

Mission: Protect our oceans

Ocean = carbon eater guide



Mission: Protect our oceans offers a creative approach to learning about the oceans and issues that affect us all: the environment, the impacts of climate change, and our future. Developed with the Natural Sciences and Engineering Research Council of Canada (NSERC) in partnership with the Canadian Commission for the United Nations Educational, Scientific and Cultural Organization (CCUNESCO).

Students will be able to draw and submit their own inventions to appear on nserc.littleinventors.org, where they will be reviewed by the Little Inventors team, NSERC and CCUNESCO! Their idea might even be chosen as team favourite, turned into an animation or even made into a real object by one of our Magnificent Makers. The winners will be invited to take part in a special exhibition in 2021 to celebrate the launch of the **United Nations Decade of Ocean Science for Sustainable Development**.

Ocean = carbon eater is the third of a set of three extensions packs on pollution designed to complement our core challenge resource pack - **Mission: Protect our oceans**, which offers a fresh way to learn about why the oceans matter, about sea life and habitats, and the threats and challenges to ocean health.

A second extension pack, **Climate Power** (the water cycle, the role of oceans in the weather, climate change issues) will be available by June 8, 2020 for World Oceans Day.

You can download the resources from nserc.littleinventors.org.

The resources have been designed to support scaffolded learning for students age 5 to 15 years old to stretch their imagination and creativity.

Use the notes in the presentation to deliver your workshop. You can choose the slides that you think are most appropriate to support your lesson, whether for elementary or secondary students. The notes are coded in regular font for content that is more accessible and **in bold for content that is more advanced**.



Familiarize yourself with the resources available before the workshop

Ocean = carbon eater

- Presentation
- 1x Take a deep breath activity sheet per student

And of course don't forget to give your students invention sheets to capture their ingenious ideas!

Tools or materials needed during the workshop

Make sure you have plenty of black pens and colouring pens available for the workshop!

Ocean = carbon eater presentation

This presentation focuses on understanding the role of the ocean in the carbon cycle, what is acidification and deoxygenation. It is most suitable for higher elementary students and secondary students. Go through the slides with your class:

- Slides 2 '**Ocean = carbon eater**' explains how carbon is absorbed by the oceans and explains what phytoplankton is.
- Slide 3 '**The Carbon cycle**' explores the carbon cycle, the composition of carbon dioxide.
- Slide 4 '**Air pollution**' illustrates how increased carbon dioxide production is affecting the oceans, and in turn, the atmosphere through the greenhouse effect.
- Slide 5 '**Ocean acidification**' explains how this excess of carbon dioxide is also affecting the acidity levels in the ocean and the creatures that live in it.
- Slide 6 '**Losing oxygen**' continues to explore the impact by looking how climate change also means that the temperature of the ocean is rising, leading to less oxygen.
- Slide 7 '**Dead zones**' highlights the issue of algae blooms creating dead zones in lakes, rivers and oceans.
- Slide 8 '**A breath of fresh air**' introduces some innovative inventions in tackling air pollution in and out of the water.
- Slide 9 '**Take a deep breath**' supports the activity sheet of the same name, and encourages students to think about the consequences of not tackling pollution issues and what the future could look like if we do!
- Slide 10 '**Coming up with ideas**' offers tips to get ideas flowing!
- Slide 11 offers useful links to continue their ocean invention journey....

You can make this PowerPoint as interactive as you wish by asking your students questions throughout, such as:

- Can you think of things that absorb carbon?
- What are plants made of?
- What do oceans, trees and plants have in common?
- What is climate change?
- What is the greenhouse effect?
- Why is climate change accelerating?
- Why is acidification in the oceans a problem?
- What is the issue with each type of pollution and their impact on oceans?
- Why do we need chemicals for agriculture, especially with our ever increasing population?
- Why do we need to look after our oceans?
- What could the future of the oceans look like?
- What would a happy ocean be like?



Then use the 'Take a deep breath' activity sheet to get your students thinking about the importance and the consequences of action on different pollution issues by projecting what could happen in case of action or inaction.

Finish by getting them to think up and draw an invention that tackles the plastic problem and submit it to the **Mission: Protect our oceans** challenge on nserc.littleinventors.org for a chance to see their invention being made real!

Customization: You could ask your students to draw creatures with hard shells, or you could do a hands-on activity where they place eggshells or oyster shells in different amount of vinegar to see the effect of acidity on them.

Extended activity: You could ask students to think about ways to explain the greenhouse effect to someone who knows nothing about it, and why it's a problem. This could be done as a presentation.

Round-up!

After running the activity, gather all the student invention drawings in a gallery around the classroom/ workspace.

Get students to discuss their favourite ideas — what do they like and why? Encourage positive feedback throughout.

- What do they think of their invention?
- What are its strengths and weaknesses?
- How do they think their invention would work in real life?
- Can they imagine their invention being used by other people? What would they say?
- What other ideas or challenges can they think of?
- Why are inventions useful?
- How will they approach problems in the future?

Give students extra invention sheets to come up with more invention ideas at home. They can also download more invention sheets for free on nserc.littleinventors.org.

After the workshop: Make sure you collect all invention sheets during the workshop. Invention drawings should be scanned (rather than photographed) to be uploaded on nserc.littleinventors.org for a chance to get picked as Little Inventors team favourites, turned into animations or even get made into real objects!

With thanks to Let's Talk Science for contributing their expertise in bringing these resources together.

You can find useful learning strategies and further ocean related resources <https://letstalkscience.ca/educational-resources/learning-strategies>.

<https://letstalkscience.ca/resources/search> (type "ocean" in the search box)

