BGE S1-S3

Geography

Third and Fourth Levels

Carly Blackman

HODDER GIBSON No.1 choice for students & teachers FOR OVER 100 YEARS

DYNAMIC LEARNING

HODDER GIBSON LEARN MORE

Course resources for BGE Geography Third and Fourth Levels

BGE Geography Student Book – available in three different formats

Textbook

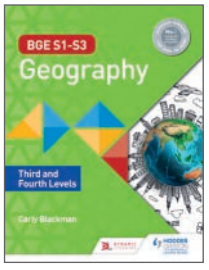
ISBN: 9781510469419

Student eTextbook

ISBN: 9781510483965

Whiteboard eTextbook

ISBN: 9781510471542



Whiteboard eTextbooks are online interactive versions of the printed textbook that enable teachers to:

- display interactive pages to their class
- add notes and highlight areas
- add double-page spreads into lesson plans.

Student eTextbooks are downloadable versions of the printed textbook that teachers can assign to students so they can:

- download and view them on any device or browser
- add, edit and synchronise notes across two devices
- access their personal copy on the move.

DYNAMIC LEARNING

Find out more and sign up for a free trial – visit: **www.hoddergibson.co.uk/BGE-Geography**

Planning & Assessment Pack – downloadable PDF for teachers

Reduce planning time, assess progress more easily and deliver BGE Geography with confidence.

This downloadable teacher pack provides invaluable support for experienced teachers, probationers, cover teachers and non-specialists.

For planning:

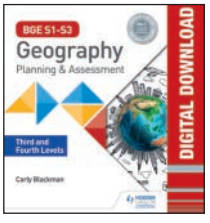
- A scheme of work with teaching notes, an overview of the relevant CfE Es & Os and Benchmarks, and assessment opportunities for each lesson

For assessment:

- At least two worksheets per unit (ideal for classwork or homework) and 11 end-of-unit assessments

Digital download (PDF)

ISBN: 9781510471511



Contents

Introduction

Welcome to BGE Geography for third and fourth levels

What is Geography?

Geography is the study of Earth's landscapes, people, places and environment. It helps us to make sense of our planet and to develop an understanding of the physical, human and environmental world in which we live.

Throughout this book, you will learn to think, question and explore like a geographer. What does that mean? Well, looking at the photograph of the Fairy Pools on the Isle of Skye, you might ask questions such as:

▲ The Fairy Pools, Isle of Skye

- Where is this place?
- How was it formed?
- How is it changing?
- What problems may exist here?
- How might these problems be challenged?

How to get the most from this book

This book covers the BGE benchmarks for *Social Studies: People, Place and the Environment* at third and fourth levels.

Each stand-alone chapter contains a series of topics designed to bring breadth and depth to a subject area. Each topic provides exploration of different geographical issues and allows for the development of geographical skills through a variety of activities and research opportunities.

At the end of the book you will find:

- a glossary defining all keywords
- answers to all activities in each topic
- larger sized repeats of OS maps at the very back of the book.

In the associated Planning and Assessment Pack, teachers will find the following items to accompany each chapter:

- a planning sheet outlining the aims of each topic, resources required, assessment opportunities and the associated experiences and outcomes, and benchmarks
- worksheet materials
- a summative assessment with associated marking scheme.

Why is Geography so important?

'The study of Geography is about more than just memorising places on a map. It's about understanding the complexity of our world, appreciating the diversity of cultures that exists across continents. And in the end, it's about using all that knowledge to help bridge divides and bring people together.'

