

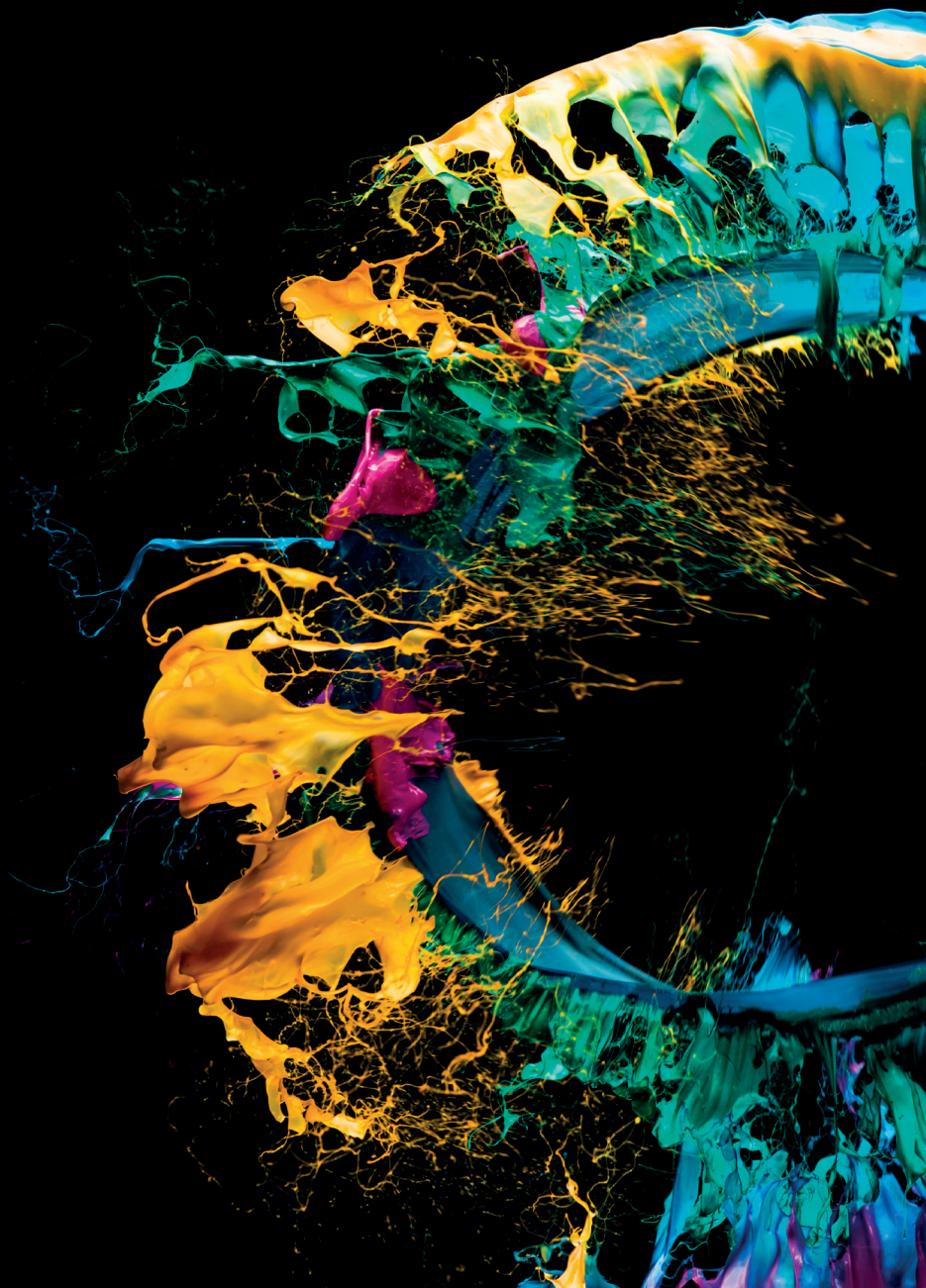
CAMBRIDGE

Brighter Thinking

# GEOGRAPHY

Teacher's Resource

A/AS  
Level for  
**AQA**



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# Introduction

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## Welcome

Welcome to this free digital Teacher's Resource, which forms part of the suite of Cambridge resources for the new AQA AS and A Level Geography specifications (7036 and 7037) from 2016 and their associated qualifications from 2017.

It has been written by the same experienced author team of practising teachers and advisers that wrote the Student Book it is designed to accompany, with the help of some additional teachers. The resource has a strong focus on the development of both knowledge and geographical skills, including fieldwork skills. With progression at its heart, it provides the tools for students to become reflective, enquiring and independent learners as they work through the specification content, and it supports teachers in preparing students effectively for the assessments.

## Overview of the content

There are 11 topic-based chapters in the main Student Book, covering the course in the following sequence:

- 1 Water and carbon cycles
- 2 Hot desert systems and landscapes
- 3 Coastal systems and landscapes
- 4 Glacial systems and landscapes
- 5 Hazards
- 6 Ecosystems under stress
- 7 Global systems and global governance
- 8 Changing places
- 9 Contemporary urban environments
- 10 Population and the environment
- 11 Resource security

This Teacher's Resource contains a set of teaching notes for each Student Book chapter. The teaching notes provide a summary of relevant **prior knowledge** that students should have from GCSE, or which may need to be filled in for those who did not take that qualification. Suggestions for **teaching ideas** and introducing particular concepts are provided. The particular **geographical skills** that can be included in each unit are also given, and there are some ideas about opportunities to embed them and teach them in context.

**Fieldwork opportunities** are suggested, which are practical and would help to support the teaching of the topic.

Where relevant, **useful resources** are also suggested. These include access to up-to-date data, relevant organisations who may offer specific support, and access to geographical information systems (GIS) and other digital mapping, which can help to illustrate some of the more involved topics in the specification.

Finally, there is also a **scheme of work** available for each AS and A Level specification unit, which includes suggestions about how to teach the content using the Student Book and selected resources from the **Cambridge Elevate enhanced edition**. The scheme of work is divided into sessions, which offer guidance on how to split up teaching time to ensure that the content is covered, but there are also opportunities to develop some of the other required skills.

The scheme of work includes references to the **Cambridge Elevate enhanced edition**, which provides digital content and additional activities to support the main Student Book, as well as some additional worksheets and other activities.

The Student Book ends with chapters on fieldwork and geographical skills and techniques, which run as a strand throughout the book, and which have been given additional prominence in the updated specifications. Fieldwork and geographical skills will also form part of the final assessment. This resource

provides guidance for managing students through the individual investigation that they will be carrying out, and developing skills such as reflective learning and problem-solving techniques.

## How to use this resource

Some chapters cover compulsory content and others cover option choices. Schools will make their particular option choices based on their own circumstances and other preferences, including previous staff experience. More details on these choices, and ideas about how to teach them are covered in the **Curriculum design** section of this resource, along with some thoughts on how to co-teach AS and A Level content.

The schemes of work should form the basis for discussion within your department. It is possible to teach them as they are, but we anticipate that you will have your own additional resources that you might want to include, some activities to reorder or slot in, links to additional video material, and perhaps some additional fieldwork and ICT opportunities that you anticipate offering to students. Time will be at a premium given the changing nature of what has to be covered, so these are realistic suggestions for helping students access the course in varied ways.

You may want to explore each section with colleagues, and work with them to put together a sequence for teaching the course, building in the external resources and opportunities that you want to provide, along with the usual fixed points of your institution's academic calendar. This will help you to develop a bespoke offering for your students that is manageable.

Each chapter also has links to the **Maths for geographers** sections, which form part of the Student Book and help teachers to prepare for the greater emphasis on quantitative skills in the updated specifications, which is also supported by the **Cambridge Elevate enhanced edition**.

# Changes to AS and A Level

## Introduction

This section of the resource explores the nature of changes to AS and A Level.

The 2016 reform to AS and A Level Geography qualifications introduced a range of new features. Some of the headline changes include:

- The provision of a core of essential subject content, and a balance of human and physical options.
- AS has been decoupled from A Level, so that the two exams are separate, although the AS qualifications are co-teachable with A Level, and guidance will be given on this in the next section of this resource.
- Two days of fieldwork are now specified for AS, with four days of fieldwork at A Level. This is a greater demand for fieldwork, which will require timetabling, as the experience will be assessed through examination at AS Level (20% of the total).

## Fieldwork

The increased time allocation for fieldwork was supported by higher education representatives on the content advisory board as they felt it helps students to relate their experiences to the real world. The additional focus on fieldwork will also help AS students with their fieldwork assessment, and A Level students with their Individual Investigations. There is further clarification in the specification that this fieldwork must take place outside the school grounds. The focus for the assessment will be on the application of knowledge and understanding, as well as skills.

Data must be measured as well as recorded, which means that some techniques involving measurement have to be built into fieldwork planning.

## Exam structure

One significant change has been the nature of the assessment, which includes 20% based on the fieldwork that is carried out as part of the AS Level course. There have also been changes to the length of the exam and the format.

Both knowledge and geographical skills (including fieldwork skills) are developed through the Individual Investigation.

**Quantitative skills** now account for around 10% of the final assessment, and are also part of the knowledge and understanding rather than just part of the fieldwork. There is a greater focus on **mathematical and statistical skills**, which are used to apply some subject knowledge.

## Content changes

There are some new topics which teachers may need support in teaching for the first time. The Student Book and this resource will help to introduce some of these new themes to colleagues.

They include:

- new units on Global systems and global governance and Changing places. These came from members of the A-Level Content Advisory Board (ALCAB), which helped to shape the final guidance that was used to develop the specification
- different emphasis on case studies so that fewer are specified, with a slight change in emphasis on course content
- in the physical topics, an emphasis on the *interdependence* of different elements of the environment, as well as on developing an understanding of the different elements themselves.

## Refocusing

There is an increased focus on the interaction between people and the environment in the new specifications. Students will need to develop an understanding of physical systems, but also the way that they interact with human activity, and how they are reliant on other processes with which they are interdependent. This emphasis starts to reduce the artificial division between what could be called 'human'

and ‘physical’ geography, and provides a closer match to the sort of experience that students might have should they move on to a period of undergraduate study.

This resource provides a range of activities that support this approach to teaching the content that is set out within the schemes of work provided for each chapter.



## Curriculum design

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This resource provides guidance on how to put together a curriculum for teaching the AS and A Level content and skills. The 2016 reform has meant a little more commonality between the specifications than was previously the case, with some common themes running through them all.

As GCSE specifications are also changing, you may wish to use this resource to assist with planning your choice of specification, and the sequence in which you teach particular topics.

The specification encourages students to 'think like a geographer' and to further understand the relevance of geography in the real world. This resource provides guidance on how to help students build on their Key Stage 4 knowledge and supports the delivery of new subject content and the assessment objectives at AS and A Level. It is also recognised that there may be some students who are accepted onto AS courses without having completed a course of GCSE Level study, and these students may need additional support to access some of the subject-specific vocabulary, which is quite extensive in a course of this nature.

This resource will help teachers to shape the curriculum offering that is provided, as there is the chance of co-teachability.

It is desirable (and important) that the material in this resource is adapted for the unique circumstances of each school where AQA Geography will be taught.

This could include some or all of the following factors:

- the geographical location of the school, which may open opportunities for specific fieldwork enquiries to be undertaken without the need for students to be taken somewhere else in the UK at additional cost – schools in interesting locations such as those close to large urban areas
- the experiences of staff – countries they may have visited, images they have taken in specific environments, and previous experience in teaching this or other specifications
- the experiences of students, who may have travelled to or lived in other parts of the world, and have experienced some processes and landforms that the teacher has not
- the availability of other supporting online materials
- connections made through the teacher's own personal learning network, using social media tools such as Twitter
- connections made with local companies or organisations who may be prepared to visit the school in person to work with students.

This means that there may be additional opportunities to filter in further resources.

Some schools will have access to other specific resources for teaching and learning, which could include:

- digital mapping services such as Digimap for Schools
- streaming digital video services such as ClickView or TigTag
- DVDs produced by companies such as Pumpkin Interactive Ltd.

Working with AS and A Level geographers requires the same attention to detail as teaching Key Stage 3 students, and a commitment to planning lessons carefully.

This would normally involve a range of activities that will stretch and challenge students, as well as provide them with the factual content that they will need in order to access the assessment.

Students should also be accessing additional materials, being selective in their sourcing, and helping to construct their own knowledge to supplement the contents of the Student Book. By working in this way, they will also gain further familiarity with important subject knowledge.

The importance of teachers as curriculum makers has been reinforced by the Geographical Association, and teacher educators such as Professor David Lambert. The schemes of work that are included in this resource are intended to be starting points for discussion and development. They can of course be adopted wholesale, or adapted for use. You may also involve students in the design of some sections of the course by asking them to read through or view video materials ahead of specific lessons (also known as 'flipping the classroom').

## Co-teachability

### What is co-teachability?

The decoupling of AS and A Level means that the AS results will not count towards the A Level results. AS is a one-year course, and A Level is a two-year course. The examinations for A Level will come at the end of the course. Both specifications have been designed to strengthen the skills gained at GCSE, and introduce a greater depth of content.

Some colleagues will, however, want to offer students the option of ‘dropping’ geography after the first year, by offering an AS Level course which will become an A Level for those who stay for the two years. This may be important when students make option choices, as it offers flexibility for them to start four courses at AS Level, and continue with three through to A Level. There are several ways that course content can be combined to make the topics co-teachable. The content has been designed to enable this to happen and still allow students to access the examination tasks.

In the first year of the course, AS and A Level students will be taught some of the core content, but there are some topics which are only taught during the second year of the course for those who continue to study the subject. There are some topics that are best suited for AS: Water and carbon cycles and Hazards would fit into this criteria. These are topics that may be more familiar with students from existing GCSE specifications. Other topics may introduce new ideas, and are better suited for A Level students.

The second year would see the teaching of the remaining topics, which would include the A Level-only topics. This could also offer the chance to revisit topics to reinforce the earlier work, as the examination would cover all of the work that had been taught over the two years. The skills that are included in the examination are the same for both years of the course.

Here are a few possible options for organising course content so that it is co-teachable (there are others). The relative length of terms will also vary, so they are included for general guidance only. Internal assessments and other elements of teaching the course will also need to be factored in.

### Three options for co-teachability

Options	Year	Course	Autumn term (Physical)	Spring term	Summer term (Human)	Fieldwork/ skills
1	1	AS & A Level	Water and carbon cycles	Hazards	Changing places	Geographical fieldwork investigation (2 days)
	2	A Level	Hot desert systems and landscapes or Coastal systems and landscapes or Glacial systems and landscapes	Global systems and global governance	Population and the environment or Contemporary urban environments or Resource security	Geographical fieldwork investigation (2 days) and geographical skills
2	1	AS & A Level	Glacial systems and landscapes or Coastal systems and landscapes	Changing places	Contemporary urban environments	Geographical fieldwork investigation (2 days)
	2	A Level	Water and carbon cycles	Hazards or Ecosystems under stress	Global systems and global governance	Geographical fieldwork investigation (2 days) and geographical skills

Options	Year	Course	Autumn term (Physical)	Spring term	Summer term (Human)	Fieldwork/ skills
3	1	AS & A Level	Coastal systems and landscapes	Contemporary urban environments	Changing places	Geographical fieldwork investigation (2 days)
	2	A Level	Water and carbon cycles	Global systems and global governance	Hazards or Ecosystems under stress	Geographical fieldwork investigation (2 days) and geographical skills

As seen above, there are various combinations of topics, which can include a focus on the more human or the more physical topics, depending on staff preferences and availability.

Core topics must be covered for the AS exam, but the optionality of questions on the examination allows for choice of the options that are taught.

### What about fieldwork?

A fieldwork investigation should be completed in the first year of the course, and this will also account for half the fieldwork allocation for the whole A Level course. The associated fieldwork experience may involve students visiting one particular location, and the further fieldwork at A Level could be designed to explore different aspects of this same location, or allow students to consider contrasting locations. Students should also be exposed to the necessary skills and enquiry structure that they will be asked about in the assessment.

