

**HODDER**  
EDUCATION

**MY REVISION NOTES**  
**WJEC GCSE**  
**GEOGRAPHY**

**WJEC**

**GCSE**

# **GEOGRAPHY**

SECOND EDITION

Includes full coverage of WJEC Eduqas  
GCSE (9–1) Geography A

- + Plan and organise your revision
- + Reinforce skills and understanding
- + Practise exam-style questions

Rachel Crutcher  
Dirk Sykes



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## Theme 1 Landscapes and Physical Processes

- 10 What makes landscapes distinctive?
- 12 How are physical landscapes affected by human activity?
- 13 How can landscapes be managed?

14 How do processes work together to create landform features  
in river and coastal landscapes?

21 What factors affect the rates of landform change in river  
and coastal landscapes?

25 What physical processes affect stores and flows in drainage basins?  
26 Why do rivers in the UK flood?  
28 What are the management approaches to flooding in the UK?

31 How are urban and rural areas linked?

34 How are rural areas changing?

36 What are the causes and consequences of population change?  
38 What are the challenges facing UK towns and cities?  
41 How and why is retailing changing in the UK?

44 What are the global patterns of urbanisation?  
46 What are the consequences of urbanisation in two global cities?  
47 How are global cities connected?

51 How do tectonic processes work together to create  
landform features?

56 What are the impacts of tectonic processes?  
60 How might the risks associated with tectonic hazards be reduced?

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## Theme 4 Coastal Hazards and their Management

### Vulnerable coastlines

- 65 Why are some coastal communities vulnerable to erosion and flooding?

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- 69 How are coastlines managed?  
75 What is the most sustainable way to manage coastlines in the face of rising sea levels?

## Environmental and Development Issues

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### Climate change during the Quaternary period

- 80 What is the evidence for climate change?  
82 What are the causes of climate change?

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- 86 What are the causes and consequences of weather hazards?  
90 What factors create variations in weather and climate within the UK?

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- 93 Where are large-scale ecosystems found?  
94 What are the key processes of ecosystems?

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- 99 How do people use ecosystems and environments?  
100 How do human activities modify processes and interactions within ecosystems?  
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## Theme 6 Development and Resource Issues

### Measuring global inequalities

- 106 What are the global patterns of development?  
107 How is economic development measured?

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128 How can regional inequalities in the UK be reduced?

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## Theme 7 Social Development Issues

### Measuring social development

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### Uneven social development

- 135 What challenges face social development in sub-Saharan Africa and South Asia?  
140 What are the healthcare issues in sub-Saharan Africa?

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150 How can technology be used and people's lifestyles changed to reduce these impacts?

### Management of ecosystems

- 152 How can damaged environments and natural habitats be managed and restored?

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Now test yourself answers and exam practice answers at  
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Getting to know the specifications at  
[www.hoddereducation.co.uk/myrevisionnotes](http://www.hoddereducation.co.uk/myrevisionnotes)

Fieldwork enquiry at  
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# Countdown to my exams

Good luck to everyone, we hope our revision and exam tips help you to feel as prepared and confident as possible.

## First thoughts

- + There are a variety of different techniques that students can use to revise. Try out different methods to find out what works for you.
- + Decide on a place where you can revise without distractions. For example, do you need silence to revise? Try to make sure it is well lit with natural light.
- + Decide on a time of day for your revision. Are you a morning or an evening person?
- + Decide on how many weeks you need to devote to your revision and how you are going to divide up these weeks.
- + Develop a routine.
- + Does your school provide revision classes? If so, decide which ones you are going to go to and build them into your revision timetable.
- + Make sure your class notes are complete and organised.
- + Study the published exam timetable.

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## 6–8 weeks to go

- + Begin by looking at the specification – make sure you know which ‘Themes’ are being tested in each examination.
- + Get hold of a set of past papers and familiarise yourself with the demands of the examination.
- + Construct a revision timetable making sure that you devote enough time to each of your subjects. Build rewards into your timetable – it is important to have a balance between work and leisure.
- + Stick to your timetable and break your revision into manageable sessions of maybe 40 minutes or so – find out what works for you.
- + Revision can be ‘passive’ or ‘active’. Passive revision involves reading over your notes – it is useful to get an overview of a topic, but it is difficult to concentrate for long periods of time. Active revision involves you doing something – it is more likely to hold your attention and help you remember information. It will also provide you with material which will help later in the revision process such as mind maps and flashcards (see the **Revision activity** boxes for more examples).

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## 2–6 weeks to go

- + Use the **checklist** at the end of each theme – tick off ‘Key questions’ when you are confident that you are ready to be tested in the examination.
- + Test yourself by working through the ‘**Now test yourself**’ and ‘**Exam practice**’ questions. Look up the answers online at **www.hoddereducation.co.uk/myrevisionnotes**
- + Look over the ‘**Worked example**’ at the end of each theme. Study the online mark scheme for these examples. Note the ‘**Exam tip**’ boxes – examination technique is vitally important to success.
- + Make a note of any key questions that still cause difficulties. Remember you are not alone – speak to your teacher, parents or friends to help you.

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## 1 week to go

- + Try to fit in at least one timed practice of an entire paper. Use the published mark scheme and try to mark your work – seek feedback from your teacher.
- + Check ‘My revision planner’ one more time to make sure you haven’t missed anything.
- + Check the time and the place of your examination.
- + Make sure you have everything you need – a spare pen, pencil, tissues, a watch and bottled water.
- + Allow some relaxation time – have an early night and get up early on the morning of the examination.
- + The day before or in the morning of the examination flick through the revision guide and your notes one last time paying particular attention to **key terms** and **examples**. Use your short-term memory effectively.

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## The day of the examination

- + Have breakfast.
- + Arrive at the examination room with plenty of time to spare.
- + Know your centre and candidate number.
- + Make sure you answer all of the core theme questions – only answer two option theme questions on the topics you have studied.
- + Never leave the examination room until you have used up all of the time available.

Good luck!

# Introduction

## Exam breakdown

This page will tell you all you need to know about what assessments you will need to take in order to complete your GCSE Geography. Whether you are in a centre in Wales or England you will have three parts to your assessment. We have colour-coded the information to ensure relevance to both Welsh and English centres. (Any text in black applies to both, in red applies to centres in Wales only and in blue to centres in England only.)

### Assessment objectives

**Assessment 1: Unit 1/Component 1 – Changing Physical and Human Landscapes.** This is assessed through a written examination lasting 1 hour 30 minutes and makes up **40%/35%** of your overall assessment. You will need to answer three questions:

**Section A** is on the core themes and you will need to answer two structured, data response questions (one on Landscapes and Physical Processes and the second on Rural-Urban Links).

**Section B** is on the option themes and you only need to answer one of these questions. You will answer either Theme 3 (Tectonic Landscapes and Hazards) or Theme 4 (Coastal Hazards and their Management).

All Assessment Objectives will be examined in this paper.

**Assessment 2: Unit 2/Component 2 – Environmental and Development Issues.** This is assessed through a written examination lasting 1 hour and 30 minutes and makes up **40%/35%** of your overall assessment. You will need to answer three questions:

**Section A** is on the core themes and you will need to answer two structured, data response questions (one on Weather, Climate and Ecosystems and the second on Development and Resource Issues).

**Section B** is on the option themes and you only need to answer one of these questions. You will answer either Theme 7 (Social Development Issues) or Theme 8 (Environmental Challenges).

All Assessment Objectives will be examined in this paper.

### Assessment 3: Unit 3 (Wales only)

**Fieldwork Enquiry** – this is a non-examination assessment (NEA) and you will have 2 hours 30 minutes to complete it in. It is 20% of your overall assessment.

You will have carried out two pieces of fieldwork before completing this assessment based on the conceptual framework and using the methodological approach allocated by WJEC for your year of assessment.

You will write a report in response to specific questions set by WJEC. You will be required to draw on the information gathered from the two pieces of fieldwork to include evidence of your understanding of the enquiry process and your independent ability to process/present data and complete extended writing.

### Assessment 3: Component 3 (England only)

**Applied Fieldwork Enquiry** – this is a written examination of 1 hour 30 minutes. This is 30% of your overall assessment.

You will have carried out two pieces of fieldwork before completing this assessment based on the conceptual framework and using the methodological approach allocated by WJEC for your year of assessment.

You will have a written examination in three parts:

Part A will assess approaches to fieldwork methodology, representation and analysis.

Part B will assess how fieldwork enquiry may be used to investigate geography's conceptual frameworks.

Part C will assess the application of broad geographical concepts to a wider UK context and assess the ability to make and justify a decision.

