational material.

# Table of Contents

## Introduction

2	About the Marine Litter Learning Kit
3	Who is the Marine Litter Learning Kit for?
4	How to use the Marine Litter Learning Kit
5	Tips for your role as a facilitator
6	Additional guide questions for discussion and evaluation
6	Precautionary measures

## Activities

8	Activity 1. Plastics and their purpose
11	Activity 2. Plastics and their properties
15	Activity 3. Decoding plastics
18	Activity 4. Sink or swim?
21	Activity 5. Fishing for microplastics
24	Activity 6. Big fish, little fish

27	Activity 7. Path of litter
30	Activity 8. Outdoor cleanup
32	Activity 9. Role-play on plastics
34	Activity 10. Writing letters to leaders

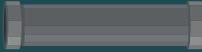
## Annex: Printable worksheets

38	Activity 3. Decoding plastics - "Decoding plastics" poster template
39	Activity 4. Sink or swim? - "Sink or swim?" worksheet
40	Activity 7. Path of litter - "Path of litter" worksheet
41	Activity 8. Outdoor cleanup - "Litter survey" data sheet
43	Activity 9. Role-play on plastics - "Role-play cards"

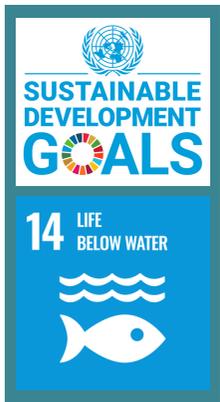
Plastic is a valuable material. It is light, durable, flexible, and generally cheap to produce. It keeps our food safe from pests and microbes, allowing our food to last longer. From eyeglasses to light switches to food packaging, plastic has become an important and indispensable part of daily life. Due to a wide range of advantageous characteristics, more and more conventional materials are being replaced with plastics.

However, the qualities that make plastic attractive can also make it problematic. While using plastic has many benefits, plastic waste has caused a lot of problems. The world's increasing reliance on plastic, lack of waste management infrastructure, and poor waste management practices have led to more plastics in the natural environment.

### Examples of conventional materials being replaced with plastics:

	Water pipe	Bucket	Shopping bag	Bottle	Milk container
Before	 Iron, lead	 Iron, zinc	 Native bag made of dried leaves	 Glass	 Glass
Now					
Reasons for the change	<ul style="list-style-type: none"> <li>• Rustless</li> <li>• Lightweight</li> <li>• Less expensive</li> </ul>	<ul style="list-style-type: none"> <li>• Rustless</li> <li>• Lightweight</li> <li>• Flexible in shape and color</li> <li>• Less expensive</li> </ul>	<ul style="list-style-type: none"> <li>• Lightweight</li> <li>• Waterproof</li> <li>• Less expensive</li> </ul>	<ul style="list-style-type: none"> <li>• Lightweight</li> <li>• Break-resistant</li> <li>• Can unscrew cap repeatedly</li> <li>• Less expensive</li> </ul>	<ul style="list-style-type: none"> <li>• Lightweight</li> <li>• Break-resistant</li> <li>• Less expensive</li> </ul>

Plastic is generally not biodegradable; they break up into smaller pieces through physical damage and when exposed to sunlight (ultraviolet radiation) and high temperatures. Plastics that end up in the marine environment, also known as marine litter, is especially concerning. If no actions are taken, there could be more plastic than fish in the ocean by weight by 2050.<sup>1</sup> About 8 million tons of plastic end up in our ocean annually. Approximately 0.28 – 0.75 million tons of plastic per year comes from the Philippines. Several scientific studies show that the Philippines is a top contributor to marine litter.<sup>2,3</sup>



Marine litter has a wide spectrum of negative environmental, economic, health, and cultural impacts. It affects communities and wildlife worldwide. Recognizing these issues, institutions and individuals around the world have committed to “prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution” by 2025.<sup>4</sup> This is one of the targets under the United Nations Sustainable Development Goals (SDGs) 14: Life Below Water.

As one of the major contributors of marine litter, efforts to prevent and reduce the amount, extent, and impacts of potential leakage of plastics into the Philippine environment must be strengthened.

# Marine Litter

Marine litter is any persistent, manufactured, or processed solid material discarded into the sea or rivers or on beaches; brought indirectly to the sea with rivers, sewage, storm water or winds; or discarded or lost at sea.

*United Nations Environment Programme<sup>5</sup>*

<sup>1</sup> Ellen MacArthur Foundation. (2016). *The New Plastics Economy: Rethinking the future of plastics*. <https://ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics>

<sup>2</sup> Jambeck, J. et al. (2015). *Plastic waste inputs from land into the ocean*. *Science*. <https://www.science.org/doi/10.1126/science.1260352>

<sup>3</sup> Meijer L., et al. (2021). *More than 1000 rivers account for 80% of global riverine plastic emissions into the ocean*. *Science Advances*. <https://www.science.org/doi/10.1126/sciadv.aaz5803>

<sup>4</sup> United Nations (2016). "Goal 14 targets." *Goal 14: Conserve and sustainably use the oceans, seas and marine resources*. <https://www.un.org/sustainabledevelopment/oceans/>

<sup>5</sup> UNEP-COBSEA. (n.d.). *Marine litter and plastic pollution*. <https://www.unep.org/cobsea/what-we-do/marine-litter-and-plastic-pollution>

## About the Marine Litter Learning Kit

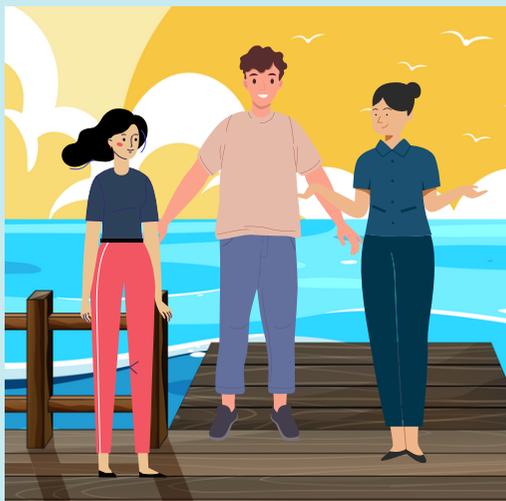
Marine litter is a big problem, and it requires big solutions. Solutions begin with awareness – awareness on the issue and awareness that leads to action. The *Marine Litter Learning Kit: A Facilitator's Guide* ("Marine Litter Learning Kit") was designed for educators and facilitators who organize environmental education programs that focus on marine litter. It is meant to be applicable to various learner profiles and learning situations where facilitators can choose the activities appropriate for their target audience. It also uses the learning-by-doing approach, providing hands-on activities and games for learners.

### The Marine Litter Learning Kit aims to:

- Engage facilitators and learners in raising awareness on marine litter and its impacts on communities and wildlife; and
- Empower the learners to take action on marine litter as individuals, in their homes and/or communities.

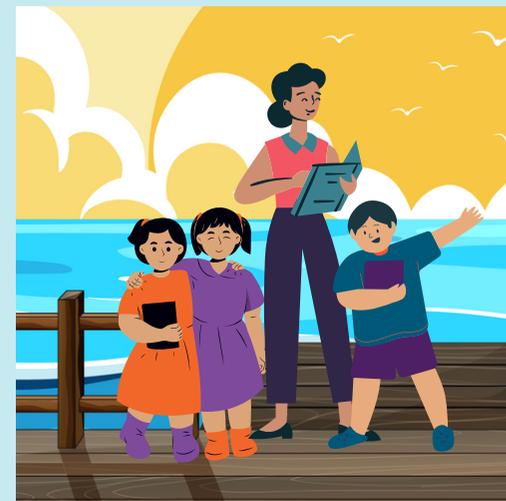
## Who is the Marine Litter Learning Kit for?

The primary audience will be referred to as **facilitators**, while the secondary audience will be referred to as **learners**.



### Primary audience: FACILITATORS

Educators and facilitators (e.g., school teachers, education officers of NGOs, local government officials, private sector workers, *barangay* workers, student organizations) who organize events to raise awareness on marine litter.



### Secondary audience: LEARNERS

Participants and supporting institutions of such events (students, learners). The age range and demographic can range from elementary school students to adults. The ideal size is a maximum of 30 learners, with about five facilitators to ensure interactive group participation.

# How to use the Marine Litter Learning Kit

The *Marine Litter Learning Kit* has 10 activities. The activities were designed to be conducted in order (from Activity 1 to 10) because the concepts build on one another. The implementation of all 10 activities could take up to three days. The overall timeframe will depend on the proximity of the learners to the site visits and if other activities will be included (e.g., meals, other discussions). If there are constraints for time, materials, and resources, activities may be done independently if key concepts are studied and explained.

Each activity has the following sections:

 <p><b>Activity Profile</b></p> <p>Approximate time needed, location, ideal number of learners, age range, and materials</p>	 <p><b>Instructional Video</b></p> <p>Link to the accompanying instructional video</p>	 <p><b>Description</b></p> <p>Brief summary of the activity</p>
 <p><b>Background</b></p> <p>Information for the facilitator to provide context to enrich the discussion</p>	 <p><b>Learning Objectives</b></p> <p>What the learners are expected to learn after the activity</p>	 <p><b>Instructions</b></p> <p>Outlines the step-by-step instructions to carry out the activity</p>
 <p><b>Modifications</b></p> <p>Suggestions on how to tweak the activity (e.g., adapting to a virtual setting)</p>	 <p><b>Discussion</b></p> <p>Questions or prompts for learners that facilitators can use to process the activity</p>	 <p><b>Key Takeaways</b></p> <p>Main messages to be learned or understood from the activities</p>



Worksheets related to the activities are compiled in the Annex. It is ideal for facilitators to review this section when preparing for the activities.

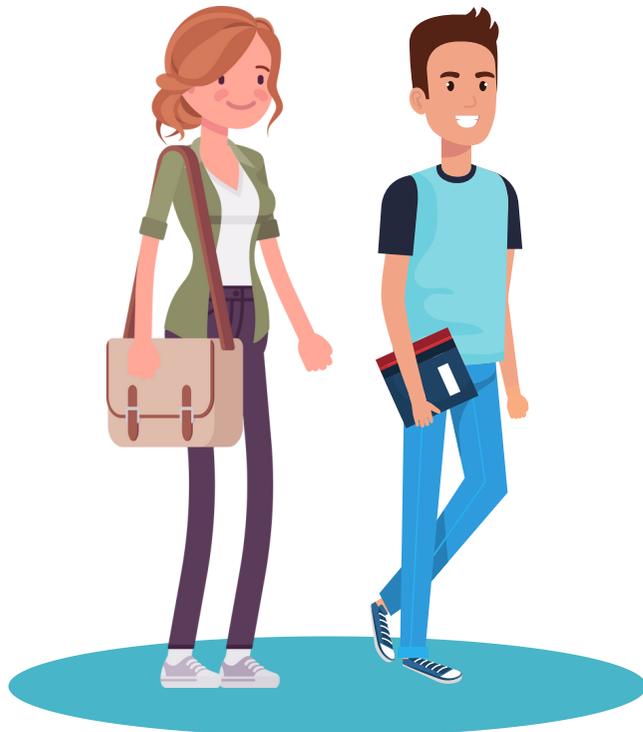
## Tips for your role as a facilitator

The *Marine Litter Learning Kit* is more than an instructional material – it hopes to inspire behavior change and action. As a facilitator, you play a crucial role in achieving the learning objectives and creating a fun, inspiring, and collaborative learning experience and environment for all learners. Here are some guidelines and reminders to help you facilitate the activities:



### Teach and learn with a heart.

Learners are affected by the energy of the facilitators. If they see you having fun, they will too. Transfer of skills and knowledge happens best when everyone is in their best place of learning!



### Practice.

Read and review the material before implementation. Practice explaining the instructions in your own words and, if applicable, the local language or dialect. Provide examples or analogies that are familiar to your audience.



### Be mindful of the time.

State the time limit for discussion to keep the talking points and key messages focused.



### Facilitate learning.

Process the experience using the reflection questions. You can find questions specific to the activity under the “Discussion” section. By verbalizing their experience, learners retain more information about what they have just experienced and discussed. Create a safe space for learners to share their thoughts.



