

# AQA GCSE Case

# Study Revision

## Booklet

## Paper 1

**Windsor Girls' School Geography  
Department**

<b>Paper 1: Living with the physical environment</b>	<b>Paper 2: Challenges in the human environment</b>
Natural hazards <ul style="list-style-type: none"><li>- Tectonic hazards</li><li>- Weather hazards</li><li>- Climate change</li></ul>	Urban issues and challenges
The living world <ul style="list-style-type: none"><li>- Ecosystems</li><li>- Tropical rainforests</li><li>- Cold Environments (DO NOT choose Hot deserts)</li></ul>	The changing economic world
Physical landscapes in the UK <ul style="list-style-type: none"><li>- UK physical landscapes</li><li>- Coastal landscapes</li><li>- River landscapes (DO NOT choose Glaciers)</li></ul>	The challenge of resource management <ul style="list-style-type: none"><li>- Resource Management</li><li>- Water (DO NOT choose Energy or Food)</li></ul>

## GCSE Geography Case Studies and Key Examples by Topic

Living with the Physical Environment (Paper 1 Physical)	Challenges in the Human Environment (Paper 2 Human)
<p style="text-align: center;"><u>The Challenge of Natural Hazards</u></p> <p style="text-align: center;">Natural Hazards Tectonic Hazards Weather Hazards Climate Change</p>	<p style="text-align: center;"><u>Urban Challenges</u></p> <p style="text-align: center;">The global pattern of urban change Urban Growth in Rio Urban challenges in the UK Sustainable development of urban areas</p>
<p><u>Natural Hazards/Tectonic Hazards</u></p> <ul style="list-style-type: none"> <li>• <b>Nepal (2015)</b> - Earthquake in LIC (Hodder pp. 14-15)</li> <li>• <b>L'Aquila (2009)</b> - Earthquake in HIC (Hodder pp. 12-13)</li> </ul> <p><u>Weather Hazards</u></p> <ul style="list-style-type: none"> <li>• <b>Typhoon Haiyan (2013)</b> (Hodder pp. 32-33)</li> <li>• <b>Somerset Levels</b></li> </ul> <p><u>Climate Change</u> No case studies needed.</p>	<ul style="list-style-type: none"> <li>• <b>London</b> (regeneration, Shoreditch, Crossrail) (Hodder pp. 218-229) <ul style="list-style-type: none"> <li>○ <b>London Urban Greening</b> (Hodder pp. 230-231) <b>Urban inequalities</b>, environmental problems, impact of urban sprawl (Hodder pp. 232-237)</li> <li>○ <b>London Urban Regeneration: The Olympic Plan</b> (Hodder pp. 238-241)</li> </ul> </li> <li>• <b>Rio de Janeiro</b> (social challenges, economic challenges, improving Rio's environment) (Oxford pp. 152-159) <ul style="list-style-type: none"> <li>○ <b>Rochinha, Brazil</b> (Self-Help; solutions) (Oxford pp. 160-161)</li> <li>○ <b>Favela Bairro Project</b> (Oxford pp. 162-163)</li> </ul> </li> </ul> <p><u>Urban Sustainability</u></p> <ul style="list-style-type: none"> <li>• <b>BedZed Sustainable Homes</b></li> <li>• <b>London Sustainable Transport</b> (e.g. congestion charging, Santander bikes, super highways)</li> </ul>
<p style="text-align: center;"><u>The Living World</u></p> <p style="text-align: center;">Ecosystems Tropical Rainforests <i>Option chosen - Cold Environments</i></p>	<p style="text-align: center;"><u>The Changing Economic World</u></p> <p style="text-align: center;">Economic development and quality of life Reducing the global development gap Economic development in Nigeria Economic change in the UK</p>
<p><u>Tropical rainforests</u></p> <ul style="list-style-type: none"> <li>• <b>Epping forest ecosystem, UK</b> (Hodder pp. 60-61)</li> <li>• <b>Changes affecting ecosystem balance - Yellowstone National Park, Grey Wolf</b> (Hodder pp. 62 - 63)</li> <li>• <b>Malaysian Rainforest</b> (deforestation has economic and environmental impacts, causes of deforestation, subsistence and commercial farming, logging etc; impacts of deforestation, economic development, loss of biodiversity etc)</li> <li>• <b>Management of tropical rainforests</b> (protection, governments, conservation groups etc). Sustainable management. (Hodder pp. 78-81)</li> <li>• <b>CITES, National Parks</b> (conservation)</li> </ul> <p><u>Cold Environments</u></p> <ul style="list-style-type: none"> <li>• <b>Svalbard</b> (opportunities and challenges for development) (Oxford pp. 80 - 83)</li> <li>• <b>Managing cold environments</b> (The use of technology, Action by governments, International agreements, Conservation groups) (Oxford pp. 86 - 87)</li> </ul>	<p><u>Reducing the global development gap</u></p> <ul style="list-style-type: none"> <li>• <b>Tourism in Jamaica</b></li> </ul> <p><u>Economic development in Nigeria</u></p> <ul style="list-style-type: none"> <li>• <b>Nigeria</b> (experiencing rapid economic development leads to significant social, environmental and cultural change) (Hodder pp 268 - 281)</li> </ul> <p><u>Economic change in the UK</u></p> <ul style="list-style-type: none"> <li>• <b>Southampton: science park</b></li> <li>• <b>Making industry more sustainable</b> (Hodder pp 298-299)</li> <li>• <b>Torr Quarry, Somerset</b></li> </ul>

<b>Physical Landscapes in the UK</b> <b>The physical diversity of the UK</b> <b>Coastal landscapes</b> <b>Option chosen - River landscapes</b>	<b>Challenge of Resource Management</b> <b>Global resource management</b> <b>Resources in the UK</b> <b>Option chosen - Water</b>
<u>Coastal Landscapes</u> <ul style="list-style-type: none"> <li>• <b>Geology and rock structure on the Dorset coast (Hodder pp. 124-125)</b></li> <li>• <b>Coastal realignment in Medmerry (Hodder pp. 146-147; Oxford pp. 110) OR you can choose to revise coastal management at Lyme Regis (Oxford pp. 112-113)</b></li> </ul> <u>River landscapes</u> <ul style="list-style-type: none"> <li>• <b>River Tees (source to mouth, key landform features) (Oxford pp. 122-123)</b></li> <li>• <b>Jubilee River Flood-relief channel (Hodder pp. 176-177)</b></li> </ul>	<u>Water</u> <ul style="list-style-type: none"> <li>• <b>Large scale water transfer scheme - Lesotho.</b></li> <li>• <b>Local scheme in an LIC (sustainable supplies of water) - Hitosa, Ethiopia. (Hodder pp. 354-355)</b></li> </ul>

### Key General Knowledge and Advice

#### For all your units you should know:

- The key geographical terminology
- Case studies
- Facts and figures to back up points especially in the case study section
- The names of all the continents
- The difference between developing countries and developed countries
- Examples of developed and developing countries
- Understand 'exam language'. For example 'costs' and 'benefits' is just another way of saying 'negatives' and 'positives' or 'advantages' and 'disadvantages'