A common fieldwork experience can be offered to both AS and A Level students. AS students should complete theirs before the summer term, but A Level students could be introduced to it then. The AS students will be examined on their fieldwork experience, and the A Level students will have their non-examination assessment of the fieldwork to complete at the end of the course. The summer term is a good opportunity to do this thinking.

### Will the teaching vary between AS and A Level?

There are some elements of the teaching that need a little more thought.

The two exams require slightly different levels of skills, knowledge and understanding (which are shown through the assessment objectives (AO) that are mentioned in the specification document). This resource could act as a type of checklist for covering the course, and may also provide guidance that helps you to decide which of these option routes you want to take.

The non-examined assessment is an opportunity for students to investigate an area of the specification that interests them. The choice of topics at AS may help guide students in a direction that staff feel is appropriate, and for which they can provide better guidance and support.

### What additional support could be offered?

This activity could also be supported by the completion of an Extended Project Qualification (EPQ), which some institutions offer to students.

You may find that some topics are complementary: a focus on the concept of place, along with Contemporary urban environments will allow students to have a particular focus on the challenges facing urban places, and might be suitable for an institution which would have difficulty getting students out to rural or coastal locations, or where students have an interest in their own local areas. For institutions with a focus on the outdoors, the more physical topics and options could be more relevant.

Here are some other connections that could be made.

- There is a nice contrast between work done on the heat of the deserts and the chill of the glacial systems and landscapes.
- Antarctica is featured in the topic on Global systems and global governance too.
- The work on Hazards could develop some of the themes in other topics by exploring how they threaten to disrupt the systems and processes that have previously been discussed in Contemporary urban environments.
- Water and carbon cycling is also discussed in the Hot desert systems and landscapes topic.

## Using the Assess to progress tool

### What is Assess to progress?

Assess to progress is a tool available in the Cambridge Elevate enhanced edition of the Student Book, which allows students to answer questions through Cambridge Elevate and submit them to you for marking.

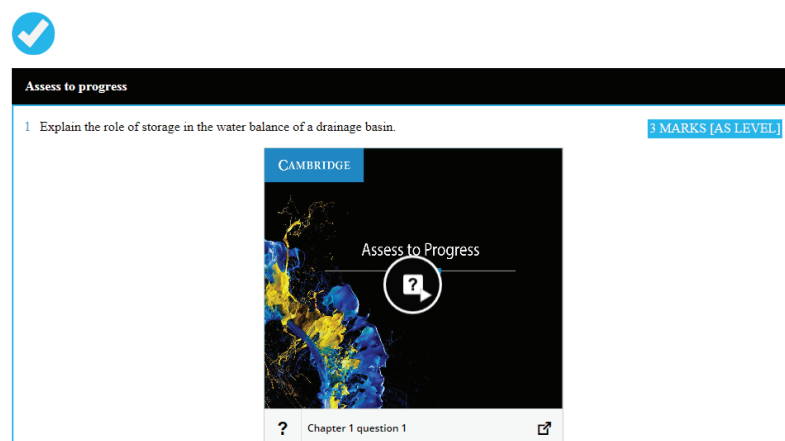
Each chapter in the Student Book contains a number of Assess to progress questions. These are exam-style questions that can be used along with the sample assessment materials (SAMs) provided by AQA to give teachers some flexibility of choice when it comes to the design of internal assessment opportunities. Some teachers may provide these assessment materials as a homework task; others may set them as end-of-topic tests, or as 'mock' examination tasks to prepare students for the final assessment.

The Assess to progress questions are supported by full model answers, written by the same experienced team who wrote the Student Book. The longer questions are marked on a level of response basis, as laid out in the AQA Geography specification.

Clear marking guidance is given for the longer answer questions, and there are also suggestions for points that may be covered by students when answering these questions. These are designed for sharing with students so that they can see how to develop their thinking, in order to progress the quality of their written communication when answering assessments. The focus on the terminal exam at A Level in particular means that there is an additional need for students to be exam-ready, and the Assess to progress questions will help them to prepare.

### How does it work?

Every Assess to progress question in the Student Book has an associated widget in the Elevate enhanced edition of the Student Book.



Students can click on the widget, which will open to show them the question and the assessment objectives that they should aim to cover in their answer. The assessment objectives have been broken down into easy-to-understand statements. Students can type in their answers and then submit them for marking.

Once submitted, the answers will appear in the teacher's edition of the Elevate enhanced edition. You can open and read each answer and then provide feedback.

To help with marking, a model answer is provided for each question, which you can compare with the student's answer. You can assign a rating for each assessment objective statement. The rating system has three levels: basic, clear and detailed. You can also enter an overall number of marks for the answer and provide written feedback.

Once you have marked the answer, you can return your feedback to the student via Elevate. At this point, the student can also see the model answer along with your feedback on their own answer. They can type notes on their work, which can help with consolidation and revision.

You can export the assessment criteria scores and marks for download or upload to your school's VLE to track students' performance over time.

# 1 Water and carbon cycles

## AIMS AND OUTCOMES

This chapter considers the major stores of water and carbon at or near the Earth's surface and their dynamic cycles and relationships. Students are required to:

- describe the distribution of water and carbon stores and understand how they operate as natural systems
- identify the main factors driving change within components of their respective systems
- analyse how water and carbon systems interact at a variety of scales to support life on Earth and, in particular, affect climate
- consider how human activity is modifying natural water and carbon cycles and the likely consequences of increasing interactions between the human and physical environment.

AS Level	Option
A Level	Compulsory

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

## Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

## Prior knowledge

Students will benefit from being aware of the following before they commence their studies.

- Water is continuously being recycled between the land, atmosphere, rivers, lakes, oceans and living things in a process called the water cycle.
- Carbon emissions are linked to the burning of fossil fuels – these are non-renewable energy resources.
- The amount of carbon dioxide in the atmosphere is increasing, and this is leading to global warming.

Students who have not encountered these concepts in their GCSE courses should be guided to reading/viewing material of a suitable level to inform them using the appropriate terminology, including the hydrological cycle, carbon emissions and causes of global warming. Some of these will also be familiar from Key Stage 3 work lower down the school.

## Teaching ideas

### 3.1.1.1 Water and carbon cycles as natural systems

The water cycle needs to be understood as a global system, within which there are smaller drainage basin systems, driven by the energy of the Sun. These include inputs, flows/transfers, stores/components and outputs. There should be an understanding of some positive and negative feedback, and the idea that systems are often in a state of dynamic equilibrium.

### 3.1.1.2 The water cycle

The water cycle should be understood as a natural cycle that contains sub-systems within it. Water is stored in a number of spheres, which should be identified. It is important that students understand the main stores, transfers, inputs and outputs of the drainage basin water cycle and how it operates, at different scales, and

over different timescales. The processes that operate within the water cycle need to be explained, and the terminology learnt. The concept of water balance within a drainage basin is explored.

The flood hydrograph is explored and described, and this leads on to an exploration of how water cycles may change over time as a result of natural processes and human impacts.

### **3.1.1.3 The carbon cycle**

The carbon cycle should be understood as a natural cycle that contains sub-systems within it – in the atmosphere, oceans, soils, and so on. It is important that students understand the main stores, transfers, inputs and outputs of natural carbon cycles and how they operate at a variety of levels from plant to continental scale. They will also need to appreciate different scales of time in the operation of carbon cycles, from fast carbon cycles over months and years, to slow carbon cycles over hundreds of millions of years.

### **3.1.1.4 Water, carbon, climate and life on Earth**

Changes in the magnitude of carbon stores, transfers and cycles will need to be considered as a result of both natural and human influences, including reasons for the rise in atmospheric carbon through various human activities that both increase carbon inputs and reduce carbon outputs. The implications of increasing atmospheric carbon should be examined in the context of likely consequences for various environments, habitats and forms of life on the planet via a systems approach. Discussion should extend to a consideration of current plans for mitigation of climate change events by limiting the increase in atmospheric carbon.

### **3.1.1.5 Quantitative and qualitative skills**

Students should be guided to develop confidence in interpreting and working with data that shows the operation of carbon cycles and in understanding mass balance and net transfers along with unit meaning and conversions. The drainage basin water balance is another opportunity. There are fieldwork opportunities in calculating the biomass and carbon content of local vegetation settings. Students could also be asked to investigate the urban water cycle, and the impact of the school buildings on the local water cycle.

### **3.1.1.6 Case studies**

Two case studies are included: a tropical rainforest ecosystem, and a river catchment at a local scale.

The Amazon rainforest is explored, with a look at changes in the carbon cycle.

The river case study is the River Tweed on the border between England and Scotland, with reference made to the catchment management plan that has been formulated for the river.

## **Geographical skills**

Given the breadth of contemporary news coverage of water and carbon issues at a variety of scales, there should be ample opportunity for students to develop their experience of using:

- recent news articles, interviews and reports, including reports on flooding
- photo analysis
- map analysis
- quantitative data charts
- numeracy – use of number, unit and measure
- graphical skills
- statistical analysis
- ICT skills – particularly in the use of remotely sensed data
- field investigations
- hypothesis formulation and data collection methodologies
- extended prose information extraction
- extended essay construction.

With a topic that encompasses controversy – that of climate change, and the enhanced greenhouse effect – students should be encouraged to consider various perspectives and the evidence supporting different views. They should consider the sources of evidence, its strength and also its accuracy, reliability and validity. Students may also consider the perspectives of local people, particularly if they live in areas that are at risk of flooding.

It is necessary for students to consider ‘scale’ from the perspective of two variables: that of area – from the small and local scale up to continental and global, but also temporal scale from short-term carbon processes and water movements occurring over weeks and months to the long-term or ‘slow carbon cycle’ that extends across hundreds of millions of years. Similarly water may be stored in clouds for just a few minutes, or locked up in ice sheets for tens of thousands of years.

## Fieldwork opportunities

There are some opportunities for fieldwork within this chapter, although there are fewer than in other chapters. If there is a local river, students could usefully investigate how it responds to rainfall events, and connect with the local Environment Agency office who may be able to provide someone to talk about the management of the drainage basin. Students could also explore how the school contributes to both of the cycles in this chapter.

## Further reading

Overview of carbon cycles from Nasa Earth Observatory

[www.cambridge.org/links/gatd6001](http://www.cambridge.org/links/gatd6001)

Science museum (UK) clips and graphics on climate change and the role of carbon

[www.cambridge.org/links/gatd6002](http://www.cambridge.org/links/gatd6002)

The main sources of carbon emissions

[www.cambridge.org/links/gatd6003](http://www.cambridge.org/links/gatd6003)

The American Museum of Natural History: how carbon cycles influence climate

[www.cambridge.org/links/gatd6004](http://www.cambridge.org/links/gatd6004)

The ocean carbon cycle

[www.cambridge.org/links/gatd6005](http://www.cambridge.org/links/gatd6005)

The water cycle

[www.cambridge.org/links/gatd6006](http://www.cambridge.org/links/gatd6006)

Issues related to river flow and drainage basin management are dealt with by the Environment Agency

[www.cambridge.org/links/gatd6007](http://www.cambridge.org/links/gatd6007)

River levels and flood risk maps

[www.cambridge.org/links/gatd6008](http://www.cambridge.org/links/gatd6008)

River gauges are shown on these websites:

[www.cambridge.org/links/gatd6009](http://www.cambridge.org/links/gatd6009) (England)

[www.cambridge.org/links/gatd6010](http://www.cambridge.org/links/gatd6010) (Wales)

[www.cambridge.org/links/gatd6011](http://www.cambridge.org/links/gatd6011) (Scotland)

River Tweed Catchment management plan

[www.cambridge.org/links/gatd6012](http://www.cambridge.org/links/gatd6012)

## Videos

Chapter 1 in the Cambridge Elevate enhanced edition includes the video clip: Why did Tewkesbury flood? The clip comes from the Flooding in the UK: Tewkesbury DVD by Pumpkin Interactive Ltd.



## 2 Hot desert systems and landscapes

### AIMS AND OUTCOMES

This chapter considers hot desert environments. It explores the processes that lead to their formation and which continue to shape them. The focus is on hot deserts and their margins as ecosystems. Students are required to:

- develop an informed appreciation of the beauty and diversity of desert environments by exploring them
- understand the challenges they present as human habitats
- develop geographical skills, including observation, measurement and geospatial mapping
- understand processes that shape the deserts, and recognise landforms which are both present day and relict
- explore the issues related to desertification and strategies for reducing its impact
- explore two case studies of the use of desert environments.

AS Level	N/A
A Level	Option

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will benefit from being aware of the following before they commence their studies:

- the geographical location of hot desert environments
- the reasons why hot desert environments occur in these locations
- the characteristics of hot desert environments
- the diurnal changes in temperature that occur in these areas, and the impact they have on the nature of weathering
- the nature of ecosystems, and the term 'biodiversity' within them
- some of the specific adaptations that plants and animals have to help them cope with hot desert climates.

If students have not covered hot desert environments at GCSE they should perhaps be encouraged to explore free online GCSE Geography revision websites, such as BBC Bitesize:

[www.cambridge.org/links/gatd6013](http://www.cambridge.org/links/gatd6013) and S-Cool: [www.cambridge.org/links/gatd6014](http://www.cambridge.org/links/gatd6014).

They could also view online video clips on hot desert environments, including the work of the BBC Wildlife team over the years. There is a useful book called *Deserts: a very short introduction* by Nick Middleton which would be accessible to students of this age in terms of readability. Books by other travellers who have visited desert environments (such as Michael Palin) may also be suitable reading in advance of the course. See the Further reading section below for details.

## Teaching ideas

This section of the specification focuses on drylands, which occur at all latitudes and are characterised by limited soil moisture caused by low precipitation and high evaporation. In common with water and carbon cycles (see Chapter 1), a systems approach to study is specified.

Students should develop an informed appreciation of the beauty and diversity of deserts and the challenges they present as human habitats.

### 3.1.2.1 Deserts as natural systems

Students should continue to develop their appreciation of the systems approach in physical geography. They will have an opportunity to explore systems concepts and their application to the development of desert landscapes. These would usually include inputs, outputs, energy, stores/components, flows/transfers, positive/negative feedback and dynamic equilibrium.

The concepts of landform and landscape will be introduced and explored, and the characteristic landscapes of these regions will become an object of study. The global distribution of mid- and low-latitude deserts and their margins (arid and semi-arid) will be explored, involving mapping and atlas work. The characteristics of hot desert environments and their margins will be explored: climate, soils and vegetation (and their interaction) all play a part here. Water balance and the aridity index will be introduced, and some analysis of their use will be undertaken. The causes of aridity will then be explored. Students will need to develop an awareness of the relative importance of atmospheric processes relating to pressure, winds, continentality, relief and cold ocean currents and their impact on this important feature of hot deserts.

### 3.1.2.2 Systems and processes

Students will be introduced to the different sources of energy and energy transfer in hot desert environments, including insolation, winds and runoff. They will be able to describe the main sediment sources, and how they can be connected with sediment cells and sediment budgets on a more local scale within a larger desert area.

Geomorphological processes are an important part of this chapter, and there is quite a lot of content to be covered here. Students will need to develop a familiarity with the impacts of weathering, mass movement, erosion, transportation and deposition. Distinctively arid geomorphological processes – weathering (thermal fracture, exfoliation, chemical weathering, block and granular disintegration) – are an extension of this introduction, and will require students to recognise their impacts.

The role of wind will need to be explored, along with the processes of erosion: deflation and abrasion; transportation; suspension, saltation, surface creep, deposition. Sources of water can be defined as exogenous, endoreic and ephemeral, and the differences between these terms are important. Students should also consider the episodic role of water during episodes of sheet flooding and channel flash flooding, and the potential they have for reshaping desert areas and creating landforms in a short space of time.

