CLIMATE - Part 2 - Science

Objectives

L.O:

To Understand the Difference Between Land Ice and Sea Ice.

Land Ice vs Sea Ice

GUIDANCE – Some of the topics discussed in this lesson can bring up feelings of anxiety in children. We recommend that you give time for open and honest discussion of any such anxieties and reinforce that only by acknowledging an issue (such as climate change or unethical use of fossil fuels) can solutions be talked about and implemented.

STARTING ACTIVITY – (5 minutes)
GROUP DISCUSSION – Begin the lesson by asking the class if they have heard the terms and know the difference between land ice and sea ice.

Explain that as the name would suggest, **land ice** is ice that forms on top of land and **sea ice** is ice that forms in the sea. Ask the class to take a moment to consider why it might be important to make a distinction between the two, before telling them that they will be performing an experiment to demonstrate why.

MAIN TEACHING – Land Ice vs Sea Ice (30 minutes)
Ask the class what happens to **sea ice** when it melts. Using the example of a drink with ice in it, explain that as the ice melts the newly formed water takes its place and the **water level** remains the same.

Now ask them what they think will happen if the ice melts in the case of **land ice**. Lead them to the conclusion of the ice flowing off the land into rivers, lakes and oceans. Explain that this water will increase the **water level** of these bodies of water.

Explain to the class that they will now be doing their own experiment to demonstrate for themselves the difference between **land ice** and **sea ice**:
GUIDANCE – If you wish to spend more time on the practical side of this lesson, we recommend that the class is given time to decorate their islands, either by colouring them in or adding props. Ensure that both islands are similar in order to provide a more accurate demonstration.

1. The islands need to be made to fit inside the two tupperware containers. It is recommended that the islands be half the length, width and height of the containers (i.e. if the container has dimensions of 20cm x 40 cm x 20 cm, it is recommended that the island be approximately 10cm x 20cm x 10 cm).

Extra Information

Materials Required:
- Ice
- 2x Clear Plastic Containers
- Cardboard
- Tape
- Cling Film
- Marker Pen
- Decorative Equipment (if desired)
- Lamp (with an incandescent bulb, required for heat)

Key Words:
- Land Ice
- Sea Ice
- Water Level
- Salinity
- Albedo
- Permafrost
- Methane
- Greenhouse Gas

Success Criteria:
- I can perform a simple experiment to demonstrate the difference between land ice and sea ice.
- I understand some of the immediate impacts of land and sea ice melting.
- I understand some of the long term impacts of land and sea ice melting.

Objectives	Land Ice vs Sea Ice	Extra Information

2. Make the islands out of layers of cardboard cut to size, and taped together.
3. Wrap the cardboard islands in clingfilm in order to prevent the cardboard soaking up any water.
4. Tape these islands to the inside of the tupperware containers to prevent them from floating.
5. Measure out an equal amount of ice between the two containers.
6. On one island place the ice on top of the island, on the other place the ice next to the island in the container.
7. Fill both containers with water, ensuring the water level is the same height, just lower than the top of the island, but that all the ice in the water is floating.
8. Use a marker pen to mark the side of the containers at the current water level.
9. Place both containers under a lamp or near a radiator in order to speed up the experiment.

Put the experiment to one side and refer back to it throughout the remainder of the lesson.

MAIN TEACHING – A Chilling Situation. (20 minutes)
GROUP DISCUSSION – Discuss with the class the potential impacts of land ice melting. Allow the class to volunteer these impacts, giving time to discuss each at length and use the list below as possible prompts.

Flooding: Rising sea levels and stronger currents in rivers could cause massive damage to coastal and riverside populations.

Habitat Loss: As land ice melts, not all of it will get to the oceans, much of it will fill lakes or create new lakes, both destroying many natural land habitats and upsetting delicate balances in aquatic habitats.

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Disruption of Ocean Currents: There are numerous ocean currents that circulate oceanic waters, spreading nutrients, food and aiding in the migration of many aquatic animals. These currents require delicate balances in temperature and salinity (salt levels) that melting ice (both land and sea) could interrupt.

Loss of Planetary Albedo - albedo (al-bee-doh): Is the measurement of how much light is reflected off a surface without being absorbed. Darker objects tend to have a much lower **albedo** meaning more light is absorbed and in turn becomes heat (like tarmac on a sunny day). Whereas lighter objects reflect more light before this can happen, as such the light colour of the arctic, antarctic and glaciers which help reflect light back into space before it's absorbed and turned into heat.

After this discussion, return to the experiment to review the results. In the **land ice** container the **water level** should have risen proportionally to the amount of ice used whereas in the **sea ice** container, negligible differences in the **water level** should be seen.

MAIN TEACHING – **(5 minutes)**
GROUP DISCUSSION – Ask the class if they've ever heard the term permafrost and what they think it may mean.

Explain that **permafrost** is permanent-frost or ice that shouldn't melt at any time of year, even summer. Explain that **permafrost** is found a lot in countries in the **Arctic Circle**, such as Greenland, Alaska, Russia, China, and Eastern Europe. As a large amount of this ice is **land ice**, as the global average temperature increases, there are growing concerns that much of this ice will melt causing devastating effects. Not just flooding but also that pockets of **Methane**, a **greenhouse gas** that has been building up for millenia under the ice, will be released speeding up the heating of the planet faster and faster.

GROUP DISCUSSION – Take time to discuss what this could mean going forward for us individually and as a species and the importance of taking steps now rather than ignoring the problem.

GUIDANCE – It's recommended that you encourage the class to speak openly about their concerns on the subject of climate change and where possible enable them to speak privately with yourself or another member of staff about related anxieties. Rather than downplaying the severity of climate change we suggest that you promote the actions that the pupils can take to make a positive impact on the situation. Why not try out some of the additional worksheets in the Climate Vibes Learning Kit.