

GCSE Geography

Paper 1: Living with the Physical Environment Named Examples/Case Studies

You need to know your named examples and be able to provide specific facts and statistics about them.

Paper 1 sections (Total time for paper - 1 hour 30 minutes):

Section A: The Challenge of Natural Hazards

Section B: The Living World

Section C: Physical landscapes in the UK - (Coasts and Rivers sections **ONLY**.
NOT glacial landscapes!)

In this booklet, an example question is given before every case study table of information.



Section A: The Challenges of Natural Hazards

Tectonic hazards

Earthquakes:

L'Aquila, Italy 2009 - HIC

Gorkha, Nepal 2015 - LIC

Weather hazards

Tropical Storm:

Typhoon Haiyan 2012 - LIC

Extreme weather event:

Somerset Level Floods 2014 - HIC

***Tectonic hazards potential question:** Use named examples to show how the effects and responses to a tectonic hazard vary between two areas of contrasting levels of wealth*

<i>L'Aquila, Italy HIC</i>	<i>Gorkha, Nepal LIC</i>
<p><u>Location & facts:</u> L'Aquila is in the Abruzzo region of Italy. The earthquake occurred on the 6th April 2009 measuring 6.3 on the Richter scale. The epicentre was 7 km northwest of L'Aquila.</p>	<p><u>Location & facts:</u> The earthquake occurred on the 28th April 2015 with a magnitude of 7.8. The epicentre was in Barpak, 80 km northwest of the capital, Kathmandu.</p>
<p><u>Primary Effects</u></p> <ul style="list-style-type: none"> • 308 killed • 1,500 injured • 67,500 homeless • San Salvatore Hospital severely damaged so could not cope with injured victims • US\$11.4million cost of damage <p><u>Secondary Effects</u></p> <ul style="list-style-type: none"> • Aftershocks triggered landslides and rock falls causing damage to housing and transport • Landslide and mudflow caused by burst main water pipeline in Paganio • Number of students at L'Aquila university has decreased since the earthquake 	<p><u>Primary Effects</u></p> <ul style="list-style-type: none"> • 8,841 dead • 16,800 injured • 1 million homeless • Destruction of 26 hospitals and 50% of schools • A reduced supply of water, food and electricity <p><u>Secondary Effects</u></p> <ul style="list-style-type: none"> • An avalanche was triggered on Mount Everest which swept through Everest Base Camp killing 19 people • Tourism and employment shrunk in Nepal after the earthquake • Rice seed stored in homes was ruined causing food shortages and income loss
<p><u>Immediate Responses</u></p> <ul style="list-style-type: none"> • Hotels provided shelter for 10,000 homeless people • 40,000 homeless given tents • Within one hour the Italian Red Cross was searching for survivors. Helped by 7 dog units, 36 ambulances and a temporary hospital. • British Red Cross raised £171,000 in support • Mortgages and utility bills were suspended <p><u>Secondary Responses</u></p> <ul style="list-style-type: none"> • Residents did not have to pay tax in 2010 • Students were given free public transport and were exempt for university fees for 3 years. • Homes took several years to rebuild and historic centres expected to take approx..15 years 	<p><u>Immediate Responses</u></p> <ul style="list-style-type: none"> • International help from the UK Disasters Emergency Committee (DEC) raised US\$126 million • Temporary shelters were set up - The Red Cross provided 225,000 people with tents • The United Nations (UN) and the World Health Organisation (WHO) gave out medical supplies to the worst-affected districts • Facebook launched a safety feature so people could indicate they were 'safe'. <p><u>Secondary Responses</u></p> <ul style="list-style-type: none"> • Durbar Square heritage sites were reopened in June 2015 in time for tourist season • Mount Everest reopened for tourists in August 2015 and climbing permits bought in 2015 were made valid until 2017 to encourage climbers back • Office for the Coordination of Humanitarian Affairs (OCHA) reported that US\$274million of aid had been committed to recovery efforts

Weather hazards potential question: Use a named example of a tropical storm to show its effects and responses.