### 3.1.2.3 Arid landscape development in contrasting settings

Students should explore the origin and development of landforms of mid- and low-latitude deserts. Some of these are produced by aeolian processes: deflation hollows, desert pavements, ventifacts, yardangs, zeugen, barchans and seif dunes. Others are the result of water: wadis, bahadas, pediments, playas and inselbergs. The relationship between process, time, landforms and landscapes in mid- and low-latitude desert settings is explored.

### 3.1.2.4 Desertification

The changing extent and distribution of hot deserts over the last 10 000 years is covered. Many present-day deserts have not always been as hot and dry as they are now.

Students should appreciate the causes of desertification and the possible role of climate change and human impact.

### 3.1.2.5 Quantitative and qualitative skills

Exercises are included which provide opportunities to engage with a range of skills within the context of hot desert landscapes.

### 3.1.2.6 Case studies

There are two case studies in this chapter to which students will be introduced:

- Case study of a relevant setting at a local scale to illustrate and analyse key themes of desertification, causes and impacts, and implications for sustainable development, including the Namib Sand Sea.
- Case study of a hot desert environment setting to support exploration of the key themes set out above, describe a sand dune environment, and allow students to engage with field data from Holkham dunes in North Norfolk, UK.

### Geographical skills

Students have the opportunity, in the right settings, to exercise and develop geographical skills, including observation, measurement and geospatial mapping skills, together with data manipulation and statistical skills, including those associated with and arising from local fieldwork. There is some potential for the use of illustrative and visual materials. Skills that are developed through this chapter include:

- literacy: use of text in a variety of forms and written for different purposes
- numeracy
- cartographic skills: use of atlas, weather charts and relief maps, which could be enhanced by the use of virtual globes and tools such as the Null Earth School tool referred to in the Student Book
- statistical skills in the Maths for geographers section.

### Fieldwork opportunities

There may be opportunities for students to visit a hot desert environment, with several school travel companies offering trips to Morocco and similar destinations, but this is not going to be common, and no such field experience is expected by the awarding body.

There is, however, considerable opportunity for supervised coastal fieldwork which could focus on some of the processes that occur when sediment is exposed to wind and forms dune systems. Possible approaches may be explored at coastal locations where sand dunes are present.

### Further reading

#### Hot desert environments

Drâa Valley Story Map

[www.cambridge.org/links/gatd6015](http://www.cambridge.org/links/gatd6015)

Racetrack Playa

[www.cambridge.org/links/gatd6016](http://www.cambridge.org/links/gatd6016)

#### The use of desert areas by people

Pull aside, stay alive – driving in a dust storm

[www.cambridge.org/links/gatd6017](http://www.cambridge.org/links/gatd6017)

Marathon des Sables, the toughest footrace on Earth

[www.cambridge.org/links/gatd6018](http://www.cambridge.org/links/gatd6018)

Namib desert coastline case study

[www.cambridge.org/links/gatd6019](http://www.cambridge.org/links/gatd6019)

Desertification – UN Decade for deserts and fight against desertification 2010–2020

[www.cambridge.org/links/gatd6020](http://www.cambridge.org/links/gatd6020)

#### General investigation

Google Earth Pro – free download

[www.cambridge.org/links/gatd6021](http://www.cambridge.org/links/gatd6021)

Virtual globe to explore global climate

[www.cambridge.org/links/gatd6022](http://www.cambridge.org/links/gatd6022)

*Deserts: a very short introduction*, Nick Middleton, Oxford University Press.

*Heat: Extreme Adventures at the Highest Temperatures on Earth*, Ranulph Fiennes, Simon & Schuster UK Ltd.

*Sahara*, Michael Palin, Phoenix.

*Heat: Adventures in the World's Fiery Places*, Bill Streever, Little, Brown and Company.

## 3 Coastal systems and landscapes

### AIMS AND OUTCOMES

This chapter considers coasts around the British Isles and the world as environments of change. Specifically, students are required to:

- consider coasts as dynamic environments, subject to change and responsible for change elsewhere
- analyse coasts as systems with multiple inputs, processes, outputs and feedback cycles
- understand how landforms combine to produce distinctive coastal landscapes that represent an amalgamation of processes and sequences over time
- understand the relationships between physical and human interactions at the coast and the nature of coastal management strategies
- show awareness of the challenges that coasts present in the likely future changes to human and physical systems.

AS Level	Option
A Level	Option

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will benefit from being aware of the following before they commence their studies:

- the difference between coastal processes and coastal features
- coastlines are zones of erosion, transportation and deposition of material
- people have a range of strategies to reduce rates of coastal erosion, but these can have unforeseen consequences on other parts of the coastline
- human influence at the coast can have both positive and negative consequences
- a significant proportion of the world's population lives on or near the coast and is likely to be affected by future changes to global sea level.

If students have not covered a coastal geography chapter at GCSE they should be guided to free online GCSE Geography revision websites such as BBC Bitesize: [www.cambridge.org/links/gatd6023](http://www.cambridge.org/links/gatd6023) and S-Cool: [www.cambridge.org/links/gatd6024](http://www.cambridge.org/links/gatd6024) or they should carry out an online search using some of the terms in the list above. They could view online video clips on the geography of coasts or read the relevant chapter in a GCSE Geography textbook.

### Teaching ideas

A systems approach is specified in this chapter which considers the coastal environment as a dynamic one, changing as a result of natural processes and human interactions and interventions, which students will be introduced to in section 3.1 but which permeate the whole chapter.

Students should develop an appreciation of the value and diversity of coastal landscapes and the geomorphological processes that contribute to their characteristic features, as described and explained in section 3.3 (processes) and 3.4 (landscape development). They should be encouraged to develop a questioning approach to coastal features and processes in establishing how changes in inputs and transfers will affect rates of output development, and they should consider the factors influencing localised variations to common coastal features as outlined in the Research point in 3.4. They should be encouraged to think of particular coastal landscapes as representing an accumulation of features over time and processes over space – with these considered at a range of scales.

The coast as a human habitat raises the need to consider how people influence coastal processes and features together with how human-induced and natural change in physical systems produces a response by humans to intervene and shape coastal systems to bring about a desired outcome. In covering human intervention in coastal landscapes (sections 3.5–3.8) students should understand that different values and perspectives need to be considered when selecting the most appropriate strategy for managing coastlines, as with Activity 3.4.

### **3.1.3.1 Coasts as natural systems**

Students should develop an appreciation of a systems approach to coasts from the start. Processes have causes, and those causes have inputs, that eventually result in outputs. Developing this approach early on will assist students' understanding of methods of coastal management that operate on a systems basis, such as the classification of sediment cells, the move towards soft engineering techniques and the development of Integrated Coastal Zone Management plans.

### **3.1.3.2 Systems and processes**

Appreciation of the role a particular input, process and output plays in the wider coastal system will enable students to develop the more sophisticated awareness that characterises 'Thinking like a geographer' in relation to physical geography. A dynamic coastal environment will see changes in inputs, stores, transfers/flows and outputs and may range from high-energy to low-energy conditions. Students should learn how the various components interact and question how and why conditions operate in different environments and why they may change.

### **3.1.3.3 Coastal landscape development**

Investigation of characteristic features of erosion and deposition should lead students to appreciate how distinctive coastal landscapes develop. The Cambridge Elevate video clip has been selected to illustrate the landscape of the Dorset coast. By studying examples from a variety of coastal landscapes in the UK and beyond, students should develop an understanding of the variety of geomorphological features that exist and the systems responsible for their development. Dynamism in the relative levels of sea and land will give the opportunity to explore long-term as well as contemporary and likely future changes experienced in coastal environments.

### **3.1.3.4 Coastal management**

Discussion and debate should explore the values and attitudes of those affected by coastal dynamism and the choice and selection of coastal management interventions by planners and decision-takers. The systems approach should enable students to recognise that every intervention has consequences elsewhere in the system. Some of these may be desirable, but others may have further negative impacts elsewhere. Awareness of cost/benefit analysis should emphasise the requirement for reliable data and acknowledge the values and perspectives of those involved.

### **3.1.3.5 Quantitative and qualitative skills**

The use of coastal maps at a variety of scales showing key features and indicating likely processes as well as the geographical analysis of coastal images and news articles gives much potential for developing qualitative skills. Quantitative analysis of coastal data collected in the field or obtained from secondary sources opens the potential to develop confidence in numeracy and the use of statistical techniques.

### 3.1.3.6 Case studies

The Holderness coast in Yorkshire has been identified for study as a local-scale coastal environment as it incorporates a variety of landscapes and a wide range of erosional and depositional features and processes, and it raises key issues of coastal management. The contrasting coastal landscape beyond the UK is that of Bangladesh. This region of the world presents many opportunities for settlement and economic provision, but it faces particular issues in adapting to, mitigating and showing resilience to impending coastal challenges, particularly rising sea levels and intensifying storm events.

### Making connections

There is useful connection with concepts, processes and issues within Chapter 1 Water and carbon cycles, particularly in understanding the cause and consequence of current sea-level rise. The systems approach underpins the other geomorphology chapters: Chapter 2 Hot desert systems and landscapes and Chapter 4 Glacial systems and landscapes, and will provide useful reinforcement of system concepts. The section on tropical storms in Chapter 5 Hazards will have relevance for describing the conditions in which metastable equilibrium conditions arise. There may be relevance to Chapter 8 Changing places in identifying the geographical features if a coastal 'place' is selected for study.

### Geographical skills

There is considerable potential to develop qualitative skills in image analysis, OS map use, GIS mapping and quantitative skills of numeracy/statistics, including:

- use and annotation of illustrative and visual materials (see Cambridge Elevate Worksheet 3.3)
- literacy: use of text in a variety of forms and written for different purposes (tourism material often describes coastal scenery and may be compared with Shoreline Management Plan descriptions)
- numeracy: analysis of financial and measured data (see Cambridge Elevate Worksheet 3.4)
- cartographic skills: use of atlas, OS, planning maps, weather charts and relief maps
- statistical skills: interquartile range, standard deviation and inferential statistics as in Maths for geographers in section 3.3.

### Fieldwork opportunities

There is considerable opportunity for supervised coastal fieldwork. Possible approaches may be:

- surveys of beach material distribution and beach profile measurement
- comparison of two coastal landscapes through analysis of their distinctive geomorphological features
- transecting across a saltmarsh or sand dune system
- interviews with residents and visitors to assess effectiveness of coastal protection measures
- measurement of rates of coastal change and how they are perceived.

### Further reading

Coasts as natural systems

[www.cambridge.org/links/gatd6025](http://www.cambridge.org/links/gatd6025)

Coastal geomorphology

[www.cambridge.org/links/gatd6026](http://www.cambridge.org/links/gatd6026)

Landscape systems interpretation

[www.cambridge.org/links/gatd6027](http://www.cambridge.org/links/gatd6027)

Coastal landscape development

[www.cambridge.org/links/gatd6028](http://www.cambridge.org/links/gatd6028)

Shoreline management plans (England and Wales)

[www.cambridge.org/links/gatd6029](http://www.cambridge.org/links/gatd6029)

Wallasea Island managed retreat

[www.cambridge.org/links/gatd6030](http://www.cambridge.org/links/gatd6030)

Protecting cities from coastal erosion

[www.cambridge.org/links/gatd6031](http://www.cambridge.org/links/gatd6031)

Managing increased flood risk

[www.cambridge.org/links/gatd6032](http://www.cambridge.org/links/gatd6032)

Holderness coast case study

[www.cambridge.org/links/gatd6033](http://www.cambridge.org/links/gatd6033)

Bangladesh coastline case study

[www.cambridge.org/links/gatd6034](http://www.cambridge.org/links/gatd6034)

## Videos

Chapter 3 in the Cambridge Elevate enhanced edition includes the video clip about erosion at the Jurassic coast. The clip comes from the Coastal processes DVD by Pumpkin Interactive Ltd.



## 4 Glacial systems and landscapes

### AIMS AND OUTCOMES

This chapter considers the characteristics, processes and landforms associated with cold environments around the globe and their human occupation. Students are required to:

- consider the physical characteristics of cold environments and their past and present distribution
- understand glacial processes and the landforms associated with them
- analyse their human occupation and subsequent development of cold environments
- explore a case study of a glaciated environment at a local scale to illustrate processes and landscapes, and a case study of a glaciated environment from beyond the UK, to illustrate the challenges and opportunities for human occupation and development.

AS Level	Option
A Level	Option

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will benefit from being aware of the following before they commence their studies.

- The main features of glaciers, such as their inputs, outputs, processes and stores.
- The scale and types of ice masses, such as ice caps, sheets and valley glaciers, as this knowledge would be helpful in developing an understanding of their mass and the significant role they can have in changing landscapes.
- The location of the world's cold environments, both polar and alpine.
- The characteristics of an Ice Age and the processes of erosion and deposition.

Students may also have an understanding of weathering processes, such as freeze-thaw. This is covered in AQA's new optional GCSE Chapter 'Cold environments' in Paper 1: Living with the Physical Environment.

Giving students some pre-course reading and research questions to answer could help to fill any gaps in their knowledge. The National Snow and Ice Data Centre is one site that you could direct students to for this:

[www.cambridge.org/links/gatd6035](http://www.cambridge.org/links/gatd6035). Documentaries could be shared with students, for example the BBC's *Frozen Planet* series.

### Teaching ideas

#### 3.1.4.1 Glaciers as natural systems

Students need to understand how glaciers operate as a system; to understand why they may be seen as a system, what their inputs, processes and outputs are and how they achieve equilibrium. A conceptual understanding of glacial mass balance is essential here, and a consideration of why it varies and what the impact of this is for advance and retreat. Engagement in mass balance calculations, as per the scheme of work, will support this understanding.

### 3.1.4.2 The nature and distribution of cold environments

Students should develop an understanding of the physical nature of cold environments. Notably, their climate and reasons for it, the vegetation and its relationship with the soil profile in cold environments. They should also be able to explain reasons for the vegetation and soil characteristics, making links back to the climate. It is important that students have a solid foundational knowledge of previous ice extent in the last glacial maximum 20 000 years ago to build upon throughout the rest of the topic and in subsequent sections.

Mapping exercises for present ice extent will help students to develop an understanding of this part of the specification. They should be able to exemplify each of the cold environment types with a range of examples from contrasting regions and degrees of latitudes and longitudes.

### 3.1.4.3 Systems and processes

Students need to have a strong understanding of a systems approach to glaciers. For example, they need to understand what the inputs are to a glacier within the accumulation zone, what the outputs are in the ablation zone, and what happens as a result to the overall mass balance of the glacier. This therefore results in glacial movement. Students should also be made aware of which types of movement will be most likely in warm- and cold-based glaciers, i.e. internal deformation in cold-based glaciers and rotational, compressional, extensional and basal sliding in warm-based glaciers.

### 3.1.4.4 Glaciated landscape development

It is essential that students have a strong understanding of glacial processes before learning about the numerous glacial landforms. They should be able to describe and explain them, and ensure they can integrate them into landform exam questions later in the topic. When teaching about the different glacial landforms, make regular links to the processes learnt earlier on. This will also help students to understand the development of glacial landscapes over time, and how the different processes of erosion, deposition and transportation interact to create these landscapes. Consolidation lessons are highly recommended as this part of the specification contains numerous new key terminologies. Asking students to create glossaries, revise for key terminology definition tests, and complete card matching and sorting activities would help to support knowledge and recall.

### 3.1.4.5 Human impacts on cold environments

There are excellent opportunities here to get students to use satellite image and photograph analysis and documentaries to learn about the impact that humans may have on cold environments. The film *Chasing Ice* could be used to exemplify the impact that climate change is having on glacial retreat. There are also a number of satellite image banks, such as the National Geographic's GlacierWorks Project: [www.cambridge.org/links/gatd6036](http://www.cambridge.org/links/gatd6036) that will help to engage students in discussion.

### 3.1.4.6 Quantitative and qualitative skills

There are numerous opportunities to develop quantitative and qualitative skills within this topic. Qualitative skills mostly come through photograph and OS map analysis. GIS packages will be especially useful for teaching students about glaciated landforms. There are also opportunities for teaching Chi-square, inter-quartile range and standard deviation, and other measurements of central tendency.