# Exam questions

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Understanding the examination question is a key component to increasing your grades. All questions in examinations are focused on one Assessment Objective (AO). If you understand the AO then this will help you keep your answer to what the examiner is looking for. All Exam practice and Worked example sections in this book have AOs after each question. As the AOs for centres in Wales are different to those in centres in England, we have included the AOs for Wales in red and those for England in blue.

**AO1.1** – Demonstrate knowledge of places, environments and processes at a variety of scales.

**AO1** – Demonstrate knowledge of locations, places, processes, environments and different scales.

These questions will test your knowledge. They will usually focus on recall or description. You do not need to add explanation. Command words testing these AOs include:

Give	Select	Name	Describe
Identify	State	Circle	Tick

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**AO1.2** – Demonstrate understanding of places, environments, concepts and inter-relationships at a variety of scales.

**AO2** – Demonstrate geographical understanding of:

- + concepts and how they are used in relation to places, environments and processes
- + the inter-relationships between places, environments and processes.

These questions will test your understanding. They will ask you to explain why or give reasons for a relationship, for example. For higher tariff questions you will get more marks for 'chains of reasoning'. It is depth of understanding that examiners will be looking for. Command words testing these AOs include:

Give reasons      Explain why

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**AO2** – Apply knowledge and understanding to interpret, analyse and evaluate geographical information and issues and to make judgements.

**AO3** – Apply knowledge and understanding to interpret, analyse and evaluate geographical information and issues and to make judgements.

These questions will ask you to APPLY the knowledge and understanding of things you have learnt to an unfamiliar context. For example, they may ask about nutrient cycling but in the context of an ecosystem that is unfamiliar. These questions are often higher tariff questions and use the following command words:

Compare      Analyse      Evaluate      Decide      Justify      To what extent

Remember to add a conclusion at the end of your answer that addresses the command word in the question, for example, clarify your decision or state to what extent.

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**AO3** – Select, adapt and use a variety of skills and techniques to investigate questions and issues and communicate findings.

**AO4** – Select, adapt and use a variety of skills and techniques to investigate questions and issues and communicate findings.

These questions will test your geographical skills which could be based around mathematical data or maps. They are generally lower tariff questions and may ask you to carry out a mathematical calculation or describe a trend/pattern. However, you could also be asked to 'Draw conclusions' from the data, which would be a higher tariff mark.

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# Theme 1 Landscapes and Physical Processes

## Distinctive landscapes

### What makes landscapes distinctive?

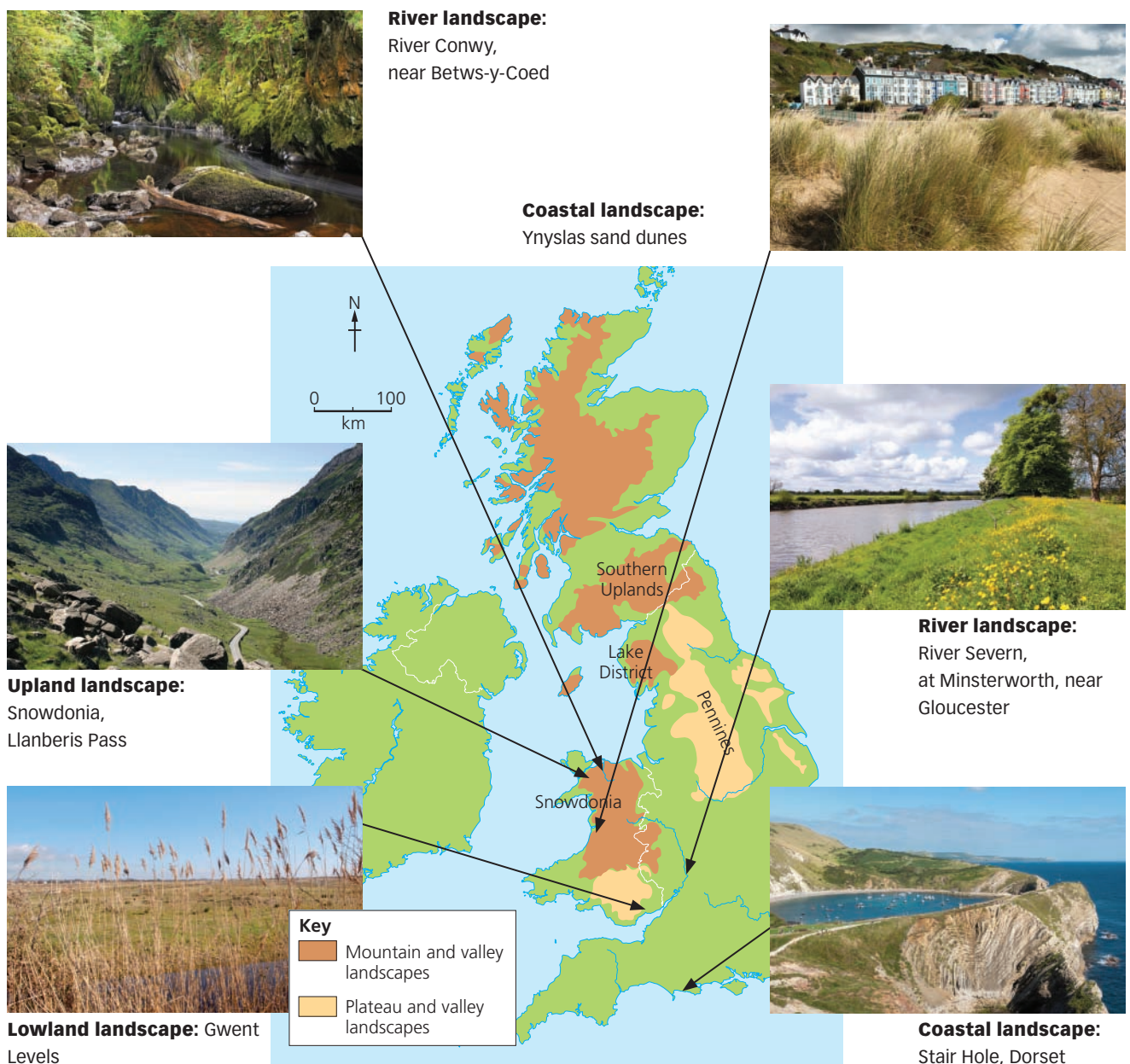
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Landscapes are made up of different features and landforms. How these features and landforms combine is what gives a landscape its special or **distinctive** appearance. You need to be able to identify and locate examples of distinctive landscapes of the UK, including:

- + **upland** and **lowland** areas
- + river and coastal landscapes.

**Upland** A landscape that is hilly or mountainous

**Lowland** An area of land that is lower than the land around it



**Figure 1** Main types of landscapes in the UK.

When describing landscapes and what makes them distinctive, remember to think about:

- + Place – a geographical concept that is used to describe what makes somewhere special or distinct. Each place includes physical and human features that make it different than anywhere else.
- + Scale – a geographical concept used to describe the relative size of something. Some features of landscapes are small, such as sand dunes, whereas others are much larger, such as mountain ranges, and so would be regional features.

### Example of a distinctive landscape: River Dyfi Estuary, Mid Wales

The River Dyfi Estuary is an example of a regional scale landscape.

#### Physical features:

- + Wide valley floor at the mouth of a large river.
- + Gently sloping sides.
- + Mud flats and sand banks visible at lower tide.
- + Both river and coastal influence on the landscape.
- + Meanders.
- + Sand dune system and sand bars have developed at the coastline.

#### Land use:

- + Tourism activities, especially along the coastline. Caravan sites.
- + Small town of Aberdyfi.
- + Drainage of some areas along the river to create grazing land.

#### Vegetation:

- + Upland moorland.
- + Deciduous forest.
- + Sand dune ecosystem.
- + Salt marsh.



1 Upland grazing and moorland habitat

2 Deciduous woodland ecosystems

3 Coastal landforms – beaches and bars

4 Small towns such as Aberdyfi

5 Meanders on the River Dyfi

6 Sand dunes at Ynyslas

7 Features of the estuary including salt marsh and sheep pasture

**Figure 2** The River Dyfi Estuary.

#### Exam tip

When asked to consider factors that make landscapes distinctive, remember to discuss physical and human features such as:

- + geology
- + people and culture
- + vegetation
- + land use.

#### Now test yourself

- 1 Define the term 'distinctive landscape'.
- 2 Name four types of distinctive landscape.
- 3 Explain why Wales and the UK have such a range of distinctive landscapes.

