WWF | FOR YOUR WORLD

ENDS OF THE EARTH

ACTIVITIES TO EXPLORE THE ARCTIC AND ANTARCTIC REGIONS

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INTRODUCTION

At the opposite ends of the earth, lie the coldest places on our planet. Bitterly cold winds whip across a landscape where temperatures fall far below freezing. Over millions of years, species have evolved to survive in these extreme conditions. There are about 20 million breeding pairs of penguins in the Antarctic. The world's largest living land carnivore, the polar bear, makes it home in the Arctic.

Yet the polar regions are under threat. Even the relatively untouched expanse of Antarctica is suffering the effects of climate change and the Arctic is also threatened by pollution, developments in the oil and gas industry, and overfishing.

This resource explores what is being done to protect the important polar regions and how every one of us can play a part in preserving them for future generations.

HOW TO USE THIS RESOURCE

This pack is aimed at teachers of 4–11 year olds and is designed to help them introduce pupils to the polar regions and understand the threats that they face. Pupils will be filled with wonder at the environments and the animals that live there and will begin to understand how the future of these places is directly linked to their own lives.

This pack contains a range of activities aimed at Key Stages 1 and 2 (ages 5-11) and ideas for a whole-school approach that can be linked to Christmas. All the activities are linked to the National Curriculum, although we hope that teachers in Scotland and Wales will find it useful to support their curriculum. Teachers will find that the material can be adapted for use with different ages and abilities. The materials can be dipped into to link with a particular unit of work such as persuasive writing or they can be followed as a topic over a whole term.

The activities in this resource use a learning cycle approach which sees understanding, making links and motivation as key precursors to taking action. Action in turn is seen as a way to enhance and extend (reflective) learning. As well as building children's knowledge of the issues, the activities will encourage pupils to be aware of the 'bigger picture' and see how seemingly small actions, such as leaving a light on, can have far reaching consequences by contributing to climate change. Some of the issues that are raised may seem overwhelming, but it is important the pupils do not feel disempowered. The activities encourage pupils to reflect on the active role that they can play in the global community.

BACKGROUND INFORMATION ON THE ARCTIC/ANTARCTIC

As well as being spectacularly beautiful, the polar regions are amongst the coldest, driest or windiest places on earth. Bright, white snow and ice stretch as far as the eye can see.

THE ARCTIC

The Arctic is a frozen ocean in the winter surrounded by land. Yet with its vast sea ice, it sprawls over one sixth of the Earth's surface, covering over 30 million km^2. The Arctic Ocean is the smallest and shallowest ocean in the world. The ice that forms over it in winter is a giant layer of floating ice. In fact there is no land at the North Pole, or within many hundreds of kilometres of it.

The Arctic is home to about 4 million people, including over 30 different indigenous peoples who speak dozens of languages. For thousands of years they lived nomadic lifestyles, hunting wild animals, such as caribou, seals and fish. Today many Arctic peoples are abandoning part of their traditional ways of life and most have settled in permanent villages. Twenty Arctic languages have become 'extinct' since the 1800s, 10 since 1990.

THE ANTARCTIC

At the other end of the earth, the Antarctic is a frozen land surrounded by ocean. Even in the summer this vast land mass is covered with ice that is an average of 2000m thick. Averaging 2,000m above sea level, Antarctica is the highest continent and parts of the sheet ice are 4,000m above sea level. Lake Vostock is buried under nearly 4 kilometres of ice. Antarctica is also a polar desert. At the South Pole, the snowfall is equal to less than 50mm of rain a year.

The Antarctic, much colder than the Arctic, is the coldest place on earth. Very few plants and animals can survive in such an extreme environment, but some have adapted to life there.

Although there are no trees or shrubs, there are two species of flowering plants and about 100 species of moss as well as lichens which grow very slowly, due to the low temperatures.

Although life on the land is very restricted by the ice and climate, the seas around Antarctica are very rich. One of the most important creatures in the Southern Ocean is krill, a tiny relative of the shrimp. Millions of them come together in shoals which are eaten by a wide variety of animals including seals, penguins, seabirds and whales.

Antarctica has no permanent inhabitants. It is protected by a 1959 treaty that established the continent as a place to be used only for peace and science. Up to four thousand scientists and support staff inhabit the area in the pursuit of research.

In exploring the issues facing the polar regions, this resource focuses on two iconic animals, the polar bear and the penguin.

POLAR BEARS

The polar bear of the Arctic is the largest living land carnivore. Today they are classified as a vulnerable species and there are around 22,000-31,000 polar bears in the wild.

Polar bears spend much of their time at or near the edge of the frozen sea ice. This is where they are most likely to find their main source of food, seals. Polar bears spend over half their time hunting. Their keen sense of smell can detect a prey from several miles away. However, hunting is a difficult task even for the mighty polar bear, which on average will catch only one seal a week.

Polar bears depend on the floating sea ice to hunt for seals. However, global warming means that the sea ice is melting earlier and freezing much later in the year. This makes access from the sea ice more difficult and gives polar bears less time to hunt and build up food stores in their bodies. Sometimes they have to swim for up to 9 days to find sea ice.

Polar bear cubs stay close to their mothers for the first two years of their lives. As climate change affects the polar bear's home, mothers are increasingly forced to make a hard choice – stay on land where food is scarce, or swim out to the sea ice and risk the safety of their cubs that cannot swim the distances between ice floes. Hunger is also now forcing polar bears to come into villages and towns to search for food and this closer contact with people can have dangerous consequences for people and bears.