#### Tips for your exam

- Use **PEEL** (State your **point**, **Explain it**, back it up with **evidence** (this could be from the resource paper, an example and fact and figures, Link back to the original question (have you actually answered the questions)).
- Answer/attempt all questions you are supposed to answer
- Read the question twice
- Underline the key words in the question - you could **BUG** your answer (**box** the command word, **underline** the key word, **glance** back over your answer)
- Make sure you can describe, explain, contrast
- Keep an eye on your timing - there are more marks at the end of sections. **It's a mark a minute!**
- Don't spend long on 1 or 2 mark questions (a sentence or even just a word is probably enough)
- Refer to examples when you know them and back up with facts and figures
- Know your case studies** in detail
- Use key terms in your answers - write in '*geographical*' language e.g. intercept rather than soaks
- Link back to the question
- Develop your points for further marks (make connections)
- Keep your answers focused on the question** - E.g. if you have been asked about earthquake responses don't waste time including the impacts
- Be specific - generalisation is the enemy of us all!**

# Paper 1: Living with the physical environment

## Natural Hazards

### Tectonic hazards

*Use named examples to show how the effects and responses to a tectonic hazard vary between two areas of contrasting levels of wealth.*

### Case study: HIC: L'Aquila, Italy (2009) & LIC: Gorkha, Nepal (2015)

<u>L'Aquila, Italy HIC</u>	<u>Gorkha, Nepal LIC</u>
<p><u>Primary Effects</u></p> <ul style="list-style-type: none"> <li>- 308 killed</li> <li>- 1,500 injured</li> <li>- 67,500 homeless</li> <li>- San Salvatore Hospital severely damaged so could not cope with injured victims</li> <li>- US\$11.4million cost of damage</li> </ul> <p><u>Secondary Effects</u></p> <ul style="list-style-type: none"> <li>- Aftershocks triggered landslides and rockfalls causing damage to housing and transport</li> <li>- Landslide and mudflow caused by burst main water pipeline in Paganio</li> <li>- Number of students at L'Aquila university has decreased since the earthquake</li> </ul>	<p><u>Primary Effects</u></p> <ul style="list-style-type: none"> <li>- 8,841 dead</li> <li>- 16,800 injured</li> <li>- 1 million homeless</li> <li>- Destruction of 26 hospitals and 50% of schools</li> <li>- A reduced supply of water, food and electricity</li> </ul> <p><u>Secondary Effects</u></p> <ul style="list-style-type: none"> <li>- An avalanche was triggered on Mount Everest which swept through Everest Base Camp killing 19 people</li> <li>- Tourism and employment shrunk in Nepal after the earthquake</li> <li>- Rice seed stored in homes was ruined causing food shortages and income loss</li> </ul>
<p><u>Immediate Responses</u></p> <ul style="list-style-type: none"> <li>- Hotels provided shelter for 10,000 homeless people</li> <li>- 40,000 homeless given tents</li> <li>- Within one hour the Italian Red Cross was searching for survivors. Helped by 7 dog units, 36 ambulances and a temporary hospital.</li> <li>- British Red Cross raised £171,000 in support</li> <li>- Mortgages and utility bills were suspended</li> </ul> <p><u>Secondary Responses</u></p> <ul style="list-style-type: none"> <li>- Residents did not have to pay tax in 2010</li> <li>- Students were given free public transport and were exempt for university fees for 3 years.</li> <li>- Homes took several years to rebuild and historic centres expected to take approx..15 years</li> </ul>	<p><u>Immediate Responses</u></p> <ul style="list-style-type: none"> <li>- International help from the UK Disasters Emergency Committee (DEC) raised US\$126 million</li> <li>- Temporary shelters were set up - The Red Cross provided 225,000 people with tents</li> <li>- The United Nations (UN) and the World Health Organisation (WHO) gave out medical supplies to the worst-affected districts</li> <li>- Facebook launched a safety feature so people could indicate they were 'safe'.</li> </ul> <p><u>Secondary Responses</u></p> <ul style="list-style-type: none"> <li>- Durbar Square heritage sites were reopened in June 2015 in time for tourist season</li> <li>- Mount Everest reopened for tourists in August 2015 and climbing permits bought in 2015 were made valid until 2017 to encourage climbers back</li> <li>- Office for the Coordination of Humanitarian Affairs (OCHA) reported that US\$274million of aid had been committed to recovery efforts</li> </ul>











# Typhoon Haiyan, Philippines, 2013

## Causes

Typhoon Haiyan struck the Philippines, South East Asia on the 8<sup>th</sup> November 2013. It was a category 5 storm on the Saffir-Simpson scale. It was one of the most powerful storms to ever hit the Philippines.

The tropical storm brought winds of up to 314 kilometres per hour, waves as high as 15 metres and 400 millimetres of heavy precipitation flooding 1km inland from the coast. 90% of the city of Tacloban was destroyed.

## Primary Effects

### Social

- 6,300 people killed - most drowned by the storm surge.
- Over 600,000 people displaced and 40,000 homes damaged or flattened.
- 90% of Tacloban city destroyed.
- Tacloban airport terminal badly damaged.
- Typhoon destroyed 30,000 fishing boats.
- Strong winds damaged buildings and power lines and destroyed crops.
- The province of Leyte took the full force of the storm. The city of Tacloban was one of the worst affected places, with most of the 220,000 people living there left homeless. Most of the destruction in Tacloban was caused by a 5 metre high storm surge. This is a wall of water similar to a tsunami. The very low atmospheric pressure associated with the typhoon caused the level of the sea to rise. As the strong winds swept water onshore, it formed a wall of water several metres high.

### Economic

- Damage cost was \$12 billion US dollars.
- Damage to rice cost \$53 million US dollars.
- The United Nations stated 75% of farmers and fishermen had lost their income.

### Environmental

- An oil barge ran aground causing an 800 000-litre oil spill.
- 400 millimetres of rainfall caused flooding.
- 1.1 million tonnes of crops were destroyed.

## Secondary Effects

### Social

- Infection and disease spread due to contaminated water.
- Eight deaths in a stampede as survivors fought for rice supplies.
- Power supplies were cut off for a month in some areas.
- Many schools were destroyed.

### Economic

- Fishing industry was disrupted as the leaked oil from the grounded barge contaminated fishing water.
- The airport was badly damaged, and roads were blocked by trees and debris.
- Looting and violence was rife in Tacloban, due to a lack of food and supplies.
- By 2014, rice prices had risen by nearly 12%.

### Environmental

- Ten hectares of mangroves (saltwater-adapted trees or shrubs) were contaminated by the oil barge leak.
- Flooding caused landslides.

## Immediate Responses

- The government televised a warning for people to prepare and evacuate.

- Authorities evacuated 800 000 people. Many went to Tacloban Indoor Stadium, which had a reinforced roof to withstand typhoon winds, however, it flooded.
- Over 1 200 evacuation centres were set up to help the homeless.
- The Philippine government ensured essential equipment and medical supplies were sent out, but in one region medical supplies and equipment was washed away.
- Emergency aid supplies arrived three days later by plane. Within two weeks, over 1 million food packs and 250 000 litres of water was distributed.
- The government imposed a curfew two days after the typhoon to reduce looting.
- The Beckhams celebrity couple, X Factor TV show and brands such as Coca-Cola, FIFA and Apple used their status to raise awareness and encourage public donations.

### Long-term Responses

- Thirty-three countries and international organisations pledged help. More than \$1.5billion US dollars was pledged in foreign aid.
- A 'cash for work' programme paid people to clear up the debris and rebuild the city.
- Oxfam replaced many fishing boats.
- In July 2014, the Philippine government declared a long-term recovery plan 'Build Back Better'. Buildings would not just be rebuilt but upgraded to protect against future disasters.
- A 'no build zone' was established in the Eastern Visayas. Homes were rebuilt away from flood-risk areas.
- Mangroves were replanted.
- A new storm surge warning system was installed.
- More cyclone shelters were built.