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A topographic map of the area around Llanidloes, showing the River Eiddon, various roads, and landmarks like the 'P' symbol and 'R' symbol.

Copyright: Sample material

### Exam practice

- 1 Name **two** environmental challenges created by human activity. [2] [AO1.1] [AO1]
- 2 Suggest **one** reason why rural economies are diversifying. [4] [AO1.2] [AO2]
- 3 Decide whether the impacts of human activity on Snowdonia National Park are largely positive or negative. [8] [AO2] [AO3]

### Exam tip

In an application of knowledge question that asks you to 'Decide', you need to weigh up all the options equally. Once you have made your decision, justify it with reasons why you arrived at the conclusion you have.

## How can landscapes be managed?

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Many distinctive landscapes in the UK are designated **Areas of Outstanding Natural Beauty (AONB)** or National Parks. These areas are visited by large numbers of people who, through sheer numbers, may cause damage to the natural landscape. Visitors must be managed in a way that minimises their impact on the landscape, and any damage caused must be repaired.

### Area of Outstanding Natural Beauty (AONB)

A part of the countryside that is designated for conservation due to its natural beauty

### Examples of strategies to manage landscapes: the Clwydian Range/Dee Valley and Brecon Beacons

#### Managing the Clwydian Range and Dee Valley AONB

- + Objection to development proposals that involve the loss of community facilities.
- + Improve signage to ensure tourists stay on paths to limit damage to the environment.
- + Monitor footpath erosion and repair when necessary to keep visitors on the paths.
- + Establish fixed point photography viewpoints.
- + Encourage local communities to share their knowledge about the area.

#### Footpath maintenance in the Brecon Beacons National Park

- + Volunteer recruitment, for example local environmental groups or ecotourists help National Park wardens to repair footpaths and walls that have been damaged.
- + Logistical operations, for example a helicopter is used to carry footpath materials due to the remote location and weight of the materials used.
- + Footpaths are replaced with hard-wearing materials such as stone.
- + Once the footpath has been rebuilt, vegetation can be restored on either side of the path to maintain the unique flora of the area.
- + The cost of footpath maintenance in the Brecon Beacons is around £100,000 each year.

### Now test yourself

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- 1 List five impacts that visitors can have on the natural landscape.
- 2 Describe how these impacts can be mitigated.
- 3 Suggest one way increased tourism can benefit a natural landscape.

### Exam practice

- 1 Name **one** technique used in National Parks to limit visitor numbers in certain areas. [1] [AO1.1] [AO1]
- 2 Suggest **one** reason why maintaining footpaths in the Brecon Beacons is difficult. [3] [AO2] [AO3]
- 3 'The attraction of visitors and preservation of the landscape in National Parks is impossible to achieve.' To what extent do you agree? [8] [AO2] [AO3]

### Exam tip

When describing ways in which visitor numbers can be managed, remember to link the management technique to how it minimises the impact that visitors have on the landscape.

### Revision activity

Create a table to show the advantages and disadvantages of the ways in which visitors can be managed in a distinctive landscape that you have studied.

# Landform process and change

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How do processes work together to create landform features in river and coastal landscapes?

## River landscapes: fluvial processes

River landforms change over time due to **fluvial erosion**, **transportation** and **deposition**.

### Fluvial erosion

The type of erosional process that occurs in a river will depend on a number of factors including the velocity of the water and the rock and soil type of the channel. The erosional processes of the river channel include:

- + **Abrasion**: stones and material carried by the river hitting the river bed and banks, wearing them away.
- + **Hydraulic action**: the sheer force of water hitting the river bed and banks, compressing air in gaps in the soil and rock which causes material to be washed away.
- + **Solution**: the slightly acidic river water dissolves chalk and limestone rocks which are made from calcium carbonate.

The erosional processes of the river **bed load** include:

- + **Attrition**: stones carried by the river collide together and are broken down, becoming rounder and smaller.
- + **Abrasion**: stones and material carried by the river hitting the river bed and banks become eroded themselves to become rounder and smaller.

### Transportation

The river transports (moves) its load in a number of ways which depend on the speed of flow and the weight of the load.

### Deposition

A river deposits material when the speed of flow is too slow for it to carry the load. This may happen:

- + Where there has been a lack of rainfall, so there is less water moving in the river channel.
- + On the inside of a **meander** because the majority of the water is on the outside of the bend. Therefore, the water on the inside of the bend is moving slowly and cannot transport load.
- + At the mouth of the river, where the river water flows against the direction of the sea.

**Fluvial** Referring to a river and its landforms

**Erosion** The wearing away of the land

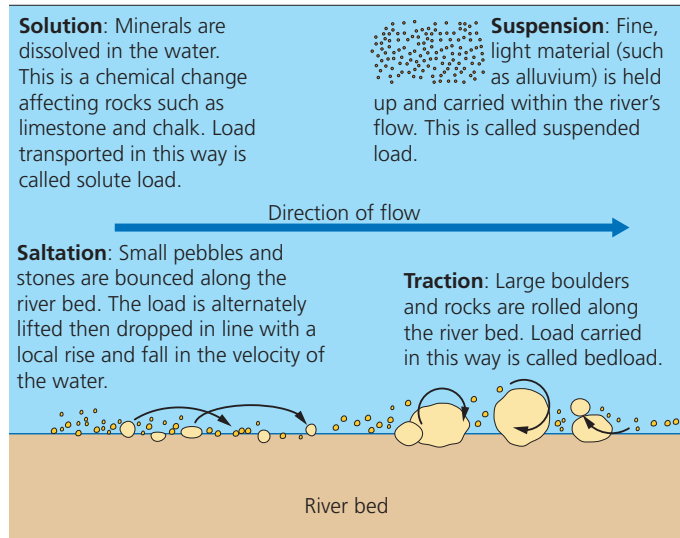
#### Transportation

The movement of material by the flow of water

**Deposition** The dropping of the material carried by the river

**Bed load** The material carried by the river being bounced or rolled along its bed

**Meander** A bend in the river formed by lateral (sideways) erosion



You also need to know the definitions of the following terms: **abrasion**, **attrition**, **hydraulic action**, **solution**

**Figure 4** River transport processes.

## How river landforms develop

**V-shaped valleys, waterfalls, gorges, floodplains** and **meanders** are all river landforms shaped by fluvial processes.

### V-shaped valleys

V-shaped valleys are found in the upper course of a river valley, where the river is usually small and the land is steep.

#### Example of a V-shaped valley: Brecon Beacons

##### Vertical erosion

makes the channel cut deeper into the landscape, leaving steep valley sides

Vertical erosion and weathering create a V-shape in the upper course

Weathering processes such as freeze-thaw and biological weathering break down soil and rock on the valley sides

Weathered material is carried into the river by gravity and washed away

Stream has to go around **interlocking spurs**



**Figure 5** Blaen Taff Fawr Stream on Corn Du (Brecon Beacons).

**V-shaped valley** A narrow valley with steep sloping sides found in the river's upper course

**Waterfall** Water falling from a higher level to a lower level due to a change in rock structure or as a result of glacial erosion

**Gorge** A steep-sided narrow valley formed by a retreating waterfall

**Floodplain** A flat piece of land on either side of a river forming the valley floor

**Vertical erosion** Erosion of the river channel that results in its deepening rather than widening

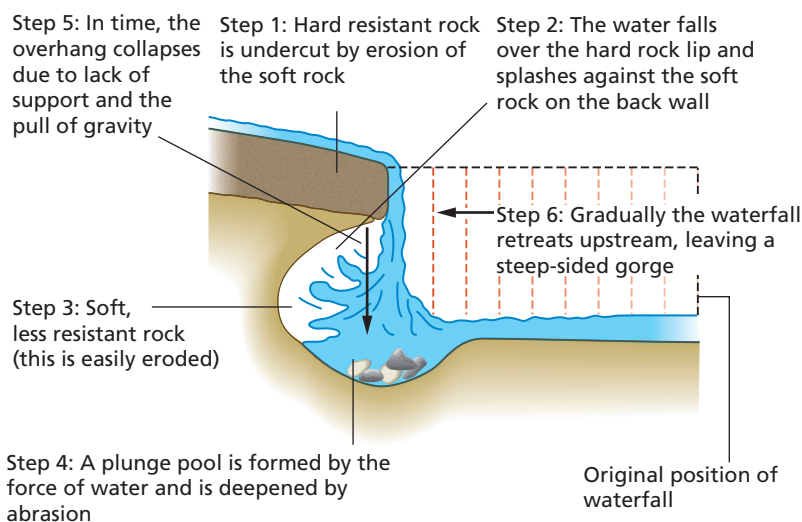
**Interlocking spurs** Hard, resistant rocks that a river cannot easily erode and therefore the river goes around them

### Waterfalls and plunge pools

Waterfalls can be formed in one of two ways: by **glacial erosion** or by **differential erosion**.