PENGUINS

Penguins are a group of flightless seabirds found in the Southern Hemisphere. There are 18 different species of penguin, five of which breed in the Antarctic. Only the Adélie and Emperor penguins live permanently in Antarctica.

Today there are around 5 million Adélie penguins in the wild. However they are listed as 'Near Threatened'. In parts of the Antarctic Peninsula populations of Adélie penguins have dropped by 65% over the past 25 years. Climate change and warming temperatures mean that the atmosphere in Antarctica holds more moisture and this brings snow. This reduces the land area on which Adélie penguins can nest. Snowfall during the late winter and early spring means that Adélie penguin chicks hatch later. There's less krill at this time of year, which can affect the chicks' chances of survival.

The world's largest penguin is the emperor, standing around 115cm tall and weighing in at 40kg. They are able to survive the bitter cold, laying their eggs during the winter, with temperatures around -50°C and winds of up to 200km per hour. Emperor penguins do not make nests. When the female lays an egg she passes it to the male who keeps it warm by balancing it on top of his feet and covering it with a flap of skin. While the female penguin returns to the sea for two months to feed, the male incubates the egg. Huge colonies of males huddle together to stay warm, with individuals taking turns to stand at the outer edge of the huddle where it is coldest. Males do not eat while they incubate the egg and can lose up to 45 per cent of their body weight. After two months the chicks hatch and the male brings up food from his stomach to feed it. Then the female penguin returns from the sea and takes over.

THREATS TO THE POLAR REGIONS

CLIMATE CHANGE

Climate change is one of the biggest threats to the polar regions. We know the planet has warmed by an average of nearly 1°C in the past century. Although this may not sound much, on a global scale it's a huge increase that is creating big problems for people and wildlife.

Climate change is already altering Arctic habitats. The Arctic is warming at twice the global average. Parts of the Southern Oceans are warming faster than any other ocean. Sea ice cover has reduced by around 40% since the early 1980s on the western Antarctic Peninsula, which affects the breeding of krill (see below).

OVERFISHING

Around the world, people are taking fish out of the water faster than they can reproduce and be replaced. With more fish being taken there is less food for the animals that depend on them.

In Antarctica, illegal fishing , the risk of overfishing, bycatch of non- target species including seabirds, and competition with feeding grounds of penguins, all need to be carefully managed. Fish, birds, seals and whales all depend on krill (tiny shrimp-like animals) in their diet and, unless sustainably managed, overharvesting of krill could mean that animal species higher up the food chain are threatened.

OIL AND GAS DEVELOPMENT

The Arctic holds some of the world's largest untapped oil and gas reserves, but getting to those precious resources, whether on land or offshore, can have a devastating environmental impact.

The roads, pipelines, airports and power stations that oil rigs need can damage habitats. The sounds of oil and gas explorations are so loud that belugas, bowhead whales and other sea life have had difficulty feeding and breeding. Some animals such as caribou, can no longer migrate where they wish which affects their survival. When something does go wrong and an oil spill occurs, Arctic wildlife can be killed and the habitat contaminated for decades.

POLLUTION

Pollutants from human activities tend to make their way to polar regions, carried on ocean or atmospheric currents. Marine debris, which can entangle wildlife, may stick around for long periods as the region's extended, dark and cold winters inhibit the breakdown of chemicals.

WHAT CAN BE DONE?

The polar regions are very special places and, although they are at the ends of the earth, we are having a big effect on them. Most scientists and governments agree that climate change, the biggest threat to the polar regions, is the result of human activity. Yet we can all do something about it and here is how:

SAVE ENERGY

Electricity and gas are made from fossil fuels which, when they are burnt, release the greenhouse gases that contribute to global warming. We can all save energy by making sure we turn lights and appliances off, rather than leave them on standby. Other ways to save electricity: turn the heating down, set the washing machine to 30°C, have a shower rather than a bath, draw curtains at dusk to keep the heat in.

DON'T WASTE FOOD

About a third of the food we buy, that's three out of every ten bags of shopping, ends up in the waste bin or landfill. There it turns into methane which is even more potent than carbon dioxide in contributing to global warming. However, about a third of our kitchen and garden waste, uncooked food scraps and peelings, grass cuttings and much more, can be composted.

BUY LOCAL AND SEASONAL

Seasonal produce is often tastier and cheaper. And it's good for the environment too. You might be able to buy British-grown tomatoes in winter, but they're probably grown in artificially heated greenhouses with high levels of heating, lighting and fertilisers.

WALK OR USE PUBLIC TRANSPORT

In the past 30 years traffic on our roads has more than doubled. Walking or using public transport is often not as hard as we think and it is a healthier option.

REDUCE, REUSE & RECYCLE

The production process for new household appliances (even the best-rated 'efficient' appliances) and entertainment systems requires massive amounts of energy and resources.

MAKE YOUR VOICE HEARD

As individuals we can all take steps to protect the polar regions. We can also press our governments to take action by:

RECONSIDERING OIL AND GAS DEVELOPMENT IN THE ARCTIC

There is no proven technology to effectively contain or clean up major oil spills in the Arctic, whether spills occur from oil and gas development or from shipping accidents. WWF is concerned about the local, regional and global effects of oil and gas development in the Arctic, and is encouraging governments and industry to support renewable energy instead of hydrocarbon development, identify 'no-go zones' for oil and gas, support research into risk lowering technologies, and adopt higher standards for spill prevention and clean up.

MOVING TO RENEWABLE ENERGY

Neither the Arctic nor the rest of the world can safely absorb the sort of climate change that would be triggered by exploiting all of the world's hydrocarbons. To avoid severe climate impacts, it is urgent that we move towards a more renewable future.

