

Year 11 Geography Case Study Booklet

The **Levels** you should be aiming for:

Level 1

The student gives a **basic description** of effects and causes, but does not develop their answer at all and only shows **limited relevant knowledge** and information. Meaning may not be communicated very clearly because of mistakes in writing. **(1-3 marks)**

If you cannot name a case study example for the question to can only reach level one.

Grammar and spelling will be poor—no extra marks...

Level 2

Student describes effects **and explains** causes with some development of their answer, and uses **some relevant knowledge** based on a range of factual information and evidence. Meaning is communicated clearly. **(4-6 marks)**

You begins to explain and quote a few facts you have remembered to support your argument.

Improved grammar and spelling will get you some marks.

Level 3

Thorough and **developed description of effects and explanation of causes**, with place-specific example. Demonstrates **thorough knowledge**, based on a full range of relevant factual information and evidence. Meaning is communicated very clearly. **(7-8 marks)**

The examiner should be impressed by how much you know. There will be more than one piece of evidence from you case study knowledge.

Very good spelling and grammar—lots of extra marks

Topic	Case Study	Revised?	Answered practice questions?
Natural Hazards	Climatic MEDC - Hurricane Katrina		
	Climatic LEDC - Drought, Ethiopia		
	Tectonic MEDC - Japan Earthquake		
	Tectonic LEDC - Haiti Earthquake		
Economic Development	Location of economic activity - UK		
	Location of economic activity - Kenya		
	Pearl River Delta, China		
	MNC - Nike, Vietnam		
	Aid - Wateraid, Mali		
Rivers and Coasts	Flooding MEDC - River Valency, Boscastle		
	Flooding LEDC - River Ganges, Bangladesh		
	River tees, North East England		
	Coastal landforms - Dorset Coast		
	Coastal Management - Holderness		

This booklet belongs to

Tropical storms have **strong winds** and **torrential rain**. They are **circular in shape** and can be **hundreds of km wide**. They **form over tropical seas (27°C or higher)**. **Warm moist air rises** and **condenses**. This **releases energy** which makes it grow really powerful. They lose strength as they move over land because their energy source (warm water) is cut off.

The USA has a **sophisticated monitoring system** to **predict** if hurricanes will hit (**satellites** can track them). This means people can be evacuated. **80%** were **evacuated** before the storm hit, reducing the death toll. Mississippi and Louisiana declared **states of emergency** and **stockpiled supplies** (food and water). The **coastguard, police, fire services** and **army** rescued over **50,000 people** and they had **access to equipment** such as helicopters.

Tropical Storm MEDC Hurricane Katrina, USA

Katrina was a category 4 storm.
Storm surges reached over 6 metres in height.
New Orleans was one of the worst affected areas because it lies below sea level and is protected by **levees**. People sought refuge in the Superdome stadium. Conditions were unhygienic, and there was a shortage of food and water. **Looting** was commonplace throughout the city. Tension was high and many felt vulnerable and unsafe.



\$50 billion in aid was given by the government.

Although the response was better than in Burma the USA **government received much criticism**. Some **homeless families** ended up in **sports stadia** where **conditions** were **intolerable** and fighting etc broke out as tensions rose. There were accusations that as it was **'black poor people mostly affected'** the government didn't care. **Looting** was commonplace. Finally, **flood defences** that were supposed to protect New Orleans **failed** and this actually increased the damage as flood water became trapped

Hurricane Katrina hit the South East USA on 29th August 2005 and cost a staggering \$300 billion.

The **primary impacts** included **1800** were **killed** and **300,000 homes** were **destroyed**. **3 million** people were left **without electricity** and **bridges** including the I-10 **collapsed**. Coastal habitats were also damaged.

The **secondary impacts** were **tens of thousands** were made **homeless** and **230,000 jobs** were **lost** from business that were damaged and destroyed. **Water supplies** were **polluted** with sewage, chemicals and dead bodies.

Oil facilities were damaged and as a result petrol prices rose in the UK and USA.

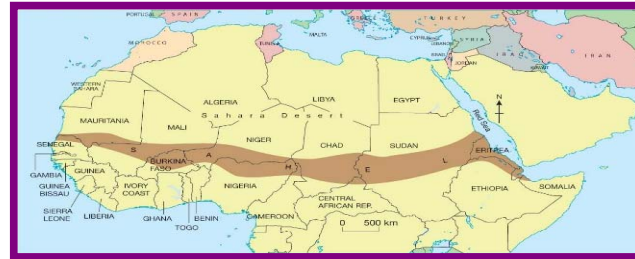


LEDC Drought (climatic problem)

The Sahel, Africa

Key Data:

Lies south of the Sahara
12° N and 17° N
Cause: Moist, rainy air prevented from moving north from the Equator.
1984 – 1985 and 2006
DESERTIFICATION from non-appropriate farming methods



The Sahel region of Africa has been suffering from drought on a regular basis since the early 1980s. The area naturally experiences alternating wet and dry seasons.

Drought is different from other hazards unlike floods and tropical storms it never kills people directly

Desertification – the turning of land, often through physical processes and human mismanagement, into desert. A severe threat to millions in the Sahel region of Africa.

Impacts:

1984 – 1985 over a million people died in Ehtiopia
2006 5.2 million people need food aid
Animals die, crops fail, people migrate to find food, disease
Absolute poverty

In the Sahel, a drought is declared when there's below average rainfall for 2 years. The Sahel has actually suffered drought for most of the last 30 years.