Barack Obama

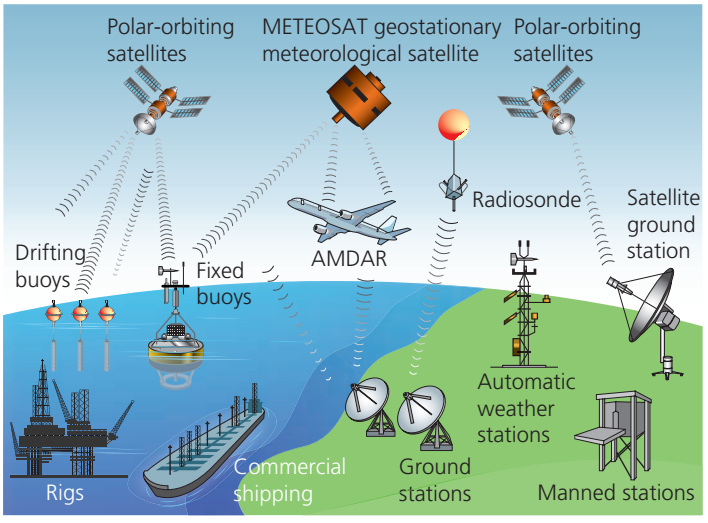
2.5 Forecasting the weather

Recording the weather

A meteorologist analyses weather conditions all over the country, then reports these to us through weather forecasts. A weather forecast tells us what the current weather conditions are like and how they are likely to change over the next few days. Weather conditions are recorded through a variety of different methods, such as weather ships in the oceans, satellites, by aircraft and special balloons as well as at local weather stations.

Learning intentions

- Understand what a synoptic chart can tell us about the weather.
- Interpret weather station circles.



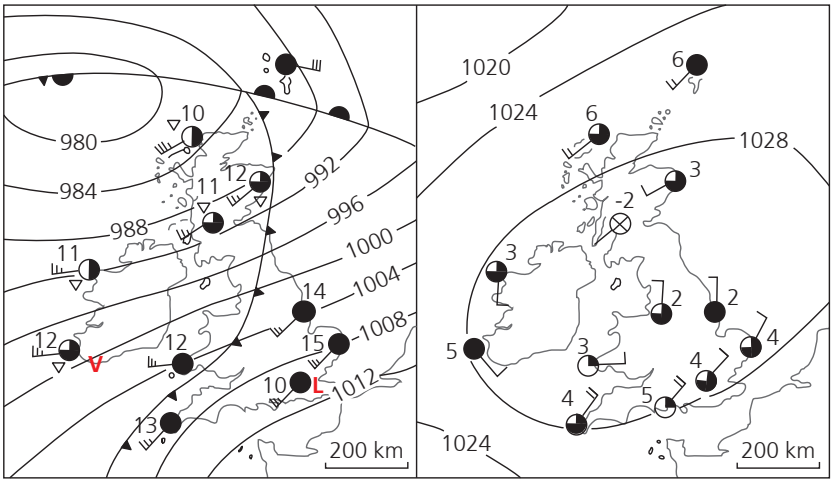
▲ **Figure 2.19** How weather data is recorded around the world

Synoptic charts

Once all of the data is collected, meteorologists will produce a map showing what the weather conditions are like across the country. This map is known as a **synoptic chart**, as shown in Figure 2.20.

A synoptic chart shows a series of lines called **isobars**. An isobar is a line that joins up places of equal air pressure. In order to forecast the weather, we need to know whether there is a low pressure system (**depression**) or a high pressure system (**anticyclone**) and which way it is moving.

A 8 December 12.00 **B** 15 December 12.00



A - A synoptic chart showing low pressure with strong winds

B - A synoptic chart showing high pressure with light winds

▲ **Figure 2.20** Synoptic charts

In practice

Reading a synoptic chart

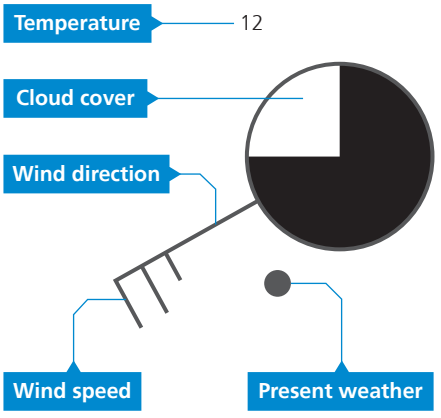
At first glance, a synoptic chart can tell us a lot about current weather conditions.

- The closer together the isobars are, the stronger the winds.
- The numbers on a synoptic chart represent the current air pressure. The lower the numbers, the worse the weather.
- Anything above 1012 mb is generally considered to be high pressure.
- Anything below 1012 mb is considered to be low pressure.

Weather station circles

Other weather elements are shown on a synoptic chart using a series of symbols. These symbols are known as weather station circles and are used all over the world.