MANAGING AND PROTECTING RESILIENT PLACES

It is important that we manage and protect areas of special biological, economic and cultural importance. WWF is working with local people and governments on a project called 'Last Ice Area'. This is the area off North East Canada and North West Greenland where scientists predict that summer sea ice will last longer than elsewhere in the Arctic. We want to chart a future for polar bears, other ice-dependent species and indigenous people.

In the Antarctic, WWF is calling for a network of Marine Protected Areas in the Southern Ocean which surrounds Antarctica. We are sending the first-ever scientists to study the Jason Peninsula Emperor penguin colony to see where the penguins feed and how they are responding to climate change. This will help determine where to establish marine protected areas in the area.

SUMMARY TABLE OF ACTIVITIES AND CURRICULUM LINKS

ACTIVITY NAME	AGE RANGE	SUBJECT FOCUS
Activity 1: Polar stories	4 - 7	English, Citizenship
Activity 2: Photo explorers	4 – 11	Geography, Citizenship
Activity 3: Polar poetry	6 – 11	English, Citizenship
Activity 4: Ends of the Earth quiz	7 - 11	Geography, Citizenship
Activity 5: Links to the Ends of the Earth	7 - 11	Geography, Citizenship
Activity 6: Ends of the Earth board game	7 - 11	Geography, Citizenship
Activity 7: Persuasive powers	7 - 11	English, Citizenship
Activity 8: Adaptation	7 - 11	Science, Citizenship
Activity 9: Wishes for the future	4 – 11	English, Citizenship

ACTIVITY 1: POLAR STORIES

Stories can be a valuable way of supporting young children in their conservation issues.

They provide a stimulating starting point and allow children to reflect on their own experiences and feelings. Stories also help very young children to develop their speaking and listening skills and provide models for writing. In this activity, children will begin by looking at a familiar story and will adapt it to create a new story, based on their knowledge of the polar regions.

AGE RANGE:	4-7
TIME NEEDED:	Two sessions of 50 to 60 minutes
KEY VOCABULARY:	Arctic, polar regions, ice berg, snowstorm, blizzard
LEARNING OUTCOMES:	• Pupils will develop their speaking and listening skills • Pupils will develop their group work skills • Pupils will understand that we can all make a difference to the future
LEARNING CYCLE:	Motivating

PREPARATION AND CLASSROOM ORGANISATION

Depending on the ages of the pupils you may like to carry out this activity as a whole class. It may also be appropriate to act as a scribe for younger pupils before they begin their independent writing.

RESOURCES NEEDED

- A copy of 'We're Going on a Bear Hunt' by Michael Rosen.
- Copies of photos 1-8 which can be projected onto the interactive white board (downloadable online).

WHAT TO DO

SESSION 1

Share the story 'We're Going on a Bear Hunt' with the children. Encourage the children to join in, noticing the pattern and repetition in the text. After reading the story spend some time looking at the end papers with the children. These show the bear walking away alone towards its cave. How does the picture make the pupils feel?

Now explain to the pupils that they are going to think about another type of bear that lives in a very different place. Give the pupils some clues and see if they can guess what sort of bear this is: it is a large bear, it leaves near the sea, it has thick white fur, it lives in a very cold place.

Show children the photo cards of polar bears and tell pupils something about the Arctic where it lives. Explain to pupils that they are going to go on an imaginary bear hunt to find a polar bear in the Arctic. They are going to create their own bear search story. To begin with, you will need to model this for the pupils. Show them photo 1 on the whiteboard. Ask pupils what they can see in the picture. How would they describe this landscape? Write down their words and ideas so that you build up a word bank that can be used by the pupils. Then, using the word bank, write a page using the pattern and repeated text from the book. For example: ice. Uh-uh! Ice. White, slippery ice. Slip, slide.

SESSION 2

After working together as a whole class in the last session you will need to refamiliarise the pupils with the story and the photos. In this second session ask pupils to create their own section of the story with each group using a different photo as a starting point.

One group could also do the section where the family enters the cave and comes face to face with the bear. They could describe some of the characteristics of a polar bear using the original story as a starting point.

As additional preparation for writing, it may be helpful, to 'walk through' the story in a larger space, such as the school hall. Pin the photos to the wall. Walk from one photo to the other in role and repeat the patterned text as you do so.

Uh-uh! An iceberg. A frozen, shiny iceberg. Grip, slip!

Uh-uh! The sea. The icy, cold sea. Paddle, paddle.

Uh-Uh! A den! A snowy, xxxx den.

REFLECTION/EVALUATION

Ask pupils to talk in pairs about the landscape that the polar bear lives in and encourage them to express their sense of wonder. Do they think that it is important that we try and protect the landscape that the polar bear lives in? Why?

ACTIVITY 2: PHOTO EXPLORERS

This is an introductory activity which aims to build pupil's knowledge about the polar regions and to begin to make links to how the future of these regions is inextricably intertwined with their own lives. Using photos in this open-ended way allows teachers to assess pupils' existing knowledge and identify the gaps that need filling. Young children also generally feel confident discussing photos as they can start with their own ideas and there is no 'wrong' answer.

AGE RANGE:	4-11
TIME NEEDED:	50 to 60 minutes
KEY VOCABULARY:	Arctic, Antarctica, polar bear, climate change, interdependence, wilderness, habitat, energy, penguin
LEARNING OUTCOMES:	• Pupils will develop their speaking and listening skills • Pupils will build upon their own knowledge • Pupils will develop their group work skills • Pupils will understand that we can all make a difference to the future
LEARNING CYCLE:	Motivating

PREPARATION AND CLASSROOM ORGANISATION

Before the lesson you will need to fix each photo to the centre of a large piece of paper so that pupils can write around it. Children will work in mixed ability groups.