### Be resourceful and creative.

Make the most of your environment. Materials listed are recommendations. It's best to use items that are readily and locally available to make sure that learning is authentic.



### Be flexible and open.

If needed, adjust the concepts and instructions based on religious, cultural, or local contexts.



### Acknowledge behaviors and emotions.

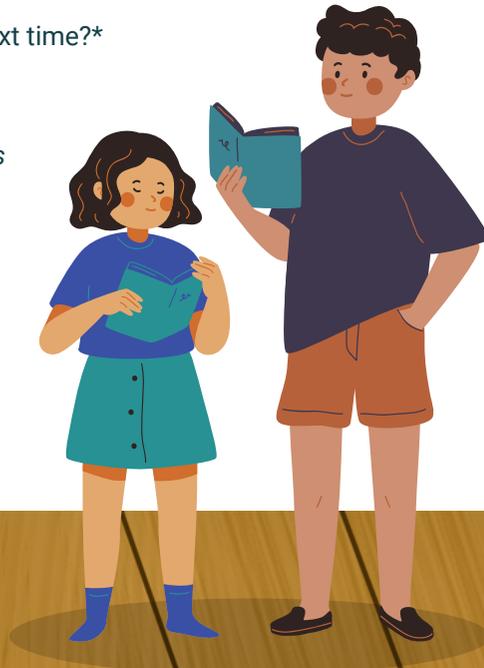
Be aware of who is participating and how much they are participating. Honor micro-behaviors such as eye contact, smiles, and nods. Acknowledge emotions that might emerge, such as anxiety, hopelessness, or feeling overwhelmed. Marine litter is a daunting and complex issue.

## Additional guide questions for discussion and evaluation

While each session has specific questions for discussion, you may add the questions below.

- What did you notice about yourself?
- Why would we do an activity like this?
- What are the bigger implications of [the activity or concept learned from the activity]? How does [the concept learned] affect your home, school, or community?
- What worked for the group/individual?\*
- What didn't work for the group/individual?\*
- What did you notice about the group?\*
- How does this activity connect to [previous activity, current events, or local context]?\*
- What would you do differently next time?\*

*\*may be answered with your co-facilitators after the activity as part of your team's internal evaluation*



## Precautionary measures

When doing the activities, please take safety precautions. Brief all organizers and participants with precautionary measures. Here are some tips and guidelines:

- Find out where the nearest police station and healthcare facilities are and keep a document with the addresses and contact details.
- If you are conducting a cleanup during a pandemic, make sure to follow safety protocols mandated by the government and medical professionals, such as physical distancing of six feet from other participants and wearing personal protective equipment, such as face masks and gloves.
- Wear closed-toed shoes to protect your feet.
- Avoid touching your face, other surfaces, and other participants during the cleanup.
- Some marine debris may be toxic, infectious, or dangerous to touch, such as syringes, chemicals, or gas cylinders. If you find any suspicious materials, do not touch them and report to appropriate local government agencies if necessary.
- If you find bottles filled with liquid, do not open them. It is difficult to determine what liquid is inside.
- Wash your hands thoroughly after the activities. Use hand sanitizer or alcohol if soap and water are not readily accessible.

# Activities

Scan the QR codes to watch the instructional videos.

ACTIVITY 1: Plastics and their purpose



ACTIVITY 2: Plastics and their properties



ACTIVITY 3: Decoding plastics



ACTIVITY 4: Sink or swim?



ACTIVITY 5: Fishing for microplastics



ACTIVITY 6: Big fish, little fish



ACTIVITY 7: Path of litter



ACTIVITY 8: Outdoor cleanup



ACTIVITY 9: Role-play on plastics



ACTIVITY 10: Writing letters to Leaders





## ACTIVITY 1: PLASTICS AND THEIR PURPOSE



link to Instructional Video:  
<https://bit.ly/MLLKActivity1>

**TIME NEEDED:** 1-1.5 hours

**LOCATION:** Indoor, outdoor, virtual

**IDEAL NUMBER OF PARTICIPANTS:** 30 learners; 5-6 learners per group

**IDEAL AGE RANGE:** 10-15 years old

**MATERIALS:** Large pieces of paper, sticky notes, and markers

**ALTERNATIVE MATERIALS:** Virtual platforms: Zoom, Padlet, or Jamboard



A brainstorming exercise to understand the relevance and value of plastic in the modern lifestyle



By the end of this activity, learners will be able to:

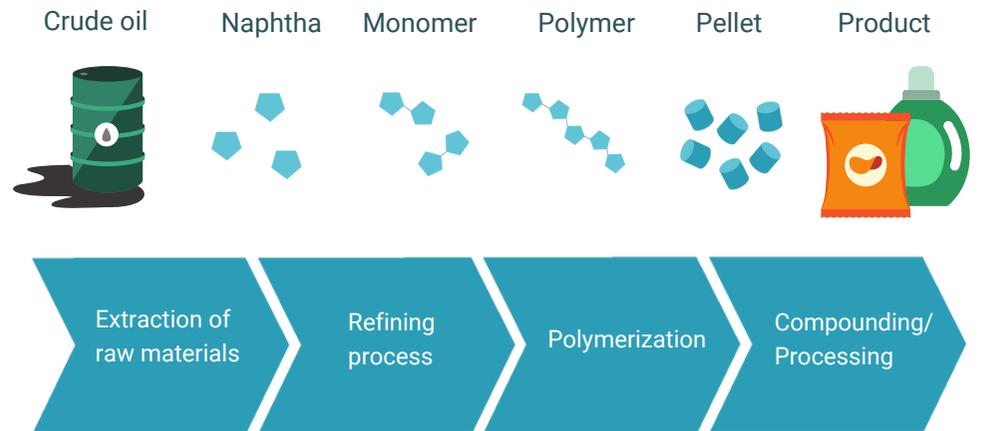
- Identify the characteristics of plastics that make them valuable to modern society; and
- Reflect on their reliance on using plastics in their daily lives.



### What are plastics?

Plastics are a wide range of materials that use polymers as their main ingredient. Majority of plastics used today are made from fossil fuel-based chemicals, but recent technological advances have enabled the development of plastics that use renewable sources, such as seaweed, corn, and cassava.

### How are plastics made?



### Characteristics of plastics

The following characteristics of plastics have led to their widespread use: resistance to water, microbes, and humidity; resistance to corrosion and good durability; low electrical and thermal conductivity; high strength-to-weight ratio; lightweight; can be made in various colors; can have different levels of transparency and opacity; and relatively low-cost compared to other materials such as glass and aluminum.

These features make plastics ideal for food and beverage packaging, furniture, toys, equipment, and accessories. While some uses of plastic are practical, convenient, and beneficial, about half of the plastic used daily are single-use disposable items.

Single-use plastics are designed for immediate disposal. They are more likely to end up leaking into the natural environment than reusable alternatives. The most common items collected in coastal cleanups are single-use plastics, such as food wrappers, grocery bags, food containers, and straws.<sup>6</sup>

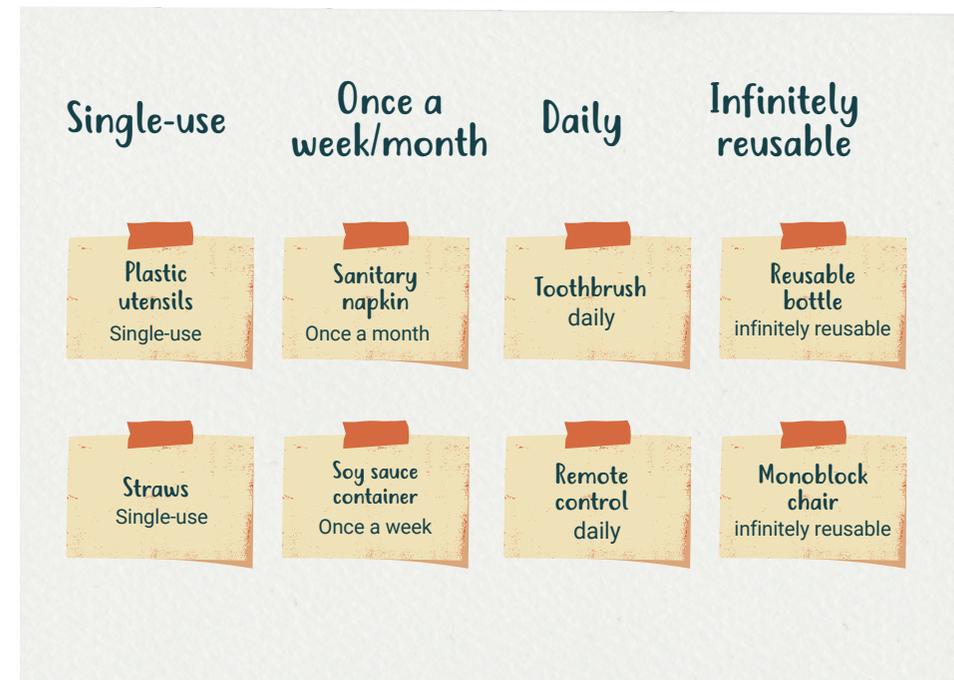
Single-use plastic packaging accounts for 36% of all plastic products globally.<sup>7</sup> It is estimated that 95% of plastic packaging (equivalent to \$80-120 billion annually) is lost to the economy after a short first use.<sup>8</sup>



1. Prepare large pieces of paper. Divide each one into four columns. Label the columns accordingly: single-use (used only once, then disposed of); daily; once a week/once a month; and infinitely reusable. Do not reveal the labels of the categories yet. You may turn the labels around or cover them with pieces of paper.

2. Form groups of four to six learners.
3. Ask learners to write down items made of plastic that they have touched or used in the last month. There should be one item per sticky note.

4. You may use the following prompts: Think about a typical day in your life. From the time you wake up until the time you sleep, what are the items you touch or use made of plastics? What is the type of packaging?
  - o Food and beverage (e.g., juices, vegetables in plastic bags, soy sauce in a sachet)
  - o Personal and home care (e.g., detergent, shampoo in a sachet)
  - o Gadgets (e.g., phones, keyboards)
  - o Clothing and accessories (e.g., buttons, eyeglass frames, earrings)
5. On each sticky note with the name of the product, ask the learners to write the approximate frequency of use.
6. You may now reveal the categories. Ask learners to place the sticky notes on the large piece of paper based on the frequency of use.



<sup>6</sup> The Ocean Conservancy. (2021). *We Clean On 2021 Report*. International Coastal Cleanup. [https://oceanconservancy.org/wp-content/uploads/2021/09/2020-ICC-Report\\_Web\\_FINAL-0909.pdf](https://oceanconservancy.org/wp-content/uploads/2021/09/2020-ICC-Report_Web_FINAL-0909.pdf)  
<sup>7</sup> United Nations Environment Programme. (2018). *SINGLE-USE PLASTICS: A Roadmap for Sustainability*. <https://www.unep.org/resources/report/single-use-plastics-roadmap-sustainability>  
<sup>8</sup> Ellen MacArthur Foundation. (2016). *The New Plastics Economy: Rethinking the future of plastics*. <https://ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics>



- Prior to the activity, you may ask the learners to bring plastics they use often to show as examples.
- If sticky notes are not available, you may use pre-cut paper with tape.
- If you have a large group of learners (> 15), you may assign a category per group to avoid duplication of answers. One option is to assign based on items (e.g., food and beverage, kitchen goods), and another is based on a section of the home (e.g., kitchen, living room).
- If you are implementing this activity in a virtual setting, you may use digital platforms with functions of a bulletin board such as Padlet (<https://padlet.com/>) or Google Jamboard (<https://jamboard.google.com/>).



- When you listed the plastic products you commonly use, did you use more or fewer plastic items than you expected?
- What are the most frequently used items? What are the least used items?
- How would you describe the plastic items you used? Use your senses to describe them.
- How many of these items are single-use? Why can't they be reused?
- Why do you think plastics are the preferred material for these items? Can they be replaced with other materials?



- Plastic is an important material that has many benefits. The material itself cannot be blamed for the global plastic waste crisis. Humans have used, produced, and improperly disposed of it.
- Plastic's properties such as durability, flexibility, and lightness allow its varied range of usability.
- Alternatives depend on the context and resources of the user. Every alternative comes with a trade-off, e.g., glass is fragile and breakable and risky to use for shipping goods.