Symbol	Precipitation	Symbol	Cloud cover	Symbol	Wind speed
,	Drizzle	○	Clear sky	◎	Calm
▽	Shower	◐	One okta	○—	1–2 knots
●	Rain	◔	Two oktas	○⌐	5 knots
✱	Snow	◕	Three oktas	○⌐	10 knots
△	Hail	◑	Four oktas	○⌐	15 knots
⚡	Thunderstorm	◑	Five oktas	○⌐	20 knots
∴	Heavy rain	◕	Six oktas	○▼	50 knots or more
✱	Sleet	◐	Seven oktas		
✱▽	Snow shower	●	Eight oktas		
—	Mist	⊗	Sky obscured		
≡	Fog	The sky is divided into eighths or oktas to record how much cloud cover there is.			



◀ Figure 2.21 Weather station circles

Activities

1 What is the role of a meteorologist?

2 Name the different ways weather conditions can be recorded around the world.

3 a) What is a weather forecast?

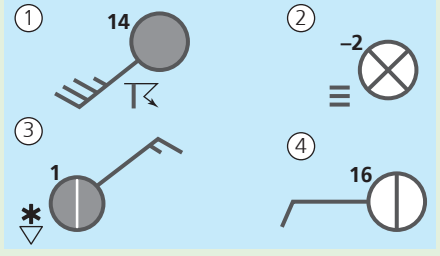
b) Why is a weather forecast important to us in our daily lives?

c) With a partner, discuss how you usually find out about the weather.

4 What is a synoptic chart?

5 What information can we learn from looking at the isobars on a synoptic chart?

6 Make a copy of the large weather station circle in Figure 2.21. Label your diagram to show all of the different elements.



▲ Figure 2.22 Weather station circles

7 Decode each of the weather station circles in Figure 2.22 and then describe the current weather conditions.

8 Test a friend. Make up four weather station circles and give them to your partner to see if they can decode them.

Taking it further

9 Make a point of studying a weather forecast, whether it is in a newspaper, on the television or the internet, or whether you listen to it on the radio.

Note down the weather conditions on the forecast, then draw a weather station circle to show the weather conditions for that day.

2.7 Depressions: areas of low air pressure

Learning intentions

- Describe what is meant by a depression.
- Understand the weather associated with the different parts of a depression.

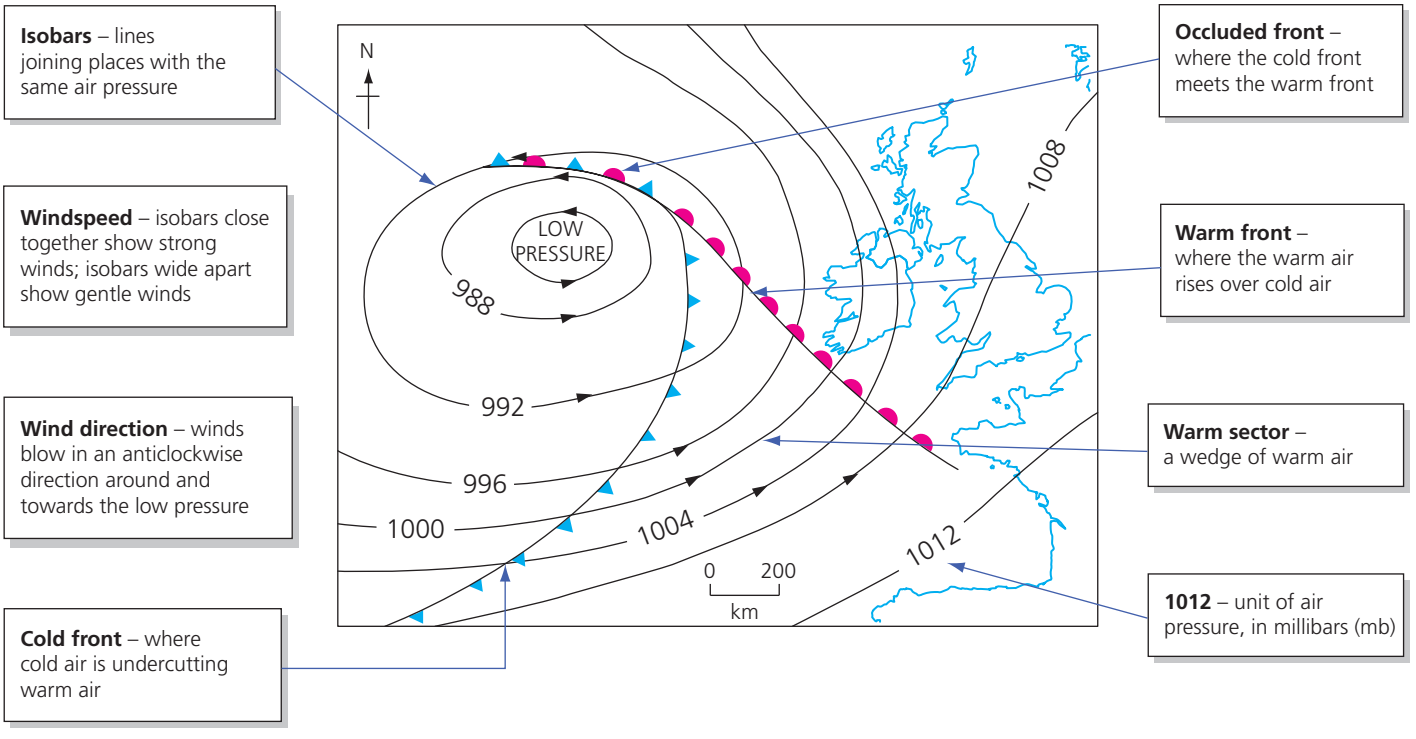
What is a depression?

