

LESSON: IMPACTS OF PLASTIC ON ECOSYSTEMS



Activity 4: Plastics for Dinner

OVERVIEW

This activity will allow participants to explore how ingested plastic moves up a food chain, with a focus on wildlife in a freshwater ecosystem.

LEARNING OBJECTIVES

After completing this activity, participants will be able to:

- Describe ways that plastic can impact living organisms.
- Identify different organisms connected in a Great Lakes food web.
- Describe and define a food chain and the impact of plastic ingestion within a food chain.

SETUP AND MATERIALS

This activity takes approximately 20 minutes.

Part 1: What is a Food Chain?

- Print a copy of the Food Chain Poster (answer key included).
- Print a copy of the Food Chain Wildlife Images and cut out each image or draw your own on scrap paper.

Part 2: Plastic Ingestion

- Print a copy of the worksheet and grab a pen or pencil (1 for each participant).

PART 1: WHAT IS A FOOD CHAIN?

INSTRUCTIONS

1. Explain what a food chain is.

- Ask participants if they have ever heard of a food chain and ask them to share what they think it might be before sharing the definition.

Definition: food chain is a path of energy that food travels along from organism to organism and also shows how organisms are related with each other by the food they eat.

- Explain to participants we're going to talk about how plastic moves through a food chain. For this activity, we'll be focusing on a freshwater ecosystem, one that can be found in the Great Lakes.
- Remind participants about the definition of an ecosystem, a natural community of interacting living organisms (like plants and animals) and their environment (*refer back to Activity 1 – Get to Know Your Ecosystem*). A good example of an ecosystem would be a lake, stressing that an important component of ecosystems are the relationships found within them.
- Ask participants to give an example of a relationship found in an ecosystem. Highlight predator and prey relationships. Define the terms prey and predator if they are new terms.

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INSTRUCTIONS (CONTINUED)

2. Now help participants learn about positions in the food chain.

- Using the food chain poster, show and discuss the structure of a freshwater food chain.
 - **Prompts: Animals eat food to gain energy. What do they use that energy for? Finding food, sleeping, mating, swimming, etc.**
- Ask participants to place the missing wildlife images in the right place on the food chain poster.

We suggest following this order:

- **Salmon:** Some of us eat fish like this salmon. Can you guess where to place the salmon? Place **salmon** at the top of the poster.
 - **Minnow:** Do you know what some big fish like salmon might eat? They eat smaller fish, like minnows. Place **minnow** on poster.
 - **Zooplankton:** What about small fish? What might they eat? They eat tiny little bugs in the water called zooplankton. Place **zooplankton** on poster.
 - **Phytoplankton:** What do you think these little bugs eat? They eat tiny little plants in the water called phytoplankton or algae. Place **phytoplankton** on poster.
- Now explain how energy moves in a food chain.
 - **Prompts: How do phytoplankton get energy? They get it from the sun, just like plants on land do. This is from photosynthesis. Explain this term if it is new.**

Definition: photosynthesis is a process by which plants and other organisms make their own food by using the energy from sunlight.

- ALL of the energy in the food chain comes from the phytoplankton. But at each level of the food chain, the animals need to move around and grow, which uses up energy. So that means less energy is now available to the next level of the food chain. This means animals at the very top of the food chain, like our fish, have much less energy available to them. Because of this, there are less and less animals in an ecosystem the further up the food chain you go. In our example there will be lots and lots of phytoplankton, lots of zooplankton, some small minnows, and a few large fish.
- Now work with participants to place final two missing images of the animals that might eat the salmon. Place **bear** and **human** on poster.

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PART 2: PLASTIC INGESTION

INSTRUCTIONS

- Provide participants with a copy of the worksheet.

1. Introduce ingestion of plastics.

- Explain to participants that animals can sometimes mistake plastic for food and eat or ingest plastics. Share that this is known as **ingestion** and is another common way that plastic impacts ecosystems.
- Ask participants where they think plastic goes in a food chain. Does it stay in one animal or does some of it move from level to level?
- Explain that microplastics can move from an animal at one level of the food chain up into the next animal in the chain that eats it (its predator).
- Ask participants if they remember what a microplastic is (you can find more information in *The Plastic Cycle - Activity 1: The Diversity of Plastic*) and explain when plastic breaks up into small pieces they can become the same size as tiny prey like the zooplankton and phytoplankton in lakes.
- Explain that as zooplankton swim, they search for particles in the water column to eat as food. Many of these particles are delicious food items - like phytoplankton but some of these particles are microplastics. Each of these zooplankton can't tell the difference between microplastics and their food.
- Ask participants what they think happens and to write this down on page 1 of the worksheet.
- Now, ask participants to imagine that they are a minnow and these tiny organisms, zooplankton, are their favourite type of prey to eat, but they can't tell the difference between microplastics and their prey, zooplankton, so accidentally ingest some of the microplastics.
- Ask participants what they think happens to those microplastics to write their answer down on page 1 of the worksheet.
- Then ask participants to think about when the salmon is now eating the minnows. What would happen to the plastic?
 - ***The plastic that the minnow ate would get transferred up the food chain into the salmon. This is called trophic transfer of microplastic because the microplastic was transferred from one trophic level to another.***
- Remind participants where humans fit in this food chain. Refer back to the poster with a human fishing in the lake and ask what might happen if humans eat fish that have eaten plastic. Let them know that some plastics will likely pass out of animals (and humans) when they poop. Even when they poop it out, it still remains within the ecosystem and can still be eaten by other animals.
- Explain that there is often pollution in our aquatic ecosystems and many scientists in the U of T Trash Team, such as Lisa and Kennedy, study how ingested plastics affect animals from Great Lakes ecosystems. (Learn more about Lisa, Kennedy and other scientists [here](#)).
- Have participants return to the first page of their worksheet to do some exercises about trophic transfer of microplastic.

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FINAL REFLECTION

Now that you have completed all parts of the activity, it's time to reflect back on what participants have learned.

- Have participants return to the last page of their worksheet to answer the questions below.
 - What types of ecosystems are impacted by plastics and what are the two main ways wildlife are impacted?
 - Can you think of some other impacts that ingestion may have on wildlife (e.g., plastics fill stomachs of birds who mistakenly feel full, turtles may mistake bags for jellyfish)?
 - Share some ideas on what we can do, as individuals, to prevent plastic pollution from entering ecosystems.
 - Examples might include:
 - *Reduce their use of plastics (avoid single use plastics, like straws or water bottles, when possible).*
 - *Educate their friends and family about the impacts of plastic on ecosystems.*
 - *Participate in clean-ups.*

Congrats! You have now completed all activities in the Impacts of Plastic on Ecosystems lesson!