# Somerset Levels Floods, Dec 2013 - Jan 2014

## Cause

Several depressions (low air pressure systems) moving across the Atlantic Ocean caused weeks of wet weather. These systems were picked up by the Polar Jet Stream which was situated more south than usual and directed towards the west of England. It was the wettest January on record and heavy precipitation saturated soils. High tides and storm surges came up the rivers from Bristol Channel. Rivers were not dredged for over twenty years which meant that sediment had built up on the river bed. This caused a reduction in the capacity of water the rivers could hold. As a result, they burst their banks.

## Social Impacts

- More than 600 homes were flooded.
- Sixteen farms were evacuated.
- Temporary accommodation for residents was needed for several months.
- Some villages were cut off.
- Power supplies were disrupted.

## Economic Impacts

- Over 14 000 hectares of agriculture land flooded for weeks.
- Over 1 000 livestock were evacuated.
- Roads were cut off.
- Railway lines were closed.
- £10 million damage cost.

## Environmental Impacts

- Rivers were contaminated with sewage, oils and chemicals.
- Debris was deposited across the land.
- Stagnant water had to be reoxygenated and pumped back into rivers.

## Management Strategies to Reduce Risk

- River banks were raised and strengthened.
- Somerset County Council pledged £20 million on a Flood Action Plan.
- Rivers Tone and Parratt were dredged in March 2014.
- Road levels were raised.
- Flood defences for communities at risk.
- Pumping stations were built.
- By 2024, there is potential for a tidal barrage.











# Epping Forest, East London, UK

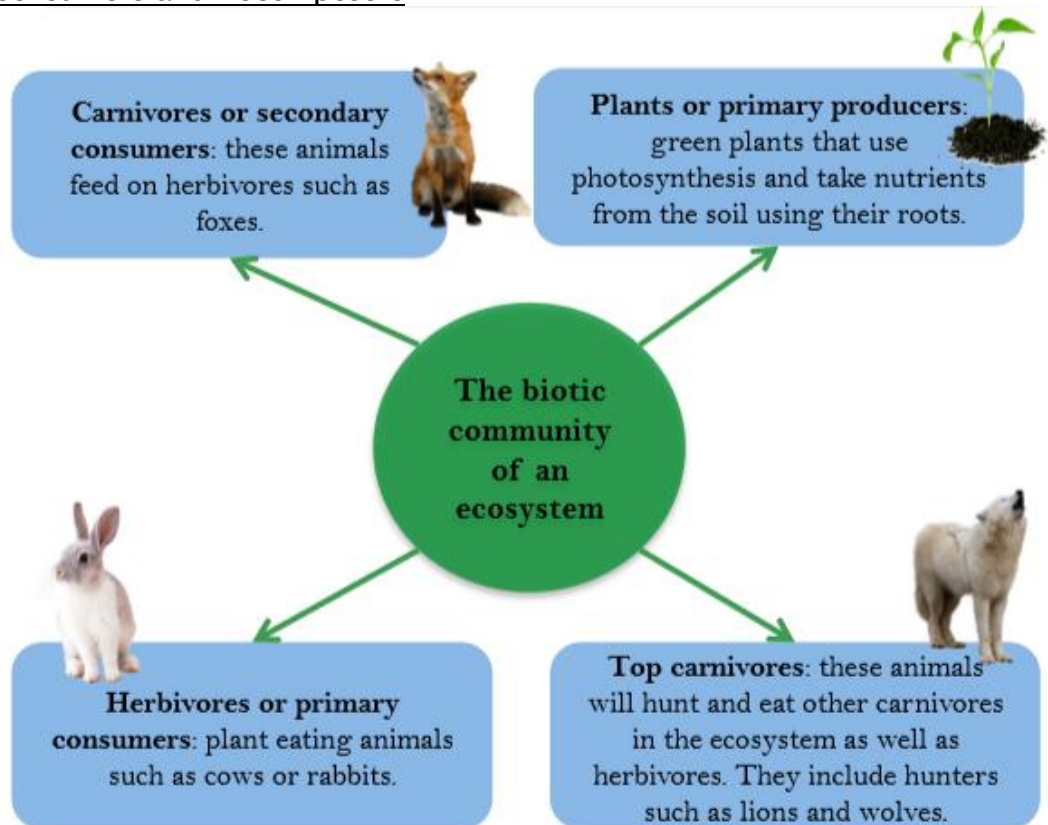
## Location

Epping Forest is located in North East London and is an ancient deciduous woodland. It has many native trees including oak, ash, elm and beech. There is a lower shrub layer of grasses, brambles and bracken that form the main producers in the ecosystem. There are many birds, mammals, amphibians and insects which are the consumers. Over 700 species of fungi act as important decomposers for the ecosystem.

## Interrelationships in the Ecosystem

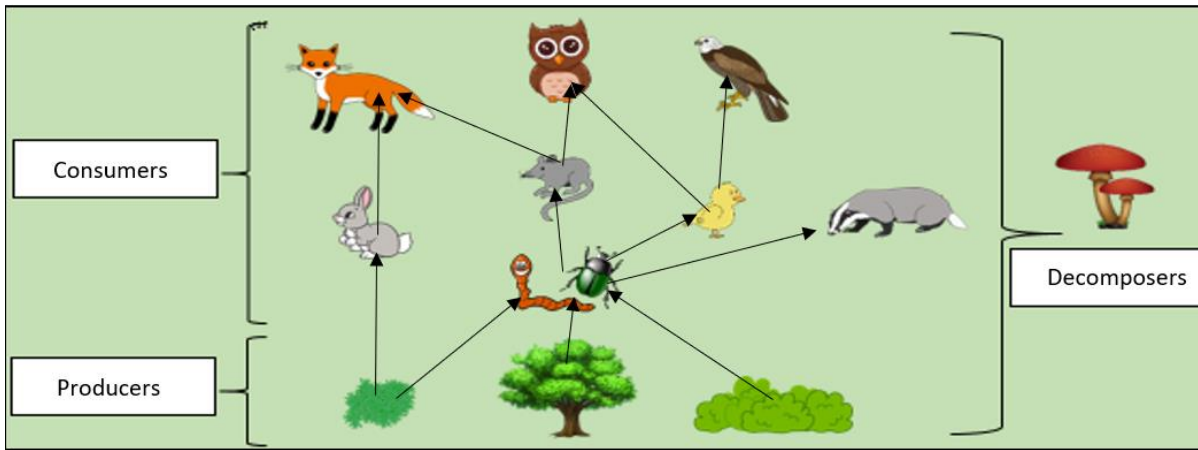
Season	Ecosystem Interrelationships: deciduous trees
Spring	Flowering bulbs such as bluebells make use of the sunlight penetrating through branches. The stored nutrients are used by the growing plants (producers) to produce fruit, berries and nuts that will feed consumers.
Summer	The broad tree leaves grow quickly in the Spring. With a large surface area, they maximise the Sun's energy to photosynthesise.
Autumn	To conserve energy and moisture, the trees shed their leaves. This is a direct response to the UK climate as the temperatures and sunlight hours decrease towards winter.
Winter	Bacteria and fungi decompose the leaf litter, releasing the nutrients into the soil.