**Glacial erosion:** where waterfalls have formed due to the erosive power of a glacier during the ice age. Glaciers carved steep valleys into the landscape, often hanging above one another. Once the glacier melted, water drains from the smaller valleys and falls into the larger ones.

**Differential erosion:** where waterfalls are formed due to a change in rock structure (hard and soft rock), which leads to the river bed being eroded at different rates, as seen on this diagram:



**Figure 6** Waterfalls formed by differential erosion.

## Gorge

A gorge is a steep-sided narrow valley with a river running along the bottom of it. A gorge is formed when a waterfall collapses and retreats upstream, and has characteristic vertical sides.

## Meanders

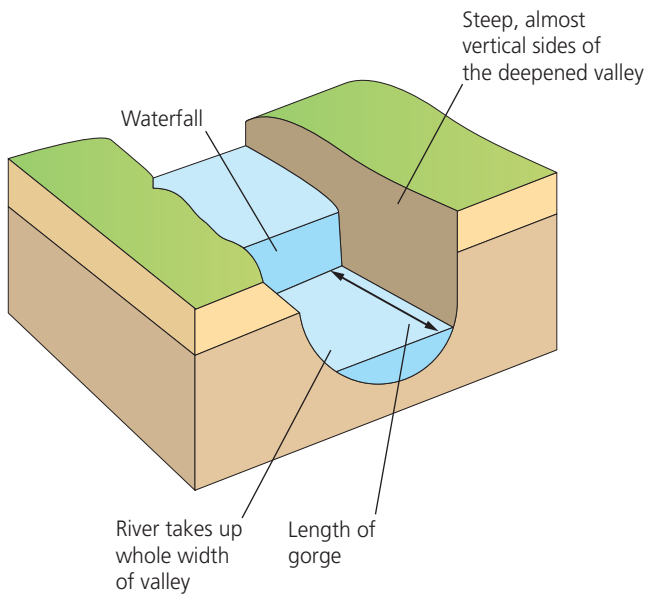
Meanders are usually found in the middle and lower courses of a river valley. They are bends in the river usually seen when the river is on a wide floodplain. Caused by both erosion on the outside of the bank and deposition on the inside of the bank, meanders can often be seen to 'move' or 'migrate' across the valley floor as the river channel changes position.

Remember to think about scale when looking at river landforms. A **slip-off slope** (point bar) is a smaller-scale feature of a meander (which is a larger scale feature). You need to know how both are formed.

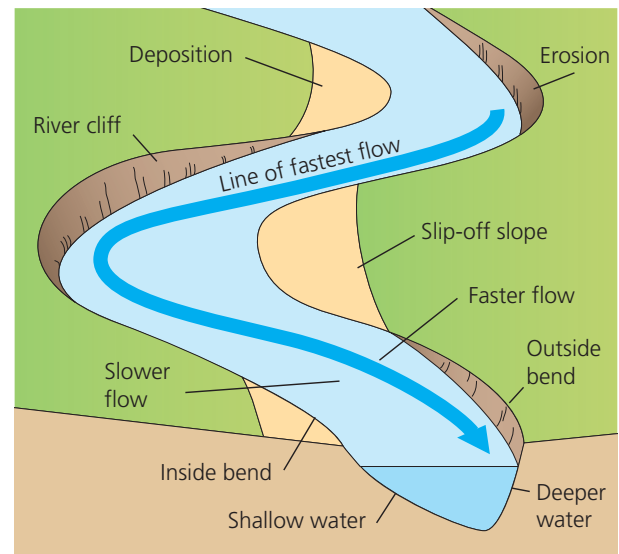
### Exam tip

Remember to think about scale when looking at river landforms. A **slip-off slope** (point bar) is a smaller-scale feature of a meander (which is a larger-scale feature). You need to know how both are formed.

**Slip-off slope** A bank of gently sloping deposited material found on the inside bend of a meander



**Figure 7** Block diagram of a gorge.



**Figure 8** Characteristics of a meander.

## Floodplain

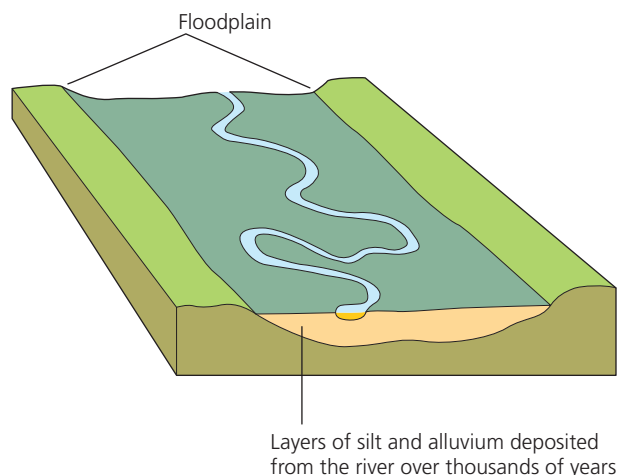
- + When the river floods, the floodplain becomes covered with water.
- + As the water is shallower on the land than it is in the river, material (silt) is deposited.
- + The silt makes the soil fertile.



**Figure 9** A meander on the River Sever.

Meanders are commonly found on floodplains as the river is no longer restricted by valley sides

Wide floodplain found in the middle and lower courses of a river



**Figure 10** A floodplain.

### Revision activity

Make an individual flashcard for each river landform that you have studied. For each card you should:

- + include a diagram of the landform
- + label the diagram with key features
- + bullet point the processes involved in its formation
- + give a located example that you have studied.

### Now test yourself

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- 1 Identify two factors that influence how sediment is transported in a river.
- 2 Draw an annotated diagram to explain how a floodplain is formed.
- 3 Describe how the large-scale feature of a waterfall is formed.

### Exam tip

When explaining the formation of a river or coastal landform remember to link the process involved (erosion or deposition) to the shape of the landform it creates.

### Exam practice

- 1 Circle **two** methods of erosion that cause the load of the river to get smaller and rounder. [2] [AO1.1] [AO1]

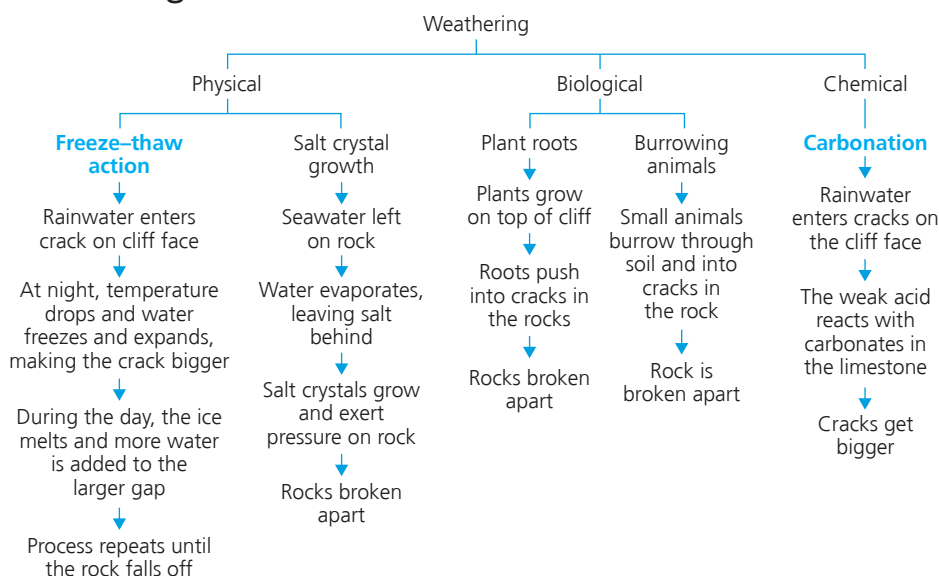
abrasion      hydraulic action      solution      attrition

- 2 Describe **one** small-scale feature of a waterfall. [3] [AO1.1] [AO1]
- 3 Draw an annotated diagram to show how a meander changes over time. [6] [AO3] [AO4]

## Coastal landscapes: slope and coastal processes

The coastline is shaped over time both by processes that happen in the sea and by those that occur on land (**slope processes**). A cliff may retreat through **weathering**, rockfalls and landslides.