Note: this activity works well with younger children, although they may need to work with an adult who scribes for them, noting down all their ideas.

RESOURCES NEEDED

- Photos 2, 7, 10, 11 and 12, one for each group (downloadable online). You may also like to copy these so that they can be shown to the whole class on the interactive white board during the feedback session.
- Large sheets of paper and
- Coloured pens – each group should have two colours.

WHAT TO DO

Explain to the pupils that they are going to explore two parts of the world that most people have never been to. These regions are among the largest remaining wilderness areas on our planet. Where do they think these might be? After taking feedback, tell the pupils that they are going to

look at the Arctic and Antarctic regions of the world. They probably already know something about these places. At this point, do not give the pupils too much information as this activity will give you useful feedback on existing knowledge.

If you feel that your class is unconfident about group work, you may like to look at one photo together as a whole class before breaking into groups. If not, explain to pupils that they are going to work together as a group to share what they know about the polar regions. As guidance, pupils may like to focus on the following questions:

Describe what you see in the photo.

- Where do they think this photo was taken? What clues in the photo give you this view?
- What is this place like?
- Is there anything else that you know about the place in this photo?

In one colour pen, ask pupils to write down all their ideas around the photo. Go around the classroom, offering support to groups. Now take feedback from the class and point out to pupils how much knowledge they already have.

For the second part of the activity, ask pupils to consider the same photo but, in a different coloured pen, write down any questions that they have. After a few minutes, allow each group to feedback to the whole class. Draw up a shared list of questions that pupils would like to explore and take a look at these. Some can probably be answered straight away because other pupils know the answer. Others may need to be researched. And some questions are more difficult to answer. Perhaps the answer depends on the opinion of the person who is answering it.

After examining the photos, explain to pupils that although these places are far away from us, we are closely linked to them. Most scientists and governments agree that climate change is the result of human activity. When we use up energy to heat our homes, cook our food or get about we burn fossil fuels – coal, oil and natural gas. This releases gasses into our atmosphere which traps heat from the sun, causing the temperature to rise and this causes the ice to melt. This means that the habitats of polar bears and penguins are threatened. But luckily we can all do something about this. All of us can try and save energy. We are going to find out a lot more about this.

REFLECTION/EVALUATION

Point out to pupils that they already know a lot about the polar regions. In pairs ask them to share with a partner one thing that they have learnt through this activity.

FURTHER IDEAS FOR YOUNGER CHILDREN

These photos can be used in many different ways with younger children:

- Display the photos around the room and ask pupils to choose one that they like and talk about this with a partner, or write it on a post-it.
- Ask pupils to pick a photo and, with a partner, imagine what they might be able to see, hear and smell if they were in this place.
- Ask pupils to think of some questions that they would like to ask the animal in the photo.

- Ask pupils what would happen if the ice melted? Where would they live? How would they raise their young? What would they eat?
- Cut out some speech bubbles for pupils and ask them to fill them in for the animal in the photo.

ACTIVITY 3: POLAR POETRY

In this activity pupils will use photographs as a starting point for their own poems.

AGE RANGE:	6-11
TIME NEEDED:	50 to 60 minutes
KEY VOCABULARY:	Arctic, Antarctica, kenning
LEARNING OUTCOMES:	• Pupils will develop their descriptive vocabulary. • Pupils will use language imaginatively to explore a new theme. • Pupils will write their own poems on polar animals, based on a given structure.
LEARNING CYCLE:	Reflection

PREPARATION AND CLASSROOM ORGANISATION

Pupils will begin by working as a whole class and will then carry out individual work.

RESOURCES NEEDED

- Some examples of kennings to show the class, if using this approach.
- Copies of photocards 13-16, which can be projected onto the interactive white board (downloadable online).

WHAT TO DO

Show the pupils the photos of the penguins and polar bears and, in pairs, ask them to think of some descriptive words or phrases to describe them. Encourage them to organise words and phrases into different headings: appearance, sound, movement, and behaviour. As a class, build up pupils' vocabulary and create a word bank. Pupils can also build on their existing knowledge of the animals from books or films. Extend pupil's choices by asking if they can improve on any words. You can also ask pupils to think of similes e.g. a nose like a lump of wet coal, and note these all down. At the end of this introduction you should have a useful shared word bank for pupils to use in their writing.

Now explain to pupils that they are going to be writing their own poems that will leave the reader with a sense of wonder and respect for the animals and their environment.

Tell pupils that the lines of their poems do not have to rhyme. This will allow them to explore more interesting vocabulary and will keep their poems fresh. You may also wish to encourage older children to use a thesaurus.

FOR YOUNGER CHILDREN

Give pupils a strong but very simple structure for their poems. For example you may wish to start with:

Where is the bear

With… (a furry white coat/

with small perky ears

and a shiny black nose?)

Where is the bear?

Pupils can go on to begin another verse with the same pattern, but perhaps describing where the bear lives, for example. Where is the bear who lives in the frozen ice etc.

Peek at a penguin

With…

FOR OLDER CHILDREN

An alternative structure would be to write a kenning. These poems look at a subject without using its name, except in the title. To begin you might like to read the following to the class and see if they can guess what animal you are describing (a cat): night prowler/mouse catcher/ tail chaser/sleep lover/furry pillow/. Again, refer to the word bank that you have built up with the pupils and encourage them to use it.

