

ABOUT THIS BOOK

The Paper 1, Living with the Physical Environment Study Book aims to meet teacher and student needs through compiling fundamental concepts, key terms and case study information within one resource. The book includes the essential content to meet the specification’s requirements, to enable students to secure a strong foundation in their geographical knowledge and understanding of the key topics and associated case studies / examples. Students aiming for the top grades should supplement this core knowledge through their own independent research into case studies in order to be more unique, and through developing their synoptic skills; such as making links between economic development and natural hazards, etc.

The Paper 1, Living with the Physical Environment Study Book includes knowledge, key terms glossary, and a range of different styles of questions for each topic to develop exam skills, as well as suggested model answers and mark scheme tips.

CONTENTS

3.1.1 THE CHALLENGE OF NATURAL HAZARDS

3.1.1.1	Natural hazards overview	Page 3
3.1.1.2	Tectonic hazards	Page 5
3.1.1.3	Weather hazards	Page 12
3.1.1.4	Climate change	Page 22
3.1.1	Natural hazards glossary	Page 30

Students must study all aspects of this section.

3.1.2 THE LIVING WORLD

3.1.2.1	Ecosystems overview	Page 32
3.1.2.2	Tropical rainforests	Page 36
3.1.2.3	Hot deserts Option	Page 46
3.1.2.4	Cold environments Option	Page 54
3.1.2	Living world glossary	Page 62

Students must study Ecosystems and Tropical Rainforests, then one option from either Hot Deserts or Cold Environments.

3.1.3 PHYSICAL LANDSCAPES IN THE UK

3.1.3.1	UK physical landscapes overview	Page 65
3.1.3.2	Coastal landscapes in the UK Option	Page 69
3.1.3.3	River landscapes in the UK Option	Page 78
3.1.3.4	Glacial landscapes in the UK Option	Page 88
3.1.3	Physical landscapes in the UK glossary	Page 95

Students must study UK physical landscapes overview, then two options from Coastal Landscapes in the UK, River Landscapes in the UK and Glacial Landscapes in the UK.

3.1.1 THE CHALLENGE OF NATURAL HAZARDS

3.1.1.1 NATURAL HAZARDS OVERVIEW

What you need to know
Definition of a natural hazard
Types of natural hazard
Factors affecting hazard risk

INTRODUCTION

Natural hazards pose major risks to people and property. They happen when a natural event such as a volcanic eruption affects people and their activities. It may lead to a natural disaster.

Types of natural hazards

Types of natural hazards include:

- **Tectonic hazards** – volcanic eruptions, earthquakes and tsunami
- **Weather hazards** – storms, droughts, flash floods

These hazards may in turn lead to further hazards such as landslides and flooding.

Hazard risk

The chance that a place will be affected by a natural event is known as the hazard risk. Sometimes this risk is closely related to natural factors such as a location being coastal, in the tropics or on a plate boundary. However, there are several human factors which can increase the hazard risk in a place:

- **Poverty** – poor people may have to live in more risky places as land is cheaper.
- **Urbanisation** – as people move into cities the pressure on land increases and people may be forced to live in areas which were previously thought to be too risky, such as steep slopes and floodplains.
- **Farming** – farmers may choose to live on floodplains to benefit from the fertile soils, but this can also put them at risk.
- **Climate change** – as global temperatures increase many places are seeing more extreme weather, including droughts, floods and intense storms. Also, the geographic patterns for climate hazards changes. This increases the hazard risk.

Question 1   Match the terms with their definitions		
A	The chance that a place will be affected by a natural event.	
B	They happen when a natural event such as a volcanic eruption effects people and their activities.	
C	Includes earthquakes, volcanoes and tsunami.	
	Natural Hazard	Hazard Risk      Tectonic Hazard

## 3.1.1.4 CLIMATE CHANGE

### What you need to know

Climate change is the result of natural and human factors, and has a range of effects

Managing climate change involves both mitigation (reducing causes) and adaptation (responding to change)

### INTRODUCTION

The climate of locations on the Earth is dependent on conditions in the atmosphere and the input of energy from the sun. The atmosphere is a mixture of gasses. Some of these gasses absorb heat and re-emit it in different directions – these are the greenhouse gasses. The most important greenhouse gasses are water vapour and carbon dioxide. The climate depends on the concentration of greenhouse gasses in the atmosphere and energy from the sun.