Typhoon Haiyan 2012	
<u>Location & facts:</u> On the 8 th November at 4.40am local time, a category 5 typhoon struck the Philippines. The typhoon originated from the northwest Pacific Ocean and had wind speeds of up to 314 km per hour.	
<u>Primary Effects</u> <ul style="list-style-type: none"> • 6,190 killed • US\$12 billion overall damage • 1.1 million tonnes of crops destroyed (damage to rice cost US\$53 million) • 75% of farmer and fishers lost their income • 1.1 million houses damaged • 4.1 million people made homeless • One kilometre inland was flooded by a 5m storm surge and 400mm of heavy rainfall 	<u>Immediate Responses</u> <ul style="list-style-type: none"> • 800,000 people evacuated • The government sent out essential equipment and medical supplies. • Emergency aid supplies arrived 3 day later by plane once the main airport was reopened • One week before power was restored • A curfew was imposed 2 days after the typhoon to reduce looting • More than \$1.5 billion was pledged in foreign aid
<u>Secondary Effects</u> <ul style="list-style-type: none"> • An oil barge ran aground at Estancia in Iloilo causing an 800,000 litre oil leak. Most of this washed ashore contaminating 10 hectares of mangroves. • Looting was rife as survivors fought for food and supplies • Rise prices rose by 11.9% 	<u>Secondary Responses</u> <ul style="list-style-type: none"> • Government scheme 'Build Back Better' is the intention to rebuild and upgrade to protect from future disasters • New storm surge warning system • Mangroves replanted • A 'no build zone' along the coast

Weather hazards potential question: Use a named example to demonstrate that the UK's weather is becoming more extreme.

Somerset floods 2014	
<u>Location & facts:</u> Somerset is a country in south-west England. It is an extensive area of low-lying farmland and wetlands bordered by the Bristol Channel. The area is drained by several rivers.	
<u>Causes</u> <ul style="list-style-type: none"> • Wettest January since records began in 1910 • 350mm of rain fell in January and February, 100mm above average • High tides and storm surges swept up the rivers from the Bristol Channel preventing river water reaching the sea and so spilled over the river banks • Rivers had not been dredged for 20 years and had become clogged with sediment 	<u>Impacts</u> <ul style="list-style-type: none"> • Over 600 houses flooded/16 farms evacuated. • Residents evacuated into temporary homes • Many people had power supplies cut off. • Somerset County Council estimated the cost of flood damage to more than £10 million. • Over 1000 livestock evacuated • Local roads cut off by floods. • Floodwaters were contaminated with sewage, oil and other pollutants. • A huge amount of debris needed to be cleared. • Stagnant water that had been collected had to be deoxygenated before being pumped back into the rivers.

Management strategies

Immediate Responses

- Villagers used boats to go shopping or attend school
- Local community groups and volunteers gave invaluable support

Long-term responses

- £20 million Flood Action Plan has been launched by Somerset County Council
- March 2014, 8km of rivers dredged to increase the capacity of the rivers
- Road levels raised to maintain communications and allow businesses to continue during floods
- River banks raised and strengthened
- More pumping stations built.

Section B: The Living World

Ecosystem

Freshwater pond ecosystem (small-scale ecosystem)

Tropical Rainforest

Amazon rainforest

Hot Desert

Western Desert, USA

Desert fringe/Desertification

The Sahel, continent of Africa

Ecosystem: An example of a small-scale UK ecosystem to illustrate the concept of interrelationships within a natural system, an understanding of producers, consumers, decomposers, food chain/web and nutrient cycling.

Characteristics

High biodiversity

Variations in light, water and oxygen available in different areas of the pond. Bottom of the pond has little oxygen and light. Pond margin and the surface of the pond (banks/sides) have plenty of oxygen and light.

Interdependence of ecosystem

Producers, consumers and decomposers are all interdependent.