### 3.1.4.7 Case studies

The case study of Wales, a local glaciated environment, provides a prime opportunity to consolidate and extend students' knowledge and understanding of glacial geomorphology. Photograph analysis, map work and the use of Activity 4.6 in the student book would be an essential activity here alongside the use of Worksheet 4.5 from Cambridge Elevate.

The southern Norway case study of a glaciated environment provides scope for a number of engaging teaching activities. Article analysis through Directed Activities Related to Text (DARTs) lends itself well to debates and discussions on the conflict between sustainable occupation and economic activities in cold environments: [www.cambridge.org/links/gatd6037](http://www.cambridge.org/links/gatd6037). Independent research, group debates and perhaps even more creative tasks such as tourist brochures could be integrated here. Though not a case study in the student book, this approach would also work well with the Vuntut Gwitchin community example.

## Geographical skills

Numerical skills are developed throughout this chapter and students have the opportunity to develop statistical and graphical skills. Mass balance calculations are made when teaching about glacial systems, glacial budgets, and ablation and accumulation using Table 4.2. The bar graphs and line graphs are used to consider the net balance of glaciers. Statistical skills, notably Chi-square, can be developed using the section on 'Fieldwork opportunities: investigating glacial deposition' and Worksheet 4.6 from Cambridge Elevate.

During the section on depositional landforms and glacial moraines, students create rose diagrams, another graphical skill, using Table 4.3. Should another set of data be available, standard deviation could be calculated on the two data sets to extend learning.

Ordinance Survey map skills are developed in Activity 4.6 and Worksheet 4.5 from Cambridge Elevate, where students can apply their understanding of erosional landforms such as ribbon lakes, corries and glacial troughs. The task also allows students to develop mental imagery of these landforms in reality.

The chapter allows students to develop literacy skills. Key terminology is embedded throughout the chapter. Suggestions for knowledge mastery are made, with match-up games, glossary development and regular links back to previous knowledge and understanding. Text interpretation is developed through newspaper article analysis, and extended prose through exam question practice and peer marking tasks.

ICT and GIS skills can also be explored during this chapter. For example, mapping glacial landforms using GIS packages, using satellite imagery for human impact on glaciers, and photograph analysis for the Norway case study of a glaciated region support visual learning of this topic.

## Fieldwork opportunities

There are a number of fieldwork opportunities in varying regions around the UK, notably:

- Wales: Snowdonia National Park and Pentir are good places to look for erosional landforms. There are numerous glacial troughs, pyramidal peaks, arêtes and corries in the area.
- The Lake District: there are erosional and depositional landforms, such as Striding Edge as an example of an arête, Red Tarn as a corrie, Wast Water as a ribbon lake. There are more notable examples of depositional landforms, such as glacial moraines.
- Scotland: on the Isle of Skye and at Glen Clova and Glen Docherty there are glacial troughs; in Deeside, south of Aviemore and at Dulnain Bridge there are roche moutonnées; in the West and Northwest Highlands there are corries. Blockfields are common in many highland regions in Scotland.
- East Anglia: there are fluvioglacial and depositional landforms.
- International trips to Iceland will provide opportunities to study all landforms and apply understanding of human occupation and development of cold environments to a new setting.

## Further reading

Interactive website on exploring the Greater Himalayan region

[www.cambridge.org/links/gatd6038](http://www.cambridge.org/links/gatd6038)

National Snow & Ice Data Center page on glacial processes, movement and landforms

[www.cambridge.org/links/gatd6040](http://www.cambridge.org/links/gatd6040)

Site on Antarctic glaciers, climate change, geology and modern-day glacial extent

[www.cambridge.org/links/gatd6041](http://www.cambridge.org/links/gatd6041)

Nasa Global Climate Change site exploring its effect on glacial retreat

[www.cambridge.org/links/gatd6042](http://www.cambridge.org/links/gatd6042)

Very thorough website on everything relating to Antarctica. Especially helpful for its information about governance, tourism and the ecosystem

[www.cambridge.org/links/gatd6043](http://www.cambridge.org/links/gatd6043)

Norway tourist board website

[www.cambridge.org/links/gatd6044](http://www.cambridge.org/links/gatd6044)

British Petroleum website with data and infographics on the Trans Alaskan oil pipeline

[www.cambridge.org/links/gatd6045](http://www.cambridge.org/links/gatd6045)

## Videos

Chapter 4 in the Cambridge Elevate enhanced edition includes the video clip: Fluvioglacial landforms. The clip comes from the Glaciation: processes and landforms DVD by Pumpkin Interactive Ltd.

## 5 Hazards

### AIMS AND OUTCOMES

This chapter considers volcanic, seismic and tropical storm hazards. Specifically, students are required to:

- understand the impacts and responses to volcanic, seismic, storm and wildfire events
- consider the nature, forms, and potential impacts of natural hazards
- show awareness of hazard perception and its economic and cultural determinants
- show awareness of characteristic human responses to hazards and their relationship to hazard incidence
- understand plate tectonic theory
- understand the nature of vulcanicity and its causes
- understand the nature of seismicity and its causes
- understand the nature of tropical storms and their causes
- understand the nature of wildfires and their causes
- describe and explain the spatial distribution, randomness, magnitude, frequency, regularity and predictability of tropical storm events
- understand the impacts of and responses to volcanic, seismic, storm and wildfire events.

AS Level	Option
A Level	Option

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will benefit from being aware of the following before they commence their studies:

- the global distribution of tectonic hazards and tropical storms
- the physical processes occurring at each of the three types of plate boundary (constructive, destructive and conservative)
- the physical conditions required for tropical storms to occur
- the reasons why people live in areas susceptible to hazards
- how monitoring, protection, prediction and planning can reduce the risks from hazards
- contrasting case studies that describe the hazard and the impacts, and how people have responded to the hazard in locations with different characteristics.

If students have not covered a tectonic or storm hazards geography chapter at GCSE they should be guided to free online GCSE Geography revision websites such as BBC Bitesize:

[www.cambridge.org/links/gatd6046](http://www.cambridge.org/links/gatd6046) and S Cool: [www.cambridge.org/links/gatd6047](http://www.cambridge.org/links/gatd6047).

Students could also carry out an online search using some of the terms in the list above. They could view online video clips about the geography of tectonic or storm hazards or read the relevant chapter in a GCSE Geography textbook.

## Teaching ideas

This chapter focuses on the lithosphere and the atmosphere, and the intermittent but regular hazards that affect human populations. By exploring the origin and nature of these hazards and the various ways in which people respond to them, students are able to engage with many dimensions of the relationships between people and the environment they occupy.

Students should develop an appreciation and an understanding of a range of hazards and understand the various impacts and responses that result (sections 5.3, 5.5, 5.7 and 5.10). They should be encouraged to have an understanding of a range of up-to-date case studies to illustrate these various impacts and responses. Examples are highlighted in the student book (specifically in sections 5.4, 5.6, 5.8, 5.9, 5.10, 5.12 and 5.13). However, students could research alternatives provided they meet the specification requirements.

Students should understand that while the nature of the hazard event has a significant impact on the magnitude of the event, the vulnerability of the affected population also plays a role when assessing the associated impacts and responses. This is possibly best illustrated by the multi-hazard case study (Haiti, a multi-hazardous environment, section 5.12).

### 3.1.5.1 The concept of a hazard in a geographical context

Students should develop an understanding of the difference between a hazard and a disaster. For hazards, there should be appreciation of the need for interaction between people and their environment; for disasters, there should be appreciation of scale. While the focus of this chapter is on natural hazards, students should appreciate that some hazards are the result of human activity such as fracking. Students should also understand that people respond to hazards in different ways, which are dependent upon their economic and cultural determinants.

### 3.1.5.2 Plate tectonics

Students need to have a clear grounding in plate tectonics in order to fully understand the sections on volcanic and seismic hazards that follow. They should be able to explain the mechanisms that drive plate movement and describe the way in which plates move to create specific landforms.

### 3.1.5.3 Volcanic hazards

There are clear links between volcanic hazards and the carbon cycle (Chapter 1 Water and carbon cycles) and attempts should be made to highlight these wherever possible. Discussion should explore the factors affecting the impacts and responses of volcanic hazards, which students should also be able to classify in various ways. The case study of Mount Ontake, Japan, has been chosen as a contemporary example of a phreatic eruption located in a more developed country (section 5.4).

### 3.1.5.4 Seismic hazards

There are clear links between the location of seismic hazards and densely populated areas that are a result of urbanisation. Students should understand the hazards that result from seismic activity and the physical characteristics which result in these. In addition to the impacts they should also understand how people respond to seismic hazards, focusing mainly on preparation in order to mitigate the impacts. The case study of Nepal has been chosen to illustrate the impacts of a seismic hazard in a less developed country.

### 3.1.5.5 Storm hazards

Students should understand the location, formation and prediction of tropical storms. They should be able to classify the various impacts and also understand the responses. The two contrasting case studies that have been chosen are Superstorm Sandy, which affected the US in 2012 (section 5.8) and Typhoon Haiyan, which hit the Philippines in 2013 (section 5.9). Students should be able to compare both the impacts and responses of these contrasting events. They should also understand the potential of climate change for increasing the tropical storm hazard.

### 3.1.5.6 Fires in nature

Students should understand the factors affecting the nature of fires, including vegetation type, weather and fire behaviour. Discussion should explore the characteristics of the chosen case study, and students should be able to describe the various impacts and responses. They should also understand how risk management can reduce the impact of wildfire hazards.

### 3.1.5.7 Case studies

Students should understand that there are some countries which are multi-hazard environments, i.e. they are at extreme risk from multiple hazards. Here, Haiti is given as a case study of a multi-hazardous environment (section 5.12) although there is the opportunity – through Cambridge Elevate Worksheet 5.4 – to investigate another example. The UK is also given as a case study, with the focus on the Somerset Levels as a local example of a hazardous environment (section 5.13).

## Geographical skills

There is considerable potential to develop qualitative skills in image analysis, map use, GIS mapping and quantitative use of numeracy/statistics, including:

- use and annotation of maps, diagrams and photographs (see Cambridge Elevate Worksheet 5.5)
- statistical skills: calculation of the mean and Spearman's rank to analyse data (see Maths for geographers feature in sections 5.3 and 5.5)
- cartographic skills: use of atlases, weather charts and distribution maps.

## Further reading

The Medecins Sans Frontieres website includes information about earthquakes in Haiti, Japan, Turkey and Italy

[www.cambridge.org/links/gatd6048](http://www.cambridge.org/links/gatd6048)

Information from the U.S. Geological Survey (USGS) can be accessed from this homepage

[www.cambridge.org/links/gatd6049](http://www.cambridge.org/links/gatd6049)

The British Geological Survey contains information about tectonic hazards in a UK context

[www.cambridge.org/links/gatd6050](http://www.cambridge.org/links/gatd6050)

The Tectonic Hazards website focuses on the differences between tectonic hazards in LEDCs (Less Economically Developed Countries) and MEDCs (More Economically Developed Countries)

[www.cambridge.org/links/gatd6051](http://www.cambridge.org/links/gatd6051)

Images, information and video clips from the BBC about volcanic, seismic and tropical storm hazards

[www.cambridge.org/links/gatd6052](http://www.cambridge.org/links/gatd6052)

This is an ESRI Story Map which shows Christchurch CBD before and after the earthquake

[www.cambridge.org/links/gatd6053](http://www.cambridge.org/links/gatd6053)

This is an ESRI Story Map detailing the Nepal 2015 earthquake

[www.cambridge.org/links/gatd6054](http://www.cambridge.org/links/gatd6054)

This ESRI Story Map is a tour of the world's most active and devastating volcanoes

[www.cambridge.org/links/gatd6055](http://www.cambridge.org/links/gatd6055)

This website from *National Geographic* contains information and videos about the hurricane hazard

[www.cambridge.org/links/gatd6056](http://www.cambridge.org/links/gatd6056)

This is an in-depth report by the BBC on Hurricane Katrina

[www.cambridge.org/links/gatd6057](http://www.cambridge.org/links/gatd6057)

This webpage contains 50 photos from *The Telegraph* from Superstorm Sandy

[www.cambridge.org/links/gatd6058](http://www.cambridge.org/links/gatd6058)

This website contains audio stories of people involved in Superstorm Sandy

[www.cambridge.org/links/gatd6059](http://www.cambridge.org/links/gatd6059)

This is an ESRI Story Map showing the inundation of coastal areas of the US due to storm surges

[www.cambridge.org/links/gatd6060](http://www.cambridge.org/links/gatd6060)

This ESRI Story Map explains the response to Superstorm Sandy

[www.cambridge.org/links/gatd6061](http://www.cambridge.org/links/gatd6061)

This article from *National Geographic* explains how buildings can be made earthquake proof

[www.cambridge.org/links/gatd6062](http://www.cambridge.org/links/gatd6062)

*The Economist* has a video clip on making a building quake proof

[www.cambridge.org/links/gatd6181](http://www.cambridge.org/links/gatd6181)

This BBC video clip explains the engineering of earthquake-resistant structures

[www.cambridge.org/links/gatd6063](http://www.cambridge.org/links/gatd6063)

## Videos

Chapter 5 in the Cambridge Elevate enhanced edition includes two video clips:

- The formation of tropical storms. The clip comes from the Tropical storms: Bangladesh's Cyclone Aila DVD by Pumpkin Interactive Ltd.
- Haiti: the 2010 earthquake. The clip comes from the Tectonics: processes and landforms DVD by Pumpkin Interactive Ltd.



## 6 Ecosystems under stress

### AIMS AND OUTCOMES

This chapter considers global biomes and ecosystems at smaller scales. Students are required to:

- know what biodiversity is and how and why it is changing
- learn how ecosystems work and how and why they may change over time
- study the distribution and characteristics of two biomes
- understand how and why deciduous woodlands have changed over time in the British Isles
- learn about the distribution, characteristics and threats to coral reefs
- understand the nature of a local ecosystem, the impact of change and management strategies
- study case studies of ecosystems at different scales to demonstrate sustainable development

AS Level	N/A
A Level	Option

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will benefit from being aware of the fact that biodiversity is crucial to planet Earth to sustain life and that human activity may have both positive and negative consequences for ecosystems, biodiversity and sustainability.

A basic understanding of climate, soils and vegetation would be an advantage, though not essential, in the study of this chapter. Students without this knowledge may require further explanation where climate and soils are significant in explaining the ecosystem characteristics.

### Teaching ideas

#### 3.1.6.1 Ecosystems and sustainability

In this section students should develop an understanding of biodiversity and the impact of human activity on ecosystem development and sustainability. The Maths for geographers box provides an opportunity for students to work out percentages and construct a choropleth map. Further information on choropleth mapping can be found in Chapter 13 Geographical skills and techniques. As an alternative to the choropleth technique, divided circles or proportional circles may be used. Elsewhere in this section students have the opportunity to interpret a more complex graph, understand the term 'impact' in its broadest sense, and to discuss the issue of development and its impact on ecosystems in developing countries. Acid rain may be further investigated in Chapter 1 Water and carbon cycles and Chapter 5 Hazards. There are opportunities for individual or group research into the various international conferences, such as Paris in 2015, and Biodiversity Action Plans.

#### 3.1.6.2 Ecosystems and processes

This section requires students to develop an understanding of ecosystems as systems with inputs, processes, stores and outputs including mineral nutrient cycling, trophic levels and food chains. Ecosystem

changes including succession in response to environmental and human activity are also covered. Students should gain an understanding of food chains and webs, pyramids and mineral nutrient cycling models. There are opportunities to ensure students grasp the vocabulary for this section, for example the difference between weathering and erosion, leaching and runoff, gross and net primary production, primary and secondary succession. They can also learn about ecosystem changes as a result of climate change or disease (ash dieback). Opportunities for making connections are available with the carbon cycle in Chapter 1 Water and carbon cycles and weathering in Chapter 4 Glacial systems and landscapes. The Sundarbans mangrove forest video on Cambridge Elevate provides a brief introduction to net primary productivity.