### Climate change is the result of natural and human factors:

#### Evidence for climate change (Quaternary to present)

The quaternary geological period started 2.6 million years ago. Temperatures have fluctuated over this period, but the overall trend is that temperatures have cooled. However, during the last century there is evidence that temperatures have risen, with the global average temperature rising by 0.85°C since 1990.

Evidence for this climate change includes:

- **Ice cores** – scientists drill into the Antarctic ice to remove cores of ice. They study the gasses trapped in these cores to calculate the temperature at the time the ice formed. Ice cores can be used to reconstruct temperatures going back 400 000 years.
- **Pollen analysis** – scientists drill into deep soils and study the different types of pollen in the soil at different depths. This gives them information about the climate through time and also about how land was used.
- **Thermometer readings** – reliable weather records began in the UK in 1910, so we can plot temperature patterns for the last 100 years.
- **Glaciers & sea ice** – measurements such as the length of glaciers and the extent of sea ice provide evidence of the effect climate change is having. Arctic sea ice has thinned by 65% since 1975.
- **Sea level** – the Intergovernmental Panel on Climate Change (IPCC) says that the average global sea level has risen 10-20cm in the past 100 years.

#### Natural causes of climate change

Natural causes of climate change include:

- **Orbital changes:** These are influenced by changes in the Earth's tilt, changes in the shape of the Earth's orbit (eccentricity) and the Earth's 'wobble' (precession). Changes in these factors are known as Milankovitch cycles after the scientist who plotted them. When these factors bring the Earth closer to the sun, there will be a period of warming and when the Earth is further from the sun there will be cooling.
- **Solar output:** A cycle of sunspot activity has also been identified by scientists. When there is more sunspot activity, the sun gives off more heat which leads to the Earth being warmer.

- **Volcanic activity:** When volcanoes erupt ash into the atmosphere it can block out the sun, leading to a period of cooling. Volcanic eruptions release large amounts of carbon dioxide, increasing the level of greenhouse gasses in the atmosphere in the longer term.

#### Human causes of climate change

Since the industrial revolution in the 18th century, people have been burning fossil fuels for power. This releases carbon which was stored deep underground into the atmosphere in the form of carbon dioxide. There is over 99% agreement between scientists that these emissions have created an enhanced greenhouse effect and caused global warming.

The main greenhouse gasses being added to the atmosphere due to human activity are:

**Carbon dioxide:** 64% of the enhanced greenhouse effect; produced by burning fossil fuels, deforestation and iron and steel production.

**Methane:** 18% of the enhanced greenhouse effect; produced by rotting vegetation in landfill sites, rice farming and livestock farming. Methane is a powerful greenhouse gas but only stays in the atmosphere for 12 years.

**Nitrous oxides:** 6% of the enhanced greenhouse effect; produced by fertilizer production and use, sewage treatment and various industrial processes. 300 times more effective in trapping heat than carbon dioxide.

**Fluorinated Gases:** Found in small concentrations in atmosphere, but 23 000 times more effective at trapping heat than carbon dioxide and stay in the atmosphere for up to 50 000 years. Produced by refrigerants, insulating gases and electronic cleaning.

#### Climate change has a range of effects

Effects of climate change which have already been observed include:

- **Surface temperatures:** Each of the last three decades has been warmer than any time since 1850. The warming is most noticeable in the northern polar region.
- **Precipitation:** Eastern North and South America, Northern Europe and Northern and Central Asia have got wetter. The Sahel, Southern Africa, the Mediterranean and Southern Asia have become drier. There has been a widespread increase in heavy precipitation events.
- **Oceans:** As they have absorbed carbon dioxide from the atmosphere oceans have become more acidic as well as becoming warmer due to global warming. There is more water in the oceans as glaciers and ice caps have melted and the ocean water takes up more space due to thermal expansion.