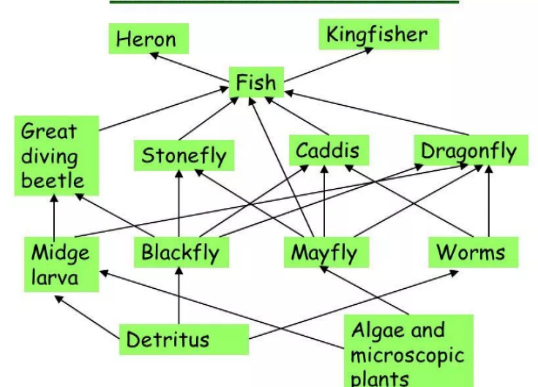
Decomposers and scavengers are usually found at the bottom of the pond (Waterworms and rat-tailed maggots).

Vegetation such as algae, microscopic plants, Waterlilys', Reed mace and Marsh marigold.

Above the surface of the pond there are Kingfishers' & Dragonflies.

Mid-water small fish and predatory fish, beetles, tadpoles etc.

A Freshwater Pond Food Web



Characteristics of the nutrient cycle

Nutrients are foods that are used by plants or animals to grow. Rainwater washes chemicals out of the atmosphere and weathered rock releases nutrients into the soil. Decomposers help to recycle the nutrients by returning into the soils.

Tropical rainforests: 'The rainforest is more valuable when left intact than when destroyed'. Using a case study, use examples to support or challenge this view.

The Amazon Rainforest	
<p><u>Causes of deforestation</u></p> <p>Logging - this accounts for 3%. 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. Vast areas of rainforest are cleared in one go (clear felling).</p> <p>Mineral extraction - Some of the minerals that richer countries need are found beneath rainforest. In the Amazon, mining is mainly about gold. In 1999, there were 10,000 hectares of land being used for gold mining. Today, the area is over 50,000 hectares. The rainforest suffers badly from this.</p> <p>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.</p> <p>Commercial Farming: cattle. This accounts for 80% of tropical rainforest destruction in Brazil. However, the land cannot be used for long.</p> <p>Commercial Farming: crops. The forest is being cleared to make way for vast plantations, where crops such as bananas, palm oil, pineapple, sugar cane, tea and coffee are grown. The cultivation of soy bean has also caused a lot of clearance in the Amazon. The amount of rainforest cleared for this crop doubled between 1990 and 2010. Growing sugar cane is a bio fuel beginning to become a major crop.</p> <p>Road building: Roads are needed to bring in equipment and transport products to markets, but road building means cutting great swathes of rainforest. The Trans-Amazonian highway began construction in 1972 and is 4000km long. It has played a major part in opening up remote areas of the Amazon.</p>	<p><u>Impacts of deforestation</u></p> <p>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.</p> <p>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. New research shows that parts of the Amazon could lose between 30 and 45% of their species by 2030.</p> <p>Local Impacts</p> <p>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.</p> <p>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.</p> <p>River pollution - Gold mining not only causes deforestation but the mercury used to separate the gold from the ground is allowed to enter the rivers. Fish are poisoned as well as people living in nearby towns.</p> <p>Decline of indigenous (native) tribes - There are now only around 240 tribes left compared with over 330 in 1900. Many have been forced out due to the construction of roads, logging, and the creation of ranches and the opening of mines.</p>

Hot Desert: For a hot desert environment or cold environment you have studied, to what extent does that environment provide both opportunities and challenges for development