The result is crop failure, **soil erosion**, famine and hunger: people are then less able to work when their need is greatest. It becomes a vicious circle and can result in many deaths, especially among infants and the elderly. In Niger in 2004, the situation was made worse when a plague of locusts consumed any remaining crops. In these cases, people rely on food aid from the international community.

The Eden project is a charity that plants trees in the area to give food to the local people

Responses:

1984 – 1985 “Live Aid” – 1st global media aid request – leads to expansion and awareness of aid agencies work
2006 – Migration of people leads to armed clashes and fighting
Increase in use of fuelwood and growing population means greater risk of further drought
Oxfam etc provide appropriate, sustainable technology

The January 1994 Northridge Earthquake struck hard: the first major earthquake to occur directly beneath a highly urbanized area in California.

MEDC Earthquake Northridge, USA 1994

Northridge was fairly prepared for earthquakes through education, rescue efforts and strong buildings.

The earthquake happened on a deep fault in the San Fernando Valley

Northridge is located 30km from Los Angeles

Measured 6.7 on the Richter Scale

Primary effects
-57 people killed
-9000 injured
-Thousands of buildings damaged
-Transport links damaged (roads)
Yet due to the earthquake happening early in the morning it reduced the deaths

Secondary effects
-Landslides
-Powerlines and waterlines damaged from the debris
-Extensive fires

Near the epicenter in the San Fernando Valley, well-engineered buildings withstood violent shaking without structural damage

Liquefaction occurred in some areas

The USGS monitor the movement yet can not predict, so preparation is key!



Landslides were triggered in mountainous areas, these block roads and damaged homes

Wooden buildings were the buildings that generally collapsed

Fires broke out from the leaking gas pipes, areas were completely destroyed by the fires

It was declared a federal disaster, so 100s of workers from FEMA helped the community recover
Millions were given to the 600,000 people that applied for financial assistance.

15,000 aftershocks occurred, these can trigger the collapse of weak buildings

There were few casualties, but economic cost was high with losses estimated at \$20 billion

MEDC Earthquake

Japan Earthquake & Tsunami 2011

A massive 9.0-magnitude earthquake struck Japan, Friday afternoon 246pm local time, on 11 March 2011 @ 0546 GMT.
The earthquake lasted six minutes.

The quake was centered 130 kilometers to the east of the prefecture's capital, Sendai (365km north east of Tokyo).

Primary effects

- Approximately 16,000 killed
- 55,000 buildings damaged/ swept away
- Fukushima Nuclear Power Plant damaged and released extreme amounts of radiation
- 4 trains swept away

Secondary effects

- 2 million homeless
- Power lines, gas and water services severely disrupted
- Major decline for Japan's agricultural, livestock and fishing industries due to fear of contamination from radiation
- Tourism numbers decreased over the next two years

10-meter tsunami was seen at the port in Sendai, near the epicentre.

Prezi presentation by A-level students – very good

<https://prezi.com/jrdghgfy7og/tohoku-japan-earthquake-case-study/>

Also this is great for effects:

<http://www.geographypods.com/2-earthquakes.html>

Japan is located on the east edge of the Eurasian Plate.

The oceanic Pacific Plate subducts (sinks under) the Eurasian Plate.

This plate margin is “destructive”

It is not a smooth process, friction is present and the plates stick, tension (pressure) builds up.

When this pressure builds up and is released, it causes a rapid shift in the plates and a lot of energy to be released, in this case the 5th most powerful earthquake ever!



Epicentre

Plate margin between Eurasian and Pacific Plate

There were many casualties, and economic cost was high with losses estimated at \$90 billion

Japan was largely prepared for the earthquake and many buildings remained standing afterwards, but it was not prepared for the subsequent Tsunami..

Measured 9.0 on the Richter Scale

Tall buildings swayed violently in central Tokyo as the aftershocks hit.

The total cost to re-build the areas affected was set at £185 billion

Tokyo's major airports halted flights, though Haneda Airport was later reported to have reopened several runways. All Tokyo area trains were halted, while the Shinkansen bullet train service was suspended.

Response

- Local emergency units were sent out to cool down the nuclear reactors of the Fukushima power plant
- The Red Cross and other related organisations assisted in the search for survivors.
- Relief organisations like ShelterBox distributed aid to Japan.
- Local emergency units and volunteers helped searching for the estimate 3,155 missing

LEDC Earthquake Haiti 2010

Small Caribbean country, part of Dominican Republic island



The country is located on a conservative plate boundary between the Caribbean Plate and the North American Plate.

The poorest country in the western hemisphere. GDP is 143/227. 66% of the population of Haiti earn less than £1 a day with 56% of the population classed as "extremely poor"

3 Million people live in Port au Prince with the majority living in slum conditions after rapid urbanisation.

- 12th January 2010 an earthquake measuring 7.0 on the Richter scale struck Haiti.
- The focus was 13km underground
- The epicentre was 25km from the capital Port-au-Prince
- Haiti suffered a huge number of serious aftershocks.

- The number of people in relief camps of tents since the quake was 1.6 million
- In July 2010, CNN returned to Port-au-Prince and reported, "It looks like the quake just happened yesterday".
- A January 2012 Oxfam report said that a half a million Haitians remained homeless
- Only about 20% of aid has been spent by the Haiti government as they have no resources.