#### Effects on people

Climate change will bring both challenges and opportunities for people:

- **Opportunities:** As there is less sea ice in the Arctic, it is easier to transport goods from Asia to the USA via ships. Areas previously covered in ice will become available for farming.
- **Challenges:** Crop productivity will decrease in the tropics, leading to hunger. Changes in precipitation will mean some areas suffer floods whilst others face droughts. Desertification will accelerate in the Sahel. Diseases such as malaria and dengue fever will affect areas which were previously too cool and areas suffering floods will see more cases of diarrhoea. Low lying coastal areas will be at increased risk from flooding. People living on small islands find their water supplies contaminated with salt and are at increased risk from storm surges.

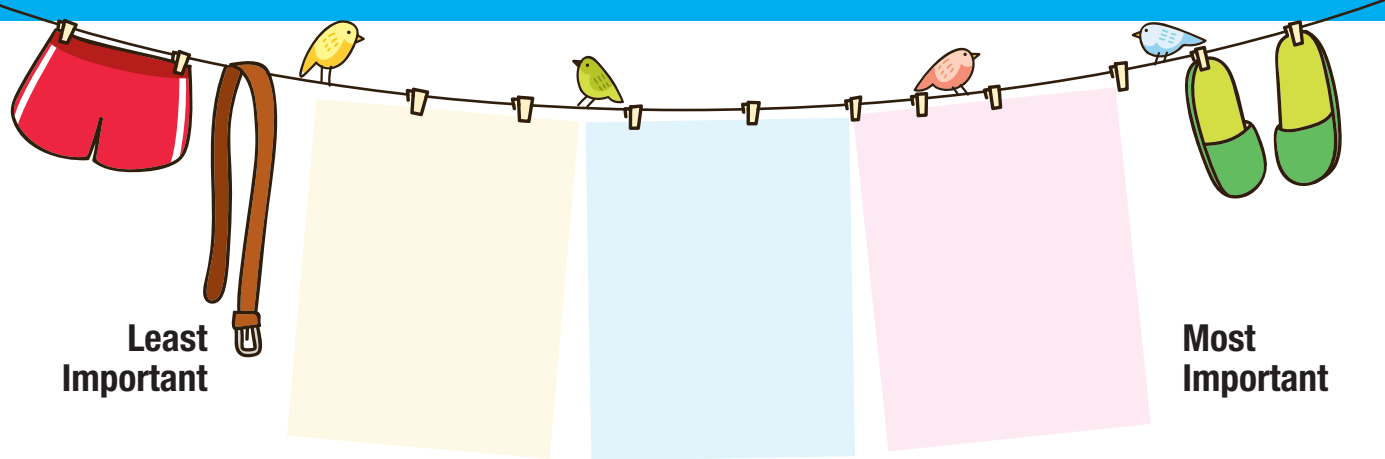
**Example: Impact of climate change in Africa:** Most areas are seeing less rain meaning that by 2020, 75-250 million people will be exposed to water stress. The crop yields in areas depending on rain for farming could decrease by 50%. Sea level rise will affect cities such as Alexandria, Cairo, Lomé and Lagos.

Question 7 | Fill the gaps to complete the following sentences:

Plants in the rainforest need to be able to cope with the high rainfall levels and the \_\_\_\_\_ light below the canopy. Trees such as kapok grow quickly so they can reach the sunlight – they sometimes become \_\_\_\_\_. The tall trees have \_\_\_\_\_ which are wide and support the tree. Trees may have leaves which can turn to face the sun and many have \_\_\_\_\_ so that rain water flows off easily. \_\_\_\_\_ are plants which grow on tree branches so they can reach the sun. \_\_\_\_\_ are creepers which grow from the ground up trees into the canopy. Animals adapt to life in a particular layer of the rainforest. Birds living in the canopy often have strong \_\_\_\_\_ to break open nuts and fruits to eat. Monkeys’ \_\_\_\_\_ help them to move around the canopy. Reptiles use \_\_\_\_\_ to hide on the forest floor and in the \_\_\_\_\_ layer.