Western Desert, USA		
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> In the Western Desert, people earn their living from farming, mining, energy and tourism industries. All of these industries provide employment, contributing to the local economy and the multiplier effect as local people earn more money and spend this in their local area, meaning more services are developed, and improvements are made to infrastructure. Farming -Farming in Coachella Valley produces lush crops of vegetables, lemons, peppers and grapes (this helps the wine industry). Most canals are used for large scale industrialised agricultures. Farmers are allocated 80% of Colorado water, even though they make up just 10% of the economy. Mineral Extraction -The Western Desert states are rich in minerals including copper, uranium, lead, zinc and coal. Copper mining has taken place for centuries in the Sonoran Desert. Energy - The Sonoran Solar Project in Arizona is a new solar power plant project that will ultimately produce energy for 100,000 homes and requires 360 workers to help build it. Hydroelectric Power (HEP) plants also supply Western Desert communities with some of their electricity. These are powered by water leaving Lake Mead. At the peak of its construction in the mid 1930s, the Hoover Dam employed 5000 people. Fossil Fuels bring opportunities to the Western Desert too. People have been drilling for oil in Arizona since 1905. Today, there are 25 active oil production sites, all of which are on land owned by the Navajo people. More than 100 employees work to produce oil worth US \$50billion. Tourism - Tourism has become the Western Desert's most important source of income. The national parks 	<p><u>Challenges</u></p> <p>Accessibility - The low population density of less than one person per square kilometre means that parts of the Western Desert lack surfaced roads. Accessibility is therefore limited in areas of Nevada north of Las Vegas. Tourists and explorers must find their own way.</p> <ul style="list-style-type: none"> The extreme temperatures make it a dangerous place if your car breaks down. In 2015, an elderly tourist died of dehydration in the Los Coyotes Reservation near the edge of the Mojave Desert. <p>Water Supply - Already, 30 million people in SW USA depend on water from the Colorado. Phoenix takes the maximum share of its water allowed, but it is predicted to double its population by 2050.</p> <ul style="list-style-type: none"> While the cities of the Western Desert grow, there is a limit to how much water can be taken from the Colorado. There is also a political limit because of an international agreement which states that water must be allowed to flow into Mexico. The region's water security is further threatened by climate change. Scientists have suggested that reduced rainfall could occur in places where water is already naturally low. In 2014, Lake Mead reached a record low level. The Western Desert is predicted to warm faster than the whole world in the next few decades. By 2100, temperatures could be 5 degrees higher than they were in the 70s. 	<p><u>How challenges have been overcome</u></p> <p>Dams and Reservoirs- In 1935, work began on the Hoover Dam, which stores 2 years river flow in Lake Mead. The Glen Canyon Dam followed in 1963. Together, the two dams smooth out the Colorado's river flow and stop flooding. Colorado's giant reservoirs bring water to cities including Phoenix, Tucson, Albuquerque, San Diego, Las Vegas and Los Angeles. However, dams create environmental problems in an already fragile environment.</p> <p>Improving Accessibility- By the late 1800s, railroad developers moved in. Their choice of sites for stations influenced the growth of future key settlements. For instance, developers determined that the water-rich Las Vegas Valley would be a perfect location for a train station. Soon after, the first saloon bars, shops and hotels were built. Better roads were laid in the 1900s. Soon people were driving through the desert in buses or in their own cars. Major cities can now be reached directly by air. Las Vegas airport receives over 40 million people annually.</p>

<p>offer visitors a chance to experience a wilderness area. Important areas include the Grand Canyon and California's Joshua Tree National Park. The heritage and culture of Native Americans are celebrated at the Colorado Museum in Parker, Arizona. The entire economy of Las Vegas is built around entertainment, attracting 37 million visitors per year. Two major lakes have been created as part of water management projects. Lake Mead and Lake Powell. Combined, they attract 2 million visitors a year and offer sailing, power boating, water skiing and fishing.</p>		
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Desert Fringe: Choose one of the following environments: an area on the fringe of a hot desert or a cold environment.