### 3.1.6.3 Biomes

Students should understand the concept of biomes and their global distribution with a detailed study of two contrasting biomes: savannah grasslands and tropical rainforest. Biomes are closely associated with global patterns of climate and soils, and students may need some help to understand soils and climate depending upon their prior knowledge. This section is a further opportunity to embed the knowledge and understanding of the theory of ecosystem structure and processes in 3.1.6.2.

### 3.1.6.4 Ecosystems in the British Isles over time

The deciduous woodland ecosystem forms the basis of this section as the climatic climax vegetation of the British Isles. Within the section succession is studied in a lithosere and hydrosere and plagioclimax vegetation in heathlands to exemplify the variety of vegetation not at the climatic climax.

### 3.1.6.5 Marine ecosystems

The main focus in this section is coral reefs with an example from the Red Sea. The distribution, main characteristics and factors in their health and survival are covered along with their future prospects.

### 3.1.6.6 Local ecosystems

There is a study of heathland as an example of an ecosystem at a small scale, with the Dorset Heathlands as an example. A Maths for geographers activity involves drawing a line graph based on data in Table 6.6, which shows change over time, and opportunities exist for students to discuss reasons to protect heathland areas and strategies for management.

### 3.1.6.7 Case studies

The Three Gorges Dam development in China and the Norfolk Broads are two case studies at the regional and local scale that are used to illustrate human impact and ecological change. Case studies are an essential component for study at A Level, and used well they are the key for students to access higher marks in longer written examination answers and essays. There are opportunities for students to discuss development issues with the inevitable economic gains versus the environment debates, and the Three Gorges Dam as well as activities provide the chance to consider costs and benefits. Challenges and management solutions in the Norfolk Broads complete the chapter.

Students may test their understanding and knowledge with an Assess to progress question intended as an A Level question.

## Geographical skills

- Choropleth mapping in section 6.1 Ecosystems and sustainability: students are asked to construct a choropleth map to show the percentage of forest damaged by acid rain in Europe and to describe and explain the pattern shown.
- Line graphs in section 6.6 Local ecosystems. Students are required to construct a line graph as the appropriate graphical technique and to describe the trends shown in the loss of heathlands in Dorset.
- Interpretation of maps, diagrams and graphs throughout the chapter, such as Figure 6.4, Activity 6.5 based on Figure 6.11, and the Physical and human activity based on the map of net primary production in Figure 6.13.
- Fieldwork investigation summarised in Worksheet 6.3 on Cambridge Elevate.
- Literacy and oracy throughout the chapter.

- Photographic interpretation is possible in several areas. The opening photograph in the chapter provides a useful resource to introduce the chapter and concepts of biodiversity and sustainability.
- Use of newspaper articles is possible through Activity 6.3 on the decline of puffins and turtle doves across Europe.

## Fieldwork opportunities

Worksheet 6.3 from Cambridge Elevate outlines a possible fieldwork opportunity involving transects and quadrats which may be used to investigate changes in soils, vegetation and land uses in an area, e.g. across a valley, on a slope or in a sere.

## Further reading

Conserving biodiversity, the UK approach

[www.cambridge.org/links/gatd6064](http://www.cambridge.org/links/gatd6064)

UK Post-2010 Biodiversity Framework: Implementation Plan

[www.cambridge.org/links/gatd6065](http://www.cambridge.org/links/gatd6065)

JNCC UK protected sites

[www.cambridge.org/links/gatd6066](http://www.cambridge.org/links/gatd6066)

Links to biodiversity news published quarterly

[www.cambridge.org/links/gatd6067](http://www.cambridge.org/links/gatd6067)

The UK Chalcid Management Plan

[www.cambridge.org/links/gatd6068](http://www.cambridge.org/links/gatd6068)

Mining In Alaska's Bristol Bay Region

[www.cambridge.org/links/gatd6069](http://www.cambridge.org/links/gatd6069)

Sustainability and environmental protection in the Arctic region

[www.cambridge.org/links/gatd6070](http://www.cambridge.org/links/gatd6070)

Broads Plan 2011 – Broads Authority

[www.cambridge.org/links/gatd6071](http://www.cambridge.org/links/gatd6071)

## Videos

Chapter 6 in the Cambridge Elevate enhanced edition includes the video clip: The Sundarbans mangrove forest. The clip comes from the Biodiversity under threat DVD by Pumpkin Interactive Ltd.

## 7 Global systems and global governance

### AIMS AND OUTCOMES

This chapter considers globalisation – the economic, political and social changes associated with technological and other driving forces which have been a key feature of the global economy and society in recent decades. Students are required to:

- identify the dimensions of globalisation
- analyse factors influencing globalisation
- know how global systems operate
- analyse patterns and factors of international trade
- study a case study of a transnational corporation
- know how the global commons operates
- make a critique of globalisation.

AS Level	N/A
A Level	Compulsory

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will benefit from being aware of the following before they commence their studies.

- Globalisation is a powerful process that has economic, social, environmental and political impacts.
- Globalisation has aspects that need to be managed.
- Globalisation provokes different views on the need to manage its impact.

### Teaching ideas

#### 3.2.1.1 Globalisation

Students should develop an understanding and knowledge of the main factors and dimensions in globalisation, to include flows of capital, labour, products, services and information; global marketing; patterns of production, distribution and consumption. They could develop a critique of the KOF Index of Globalisation, using Worksheet 7.1.

#### 3.2.1.2 Global systems

Students examine the form and nature of economic, political, social and environmental interdependence in the contemporary world. The issues that they study include:

- unequal flows of money, people, ideas and technology, which can lead to growth and stability, or may lead to inequalities, conflict and injustices
- unequal power relations that enable some countries to drive global systems to their own advantage.

### 3.2.1.3 International trade and access to markets

Students examine the main trends in the volume and pattern of international trade and investment associated with globalisation. Trading relationships and patterns between large, highly developed economies and smaller, less developed economies are examined.

Differential access to markets associated with levels of economic development and trading agreements and its impact on economic and social well-being is studied.

Students investigate the nature and role of transnational corporations (TNCs) using the example of the Tata Group, including their spatial organisation, production, linkages, trading and marketing patterns. They also examine world trade in one food commodity, namely coffee.

They also consider how international trade and variable access to markets impacts on their own and other people's lives across the globe.

### 3.2.1.4 Global governance

Students examine the emergence and developing role of norms, laws and institutions in regulating and reproducing global systems.

They examine issues associated with attempts at global governance, including how:

- agencies, including the UN in the post-1945 era, can work to promote growth and stability but may also exacerbate inequalities and injustices
- interactions between the local, regional, national, international and global scales are fundamental to understanding global governance.

### 3.2.1.5 The global commons

Students learn about the concept of the 'global commons' with particular reference to Antarctica (including the Southern Ocean as far north as the Antarctic Convergence). The global commons should provide benefits to all people. The rights of all people to sustainable development entails the need to protect the global commons.

### 3.2.1.6 Globalisation critique

Students examine the impacts of globalisation to consider the benefits of growth, development, integration and stability against the costs in terms of inequalities, injustice, conflict and environmental impact.

### 3.2.1.7 Quantitative and qualitative skills

Students must engage with quantitative and qualitative approaches across the theme as a whole.

## Geographical skills

Students can develop their cartographic skills, e.g. interpreting choropleths. There are a number of flow diagrams, some with different-size circles that are proportional to the remittances (e.g. Figure 7.7), and some unconventional diagrams (e.g. Figure 7.6). Compound bar graphs are used in Figure 7.22 – many students find these difficult to understand. Compound line graphs are used in Figure 7.24. In both cases, the key should make the diagrams easy to understand. Maths for geographers invites students to use simple descriptive statistics such as the mean, range and standard deviation of a data set. Temperature graphs are provided in Figure 7.29 and can be used in this respect.

## Fieldwork opportunities

Students could investigate the main street in their nearest town or city. They could work out how many of the shops/businesses belong to a chain store or are independent. If possible, they could compare this with a survey in a small village/rural area. They could comment about the impact of globalisation on different-sized settlements.

## Further reading

Cross Academe, Topic Eye A Level Geography 2016/2017

[www.cambridge.org/links/gatd6180](http://www.cambridge.org/links/gatd6180)

*The Pocket World in Figures, The Economist*

[www.cambridge.org/links/gatd6072](http://www.cambridge.org/links/gatd6072)

British Antarctic Survey, 1999, Antarctic Schools Pack

[www.cambridge.org/links/gatd6073](http://www.cambridge.org/links/gatd6073)

*Geographies of globalisation*, W. Murray and J. Overton, Routledge.

*Globalisation*, S. Oakes, Philip Allan Updates.

## Videos

Chapter 7 in the Cambridge Elevate enhanced edition includes the video clip: Booming Bangalore. The clip comes from the Booming Bangalore DVD by Pumpkin Interactive Ltd.

## 8 Changing places

### AIMS AND OUTCOMES

This chapter considers people's engagement with places, their experience of them and the qualities they ascribe to them which are of fundamental importance in their lives. Students are required to:

- understand some of the ways in which geographers have defined place
- understand how places are represented in a range of different ways
- understand how these representations are constructed and shaped by internal and external forces
- use quantitative and qualitative techniques to investigate the character of places – one local and one far away.

AS Level	Compulsory
A Level	Compulsory

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will benefit from being aware of the following before they commence their studies:

- that places have always been important to people
- that different places are perceived differently by people and this affects their behaviour within them
- that perceptions of place can be changed and manipulated, with both positive and negative consequences.

### Teaching ideas

#### 3.2.2.1 The nature and importance of places

Students should develop an understanding of the meaning of place. They should examine different aspects of place and contrast different types of places. A straightforward contrast is that of rural and urban. They might use Tonnies's *gesellschaft* and *gemeinschaft* as a starter and then consider how global interactions (and the development of ICT) have made these two extremes outdated.

Another popular case study regarding place is the Occupy Movement. What does this tell us about place? How does the place differ when the people/protesters are not there? How does the answer differ when the terms 'people' and 'protesters' are changed?

#### 3.2.2.2 Changing places – relationships, connections, meaning and representation

Students should study the following in relation to the local place within which they live or study and at least one other contrasting place, and encompassing local, regional, national, international and global scales.

- The ways in which the following factors affect continuity and change in the nature of places and our understanding of place: relationships and connections, meaning and representation.

- The ways in which students' own lives and those of others are affected by continuity and change in the nature of places and our understanding of place.

### 3.2.2.3 Quantitative and qualitative skills

Students must engage with a range of quantitative and qualitative approaches across the theme as a whole. Quantitative data, including the use of geospatial data, must be used to investigate and present place characteristics. Particular weight must be given to qualitative approaches involved in representing place, and to analysing critically the impacts of different media on place meanings and perceptions. The use of different types of data should allow the development of critical perspectives on the data categories and approaches.

### 3.2.2.4 Place studies

This is the core of this chapter. Two very different place studies are considered here – Stratford in east London (home to the 2012 Olympic and Paralympic games) and the Blasket Islands, a remote set of islands off the south-west coast of Ireland. There are obvious contrasts: one is urban, one rural; one has had major regeneration, the other less funding. But there are similarities: both have declined in population size and economic activity, but both are having a resurgence, one large scale, one small scale.

## Geographical skills

In this chapter, students are required to study the meaning of different words. For example, the photograph showing private and public space (Figure 8.2) may be used as a basis of a discussion – what is private and what is public? Similarly, study of the quotes from Charles Dickens may be used to investigate how words may contribute to a sense of place. The chapter also requires the students to study OS maps in combination with photographs. How do maps and photos convey a sense of place?

The study of the Blasket Islands requires an interpretation of climate data – how does this aid our understanding of place? Census data is provided for the study of Stratford, east London (Worksheet 8.4). Students are required to compare the data for Stratford with their home area. There are several opportunities to discuss how the use of quantitative data and qualitative data complement each other in the study of place.

## Fieldwork opportunities

There are many opportunities for fieldwork. These include:

- mapping the distribution of housing types and ages in an area
- carrying out a land use survey and comparing it to results from *Kelly's Directories*
- carrying out a survey of positive and negative externalities and comparing this to socio-economic data from the Census.

## Further reading

Neighbourhood statistics

[www.cambridge.org/links/gatd6074](http://www.cambridge.org/links/gatd6074)

Ecotourism on the Blasket Islands

[www.cambridge.org/links/gatd6075](http://www.cambridge.org/links/gatd6075)

Visiting the Blasket Islands

[www.cambridge.org/links/gatd6076](http://www.cambridge.org/links/gatd6076)

Accommodation on the Blasket Islands

[www.cambridge.org/links/gatd6077](http://www.cambridge.org/links/gatd6077)

*The Personality of Ireland*, E. Estyn Evans, Blackstaff Press.

*The Voyage of St. Brendan*, J. O'Meara, Dolmen Press.

*The Brendan Voyage*, T. Severin, Hutchinson.



'Regeneration and well-being in East London: Stories from Carpenters Estate', Bartlett Development Planning Unit, UCL.

'Carpenter's Estate: Common Ground', Peter Dunn, Daniel Glaessl, Cecilia Magnusson, and Yasho Vardhan, London School of Economics.

## Videos

Chapter 8 in the Cambridge Elevate enhanced edition includes three video clips:

- the history of East London
- the regeneration of Canary Wharf
- issues associated with regeneration.

All three clips come from the Aiming for Gold: The 2012 Olympics and East London DVD by Pumpkin Interactive Ltd.

## 9 Contemporary urban environments

### AIMS AND OUTCOMES

This chapter considers urban growth and the associated environmental, economic and social challenges that arise from this. There is examination of the nature of the urban physical environment, and the potential for sustainability drawing upon a range of urban settings from contrasting areas of the world. Students are required to:

- examine the features of urbanisation in contrasting areas of economic development
- consider the emergence and characteristics of megacities and world cities and their regional and global roles
- identify the social and economic issues associated with urbanisation
- appreciate the effect of urban environments on weather, climate and drainage
- be aware of environmental problems associated with urban areas, such as atmospheric pollution and waste disposal, and strategies to manage these problems
- consider the features of and strategies for developing sustainable urban growth and living
- develop knowledge of a range of urban settings from contrasting areas of the world.

AS Level	Option
A Level	Option

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will benefit from being aware of the following before they commence their studies:

- the process of urbanisation and how it varies throughout the world and over time
- the expansion of the world's urban population, the greatest increases being in less developed economies
- the difference between the causes and pace of urban change in more and less developed economies
- the different functions within a settlement
- the concept of sustainability.

Gaps in knowledge about urbanisation could be addressed by watching a video clip on Urbanisation by Dr Charlotte Lemanski ([www.cambridge.org/links/gatd6078](http://www.cambridge.org/links/gatd6078)). This clearly outlines the key terms (e.g. urbanisation, urban). Population statistics across time, together with development indicators (e.g. birth rate, access to safe water) and OS maps can be useful tools when considering urban change and functions within a settlement. The UN Sustainable Development Goals ([www.cambridge.org/links/gatd6079](http://www.cambridge.org/links/gatd6079)) and the RGS-IBG website [www.cambridge.org/links/gatd6080](http://www.cambridge.org/links/gatd6080) will help to fill gaps in knowledge about sustainability.

## Teaching ideas

### 3.2.3.1 Urbanisation

Assess students' prior knowledge by encouraging them to share what they know about urbanisation so far. Clarify with students the issues with measurement and forecasting of urbanisation so that they develop awareness of the need to be critical when examining any data relating to urbanisation.

Class discussion can be used to encourage students to describe and analyse patterns of past and projected urbanisation. To review the global pattern of urbanisation, create a living graph. Students should be given character cards and then will have to decide where they should place themselves on the graph showing urbanisation. This will help them appreciate the reasons for urbanisation.