REFLECTION/EVALUATION

At the end of the session, ask some pupils to read out their poems to the rest of the class. Ask pupils to reflect on how the poems make them feel.

ACTIVITY 4: ENDS OF THE EARTH QUIZ

This is an engaging activity to introduce a new topic to a class.

AGE RANGE:	7-11
TIME NEEDED:	30 minutes
KEY VOCABULARY:	Arctic, Antarctica, polar regions
LEARNING OUTCOMES:	• Pupils will learn more about the polar regions in an interactive way • Pupils will develop their speaking and listening skills • Pupils will develop their group work skill
LEARNING CYCLE:	Motivating

PREPARATION AND CLASSROOM ORGANISATION

You will need a copy of the quiz for each pair of pupils.

RESOURCES NEEDED

Enough copies of the quiz for each pair of pupils to share one (downloadable online).

WHAT TO DO

Before you start, write the words 'polar regions' on the board. Explain to pupils that you would like them to suggest, in a very short time, as many ideas as possible that come to mind when they see these words. Write all the ideas down without rejecting any.

Now give each pair of pupils a copy of the quiz to complete. Once they have had the chance to complete this, go through the answers as a whole class. You may wish to add additional information from the answer sheet.

REFLECTION/EVALUATION

As a class reflect on what pupils have found out. Is there anything that particularly surprised them? Go back to the thought shower. Is there anything that they now feel differently about?

ENDS OF THE EARTH QUIZ ANSWERS

1. **TRUE**. The area of Antarctica that is ice free is about the same size as Denmark.
2. **TRUE**. Polar bears live in the Arctic Circle whilst most species of penguin live in Antarctica.
3. **FALSE**. No trees or shrubs exist on Antarctica. However there are around 100 species of moss, lichens and two species of flowering plant. They grow very slowly in the icy conditions.
4. **FALSE**. No one owns Antarctica. It is protected by a 1959 treaty, signed by 50 nations, that established the continent as a place to be used only for peace and science.
5. **TRUE**. Climate change is leading to a decline in the sea ice which is essential for polar bears to hunt and raise their young.
6. **FALSE**. Penguins lost the ability to fly millions of years ago, but their powerful flippers and streamlined bodies make them very accomplished swimmers. They are the fastest swimming and deepest diving species of any birds.
7. **FALSE**. The South Pole lies at the extreme south of the earth, in Antarctica.
8. **TRUE**. Antarctica is a polar desert with very low levels of precipitation which mostly falls as snow - averaging less than 50mm a year, 20mm less than the Sahara.
9. **FALSE**. They are very good swimmers. Their Latin name, Ursus maritimus, means sea bear because they spend so much time in or near the sea.
10. **FALSE**. Antarctica covers 14million km2 - which is about 58 times the area of the UK.
11. **TRUE**. Scientists working in Antarctica can get sunburnt in as little as 5 minutes if they don't wear high factor sunscreen.

ACTIVITY 5: LINKS TO THE ENDS OF THE EARTH

AGE RANGE:	7-11
TIME NEEDED:	50 - 60 minutes
KEY VOCABULARY:	Interdependence, climate change, arctic ice, global warming
LEARNING OUTCOMES:	• Pupils will develop their speaking and listening skills • Pupils will develop their group work skills • Pupils will understand how everyday activities impact on the environment
LEARNING CYCLE:	Making links

PREPARATION AND CLASSROOM ORGANISATION

You will need one starter card and one set of consequence cards, cut up, for each group of pupils. Pupils will work in mixed ability groups.

RESOURCES NEEDED

- Starter cards; one for each group of pupils (downloadable online).
- Consequence cards; one sheet, cut up for each group of pupils (downloadable online).
- Large sheets of paper, glue and pens.

WHAT TO DO

Begin by telling the class a traditional Jewish story. One day a group of people were travelling in a boat. One of them began to drill a hole in the boat under his seat. “What are you doing that for?” his companions cried, as the water began to collect around their feet. “What does it matter to you?” replied the man. “I’m only drilling under my own seat!”

Ask the pupils what they think the message of this story is. Draw out the fact that everyone in the boat shares the same fate. It is the same with our planet. Our actions affect people and animals that we will never see. This is called interdependence.

Explain to pupils that they are going to be making some links and finding out how simple actions can have far-reaching consequences.

Give each group of pupils a starter card. Tell pupils that on each starter card is a simple action that someone has taken. It is also the start of a chain reaction. In each group they will create a web of links which will show how everything that we do has an effect. Ask pupils to glue their starter card onto their sheet of paper and then organise the consequences cards onto the sheet in a way that

shows that each action leads on to a consequence. When they have agreed on where to put their cards they should glue them down and link them with arrows.

Take feedback from each group and ask them to explain what they have noticed. It will probably have become clear to pupils that every action has a consequence. Talk about how climate change is considered to be the most serious environmental challenge facing our planet. The climate has changed many times before during the earth's history. But most scientists and governments agree that our climate is now changing faster than species and habitats can adapt to, and that this is due to the activities of people. Climate change is causing the arctic ice to melt. As the earth becomes warmer, we are seeing more extremes in weather conditions with droughts meaning that less food can be grown in different parts of the world while other parts of the world are flooded.

Remind pupils that it is important to remember that we can all do something about climate change. With pupils go back and look at the starter cards. What could each person have done differently? What can we all do to save energy?

EVALUATION/REFLECTION

Ask pupils to think back to the story at the beginning of this session. How does it relate to what they have learnt in the lesson? Ask each pupil to write down one thing that they are going to do differently as a result of what they have learnt. Ask them to share this with a partner and get some ideas from the class.