<p style="text-align: center;">The Sahel, Africa</p>	
<p><u>Causes of desertification</u></p> <p>Natural causes: Climate data shows long-term reduction in rainfall in the Sahel. This would make the desert fringe a drier region and lead to further desertification.</p> <p>Human causes: Population growth is high in the poorest parts of the Sahel. There are half a billion people living in the Sahel today and is expected to increase to one billion by 2050.</p> <ul style="list-style-type: none"> • Migration increases population pressures as people move from one fragile area to another; increasing desertification. • War and conflict forces people to move to desert fringe environments. • Overcultivation - small scale subsistence farming lead to many crops being planted and aquifers being drained leaving behind infertile soil. • Overgrazing - too many cattle graze for too long on one site may leave the vegetation unable to regrow. • Soil erosion - overcultivation and overgrazing both lead to soil erosion. The top soil becomes baked hard by the sunlight and any intense rain will wash over the soil rather than soaking into the ground. Therefore, it is impossible for vegetation to grow back. 	<p><u>Tackling desertification</u></p> <p>Great green wall: The African Union proposed the 'Green Wall' where they plan to plant a wall of trees across the entire Sahel region. It will take decades for the trees to reach maturity. It is a sustainable method. The tree roots stabilise the soil and the decomposing leaf litter adds nutrients to the soil. It will also generate work for the poor and help to bring political co-operation with the reduction of refugee camps.</p> <p>Bunds: low stone walls that are parallel to the slope gradient. They help prevent soil erosion and slow down the flow of rainwater as the water pools behind the bund instead of runoff over land.</p> <p>Appropriate technology: <u>Efficient Stoves</u> - made locally using available materials such as clay and small amounts of wood and charcoal. They can generate sufficient electricity from the heat to charge a mobile phone too as they incorporate a thermocouple.</p> <p><u>Solar Panels</u> - provide energy for cooking and provide the Sahel nations with money to tackle desertification more effectively.</p> <p>Other land management measures: such as planting grass on slopes to stabilise the soil/collecting rainwater on roofs/building small rock dams etc.</p>