## Producers, Consumers and Decomposers



## Food Chains and Food Webs

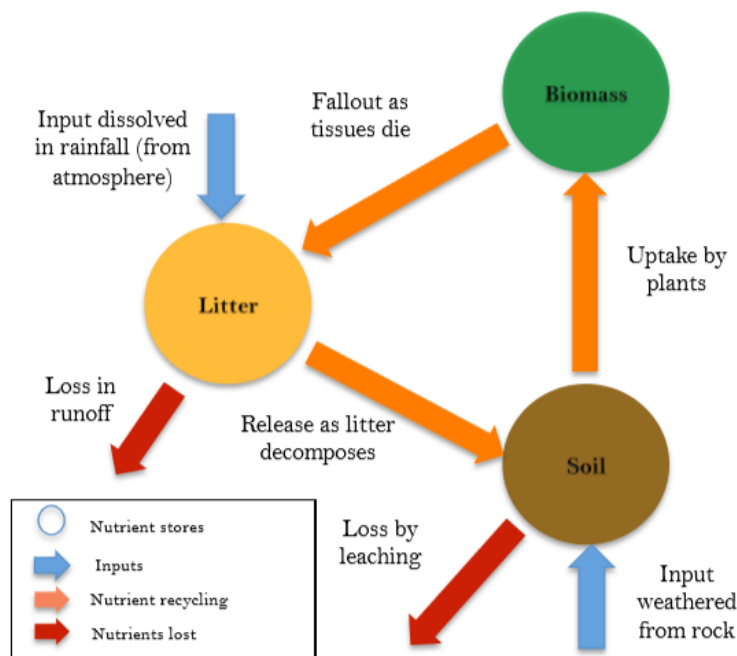
A food chain shows the direct links between organisms in an ecosystem, in the form of a line whereas a food web shows all the connections between organisms in an ecosystem. Below is an example of a food web for Epping Forest.



An example of a food chain would be:

Deciduous Tree → insects → small bird → sparrowhawk

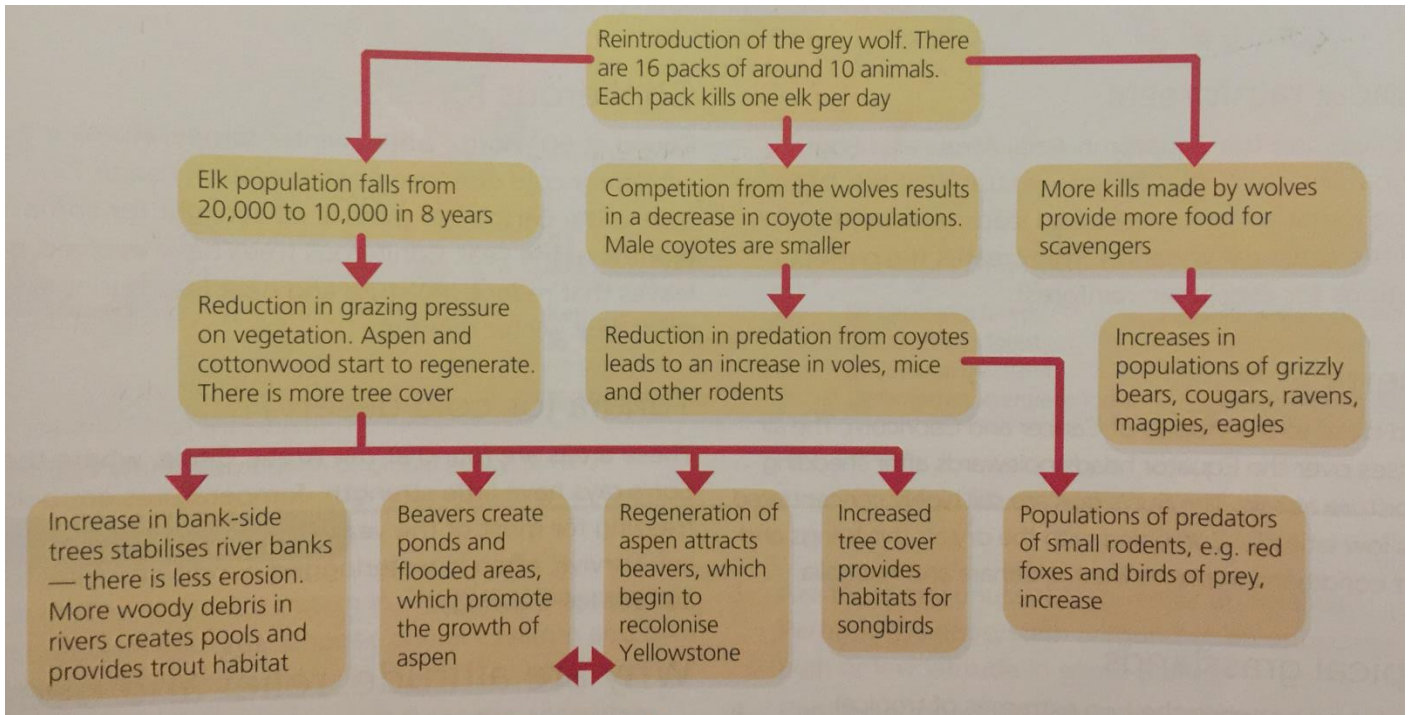
Nutrient Recycling



The balance and interdependence between the components of the deciduous woodland ecosystem can be demonstrated by the nutrient cycling that takes place.

Inputs in to the ecosystem include weathered rock which forms soils, some of this soil is lost through leaching (rainwater washing the nutrients) and some of the soil is taken up by plants (biomass). Biomass takes up the nutrients in the soil, when the biomass dies its tissue falls to the surface to form the litter. Decomposers break down the tissue in the litter and release organic matter back in to the soil where the nutrients can be taken up by biomass again. The cycle is continuous.

## Yellowstone National Park - Grey Wolf



- In Europe and USA, killing wolves and bears removed danger to people and their cattle.
- Fewer carnivores meant that rabbit and deer populations quickly multiplied and began to eat all available vegetation, stripping the land bare, leading to soil erosion.
- Ecosystem lacks balance.
- Many scientists believe that 'ecosystem restoration' is the best way to restore ecosystem balance.
- Grey wolves were recently reintroduced to Yellowstone National Park in the USA which has resulted in a lot of impacts.
- Wolves have restored balance to the ecosystem and landscape.



# Tropical rainforests - Case study: Malaysia

A case study of a tropical rainforest to illustrate:

- causes of deforestation - subsistence and commercial farming, logging, road building, mineral extraction, energy development, settlement, population growth
- impacts of deforestation - economic development, soil erosion, contribution to climate change.

## Causes of deforestation

**Logging** - Malaysia = world's largest exporter of tropical wood in the 1980s. Clear felling - all trees are chopped down in an area. Recently, clear felling has been replaced with selective logging where only full-grown trees are cut down. Timber companies are interested in trees such as mahogany and teak and sell them to other countries to make furniture (selective logging). Smaller trees are often used as wood for fuel or made into charcoal.

**Mineral extraction** - Mining (mainly tin and smelting) is common in Peninsular Malaysia. Rainforest has been cleared for mining and road construction. Drilling for oil and gas has recently started on Borneo.