### Weathering



### Slope processes

The processes involved in moving material from the cliffs on to the beach

### Weathering

The breakdown of rocks in place by elements of the weather

### Freeze-thaw action

The breakdown of rocks due to water entering cracks and repeatedly freezing and thawing

**Carbonation** Where chemicals in rainwater such as carbonic acid react with chemicals in rocks such as limestone

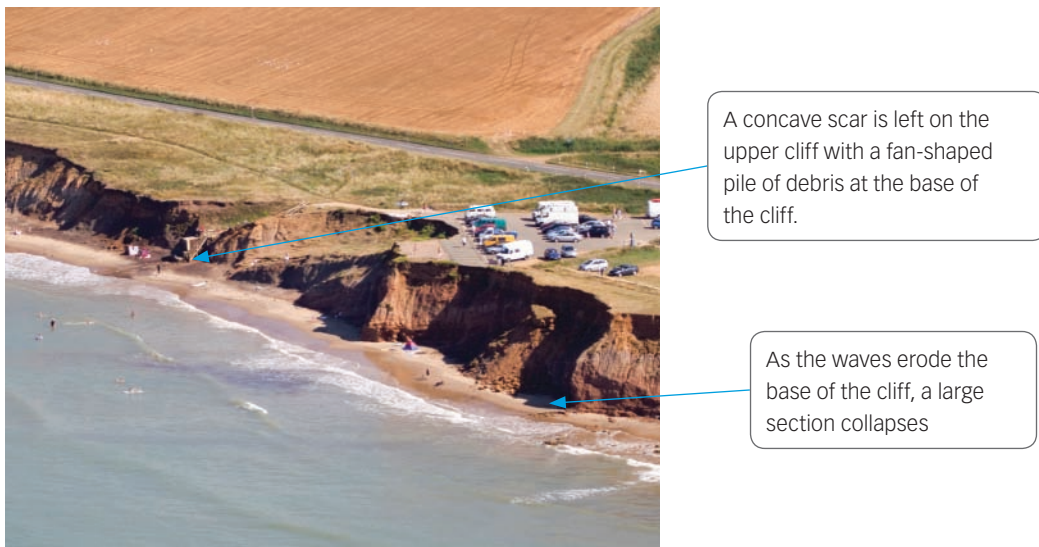
**Mass movement** When soil, rocks or stones move down a slope

## Rockfalls and landslides

Once rock has been eroded from the upper part of a cliff, the material moves down towards the beach resulting in **mass movement**, for example rockfalls and landslides.



**Figure 11** Evidence of erosion in limestone cliffs on the Glamorgan Heritage Coast.



**Figure 12** Cliffs on the Isle of Wight with numerous landslides.

## Coastal erosion

The processes that erode the cliff are:

- + **Hydraulic action:** the force of waves crashing into cliffs. Air trapped in the cracks is compressed, which breaks up the rock.
- + **Abrasion:** waves hurl sand and pebbles against the cliff, which wears the land away.
- + **Solution:** salt water dissolves rocks made of calcium carbonate.

The processes that erode the beach material are:

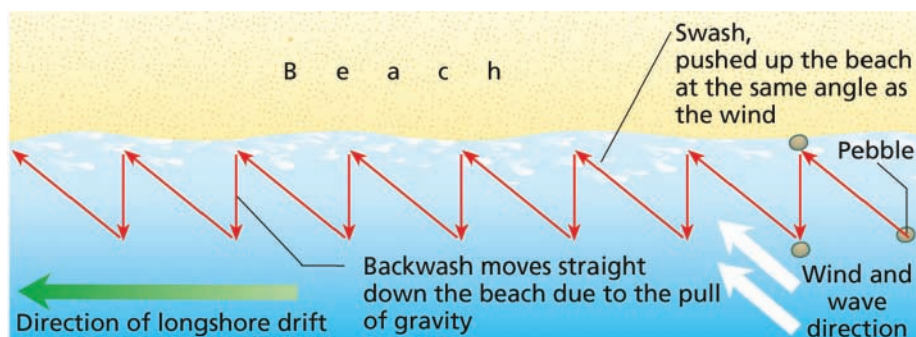
- + **Abrasion:** waves hurl sand and pebbles against the cliff, which wears the land away.
- + **Attrition:** pebbles are rolled back and forth. They collide with each other which makes them smaller and rounder, eventually turning them into sand.

## Coastal transportation and deposition

Once the eroded material, called **sediment**, falls into the sea, it will be transported by the power of the waves and currents along the coastline by **longshore drift**.

**Sediment** The material carried by the sea

**Longshore drift** The process by which sediment is moved along the coastline



**Figure 13** Longshore drift.

## Distinctive coastal landforms

The coastal environment has both large-scale and smaller-scale features.

### Headlands and bays

- A **headland** is an area of land that juts into the sea and is formed due to harder, more resistant rock being eroded more slowly.
- A **bay** is formed between the headlands due to softer, less resistant rock which erodes more quickly. Beaches often form in sheltered bays.

### Cliffs and wave-cut platforms

A **wave-cut platform** is formed when a cliff face is eroded by the sea:

- As the waves pound the base of the cliff, hydraulic action and abrasion cut a **wave-cut notch** into the base of the cliff.
- With continued erosion at every high tide, the wave-cut notch will eventually make the cliff unstable and lead to its collapse.
- The material from the cliff will then be moved by the sea, and in doing so abrasion will smooth the surface of the wave-cut platform left behind.
- If the cliff is made from well-jointed sedimentary rocks, then the wave-cut notch will often occur along the **bedding planes** as these are a weak point and will erode much more quickly.

### Arches and stacks

These form in headlands:

- Two caves on either side of a headland erode (by abrasion and hydraulic action) backwards until they cut through the back wall. This creates an **arch**.
- Weathering erodes the roof of the arch and wave cut notches erode the base of the arch to make it wider.
- Eventually the roof collapses to leave a pillar of rock called a **stack**.

**Headland** An area of land that juts into the sea

**Bay** A recessed area of coastline often found between two headlands

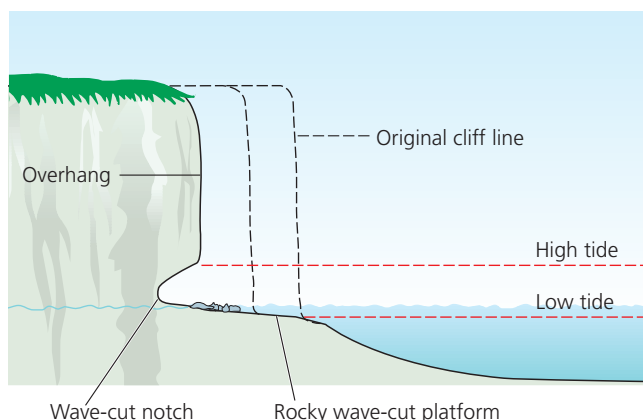
**Wave-cut platform** A coastal landform made of a rocky shelf in front of a cliff

**Wave-cut notch** A slot with overhanging rocks that has been cut into the bottom of a cliff by wave action

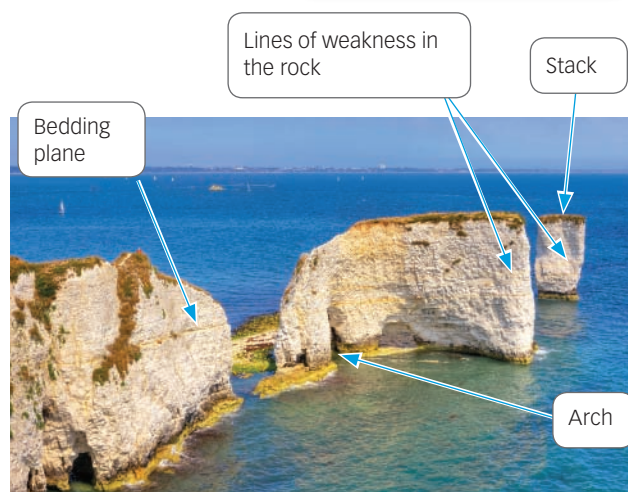
**Bedding plane** Clearly seen layers of rock in a cliff face