A low-pressure weather system is known as a **depression**. Depressions are weather systems which pass from west to east over the country and may last a few days. In a depression, wind blows in an anti-clockwise direction and brings cold and wet conditions. Depressions are very common in Britain, with over 100 occurring every year.

In Chapter 2.4, we learned that five different air masses influence the weather within the UK. Sometimes, when two of these air masses meet, we get a **front**. A front is a boundary which separates two air masses. A warm front has warm air behind it while a cold front has cold air behind it. Whenever two air masses meet, we get rain. The two most common air masses to meet are the polar maritime (mP) and the tropical maritime (mT) air masses.

When air masses meet, a low-pressure weather system is formed, creating a depression.

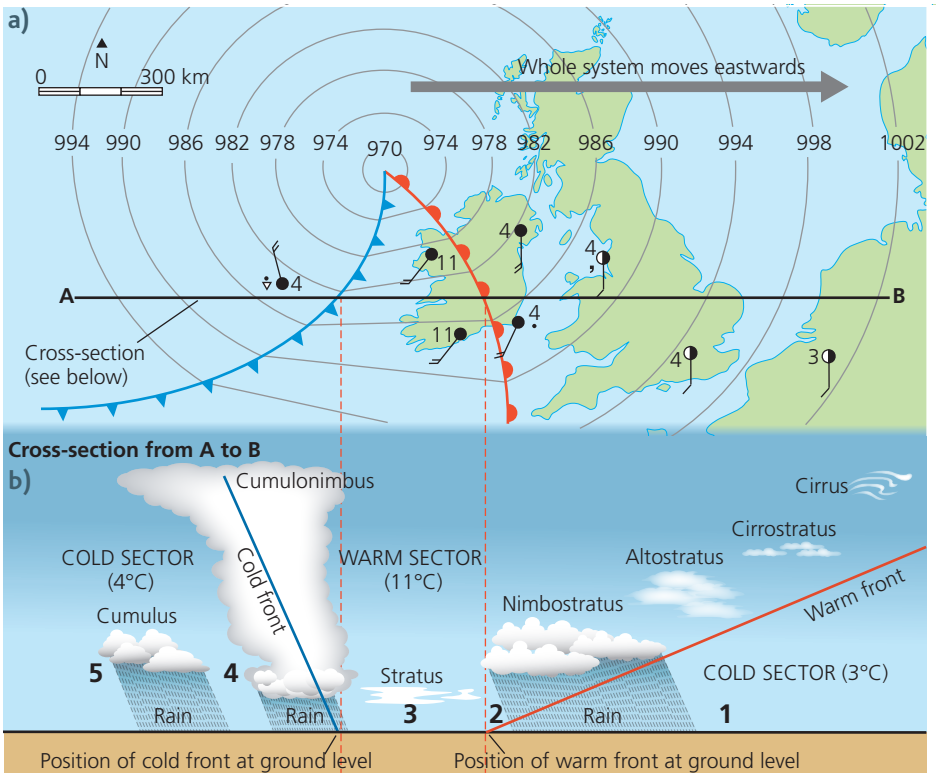
▲ Figure 2.26 Summer thunderstorm over a meadow



▲ Figure 2.27 Features of a depression

The passing of a depression

As a depression passes over, there are considerable changes in weather conditions.