**Energy development** - An unlimited supply of water and ideal river conditions have encouraged dams to be built to generate hydroelectric power. This involves flooding large areas of rainforest. 2011, after 5 decades of delays, the controversial Bakun Dam in Sarawak started to generate electricity. The Bakun Dam (205m) is Asia's highest dam outside China. Several more dams are planned to boost Malaysia's electricity supplies. Dam's reservoir flooded over 700km<sup>2</sup> of forests and farmland.

**Commercial Farming:** Malaysia is the largest exporter of palm oil in the world. During the 1970s, large areas of land were converted to palm oil plantations. Plantation owners receive 10 year tax incentives, so increasing amounts of land have been converted to plantations.

**Road building:** Roads are constructed to provide access to mining areas, new settlements and energy projects. Logging requires road construction to bring in machinery and take away the timber.

**Subsistence farming** - tribal people living in the rainforest practice subsistence farming. One method of clearing land is 'slash and burn'.

## Impacts of deforestation

**Global warming:** When trees are felled, more carbon dioxide remains in the air. Also, fire is often used in clearing rainforests, which means that the carbon stored in the wood returns to the atmosphere.

### **Loss of biodiversity**

Biodiversity will be reduced and individual species will become endangered or extinct. It is estimated that 137 plant, animal and insect species are being lost every day. This amounts to 50,000 species a year. As the species disappear, so do many cures for life threatening diseases. E.g. Rosy Periwinkle found in Madagascar has been proven to cure cases of leukaemia (plant is used for cancer treatment).

### ***Biodiversity in the Main Range, Peninsular***

***Malaysia.*** Upland region stretching 500km along the backbone of Peninsular Malaysia. Region is important because: largest area of continuous forest left in Peninsular Malaysia, forests are particularly rich in biodiversity, with over 600 species. Still undiscovered plants for medicinal properties.

### **Local Impacts**

**Climate change** - Deforestation disrupts the water cycle. With the felling of trees, evapotranspiration is reducing so there is less moisture in the atmosphere. The local climate becomes drier. Once the recycling of water is reduced, the local climate becomes warmer. This is bad for farming.

**Soil erosion and fertility** - As soon as any part of the forest cover is cleared, the thin topsoil is quickly removed by heavy rainfall. Bare slopes are particularly prone to soil erosion. Once the top soil has been removed, there is little hope of anything growing again.

**River pollution** - Gold mining not only causes deforestation but the mercury used to separate the gold from the ground is allowed to enter











International co-operation is the only way to protect rainforests in the future.

Do you agree with this statement?

**[6 marks]**

Introduction:  
What is your  
tropical  
rainforest?

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Paragraph 1 -

Outline why you  
agree with the  
statement.

Provide evidence  
of deforestation  
and evidence of  
international  
cooperation.

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Counterargument

Outline another  
way rainforests  
can be protected  
in the future.

Give examples  
and link to  
sustainability.

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Conclusion:

Your overall  
opinion linking  
back to the exam  
question.

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# Svalbard, Norwegian Island, Arctic Ocean

## Location

Svalbard is a Norwegian territory in the Arctic Ocean (northern hemisphere) and the most northerly permanently inhabited group of islands in the world. It has five major islands and a population of around 2700, most people live in Longyearbyen.

It has a polar climate with 60% of the land covered by glaciers. The rest of the land is tundra. There is no arable farming and no trees. It is too cold. More polar bears and snow mobiles than people.

## Opportunities for Development

Opportunity for Development	Description
Mineral Extraction	<p>Svalbard has rich reserves of coal, but mining there is a controversial issue. Environment groups are against it as burning coal is a major source of greenhouse gases. However, coal mining is vital to the economy of Svalbard. It is the main economic activity. More than 300 people are employed in the mines and as support staff. In recent years, the industry declined due to low world coal prices and jobs were lost. Much of the coal is exported to Russia. A new coal mine opened near Svea in 2014.</p>
Energy	<p>Some of the coal mined on Svalbard is burned to generate electricity in the Longyearbyen power station. It is Norway's only coal-fired power station and supplies all of Svalbard's energy needs. Environmentalists believe the power station should close and renewable sources should be explored. The most likely future source being geothermal energy, tapping into the heat of the Earth and using it to generate electricity.</p> <p>Like Iceland, which uses geothermal energy, Svalbard is located close to the Mid-Atlantic Ridge, a constructive plate margin. Here the Earth's crust is thin and hot rocks are close to the surface.</p> <p>Another future option involves capturing carbon dioxide from burning coal and circulating this instead of water to generate electricity. This is known as Carbon Capture and Storage.</p>
Fishing	<p>The cold waters of the Barents Sea south of Svalbard are one of the richest fishing grounds in the world.</p> <p>Apart from cod, there are an estimated 150 species of fish here, including Herring and Haddock. These waters are extremely important breeding and nursery grounds for fish stocks and need to be protected from pollution.</p> <p>Fishing in the Barents Sea is jointly controlled and monitored by Norway and Russia to ensure that the fishing is sustainable, and the ecosystem is protected.</p>
Tourism	<p>Tourism in Svalbard has grown in recent years as people seek to explore extreme natural environments.</p> <p>In 2011, 70 000 people visited Longyearben and 30 000 of these were cruise passengers.</p> <p>The harbour at Longyearben was enlarged to allow for more cruise ships.</p> <p>Tourism provides around 300 jobs for locals.</p> <p>Most tourists come from Norway and most visit as part of organised tours.</p> <p>Tourists come to explore the extreme environment and see glaciers, wildlife, especially polar bears. Adventure tourism is becoming more popular with activities such as hiking, kayaking and snow mobile safaris.</p> <p>In the winter, tourists visit to see the Northern Lights.</p>

## Challenges that hinder Economic Development

Challenges for Development	Description
Extreme Temperatures	Winter temperatures in Longyearben can fall below $-30^{\circ}\text{C}$ . In the Polar regions (north), it is even colder! This makes it extremely difficult and potentially dangerous to work outside, with a serious risk of frostbite. People must dress in warm clothes which can make outdoor work very slow and difficult. As a result, construction work such as building houses, shops and office; constructing roads and constructing mining operations to extract coal is limited and carried out in the Summer. Those people working in the mines must cope with the very demanding conditions.
Inaccessibility	Svalbard is very remote and can only be reached by plane or ship. There is one international airport, at Longyearben, with flights from Norway and Russia. There is a very limited road network (about 50km) mostly around Longyearben. Transport is mainly by snowmobiles.
Provision of Buildings and Infrastructure	People involved in construction (roads, buildings, harbour extension) must cope with very challenging weather conditions (extreme cold and winter darkness). Buildings are very well insulated. The frozen ground (permafrost) provides firm foundations but care must be taken to prevent thawing and subsistence. Gravel roads, raised above the ground surface (to prevent heat transfer), are relatively cheap to maintain. Domestic services (water sanitation) are raised off the ground in insulated pipes so they can be serviced and to prevent possible melting of permafrost.

Remember you can use acronyms to remember this case study ....

C = Construction

E = Extreme Temps

S = Services

A = Accessibility (lack of)

These are the challenges Svalbard faces to development.

AND

M = Mining

E = Energy

F = Fishing

T = Tourism

These are the opportunities for development in Svalbard.