ACTIVITY 6: ENDS OF THE EARTH BOARD GAME

In this activity pupils will design their own illustrated board game that will focus on the threats faced by the polar regions and what some of the solutions might be. This activity will be more effective if pupils have had the chance to explore some of the issues relating to the polar regions through earlier activities such as Activity 5 Links to the Ends of the Earth.

AGE RANGE:	7-11
TIME NEEDED:	Two sessions of 50 to 60 minutes
KEY VOCABULARY:	Threat, solution, polar regions, Arctic, Antarctic, climate change, arctic ice, global warming
LEARNING OUTCOMES:	• Pupils will develop their group work skills • Pupils will develop their understanding of some of the threats facing the polar regions. • Pupils will understand that we can all make a difference to the future
LEARNING CYCLE:	Knowledge

PREPARATION AND CLASSROOM ORGANISATION

If you decide to do a whole-class version of a board game, you will need to make a large 'board'. To make this you can cut two large pieces of scrap wallpaper and glue these together.

RESOURCES NEEDED

- A large sheet of paper or card for each group of pupils. To make a larger, whole class version you could use wallpaper (see above).
- Dice.
- Counters.
- Small pieces of card with which to make Threat or Solution cards.
- Pens, sheets of paper, colouring materials
- Photocards 1-17 (downloadable online).

WHAT TO DO

SESSION 1

Talk to the class about their favourite board games. How do they work? How do people win the game? What equipment do they use? If they are not mentioned, refer to two simple games, Snakes and Ladders and Monopoly. Both these games involve moving round a board.

In Monopoly you also pick up cards. Explain to the class that they are going to be creating their own board game which is based on the polar regions. The game will be played like Snakes and Ladders so players will move from one end of the board to the other to win. Instead of 'snakes' and 'ladders' there will be 'threats' and 'solutions', which players will pick up when they land on the appropriate space.

Before beginning, display some of the photos and ask pupils to think what dangers face the polar regions – global warming, over fishing, pollution, burning of fossil fuels etc. Then ask them to think of some of the actions that can be taken to avert the threats - cutting down on the use of fossil fuels, saving energy by turning off lights, using public transport etc. These will be written on solution cards.

Take some feedback from the groups and show pupils how to make a threat or solution card using the example below.

THREAT

A damaged pipe spills oil into the sea. The oil kills thousands of birds. Miss a turn.

SOLUTION

You take the bus to school instead of driving in a car. This saves petrol. Move forward two spaces.

SESSION 2

In this session, pupils will design a simple board with approximately 60 spaces. They can illustrate the spaces and in a number of others will instruct players to pick up one of the Threat or Solution cards that have been made in session 1.

Remember to find time for pupils to play their games – they are likely to be highly motivated!

EVALUATION/REFLECTION

Ask pupils to think about how they felt when playing the game. What do they feel about the threats that the polar regions face? It is also important to end the session by reminding pupils that we all have a part to play in protecting the polar regions. Ask pupils to think of some actions that may be taken, referring to the solution cards. Ask each pupil to share with a partner one thing that they are going to do as a result of what they have learnt.

FURTHER IDEAS

You may like to develop these games and sell them at the school fair to raise money to protect the polar regions.

ACTIVITY 7: PERSUASIVE POWERS

In this activity pupils will carry out research into the polar regions and will use this to write a persuasive letter to a world leader. This activity could be carried out as part of a unit of work on persuasive writing.

AGE RANGE:	7-11
TIME NEEDED:	Two sessions of 50 to 60 minutes
KEY VOCABULARY:	Persuasive, Last Ice Area, Arctic, global warming
LEARNING OUTCOMES:	• Pupils will research a topic and apply this to a task • Pupils will develop a persuasive argument • Pupils will develop an appreciation of and concern for living things and their habitat.
LEARNING CYCLE:	Action

PREPARATION AND CLASSROOM ORGANISATION

Before beginning this activity, give pupils the opportunity to carry out some research on polar regions.

RESOURCES NEEDED

Access to resources, either over the internet or through books. You will find information on the Last Arctic Area from: www.wwf.panda.org/what_we_do/where_we_work/arctic/last_ice_area/

WHAT TO DO

SESSION 1

Talk to pupils about a time when someone has tried to persuade them to do something. This might include giving out leaflets or adverts, people trying to win votes as in the school council, or a teacher trying to persuade pupils to do their best in school.

Now discuss the point of a persuasive letter. What would make a reader take notice of it? You may like to analyse a persuasive letter together as a class and identify some of the features. These might include:

- A clear statement of what you want the reader to do
- Emotive language (e.g. strong adjectives)
- Speaking directly to the reader, using the pronoun 'you'
- An appeal to the readers' sympathy

- A rhetorical question
- Some facts and figures

Explain to pupils that, using the research that they have carried out, they are going to begin working on writing a persuasive letter to encourage a world leader to chart a future for the 'Last Ice Area', the area of the Arctic that scientists predict summer sea ice will last the longest. This will create a protected or managed area for the indigenous people and animals that live in that part of the Arctic. It will help to ensure the survival of some of the animals and people that are most threatened by climate change.

Ask pupils to share some of the information that they have found out about the Arctic and the Last Ice Area. They should come back to class and share what they have found with others.

Encourage pupils to note down any useful information or facts and figures.

SESSION 2

After recapping on the first session ask pupils to talk in pairs through the reasons why the Last Ice Area needs to be managed. They should list down as many reasons as they can. Take some feedback from the class, noting down the most useful points.