▲ **Figure 2.28** The movement of a low-pressure weather system

1 Before the warm front

- The wind is increasing (southerly)
- Temperature is cool
- Cirrus/cirrostratus/altostratus clouds
- Dry

2 At the warm front

- Wind is getting stronger (south-west)
- Nimbostratus clouds (lower and thicker)
- Temperature increasing
- Steady rain

3 In the warm sector

- Westerly wind
- Warmest part of depression
- Broken stratus clouds (dull)
- Isolated showers

4 At the cold front

- Wind picks up (north-west)
- Thick cumulonimbus clouds
- Sudden drop in temperature
- Very heavy rain/thunder

5 After the cold front

- Wind speed drops off (north-west)
- Low temperature
- Scattered showers
- Cumulus clouds

▲ **Figure 2.29** The stages of a depression

Activities

1 Describe the key characteristics of a depression.

2 What is a weather front?

3 Which two air masses most commonly form a depression?

4 Collect a blank map of the British Isles from your teacher. Using Figure 2.28 a) to help you, annotate your own map to show the key features of a depression. You should include:
   - a) a warm and a cold front
   - b) isobars (include air pressure and arrows)
   - c) annotations to show key characteristics.

5 Make a copy of Figure 2.28 b). Underneath your diagram, note down the weather associated with each part of the depression. Use Figure 2.29 to help you.

6 State which part of a depression has:
   - a) the warmest temperatures
   - b) the heaviest rainfall
   - c) the thickest clouds
   - d) steady rain
   - e) no rain
   - f) strong winds.

7 Create a series of flashcards to summarise the key features of a high-pressure and a low-pressure weather system.

Points to remember

When describing the weather at different points in a depression, you should always refer to the following:

- temperature
- wind
- clouds
- precipitation.

10.3 Human causes of climate change

Learning intentions

- Identify ways humans are adding greenhouse gases to the atmosphere.
- Understand how changes to greenhouse gases can lead to climate change.
- Identify the top polluting countries in the world.

If you were to look back at Figure 10.1 in Chapter 10.1, it is clear that global temperatures have increased dramatically over the last 30 years. Many scientists now believe that humans have played an important role in this increase. As a result of a growing population and economic development, levels of carbon dioxide, methane, nitrous oxide and chlorofluorocarbons (CFCs) have increased, but what activities have led to such a growth?

Increased carbon dioxide

Ever since the Industrial Revolution, developed countries have been heavily reliant on **fossil fuels**. The burning of fossil fuels releases carbon dioxide into the atmosphere, and is responsible for 57 per cent of all greenhouse gas emissions today.

▲ Figure 10.7 Fossil fuels are burned in power plants to produce electricity

Fossil fuels are used to power our factories, heat our homes, produce our electricity and drive our cars. Human lives are heavily dependent on them and they are now being used up 100,000 times faster than they are formed.

There is now the added problem of increased production from **newly industrialised countries** such as China who produce approximately 30 per cent of global carbon dioxide emissions.

Deforestation is also an increasing problem, where the removal of trees results in an increase of carbon dioxide in the air. According to the World Bank, 1.3 million km^2 of forest was lost worldwide between 1990 and 2016. With fewer trees to take in carbon dioxide, more builds up in the atmosphere, contributing to a warmer climate.

Table 10.1 shows which countries emitted the most carbon dioxide in 2015.

Country	Total carbon dioxide emissions from fuel combustion (million metric tons) (2015)
China	9040.74
United States of America	4997.50
India	2066.01
Russia	1468.99
Japan	1141.58
Germany	729.77
South Korea	585.99
Iran	552.40
Canada	549.23
Saudi Arabia	531.46

▲ Table 10.1 Source: Union of Concerned Scientists website, www.ucsusa.org/global-warming/science-and-impacts/science/each-countrys-share-of-co2.html

Increased methane

Although methane only makes up 14 per cent of global greenhouse gas emissions, it is able to absorb far more heat than carbon dioxide. Two-thirds of global methane comes from man-made sources such as the burning of fossil fuels, the amount of waste we dump in **landfill** sites and the increase of livestock and rice fields to feed our growing population.