## ACTIVITY 2: PLASTICS AND THEIR PROPERTIES



link to Instructional Video:  
<https://bit.ly/MLKActivity2>

**TIME NEEDED:** 1-2 hours

**LOCATION:** indoor, outdoor, virtual

**IDEAL NUMBER OF PARTICIPANTS:** 30 learners

**IDEAL AGE RANGE:** 10-18 years old

**MATERIALS:** Various types of common household items that are non-plastics, pure plastics, and mixed materials (see table on page 12 for examples)

**ALTERNATIVE MATERIALS:** Zoom app, Mentimeter, Google Slides



An activity to distinguish between and among non-plastic materials, pure plastic materials, and mixed materials



Plastics can be seen in many materials that do not look like conventional plastics. For example, beverage cartons such as milk and juice boxes are made from layers of paper and plastics. Packaging for food and snacks, such as potato chips and crackers, contains an aluminum layer that blocks light, humidity, and odors. The mixed layers help keep the contents fresh for longer. This type of material composition also makes recycling difficult.

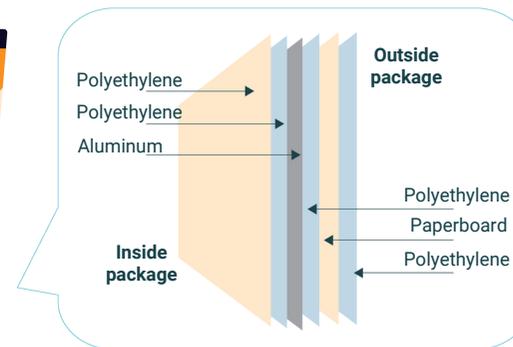


By the end of this activity, learners will be able to:

- Differentiate the physical characteristics and properties of non-plastic, pure plastics, and composite materials;
- Identify and categorize which items have a higher chance for recyclability and why; and
- Identify potential alternatives to the materials.



Beverage cartons



Packaging for food and snacks

- POLYPROPYLENE Physical food contact layer
  - Heat seal surface
  - Provides flexibility and strength
- NYLON
  - Abrasion resistance
- ALUMINUM FOIL Barrier layer
  - Protects from light, gases, and odors
  - Extends shelf life
- POLYESTER Outside layer
  - Excellent printable surface
  - Provides strength

Illustration is adapted from Tetra Pak (<https://www.tetrapak.com/>)

Illustration is adapted from Stand Up Pouches (<https://www.standuppouches.net/>)

### Determining recyclability

**Recyclability** is how recyclable an item is.

In general, items made of **one material** have higher recyclability. Items with mixed materials are more difficult to recycle because the materials are often fused or blended together, making them hard to separate and recycle individually.

When an item is recyclable, it holds value for waste collectors and recycling facilities. This means that there's a higher chance that it will be collected and recovered, and thus, a higher chance of the item not ending up in landfills or the natural environment, such as waterways and the ocean.



*Recycling*

is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products.<sup>9</sup>

### Non-plastics, pure plastics, and mixed materials

For this activity, items will be divided into three categories:



*Non-Plastics*

Items that are completely not made of plastics (e.g., made of wood, aluminum, paper)



*Pure Plastics*

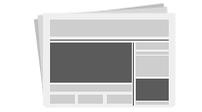
Items that are completely made of plastics



*Mixed Materials*

Items that are made of a mix of plastic and non-plastic materials

The table below serves as a guide for examples of items that fall under these three categories:

Categories	Non-plastics	Pure plastics	Mixed materials
<b>Stationery</b>	 newspaper, cardboard, tissue paper, toilet paper, pencil, chalk	 pen casing, transparent file folder	 mechanical pencil, scissors with plastic handles
<b>Clothing</b> <small>Note: Read the tag to see type of material</small>	 100% cotton shirt, leather belt, leather shoes	 shirt (e.g., polyester, nylon, rayon, acetate, polyurethane)	 shirt (e.g., cotton, polyester), sneakers (e.g., polyester, nylon, rubber), diapers
<b>Kitchen goods</b>	 knife, stainless spoon and fork, ceramic plate, stainless strainer, glass	 plastic bag, plate, spoon and fork, strainer, cup	 cooking pan with plastic handle
<b>Bath goods</b>	 soap, 100% cotton towel	 shampoo bottle, toothbrush	 sachet, shaving razor with plastic handle
<b>Food and beverage</b>	 banana, papaya, rice, chicken, fish	 straw, polyethylene (PET) bottle	 beverage carton (plastic and paper), takeaway coffee cup (plastic and paper)

<sup>9</sup> United States Environmental Protection Agency. (n.d.) "Recycling Basics." <https://www.epa.gov/recycle/recycling-basics>



1. Prepare 10-20 common household items that are non-plastics, pure plastics, or mixed materials, depending on the time allotted for the activity. These may be a mix of items still in use and wastes that are clean and dry.
2. Place labels to separate the activity area into three groups: non-plastics, pure plastics, and mixed materials.
3. Pick up an item and ask the learners to move to the category they think the item belongs to. Set a short time limit (e.g., 10 seconds) to make participants decide quickly.
4. After the time given, announce the correct answer and ask questions under the Discussion section.



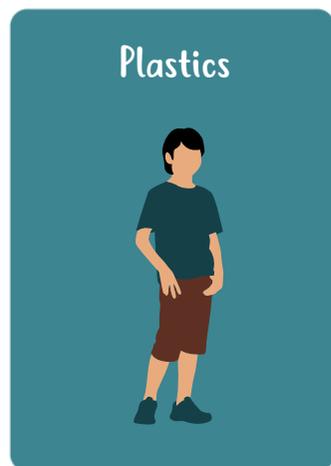
- What is this item made out of?
- Do you think this is recyclable? Why or why not?
- Are there items that fulfill the same purpose, but are made from different materials? (e.g., newspapers can be replaced by reading the news from gadgets)



1. For the next task, divide the materials into three different material categories: non-plastics, pure plastics, and mixed materials. Choose two items that are from the same category and one that is not. Put each set of materials in separate containers, such as reusable bags or baskets, then distribute one set per group.



2. Explain that there are three materials in each container and only one material belongs to a different material category.
3. Ask the learners to differentiate and discuss which one is different and consider how it is different from others. Assign a representative from the group to report to the bigger group which material is different from others and why.
4. Invite other groups to share if they agree or not, and provide supplementary comments and information as needed.



Mixed materials



Sneaker  
(Polyester,  
nylon, rubber)



Tote bag  
(Nylon, cotton)

Non-plastic



T-shirt  
(Cotton)



- What makes this item different? What is this item made out of? What are the other items made out of?
- Which of the items is recyclable?
- Are there items that can be used for the same purpose, but are made from different materials? (e.g., newspapers can be replaced by reading the news from gadgets)



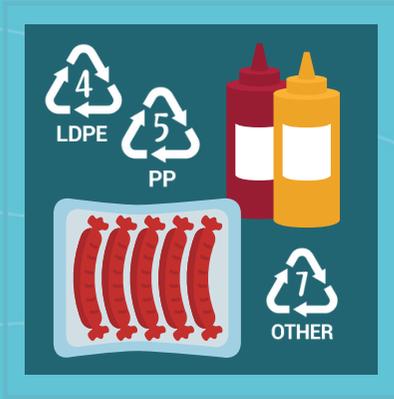
- You may assign the learners to bring the common household items.
- For the second task, you can make this more challenging by increasing the number of items of the same category (three to four items of the same category).
- If you are conducting this virtually, you can either show the common household items over the screen or put photos of these items in a presentation. You can use a polling app such as Metimeter (<https://www.mentimeter.com/>), Zoom's built-in polling app (<https://zoom.us>), or a polling function that may be embedded in Google Slides, such as Poll Everywhere (<https://www.polleverywhere.com/>) to ask learners to vote for the category or vote for which item does not belong to the group.



### Additional points for discussion

- Which item's composition surprised you?
- Was it easy or difficult to identify which item was different?
- What challenges did you encounter when grouping materials based on their composition? Are they easy to distinguish?
- Can you describe a world without plastics? What items would you substitute?
- Can plastics be realistically substituted by other materials? Consider aspects such as physical features, cost, and durability.
- Plastics are abundantly used in our lives, but in various mixture forms which can be difficult to tell from the onset.
- Given a choice, use materials with higher recyclability.
- When items have high recyclability, there's a higher chance of them being collected, recovered, and recycled, which means a higher chance of these items not ending up in landfills and the natural environment.





## ACTIVITY 3: DECODING PLASTICS



**TIME NEEDED:** 1-1.5 hours

**LOCATION:** Indoor, outdoor, virtual

**IDEAL NUMBER OF PARTICIPANTS:** 30 learners; 5-6 learners per group

**IDEAL AGE RANGE:** 12-15 years old

**MATERIALS:** Assorted plastic items and the "Decoding plastics" worksheet

**ALTERNATIVE MATERIALS:** Zoom, Google Slides, or Canva



An exercise that teaches the different plastic types by checking the plastic resin identification codes



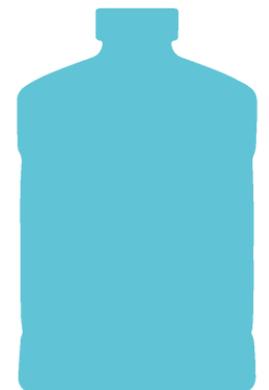
By the end of this activity, learners will be able to:

- Recognize the existence of plastic resin identification codes, what they mean and what they are for;
- Understand the different types of similar-looking plastics; and
- Identify different types of plastics that require different treatments of recycling by checking the plastic resin identification codes.



# Resin Identification Code

The American Society for Testing and Materials (ASTM) International Resin Identification Coding System (often abbreviated as RIC) is a set of symbols to identify the plastic resin that an item is made out of. It is represented by a number inside a set of "chasing arrows" or a solid triangle. The RIC is often incorrectly interpreted as a symbol of recyclability.



## The RICs are:

Symbol	Resin and Resin Identification Code	Recyclability	Characteristics	Product Examples
 PET	Polyethylene PETE or PET	Recyclable	lightweight, smooth, and shatter-resistant	 Beverage bottles for water or soda
 HDPE	High-Density Polyethylene HDPE	Recyclable	long-lasting, extremely durable, and resistant to deterioration	 milk jugs and bottles for household cleaners
 PVC	Polyvinyl Chloride PVC	Recyclable in some applications	lightweight and versatile	 pipe and window fittings, car parts, plastic wrap
 LDPE	Low-Density Polyethylene LDPE	Recyclable in some applications	flexible, durable, and lightweight	 frozen food bags, food bag, shopping bags
 PP	Polypropylene PP	Recyclable in some applications	durable and lightweight	 ketchup bottles, microwavable meal trays
 PS	Polystyrene PS	May be difficult to recycle	lightweight, versatile, and cheap; not safe to be microwaved or heated	 cosmetic bags, Styrofoam plates and cups
 OTHER	Other	May be difficult to recycle	made from various materials	 5-gallon water bottles, baby bottle

It has been estimated that only 9% of all the plastic waste generated has been recycled.<sup>10</sup> The recyclability of an item also depends on the facilities available in the area to recover and recycle it. Majority of the recycled items fall under 1 (PET/PETE) and 2 (HDPE). Because the recyclability of the other plastic types varies considerably, these items are more likely to end up in landfills or the natural environment.

<sup>10</sup> Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science advances* 3(7).



Instructions

1. Bring 5 - 10 items made of plastic that have the symbol for the RIC. Try to bring products that have a mixture of different types (e.g., soda bottle).
2. Give each group at least three items made from the same resin code.

3. Explain the purpose and types of the identification symbols including the need for a separate collection for recycling. The example of a soda bottle may be used to explain why the cap and label have to be removed for recycling.
4. Ask the learners to answer their "Decoding plastics" worksheet. After 15 minutes, each group will present their poster to the group.

### "Decoding plastics" poster template

Draw the item and fill in the blanks. A sample has been provided.