A living graph activity could also be used to emphasise the differences to the process of urbanisation taking place in less economically developed countries, and the complexity of suburbanisation and counter-urbanisation. Build students' knowledge of how these processes operate in practice.

Students will need to appreciate how specific places have changed over time and be aware of urban policy and regeneration in Britain since 1979. Discuss students' knowledge of megacities, then build on this and probe students to think about the relative importance of economic, social, technological, political and demographic factors. Identify issues of resource consumption in megacities and encourage students to think of the issues relating to sustainable urban development.

### 3.2.3.2 Urban forms

GIS can be used to identify different urban forms, such as walkable urbanism and brownfield sites. Students could develop a Story Map in ArcGIS to present this for different places across the world. This will then support discussion of the advantages and disadvantages of building on the green belt or on brownfield sites. You can provide examples from the local areas, and use news coverage of where brownfield sites have been developed in London (e.g. Olympic Park, Stratford in East London).

Students will need to develop awareness of terminology relating to new urban landscapes. It would be helpful to make these less abstract by thinking through the labels associated with UK cities. Maps, photographs and sets of data about several UK cities might help to stimulate discussion here. Students can then think about the distinctive cultural and heritage quarters of cities. They could look at an example of a Google map, and then go on to create their own map. There is an opportunity for independent research in developing a profile of London as a post-modern city, and then some independent reading to extend students' knowledge of perspectives on urban landscapes.

### 3.2.3.3 Social and economic issues associated with urbanisation

Through independent reading and class discussion students should develop their knowledge of the social and economic issues associated with urbanisation in general and then in respect to Bangalore and London. Use discussion to clarify with students the issues associated with urban poverty, and the difference between rural and urban poverty. Students could develop their case study knowledge of each area by using enquiry questions to create a comprehensive overview of the issues for both cities. To reflect on and review this, students should then write a report comparing the effectiveness of how Bangalore and London manage the social and economic issues associated with urbanisation, which will develop their understanding of these issues, and their case study knowledge.

### 3.2.3.4 Urban climate

Students need to appreciate the importance of monitoring and modelling the urban climate. This can be achieved by introducing them to the work of an urban climatologist. They should then have access to data to illustrate London's urban climate (e.g. London Urban Meteorology Observatory data). Students should look at the different ways that the urban environment influences and affects the weather and climate (e.g. temperature, precipitation, wind and air quality).

This topic lends itself to thinking about the connections between physical and human geography. Once students have developed knowledge of the urban heat island (UHI) effect, they can consider how the growth of a city might affect the severity of the UHI effect. How could developers plan to reduce the UHI? Students

then will be well placed to make connections to the built environment by reading about building projects in London. They should make notes on the effect of tall buildings on wind direction and speed.

Students should develop their knowledge of air pollution. They could create a mini case study on pollution reduction schemes in Beijing and evaluate how effective each strategy has been. Through independent research they can examine other pollution reduction schemes used around the world including an evaluation of how effective they have been at reducing pollution. This could culminate in students being able to develop a case study of how pollution is reduced in Bangalore and London.

### 3.2.3.5 Urban drainage

Assess students' prior knowledge by encouraging them to identify factors that will affect an urban river. Through discussion, support the comparison of urban and rural settings and the characteristics of urban and rural discharge. Provide students with different urban precipitation surfaces and catchment characteristics. They can then decide how this will have an impact on water movement, and sketch the resulting hydrograph. Using class reading, students could be supported to identify any sustainable urban drainage schemes (SuDS) in your local area and evaluate the effectiveness of this scheme.

Students should develop knowledge of river restoration and conservation in damaged urban catchments. Discussion should then draw out the aims and general benefits of river restoration. Students will develop a case study on different restoration projects including the River Marden in Calne.

### 3.2.3.6 Urban waste and its disposal

Using their prior knowledge, encourage students to identify different sources of waste for the three types of physical waste generation (e.g. give students A3 sheets with industrial activity, commercial activity and personal consumption). Each group can share their lists, and through questioning you can consider the significance of each source of waste (e.g. considering the amount of waste generation, the cost of disposal, whether it is monitored and regulated, and whether any can be recycled). To support this activity, you could use photo prompts; this might be helpful for industrial and commercial activity where students might have less knowledge of the sources of waste. Each student should then research an approach to waste disposal (e.g. unregulated, recycling, recovery, incineration, burial, submergence and trade) and focus on the environmental impacts of each. They will need to present/share their individual research, and there can be class discussion or debate about the scale and significance of the environmental impacts.

Students should develop their knowledge so that they can compare incineration and landfill approaches to waste disposal in Bangalore and London. They can start by including general information already collected (e.g. key information about the two approaches). Students can then either collect more information about the approaches via independent research, or they could be provided with case study cards that are circulated around the group. They will have to distinguish which kind of approach and specified urban area the case studies relate to.

### 3.2.3.7 Other contemporary urban environmental issues

Students will need to consider a range of urban environmental issues: atmospheric pollution, water pollution, dereliction and waste disposal. They will identify these environmental problems in Bangalore and London, and the strategies used to manage them. This could be done in a table, so that they can complete their notes as groups are presenting their information about each environmental problem. There should be a column for the environmental issue, the strategies used to manage these issues, and an evaluation of the strategies used. Class discussion should enable consideration of whether countries should be allowed to export their waste. This should lead to a summary and evaluation of the success of dealing with e-waste.

### 3.2.3.8 Sustainable urban development

Assess students' prior knowledge by encouraging them to share what they know about sustainability and sustainable development. Gaps can then be identified, and students can independently extend their background knowledge.

Class discussion could support students' understanding of urban ecological footprints. Students should have the opportunity to think about their own ecological footprint – considering what impacts on their ecological footprint and the implications of this.

The concept of liveability should be discussed. Students could be asked to predict what locations around the world have the best and worst living conditions. As an extension task, they could be asked to devise a rating scale that they would use to consider liveability. Students could compare their predictions with the ratings system used. As they are considering their rankings, students could be asked to justify verbally or in written form, what characteristics have led them to this conclusion. They could then conduct a mini enquiry into liveability.

### 3.2.3.9 Case studies

Teaching of the basics of each urban case study should be built up throughout the lesson sequence, where it is appropriate to illustrate and analyse key areas of the specification. Opportunities for this are highlighted, and the Student Book supports this with several references to the case studies of London and Bangalore throughout the chapter.

In the case study-focused lessons, students should already be aware of the case studies of Bangalore and London, and there is a focus on providing students with the opportunity to compare, analyse and evaluate across their two case studies. A Level students should be given the opportunity to report their findings in extended prose. The use of a range of sources (e.g. statistical data sets, photographs, maps, graphs) offers helpful ways to develop students' knowledge of these contrasting urban areas, while also developing other geographical skills.

## Geographical skills

Skills that are developed throughout this chapter include:

- numeracy: Maths for geographers questions and Tables (e.g. Tables 9.1, 9.2 and 9.3) enable students to consider carefully the application of their graphical skills and interpret complex patterns of numeric data
- literacy: text interpretation is developed through many resources available from Cambridge Elevate, and extended writing is developed through report writing and the Assess to progress questions
- high order thinking: Worksheets are designed to encourage students to think like a geographer, and encourage students to make links between topics (e.g. Worksheet 9.8). Further reading will enable students to engage independently and ensure a critical understanding of key concepts.

## Fieldwork opportunities

There are several opportunities for fieldwork relating to contemporary urban environments. Chapter 12 Fieldwork provides more information on the style of fieldwork investigations needed for the geographical investigation at A Level. For example, Table 12.2 signposts examples of hypotheses and methods of data collection for an urban heat island investigation, which relates to the content within 9.4 Urban climate.

## Further reading

Questionnaire to calculate an ecological footprint and carbon emissions

[www.cambridge.org/links/gatd6081](http://www.cambridge.org/links/gatd6081)

Video clip focused on urbanisation; this could be used as a stimulus for discussion about the possibilities for sustainable cities in the future

[www.cambridge.org/links/gatd6082](http://www.cambridge.org/links/gatd6082)

Questionnaire to examine lifestyle choices and a person's environmental carbon footprint

[www.cambridge.org/links/gatd6083](http://www.cambridge.org/links/gatd6083)

A range of resources to extend student knowledge on urbanisation

[www.cambridge.org/links/gatd6084](http://www.cambridge.org/links/gatd6084)

A range of resources to extend student knowledge on sustainable development

<http://www.cambridge.org/links/gatd6085>

Article that identifies issues of resource consumption in megacities

[www.cambridge.org/links/gatd6086](http://www.cambridge.org/links/gatd6086)

Video resource on urban poverty by Dr Charlotte Lemanski about how urbanisation affects poverty, and the difference between urban and rural poverty

[www.cambridge.org/links/gatd6087](http://www.cambridge.org/links/gatd6087)

Video resource on urbanisation by Dr Charlotte Lemanski, which provides factual detail about the process, and outlines issues with measurement and forecasting of urbanisation

[www.cambridge.org/links/gatd6088](http://www.cambridge.org/links/gatd6088)

Ideas about how urban landscapes can be examined by visual literacy

[www.cambridge.org/links/gatd6089](http://www.cambridge.org/links/gatd6089)

Ideas about how to use geographical data sets to examine social-economic variations within an urban area

[www.cambridge.org/links/gatd6090](http://www.cambridge.org/links/gatd6090)

London Urban Meteorology Observatory data to illustrate London's urban climate

[www.cambridge.org/links/gatd6091](http://www.cambridge.org/links/gatd6091)

An introduction to urban climate through a focus on the work of an urban climatologist

[www.cambridge.org/links/gatd6092](http://www.cambridge.org/links/gatd6092)

An infographic to use as a stimulus to discuss students' knowledge of megacities

[www.cambridge.org/links/gatd6093](http://www.cambridge.org/links/gatd6093)

'Urbanisation and Development in the Caribbean', *Geography*, 80(4):332–41, R. Potter.

'Urban Poverty and Urban Development Commission in Barbados, West Indies', *Geography*, 85(3):263–67, R. B. Potter and E. McAlasan.

*Fundamentals of the Physical Environment*, P. Smithson, K. Addison and K. Atkinson, Routledge.

*Introducing Human Geographies*, P. J. Cloke, P. Crang and M. Goodwin, Routledge.

## Videos

Chapter 9 in the Cambridge Elevate enhanced edition includes the video clip: Housing and conditions for Bangalore's poor. The clip comes from the Challenges of urbanisation: Inequalities in Bangalore DVD by Pumpkin Interactive Ltd.

## 10 Population and the environment

### AIMS AND OUTCOMES

This chapter considers the environmental factors that affect global populations and levels of health, morbidity and mortality. Students are required to:

- understand that global populations are influenced by climate, soils, topography and resource availability
- explain global patterns of food production and consumption and the concerns over global food security
- describe the characteristics and distribution of two major climatic types and two zonal soils
- give an overview of global and regional patterns of health, mortality and morbidity
- explain how population changes as a result of natural change, such as birth and death rates, and migration change
- understand the concepts of overpopulation, underpopulation and optimum population
- identify contrasting perspectives on population growth and predictions of global population change under different scenarios.

AS Level	N/A
A Level	Option

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will benefit from being aware of the following before they commence their studies:

- population measures such as birth rates, death rates, infant mortality and life expectancy. They should appreciate that the world's population is expanding, with the greatest increases being seen in Low Income Countries (LICs)
- population ecology (how the numbers of people change over time and space). This should help students to appreciate the difference between HICs and LICs
- different food is produced in different places, depending on factors such as the climate, and that food is transported between countries through trade
- population numbers and movements have implications for the provision of food, water and energy supplies
- levels of health and disease vary between places.

Gaps in student knowledge could be addressed using the Worldometers website

[www.cambridge.org/links/gatd6094](http://www.cambridge.org/links/gatd6094), which shows real-time data for births, deaths and population growth.

## Teaching ideas

### 3.2.4.1 Introduction

Introduce the idea of population and check key terms, such as density and distribution. Read the introduction to Chapter 10 in the Student Book and note down factors that encourage or discourage population growth. Then read the section on global patterns of population. Use Table 10.1 to produce a line graph of world population growth between 1800 and 2050 (estimate). Discuss the pattern shown and the difficulty with producing future estimates. Use Table 10.2 to highlight population trends in HICs, MICs and LICs.

### 3.2.4.2 Environment and population

#### Global patterns of food production

Challenge students to estimate how much of the world's exploitable land surface is being used to grow food (around half) and where their food originates from. Use food labels to plot the origin of foodstuffs on a world map. Read the section of the Student Book called Global and regional patterns of food production and consumption and use Table 10.3 to discuss percentage increases in calorie intake in different parts of the world.

#### Agricultural systems and physical variables associated with food production

Class discussion about open and closed systems. How many of each can they identify? Talk about agricultural systems and list as many inputs, processes and outputs as the group can think of. Read the section on agricultural systems and agricultural productivity. Read the section called Key physical environmental variables – climate and soils, and create a mind map to show the different physical variables that affect agricultural production.

#### Major climatic types

Recap the reasons for the differing global heat distribution (distance from sun, tilt of earth/angle of sun, thickness of atmosphere). Read the section on climatic types. Use Worksheet 10.1 to create a summary to show the differences between semi-arid climates and Mediterranean climates. Outline the challenges of living in each climate type.

#### Zonal soils and soil problems

Challenge students to write a 'recipe' for soil. What is soil made of? (Weathered rock, organic matter, air and water.) Read the section on zonal soils. Create annotated diagrams of ferralsol and podsol soils. Outline the similarities and differences in their characteristics and use. List the ways that soil type affects human activities. Find out about the soil in your locality: go to the UK Soil Observatory website at [www.cambridge.org/links/gatd6095](http://www.cambridge.org/links/gatd6095) and use the map viewer and add layers to find out about the soil type, acidity, moisture and biodiversity for your postcode. Read the section on soil problems and create a summary table to show the four problems outlined in the chapter.

#### Strategies to improve food security

Class discussion on food shortages. Where does all of our food originate from? (Initially the sun.) Do we have a global shortage of food? (In real terms, no.) Who suffers when food is in short supply? Read the section called Strategies to ensure food security. Allocate one method of improving food security to different groups/members of the class (there are six in total). Students should create a presentation to show how their chosen method works and to what extent it could solve global food insecurity.

### 3.2.4.3 Environment, health and well-being

#### Global patterns of health, morbidity and mortality

Ask students to identify specific diseases that affect specific countries or parts of the world. Read the section called Global patterns of health, morbidity and mortality and write the formula for calculating DALYs. To what extent is this formula better than life expectancy? Plot non-communicable and infectious (communicable) diseases onto a world map. Use Table 10.4 and the Chi-square test to work out whether



there is a statistical relationship between births attended by skilled personnel (%) and infant mortality rate (per 1000 births) in selected African countries. Worksheet 10.2 will lead students through this activity, and further details on the completion of Chi-square tests can be found in Chapter 13 Geographical skills and techniques.

### **Environmental variables and diseases. The global distribution of a biologically transmitted disease: malaria**

Read the section on environmental variables and diseases. Use Table 10.5 to create a graph showing diseases with large health burdens that are caused by environmental factors. Read the section called The global distribution of a biologically transmitted disease: malaria. Write a news report about the prevalence of malaria and the attempts to eradicate the disease.

### **Environmental variables and diseases. The global distribution of a non-communicable disease: lung cancer**

Read the section called The global distribution of a non-communicable disease: lung cancer. Create a table outlining the human and physical factors that have been linked to lung cancer.

#### **3.2.4.4 Population change**

##### **The demographic transition model – uses and validity**

Read the section on natural changes. Create a table to show the factors that lead to changes in birth and death rates. Use the Data Explorer website to find out how the UK birth rate grew from 10.88 per thousand in 2004 to 12.22 per thousand in 2014. Investigate the causes of this increase. Which localities/regions/social groupings saw the largest increases in births? What will be the implications of these changes? Read the sections on the demographic transition model. Create a copy of the model (Figure 10.33) and annotate it to show key changes and reasons for changes.

