EDUCATOR GUIDE: FROZEN WORLDS

INSTRUCTIONS

1. Direct students to watch the Our Planet Frozen World episode on YouTube.

   OR discuss the Earth's pole habitats on a class call, and show the Frozen Worlds biome tour on ourplanet.com to fuel a class discussion on the characteristics and importance of ice ecosystems to people, the wildlife and the planet. Tips for using videos to prompt constructive discussions can be found in the *Our Planet Their Future Educator's Guide (PDF).*

2. Direct students to watch 'How to Save Our Frozen Worlds', on ourplanet.com, narrated by Sir David Attenborough.

3. Direct students to spend some time visiting the Frozen Worlds biome on our explorable globe. Students should then use the information in the video above and collected from the interactive globe to complete the questions and tasks below. Suggested answers are included in this version.

Use the explorable globe to help you find the answers to the following questions.

1. Complete the statistics on The Earth's Ice below:

- **70%** of our freshwater is frozen.
- 15% of our **oceans freeze over for part of the year.**
- **20%** of our land surface is so cold the ground is permanently frozen. This is called **permafrost**.

2. List the problems that global warming is causing for each of the polar species below:

Polar Bears	**Walruses**
• Polar bears require around 45 ringed seals a year to survive but seals can only be caught while the sea ice is present. • Sea ice is melting sooner and freezing later each year meaning polar bears must wait longer for their first meal and have less time to hunt. This gives them less time to build important fat reserves.	• As the arctic sea ice diminishes faster and further, the Pacific walrus have no ice to rest on. • They are hauling themselves onto beaches in great numbers when they should be dispersed across the ocean. • Coming onshore in such vast numbers is unnatural behaviour and creates new dangers.

3. Watch this video. Explain why each of the different types of ice listed below is important to both humans and wildlife:

Sea ice: Sea ice is where algae grows and is the foundation of the whole food chain.

Land ice: Ice caps and glaciers are flood preventers. They lock up 24 million cubic kilometres of water, keeping sea levels constant and protecting our coastal cities.

Permafrost: Permafrost stores almost twice the amount of carbon currently in the atmosphere, enough greenhouse gas to knock climate change into overdrive.

All ice: Ice and snow reflect sunlight back into space cooling our planet but where it has melted, the reverse is happening.

4. Why is melting permafrost a huge problem?

As permafrost melts it releases huge volumes of methane, a greenhouse gas nearly 30-times more powerful than CO2. If the permafrost continues to melt, climate change could become unstoppable.

Use the How to Save Our Frozen Worlds video to help you find the answers to the following questions.

5. A) What is causing climate change? B) What can account for two thirds of this problem?

a) The release of greenhouse gases into our atmosphere.

b) The burning of fossil fuels in homes, power stations, by industry and in vehicles.

6. List reasons why a transition to clean, renewable energy is achievable:

- The cost of solar power has fallen more than 70% in seven years
- The cost of producing energy, from some renewable sources, is already undercutting fossil fuels.
- In the US employment in solar energy is growing nine times faster than the rest of the economy.
- For every dollar the US invests in clean energy, China invests two.
- By 2040, more than half of new cars sold will be electric.

7. Why is a transition to clean, renewable energy important?

- To keep global warming within safe limits, we need to reduce our carbon emissions by half every decade.

8. Keeping global temperature within safe limits, also requires carbon capture. Explain how rewilding the planet and allowing habitats to recover will help achieve our goals.

Growing plants will draw carbon out of the atmosphere and lock it back up in themselves and the soil. Other habitats can also lock away carbon.

9. In addition to protecting our ice caps and our planet's incredible wildlife, make a list below of some of the other benefits of stabilising our climate:

- Renewables will drive down the cost of electricity, create millions of jobs and stimulate our economies.
- Electric vehicles will make our streets safer and quieter.
- We will eliminate air pollution, which kills 7 million people a year, so we will even live longer.

10. Suggest ways that we can help fight climate change and save our Frozen Worlds at home:

- Switch to a renewable energy provider
- Sign petitions and call on the government to take action on climate change.
- Travel responsibly and choose sustainable ways to get from A to B. Walk, cycle, use public transport or share lifts wherever you can.
- Eat sustainably
- Reduce waste

LINKS TO THE SUSTAINABLE DEVELOPMENT GOALS

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy

https://www.un.org/ sustainabledevelopment/energy/

Goal 13: Take urgent action to combat climate change and its impacts

https://www.un.org/ sustainabledevelopment/climatechange-2/

Goal 14: Conserve and sustainably use the oceans, seas and marine resources

https://www.un.org/ sustainabledevelopment/oceans/

Ensuring the future of our frozen worlds also contributes to other SDG goals, including the following:

GOAL 2: Zero Hunger

GOAL 12: Responsible Consumption and Production

GOAL 15: Life on Land

DISCUSSION PROMPTS

Use these prompts to generate a class or small group discussion based on the Our Oceans briefing, or videos on ourplanet.com.

Can you describe the frozen worlds of the polar regions? What do the polar regions look like? What do they feel like?

Allow children to convey their sense of wonder at these places that they will never have seen.