- Hi, I'm *name of item*.
- I'm number *Plastic Resin Identification Code*.
- I'm used for *indicate purpose/s*.
- My physical features are *Surface appearance (e.g., color, texture) Rigidity (e.g., flexible, rigid, semi-rigid) Transparency (e.g., transparency, translucent, opaque)*
  - *Recyclability: high, recyclable in some applications, difficult*
  - *Ways to reduce my use: tips to reduce*

#### Sample

- Hi, I'm *bottled water*.
- I'm number *1 (PET)*.
- I'm used for *bottles for salad dressing and soda*.
- My physical features are *clear, rigid, and transparent*.
- *Recyclability: Highly recyclable*
- *Ways to reduce my use is bringing your own bottle!*



Discussion

- Are the different plastic types easily distinguishable without looking at the RICs? Why or why not?
- What efforts might be needed to separately collect and recycle mixture types?
- Does knowing the RICs guarantee consumers to recycle their plastics? Why or why not?
- How are RICs relevant to your daily life?
- In your own household, how can you bring into practice your knowledge of the RICs?



Modifications

- You may assign the learners to bring the common household items per RIC. Provide examples in case the items are not labeled with the RIC.
- If you are conducting this virtually, you can either show the common household items over the screen or put photos of these items in a presentation. You can provide a digital version of the "Decoding plastics" poster as a PDF or a slide in a presentation such as Google Slides (<https://www.google.com/slides>) or Canva (<https://www.canva.com/>) that the learners can work collaboratively on.



Key Takeaways

- The wide variety of materials in the market and their different recycling processes led to the creation of codes for plastics.
- RICs are standard codes used to identify the materials used in different plastic products.
- The presence of the RIC does not mean that an item is automatically recyclable or recycled. The recyclability depends on the material and the recycling facilities available in the area.



To print this worksheet, go to the Annex: "Decoding plastics."



## ACTIVITY 4: SINK OR SWIM?



Link to Instructional Video:  
<https://bit.ly/MLKActivity4>

**TIME NEEDED:** 1-2 hours

**LOCATION:** Indoor, outdoor

**IDEAL NUMBER OF PARTICIPANTS:** 30 learners; 5-6 learners per group

**IDEAL AGE RANGE:** 15-18 years old

**MATERIALS:** Plastic samples of different resin types (PP, LDPE, HDPE, PS, PVC, PET), scissors, two buckets or basins of the same size, tap water and sea water, printed "Sink or swim?" worksheet

**RELATED INFORMATION IN ANNEX:** "Sink or swim?" worksheet



An experiment that tests the buoyancy of different types of plastics through simulation in freshwater and saltwater environments



The buoyancy of an object to water is determined mainly by the density (or specific gravity) of the object. In general, if the object weighs more than an equal volume of water, it is denser and will sink. If the object weighs less than an equal volume of water, it is less dense and will float. In other words, if the density of the object is less dense than water (1.00 g/mL), the object will likely float. If it is denser, it is likely to sink.



**By the end of this activity, learners will be able to:**

- Describe how the density of plastic affects its location in the ocean water column; and
- Make the connection between the buoyancy of plastics and how the materials can travel in tap water or saltwater

This explains the difference in buoyancy of plastic types. Plastics with higher density tend to sink rapidly to the sea floor and plastics with lower density float and remain close to the ocean surface and will be carried by the ocean currents. The floating plastics tend to accumulate in the major ocean gyres especially in the sub-tropics. They are estimated to be a minimum of 5.25 trillion particles and weighing 0.27 million tons.<sup>11</sup> Other floating plastics are washed up on beaches and shores. The debris that are visible on the surface of beaches may only be a small portion of the total plastic wastes that leak into the marine environments.

Among the plastic types, PET is most dense and likely to sink. However, if the PET bottle is sealed with a cap and the bottle contains air inside, then the buoyancy increases and the bottle is more likely to float.

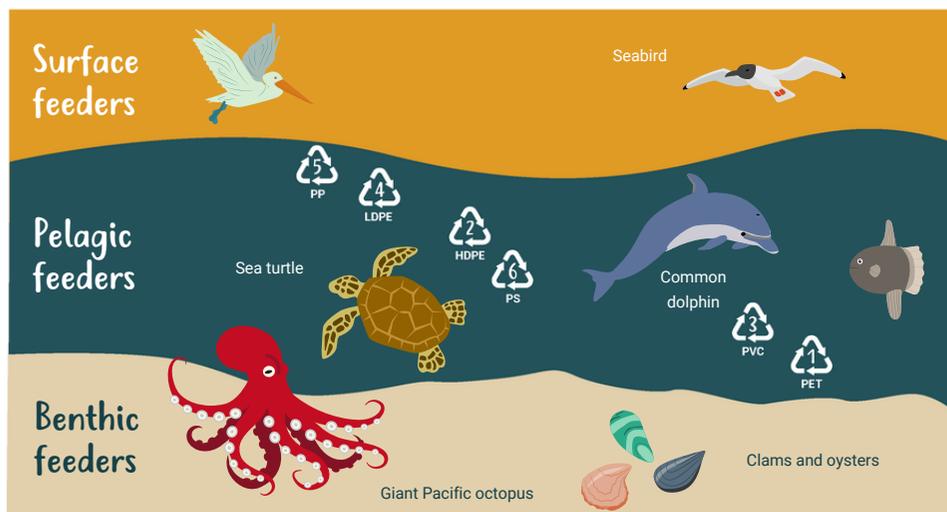
<sup>11</sup> Eriksen M, Lebreton LCM, Carson HS, Thiel M, Moore CJ, Borerro JC, et al. (2014) Plastic Pollution in the World's Oceans: More than 5 Trillion Plastic Pieces Weighing over 250,000 Tons Afloat at Sea. PLoS ONE 9(12): e111913.

Substance	Density (g/ml)	Buoyancy in tap water (1.00 g/ml)	Buoyancy in sea water (1.03 g/ml)
 PP	0.90 - 0.91	Float	Float
 LDPE	0.92 - 0.94	Float	Float
 HDPE	0.94 - 0.96	Float	Float
 PS	0.02 - 1.07	Float/Sink	Float/Sink
 PVC	1.16 - 1.45	Sink	Sink
 PET	1.38 - 1.39	Sink	Sink

Monterey Bay Aquarium (2010)<sup>12</sup>

### Water column cross section

Some plastics float, some sink, but all plastics may have an impact on marine life if they make it into the ocean. Which plastic objects may impact which animals?

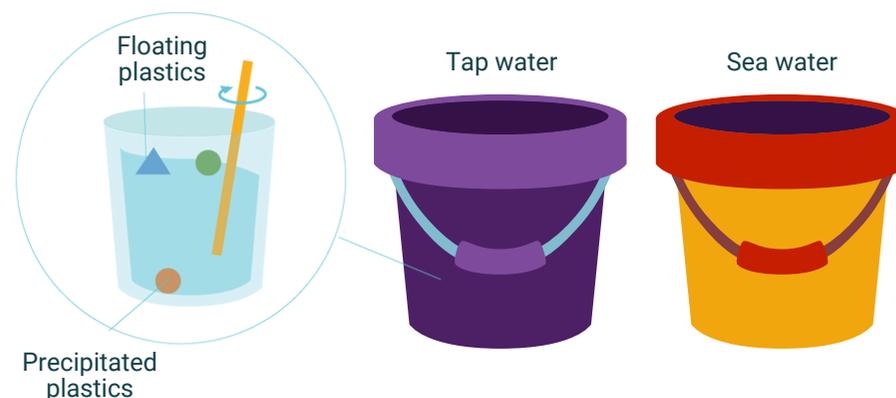


### Impacts of marine litter on marine life

Marine litter has direct and indirect effects on marine organisms. Abandoned, lost, or otherwise discarded fishing gear (ALDFG) can cause habitat destruction by crushing fragile ecosystems, such as coral reefs, and smothering marine organisms by entanglement. Marine organisms can get entangled in other kinds of plastics and cause death by drowning, suffocation, or strangulation. Marine animals can also mistake plastic waste as food and ingest them, which can cause obstructions in their digestive system and prevent organisms from taking in food, leading to malnutrition, starvation, suffocation, and death.<sup>13,14</sup>



1. Prepare plastic waste samples of different RICs (PP, LDPE, HDPE, PS, PVC, PET). Cut them into similar size pieces to allow comparison with even conditions. Write numbers on the plastics with a marker to distinguish each other and take note of which number corresponds to which plastic types.
2. Prior to conducting the experiment, ask the learners to predict whether the items will sink or swim (float) based on their intuition. Record answers in the left-hand side under "Prediction." The printable worksheet is available in the Annex.



<sup>12</sup> Monterey Bay Aquarium. (2010) Plastics in the Water Column. Monterey Bay Aquarium Foundation.

<sup>13</sup> National Oceanic and Atmospheric Administration. (n.d.) "Why is Marine Debris a Problem?" *Marine Debris Program*. <https://marinedebris.noaa.gov/discover-marine-debris/why-marine-debris-problem>

<sup>14</sup> Thevenon, F., Carroll, C., & Sousa, J. (2014). *Plastic debris in the ocean: the characterization of marine plastics and their environmental impacts, situation analysis report*.

3. Pour the same amount of tap water and sea water in a separate bucket or basins of the same size. If sea water is not available, perform the experiment using tap water only.
4. Put plastic items in the tap water bucket and stir to check if it floats or sinks. Do the same with a sea water bucket. Swirl the water to simulate ocean currents. Repeat the same procedure on all plastic types. It could be done one by one or simultaneously.
5. Explain the density of different RICs and their relation to buoyancy between tap water and sea water and check if the result of the experiment is consistent with the expected result. Record your data in the right-hand side result section of the table under "Results."

Resin Type	Prediction: Did the plastic sink or swim?		Results: Did the plastic sink or swim?	
	Sea water	Tap Water	Sea water	Tap Water
 Polyethylene PETE or PET				
 High-Density Polyethylene HDPE				
 Polyvinyl Chloride PVC				
 Low-Density Polyethylene LDPE				
 Polypropylene PP				
 Polystyrene PS				



- Did your prediction match your findings? If not, why do you think you may have gotten different results?
- With the results of the experiment, what do you think will happen with the plastic items that float in fresh water and sea water? What about those that sink?
- How do plastics end up in rivers and or seas? How do these plastics affect the different marine life?



- Density affects the buoyancy and location of the plastic debris in the water column. If plastic is more dense than water, it will sink. If it's less dense, it will float.
- What you generally see in rivers and seas are floating plastics on the surface. There could be more plastics available in different depth layers that are not visible on the surface.
- Different plastics will have different impacts on marine animals. The impacts will depend on the buoyancy of the plastics and the ocean's zones where the animals feed and live. Some animals may become entangled in them, while others may consume them.



To print this worksheet, go to the Annex: "Sink or swim?"



## ACTIVITY 5: FISHING FOR MICROPLASTICS



link to Instructional Video:  
<https://bit.ly/MLKActivity5>

**TIME NEEDED:** Approximately four hours (half a day)

**LOCATION:** Shore, coastal area

**IDEAL NUMBER OF PARTICIPANTS:** 30 learners; 5-6 learners per group

**IDEAL AGE RANGE:** 15-18 years old

**MATERIALS:** 5 mm mesh sieve, ruler/tape measure (50 cm or longer), buckets, trays/containers, shovel or a large spoon, tweezers, notebook and pen, personal care products with microbeads, muslin/cheesecloth



An experiment that “fishes” microplastics from the shore. If learners don’t have access to the ocean, a modification is provided for learners to “fish” for microplastics in personal care products.



 5mm  
 Microplastics are plastic particles less than 5 millimeters in length -- that’s about the size of a munggo bean (munggo).

### Two types of microplastics

There are two types of microplastics: primary and secondary.

### Microplastics

They occur in the environment as a consequence of plastic pollution and weathering. Due to their small size, they can be ingested easily by filter-feeding marine organisms and accumulated through the food web.<sup>15</sup>

Primary microplastics are tiny particles designed for commercial use, such as microbeads used in personal care products, plastic pellets used in industrial manufacturing, and plastic fibers used in synthetic textile.

Secondary microplastics are particles that result from the breakdown of larger plastic items such as PET bottles.<sup>16</sup>



By the end of this activity, learners will be able to:

- Define what microplastics are;
- Identify sources of microplastics; and
- Visualize the presence of microplastics in the marine environment.

<sup>15</sup> National Oceanic and Atmospheric Administration. (n.d.) “What are microplastics?” <https://oceanservice.noaa.gov/facts/microplastics.html>

<sup>16</sup> Boucher, J. and Friot D. (2017). *Primary Microplastics in the Oceans: A Global Evaluation of Sources*. Gland, Switzerland: IUCN. 43pp.