**Arch** A natural opening in a cliff where the sea is able to flow through

**Stack** A vertical pillar of rock left behind after the collapse of an arch



**Figure 14** The formation of cliffs and wave-cut platforms.

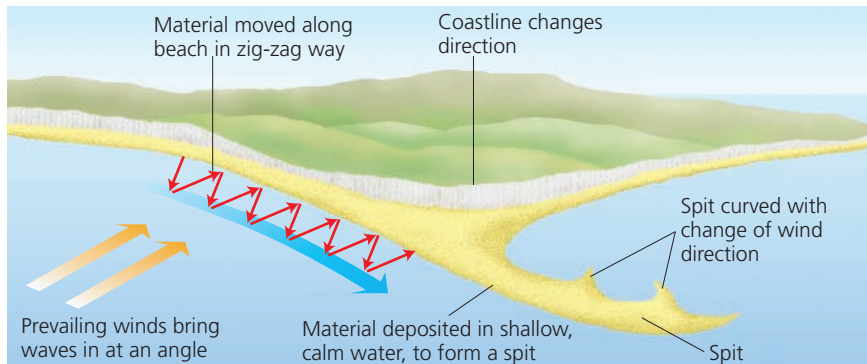


**Figure 15** Old Harry Rocks, Handfast Point, near Swanage, Dorset.

## Beaches and spits

Beaches and spits are formed when the **swash** is stronger than the **backwash** and deposition occurs:

- + A **beach** is a build-up of sand, shingle and pebbles deposited by waves.
- + Longshore drift transports beach material along the coast. Where the coast changes direction, for example at a river mouth, beach material is carried out to sea. This creates a new strip of land which projects out into the sea and remains attached to the land at one end, called a **spit**. Spurn Point on the Holderness coastline at the mouth of the River Humber is an example of a spit.
- + Fine silts and sands that are transported by the river are deposited at the river mouth and form an **offshore bar**. The mouth of the Dyfi Estuary (see the longshore drift example) is an offshore bar. This material can then be washed onshore by the swash action.



**Figure 16** Formation of a spit.

**Swash** The movement of water up the beach as a wave breaks

**Backwash** The flow of water back into the sea after a wave has broken on to the shore

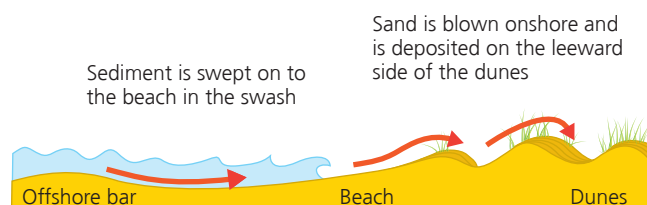
**Beach** Created by deposition (usually sand, shingle or pebbles) and lies between the high water mark and the low water mark

**Spit** A sand or shingle beach that is joined to the land but projects outwards into the sea in the direction of the prevailing wind

**Offshore bar** An area of deposition that is slightly off the coastline in the estuary of a river

### Example of sand dunes created by longshore drift in Ynyslas

Ynyslas sand dunes are located on the west coast of Wales in Ceredigion and provide an excellent example of how a sand dune system can be created by longshore drift. The map explains why the sand dunes are found here, as well as the development of an offshore bar.

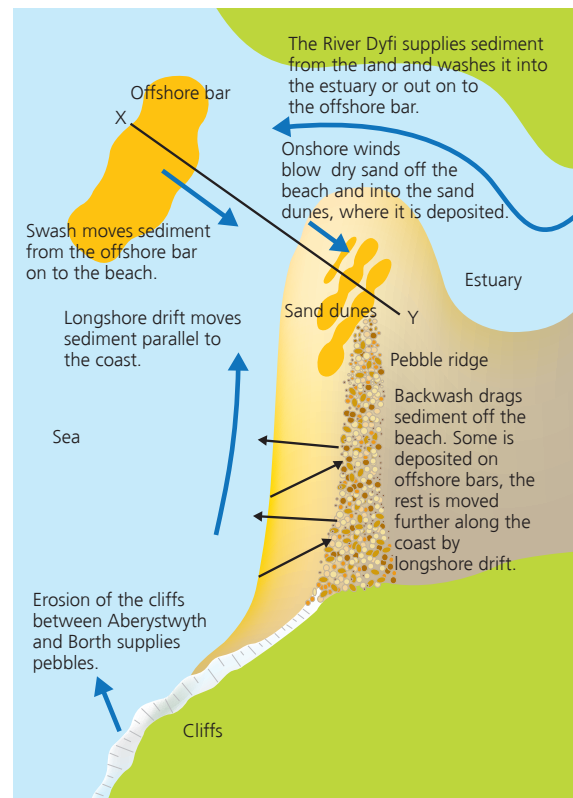


**Figure 17** The transportation of beach sediment at Borth and Ynyslas on the Ceredigion coast.

#### Revision activity

Make a revision card for a located coastal environment that you have studied, and include on it:

- + a map of the location
- + what coastal landforms are found there
- + why those landforms are found there
- + the direction of longshore drift (if appropriate)
- + the source of sediment supply (if appropriate).



**Figure 18** Movement of sediment in Ynyslas.

## Rock pools

- + **Rock pools** are small hollows in rocks found at the coastline such as in a wave-cut platform.

**Rock pool** A pool of seawater between shoreline rocks

- At high tide the pools are covered by the sea, and at low tide some seawater remains in the hollow, creating a rock pool.
- The rock pools are enlarged by the process of abrasion at high tide as small rocks within the pool whirl around due to the movement of the waves and gradually increase the size of the hollow.

### Now test yourself

TESTED

- Give two features created from coastal deposition.
- Describe two ways cliffs are eroded by weathering.
- Study the photo of Old Harry Rocks on page 19. Suggest how this headland will change after another 100 years of erosion.

### Exam tip

If an exam question asks you to use a map to inform your answer, make sure you look at all the features shown on the map and think about how they may interact and influence each other to change the landscape.

### Exam practice

- State **two** slope processes that result in cliff retreat. [2] [AO1.1] [AO1]
- Describe how sediment moves along a coastline. [4] [AO1.1] [AO1]
- Look at the map of the Ynyslas sand dunes on page 20. Suggest how the coastal landforms may change with increased cliff erosion to the south of the map. [6] [AO2] [AO3]

## What factors affect the rates of landform change in river and coastal landscapes?

REVISED

Geology, climate and human activity will affect the rate of landform change (how fast the change happens) in both river and coastal environments.

### Geology

The type of rock that is being eroded and the way in which the rock types are laid down will affect the rate of change. In the case of river landscapes, we have already seen how a change in rock type can lead to the formation of a waterfall. Geology can also determine whether a river flows over-or underground.

#### Example of rock type: Bishopston River, South Gower

- The Bishopston River has its source on millstone grit and crosses on to carboniferous limestone near the village of Kittle.
- Due to the joints in the limestone being easily eroded by solution, large **caverns** and **sink holes** appear which enable the river to run underground.
- As a result, the river channel on the surface is dry for the majority of the time, unless there is heavy rainfall, in which case the underground channels fill up, causing water to flow overland as well. Far less erosion occurs in the surface river channel as a result of the infrequent channel flow.

**Cavern** A large underground cave which has been created due to enlargement of joints in carboniferous limestone

**Sink hole** A hole in the ground caused by a collapse of the surface layer, often found in carboniferous limestone areas where caverns are present



Carboniferous limestone

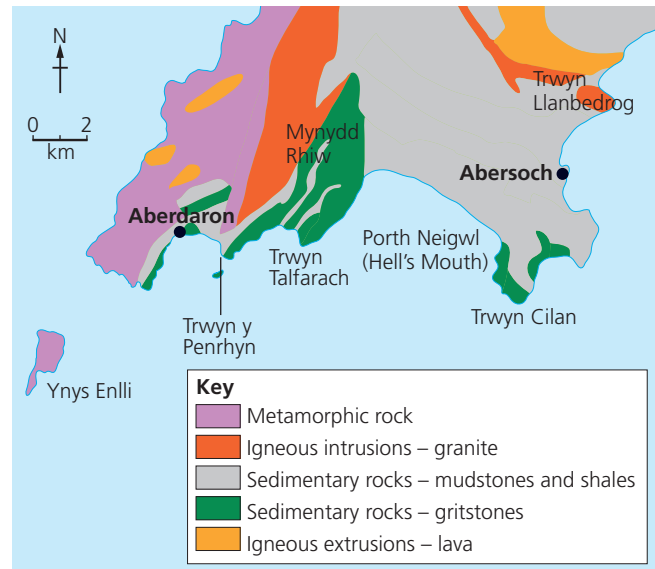
Sink hole

Water disappears and the river bed downstream is usually dry

**Figure 19** The Bishopston River, South Gower: sink hole causing the river to go underground.

### Example of concordant and discordant coastlines: Llyn Peninsula

- + Concordant:** the north coast of the Llyn Peninsula is a **concordant coastline**, where layers of different rock types run parallel to the coastline. The metamorphic rock erodes at the same rate so the coast has few headlands and bays.
- + Discordant:** by contrast, the coastline between the Trwyn Llanbedrog headland and Abersoch Bay is a **discordant coastline**. The headland consists of more resistant igneous rock (erodes slowly) and the neighbouring Abersoch Bay of less resistant mudstone and shale (erodes faster). The different erosion rates result in the formation of headlands and bays.