Now ask pupils to identify what they think are the three most important points that need to go in their letter. They should back each of these up with an explanation. Now ask pupils to write their letters and include these points, thinking carefully about whom they are writing for and what they want them to do.

EVALUATION/REFLECTION

Ask some pupils to read their letters to the class. Pupils who are listening should think about which parts of the letters were most convincing and why.

Encourage pupils to reflect on how they felt when they wrote and listened to the letters. It is important that pupils have the opportunity to express their feelings about what may be worrying issues, and that they have the space to explore solutions.

FURTHER IDEAS

- You may wish to write persuasive letters on other issues. These might include:
- Encouraging world leaders to tackle climate change by cutting greenhouse gases.
- Writing a letter to other classes in the school asking them to save energy.
- Writing to parents in the school to encourage them to save energy at home.

ACTIVITY 8: ADAPTATION

In this activity pupils will look at how polar bears and penguins have adapted to suit their harsh environments. They will go on to look at what a scientist needs to pack in order to be able to live in extreme conditions.

AGE RANGE:	7-11
TIME NEEDED:	50 to 60 minutes
KEY VOCABULARY:	Adaptation, habitat, global warming
LEARNING OUTCOMES:	• Pupils will develop their group work skills • Pupils will know that species are adapted to their environments.
LEARNING CYCLE:	Knowledge

PREPARATION AND CLASSROOM ORGANISATION

Some research on polar regions. Pupils might like to visit arkive.org to find out more about penguins, polar bears, the Arctic and Antarctica.

RESOURCES NEEDED

- Resource sheets 1 and 2 [large photos of penguin and polar bear with arrows so that pupils can identify the ways in which they have adapted to their habitats], one photo for each pair of pupils.
- Photocards 1 and 16 on the whiteboard (downloadable online).

WHAT TO DO

Explain to pupils that animals that live in the polar regions are uniquely adapted to survive in the extreme conditions of the habitats in which they live. Give one photo to each group of pupils and see if they can describe the ways in which the animals have adapted to suit their environment. Take feedback from pupils. You can use the information below to help build up their knowledge.

PENGUINS

- Webbed feet for steering and braking underwater.
- Claws for moving on the ice or digging burrows.
- Tail to steer when swimming.
- A beak for catching prey.
- Feathers which trap a layer of air to keep the body warm.

- Black and white feathers for camouflage.
- Shorter wings that act like paddles.
- A torpedo shaped body that moves easily under water.

POLAR BEAR

- A 10cm layer of fat (blubber) under the skin to keep warm.
- Webbed feet for swimming.
- Powerful legs for swimming long distances.
- Small ears lose little heat.
- Polar bears hairs are transparent allowing the sun's heat to reach the skin.
- Fur that sticks together when wet, making a waterproof barrier.
- A nose that has a very good sense of smell to sniff out prey.
- Black skin beneath the fur which absorbs heat.
- Three eyelids to help protect the bear's eyes.
- Huge paws that act as a natural snowshoe to help the bear move across ice.
- White fur acts as camouflage.

Explain to pupils how indigenous people such as the Inuit in North America and Greenland, and the Saami in Northern Europe have lived on the land around the edge of the Arctic Circle for thousands of years. Traditionally they lived a nomadic life, travelling across the frozen land and sea to hunt animals such as seal and walrus. In the past they used animal furs and skins to keep warm and built shelters such as igloos to protect themselves against the elements. Today most Arctic peoples live in permanent modern homes and ways of life are changing.

Scientists and support staff are the only group of people that live in the Antarctic. They too have to adapt to the extreme conditions in which they live and work. In groups, ask pupils to think of a kit list that a scientist would need to survive.

Bring pupils back as a class and discuss their ideas. You may like to add in some of the following essentials if they have not been mentioned: warm clothing and boots, tent and sleeping bags, food supplies, a cooking stove and fuel, rope, ice axe, snow shovel, skis, maps, satellite mobile phone, compass, sunglasses, sun cream. People also need to drink several litres of water a day since the air is very dry.

EVALUATION/REFLECTION

Discuss how technology allows scientists to adapt to extreme conditions. However animals have evolved over millions of years to adapt to their habitats. Today these are changing rapidly due to global warming, and they are finding it harder to adapt and survive. What ideas do pupils have that would help species to survive?

ACTIVITY 9: WISHES FOR THE FUTURE

This activity could be used to build on work that is taking place throughout the school. The box below gives some background information on the significance of trees in various cultures and religions...

Throughout time, trees have been revered in many cultures. In Japan, the Tanabata festival originates from a legend about two lovers who were separated by the milky way and only allowed to meet once a year on July 7th. Every year children in Japan write their wishes on strips of paper and hang them on bamboo branches.

The banyan tree is sacred to Hindus and Buddhists in India. The tree is often planted around temples and is known as 'the wish-fulfilling tree', representing eternal life.

The tradition of a Christmas tree became popular in the UK in 19th century after it was introduced by Prince Albert. Today people are beginning to think more about how to have a Christmas that does not harm the environment. The manufacture of artificial trees uses large amounts of fossil fuels and real trees may not come from a sustainable source. One alternative is to create a wishing tree.

AGE RANGE:	4-11
TIME NEEDED:	30 minutes
KEY VOCABULARY:	Climate change, Arctic, fossil fuels, sustainable
LEARNING OUTCOMES:	• Pupils will be introduced to the concept of sustainability • Pupils will develop caring attitudes to their own and the wider environment • Pupils will reflect on what changes they would like to see in the world
LEARNING CYCLE:	Motivating

PREPARATION AND CLASSROOM ORGANISATION

Choose a large branch or large plant or alternatively create a 'tree' from recycled papers which can be displayed in the school. One way of doing this that would involve the whole school would be for each class to print every pupil's hand in a variety of green paints. These could then be cut out and arranged upside down in the shape of a large Christmas tree.