### Primary microplastics



### Secondary microplastics



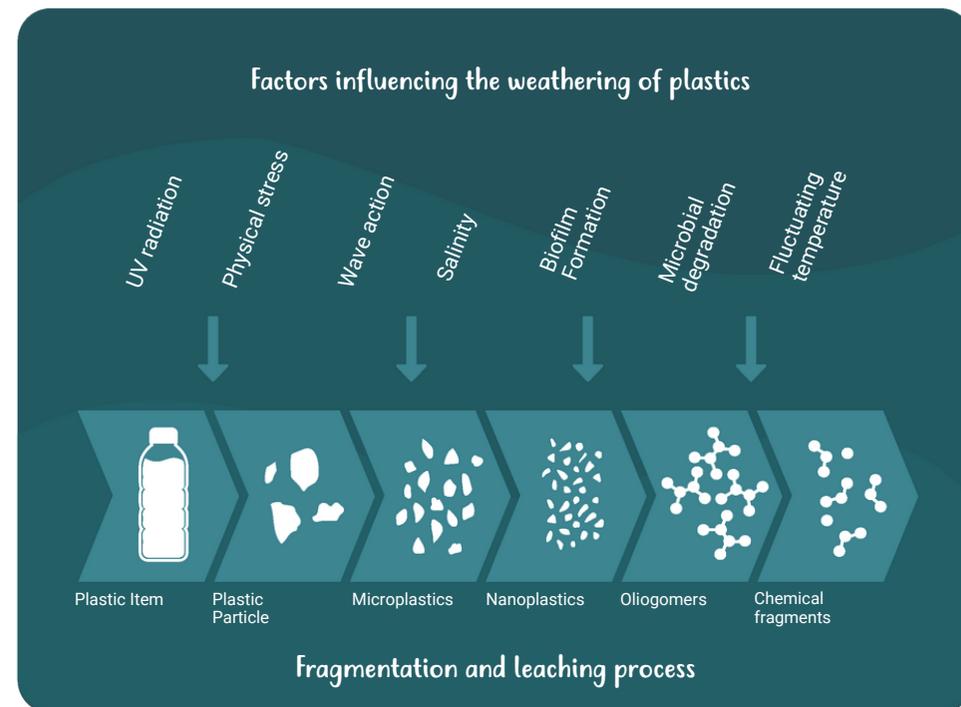
**Microbeads** are used in cosmetics and personal care products for scrubbing or exfoliating. Microbeads are found in certain types of facial wash, toothpaste, and body wash.<sup>17</sup>

**Plastic pellets**, sometimes called pre-production plastic pellets, are the building blocks of most plastic products. They are melted and molded into the plastic products we use.<sup>18</sup>

**Plastic fibers**, sometimes called microfibers, come from plastic-based textiles such as polyester, rayon, and nylon. When we wash garments made from these textiles, especially by washing machine, they shed tiny plastic fibers and will be washed in the drainage.<sup>19</sup>

### Deterioration of plastics

Plastics that end up in the marine environment are subject to various physical, chemical, and biological stresses. These factors make plastics break up into smaller pieces.



Adopted and modified from Jahnke et. al. 2017 <sup>20</sup>



1. Identify suitable sites for sampling. The shore is ideal because of the presence of fine sediment. Select two to three sample sites to observe trends or differences.
2. Delineate a 50 cm x 50 cm square using a ruler or tape measure and collect all the sand in the square to a depth of 1 cm. This corresponds to about 2.5L in volume.
3. Sieve the collected sand with a 5 mm mesh and separate the particles into two size classes (< 5 mm and >5 mm) in different buckets.

<sup>17</sup> Boucher, J. and Friot D. (2017). *Primary Microplastics in the Oceans: A Global Evaluation of Sources*. Gland, Switzerland: IUCN. 43pp.

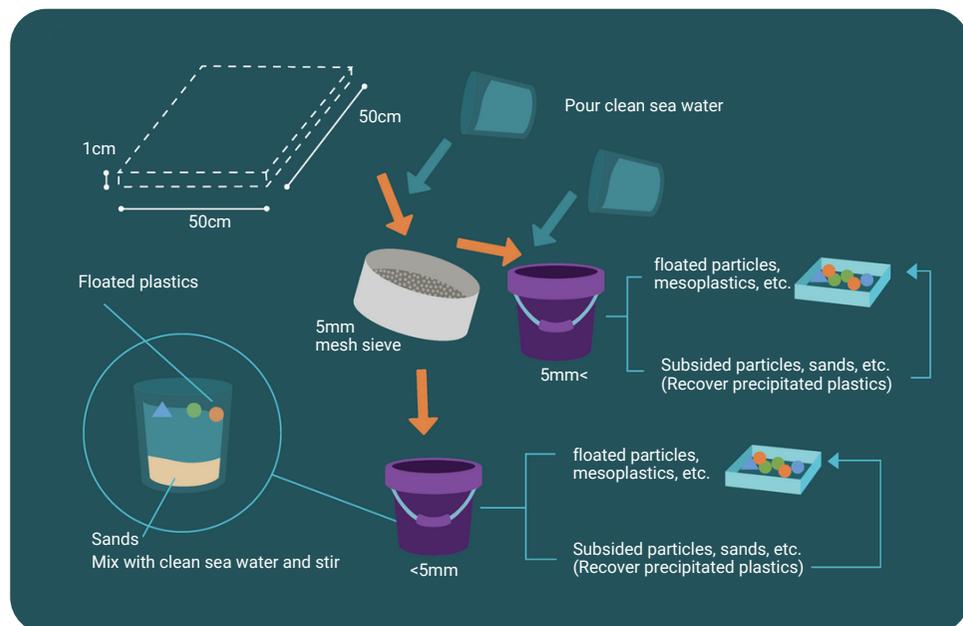
<sup>18</sup> National Oceanic and Atmospheric Administration. (n.d.) "Pre-production Plastic Pellets." <https://marinedebris.noaa.gov/pre-production-plastic-pellets>

<sup>19</sup> United States Environmental Protection Agency. (n.d.) "What you should know about microfiber pollution." [https://www.epa.gov/sites/default/files/2020-07/documents/article\\_2\\_microfibers.pdf](https://www.epa.gov/sites/default/files/2020-07/documents/article_2_microfibers.pdf)

<sup>20</sup> Jahnke, A., Arp, H. P. H., Escher, B. I., Gewert, B., Gorokhova, E., Kühnel, D., MacLeod, M. (2017). *Reducing Uncertainty and Confronting Ignorance about the Possible Impacts of Weathering Plastic in the Marine Environment*. Environmental Science and Technology Letters, 4, 85–90.

4. In each bucket, pour clean sea water and stir well. After waiting for particles to settle, collect the floating particles and put them in separate containers. Then remove plastics that don't look like plastics. If the particles are too small, you may use tweezers to pluck them out.
5. Look carefully and recover subsided plastic particles, if any.
6. Estimate the amount (number of grams) of microplastics (< 5 mm) in the quadrate (0.25 m<sup>2</sup>) by visual estimation. Imagine the number of erasers of a standard pencil that can fit in the palm of your hand.
7. Estimate the size of the beach (m<sup>2</sup>) and estimate the amount of microplastic particles in the beach surface (1 cm depth). If the size of the beach is about 1 hectare (10,000 m<sup>2</sup>) and the amount of microplastics in the quadrate is about 1 g, the equation to estimate the potential amount of microplastics at the surface (1 cm depth) of the beach would be: 40kg = [10,000 m<sup>2</sup> x 1g]/0.25 m<sup>2</sup>.
8. You can ask your learners to draw the sampling site and indicate where the highest concentrations of microplastics were found.

**Note:** Please make sure that the learners do not take any sand, shells, and other items home. Dispose of the plastics properly.



- How did you find the activity? What did you like or not like about it?
- Where do you think the microplastics came from?
- What could they have been originally part of? Do you think they are primary or secondary microplastics?
- What could be the impact of microplastics on nature and humans?



- If your place of residence is not near a beach or any body of water, look for products in your household that may contain microplastics, such as facial wash, body wash, or toothpaste. Microplastics are sometimes listed in the ingredients list as polyethylene, polypropylene, copolymer acrylates, acrylates copolymer, polymethyl methacrylate, polytetrafluoroethylene, and nylon.

- Dilute one tablespoon of the product in a cup of water.
- Slowly pour the diluted solution through the filter, which could be a muslin or cheesecloth over a sieve.
- Observe the microbeads left on the filter. Try to count the number of microbeads left and multiply that with the total volume of the product.



- If you washed your face/body with a product with microbeads everyday, where do the microbeads go?
- What are possible alternatives to microbeads?
- What could be the impact of microbeads on nature and humans?



- Microplastics are plastic particles less than 5 millimeters in length. Because they are small, they are not always easy to see in the environment.
- Microplastics can come from products intended for commercial use, such as personal care products and cosmetics, and from larger pieces of plastic.



## ACTIVITY 6: BIG FISH, LITTLE FISH

link to Instructional Video:  
<https://bit.ly/MLKActivity6>

**TIME NEEDED:** 1 hour

**LOCATION:** Indoor, outdoor

**IDEAL NUMBER OF PARTICIPANTS:** 24 learners

**IDEAL AGE RANGE:** 10-18 years old

**MATERIALS:** Small stickers and big stickers, thin sheets of colored paper to make bracelets

Description

A game of tag to illustrate the concept of biomagnification in the marine environment

Background

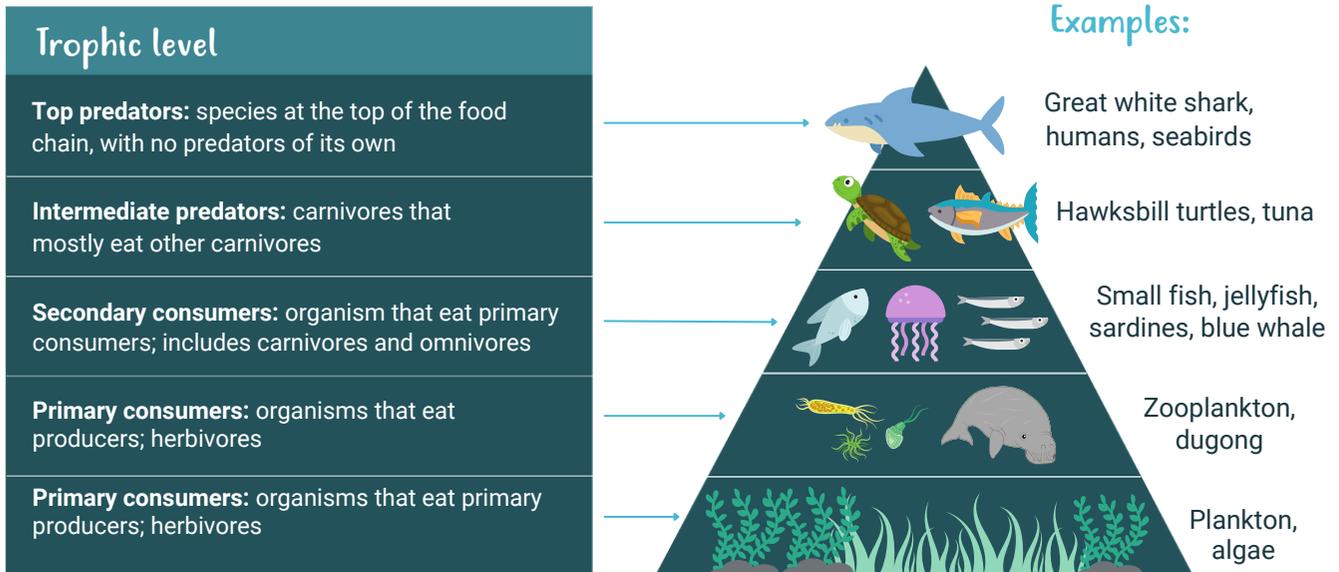
### Ecological pyramid

The marine ecosystem is made up of organisms that are interconnected energy producers and consumers. Relationships are observed and reflected on the position each one takes on the trophic level.