Primary effects

220 000 people were killed

300 000 people were injured

1.3 million Haitians were displaced (homeless).

Eight hospitals or health care centres in Port-au-Prince were badly damaged or collapsed.

200 000 homes were damaged in the Port-au-Prince area.

The main shipping port was badly damaged and part of it collapsed into the sea.

100 000 homes were destroyed.

Many Government buildings including the Presidential Palace were destroyed.

Road were blocked by fallen buildings and smashed vehicles.

Secondary effects

In early January 2010 the EU released €3 m in emergency funding.

The European Council and its member nations later announced more than €429 million in aid.

Over 2 million Haitians were left without food and water.

Looting became a serious problem.

The destruction of the Government buildings hindered the government's efforts to control Haiti and the police force collapsed.

The Haitian tourist industry declined as tourists stopped visiting.

The damage to the Port and main roads meant that critical aid supplies for immediate help and long-term reconstruction were prevented from arriving or being distributed effectively.

By November 2010 there were outbreaks of cholera.

The many dead bodies in the streets and under rubble, created a health hazard in the heat. So many had to be buried in mass graves.

Displaced people were moved into tents and temporary shelters.

There were frequent power cuts.



The governments of the United States, Israel, the Dominican Republic, Canada, Brazil, Italy and Cuba sent over 1,000 military and disaster relief personnel each, with the United States being by far the largest single contributor to the relief efforts.

Possible Case Study Questions – 9 marks + 3 for SPaG
- Natural Hazards

1. Case Study - Climatic hazard in an LEDC

Name the LEDC and state the climatic hazard

Q. Outline the causes of this hazard and explain the impacts on the country. Include three developed points.

2. Case Study: Climatic hazard in an MEDC

Name the MEDC and state the climatic hazard

Q. Outline the impacts of the hazard and the sustainability of the responses. Include three developed points.

3. Case Study: Tectonic hazard in an LEDC

Name the LEDC and state the tectonic hazard

Q. Describe the causes of this hazard and suggest how sustainable the responses were. Include three developed points.

4. Case Study: Tectonic hazard in an MEDC

Name the MEDC and state the tectonic hazard

Q. Describe the effects of this hazard and suggest how sustainable the responses were. Include three developed points.

Factors that affect the location of economic activity (MEDC) - UK

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Location of Industry in an MEDC — Case Study

You also need to know why industry locates where it does in MEDCs. Well, you're in the right place to find out, 'cos here's a case study of what's where and why in the good ol' UK.

The Location of Industry in an MEDC — the UK

QUATERNARY — ELECTRONICS

Many electronics companies are based in the Central Lowlands of Scotland because of the local skilled labour supply — nearby universities such as Glasgow, Edinburgh and Heriot-Watt provide electronics and engineering graduates.

TERTIARY — TOURISM

There's a strong tourist industry in Cumbria because of the beautiful scenery.



SECONDARY — MANUFACTURING

Government grants have encouraged car manufacturers to locate in Merseyside, e.g. in 1998 Jaguar cars began production at the Halewood plant after receiving a £50 million grant from the Government.

PRIMARY — MINING

Coal mining has been a major industry in Nottinghamshire since the 13th century because of the coalfields in the area. Although most mines have now closed, a small amount of mining still goes on.

QUATERNARY — HIGH TECHNOLOGY

There are many high technology industries along the M4 corridor (the area near the M4 motorway). The area is close to universities (Bristol, Oxford and Reading) that provide skilled workers, and the motorway is good for communication.

SECONDARY — CHEMICAL PROCESSING

There are chemical works in North East England because they're near to offshore oil rigs that provide the raw material for the industry.

PRIMARY — FARMING

There are lots of farms in Lincolnshire and East Anglia because of the good soil and mild climate. It's also very flat, which makes it easier to use large machinery such as tractors.



QUATERNARY — HIGH TECHNOLOGY

There are many high technology industries near Cambridge because the university provides educated and skilled workers.



TERTIARY — RETAIL

There are lots of shops in London because there are plenty of customers and good public transport. There are also excellent transport links for the delivery of products to shops.



Case studies and London buses — you wait for ages and two come along at once...

So if you like a touch of farming, the east of England's the place to be. Industry within your local town will be based in suitable places for similar reasons. Try listing some local companies and working out why they might be based there.

Factors that affect the location of economic activity (LEDC) - Kenya

Location of Industry in an LEDC — Case Study

If you're not feeling very **industrious**, I think I can help you. A case study on **why industry** locates where it does should boost your enthusiasm — then you can turn this **raw material** into some exam fodder.

The Location of Industry in an LEDC — Kenya

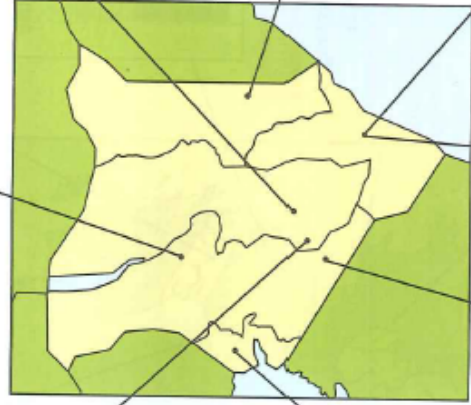


TERTIARY — TOURISM
There's a strong **tourist industry** in the **Rift Valley**. The area has several **National Parks** and lakes (e.g. Lake Turkana and Lake Magadi).