RESOURCES NEEDED

- Branches, large plant or created Christmas tree (see above).
- Photocard 17 (downloadable online).
- Computer projector/screen.
- A Christmas card with a polar bear on it.
- You may also have a copy of 'The Bear' by Raymond Briggs in school which it would be useful to show pupils.
- You may also like to prepare a Christmas wish for the tree to show pupils.

WHAT TO DO

Explain to pupils that you are thinking of an animal that is often shown on Christmas cards or in popular children's Christmas books. Give the pupils some clues so that they can identify the polar bear. When they have done this, project the photo on to the screen. Talk to pupils about the photo:

- What does this show?
- Where has the photo been taken?
- What do they think is happening in this photo?

Explain to the pupils that polar bears have adapted to live on sea ice. Their thick coats protect them from the freezing temperatures. For much of the year the Arctic region is covered in sea ice. Polar bears depend on the sea ice to hunt their main source of food, seals and to find mates to breed. But today the sea ice is melting. That means that there is less ice and more water that the polar bears have to swim in. It is getting harder for them to hunt.

So what has this got to do with us? Ask pupils if they have any ideas. Explain to pupils that the climate is changing too fast because of what we are doing. Many of the things that we do every day use fossil fuels such as coal, oil and natural gas. When we burn fossil fuels carbon dioxide is released into the atmosphere and this causes climate change.

But we can do something about this. Every one of us can do something to cut back on the energy that we use. Ask pupils if they can think of ways that they might be able to do this. This could be something as simple as walking to school instead of driving, recycling our waste, buying food that is grown locally and not transported thousands of miles by air, and making sure that TVs and computers are not left on standby when we go to bed.

Now turn to the Christmas tree. Ask pupils how many of them have written down a list of what they want for Christmas. At this time of year, lots of us are wishing for different things. If we think about our planet and the future of polar bears like the one we have seen, we might make a wish for the whole world.

Explain to pupils that this Christmas in school they are going to put a wish for the planet on the Christmas tree. What changes would they like to see that would give our planet and all the animals and people that live on it the best chance of survival? Show pupils your Christmas wish decoration and read it to the school. Ask a child to hang it on the tree.

In their classes pupils can make a decoration for the tree. They could use recycled and reused materials: bottle tops, recycled wrapping papers and Christmas cards, sweet wrappers, CDs etc.

GLOSSARY

ADAPTATION

The way in which a plant or animal changes gradually to adjust to the conditions of the environment, making it easier for them to survive.

ANTARCTIC

The area surrounding the South Pole. Antarctica is a continent, but it is not owned by any country. It is protected by international laws.

ARCTIC

The area above the Arctic Circle which lies 65.5 degrees north. This includes the Arctic Ocean, and areas of North America, Russia, Greenland and northern Europe.

ARCTIC OCEAN

The ocean surrounding the north Pole. Much of the sea is covered in ice. The Arctic Ocean is about one and a half times the size of the United States.

CAMOUFLAGE

Colours and patterns that blend with the surroundings, making an animal difficult to see.

CLIMATE CHANGE

A term which refers to the accelerated rate of change in the climate which most scientists agree is the result of human activities. The burning of fossil fuels, which interferes with the natural balance of gases in the atmosphere, is largely to blame. As a result, global temperatures are rising and we are seeing an increase in extreme weather events.

FOSSIL FUELS

Fuels such as coal, oil and natural gas that are formed from the remains of plants and animals that lived millions of years ago.

GLOBAL WARMING

The rise in the average temperature of the earth caused by the increasing amount of greenhouse gases in the atmosphere.

GREENHOUSE GASES

Gases in the atmosphere that trap heat as it rises from the surface of the earth. This means that the temperature of the earth is rising.

HABITAT

The natural home or surroundings of a living thing.

INDIGENOUS PEOPLE

People from any ethnic group who inhabit a geographic region with which they have the earliest historical connection.

KRILL

Small shrimp-like animals that live in very large groups in the sea. They are a very important food source for all fish, birds, seals and whales.

POLAR REGIONS

The areas that surround the North or South Pole.

POLLUTION

Spoiling air, land, or water with harmful things such as oil, chemicals or plastic rubbish. Pollution is caused by the activities of people.

PRECIPATATION

Any kinds of wet weather, such as rain or snow.

PREDATOR

An animal that hunts others for food.

RENEWABLE ENERGY

Energy generated from sources that can be replaced or replenished, e.g. wind, wave, solar, tidal and geothermal.

USEFUL LINKS

WWW.ANTARCTICA.AC.UK

The British Antarctic Survey is responsible for the UK's scientific activities in the Antarctic. This site has information on the wildlife, geography and environment of the Antarctic.

WWW.BBC.CO.UK/NATURE

This website contains a large number of video clips of polar bears and penguins.

WWW.ARKIVE.ORG

A wealth of wildlife film and photography.

WWW.LOVEFOODHATEWASTE.COM

A site with information on how to cut down food waste.

WWW.EATSEASONABLY.CO.UK

What to grow and eat, when.

WWF.ORG.UK/HOW_YOU_CAN_HELP/CHANGE_HOW_YOU_LIVE

Simple steps we can each take to make our daily lives more sustainable.

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Why we are here
To stop the degradation of the planet's natural environment and
to build a future in which humans live in harmony with nature.
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