

Independent KS3 study task: Impact of humans on global warming

Newspaper article: Will polar bears become extinct?



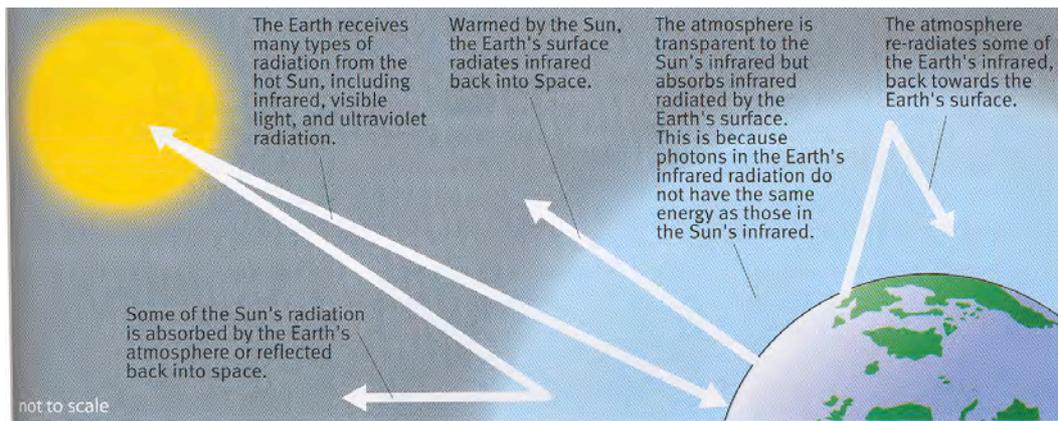
Polar bear by Ansgar Walk

Polar bears live in the northern (Arctic) parts of Alaska, Canada, Greenland, Norway, and Russia. They are not yet classified as 'endangered', but their numbers are dropping. It is likely that there are fewer than 27,000 polar bears left in the wild.

The polar bears' natural habitat is sea ice, and this is vanishing fast. They live mainly on seals which they catch at the edge of the ice.

Satellite measurements collected by British researchers have shown that the ice is getting thinner and there is less of it. This is thought to be because the temperature of the Arctic is higher for longer in the summer. This could also mean that climate change is happening faster in northern latitudes.

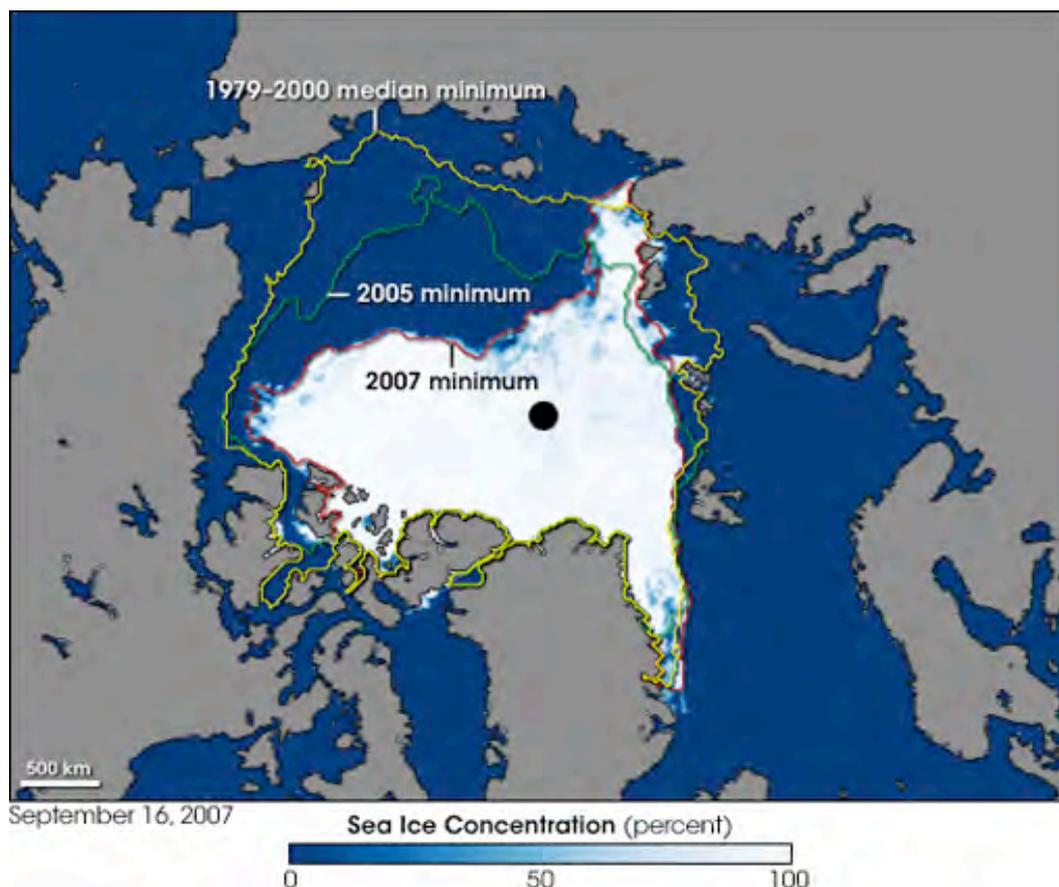
Northern sea ice is also thought to be important in keeping the Gulf Stream flowing. The Gulf Stream brings warmer water from the Gulf of Mexico to north-west Europe. As it meets the cold water of the Arctic it becomes denser and descends, thereby pulling more water behind it and keeping the Gulf Stream moving. The Gulf Stream warms northern Europe.