What animals can you think of that live in these frozen landscapes? Which are the biggest animals? And which are the smallest?

The polar bear is the world's largest carnivorous land animal. Bowhead whales in the Arctic can grow to 18m in length while the Blue whale, which spends the warmer months in the Antarctic, can grow to over 33m in length. The smallest animals are microscopic plankton and krill, which are tiny, shrimp-like, animals.

Why are the smallest animals important? What would happen if these tiny creatures disappeared?

Through the food chains, the largest animals, depend on the smallest for their survival. The Bowhead whale needs to eat about 100 tonnes of tiny zooplankton every year.

Can you think of one important change that is taking place to these ice worlds? Global warming means that the earth's climate is changing and the ice in the frozen worlds is melting.

Why does this change matter?

Melting ice means that the future of animals and people living in the polar regions is under threat. As a result of the ice melting global warming is accelerating. This means that there are more extreme weather events, more species are threatened, and sea levels are rising. Some species rely on the ice – eg walruses and polar bears who hunt from sea ice.

What can we do about it?

Using less energy. Using renewable power such as hydro-electric, wind or solar instead of fossil fuels (locally through solar panels etc, and for power stations).

Imagine it is 2030 (12 years time). What would you like the world to be like? What is different at the poles, and what is a city of the future like? How are they connected?

EXTENSION ACTIVITY IDEAS

KS2-3

ACTIVITY IDEA	SUBJECTS
Separate into groups, each focused on a different animal that lives in the Arctic or Antarctic (seal, polar bear, walrus, penguin, krill, narwhal, arctic tern etc). Think about what the creature looks like and discuss/research how it has evolved to survive in the frozen world. Consider how it will be affected if temperatures rise and ice melts.	Geography Science
Ask the young people to write a story in the first person from the perspective of a polar animal, experiencing the effects of climate change. What challenges do they face? How does it make them feel?	Literacy Geography
Working in small groups, ask the young people to map out a typical day (as a diary or as a picture storyboard). They should highlight every time an activity uses energy or contributes to global warming, and consider what they, their parents or their school could do differently to reduce impact. Groups report back and compile a list of all the things that could be changed for the better on the board. Discuss if any of these could actually be achieved, and who would have to make those changes. Write letters or design posters to try and persuade the people who need to do things differently to act.	Geography Citizenship Art & Design
Ask the young people to work in small groups to plan a polar expedition. What would they need to take? How would they get there? What dangers would they face and how would they deal with them?	Geography Literacy
Show the image of the polar bears and penguins on the sea ice (below). Animals can't speak, but ask the young people to imagine that these animals could send a message to all of us? What would that message would be?	Literacy

KS3-4

Activity Idea	Subjects
Polar Species Research Project Research the animals that live in the Arctic and/or Antarctic. For each species you research, create a fact file. Aim to research at least 4 species. You should try to include the following in each fact-file: Name of species Image of species – This can be drawn, printed or copied and pasted. Endangered status – Use the IUCN website to help you Habitat – Include a map and highlight the regions where this species can be found. Adaptations to habitat – Label your image of the species to show how it is adapted to live in freezing climates Diet – Draw a food chain showing how the species fits into a polar ecosystem Migration – Does this species migrate? Where, when and why? Threats to populations – Include both natural and human inflicted threats	Biology Geography
Polar Explorer Journal Write two diary entries from the perspective of polar explorers, one from an expedition in 2020 and one from an expedition in 1980. Try to include as much sensory detail (sights, sounds, smells, taste, touch) as possible to aid your description. Think about the conditions you are facing and the sights and wildlife you have seen. What similarities and differences might there be between the two diary entries, think about what may have changed in polar regions between 1980 and 2020. Aim for half a side to a side of A4 for each entry.	English
Design Brief The climate crisis threatens to destroy life on our planet as we know it. However, the way humans have been living is part of the problem. From burning fossil fuels for energy to clearing forests for industry and agriculture,	Design Technology / Product Design

to throwing away plastics and waste in vast amounts, if we are to turn the tide of climate change then a new sustainable way of living is needed. Your brief: Design a lifestyle app to help the public make better choices and live more sustainably in their everyday lives. You can focus on one issue or as many as you'd like - be creative! You may want to consider one or more of these aspects: Energy sources, transport, food, calling for action from government, consumption, waste and pollution, water use, protecting habitats and wildlife. You can draw your design on paper with a pencil and rule, or electronically if you wish. Remember to label it clearly and in detail. Hint: Stuck on where to begin? Carry out some research, what apps are out there already? What features of popular apps could you use in yours? Carry out some market research, what do you friends and family think could help them to make greener choices?	
1. For each of the statements/questions below make a list of arguments both *for* and *against.* Use facts and statistics to support your arguments where possible. **2. Choose one topic to plan, write and perform a persuasive speech on. Alternatively, why not ask a family member or friend to take the opposing side and hold a debate (in person or virtually)!** • Do school climate change protests make a difference and are they important? • Should we eat less meat to save the environment? • Melting ice in the poles is nothing to worry about. • Climate change is down to world leaders to solve, not everyday people.	**Speaking and Listening/ Debate/ Drama/ English Language**