SECONDARY — MANUFACTURING
There are lots of **manufacturers** in **Nairobi** that produce **textiles, foods** and drinks. The area has **good transport links** (including an **airport**) and a **good labour supply** — Nairobi's **population** is about **3 million people**.



TERTIARY — TOURISM
There's a strong **tourist industry** near **Mount Kenya** because it's the **second highest mountain** in Africa and has a **National Park**.



PRIMARY — FARMING
There are lots of **farms** in the **Nyanza** and **Western Provinces** that produce **coffee, tea, tobacco** and **fruits** — these are the areas that receive **enough rainfall** to **grow crops**.



PRIMARY — FARMING
Livestock (e.g. **camels** and **cattle**) are reared on **farms** in the **North Eastern Province** because the **climate** is **too dry** for crops, but is suitable for **grazing**.

TERTIARY — TOURISM
There's a strong **tourist industry** in the **Coast Province** because of its **beaches**, e.g. **Diani Beach**.



SECONDARY — MANUFACTURING
There are **cement works** in the **Coast Province** because they use **limestone** from the nearby **deposits** as a **raw material**.

PRIMARY — MINING
There's a large **mine** in **Magadi** that extracts **irona** (a mineral that's used to make **glass**). The mineral forms around **Lake Magadi** as the water **evaporates**.



Camilla the camel was fed up of case studies — she had the hump...

..and who can blame her. Look on the bright side though, the good news is that **Kenya** is an **LEDC**, so it doesn't have any **quaternary industry**. That means there's only three different types of **industry** to remember for this page.

Conflict between economic activity and the environment - Pearl River Delta, China

What is it?

The Pearl Delta is in the Republic of China in the low-lying area surrounding the Pearl River estuary where the Pearl River flows into the South China Sea. It is one of the most **densely urbanised regions** in the world and **one of the main hubs of China's economic growth**.

✓ The Pearl River Delta has become **the world's workshop** and is a **major manufacturing** base for products such as electronic products (such as watches and clocks), toys, garments and textiles, plastic products, and a range of other goods.



Nearly five percent of the world's goods were produced in the Greater Pearl River Delta in 2001. Over 70,000 Hong Kong companies have plants there.

✗ All of this manufacturing creates a lot of pollution. The Pearl River Delta is notoriously polluted, with **sewage** and **industrial waste**. (Treatment facilities are failing to keep up with the growing population). This has a negative impact on the environment.



The problems

In October 2009, Greenpeace released a report, "Poisoning the Pearl River" that detailed the results of a study it conducted.

All samples they took contained hazardous properties including heavy metals such as beryllium, copper and manganese.

✗ These substances are associated with a long list of health problems such as cancer, endocrine disruption, renal failure and damage to the nervous system as well being known to harm the environment.

✗ **Pollution is a great risk to the Chinese White Dolphins that inhabit the area.**



✓ The industries in the delta make over **US\$448 billion** a year

Future Management

In 2007, the World Bank approved a \$96 million loan to the Chinese government to reduce water pollution in the Pearl River Delta. 7.1 billion was spent on the river by mid 2010 to clean up the river's sewage problems.

✓ The city will build about 30 water treatment plants, which will treat 2.25 million tonnes of water per day. The program hopes to cut down the amount of sewage in the area by 85%,



Multinational Company (MNC) - Nike, Vietnam

Nike has been accused of using child labour in the production of its soccer balls in Pakistan.

Key Facts

Nike is the world's leading supplier of sports footwear and equipment. The company was founded in 1972. The company name comes from the Greek word for 'victory'. Nike does not make any shoes or clothes itself but contracts out to factories in LEDCs.

These subcontracted companies then act on their own and re-subcontract their operations in other Asian countries that give low wages and have no employment laws. E.g. Vietnam, The Philippines and Indonesia.

Pay millions of dollars to sport superstars to promote their product.

Pay workers in foreign countries \$2 per day to make their product.

Benefits

- The average pay at a Nike factory close in Vietnam is \$54 a month, 3x higher than other jobs.
- It encourages female employment
- Offers jobs to local people
- Helps to boost the local economy by employing people.

Negatives

- Sweatshops - long working hours and poor conditions
- Child labour
- Hazardous working conditions
- Below subsistence wages (not enough money to afford basic food and water)

The numbers...

- Yearly revenue of \$19.2 billion (2009).
- Products in 140 countries.
- Contracts to 700 factories in 45 countries.
- Employing 800.000 people in the supply chain.

What is being done by Nike?

- Introduced a code of conduct for subcontractors to ensure that they are treating people properly.
- Decommissioning subcontractors who fail to follow the code of conduct.
- Auditing tools and task force to guarantee human rights.
- Nike have hired independent auditors to make sure that the company subcontractors are living up to Nike's code of conduct.
- In 1998 Nike changed the minimum age requirements to 17 years old.

"Nike's Wealth was built upon the backs of the worlds poor"



A sustainable aid project in an LEDC - WaterAid in Mali



What is WaterAid?

WaterAid is an **international NGO (non-governmental organisation /charity)** that focuses on the provision of safe domestic water, sanitation and hygiene education to the world's poorest people. WaterAid's vision is of a world where everyone has access to safe domestic water and effective sanitation.