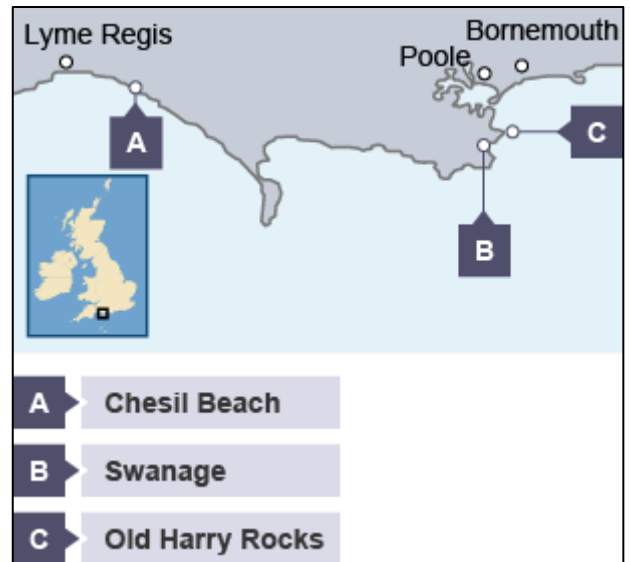
## Dorset Coast, near Swanage, South East England

### Location

Dorset is in the south of England. Its coastline has examples of many erosional and depositional landforms.

For example:

- Swanage is an example of a headland and bay
- Old Harry Rocks is an example of caves, stacks and stumps
- at Chesil Beach there is a bar

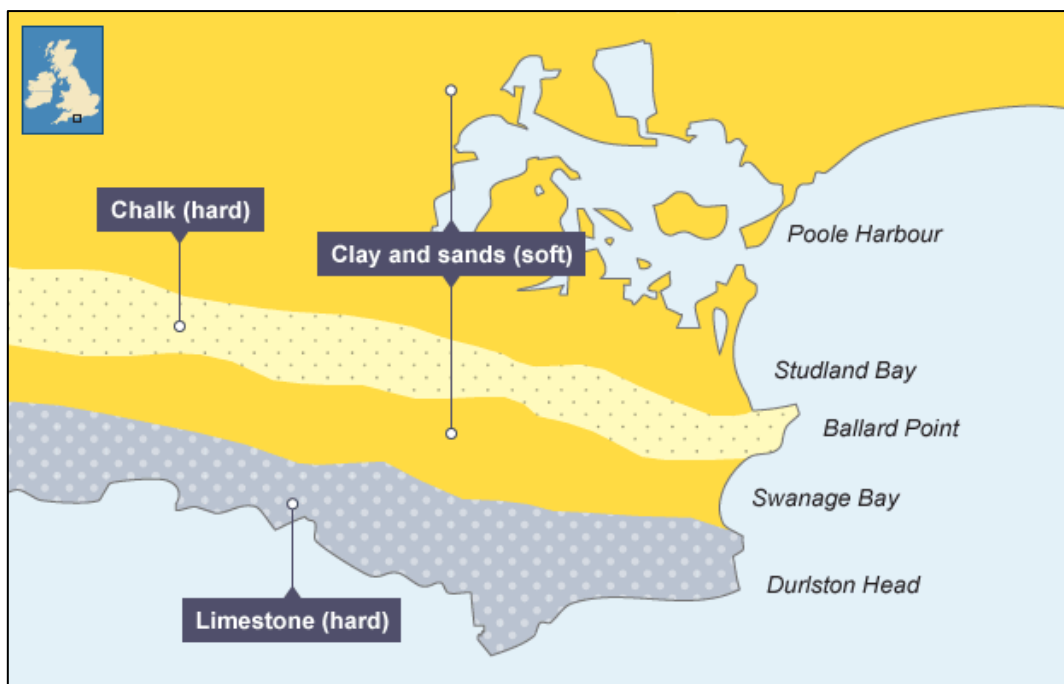


### Swanage Bay

The area around Swanage is made up of bands of hard and soft rock. The soft rock is made of clay and sands, and the hard rock is chalk and limestone.

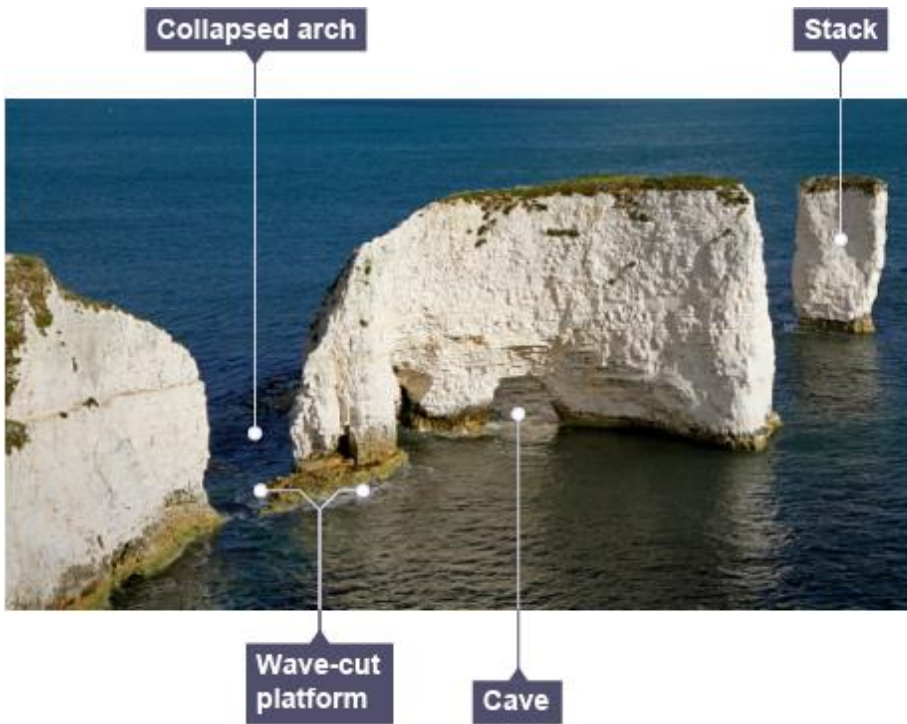
As erosion processes take place, the clay erodes away quicker than the limestone and chalk. This forms headlands and bays creating Swanage Bay and two headlands - Ballard Point and Durlston Head.

To the north of Swanage is Poole Harbour, one of the UK's largest natural harbours. A great deal of deposition has taken place in this large sheltered bay. You can see two spits at the mouth of the harbour, one on the south side and one on the north.



### Old Harry Rocks

Old Harry Rocks are located on the headland between Swanage and Studland Bay. The headland is made from chalk, a hard rock. The headland juts out into the sea, so it is more vulnerable to high-energy waves. This caused the formation of Old Harry, a stack. Over time Old Harry will collapse to form a stump.



### Chesil Beach

Chesil Beach is an example of a bar. Sediment has been deposited over time to form a spit. The spit has continued to join to the Isle of Portland. Behind the spit there is The Fleet, a lagoon.



# Exam Practice

Explain how different landforms may be created by the transport and deposition of sediment along the coast.

[6 marks]

Identify a landform created by transport and deposition. Explain how it is formed.

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Identify an additional landform created by transport and deposition. Explain formation

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Explain how different landforms may be created by erosion and weathering.  
[6 marks]

Identify a landform created by erosion and weathering. Explain how it is formed.

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Identify an additional landform created by transport and deposition. Explain briefly explain the formation

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With reference to an example of a section of coastline, describe the major coastal landforms of deposition.  
[6 marks]

Identify a landform created by deposition. Explain how it is formed.