Section C: Physical Landscapes in the UK

Coastal landforms

Dorset

Coastal management

Medmerry, West Sussex

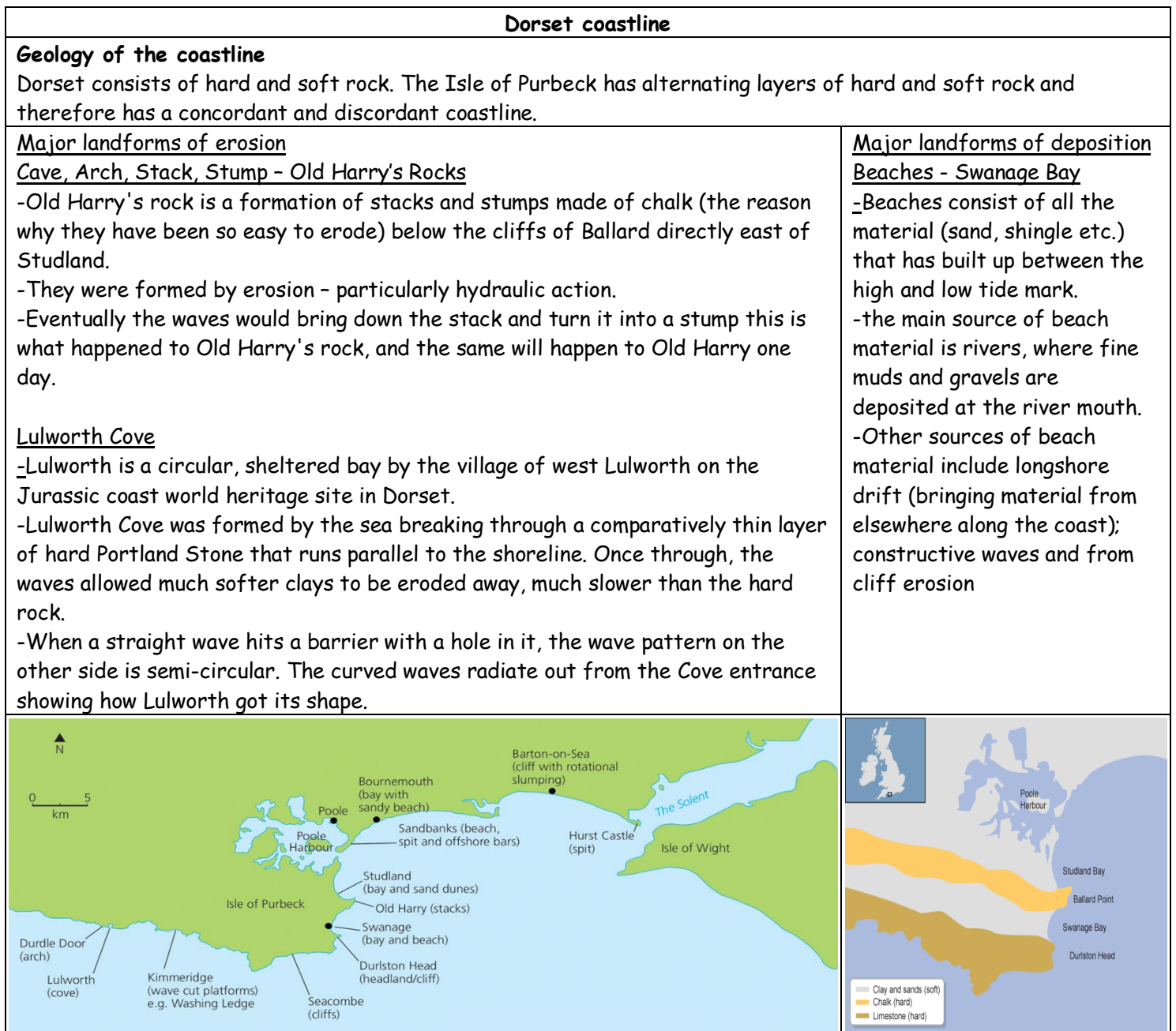
River landforms

River Tees

River management

Boscastle

Coastal landform: Using Figure 12 and your own knowledge, explain how different landforms may be created by the transport and deposition of sediment along the coast.



Coastal management: Suggest how the sea defences shown in Figure 11 help to protect the coastline.

Coastal realignment - Medmerry, West Sussex

Reasons for management

A shingle ridge was the only protection from the sea and from the 1990s beach re-profiling took place every winter, at an annual cost of £200,000. This was becoming unsustainable. If breached, then 348 properties in Selsey, a water treatment plant and the main road between Chichester and Selsey would be flooded along with many holiday homes and rental cottages. The last breach, in 2008, cost £5 million.

Management strategy

Work to realign the coast began in 2011 and was completed in 2014. Managed retreat was achieved by the following:

- Building a new embankment, up to 2km inland from the shore, using clay. This enclosed future intertidal area and protected the properties behind it.
- Behind the embankment, a channel was built along its whole length to collect draining water. Four outfall structures were built into the embankment to take the water into the inter-tidal area.
- Rock armour was then placed on the seaward edges of the embankment, where it linked up with the remaining ridge. This used 60,000 tonnes of rock from Norway.
- Once the embankment and rock armour were in place, a 110 metre breach was made in the shingle bank to allow the sea to flood the land to create a new intertidal area.

Effects

- Selsey now has a 1 in 1000 chance of coastal flooding, which provides the best level of protection in the UK.
- A maintenance access path behind the embankment provides a cycle route and footpath.
- Tourism 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 fishing industry in Selsey.
- Designers were able to take measures to protect existing species, such as water voles, crested newts and badgers.
- 300 hectares of new intertidal habitats are forming seaward of the embankment. Mudflats, salt marshes and transitional grasses have already attracted large numbers of ducks and lapwings. The area is turning into a huge nature reserve managed by the RSPB.

Conflicts

- Some locals still feel that the EA should not have given up the land so easily and insist they should have looked into other options.
- Some opponents of the scheme came from outside the area: they resented such an expenditure in a sparsely populated area. Would the money not have been better spent draining Somerset levels for example?
- At £28 million, the scheme was very expensive. It will cost £0.2 million a year to maintain the shingle wall.
- For this to take place, the farms growing oilseed and winter wheat had to be abandoned. Losing good agricultural land raised questions regarding the priority given by the EU for protecting buildings over farmland.
- Habitats of existing species such as badgers would have been disturbed.