Poor sanitation means **bad health**. Bacteria, viruses and parasites found in human waste are responsible for the transmission of cholera, typhoid and other infectious diseases that **kill millions of people each year**. The problem is huge in both **urban and rural areas**

Why are WaterAid in Mali?

65% of the country is desert or semi-desert

Wateraid is first targeting Slums in Mali's capital, it wants to show the government that projects in slums are easy to set up and sustainable.

Physical reasons

- Natural environment is harsh and deteriorating.
- Low rainfall which leads to drought.

Has it been successful?

YES!

- Health has now improved include reducing the deaths from diarrhoea – 65% improvement
- Education is now improving, money is being invested into the infrastructure
- Wateraid employs local people, who they are training up to maintain the system and raise money to keep it running.
- They invest in the community – THIS IS SUSTAINABLE

Human reasons

- Population = 12 million
- 50% have access to clean sustainable water.
- Many people live in slums

WHY IS IT SUSTAINABLE?

WaterAid are training local people to maintain system and raise money to keep it running.

WaterAid are encouraging communities to invest in their own infrastructure.

Education programmes = health benefits

People can cope better with droughts and harsh times in the future.

The government acknowledge that it is possible for everyone to have access to safe water and they begin to help.

Possible Case Study Questions - Economic Development

1. Case Study: An Aid project in an LEDC.

Name and locate an aid project

Describe the main features of the project. Explain how the project is sustainable.

2. Case Study: Multi-national companies

Name a multi-national company you have studied and a country where it is located.

Explain how the multi-national company affects local people and the overall economy of the country. Include at least three different ideas, with detail.

3. Case Study: An aid project in an LEDC.

Name the LEDC and aid project

Describe the main features of the aid project and explain how sustainable the project is. Include at least three developed ideas.

4. Case Study: The effects of economic development.

Name and locate an economic activity

How has the economic activity affected the natural environment? What has been done to minimise damage to the environment?

5. Case Study: An economic activity in an LEDC

Name and locate an example of an economic activity you have studied in an LEDC.

Explain why this economic activity is located in this LEDC. What factors might influence decisions about whether the named economic activity remains at this location in the future? Include at least three different ideas, with detail.

6. Case Study: a multi-national company

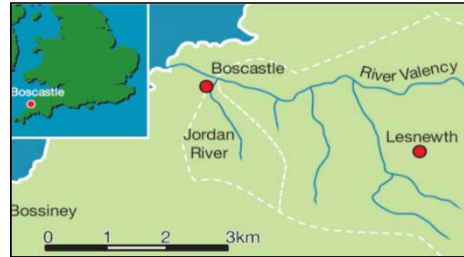
Name a multi-national company and one country where it operates.

Explain how the multi-national company affects local people and the economy of that country. Include at least three different ideas, with detail.

River flooding (MEDC) - River Valency, Boscastle

What caused the flash flood?

Physical Causes	Human Causes
<p>Confluence of 2 rivers: Boscastle stands where two valleys meet, formed by the rivers Valency and Jordan. A third river, Paradise, also flows through the village.</p>	<p>Bridge Tree trunks and debris got stuck underneath the low bridge which meant that the water could not travel through so the river burst its banks.</p>
<p>Impermeable ground The geology of the land is clay which means that water was unable to infiltrate and there was more surface runoff. This reaches the river quicker.</p>	<p>Land use The land either side of the river was built on which meant that there were more impermeable surfaces.</p>
<p>Topology Boscastle is in a valley surrounded by steep hill sides. Water travelled quickly over the steep slopes to reach the river.</p>	
<p>Heavy rainfall 6 inches of rain fell in just 2 hours. It was summer so the ground was very dry and hard which prevented infiltration.</p>	



Management responses to the flood

Management	Sustainable?	Why?
Planting trees on the hillside above the river	Yes	Aesthetically pleasing (looks nice), natural soft engineering method. The trees will intercept water reducing the amount reaching the river.
Moving the low bridge	Yes	The bridge was too low which made the flooding worse, moving it is a long term method which will have huge benefits on the amount of water the river can hold.
Inserting a culvert (hole in the side of the river channel which diverts water away from the town)	Yes	As soon as the water reaches a certain height it will travel through the culvert and away from the town. This will reduce the risk of flooding as the river will have a greater capacity. It is a long term method which requires little maintenance.
Widen the river channel	No	Although it will increase the capacity of the river, the river may need to be widened even more in the future so it is not a long term method. It is also expensive.

Impacts of the flood

Social	Economic	Environmental
People were traumatised by the flood	Businesses were ruined	Trees were uprooted and swept away
People's homes were destroyed	It cost a lot to repair the village	Loss of animal habitats
People were injured	Home insurance companies had to pay out a lot of money	Dirty water
People's cars were swept away		

River flooding (LEDC) - River Ganges, Bangladesh, South Asia July and August 2007

Causes

- Heavy rainfall - 900mm if rain fell in July
- Melting snow from glaciers in the Himalayan Mountains
- Increased discharge of the River Brahmaputra
- The peak discharge of the River Ganges and River Brahmaputra happened at the same time which increase discharge downstream.