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Identify an additional landform created by transport and deposition. Explain briefly explain the formation

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## Coasts - you only need to pick one case study to revise for management (either Medmerry OR Hengistbury Head)

### Medmerry Managed Retreat, West Sussex, South East England

#### Outline of Managed Retreat

Managed retreat (also known as managed realignment) allows an area that was not previously exposed to flooding by the sea to become flooded by removing coastal protection. This process is usually in low lying estuarine areas and almost always involves flooding of land that has at some point in the past been claimed from the sea.

#### Location

Medmerry is a nature reserve on the coast of West Sussex, South East England. This stretch of shoreline is one of the south coast's most vulnerable areas to flooding from the sea.

#### Requirement for the Scheme

This flat, low-lying and coast is mainly used for farming and caravan parks. For many years the land was protected by a low sea wall, but this is now in need of repair which would have cost £200 000 a year to maintain. The sea frequently breached the sea wall in 2008 costing £5 million worth of damage. With sea levels expected to rise, breaches would become more frequent. Given the relatively low value of the land, it was decided to allow the sea to breach the current sea defences and flood some of the farmland that was previously protected.

#### The Scheme

The Medmerry scheme cost £28 million and the controlled breaching of the old sea defences took place in November 2013. The Environmental Agency decided to follow the strategy of Managed Retreat, deliberately breaching the old sea wall to allow farmland to be flooded. Compensation was paid to residents and footpaths were redirected. A 2-kilometre embankment was constructed and around the perimeter of the area to be flooded to contain the waters and protect surrounding roads, farmland and caravan parks. Rock armour was placed at the seaward edges of the embankment to provide extra protection.

In the future the scheme will create a large natural saltmarsh to form a natural buffer to the sea, help to protect the natural surrounding farmland and caravan parks from flooding and establish a valuable wildlife habitat and encourage visitors to the area.



#### Impacts

##### Social

- Selsey now has a 1 in 1000 chance of coastal flooding which provides the best level of protection for people living in coastal zones in the UK.
- A maintenance access point behind the embankment provides a cycle route and footpath.

## Economic

- Tourism, a main contributor to the local economy is expected to increase. Two new car parks and four viewing points give easy access.
- The newly flooded area is expected to become an important fishing nursery that will boost the local fishing industry in Selsey.

## Environmental

- 300 hectares of new intertidal habitats are forming seaward of the embankment. Mudflats, saltmarshes and grasses have already attracted a large quantity of ducks and lapwings. The area is turning into a huge nature reserve.
- By carrying out a detailed environment assessment prior to flooding, designers were able to take measures to protect existing species such as water voles, crested newts and badgers.

## Conflicts

### Social

- Some residents still feel that the EA gave up the land too easily and insist that they should have explored alternative options such as offshore reefs or continued beach realignment.
- Some opponents came from outside the area; they resented such an expensive scheme for an area with a low population.

### Economic

- At £28 million, the scheme was very expensive. It only cost £0.2 million a year to maintain the sea wall.
- For the managed retreat to take place, three farms growing rapeseed oil and winter wheat had to be abandoned. Losing income from loss of agriculture.

### Environmental

- Despite planning, habitats of existing species such as badgers would have been disturbed.



## Case Study: Hengistbury Head



### Why does Hengistbury Head need protecting?

To protect 14 species of rare endangered plants

Task: **Prioritise** these reasons from most to least important in deciding why Hengistbury Head needs coastal protection

The tourism infrastructure (cafes and restaurants)

To protect the beach huts (some are worth £200,000 each)

The visitor centre which cost £1 million to build

Many retirees live in nearby town, Christchurch

In last 200 years around 150 metres of land has been lost

It is a Site of Special Scientific Interest (SSSI)

#### Stage 1:

The Hengistbury Head Long Groyne was constructed in 1938 to encourage the accumulation of sediment in front of the cliffs, but this resulted in starving the beaches to the north and an increased rate of erosion. The mass concrete structure was constructed with dry mix concrete placed inside sand bags along its sides.



#### Stage 2:

A concrete seawall was constructed on the spit in the 1960s to protect the beach huts. However there are no defences protecting the beach huts on one half of the spit. Here, the beach is deteriorating and the sand dunes are being lost. The cost of the sea wall was £1.5 million.



#### Stage 4:

Also in the 1980s, beach re-nourishment occurred to reduce coastal erosion. This has continued to occur approximately every 5 years. Mostly the re-nourishment is done using sand dredged up off the Isle of Wight though once, to save money, material from the dredging of the entrance to Poole Harbour was used. In 2005, shingle was used to re-nourish the beach at Hengistbury Head rather than sand. Because it is heavier shingle is less prone to longshore drift than sand. However shingle is a much rarer resource than sand and is therefore a more expensive option. Major beach replenishment last took place near Hengistbury Head in 2010 using sand.



#### Stage 3:

17 long rock groynes measuring 20m long were constructed in 1980s. The cost of the beach hut properties of £40 million is much higher than the £1.7 million of building 17 groynes which are at present on the spit



## Positive outcomes

Seafront businesses are thriving

The harbour is now better protected, benefitting boat owners and fishermen

The new beaches have increased visitor numbers

The new defences have stood up to the recent winter storms

## Negative outcomes

People believe that the defences have spoiled the view of the area

Increased visitor numbers has led to conflicts with local people

Traffic congestion has increased

The sea wall may cause increased erosion further down the coast



Name an example of a coastal management scheme in the UK.

Assess whether the overall benefits outweigh any conflicts that are caused as a result of the scheme.

**[6 marks]**

Introduction:  
What is your coastal management scheme?

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Paragraph 1 -

Outline a way the scheme was successful.

Give evidence and examples.

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Counterargument -

Outline a way that the conflicts outweigh the benefits.

Give examples and evidence.

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Conclusion:

Your overall opinion linking back to the exam question.

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'Hard engineering strategies are effective in protecting the coastline.' Do you agree with this statement? Explain your answer.