Drip tips	Limited	Buttress roots	Emergents
Epiphytes	Lianas	Tails	Beaks
Beaks	Camouflage		

Question 8 | Complete the ‘washing line of relative importance’ to show how important FARMING, LOGGING and ENERGY PRODUCTION are in causing deforestation in Malaysia. Write a statement to support your choices.



Question 9 | Match the ways to tackle deforestation with their descriptions and examples

Strategy	Description & example
Selective logging and replanting	Kilim Karst Geoforest Park is an example of an ecotourist destination in Malaysia, where tourists can take a boat trip along the river to see wildlife ranging from macaque monkeys and eagles.
Conservation and education	National parks such as Taman Negara in Malaysia educate local people and visitors about the value of the rainforest and the importance of using it sustainably.
Ecotourism	A technique introduced in Malaysia in 1977 which involves only cutting down some of the trees and planting saplings in places where trees are cut down.
International agreements about the use of tropical hardwoods	Some countries have agreed to reduce debts owed to them by other countries if they agree to protect their rainforests. This is known as a debt-for-nature swap and was first used by Bolivia.
Debt reduction	The Forest Stewardship Council (FSC) promotes sustainable forestry. If wood has a FSC label, buyers know it has come from sustainably managed forests.

Question 10 | Exam-style question

With reference to a case study, discuss the significance of different factors influencing the rate of deforestation in a tropical rainforest. (6 marks)

# 3.1.3 PHYSICAL LANDSCAPES IN THE UK

## 3.1.3.1 UK PHYSICAL LANDSCAPES

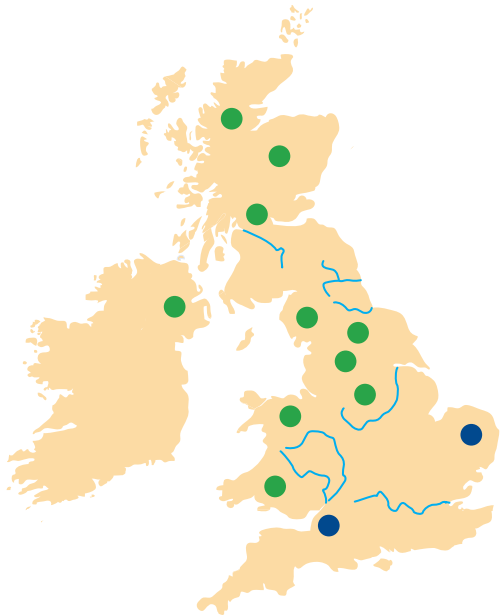
### What you need to know

The UK has a range of diverse landscapes

### INTRODUCTION

The UK has many different landscapes, including upland and lowland areas. River systems play an important role in the UK landscape. The distribution of uplands and lowlands is largely influenced by geology, by volcanic history and by glacial processes that saw much of the UK covered in ice during the last Ice Age. Weathering over the ages produces distinct landscapes, and the UK’s climate and soils vary to influence land use, ecosystems and the biosphere.

### Overview of location of major upland and lowland areas and river systems:



- Lowlands**  
Somerset Levels, The Fens and East Anglia
- Highlands**  
Northwest Highlands, Grampian Mountains, Southern Uplands, Pennines / Yorkshire Dales / Peak District, Cumbrian Mountains / Lake District, Cambrian Mountains / Snowdonia, Antrim Mountains, Brecon Beacons
- River systems**  
Thames, Severn, Wye, Trent, Tees, Tyne, Clyde

If you were to imagine drawing a line from the River Tees to the River Exe, then areas northwest of this line are generally considered to be uplands while the areas to the southeast are typically lowlands. This does not mean there is no high ground at all, just that it is not so high as true uplands. There is a general correlation between the highlands of the UK and post-glacial areas – by this it means that the true uplands were generally once covered by glacial ice as it moved south, shaping the mountains on the way.