Learning Objectives

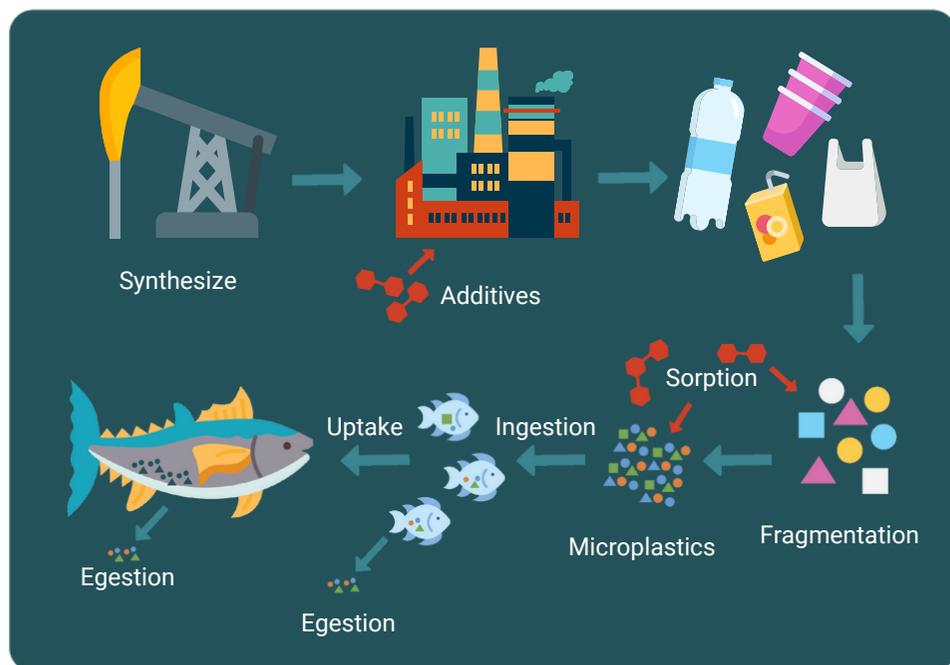
By the end of this activity, learners will be able to:

- Define biomagnification and the ecological pyramid; and
- Show the relationship between microplastics and their potential impact on wildlife and humans.



### Microplastics and biomagnification

When microplastics are taken up by primary producers and primary consumers or the lower trophic level organisms, they cannot be digested and can remain in the bodies of the organisms. Plastics accumulate in the higher trophic level organisms over time. This net result of uptake of contaminants in a living organism is called **biomagnification**.



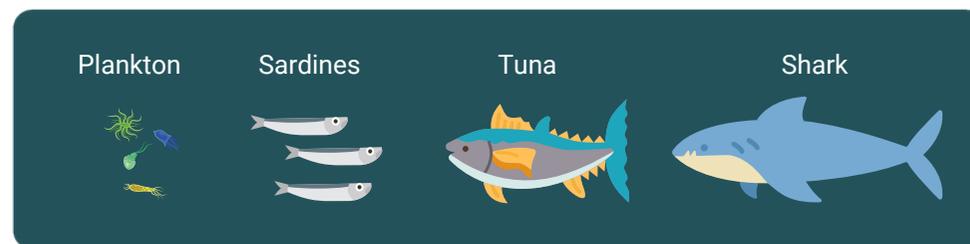
Adopted and modified from Takada (2017)<sup>21</sup>

### Effects of additives and adsorbed pollutants

Most plastic products contain various additives to maintain their properties. Upon exposure to weathering and fragmentation into small pieces, some of these additives are leached out to surrounding sea water, while others still remain in the plastics. Marine plastics can also adsorb (individual molecules, atoms, or ions gathering on surfaces) toxic chemicals such as pesticides and heavy metals from the surrounding water. This can pose an additional adverse effect to marine organisms through biomagnification.<sup>22</sup>



1. Assign roles to the learners: small, medium, or large fish. There should be at least 14 plankton, seven (7) sardines, two (2) tunas, and one (1) shark. If you're playing with more learners, divide the learners so most of them are plankton and small fish, a few medium, and even fewer large fish.



2. Give everyone the prepared paper bracelets. Sardines will have orange bracelets, tuna will have blue, and the shark will have green.
3. Give stickers to only plankton and sardines randomly (some get one, two, or even three, while some get none). The sticker represents microplastics in the ecosystem.
4. The rules:
  - o This is a game like tag. Large fish, in this case the shark, can tag (or "eat") any sardines or tuna fish. When a fish is tagged by a larger fish, it is considered to be "eaten". When they do, they have to take all the stickers of the fish they eat and put them on their shirt or a part of their body that can be easily seen.
  - o Tuna can only eat small fish. Again, when they do, they have to take all the stickers of the fish they eat.
  - o To show the concept of biomagnification better, sardines can only be eaten. They just "swim" around and must give up their sticker if they have been "eaten".
  - o Once a fish has been "eaten", they will sit down to let everyone know they are out of the game.

<sup>21</sup> Takada, H. (2017). Issue of micro plastics in the coastal and marine environment and 3R solutions. <https://www.uncrd.or.jp/content/documents/5478BackgroundPaperShigeTakada-Final.pdf>

<sup>22</sup> Li, W. C., Tse, H. F., & Fok, L. (2016). Plastic waste in the marine environment: A review of sources, occurrence and effects. *Science of the Total Environment*, 566–567, 333–349.

5. Explain the rules of your space:

- No pushing or shoving.
- No hiding.
- Don't go beyond the activity area.

6. The time for the game depends on the number of learners playing. Monitor how quickly the little fish lose their stickers. Once you see that most of them have been "eaten," stop the game and have the medium fish (if any are left) and large fish count how many stickers they collected.



Modifications

To make the roles of the learners more visible, you may ask the learners to create headdresses and draw their assigned roles. You may also prepare these ahead.



Discussion

- How did you find this activity?
- Ask the large fish: How many fish did you eat? How many stickers did you accumulate? Would it be possible for the large fish to identify which small fish is contaminated with plastics or not and be selective when eating them?
- What if we had let the little fish pick up more plastics once they had been eaten? Would those plastics have biomagnified in our ecosystem (our game)?
- If a fish lives for a long time, do you think there's a higher chance that it will accumulate more plastics? Why or why not?
- What would be the potential effects on humans as the top predator that can eat from small fishes to larger predators?
- To share a real-life scenario, you may present news/photos of fish bought in Puerto Princesa, Palawan with plastic items inside its belly. You may visit the URL here: <https://www.gmanetwork.com/news/news/regions/788705/fish-bought-in-puerto-princesa-market-yields-plastic-trash/story/>



Key  
Takeaways

- When plastics are taken up by animals at the bottom of the food chain, they can start to bioaccumulate, or build up in the animals in higher trophic levels.
- Biomagnification is not specific to breeds or species. All organisms are affected by the accumulation of plastics.
- Organisms on top of the food chain such as sharks ingest a lot of toxins that work their way up the food chain.



## ACTIVITY 7: PATH OF LITTER

link to Instructional Video:  
<https://bit.ly/MLLKAactivity7>

**TIME NEEDED:** Half a day

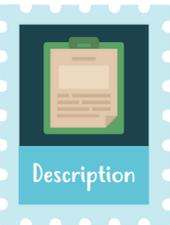
**LOCATION:** Site visit and indoor

**IDEAL NUMBER OF PARTICIPANTS:** 30 learners; 5-6 learners per group

**IDEAL AGE RANGE:** 16-18 years old

**MATERIALS:** Large pieces of paper, sticky notes, markers, papers, and pens, "Path of Litter" worksheet

**RELATED INFORMATION IN ANNEX:** "Path of Litter"



A trip to a waste management facility will help learners understand how waste is being collected and treated



### Waste management hierarchy and 3Rs

There are different ways that individuals and organizations can help reduce marine litter and its impacts. There are no simple, one-size-fits-all solutions -- each solution's success depends on the resources available, culture, location, perceptions, and other factors.



### By the end of this activity, learners will be able to:

- Deepen their understanding of the status and challenges of waste management and how plastic wastes are being treated;
- Learn about the waste management hierarchy and 3Rs (reduce, reuse, and recycle); and
- Contextualize the importance of the 3Rs and waste management hierarchy by witnessing actual ground activities in the community.

The waste management hierarchy is a recognized order of priority for managing waste materials based on their environmental impacts. It is showing the hierarchy from the most preferred method (at the top) to the least preferred method (at the bottom). All levels of action are necessary for proper waste management.

The reduce, reuse, and recycle elements are often abbreviated as the 3Rs of waste management. It is a more simplified concept of the waste management hierarchy.



### Waste management facilities

When we throw away our household wastes, they end up in different destinations. The Philippine law defines a solid waste management facility as “any system, program, or facility for resource conservation” and “any facility for the collection, source separation, storage, transportation, transfer, processing, treatment, or disposal of solid waste.”<sup>23</sup>

These include, but are not limited to, sanitary landfills, materials recovery facilities (MRFs), junk shops, and recycling centers.

*Junk Shop*

A place where discarded recyclables are brought, bought, sold, or sorted

*Sanitary Landfill*

A site for the safe and controlled disposal of waste materials

*Materials Recovery Facility (MRF)*

A solid waste transfer station or sorting station, drop-off center, a composting facility, and/or a recycling facility



The activity can be divided into three sections: the pre-site visit, site visit, and post-site visit.

#### A. Pre-site visit

1. Schedule an appointment for a site visit at a waste management facility in your area.

2. Request for a representative from the waste management facility to give a tour or orientation. Inquire about the proper dress code and materials learners are allowed to bring/not bring.
3. Organize a short briefing session for the learners to inform them of the site visit’s objectives and tasks. Provide a brief presentation on the status of waste generation and disposal in their city. If available, highlight data specific to plastic waste, e.g., most common plastic type collected or waste flow diagram of plastic. Use only objective and factual information such as statistics that the local government provides (e.g., amount of waste disposal, waste management budget), photos of the landfills, waste littering in rivers and streets, if available and applicable.

#### B. Site visit

1. Visit the waste management facility during the actual operations schedule where participants get to observe the processes. Ask the participants to take note of the following:
  - o Function of the facility
  - o What items are being collected
  - o Organizational structure (roles, management, and ownership)
  - o Waste segregation process
  - o Benefits and challenges
2. Allocate time for learners to ask questions. The representative of the waste management facility can help validate their observations and improve their understanding of the facility.

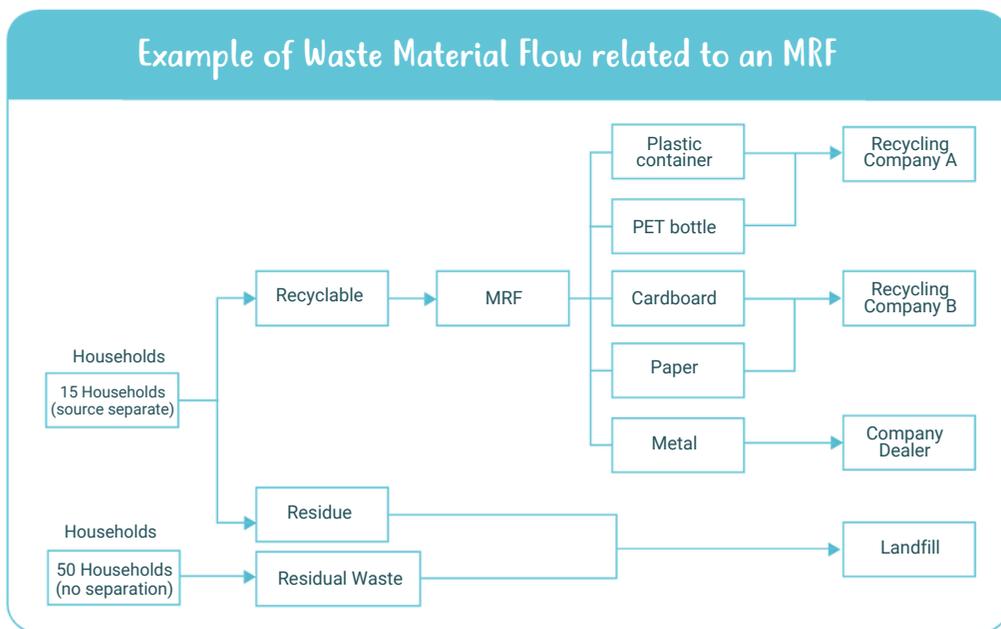
<sup>23</sup> Republic of the Philippines. (2001). Ecological Solid Waste Management Act of the Philippines. [https://lawphil.net/statutes/repacts/ra2001/ra\\_9003\\_2001.html](https://lawphil.net/statutes/repacts/ra2001/ra_9003_2001.html)

### C. Post-site visit



- Divide the learners into groups and ask them to discuss and write down the following:
  - General impressions and observations using their senses (e.g., sights, sounds, smells, textures)
  - Five key findings from the site visit
  - Waste material flow (see example below)
  - Three recommendations to improve the system

- Ask a representative of each group to present their results and invite questions and comments from the other groups.