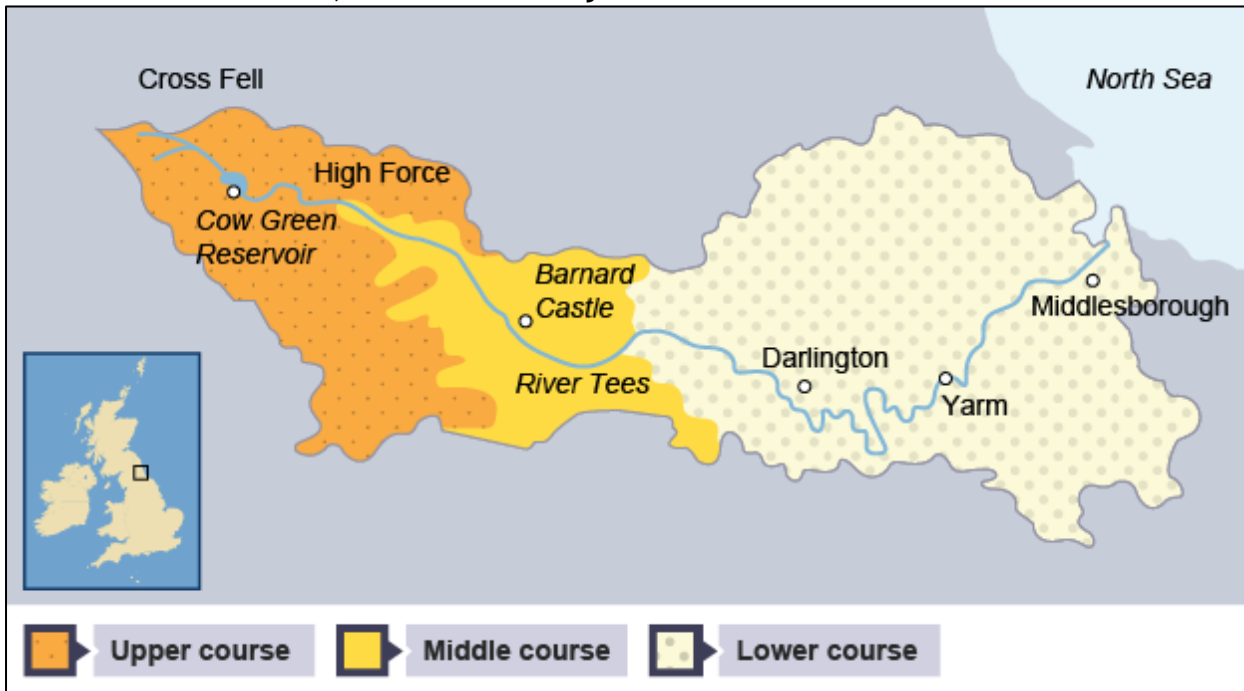
**[6 marks]**

<p>Introduction: What is your coastal management scheme? What is hard and soft engineering?</p>	<hr/> <hr/> <hr/> <hr/>
<p>Paragraph 1 -  Hard engineering is more effective than soft engineering in managing the coastline.  Link to examples.</p>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Counterargument -  Soft engineering is more effective than hard engineering in managing the coastline.  Link to examples.</p>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Conclusion: Your overall opinion linking back to the exam question.</p>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

# River Tees, North East England

## Location

The River Tees is in the north of England. The source of the River Tees is in the Pennines and it flows east to its mouth, where the river joins the North Sea.



## Upper Course

The upper course has hard impermeable rocks. Here, vertical erosion has formed a V-shaped valley.

High Force is in the forest in Teesdale in the River Tee's upper course. The river drops 20m as a single sheet of water into the foaming and turbulent plunge pool below. It then continues its course through a spectacular gorge.

The waterfall was formed due to a resistant band of igneous rock (cooled volcanic lava) called *dolerite*, which cuts across the river valley. This has developed over hundreds of years to form High Force Waterfall.

The underlying darker rock with horizontal layers (called beds) is the *carboniferous limestone*. The overlying slightly lighter coloured rock with vertical joints is the *dolerite*. As the river plunges over the waterfall, it undercuts the weaker limestone forming an overhang. This eventually collapses, and the waterfall gradually retreats upstream to form a gorge (700m long).

## Middle Course

The River Tees flows from west to east near Darlington over relatively low-lying land in its middle course. Along this stretch of the River Tees are good examples of meanders, levees and flood plains. The meander at Sockburn is a good example.







### Lower Course

Near Yarm, the meanders in the lower course are much larger, there is the potential for ox bow lakes to form here in the future, but this has not happened yet. In this area there are also levees which have formed when the river has flooded.

The River Tees has a very large estuary entering the Bristol Channel with mudflats and sandbanks which supports wildlife in the area. Sites such as Seal Sands are protected areas.



# Exam Practice

Explain the processes involved in the formation of a waterfall.

**[6 marks]**

Introduction:  
What is river  
landscape and  
example of a  
waterfall?

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Describe the  
geology of  
where a  
waterfall forms

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Explain how the  
overhang and  
plunge pool are  
then created.

Use key terms  
and refer to  
difference  
erosion  
processes.

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For a river landscape you have studied, describe the erosional and depositional landforms from source to mouth.

**[6 marks]**

Introduction:  
What is river landscape.

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Describe the features in the upper course and middle course.

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Describe the features in the lower course.

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Explain the formation of an ox-bow lake.

**[6 marks]**

Introduction:  
What is river  
landscape.

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Describe the  
conditions needed  
for an ox-bow  
lake to form.

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Explain how the  
neck is narrowed  
and eventually  
cut through.

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Explain how the  
ox-bow lake is cut  
off from the main  
river channel.

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'The causes of river flooding are usually the result of human factors'.

Do you agree with this statement? Explain your answer.

**[6 marks]**

Introduction:  
State your opinion, do you agree or disagree.

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Give one reason for your opinion, explain it and support with evidence.

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Link it to either a human or a physical factor.

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Give another reason for your opinion, explain it and support with evidence.

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Link it to either a human or a physical factor.

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# Jubilee River flood-relief scheme

## What is it?

- Relief channel for the River Thames
- South-east England
- Runs through Berkshire and Buckinghamshire
- Flows roughly parallel to the River Thames
- START: south-east of Maidenhead and flows in south-easterly direction passing just through the north of Eton
- After Eton re-joins the River Thames

## What are the characteristics of the scheme?

- Funded by the Environmental Agency (EA)
- Cost - £110 million
- Opened in 2002
- 11.7 kilometres long
- 50 metres wide
- Channel designed to look like a natural river
- Shallow reed beds, a nature reserve with bird hides created
- Five weirs
- Normal conditions level of water in river is low, but when discharge is high, the Jubilee River effectively diverts from the River Thames - preventing River Thames from overflowing
- Reduces risk of flooding in southeast Maidenhead, Eton and Windsor

## Why was the scheme required?

- Thames flood plain is low-lying and prone to flooding
- Royal settlement of Windsor: attracts many international visitors. Eton home of prestigious public school
- Impermeable surfaces of the built up areas have historically resulted in flooding
- High value property in the area

## What measures were taken?

- Jubilee River created to take overflow water from the River Thames in times of high discharge following heavy rainfall

## Issues

### Social

- 3,000 properties were protected in affluent Windsor and Eton
- Detriment of less wealthy settlements of Old Windsor and Wraysbury
- Thames at Old Windsor now suffers from much higher discharge due to merging of the two channels just upstream
- Paddle boaters promised navigable river. However on two weirs they have to carry their boats around them, Taplow weir considered too dangerous to cross

### Economic

- Most expensive flood-relief scheme in the UK
- One year after completion weirs were damaged by floods
- Initial repair bill for Slough weir alone was £680,000
- Projected cost of £330 million
- Small businesses stand to lose money
- Insurance costs are high
- Business costs for Wraysbury alone were around £500 million in 2014

### Environmental

- 2014 extensive flooding
- Fields inundated and habitats were disturbed
- Concrete weirs are rather ugly
- Ongoing repairs on weirs
- Problem of algae collecting behind the weirs
- Disruption to natural ecosystem

# Exam Practice

Name an example of a flood management scheme in the UK.

Assess whether the overall benefits outweigh any conflicts that are caused as a result of the scheme.

**[6 marks]**

Introduction:  
What is your flood management scheme?

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Paragraph 1 -

Outline a way the scheme was successful.

Give evidence and examples.

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Counterargument -

Outline a way that the conflicts outweigh the benefits.

Give examples and evidence.

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Conclusion:  
Your overall opinion linking back to the exam question.

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Explain the benefits of soft engineering strategies in reducing the flood risk.

**[6 marks]**

Introduction:  
What is soft engineering? Give some examples of soft engineering.

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Explain how soft engineering is better than hard engineering.

Link to your example.

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Explain another benefit of how soft engineering is better than hard engineering.

Link to your example.

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