Scotland has the tallest mountains in the UK, and the largest upland areas with the North West Highlands, Grampian Mountains, Cairngorms, Trossachs, etc. The mountains are divided up by lowland areas with lochs (lakes) and they are all shaped by glacial processes, leaving many glacial features such as steep-sided valleys, deep lakes and coastal fjords. Ben Nevis is the tallest mountain in the UK, at 1345m high. Many of the Scottish uplands are used for skiing and winter sports during the season; they have alpine species and a cold climate. Ninety-seven of the top 100 tallest mountains of the UK are found within Scotland, many with ancient extinct volcanic history. The River Clyde has its source there.

Mountain Snowdon is the seventy-sixth tallest mountain in the UK at 1085m; it is found within Wales in the uplands of Snowdonia that are part of the Cambrian Mountains. Again, this is a post-glacial area with many features of arêtes, pyramidal peaks, valleys, etc. The mighty rivers of the Severn and Wye have their sources in these highland areas. To the south are the Brecon Beacons mountains.

In Northern Ireland, the Antrim Mountains are the highest ground and are found in the northeast. There are many unique landforms in the basalt here, like the infamous Giant’s Causeway – the result of an ancient, basaltic lava fissure eruption.

England’s high ground is found predominantly in the Cumbrian Mountains and Pennines running from the River Tyne in the north, and the River Trent to the south. Scafell Pike is the highest peak in England at 978m, found in the Lake District within the Cumbrian mountains – an area of high ground formed from ancient lava beds and ash fields. The south-west peninsula has other upland areas such as Dartmoor and Exmoor, although these are much lower in height than the major highlands.

Lowland areas include the Somerset Levels, which are prone to flooding, and the Norfolk Broads and Fens. Much of the marshy Fens were once below sea level and have been reclaimed from the sea.

Major rivers of the UK include the Thames, the Clyde, the Trent, the Wye, the Tees and the Tyne. The River Severn is the longest river in the UK, beating the River Thames by nine kilometres. Many of these rivers have some form of management to control their flow and reduce flood risk. There is a huge variety of river landforms along their courses, including waterfalls, gorges, meanders and valleys.

### Question 1 | Match the cells with their descriptions

A	Water flowing in a channel
B	The features of the land
C	Many different features
D	Mountainous or very hilly area
E	Very flat area, often marshy
F	Shape of the land

Relief	Landscape	Highland	Lowland	River	Diverse
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### Question 2 | Are these statements true or false?