There is an energy balance between radiation entering and leaving the atmosphere.

The ice covering the Arctic Ocean is now only about 3 metres thick. Data from submarines suggests that it has thinned by around 40 per cent since the 1960s. The area covered by ice has also dropped dramatically as the map below shows.

Computer models have previously suggested that the decrease in the area covered by ice was caused by changing wind patterns. But new research, based on satellite observations, suggests that Arctic summers staying warmer for longer are to blame.



Map of the North Pole, showing sea cover 2000-07

Dr Seymour Laxon, from the Centre for Polar Observation and Modelling at University College London, who led the research, said the Arctic summers were relatively warm for five days longer every decade.

"When we compared the data from the satellites, we were astonished by the similarity between changes in ice thickness and the length of the summer melt seasons," he said. "This result suggests that if this continues, further melting will occur, leading to the eventual disappearance of the ice during the summer. The team, which also included UK scientists from the Met Office Hadley Centre for Climate Prediction, used satellite radar to measure the top one tenth of the ice layer and estimate the thickness.

"The melting won't cause sea levels to rise, but removing ice will allow more sunlight to be absorbed, further raising temperatures," said Dr Laxon. "Models predict a temperature increase of three times the global average in the Arctic because of this."

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- 1** Read the article 'Will polar bears become extinct?'.
- 2** Choose at least 3 pieces of evidence to suggest that the habitat of the polar bear is decreasing in size. Explain what humans can do to reduce the impact of global warming.
- 3** This is what you should do to show that you can work towards different levels.

Level 3

State one piece of evidence which shows that the habitat of the polar bear is getting smaller.

Level 4

Describe how scientists gathered the data to suggest polar bears are endangered, and the impact which humans have on global warming.

Level 5

Explain the possible causes of the decreasing habitat of the polar bear, and why global warming is occurring.

Level 6

Summarise the limitations in the evidence collected by scientists researching polar bears, and discuss the different effects of global warming on the Earth.

Level 7

Suggest other impacts which the greenhouse effect will have (you will need to carry out extra research).

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Level descriptors

Level	Students have to:
3	State that ice covering the Arctic Ocean has thinned by around 40 per cent since the 1960s, threatening the only natural habitat of the polar bear. (Summers have become 5 days longer each decade.)
4	Describe the process of collecting the evidence (use of satellite radar to measure the top one-tenth of the ice layer, and estimate the thickness and data from submarines). Describe how humans can affect global warming (carbon dioxide from the burning of fossil fuels and deforestation, methane from farm animals, and nitrous oxide from vehicles causing to an increase in the greenhouse gases which trap most of the energy radiating from the Earth).
5	Explain that the longer Arctic summers are to blame because they remove more ice, allowing more sunlight to be absorbed, further raising temperatures. This will mean further melting, leading to the eventual disappearance of the ice during the summer. Diagram to show how global warming is occurring, explaining the greenhouse effect in detail.
6	Explain the limitations in the evidence: <ul style="list-style-type: none">• only models have been used to predict a temperature increase of three times the global average in the Arctic, and there is no specific evidence for this;• it doesn't say how they counted the number of polar bears, or whether the decreasing habitat is endangering the number of polar bears. Explain the different effects of global warming on the Earth (e.g. sea levels rising, change in precipitation and other local climate conditions)
7	As level 6, but obvious that student has carried out extra research into the effects of global warming, such as: <ul style="list-style-type: none">• the effect on forests, crop yields and water supplies• the effect human health, animals, and many types of ecosystems• the possibility that deserts may expand into existing rangelands, and features of some of our National Parks may be permanently altered.