- Based on the site visit and data gathered, ask the learners to write down ideas to reduce and manage waste generation and disposal in sticky notes and place them on the board.

- Review their answers and consolidate them into categories based on the waste management hierarchy (reduce, reuse, recycle, recover, and dispose). Depending on the number of learners and ideas generated, you may merge categories together.
- Assign groups a category for a deeper discussion. Ask them what kind of resources are needed to implement the category (physical, human, financial, and intellectual resources).
- When learners have listed the resources needed, ask them to rank which actions will be most resource-intensive and which ones will have the highest positive impact.
- Ask the groups to present outcomes and compare them. Discuss the similarities and differences between the groups and identify reasons for them.
- Reflect on your household's waste. Can you trace the path of litter from your home to the facilities you visited? Are there any gaps along the path?
- What can you do to contribute to effective waste management in the community and city as a whole?



- During the discussion, write down key points and observations on a large piece of paper or board.
- To make the sharing more efficient, ask the learners not to repeat observations and statements that have been previously shared. You can mark the repeated findings with an asterisk or another symbol to emphasize that it was a common observation.



- Effective waste management requires appropriate infrastructure, enforceable policies, and cooperation by citizens. The waste management hierarchy shows that there are different actions that can be done.
- Wastes are generated everyday, but there are individual efforts that we can take to lessen the waste we produce.



## ACTIVITY 8: OUTDOOR CLEANUP

link to Instructional Video:  
<https://bit.ly/MLKActivity8>

**TIME NEEDED:** Three Hours

**LOCATION:** Outdoors (e.g., beach, streets, sidewalks). Access to a beach and ocean is ideal.

**IDEAL NUMBER OF PARTICIPANTS:** 30 learners

**IDEAL AGE RANGE:** 12-18 years old

**MATERIALS:** tongs, work gloves, sacks or garbage bags, weighing scale, "Litter survey" data sheet

**RELATED INFORMATION IN ANNEX:** "Litter survey" data sheet

Description

An activity to cleanup an area and identify what types of wastes commonly end up in the environment

Learning Objectives

By the end of this activity, learners will be able to:

- Understand and identify the variety of litter that goes into the environment;
- Relate how plastic waste negatively impacts the environment; and
- Participate in an organized cleanup activity.

Background

### Cleanups

Organizing outdoor cleanups is a way not only to remove wastes from the natural environment, but also show participants a sense of the marine litter issue through experiential learning. Cleanups can also collect data on what types of waste are leaking into nature. This information could be helpful in developing policies or campaigns to reduce marine litter.

### International Coastal Cleanup: Philippine data

Data from the 2019 International Coastal Cleanup shows that the Philippines collected 8,238,593 pieces of marine litter. The top wastes collected were food wrappers (3,415,438 pieces); cigarette butts (1,304,417 pieces); plastic bottle caps (412,184 pieces); plastic beverage bottles (371,529 pieces); and straws and stirrers (315,582 pieces).<sup>24</sup>

Instructions

### Preparation

1. Decide on the location to clean and survey. Identify any potential hazards, such as vehicles on the road.
2. In the designated area, identify the location where all wastes will be brought and weighed.
3. If applicable, apply for the necessary permits to conduct the activity. Contact the local government to confirm the proper disposal method of collected waste.
4. Assign roles to different participants: who will collect specific wastes, weigh the wastes, record, and ensure proper disposal.

<sup>24</sup> Ocean Conservancy. (2020). *Together, we are Team Ocean*. [https://oceanconservancy.org/wp-content/uploads/2020/10/FINAL\\_2020ICC\\_Report.pdf](https://oceanconservancy.org/wp-content/uploads/2020/10/FINAL_2020ICC_Report.pdf)

## Litter survey

5. Collect the waste within the designated area. Weigh and record each waste type: plastic, paper, glass, metal, and others.
6. Calculate the percentage of each waste type by weight, especially the plastics.



- What was the most abundant type of waste?
- What did you record and observe about the ratio of volume of waste to weight?
- Imagine what these items would look like five or 10 years from now. How could this item affect the environment? Could it have an impact on wildlife or people?

- Based on the wastes that you collected, where do you think the waste mostly came from (e.g., on-site littering, through rivers, from foreign countries)?
- For wastes that you think came from the local area, what does it say about the lifestyle of the people in the community?
- How do you think litter can be prevented in this area?
- What did you learn from the outdoor cleanup experience?



- Cleanups can help gather data about common wastes that leak into the environment. By identifying the materials present during clean up, we can also trace their presence in our lifestyle.
- Litter of local origin can present the lifestyle of a nearby or upstream communities. Assessing its use and misuse may present ways on how to minimize wastes in an area.



To get a sample of a data sheet, please go to the Annex: "litter survey"



## ACTIVITY 9: ROLE-PLAY ON PLASTICS



link to Instructional Video:

<https://bit.ly/MLLKActivity9>

**TIME NEEDED:** Two to three hours

**LOCATION:** Indoor/open space/virtual

**IDEAL NUMBER OF PARTICIPANTS:** 30 learners

**IDEAL AGE RANGE:** 10-18 years old

**MATERIALS:** Role-play cards, costumes (as needed)

**RELATED INFORMATION IN ANNEX:** "Role-play cards"



### Description

A role-playing exercise where learners act as different community members and how they can manage and/or prevent marine litter



### Learning Objectives

**By the end of this activity, learners will be able to**

- Illustrate understanding of the marine plastic issue by learning about the positions of different stakeholders; and
- Understand the different perspectives on the marine litter issue.



### Background

Marine litter is a complex issue that affects stakeholders in different ways. Engaging stakeholders is crucial in understanding the impacts and developing solutions. The sectors will be interpreted in light of perceptions about their motivation, responsibility, and competence.

Role-playing activities can be an emotional process for some, especially if learners have had personal experiences with the topic. To build a safe place for learners, facilitators, and other stakeholders, make sure that learners have the opportunity to process the experience by allocating ample time for debriefing.



### Instructions

1. Set the scene for the role-play by explaining that the learners are going to participate in a local council meeting. They all live on a fictional island called Isla Sinaya. Isla Sinaya is a small isolated island that's getting more polluted due to the lack of waste management infrastructure and growing number of tourists. There has been a proposal to ban single-use plastic bags, straws, and cutlery in the entire island. The final decision will be made during this meeting.
2. Learners will be divided into five or six stakeholders. The recommended stakeholders are: (i) local government; (ii) environmental NGO; (iii) association of waste pickers; (iv) association of store owners; (v) residents; and (vi) association of hotels and restaurants.
3. Select one learner to be the mayor, whose main tasks are to facilitate the meeting and make the final decision at the end of the role-play activity.
4. Each group will be given a role-play card assigned to their stakeholder (see Annex: "Role-play cards" for the card cutouts that may be distributed). Note that the other learners do not know what the other cards contain.

5. Give the learners about 20 to 30 minutes to discuss their roles, position on the issue, and how they would advocate for their group's position in the meeting. Encourage their creativity by telling them that the role-play cards provided serve only as their starting point. They can add information to what's already given and present their own interpretation of the stakeholders assigned. They can also create names for their groups and characters, and develop costumes with available materials.
6. During the preparation, go around the groups and check for comprehension and offer support as needed.
7. Come together and allow each group to perform their role-play to the class. Start and end with a statement from the mayor, and have the discussion in the middle. To ensure equal participation, have several rounds of discussions where each stakeholder has up to three minutes to make their statements and respond to each other.



**Selecting learners for the stakeholders:** If the learners include representatives from these actual sectors (e.g., a learner is a store owner or member of an environmental NGO), place them in a sector they do not represent. This will encourage them to empathize with other stakeholders.

#### When using the role-play cards:

- Add, remove, or replace stakeholders based on the local context and/or current events.
- You may modify the role-play cards by identifying qualities or biases of each stakeholder. You may also change the stakeholder's stand on the issue (i.e., pro or anti the plastic ban).

**Opting not to use role-play cards:** You may choose not to use the role-play cards provided. Develop a fictional case study based on a marine litter issue relevant to the learners, and identify stakeholders affected by this issue.

#### Other tips:

- To encourage participation from more learners, you can set a rule to have each person speak only once per round. This will compel other members of the stakeholder group to speak or respond to others.
- You may assign an observer per group. The observer can share how the other learners prepared for the discussion and how they respond and listen to each other.



After the role-play activity, you may use the following guide questions for a debrief:

- How did you prepare for your role?
- Did you agree or disagree with the position that was given to you? If you disagreed, was it difficult to get into character?
- Were you content with the outcome? Why or why not?
- What did you learn about the other stakeholders' positions?
- Why is it important to listen to other stakeholders' perspectives?
- What are the factors that can affect the outcome?
- What new beliefs, if any, do you have after the stakeholders meeting?



- All stakeholders have a role in preventing and managing marine litter.
- Each stakeholder has a different approach, perspective, and understanding of the marine litter issue. Each stakeholder's idea of a solution will also have different motivations.
- To come up with a practical and implementable solution, it is necessary to understand how laws and projects positively and negatively affect different stakeholders, and what can be done to address each stakeholder's concern.



To print the role-play cards for distribution to the groups, go to Annex: "Role-play cards"

## Activity 10: WRITING LETTERS TO LEADERS



link to Instructional Video:

<https://bit.ly/MLLKActivity10>

**TIME NEEDED:** 90 minutes

**LOCATION** Indoor, outdoor, virtual

**IDEAL NUMBER OF PARTICIPANTS:** 30 learners

**IDEAL AGE RANGE:** 10-18 years old

**MATERIALS:** Pen and paper



Description

A writing activity that aims to connect learners to leaders



Learning Objectives

**By the end of this activity, learners will be able to:**

- Exercise writing and campaigning skills to address marine litter; and
- Empower learners to take action about marine litter by reaching out to authorities through writing letters.



Background

Leaders may not always be aware of how their decisions affect their constituents. Writing letters to leaders is a concrete way that citizens can take action on an issue they are concerned about. There are different reasons to write a letter to a leader: to explain how an issue affects an individual or community; express support and appreciation; to commend or congratulate good efforts; or to show concern over an issue and offer recommendations or solutions.

In this activity, a leader is defined as someone who has authority over a group. This can be a leader in a school, government, business, or community.

### Letter structure

There are different ways to structure a letter to a leader. It would be ideal to focus on one major subject to ensure clarity and focus. Here are basic parts that can serve as your starting point:

**Header:** Ensure that the title/prefix, spelling, and affiliation are correct, and that the letter writer is addressing the right person and position. Find the addressee's business address or e-mail address.

**First paragraph:** This serves as your opening statement.

- Start by identifying the topic of the letter ("I am writing to raise my concerns about the increasing marine litter seen in our public beach...").
- Introduce yourself and why you care about the issue ("I am a resident of this barangay and visit the beach often with my family and friends...").
- Personalize your relationship with the addressee ("I voted for you in the last elections" or "I am a loyal customer of the brand that you manage.")
- Offer sincere compliments ("I am a fan of the product that your business is selling...").

**Second and third paragraphs:**

- Explain how the issue affects you and your community.
- Acknowledge the opposing arguments and evidence. Do your research and present accurate and credible facts.
- Propose a call to action. What do you want them to do? Be specific. For example, pass a policy to reduce plastic pollution or redesign the product packaging.

**Fourth paragraph:** This serves as your closing statement. Ask for a response (“I look forward to hearing from you”) and thank the addressee for their time and work.

**Your name, signature, and contact details:** Make sure you inform the addressee of your basic information and how they can reach you.

You may share these tips with the learners.

- **Always have a respectful and constructive tone.** This approach generally has higher influence than a letter that is harsh or threatening.
- **Be brief.** The people you are writing have busy schedules, so try to keep your letter to one page: a short opening, two to three paragraphs, and a short closing. Follow the same format in an email.