Primary (short term) effects

- Over 2000 deaths
- 25 million people made homeless
- 44 schools totally destroyed
- Many factories closed and lots of livestock were killed
- 112,000 houses were destroyed in India
- 10,000 km of roads were destroyed
- Rivers were polluted with rubbish and sewage

Secondary (long term) effects

- Children lost out on education
- Around 100,000 caught water-borne diseases like diarrhoea
- Flooded fields reduces basmati rice yields - prices rose by 10%
- Many farmers and factory workers became unemployed

Comparing the UK and Bangladesh

	UK	Bangladesh
<i>Population (millions)</i>	60	136
<i>Area (sq km)</i>	243,000	144,000
<i>Number of people per sq km</i>	244	1042
<i>Average amount people earn per year</i>	£18,600	£124
<i>% of people living in rural areas</i>	10%	84%
<i>Length of paved roads per sq km of land</i>	1531km	138km
<i>Number of phone lines per 1000 people</i>	1406	6

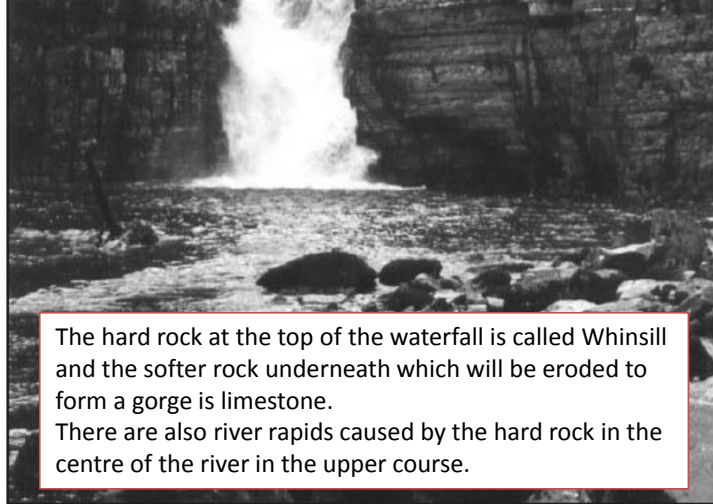
Flooding management

- Bangladesh has a Flood Forecasting and Warning System with 85 flood monitoring stations. Flood warnings can be issued up to 72 hours in advance but they often don't reach rural communities.
- There are 6000km of man-made levee's but they are easily eroded and are not properly maintained so they don't stop flooding.
- Instead of trying to stop flooding, in some areas they are allowing flooding to happen under controlled conditions. This means that there is less sediment building up in the rivers so flooding is less likely.

River valley and landforms - River Tees, North East England

The upper course of the River Tees

In the upper course the river flows over hard, impermeable rocks. The valley has steep sides forming a V-shape. The river channel is shallow and rocky and the river is turbulent and clear. In the upper course there is the famous High Force waterfall (Figure 2) and gorge as well as rapids and potholes. Erosion downwards is the main work of the river in the upper course.



The hard rock at the top of the waterfall is called Whinsill and the softer rock underneath which will be eroded to form a gorge is limestone. There are also river rapids caused by the hard rock in the centre of the river in the upper course.

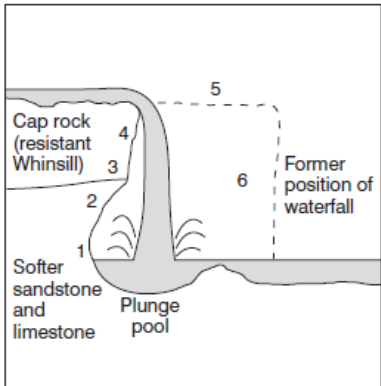


Figure 8: The formation of High Force and its gorge

Figure 2: The waterfall at High Force

The middle course of the River Tees

As the River Tees flows downstream the gradient becomes less steep. The river begins to erode sideways (lateral erosion) rather than downwards and the river begins to deposit sand and gravel. The lateral erosion means the river gets wider, the river valley gets wider and meanders begin to form.