**Figure 20** The geology of the Llyn Peninsula.

## Climate

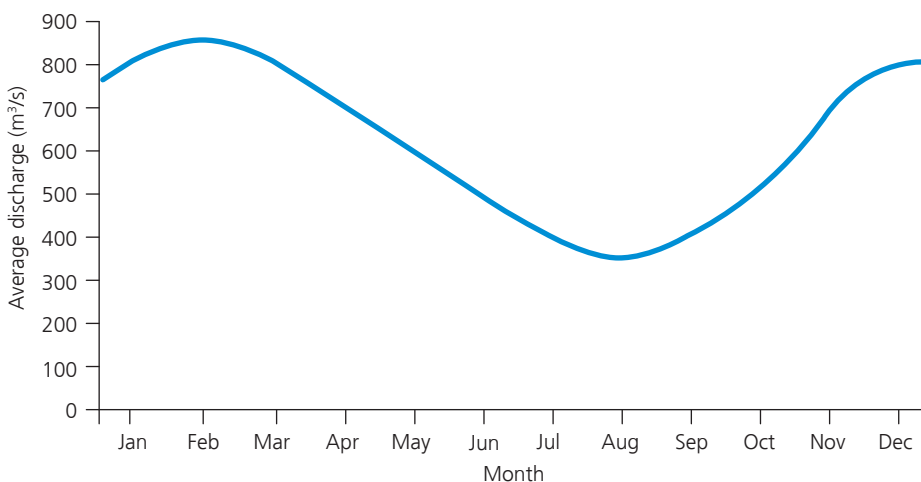
Climate will affect the rate of change of river and coastal landforms:

- + Coasts:** the prevailing wind affects the angle at which the waves break on to the coastline, and therefore the direction of erosion and transportation. The waves break on to the beach at this angle, pushing material up and across the beach. Therefore, the wind direction determines where depositional features form (for example a spit).
- + Rivers:** the more water that is flowing in a river, the higher the erosion rates will be. The highest erosion rates in UK rivers are found during the winter months when there is more rainfall.
- + Extreme weather events** may also alter the landscape. A powerful storm can change the appearance of a coastline overnight. The more severe the storm, the more destructive waves it creates. This is due not only to the increased wind speed, but also to the fetch – the distance the wave has travelled before breaking onshore. As a result, the most powerful and destructive storms that hit the UK are usually from the south-west. This is due to the large distance of open water that the Atlantic Ocean provides, which increases the fetch of the waves.

### Concordant coastline

Rocks are formed parallel to the sea so that erosion rates along the coastline are even

**Discordant coastline** Rocks are formed at right angles to the sea and so erosion rates vary along the coastline depending on rock type



**Figure 21** The river regime of the River Severn shows the variation in a river's discharge (the volume of water flowing through a river at any point) over a year.

### Example of winter storms causing coastal damage: west Wales coastline

In the spring of 2014, there was a series of storms in the UK causing severe erosion of the Welsh coastline. The impacts of these storms included:

- + Aberystwyth – 6 January 2014: waves damaged the sea wall, demolished part of the promenade and washed pebbles and sand across the main road.
- + Aberdyfi – January 2014: a severe storm damaged the sand dune system that protects part of the town and led to 3–6 metres of land being eroded.
- + Aberdaron – 12 February 2014: gusts of 173 kph were recorded, the strongest in Wales; the power of the waves resulted in at least 30 cm of land being taken from these receding cliffs.



**Figure 22** Location of severe coastal erosion in 2014.

### Human activity

The impact of human activity on both river and coastal landscapes may be both intended and unintended:

- + Intended human activity includes management strategies to reduce the impact of erosion of both river and coastal landforms.
- + For rivers, an example is the management of meanders in a built-up area, where people are concerned about erosion on an outside bank affecting buildings and services. Management strategies to help reduce the amount of erosion include gabions (cages filled with rock), which absorb the power of the water, or reinforced concrete banks which resist the force of the water. These methods are used extensively on rivers running through built-up areas, for example the River Thames throughout central London.
- + For coasts, an example is the management of beaches where the coastline is left exposed to erosion as the process of longshore drift moves large amounts of beach material along the coastline. As a result, human settlements close to the coast are vulnerable due to cliff collapse or flooding.



**Figure 23** Groynes at St Bees Beach in Cumbria.

### Example of impact of intended and unintended human activity: Criccieth coastline

- + Criccieth is on the south coast of Gwynedd.
- + The cliffs are composed of easily eroded material known as glacial till.
- + The beach is affected by longshore drift which moves the glacial till from west to east along the coastline.
- + **Groynes** keep the material on the beach so that it continues to attract visitors and the income they bring. This is an intended consequence.
- + The beach also protects the coastline by absorbing the wave energy.
- + To the east of the groynes there is an area of cliff that is very prone to collapse due to an increase in rates of erosion. This is likely to be due to the lack of beach material protecting it as the groynes to the west are now preventing the movement and deposition of new material. This is an unintended consequence.

**Groyne** A low wall or barrier on a beach built at right angles to the sea to restrict longshore drift

### Now test yourself

TESTED 

- 1 Complete the following sentences using words from the box below:

atmospheric	landforms	concordant	straight
discordant	coastal	curved	river
			ecological

Geology influences both coastal and ..... landscapes. At the coast the direction in which rock types meet the sea can greatly impact the speed of erosion and the ..... that result. When rocks are formed parallel to the sea this is known as a ..... coastline. When they form at right angles to the sea this is a ..... coastline.

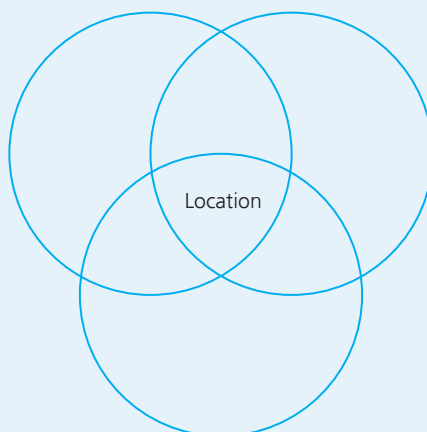
- 2 Describe how a change in geology can lead to the formation of a river landform.
- 3 Suggest reasons why human activity can have unintended consequences in coastal environments.

### Exam practice

- 1 Name **two** ways in which extreme weather events change river landscapes. [2] **[AO1.1]** **[AO1]**
- 2 Explain why climate influences the rate of erosion in coastal landscapes. [4] **[AO1.2]** **[AO2]**
- 3 Is geology as important as the processes of erosion and deposition in the formation of coastal landforms? Justify your answer. [6] **[AO2]** **[AO3]**

### Revision activity

- 1 For a coastal landscape that you have studied, draw a Venn diagram with the name of the location in the middle section. Write down the geological influences in one ring, the climatic influences in a second and the human activity in the third ring. If these different factors influence each other in any way, then write this in the overlapping areas.



- 2 Repeat this exercise for a river landscape you have studied.

### Exam tip

When giving an example of the influence of geology, climate or human activity on either a river or a coastal landscape, make sure you explain the link between what it is that people are doing and the change in the natural environment.

# Drainage basins of the UK

## What physical processes affect stores and flows in drainage basins?

REVISED

### Flows and stores of water

As water moves through a **drainage basin** it **flows** from one **store** to the next.

### Relationship between drainage basin processes

The movement of water through the drainage basin can be seen in the diagram. The speed at which water moves through drainage basins can vary due to:

- + **The type and quantity of rainfall:** rainfall moves more quickly through a drainage basin in heavy rainstorms than in light drizzle. Raindrops are larger and falling in a shorter period of time, so less infiltration and more surface runoff will occur.
- + **The type and quantity of vegetation cover:** more **interception** occurs in a woodland compared to a meadow.
- + **The size and shape of the drainage basin:** round drainage basins lead to a faster movement of water into the river than elongated ones. Larger basins have a larger discharge as they drain from a larger surface area of land.
- + **The steepness of slopes:** steeper slopes mean greater surface runoff and less infiltration.
- + **The geology and soil type within the drainage basin:** impermeable soil or rocks lead to less infiltration or groundwater flow and more surface runoff.