River landforms: Using Figure 16, explain the processes involved in the formation of the landforms shown.

River Tees, North East, England

Background information

The River Tees is located in the north of England. The source of the River Tees is located in the Pennines and it flows east to its mouth where the river joins the North Sea. Located at Cross Fell in the Pennines. There is lots of saturated peat bog at the source, which drains out of the bog creating small streams. 893m above sea level, where rainfall is over 2000mm a year.

Upper Course

- This area has hard impermeable rocks. Here, vertical erosion has formed a V-shaped valley.

Middle Course

- As the River Tees starts to erode sideways (lateral erosion), it forms meanders.

Lower Course

- The river flows into an estuary in the port of Teeside.

<ul style="list-style-type: none"> • High Force, the UK's largest waterfall at 21 metres high is located in the upper course. An area of hard igneous rock, called Whin Sill (or Whinstone), is located above a layer of soft rocks (sandstone and shale) and together the waterfall. It has a 500m gorge in front of this. • Interlocking spurs form in the upper course as the river winds around high land. 	<ul style="list-style-type: none"> • The town of Yarm is found entirely within a meander. Here the river flows in a giant bend all the way around the town, and oxbow lakes have formed. • In this area there are also levees which have formed when the river has flooded (flood plains). 	<ul style="list-style-type: none"> • This has both mud flats such as Seal Sands and petrochemical industry.
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River management: Suggest how the flood management scheme shown in Figure 15 helps reduce the risk of flooding.

Boscastle		
<p>Background information In August 2004, the village of Boscastle saw a month's worth of rain fall in two hours. The drainage basin of Boscastle is steep and impermeable rock. Boscastle is also located on a confluence of three rivers. These factors led to a flash flood which caused over one thousand homes, cars and businesses to be swept away and damaged.</p>		
<p>Causes</p> <ul style="list-style-type: none"> • Over 60mm of rainfall fell in 2 hours (a typical months rainfall). • The ground was already saturated due to the previous 2 weeks of above average rainfall. • The drainage basin has many steep slopes, and has areas of impermeable slate causing rapid surface runoff. • Boscastle is at the confluence of 3 rivers, Valency, Jordan and Paradise. A large quantity of water all arrived within a short space of time causing the rivers to overflow. • The flooding coincided with a high tide, making the impact worse. • Old sewer and drainage system with low capacity. • Lack of any flood control eg; raised banks around river and emergency drainage ditches. • Small, low bridges over river trapped material and cars acting as a dam and causing more water to flow around the bridge leading to flooding. 	<p>Effects</p> <ul style="list-style-type: none"> • Homes, businesses and cars belonging to more than 1,000 people were swept away. • Income from tourism was lost. This had an impact on livelihoods and the local economy. • There were vast numbers of subsequent insurance claims. • No lives were lost, partly due to the rapid response of the emergency services. • 25 business properties destroyed. • 50 buildings damaged. • 4 footbridges washed away. • Pavements and gardens damaged by weight of water. • Roads blocked so rescue by helicopter only. 	<p>Defence scheme</p> <p>To prevent this type of flood happening again, the environmental agency invested £10 million into several flood defences, such as:</p> <ul style="list-style-type: none"> • Widening and deepening the river channel - this allowed the river to carry more water. • Removing low bridges and replacing them with wider bridges - this meant large amounts of water could flow freely underneath the bridge and the bridge wouldn't act like a dam (in the 2004 flood, vegetation and debris became blocked, creating the effect of a dam). • Raising the car park and using a permeable surface - this allowed cars to be much higher and so they were less likely to be swept away. • Tree management - dead trees were removed to prevent them being swept away, causing blockages under bridges. Land owners were encouraged to maintain vegetation and plant new trees