

## C3 ACTIVITY 2: THE EFFECT OF GLOBAL WARMING ON THE POLAR ICE CAPS AND MELTING GLACIERS

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### Background

This activity looks at how global warming affects sea levels, by looking at the difference between floating icebergs and the ice-covered landmasses of Greenland and Antarctica. Melting icebergs, no matter how large, will not result in increased sea levels, whereas chunks of ice landmass breaking (calving) from Antarctica, or melting glaciers from Greenland, will.

This activity mimics the effects of ice(bergs) melting in the waters of the oceans and ice (landmass-glaciers) melting into the surrounding oceans. The students will probably be surprised to discover that an ice(berg) melting does not contribute to a rise in water levels, whereas the ice (landmass-glaciers) melting into the water does.

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### Equipment required (per group):

- A drinking glass (any size)
  - Two wide, transparent containers (A and B shown in Figure 14)
  - Ice cubes
  - Film canister (or similar) weighted with ballast, sand, small nails or pebbles, to ensure it doesn't float (D shown in Figure 14)
  - Small plastic container (C shown in Figure 14)
  - Marker
  - Mounting needle
  - Tea light
  - Matches
  - Water
  - Salt (optional)
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### Suggested approaches:

- This is an ideal activity to set up at the start of the class, leave aside, and revisit later when all the ice has melted.
- Some of the groups could decide to add salt while other groups do not. At the end the groups can compare results and see if using salt water results in a marked difference from using fresh water.
- After carrying out this activity, you could present the students with an extra challenge. Place some ice cubes in a glass and fill it up to the brim. Ask the students to predict what will happen when the ice cubes melt in this container:
  - ❓ *Will the water overflow?*
  - ❓ *Will there be no change?*
  - ❓ *Will the water level drop in the glass?*
- If possible, take a photo of this setup for comparison between the water levels now, and later, when the ice cubes have melted.
- While waiting for the ice to melt, facilitate a discussion or a brainstorming session about climate change.



Figure 14

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### What to do:

**Preparing the equipment:** Heat the mounted needle with the flame from the tea light. Make several holes in the base of container C to make it behave like a sieve.

1. Pour equal quantities of water into containers A and B. You can add salt to make salt water (but this does not change the outcome).
  - ✔ *Explain to the class that containers A and B represent the sea.*
2. Stand item D, the weighted film canister, in container B. Make sure it does not float.
  - ✔ *Explain to the class that D represents a landmass surrounded by sea.*
3. Mark the water level in container B.
  - ✔ *Explain to the class that you are marking the sea level.*
4. Put some ice cubes into container A, making sure they float (i.e. make sure they are not touching the bottom).
  - ✔ *Explain to the class that the ice cubes represent floating icebergs.*
5. Mark the water level in container A.
  - ✔ *Explain to the class that you are marking the sea level.*
6. Put the same quantity of ice cubes into container C and place it onto D.
  - ✔ *Explain to the class that container C with the ice cubes on it, represents the frozen ice caps of the Antarctic or Greenland.*
  - ✔ *Ask the students to predict what will happen when the ice cubes in container A melt, and when the ice cubes in container C melt.*
7. This setup can be left aside and revisited when all the ice cubes have melted. If possible leave it in a relatively warm place to mimic global warming.