**Drainage basin** An area of land drained by a river and its tributaries

**Flow** The movement of water

**Store** A place where water is stationary within the water cycle

**Interception** When rainfall does not reach the ground as it is blocked by trees, buildings and so on

**Infiltration** The movement of water into the soil

**Throughflow** The flow of water through the soil

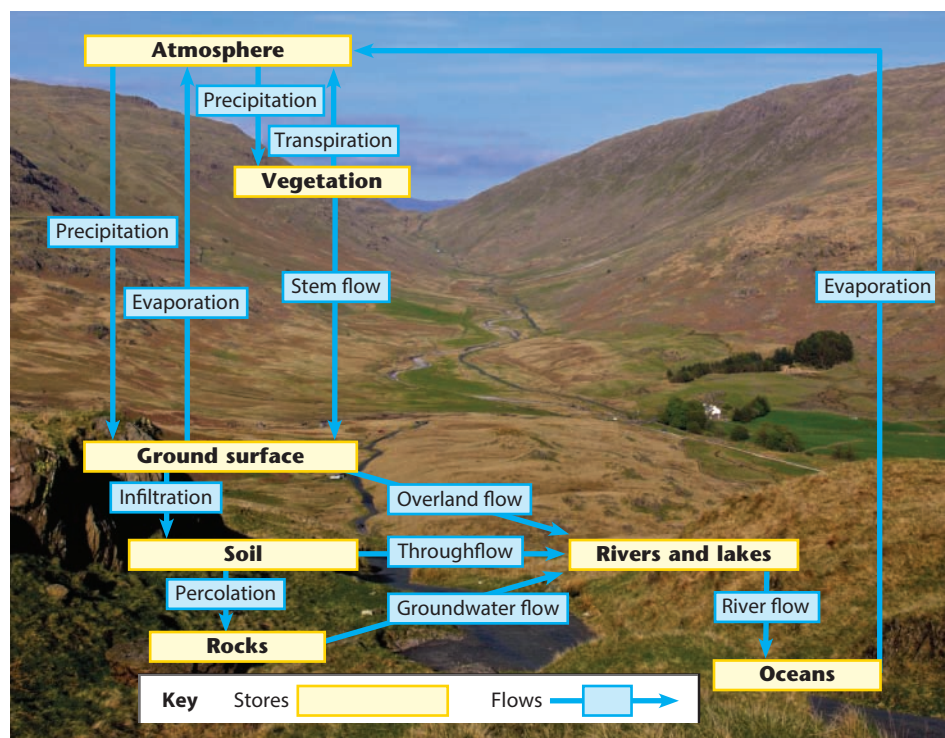
**Overland flow** The flow of water across the ground surface

**Groundwater flow**  
The flow of water through rocks

**Transpiration** Water given off by plants

**Stem flow** Movement of water that has been intercepted down the stem or trunk of a plant

**Percolation** The movement of water from the soil into the bedrock



**Figure 24** Stores and flows of water in a natural drainage basin.

### Now test yourself

- 1 Name two ways water leaves the drainage basin system.
- 2 Explain why the size and shape of the drainage basin can influence the volume of water in a river.
- 3 Describe the impact that urbanisation has on the drainage basin.

TESTED

### Revision activity

Draw a table like the one below. For each store and flow in the drainage basin complete the table to show what would happen if the amount of that store or flow increased or decreased.

Store/Flow	If it increased ...	If it decreased ...
Precipitation	More water in the drainage basin would lead to higher river levels.	Less water in the drainage basin which may lead to low river levels or dry river channels.

### Exam practice

- 1 Give **one** store and **one** flow in a drainage basin. [2] [AO1.1] [AO1]
- 2 Give **two** reasons why the type of rainfall influences movement of water through a drainage basin. [4] [AO1.2] [AO2]
- 3 Evaluate the influence of vegetation on flow of water through a drainage basin. [8] [AO2] [AO3]

### Exam tip

When asked to discuss the interrelationships between drainage basin processes, you will need to explain why a 'store' in one part of the basin may affect the 'flow' in another part.

## Why do rivers in the UK flood?

REVISED

Climate, vegetation and geology (physical factors) may affect a river's discharge and lead to flooding. Urbanisation (human factors) may also cause flooding.

### Climate

Increased amounts of rainfall will increase the chance of a river flooding. This may be due to either:

- + Seasonal rainfall: continuous rainfall causes the ground to become saturated, leading to more overland flow and therefore higher river levels
- + A storm event: when a heavy storm brings a high volume of rainfall in a short period of time this causes a sudden rise in river levels that can lead to flash floods

### Vegetation

- + Different types of vegetation intercept different amounts of rainfall, which influences how rapidly water moves through the drainage basin to reach the river channel. For example, broad-leaved trees intercept more rainfall than grassland and reduce the speed at which it reaches the ground. In addition, their roots are deeper and cover a larger area, so taking more of the infiltrated water out of the soil
- + Removal of vegetation: if trees are removed from a drainage basin then water will reach the river channel much more quickly due to quicker saturation of the soil

## Why do rivers flood?

### Geology

- + Porous rocks have large spaces within the rock which allow water to pass through. This reduces the flood risk due to increased groundwater flow
- + Impermeable rocks have very few spaces within the rock. Little water passes through, creating more overland flow and a higher flood risk
- + A rock may not be porous but can be well jointed, allowing water to pass through these lines of weakness. For example, carboniferous limestone

### Urbanisation

- + The expansion of towns and cities leads to the ground being covered with impermeable surfaces such as tarmac, which reduces the amount of water that is infiltrated. This causes more overland flow and increases the chance of flooding

# MY REVISION NOTES

WJEC GCSE

## GEOGRAPHY

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**Urban issues in contrasting global cities**

What are the global patterns of urbanisation?

Patterns of urbanisation

The size of urban areas across the world is growing in terms of both physical area and number of people (**urbanisation**). Just over half of the world's population now live in urban areas, and this percentage is increasing. Cities in **newly industrialised countries (NICs)** are growing at a particularly fast rate. The table below shows the world's largest **mega-cities** in 2019.

City and country	Population in 2019
Tokyo, Japan	37.4 million
Delhi, India	29.3 million
Shanghai, China	26.3 million
Sao Paulo, Brazil	21.6 million
Mexico City, Mexico	21.6 million

The distribution of the largest mega-cities is overwhelmingly in Asia. Europe does not appear even in the top ten mega-cities as they tend to be more frequent in NICs. It is not surprising that two of the most populous countries in the world have a number of the largest cities.

**Urbanisation** The growth of towns and cities.

**Newly industrialised countries (NICs)** Middle-income countries where the pace of economic growth is faster than in other developing countries.

**Mega-cities** Cities with over 10 million residents.

**Globalisation** The global web of links between countries involving people, trade, ideas and cultures.

**Global cities** Cities that play an important role in the global economic system of finance and trade.

**Global cities are important** Global cities are important places around the world as they are now more connected than ever. They are centres of economics, trade, society and culture, and politics. Global cities are places of connection, often with the following features: the location of stock exchange and bank headquarters; the location of central government, international organisations and multinational corporations; the location of a wide range of entertainment venues; the location of top-rated universities and research.

**Distribution of global cities** The distribution of global cities is not even. There are areas where they are clustered and other parts of the world where there are very few. For example:

- North America, Western Europe and South Asia have clusters
- Africa has very few global cities, with just six of them
- India has eight
- China has fourteen.

**Figure 11 Global cities.**

**Changing pattern of global cities over time**

The pattern of global cities is not static and is subject to change. To keep their global city status, each city must continue to develop and strengthen its links with other places around the world. As cities grow and develop within NICs, they are hoping to become new global cities. They look to exploit new trade routes by becoming a vital connection. If an existing global city does not continue to develop then it may well lose its global city status.

**Now test yourself**

- 1 Describe the difference between a mega-city and a global city.
- 2 Define the term 'globalisation' and explain why this causes urbanisation to occur.
- 3 Explain why a city might lose global city status.

**Revision activity**

Pick three global cities and make a list of the characteristics that you think make them global cities.

**Exam practice**

- 1 Study Figure 11. Describe the distribution of global cities shown on the map. [2] (AO2) (AO4)
- 2 Describe the characteristics of a global city. [4] (AO1.1) (AO1)
- 3 Explain why cities in NICs are growing at the fastest rate. [6] (AO1.2) (AO2)

Avoid common mistakes and enhance your exam answers with **Exam tips**

**Exam tip**

When answering a question where you need to describe the distribution in relation to data given in a table, remember to:

- give the overall pattern
- give examples of the highest and lowest
- quote some of the figures from the table.

Spotting anomalies in the data is also creditworthy.

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