##### **Migration processes and the implications of migration**

Ask the class if they have seen recent news articles about migration. If appropriate, discuss the push and pull factors and intervening obstacles of the migration. An alternative to this is to use a recent news article from a news website. Read the section on migration processes. Create a copy of Lee's model of migration (Figure 10.38) and annotate it to show the key features and validity. Read the section on the implications of migration. Using the news article called 'Despite border crackdown in Ethiopia, migrants still risk lives to leave', identify the push and pull factors and the physical and human intervening obstacles within the article. Watch the video clip on Cambridge Elevate about why European Union (EU) migrants move and the impact that their arrival has on UK sectors of industry.

#### **3.2.4.5 Principles of population ecology and their application to human populations**

##### **Population growth dynamics**

Read the section called Population growth dynamics. Define overpopulation, underpopulation and optimum population. Allocate one key term to each student. Each student must carry out research to find a country that fits their key term, for example a country that could be described as being overpopulated, underpopulated or having optimum population.

##### **Population, Resources and Pollution model**

Read the section called Balancing population and resources. Use an appropriate website to calculate the ecological footprints of the class, such as the WWF site [www.cambridge.org/links/gatd6096](http://www.cambridge.org/links/gatd6096). Read the section called The Population, Resources and Pollution model. Investigate climate change in the Maldives. The Maldives is a group of islands in the Indian Ocean. It is the 11th most densely populated country in the world, with around 400 000 living on just 298 km<sup>2</sup> of land. Find out how climate change is threatening the existence of the population of the Maldives.

## Perspectives on population growth

Read the section called Perspectives on population growth. Summarise the different perspectives on population growth. To what extent do you agree with each? Read the 2014 research into Easter Island ([www.cambridge.org/links/gatd6097](http://www.cambridge.org/links/gatd6097)) and create a case study to show how the Rapa Nui people were wiped out through environmental degradation.

### 3.2.4.6 Global population futures

#### Health impacts of global environmental change

Read the section called Health impacts of global environmental change. Create a table to show the future potential health impacts of both global warming and ozone depletion. Categorise each change to show whether it will result in fewer or more incidences of morbidity and mortality.

#### Predictions of global population change

Read the section called Predictions of global population change. Use Table 10.11 to calculate the percentage increases in population for each continent between 2015 and 2100. Create a graph to show the results. How and why is the world's population projected to change by 2030?

#### Implications of future population

Read the section called Possible implications of future population totals. Summarise changes under all three scenarios both globally and in HICs and MICs. To what extent will these changes affect us?

#### Approaches to managing future population change

Read the section called Approaches to managing future population change. Have a discussion using Table 10.12. What can governments realistically do to manage the number of people within their country? Carry out research into governments that have tried to implement these ideas. How successful have they been?

### 3.2.4.7 Case studies

#### The relationship between place and health

Ask students to create a sketch map of their locality, identifying places that make them feel good or bad. They should also say whether this would be the case for somebody younger/older than them. This introduces the theory that place affects well-being.

Identify a green structure in their locality, that is, a network of green spaces, both rural and urban, which are essential to the well-being and quality of life of communities. Read the case study called The relationship between place and health. Discuss the news article 'Green spaces improve schoolchildren's mental development, study finds'. To what extent do students agree with these findings?

Finally, create a webpage (either on paper or using web design software) to show the key details and benefits of the Bankside Open Spaces Trust.

#### Population growth in Tanzania

Locate Tanzania on a world map. Label the capital city and other large settlements. Read the case study called Population growth in Tanzania and discuss the type of country that Tanzania is. Compare the demographic data in Table 10.10 with recent data from other countries. Use the information in Table 10.10 to discuss mortality rates in Tanzania. Make a list of environmental and socio-economic factors that lead to population growth and decline in Tanzania.

#### Assess to progress questions

Students should complete the Assess to progress questions and use the mark scheme on Cambridge Elevate to mark their work.

## Geographical skills

Numerical skills are developed throughout this chapter. Tables 10.1, 10.2, 10.3, 10.4, 10.8, 10.11 and 10.12 all require students to interpret complex patterns of numeric data. In the section on Global patterns of health, mortality and morbidity, students have the opportunity to develop statistical skills through a Chi-square test. This activity looks for a correlation between infant mortality and births attended by a skilled professional. Worksheet 10.2 leads students through this task and further details on the completion of Chi-square tests can be found in Chapter 13 Geographical skills and techniques. In addition to this, the sections on population change and global population futures give students the opportunity to calculate percentage changes.

Literacy skills are embedded within this chapter. Text interpretation is developed through activities such as the news article about Ethiopia within the implications of migration section. The use of extended writing is found in many activities. For example, within the future population–environment relationships in Uganda and UK sections, students write a detailed account of the differing population challenges for HICs and LICs. Key terms are included throughout.

Opportunities for high order thinking are found at various points throughout the chapter. There are three activities where students are asked to think synoptically, combining human and physical processes. There are also two activities that are designed to encourage students to think like a geographer. Further research is suggested through weblinks and specific activities, such as the Green spaces task in the section on relationship between place and health.

Practical skills and application are also developed. Within the zonal soils section, students create annotated diagrams of soil profiles. The use of case studies is also well embedded. Examples of this are the study of green spaces in London, population growth in Tanzania and future population–environment relationships in the UK and Uganda.

## Further reading

The United Nations database for researching a wide range of information about individual countries

[www.cambridge.org/links/gatd6098](http://www.cambridge.org/links/gatd6098)

The World Bank database, which provides development information about individual countries

[www.cambridge.org/links/gatd6099](http://www.cambridge.org/links/gatd6099)

The website of a charity that researches aspects of global population and environmental sustainability

[www.cambridge.org/links/gatd6100](http://www.cambridge.org/links/gatd6100)

An American organisation that builds partnerships between governments, NGOs, research institutions and local people in order to facilitate improved global health

[www.cambridge.org/links/gatd6101](http://www.cambridge.org/links/gatd6101)

The United Nations website that has information about the global AIDS pandemic

[www.cambridge.org/links/gatd6102](http://www.cambridge.org/links/gatd6102)

The UK Soil Observatory site, which can be used for obtaining detailed soil information for Great Britain

[www.cambridge.org/links/gatd6103](http://www.cambridge.org/links/gatd6103)

The United Nations Food and Agricultural Organization, which works to eradicate global hunger and encourage sustainable use of the land

[www.cambridge.org/links/gatd6104](http://www.cambridge.org/links/gatd6104)

## Videos

Chapter 10 in the Cambridge Elevate enhanced edition includes the video clip: Europe's economic migrants. The clip comes from the Population change: causes, impacts and management of mitigation DVD by Pumpkin Interactive Ltd.

# 11 Resource security

## AIMS AND OUTCOMES

This chapter considers the large-scale exploitation of natural resources that have an uneven global distribution, with particular reference to energy, ore mineral and water resources. Students are required to:

- consider the increasing demand for water, minerals and energy and their critical roles in human affairs
- analyse the nature and changing patterns of local and regional transfers of water and massive global transfers of energy and minerals
- appreciate the fundamental relationships between the physical environment and human activities in respect of energy, mineral and water provision
- examine how people in their local, national and international communities attempt to secure necessary supplies of these resources to achieve resource security, and the themes of sustainability and conflict that their attempts may encounter
- explore the environmental implications in obtaining, using and disposing of the waste products associated with water, mineral and energy supplies.

AS Level	N/A
A Level	Option

Types of assessment questions:

- multiple choice
- short answer
- levels of response
- extended prose.

## Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

## Prior knowledge

Students will benefit by being aware of the following before they commence their studies:

- the difference between a renewable and non-renewable resource
- why and how resources are traded internationally
- the fact that obtaining and using resources can have positive and negative economic, social and environmental consequences
- the fact that the use of certain resources can have global environmental impacts
- the fact that human welfare relies on access to certain key resources, with consequences if they are not available in sufficient quantity or quality
- the concept of sustainable use of resources, and implications if they are not used sustainably.

If students have not covered chapters on energy and water supplies at GCSE they should be guided to free online geography GCSE revision websites such as BBC Bitesize: [www.cambridge.org/links/gatd6105](http://www.cambridge.org/links/gatd6105) and [www.cambridge.org/links/gatd6106](http://www.cambridge.org/links/gatd6106) or S-Cool revision: [www.cambridge.org/links/gatd6107](http://www.cambridge.org/links/gatd6107).

Students could carry out an online search using some of the terms in the list above. They could view online video clips on the geography of energy, mineral ores and water supplies, or read the relevant chapters in a GCSE Geography Student Book.

## Teaching ideas

The linking theme of energy, ore mineral and water resources is in their essential use but uneven distribution and the need to transfer them to areas with human need. Obtaining, transferring/transporting and using these resources have implications at a range of scales from local to global. The relationship between the physical environment and increasing human demand should be central, as well as the implications of use and disposal. Students should become familiar with using atlases and GIS in developing their appreciation of locations, flows and cross-border movements, with which they are aided throughout the chapter with frequent map illustrations.

The key issues in water, mineral and energy security lie in matching sufficient quantities to specific amounts of human need. Students are guided through the use of tables, charts and graphs and the use of proportions, percentages and measurement equivalency so that they become familiar with interpreting and learning to question quantitative data and the patterns of resource distribution it can illustrate.

Obtaining sufficient supplies of water, mineral ore and energy resources will require students to consider the acceptable environmental consequences of their procurement, and decisions concerning how scarce resources are allocated will take students into consideration of the power balance between different groups within a nation, between groups of countries and in terms of global equity. Being able to appreciate different perspectives, assess needs and examine the values of key players in the provision of water (section 11.3 Water security), energy (section 11.5 Energy security) and minerals (section 11.6 Mineral security) should be explored by encouraging students to read a range of texts and articles representing different groups and to seek to analyse them as skilled geographers. Investigating the views of a local population sample will assist in examining attitudes towards how future water and energy provision should be secured as well as taking students' own views into account (section 11.7 Resource futures: water, energy and ore minerals).

### 3.2.5.1 Resource development

Students should develop an awareness of resource classification and the implications for sustainable use of some resources and the finite nature of others. Theories of resource usage and the life cycle of resource exploitation should inform the remainder of the chapter and provide a conceptual basis for the sections that follow. Students should be prepared to challenge historic resource theories in the light of technological innovation, demand changes and the drive towards a more sustainable use of the planet's resources. They should consider how Environmental Impact Assessments (EIA) are used when planning major resource projects to minimise or mitigate likely environmental impacts.

### 3.2.5.2 Natural resource issues

Students will consider a range of contemporary challenges posed by the fact that resource surpluses and population needs are frequently in different places generating trade in energy, ore minerals and water resources. Demand is not just a function of population numbers, but of affluence, distribution density and economic stage. Movement of some energy resources is more easily carried out than others, but technology is facilitating new patterns of production and consumption.

Cross-border transfers of energy, ore minerals and water can bring beneficial trade to producer and consumer, but there are circumstances where conflict may arise. Students should become aware that energy, ore minerals and water trade and use take place within a context of geopolitics, which can encourage or work against cross-border cooperation.

### 3.2.5.3 Water security

Global patterns of water consumption and availability alter as human and physical environments undergo change. Students should analyse where and why the framework of water need and supply are changing with reference to economic and environmental dynamism. The physical basis of water supply – either via flow or historic stores – will enable students to explore the relationship between climate, geology and drainage patterns. Awareness that excessive water use (both in abstraction and contamination) in one area can have implications for water users elsewhere will demonstrate that water exploitation may benefit by being viewed from a systems approach.

Strategies to increase water provision in the face of increasing demand and/or declining supply will enable students to compare a range of water provision methods on the basis of effectiveness, cost, equality of access and sustainability. They should examine the environmental impacts of a major water supply scheme

that involves a major dam and/or barrage and associated distribution networks. The geopolitics of water transfer schemes places water within a strategic resource framework similar to that of energy supplies. Students will consider the issues around increasing supplies of a renewable resource, how to reduce demand, and the implications of the virtual water trade.

#### 3.2.5.4 Energy security

Energy may be classified according to the way it is sourced and how it is used. Students will consider the key distinctions and how energy demand is related to economic and social levels of development.

Communities frequently have a range of energy sources that may be exploited. The question of which ones and what form (primary or secondary energy) has a clear link, like water, to the physical environment as well as the nature of human needs. Students will need to examine the structural context in which energy resources are discovered, exploited and traded through the operation of energy transnational corporations (TNCs) and state energy companies.

Strategies to secure energy security should be examined as finite supplies are depleted, the trading context evolves and demand continues to increase. Students will want to question whether increasing energy demand is inevitable or whether more efficient use can combine with technological improvements to make supplies go further. In considering desirable energy mixes they will need to consider the environmental issues of particular forms of energy generation and uses, taken at a variety of scales, and investigate the issues surrounding the safe disposal of energy residues and waste. They should examine the environmental impacts of one major energy resource development and its associated distribution network.

#### 3.2.5.5 Ore mineral security

Students should examine this theme with reference to one specific key global mineral resource: iron ore or a non-ferrous metal ore such as copper, tin or manganese. Access to a mineral ore is likely to be less of a security issue for human welfare, unlike water or energy, but will contribute to economic and possibly strategic security.

The global distribution of the specified ore (this chapter focuses on copper ore) should describe resource location and size of reserves, and examine the physical geography associated with its occurrence, pattern of distribution, form and extraction methods. The environmental impacts of extraction need to be considered together with those of distribution networks and the geopolitical implications of trade.

Students should consider the processing demands of the specific ore mineral, its end use and components of demand. Trends in demand and possibility of reuse, recycling or substitution should also be examined. This will lead on to a consideration of the extent to which extraction and use of the mineral ore can move towards a more sustainable approach to a finite resource.

#### 3.2.5.6 Resource futures

The implication of fossil fuel dependence on global climate is likely to be familiar to students. But they will need to examine the evidence for the apparent correlation in order to be able to consider the urgency of the desirability to move towards alternative energy sources. Referencing Chapter 1 Water and carbon cycles and the section on carbon cycles will support this. Their evaluation of alternative energy provision should consider cost, availability, geopolitical considerations, environmental impact and sustainability among other factors. Students will need to become familiar with the global energy frameworks being developed to encourage international agreement and steer desired courses of action, many of which are ongoing, and it will help if they engage with a constantly evolving energy news scenario. With respect to ore minerals, students should examine the balance between lifetime reserve estimates and demand trends and the potential for more efficient use, and consider the demands for rare earth metals and the implications of the economics of their exploitation.

#### 3.2.5.7 Case studies

Students are required to be familiar with a case study of either water, mineral ore or energy resource issues in a global or specified regional setting. Water issues in Peru has been taken as the focus for the case study presented here, with an examination of the relationship between water security in a country of extreme precipitation variation and human welfare, along with attempts to manage water provision.

The second case study focuses on New Zealand and, in particular, the Waikato region of North Island. Students are required to analyse how aspects of the physical environment affect the availability and cost of energy (or water) and the way in which energy (or water) is used, and how the energy provision in New Zealand generally, and around Waikato specifically, illustrates the key physical/human interactions.

## Geographical skills

There is considerable potential to develop qualitative skills in atlas use, resource mapping and analysing journalism articles and quantitative skills of numeracy/statistics, including:

- use and interpretation of a variety of graphs, tables and charts (see Cambridge Elevate Worksheets 11.2, 11.3 and 11.7)
- literacy: use of text in a variety of forms and written for different purposes (as in the Research point in 11.5 that examines water charity websites)
- numeracy: analysis of trade data, equivalency of data measures and measuring current and forecast trends (as in the Maths for geographers exercises)
- cartographic skills: use of atlas, regional and flow-line maps (as in Activities 11.4 and 11.6 (1))
- statistical skills: use of mean, median and mode, percentages and proportions (see Cambridge Elevate Worksheet 11.7).