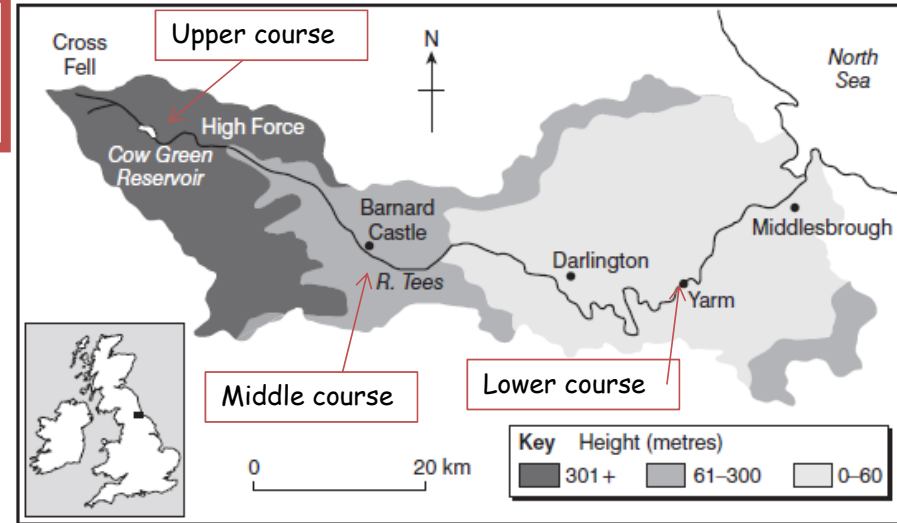


Figure 1: The drainage basin of the River Tees

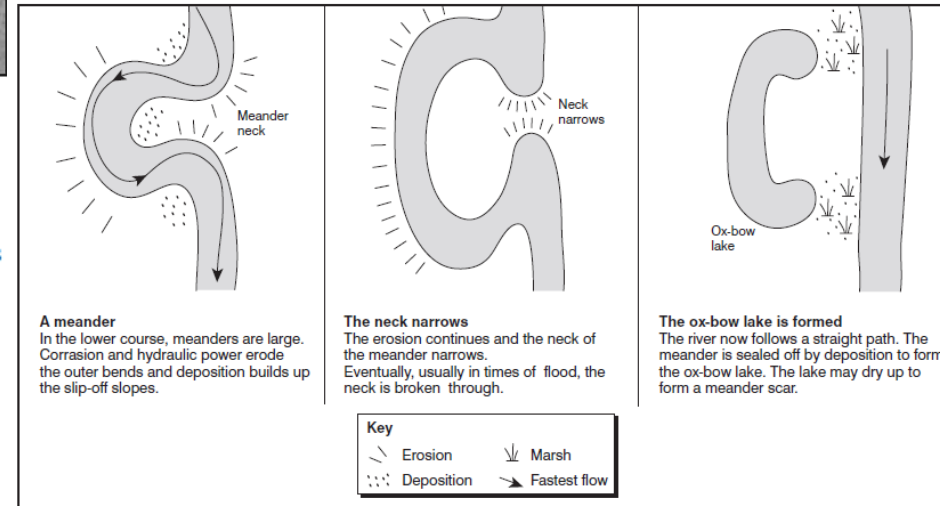


Figure 5: Formation of an ox-bow lake

River valley and landforms - River Tees, North East England - CONTINUED

The lower course of the River Tees

Close to Yarm the River Tees has formed very large meanders. Some of these meanders have led to the formation of ox-bow lakes (Figure 5) and flooding has caused levées to form (Figure 6). Levées are high banks of silt along the banks of a river. They are formed where a river flows slowly, carries a large load of silt and floods on occasions. When the river floods the coarser material is deposited first close to the river channel. The finer material is deposited further away. Over many years this coarse material builds up to form the levées on the river bank. In times of low flow when the river has little water and is flowing slowly it deposits material on the river bed, building it up.

Gradually the river bed increases until it is higher than the land around. Then flooding is disastrous as the water cannot flow back into the river. The lateral erosion by the meanders and the occasional floods build up a wide, flat flood plain on either side of the river. Here the valley is a broad U-shape with quite gentle sides.

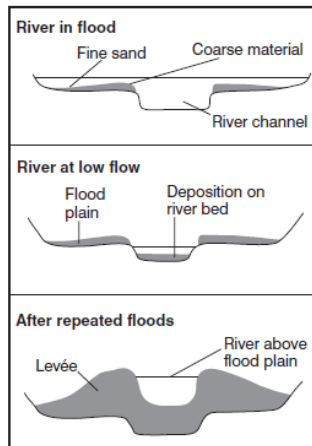


Figure 6: Formation of levées

River basin management

The drainage basin of the River Tees has been managed for over a century. The management has had several aims:

- to reduce flooding
- to improve water supply

A variety of strategies have been used, including the building of reservoirs such as Cow Green and Grassholme. In the 19th century, 'cut-offs' were built near Stockton to straighten the river for navigation, and recent flood protection schemes have been built at Yarm. Today there is a huge watersports complex at the Tees barrage.

Activities

1 Tops and tails – match the word or term with the correct definition:

Confluence	Diagram of a river from its source to its mouth
Cross-section	Where a river starts
Drainage basin	Where a river flows into the sea
Long profile	Diagram of a river from bank to bank
Mouth	Where two rivers meet
Source	The imaginary line around a drainage basin
Tributary	The area of land that a river drains
Watershed	A smaller river flowing into a large river

2 Complete a table like the one begun in Figure 7 to show the main landforms and processes along the River Tees. Try to include actual names of places and landforms.

	Upper course	Middle course	Lower course
Long profile			
Cross-section			
Valley features			
Gradient			
River and channel features/landforms			
Processes at work			

Figure 7: Landforms and processes along the River Tees

Coastal area and landforms - Dorset Coast

Coastal Area — Case Study

If coastal landforms are your thing (and let's face it, how could they not be), then the Dorset coast is paradise on Earth. It's got the lot — headlands, bays, arches, stacks, coves, tombolos, lagoons...

The Dorset Coast has Examples of many Coastal Landforms

The Dorset coast is made from bands of hard rock (like limestone and chalk) and soft rock (like clay). The rocks have been eroded at different rates giving headlands and bays and lots of other exciting coastal landforms.

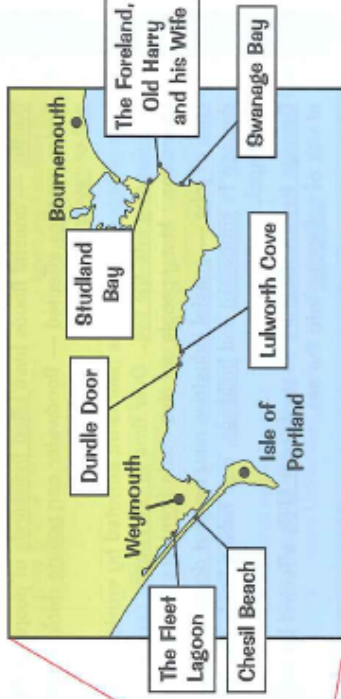
Durdle Door

Durdle Door is a great example of an arch. Erosion by waves opened up a crack in the limestone headland, which became a cave and then developed into an arch.



