

Glacial Environments



Purpose and key aspects of this unit

The purpose of this unit of work is to introduce students to a fascinating area of physical geography: glacial environments. In addition to the wealth of unique landforms that can be explored, glacial studies are important in other ways. As climate change drives melting, a reduction in world-wide ice cover is set to severely impact on many places. Lives of people in non-glacial areas – including the UK – may be radically altered on account of vanishing ice. Glacial environments have become one of the most highly relevant physical domains for school pupils to learn about.

The unit commences by asking where in the world ice can be found. Different scales of ice cover exist, from the valley glaciers of Italy to the Antarctic ice sheet. Students will explore how ice grows and why the total amount of ice on planet earth has changed over time. The important link between ice cover and sea-levels should be highlighted early on, so that any initial misconception that 'glaciers have nothing to do with me' is quickly dispelled! The mystery of why all of the world's glaciers are now retreating will be investigated and key links with global warming outlined.

The themes of interdependence and environmental interaction are then introduced as students examine positive ways in which glaciers impact on human lives – as well as hazardous ones. The vital role that melt-water plays in delivering fresh water in South America and Asia can be placed alongside the economic benefits that skiing, snowboarding and other forms of ice tourism bring to countries at varying levels of economic development. The risk that avalanches bring to tourists is also highlighted. Remembering that glaciers are now starting to vanish, pupils should question whether human uses of glaciers are sustainable in the long term.

Plenty of opportunities exist for process and landform studies to be made in the second half of the unit. Non-specialist teachers can easily tackle delivery of the landforms that are referred to. However, teachers with a specialism in physical geography may wish to extend this part of the unit. Fieldwork opportunities do of course exist, and areas such as the Lake District or Isle of Arran could be visited in order to witness the landforms that a previous retreat of ice has revealed. In the final two lessons, the impact of sea-level rise on (i) local homes and (ii) the world's most vulnerable people will be examined.

Intended outcomes

By the end of this unit students will:

- be able to describe the global distribution of ice and identify the places where most glaciers are found
 - have developed a spatial awareness that very different sizes and scales of glacier exist
 - recognise that the formation of ice depends on environmental (climatic) factors
 - understand that these environmental factors are not constant and have changed over time for complex reasons
 - have developed an awareness that human-induced climate change now threatens the long-term survival of glaciers everywhere
 - be able to offer some explanation of how glaciated environments can bring diverse opportunities and challenges for people
 - understand why the loss of the opportunities brought by glaciers – due to climate change – is a cause for global concern
 - recognise the main landforms that are found in glaciated environments and be able to offer a description of them
 - understand how processes shape glacial landforms and appreciate the differences between weathering, erosion and deposition
 - recognise that what happens to glaciers in the future could have an impact on their own homes as a consequence of sea-level rise
 - be able to categorise the diverse ways in which melting ice and sea-level rise could impact on their own home environment
 - have developed their own opinions about whether more should be done to try and prevent melting ice from harming the world's most vulnerable peoples
 - have been exposed to a variety of enquiry approaches (and perhaps have undertaken fieldwork investigation)
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Key Resources

Film resources

Scenes from the 2006 film *An Inconvenient Truth* are referenced throughout this Unit. A copy was sent to all UK schools by DfES in May 2007 and should therefore be available for use in either geography or science department libraries.

Web resources

Discovering Antarctica <http://www.discoveringantarctica.org.uk/>
National Geographic <http://www.nationalgeographic.com/>
Glaciers Online – <http://www.swisseduc.ch/glaciers/>
All about Glaciers <http://nsidc.org/glaciers/>
Sustainable Schools <http://www.teachernet.gov.uk/sustainableschools/>
Your climate, your life <http://www.yourclimateyourlife.org.uk/>
Mount McKinley <http://www.geographyataltitude.co.uk/secondary.htm>

Printed resources

Glacial studies are included in existing KS3 and GCSE text books and some material could be integrated into / adapted for this new SoW e.g. Raw & Shaw (1999) *Geography in Place 2*, Chapter 2 (Collins)

Several back issues of *National Geographic* contain useful articles:

- July 2007 *Iceman Murder Mystery*
- June 2007 *The Big Thaw*
- September 2004 *GeoSigns*

National Geographic articles since 1996 are also available online, including many of the photographs used in the magazines:

Iceman: <http://www7.nationalgeographic.com/ngm/0707/feature2/>
Big Thaw: <http://www7.nationalgeographic.com/ngm/0706/feature2/>
<http://www7.nationalgeographic.com/ngm/0706/feature2/gallery1.html>
GeoSigns: <http://magma.nationalgeographic.com/ngm/0409/feature2/>

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Main curriculum areas

Geography

This unit provides opportunities for pupils to:

- ask physical geographical questions
- identify distribution patterns and use atlases to locate places
- collect and present landform evidence for erosional and depositional processes
- explore inter-relationships between physical and human processes
- potentially enhance their learning experience through fieldwork

Pupils will be taught :

- seven key related areas of physical geography / human geography / environmental management
- where in the world the greatest risks of sea-level rise are faced
- that the UK and other places are interdependent, through an analysis of the impact that Greenland and Antarctic ice melting would have on British people

Science

This unit can enhance pupils' understanding of some key areas of science, including:

- awareness of planetary / solar scale movements e.g. the earth's orbit around the sun & sunspot activity
- system building (input and output relationships)

Citizenship

This unit will help pupils:

- think about what is happening to the physical environment in different parts of the world today as a result of glaciers melting and what it means to people in other countries