Did you know?

As of March 2019, the current population was 7.7 billion. This is set to increase to 9.8 billion in 2050.

Increased nitrous oxide

Nitrous oxide only makes up approximately 8 per cent of global greenhouse gas emissions. Yet it is up to 300 times more effective at trapping heat than carbon dioxide. Since the Industrial Revolution, the level of nitrous oxide in the atmosphere has increased by 16 per cent. The main contributors are believed to be nitrogen-based fertilisers, sewage treatment plants and the burning of fossil fuels and wood. Increased car ownership is also a major factor as nitrous oxides are released when petrol and diesel are burned.

▲ Figure 10.8 Billions of cars and other vehicles spew out harmful emissions that contribute to greenhouse gases in the atmosphere

Increased chlorofluorocarbons

Chlorofluorocarbons (CFCs) are gases which rarely occur naturally and are almost entirely the result of human activities. When compared to carbon dioxide, their concentration in the atmosphere is very small, yet they are up to 13,000 times more effective at trapping heat. They are released into the atmosphere through the use of air conditioning units, aerosol cans, polystyrene insulation and packaging, refrigerators and solvents.

Activities

1 Your teacher will give you a blank map of the world.
   a) Annotate your map to show:
      (i) the location of the top ten global contributors to carbon dioxide emissions
      (ii) the amount of carbon dioxide emitted for each country.
   b) Which country is responsible for emitting the most greenhouse gases?
   c) Why do you think their emissions are so high?

2 What are the two main factors responsible for an overall increase in greenhouse gas emissions?

3 For each greenhouse gas, identify the ways humans are adding to its concentration in the atmosphere.

4 In your opinion, what is the 'worst' greenhouse gas? Explain your answer.

Concentration of greenhouse gases in the atmosphere	
Carbon dioxide	75 per cent
Methane	14 per cent
Nitrous oxide	8 per cent
CFCs	3 per cent

▲ Table 10.2

5 Using the figures in Table 10.2, draw a pie chart to show the concentration of different greenhouse gases in the atmosphere.

6 a) Under the following headings, make a list of everything you do on a daily basis that contributes to the greenhouse gases in our atmosphere:
      (i) carbon dioxide
      (ii) methane
      (iii) nitrous oxide
      (iv) CFCs.
   b) Compare your lists with a partner.
   c) Work with your partner to write down simple changes you could make to help reduce your greenhouse gas emissions.

10.6 Local effects of climate change

Learning intentions

- Understand the impacts of climate change on Scotland.
- Explain the future consequences of climate change on people and the environment.

Future changes

Based on Scottish government projections, Scotland is expected to get warmer but wetter. It is expected that summers will be hotter but shorter while winters will be milder yet windier. All of these changes will alter local environments which will have a dramatic impact on our lives.

Increase in flooding

From records dating back to 1961, the east of Scotland has seen a 36.5 per cent increase in precipitation, while the north and west of the country have seen a 69 per cent rise. This has resulted in an increase in the frequency of floods causing damage to homes, disrupting travel, causing loss of business and impacting on key local services. More flooding in low-land areas such as Oban, Wester Ross and parts of Aberdeenshire will see a reduction in the availability of land and an increase in the cost of home insurance and flood defences.

▲ Figure 10.17 Flooding can cause huge financial problems

Rising temperatures

Records show that average temperatures in Scotland have increased by 0.5°C in the last 100 years. This may not sound like much but the slightest of changes can have dramatic effects on agriculture, human health and biodiversity. Droughts and heatwaves will become increasingly more frequent and increased exposure to the Sun may lead to an increase in skin cancers, with heat-related deaths expected to double in the next 20 years.

An increase in temperatures will also have an impact on Scotland's ski industry. A record temperature of 18.3°C was recorded in February 2019, forcing ski resorts to close and putting a strain on local economies. Four of Scotland's biggest resorts, including the Nevis Range and Glencoe near Fort William, have invested in snow machines in an attempt to keep part of their ski resorts in operation, following a continual decline in snow cover over the last 40 years.