Lulworth Cove

Lulworth Cove is a cove formed after a gap was eroded in a band of limestone. Behind the limestone is a band of clay, which has been eroded away to form the cove. The same is now starting to happen at Stair Hole further west along the coast.



Chesil Beach

Chesil Beach is a tombolo formed by longshore drift. It joins the Isle of Portland to the mainland. Behind Chesil Beach is a shallow lagoon called The Fleet Lagoon.



Swanage Bay and Studland Bay

There are two bays with beaches called Swanage Bay and Studland Bay. They're areas of softer rock (sandstone and clay). In between them is a headland called The Foreland made from a band of harder rock (chalk). The end of the headland has been eroded to become a stack called Old Harry and a stump called Old Harry's Wife.



I love a good tombolo — prizes and fun for everyone...

That's actually Old Harry's second wife. His first wife collapsed into the sea in 1896. It was sad, but she would've wanted him to move on. Before you move on, make sure you know the names of the landforms of the Dorset coast.

Coastline Management - Holderness Coastline

26

Coastal Management – Case Study

Holderness in east Yorkshire has one of the **fastest eroding coastlines** in Europe. What a claim to fame...

Hard Engineering Strategies have been used Along Holderness

There's **rapid erosion** along the Holderness coast (about 1.8m per year), which has had lots of **impacts**:

- 1) **Homes** near the **cliffs** (e.g. in Skipsea) are at risk of **collapsing into the sea**.
- 2) **Businesses** are at risk from erosion so people will **lose their jobs**, e.g. Seaside Caravan Park at Ulrome is **losing** an average of 10 pitches a year.
- 3) The **gas terminal** at Easington is at risk (it's only 25 m from the cliff edge). This terminal accounts for 25% of Britain's gas supply.
- 4) **80 000 m² of farmland** is **lost** each year. This has a **huge effect** on farmers' livelihoods.

To try to **reduce** these **effects**, **11.4 km** of Holderness coastline has been **protected** by **hard engineering**:

Bridlington is **protected** from erosion and flooding by a **4.7 km long sea wall** as well as **wooden groynes**.

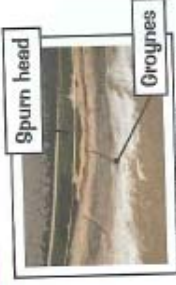
There's a **sea wall**, **wooden groynes** and **rip rap** at **Holderness** to **protect** the village from erosion and flooding.

There are **groynes** to create **wider beaches** and a **sea wall** at Withemsea. Some **rip rap** was placed **in front of the wall** after it was **damaged** in severe storms in 1992.



Defences including **two rock groynes** were built at **Mappleton** in 1991. They cost **£2 million** and were built to **protect** the **village** and a **coastal road** from erosion and flooding.

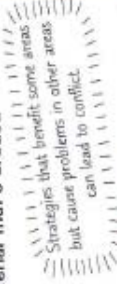
The eastern side of **Spurn Head** is **protected** by **groynes** and **rip rap**. This also protects the **Humber Estuary** behind Spurn Head.



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The Strategies are Locally Successful but Cause Problems Elsewhere

- 1) **Groynes** protect **local areas** but cause **narrow beaches** to form **further down** the Holderness coast. This increases erosion down the coast, e.g. **Cowden Farm** (south of Mappleton) is now at risk of falling into the sea.
- 2) The material produced from the erosion of Holderness is **normally transported south** into the **Humber Estuary** and **down** the **Lincolnshire coast**. Reducing the amount of material that's eroded and transported south **increases** the **risk of flooding** in the Humber Estuary, because there's **less material** to slow the floodwater down.
- 3) The rate of **coastal retreat** along the **Lincolnshire coast** is also increased, because **less new material** is being added.
- 4) **Spurn Head** is at risk of **being eroded away** because **less material** is being **added to it**.
- 5) **Bays** are forming **between** the **protected areas**, and the protected areas are becoming **headlands** which are being eroded **more heavily**. This means **maintaining** the **defences** in the protected areas is becoming **more expensive**.



Strategies that benefit some areas can lead to conflict.

Holderness coastal management officer — probably not the easiest job to have...

Maybe you don't love case studies as much as me (I mean, how could you), but they really have to be learnt. It's always a speedy route to impressing the examiner — and a happy examiner makes for a more pleasant results day.

**Possible Case Study Questions - 9 marks + 3 for SPaG
- Rivers and Coasts**

1. Compare the impacts of flooding in an MEDC and an LEDC. You should refer to case studies in your answer.
2. Discuss the causes of flooding in an MEDC/LEDC. Use a case study to help you.
3. Compare flood management strategies used in an MEDC and LEDC. You should make reference to their sustainability
4. Describe how a river changes from source to mouth. You should refer to place specific examples in your answer and identify specific features found in a rivers course.
5. Explain how a stretch of coastline is managed. You must identify different conflicts which may be in place at your chosen stretch of coastline.
6. CASE STUDY: River valley and landforms
Name of river valley you have studied:
Describe one or more landforms which are found in this river valley.
Explain how they have been formed. Use a labelled diagram or series of diagrams in your answer.
Include at least three different ideas, with detail.