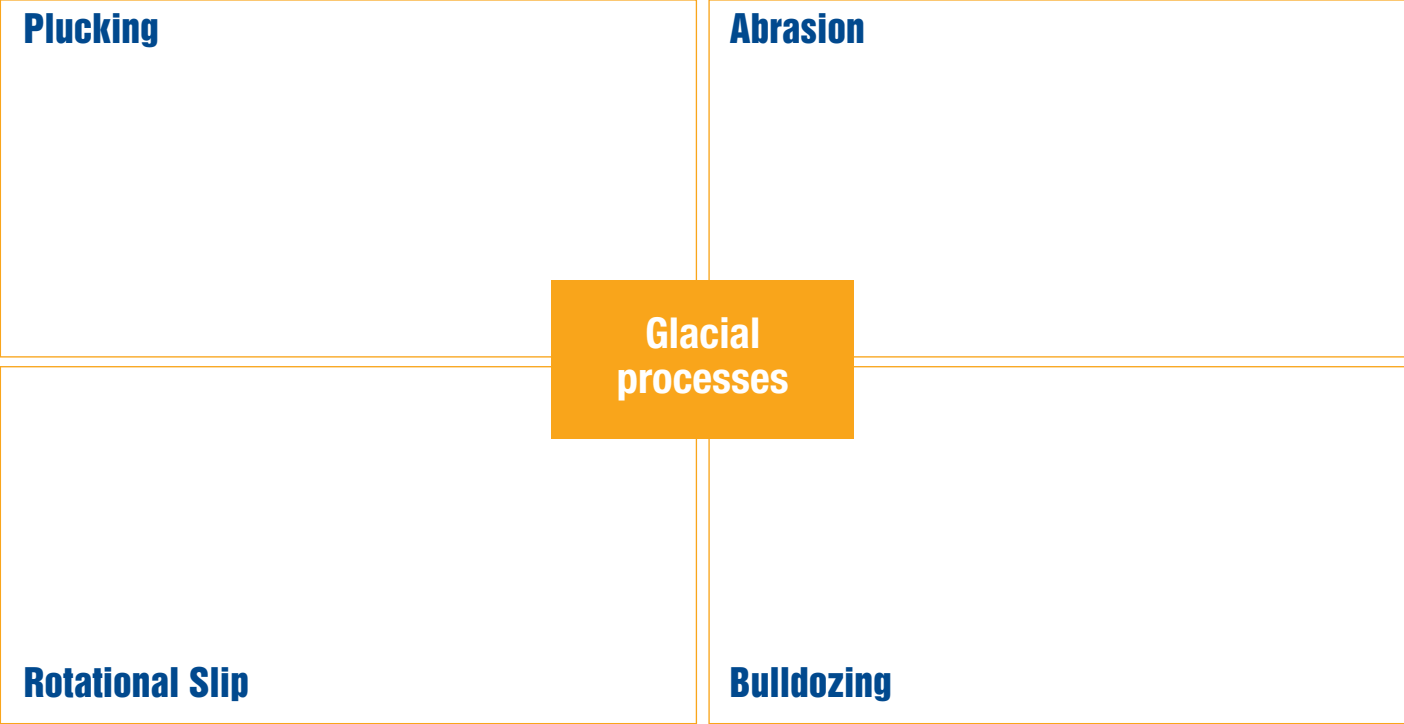
Most highland areas are found in the west of the UK.	
The Grampian Mountains are found in Wales.	
The Somerset Levels are located in the South West of the UK.	
The Fens is a highland area in the East of the UK.	
The Pennines run through the centre of the UK.	



Question 5 | What conflicts could happen in glaciated areas between...

... tourists and farmers?	
... quarrying and tourism?	
... forestry and conservation?	

Question 6 | Add text and images to the diagram to show four types of glacial processes



Question 7 | Match the types of economic activities in upland areas with their descriptions

Economic activities	Description
Tourism	The land in glaciated upland areas has poor soils and is mainly used for grazing. In lowland areas soils are deeper as material has been deposited, making them suitable for growing crops and feed for animals.
Farming	Plantations of conifers have been planted in many upland areas in England and Scotland. These trees grow well on the acidic soils and are cut down after 20-30 years to be used as timber.
Forestry	Glacial landscapes are popular with adventurers who want to hike, climb, mountain bike and sometimes even ski. Others may visit to enjoy the scenery.
Quarrying	Hard rock found in upland glaciated areas can provide stone for building roads and buildings. The glacial till deposited in lowland areas may be used as a source of sand for the construction industry.

Question 8 | Complete the following sentences by filling the gaps.

The Lake District is in the \_\_\_\_\_ of England and is a National Park. Its famous mountains were carved by glaciers in the past. It is very popular with tourists.

Social impacts – Almost 15 million people visited the Lake District in 2014, with 90% of them arriving by \_\_\_\_\_. This puts a great deal of pressure on the small towns and villages. It is difficult for local people to afford houses as prices have \_\_\_\_\_.

Economic impacts – Tourists spent £1000 million in the Lake District in 2014 and tourism provides many jobs, but most of these jobs are \_\_\_\_\_.

Environmental impacts – Popular sites are at risk of footpath \_\_\_\_\_ and scenic villages can become \_\_\_\_\_ and overcrowded. Cars bring \_\_\_\_\_ and the waves created by boats erode the lake shore.

North West	Risen	Car	Seasonal
Congested	Erosion	Air pollution	

Question 9 | Sort the landforms into the table to show if they are formed by erosion or transportation and deposition

• Corries • Moraines • Drumlins • Arêtes • Pyramidal peaks • Glacial troughs • Erratics • Truncated spurs • Ribbon lakes • Hanging valleys	
Erosional landforms	Depositional landforms