## Fieldwork opportunities

There is some opportunity for geographical investigation in the field in this chapter:

- surveys of water use by household and how this is changing
- surveys of domestic energy use and changing demand
- questionnaire surveys of attitudes to different energy sources
- environmental impact survey of a visited energy source.

## Further reading

Resource frontiers

[www.cambridge.org/links/gatd6108](http://www.cambridge.org/links/gatd6108)

Environmental Impact Assessment (EIA)

[www.cambridge.org/links/gatd6109](http://www.cambridge.org/links/gatd6109)

Global trade in coal

[www.cambridge.org/links/gatd6110](http://www.cambridge.org/links/gatd6110)

Global trade in gas

[www.cambridge.org/links/gatd6111](http://www.cambridge.org/links/gatd6111)

Geopolitics of water use

[www.cambridge.org/links/gatd6112](http://www.cambridge.org/links/gatd6112)

Water supply in Peru

[www.cambridge.org/links/gatd6113](http://www.cambridge.org/links/gatd6113)

The UK energy gap

[www.cambridge.org/links/gatd6114](http://www.cambridge.org/links/gatd6114)

Future energy possibilities

[www.cambridge.org/links/gatd6115](http://www.cambridge.org/links/gatd6115)

Energy background in New Zealand

[www.cambridge.org/links/gatd6116](http://www.cambridge.org/links/gatd6116)

The World Copper Factbook 2014

[www.cambridge.org/links/gatd6117](http://www.cambridge.org/links/gatd6117)

Chile's pollution grows to meet China's demand for copper

[www.cambridge.org/links/gatd6118](http://www.cambridge.org/links/gatd6118)

## Videos

Chapter 11 in the Cambridge Elevate enhanced edition includes the video clip: Biogas production in India. The clip comes from the Energy security: India's sustainable solutions DVD by Pumpkin Interactive Ltd.



## 12 Fieldwork investigation

### AIMS AND OUTCOMES

All students are required to undertake fieldwork to investigate processes in both physical and human geography. For AS Level, students are required to:

- spend a minimum of two days undertaking fieldwork
- conduct significant fieldwork in both physical and human aspects, although these may be integrated into a single enquiry
- produce a fieldwork report that will form the basis of answers to a range of possible exam questions. They are not required to submit an investigation for marking
- ensure they can answer questions on any aspect of the investigation process, from drawing up aims and objectives through to conclusions, evaluation and further possible development.

For A Level, students are required to:

- spend a minimum of four days undertaking fieldwork during their A Level course. It may be completed locally or beyond the local area, on full days or the equivalent time in disaggregated sessions and cover both physical and human processes
- conduct an independent investigation which may be based on either human or physical aspects of geography, or a combination of both. ('independent' does not mean working alone; data collection and field investigations may be carried out as part of a group, including the incorporation of data from others in the group)
- work independently in contextualising, analysing and reporting their investigation, which should be based on an individual title that demonstrates the required fieldwork knowledge, skills and understanding.

Schools/colleges will be required to provide a fieldwork statement confirming that each candidate has spent the requisite time in the field collecting geographical data for both AS and A Level courses.

AS Level	Compulsory (exam-based)
A Level	Compulsory (investigation submitted for marking)

AS Level: types of assessment questions:

- short answer
- levels of response.

A Level: written geographical investigation report:

- 3000–4000 words long, including all text, text boxes and supplementary material. Marked by the teacher. Samples submitted to AQA for moderation.

### Scheme of work

To download the scheme of work for all units, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Teaching ideas

#### AS Level

#### 3.4 Geography fieldwork investigation

Students will need to experience and participate in the full set of fieldwork steps. The justification and level of sophistication for each stage of the enquiry process will need to be taught, but students are expected to show independent thinking and autonomous working to produce an individual fieldwork enquiry. In the AS exam they may be asked questions on any of the following:

- preparation for fieldwork, including how and why the aims/objectives were drawn up, background reading to develop a theoretical base, planning data collection from secondary source and primary data in the field, data sampling techniques and conducting risk assessments
- how and why primary data was collected in the field and from secondary sources. Students should be able to explain why particular sources of data were selected and justify the methods used
- processing and presenting data using relevant graphical and cartographic techniques (see Chapter 13 Geographical skills and techniques)
- analysing data, including statistical techniques where relevant (see Chapter 13 Geographical skills and techniques)
- drawing conclusions that relate back to the initial aim, hypothesis or enquiry question. These should be made in the context of the place selected for study and the general theoretical context
- evaluate all stages of the enquiry and be able to review the overall success of the study
- consider how the enquiry could be developed further in both methodology and areas for further investigation
- what the student understands of the general fieldwork enquiry process
- specific details of the student's own fieldwork enquiry.

While it is accepted that centres may feel it necessary at times to carry out data collection in groups, students are expected to show that they have been personally involved at all stages of the enquiry and have had the opportunity to use their own initiative at all stages of the investigation.

Questions relating to general geographical skills and geographical investigation will constitute 25% of the final AS mark.

## A Level

### 3.3 Geography fieldwork investigation

#### 3.3.1 Fieldwork requirements

Schools and colleges are required to provide a fieldwork statement by 15 May in the year of entry to confirm that each candidate has undertaken four days of geographical fieldwork over the length of the course relating to processes in both human and physical geography.

#### 3.3.2 Investigation requirements

Students are required to undertake an independent investigation that must incorporate a significant element of fieldwork. It may be based on either human or physical geography or a combination of both. While they may incorporate field data and/or evidence from field investigations collected in groups they should produce an independent investigation with an individual title.

The independent investigation must:

- be based on an issue or research question defined and developed by the individual student. The defined aspect of investigation is to address aims, questions and/or hypotheses that relate to any part of the specification content
- show understanding of the theoretical or comparative context for a research question/hypothesis and involve research of relevant literature sources that relate to the selected focus of study
- make use of good-quality field data and/or evidence from field investigations that is relevant to the topic under investigation and that has been observed and recorded
- justify decisions made concerning practical elements of data collection and observation in the field including frequency/timing of observation, sampling and data collection approaches
- include and refer to the student's own field data and/or secondary data, research and their experience of field methodologies of the investigation of core physical and human processes
- in the selection of appropriate techniques for analysing and presenting the results of field data, show knowledge and understanding of the basis for selection. It must demonstrate the student's ability to select suitable quantitative and qualitative approaches and to apply them appropriately
- demonstrate that field data has been interrogated and critically examined, comment has been made on its accuracy and reliability and the experience has been used to extend geographical understanding

- show evidence of independent contextualisation, analysis and summarisation of data and findings, and make conclusions that have been drawn through the application of existing knowledge, theory and concepts. Sense has been made – and understanding is demonstrated – of field observations, and recognition has been shown of their relationship to the wider geographical context
- present field results through extended writing that shows clarity, logic, coherence and is within a wider range of presentation methods
- show the ability to make a well-argued case by answering a specific geographical question through the use of effectively deployed evidence and its relationship to theory
- include evaluation and reflection upon the investigation process and findings plus an understanding of the ethical dimension of research in the field.

While allowing the use of data collected in a group context each candidate must produce a completed report that is individual to them. It will be marked internally and samples sent for moderation by AQA. It comprises 20% of the A Level course.

### 3.3.3 Non-exam assessment mark scheme guidance

Teachers are strongly recommended to familiarise themselves and their students with the overall description statements for Levels 1–4 of the non-exam assessment component.

## Geographical skills

There are many categories of skills that students will need to be prepared in for both the AS and A Level investigation. These range from those of framing appropriate geographical questions and the concept of the hypothesis and null hypothesis, to researching, assessing field methodologies, assessing veracity, reliability and bias through to graphical and statistical skills and presenting a coherent investigation within the word limit (A Level) or exam time and space (AS Level).

Specific areas of skill that teachers will wish to assure themselves that their students have practised and can deploy effectively are:

- being able to identify a manageable focus for their investigation, related to an aspect of the specification that enables them to select a focused research question or issue that will enable them to display their geographical investigation ability fully
- putting their research question within a theoretical context (which may or may not involve the use of the null hypothesis concept – see Student Book Chapters 12 Fieldwork and 13 Geographical skills and techniques) and applying it at a suitable geographical scale and to an appropriate location(s)
- being aware of the range of data collection options that exist: qualitative and quantitative data, primary and secondary, questionnaire and interview surveys, sampling choices, timeframe, and so on. – and being able to select (and justify) the most appropriate for their investigation
- being aware of the range of data presentation techniques, their appropriateness and limitations, and choices within specific techniques (such as colour choice on choropleth maps and coding options for questionnaire responses). Reference to Chapter 13 Geographical skills and techniques will assist
- being aware of numerical and statistical skills to analyse data and confirm the reliability of samples. Reference to Chapter 13 Geographical skills and techniques will assist
- being able to evaluate not just reliability of results but also methods of enquiry, appropriateness of procedure, strength of conclusions drawn, the validity of the original enquiry question/issue and the locational context in which it has been studied. Any and all of these may generate ideas for further refinement of the study or development of the ideas encountered.
- being able to write clear, accurate, coherent prose that develops the geographical ideas of the investigation fully while (for A Level) remaining within the 3000–4000 word recommendation (to include all text, text boxes and presentation techniques but not the appendices). Less than this recommendation and students may not allow the appropriate coverage required by the assessment objectives. Students whose reports exceed the recommended length may be penalised for lack of precision and focus. Developing the skill of efficient and high-quality geographical communication is valid for more than just fieldwork and is a skill that will be required by students responding to exam questions on their geographical investigation at AS Level.

## Further reading

Fieldwork guidance from the Geographical Association (GA)

[www.cambridge.org/links/gatd6119](http://www.cambridge.org/links/gatd6119)

GIS links (GA document)

[www.cambridge.org/links/gatd6120](http://www.cambridge.org/links/gatd6120)

Fieldwork guidance from the Royal Geographical Society (RGS-IBG)

[www.cambridge.org/links/gatd6121](http://www.cambridge.org/links/gatd6121)

RGS-IBG: The case for qualitative fieldwork

[www.cambridge.org/links/gatd6122](http://www.cambridge.org/links/gatd6122)

GIS links (RGS-IBG document):

[www.cambridge.org/links/gatd6123](http://www.cambridge.org/links/gatd6123)

[www.cambridge.org/links/gatd6124](http://www.cambridge.org/links/gatd6124)

[www.cambridge.org/links/gatd6125](http://www.cambridge.org/links/gatd6125)

[www.cambridge.org/links/gatd6126](http://www.cambridge.org/links/gatd6126)

Field Studies Council (FSC):

[www.cambridge.org/links/gatd6127](http://www.cambridge.org/links/gatd6127)

[www.cambridge.org/links/gatd6128](http://www.cambridge.org/links/gatd6128)

[www.cambridge.org/links/gatd6129](http://www.cambridge.org/links/gatd6129)

FSC: The place of fieldwork

[www.cambridge.org/links/gatd6130](http://www.cambridge.org/links/gatd6130)

## 13 Geographical skills

### AIMS AND OUTCOMES

All students are required to develop general and specific geographical skills and confidence in their use and application:

- Geographical skills should permeate the course and be systematically introduced, practised and developed at appropriate points in each unit of teaching. It is not intended that they form a separate theme or topic. Teachers should aim to integrate a roughly equal balance of quantitative and qualitative methods through each of the core elements and options and return to them frequently enough to develop knowledge of procedure into a competence of skill that students can apply appropriately and confidently.
- While contributing considerably to Assessment Objective (AO) 3 (use of a variety of relevant quantitative, qualitative and fieldwork skills), students will find geographical skills are explicit in AO2 (apply knowledge and understanding in different contexts to interpret, analyse and evaluate geographical information and issues) and implicit in AO1 (demonstrate knowledge and understanding of places, concepts, processes, interactions and change, at a variety of scales).

AS Level	Compulsory (exam-based)
A Level	Compulsory (investigation submitted for marking)

Types of assessment:

- multiple choice questions
- short answer questions
- levels of response questions
- extended prose (A Level geographical investigation study).

### Scheme of work

To download the scheme of work for all chapters, visit the Cambridge website:

[www.cambridge.org/alevelgeographysamples](http://www.cambridge.org/alevelgeographysamples)

### Prior knowledge

Students will have encountered a range of geographical skills from courses taken prior to AS/A Level courses. If they have followed a GCSE course they will be familiar with conducting a field study and analysing the data. As with many skills, teachers will want to ensure erroneous habits have not crept in. For some students their confidence in certain skills may not be strong and teachers will want to reassure them that they will be guided appropriately and helped to develop expertise in the deployment of geographical skills. Students may find it useful to revise key geography skills using the BBC Bitesize website:

[www.cambridge.org/links/gatd6131](http://www.cambridge.org/links/gatd6131) and the Field Studies Council (FSC) website:

[www.cambridge.org/links/gatd6132](http://www.cambridge.org/links/gatd6132) which have advice on both GCSE and A Level geography fieldwork.

### Teaching ideas

During their course (AS or A Level) students should be introduced to new geographical skills, develop existing abilities and be given opportunities to demonstrate knowledge of them. They should use them in the collection and analysis of information, to critically question data sources and to communicate geographical information clearly and accurately. Teachers should look for opportunities in each chapter as it is taught to develop and rehearse geographical skills. Good skill development comes through:

- relevant application
- clear understanding of function
- frequent practice in use.

### 3.4.1 Quantitative skills and qualitative skills

Many of these skills will be developed and drawn upon in the development of investigations in the field and the processing of information obtained. Particular qualitative and quantitative skills will require teaching, followed by practice and application to the study students are engaged in.

### 3.4.2 Specific skills

#### 3.4.2.1 Core skills

Core skills should be developed as a function of activities undertaken to develop understanding of core and optional chapters (such as numeracy), but some may be more appropriately related to a fieldwork investigation (for example distinguishing between questionnaire and interview techniques).

#### 3.4.2.2 Cartographic skills

Cartographic skills are an essential component of the geographer and should be systematically developed through frequent use, critical evaluation and construction in a variety of forms and at a range of scales. GIS tools should be examined and deployed as well as OS and other forms of specialist mapping.

#### 3.4.2.3 Graphical skills

Skills of graphical representation require students to be familiar with the range of charts, tables, graphs and diagrams they may encounter. They should be frequently guided to make advanced interpretation of graphical information, be aware of different techniques and their appropriate use/limitations, and practise the decisions involved in their accurate construction and application.

#### 3.4.2.4 Statistical skills

Students should avoid viewing statistical skills as stand-alone techniques that they learn out of context, but as essential tools in interpreting and analysing geographical features and processes. They should understand their function and value, be able to apply them confidently, and interpret their results in a wider geographical context. Through the use of statistical skills students should develop a critical regard for accuracy, reliability, validity and the significance of doubt in the use of geographical information.

#### 3.4.2.5 ICT skills

Students will develop ICT skills that they will use as critical consumers of electronic database information, such as the use of census information; as collectors of remotely sensed data – possibly as part of field study; and in deploying ICT in the production of their own geographical data. Students should also be made aware of innovative developments in ICT such as crowdsourcing, big data and evolving applications of GIS.

### Further reading

Geographical Association (GA): Statistical techniques

[www.cambridge.org/links/gatd6133](http://www.cambridge.org/links/gatd6133)

Royal Geographical Society (RGS-IBG): Supporting A Level fieldwork

[www.cambridge.org/links/gatd6134](http://www.cambridge.org/links/gatd6134)

[www.cambridge.org/links/gatd6135](http://www.cambridge.org/links/gatd6135)

Field Studies Council (FSC): Displaying and analysing geographical data

[www.cambridge.org/links/gatd6136](http://www.cambridge.org/links/gatd6136)

## Pumpkin Interactive videos

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Pumpkin Interactive video clips appear throughout the A/AS Level Geography for AQA Elevate enhanced edition. These engaging video clips help to bring learning to life.

The video clips available in each chapter are identified in the teaching notes.

### A message from Pumpkin Interactive

With over 20 years' experience, UK-based Pumpkin Interactive are experts in producing high-quality specification-matched video content for Key Stages 3–5.

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