Save Philippine Seas, a non-profit organization based in the Philippines, has a “Letters to Leaders” section on its website with free downloadable templates (<https://www.savephilippinenseas.org/letters-to-leaders>). You may explore these to see examples.

The group behind Save Philippine Seas has written many letters to leaders, and these letters have inspired policy changes, reduction of single-use plastics in business establishments, and reduction of waste in events.

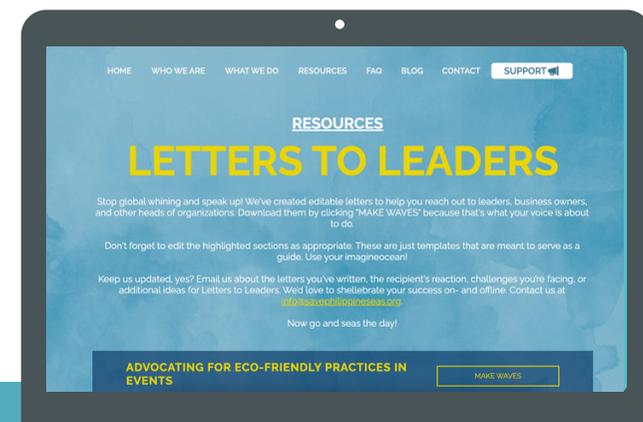


1. Give a short briefing on the benefits of writing letters to leaders, basic structure and contents of the letter, and tips on writing letters.
2. Ask learners to think about marine litter or plastic waste issues in their communities. Who are the leaders that can make a positive impact or take action on these issues? Who are the people who hold leadership positions in schools, businesses, villages, or governments?

3. In groups, ask learners to discuss ideas and write a letter to their chosen leader.
4. Allocate 30-45 minutes for learners to write their letters.
5. After 30-45 minutes, form smaller breakout groups with the learners and ask each one to read their letters out loud. Other groups will give feedback to the letter (e.g., strengths and what needs to be improved). Allow learners to decide as a group whether or not they will be sending the letters to the leaders.



- This is an activity that can also be done individually.
- During the feedback session, you may ask learners to react to the letters as the recipients. For example, one group decided to write to a government official. Another group can respond as if they are the government official receiving and reading the letter.





- How was the activity for you? Was it easy or difficult? Why?
- What issues were similar among the group? What issues were different?
- Were there any thoughts or ideas that were conflicting during the breakout groups? If yes, what were they and how were they resolved?
- Why did you choose to write to the specific leader?
- What do you think is the significance of writing letters to leaders? How can it help your advocacy?



- Writing letters is a powerful tool to raise certain issues. By taking a moment to write, citizens can discern and organize their concerns in a way that is non-threatening. Environmental issues are better solved when kind words are used!
- Communication is a two-way street. If constituents inform their leaders of what they want to advocate for and leaders listen, a fair solution can take shape.





Annex:  
Printable  
Worksheets



Draw the Resin Identification Code assigned to you.

- Hi, I'm \_\_\_\_\_
- I'm number \_\_\_\_\_
- I'm used for \_\_\_\_\_
- My physical features are:
  - Surface appearance (e.g. color, texture):  
\_\_\_\_\_
  - Rigidity (e.g., flexible, rigid, semi-rigid):  
\_\_\_\_\_
  - Transparency:  
\_\_\_\_\_
- Recyclability: \_\_\_\_\_
- Ways to reduce my use:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## Sink or swim? Activity 4

Resin Type	Prediction: Did the plastic sink or swim?		Results: Did the plastic sink or swim?	
	Sea water	Tap Water	Sea water	Tap Water
 Polyethylene PETE or PET				
 High-Density Polyethylene HDPE				
 Polyvinyl Chloride PVC				
 Low-Density Polyethylene LDPE				
 Polypropylene PP				
 Polystyrene PS				



Write down general impressions and observations using your senses (e.g., sights, sounds, smells, textures).

Write down five key findings from the site visit.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Draw the waste material flow.

Provide three recommendations to improve the system.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_



Litter survey  
Activity 8

Team Members:

Location:

Date

Item	Number	Weight
<b>Plastics</b>		
Cigarette Butts:		
Food Wrappers (candy, chips, etc.):		
Take Out/Away Containers (Plastic):		
Take Out/Away Containers (Foam):		
Lids (Plastic) :		
Bottle Caps (Plastic)		
Straws/Stirrers:		
Forks, Knives, Spoons:		
Beverage Bottles (Plastic):		
Face masks		
Face shields		
Grocery Bags (Plastic):		
Other Plastic Bags:		
Cups & Plates (Foam):		
Cups & Plates (Plastic)		
<b>Plastics-Sub-Total</b>		
Fishing gear (nets, ropes)		

<b>Glass</b>		
Beverage Bottles (Glass):		
Mirrors		
Cullets/shards		
<b>Glass-Sub-Total</b>		
<b>Metals</b>		
Beverage Cans		
Others:		
<b>Metals-Sub-Total</b>		
<b>Paper</b>		
Paper Bags:		
Cups & Plates (Paper)		
Others:		
<b>Paper-Sub-Total</b>		
<b>Tiny Trash</b>		
<b>Tiny-Trash-Sub-Total</b>		
<b>Others (to be filled by learners)</b>		
<b>Others-Sub-Total</b>		
<b>TOTAL WEIGHT OF WASTER COLLECTED</b>		



## Litter survey Activity 8

Waster Category	Weight	Percentage of Weight
Plastic		
Glass		
Metal		
Paper		
Others		

Based on the Ocean Conservancy Cleanup Data Sheet



## Role-play cards Activity 9

### (i) Mayor

As mayor, your role is to lead the implementation of national and local waste management policies in your municipality. This includes closing open dumpsites, promoting waste segregation at the household, and reducing waste dumped into the landfills.

You will be giving the opening and closing statement during the meeting. You will also chair and facilitate this meeting and invite your stakeholders to present their views. Make sure that all groups have the chance to be heard and present a solution.

### (ii) Municipal council (Sangguniang Bayan)

The municipal council is the local legislative branch of the government. This means that your primary responsibility is to develop laws for your constituents. You recognize that polluted seas and shores will have a negative impact on tourism and the local economy. However, a ban on single-use plastics may inconvenience many of your constituents, from the tourism sector, food and beverage sector, and residents, and the alternatives to plastics are not readily accessible.

### (iii) Environmental NGO

As the leading environmental NGO in Isla Sinaya, you are strongly advocating for the ban on single-use plastics. You are concerned about the plastic found on the beach and seas, and how it will affect livelihoods and wildlife.

The island does not have the necessary waste management infrastructure to collect and dispose of the increasing plastic waste.

### (iv) Association of waste pickers

The association of waste pickers is supporting the ban on single-use plastics. By banning these disposable items, you will have less waste to sort and clean. Most of the plastics are non-recyclable, such as sachets, straws, and food packaging made from mixed materials. You also want to use this meeting to ask government support for social services, such as healthcare and hazard pay.



## Role-play cards Activity 9

### (v) Residents

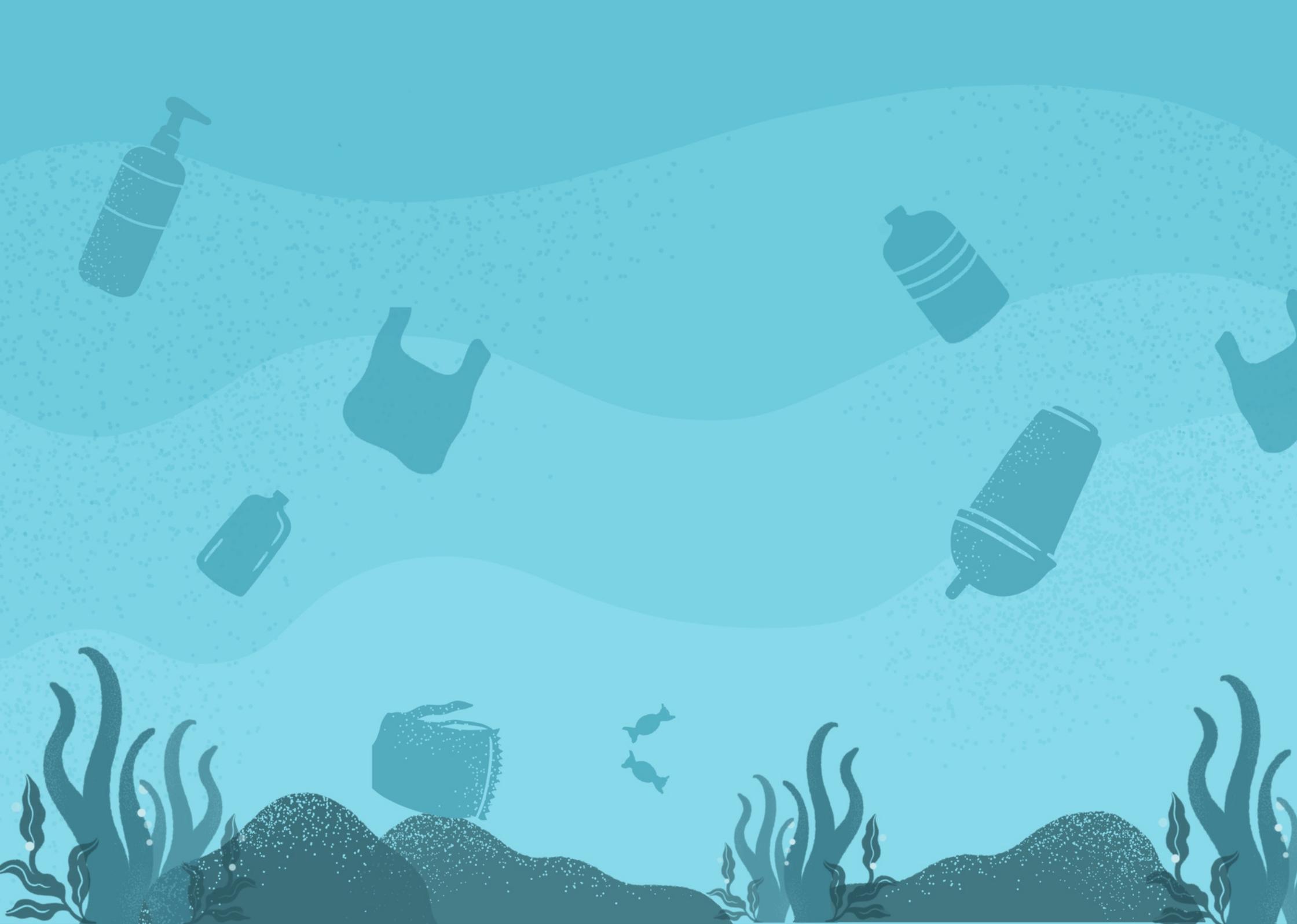
The residents of Isla Sinaya are divided on the issue to ban single-use plastics. Some residents are for the ban because they see the negative impacts of marine plastic pollution, but others are against it because they don't want to be inconvenienced by it. This meeting will help you see different sides of the issue and make your stand as a group.

### (vi) Association of store owners

The association of store owners is against the proposal to ban single-use plastics. Switching to paper bags is more expensive because the paper bags cost four times more than the plastic bags. You will have to incorporate this cost in your operations, which means an increase in expenses. This could also inconvenience your customers.

### (vii) Association of hotel and restaurant owners

The association of hotel and restaurant owners is against the proposal to ban single-use plastics. Switching to paper-based products and reusables will cost five times more than the current plastic options, from the cutlery to take-out packaging. The use of reusable straws, dishes, and cutlery will also require washing, which takes up time, detergent, energy, and water.



# UN HABITAT FOR A BETTER URBAN FUTURE

United Nations Human Settlements Programme (UN-Habitat)  
Rockwell Sheridan Business Center 14th Floor, North Tower,  
Sheridan corner United Streets, Barangay Highway Hills,  
Mandaluyong City, Philippines 1550



[unhabitat.org.ph](http://unhabitat.org.ph)



[@UNHabitatPhilippines](https://www.facebook.com/UNHabitatPhilippines)



[info@unhabitat.org.ph](mailto:info@unhabitat.org.ph)



[@UNHabitatPh](https://twitter.com/UNHabitatPh)