▲ Figure 10.18 Ski resorts are forced to close early due to a lack of snowfall

Threats to coastal communities

With sea-levels set to rise by more than 40 cm, coastal communities are under threat from an increased risk of flooding, coastal erosion and coastline retreat. People may be forced to move further inland, putting increased pressure on space and resources. Over 100 coastal sites in Scotland have been identified as being under threat including Greenock, Ayr and Dunoon.

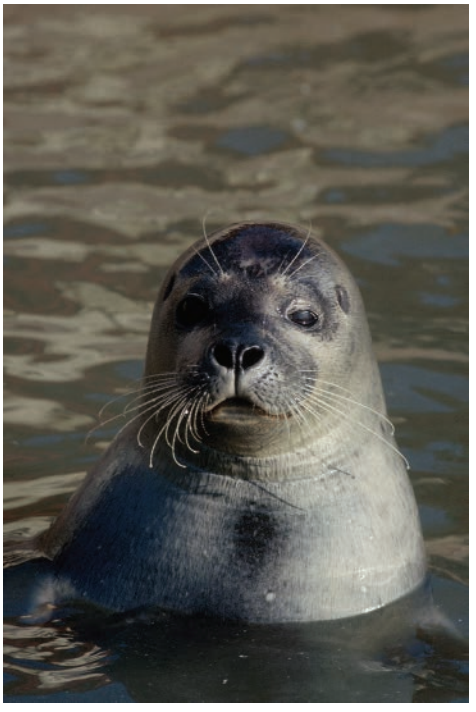
Marine environments

Rising temperatures of our seas and oceans are likely to affect our marine life such as fish, mammals and seabirds. Species such as cod and haddock will be forced to move further north in search of cooler waters. This will have an impact on local fishing industries, which will have a knock-on effect on local economies.

Agriculture

Increased temperatures could see an increase in pests, disease and other non-native species, putting crop yields and livestock at risk. Additional spending may be required on pesticides and fertilisers to encourage crop growth and to prevent crops rotting due to increased heat or moisture.

In some cases, as temperatures continue to rise, Scotland could see an increase in food production as growing seasons are lengthened. Areas on the east coast, such as Kelso and Montrose, could see a rise in the growth of fruits, with multiple yields being grown each year. However, with an increase in yields, soil quality may decline, resulting in even more fertilisers being used.



▲ Figure 10.19 Harbour (or common) seals are found around Scotland's coasts but face continued threat from pollution and climate change

Activities

1 According to the Scottish government projections, how is Scotland's climate expected to change in the future?

2 Explain the impact of an increase in flooding on the people and the landscape in Scotland.

3 a) How will Scotland's ski industry be affected by climate change?

b) What has been done to try and minimise the impacts of rising temperatures on Scotland's ski industry?

4 What impact will a rise in sea-level have on the people of Scotland?

5 Why might those involved in the Scottish fishing industry be concerned about rising temperatures?

6 Discuss the effects climate change will have on Scottish agriculture.

7 Your teacher will give you a blank map of Scotland. Annotate your map to show the impact of climate change across Scotland, referring to specific named areas where appropriate.

8 As a young person growing up in a changing world, what change do you believe will have the biggest impact on Scotland? Explain your answer.

Taking it further

9 With your partner, think of three things you could change in your school to make it a more environmentally friendly place. What could you and the rest of your class do to help make these changes happen?

10 Visit the Scottish Environment Protection Agency website (www.sepa.gov.uk) and find out the flood risk for your home town and surrounding area.

BGE S1-S3 Geography

Third and Fourth Levels

Think, question and explore like a geographer with this highly enjoyable course covering all CfE Third and Fourth Level Benchmarks, as taught in S1 to S3.

- **Understand geographical ideas, issues and processes** with clear explanations, diagrams and a glossary of key words
- **Build your interpretative, analytical and evaluative skills** by applying your knowledge to activities involving maps, photos, graphs and case studies
- **Learn at a pace and level that is right for you** with engaging tasks that show how your skills are progressing, plus plenty of stretch and challenge activities
- **Lay firm foundations for National qualifications** by developing the skills in BGE that will help you to succeed in the future

Carly Blackman is an experienced Geography teacher, author and SQA appointee. She also delivers teacher training and student revision events for Hodder Gibson.

HODDER GIBSON
t: 01235 827827
e: education@bookpoint.co.uk
w: hoddergibson.co.uk

ISBN 978-1-5104-6941-9

FSC