

Physical Geography Case studies & Examples

HAITI (LIC)	NEW ZEALAND (HIC)	Typhoon Haiyan	Beast from the East
<p>CAUSE: Haiti lies right on the boundary of the Caribbean and North American plates. There was slippage along a conservative plate boundary that runs through Haiti. On 12 January 2010, a magnitude 7 earthquake hit Haiti. The earthquake's epicentre was 25 km west of Port-au-Prince, the capital.</p> <p>EFFECTS Primary effects:</p> <ul style="list-style-type: none"> 3 million people affected. Over 230,000 deaths 300,000 injured – 50 hospitals collapsed 30,000 commercial buildings collapsed – primary effect Airport and port damaged (Port Au-Prince) <p>Secondary effects:</p> <ul style="list-style-type: none"> Businesses destroyed – Damage to the main clothing industry 20% of people were left without a job <p>1.3 million homeless</p>	<p>CAUSE: An earthquake struck New Zealand's South Island on 22nd February 2011 at 12.51pm. It reached 6.3 on the Richter Scale. The plate boundary moves in two ways- destructive and conservative</p> <p>Primary effects</p> <ul style="list-style-type: none"> 181 people killed in total Road and bridges were severely damaged in places Christchurch's cathedral spire was damaged Canterbury Television (CTV) building collapsed. This was 6 storeys high <p>Secondary effects</p> <ul style="list-style-type: none"> 1000 people were left homeless Review of all building codes to make buildings stronger <p>Fires spread due to gas pipes catching fire</p>	<p>CAUSES: Typhoon Haiyan was a tropical cyclone that affected the Philippines in South East Asia in November 2013. It was one of the strongest tropical cyclones ever recorded with winds of 313 km/h. In some areas, 281.9 mm of rainfall was recorded, much of which fell in under 12 hours. Waves of up to 7 m in height battered the coast. The Philippines is a fairly poor part of the world with minimal investment in prediction, planning and protection schemes.</p> <p>Economic effects</p> <ul style="list-style-type: none"> The overall economic impact of Typhoon Haiyan is estimated at \$5.8 billion (£3.83 billion). Six million workers lost their sources of income. Major rice, corn and sugar-producing areas for the Philippines were destroyed affecting the country's international trade and farmers' incomes. <p>Social effects</p> <ul style="list-style-type: none"> More than 7,000 people were killed by Typhoon Haiyan. 1.9 million people were left homeless and more than 6,000,000 displaced. There were outbreaks of disease due to the lack of sanitation, food, water, shelter, and medication. In the city of Tacloban, widespread looting took place in the days following the typhoon. <p>Environmental effects</p> <ul style="list-style-type: none"> Widespread floods damaged and in many cases destroyed homes and businesses in coastal areas. Thousands of trees were uprooted leading to a massive release of carbon dioxide and loss of habitat with resulting effects on wildlife. Major roads were blocked by trees, and were impassable. 	<p>CAUSES:</p> <ol style="list-style-type: none"> The Beast from the East (25 February) was caused by a change to the northern polar jet stream, which twisted its direction unexpectedly, drawing in cold air to the UK from the east. This bending was caused by a jump in temperatures high over the Arctic. This unexpected warming weakened the jet stream that brings warm air in from the Atlantic to Ireland and Britain, this allowed COLD air in from the East So cold air from thousands of miles away is dragged over to us, bringing a severe chill – though the air is a lot warmer when it arrives at our doorstep, having risen from -50°C. This air picked up moisture over the North Sea bringing SNOW This affected mainly the East coast and dumped a huge amount of snow on the UK Then on the 1st of March a depression called Storm Emma started to move in from the SE (from the Atlantic) across Cornwall causing even more snow as it hit the cold air sat over the UK. This caused the Met Office to issue Red weather warnings. <p>Primary effects</p> <ol style="list-style-type: none"> A man died in London after being pulled from a frozen lake, whilst there were 3 other reported deaths Gusts of 60-70mph in parts of northern England and Wales destroying houses. Rural areas experienced temperature lows of -12°C Snow drifts were as high as 7m in places <p>Secondary effects</p> <ol style="list-style-type: none"> British Airways cancelled hundreds of short-haul flights from Heathrow, and London City Airport also cancelled many services. Hospitals in Glasgow, Grimsby, Scunthorpe and Goole cancelled all outpatient appointments. Hundreds of people were trapped in their vehicles for hours, on the A31. The AA estimated that there were 8,260 collisions on Britain's roads from the snow chaos in just three days, with the insurance cost above £10m. Some supermarkets saw a rush of customers. There were reports of shelves being stripped of bread, milk and soup. <p>Management/Responses</p> <ol style="list-style-type: none"> Stranded drivers were given foil blankets Army and Royal Air Force personnel were called in to ferry health workers through blocked roads in Lincolnshire and in Scotland. Ten RAF 4x4 vehicles with 20 airmen began transporting health staff from dawn in Lincolnshire after an urgent request from local police. Councils had to lend out gritters and snow ploughs to clear the roads Drivers of a Greggs Delivery van, stuck on the A1 near Newcastle, gave out free food to stranded drivers The Met Office issued "red Warnings" for several areas, including the belt between Edinburgh and Glasgow, and Public Health England (PHE) urged people to plan ahead to ensure they have enough food and medicine. Rail passengers were warned to avoid travelling to or from Scotland on Thursday while in Kent 50 stations closed.
<p>Immediate responses</p> <ul style="list-style-type: none"> Neighbouring Dominican Republic provided emergency water and medical supplies as well as heavy machinery to help with search and rescue. Emergency rescue teams arrived from a number of countries, eg Iceland. Temporary field hospitals were set up by the Red Cross. United Nations troops and police were sent to help distribute aid and keep order. <p>Long term responses</p> <ul style="list-style-type: none"> Money was pledged by organisations and governments to assist in rebuilding e.g. Port Au-Prince, but only slow progress had been made after one year. After one year, there were still 1,300 camps. 'Cash for work' programs are paying Haitians to clear rubble. Schools are being rebuilt. <p>OVERALL: HAITI DID NOT HAVE THE INFRASTRUCTURE OR MONEY TO COPE WITH THE EARTHQUAKE</p>	<p>Immediate Responses</p> <ul style="list-style-type: none"> The Australian Government donated NZ\$6.7 million to the Red Cross appeal to rebuild the area Bottled water was provided as water supplies were cut off 27,000 chemical toilets were flown into the area as sanitation and sewerage works were damaged Electricity companies worked around the clock to restore power to areas that were cut off Search and rescue teams came from New Zealand, Australia, UK, USA, Japan, Taiwan, China and Singapore <p>Long term Responses</p> <ul style="list-style-type: none"> Review of all building codes to make buildings stronger Total cost of rebuilding was \$40 billion which included buildings like the CTV building <p>OVERALL: NEW ZEALAND HAD THE INFRASTRUCTURE, KNOWLEDGE AND MONEY TO COPE WITH THE EARTHQUAKE</p>	<p>Responses</p> <ul style="list-style-type: none"> Even though the loss of life was significant, it could have been much worse if not for the efforts of the Philippines' meteorological agency. It broadcast warnings leading to the evacuation of approximately 750,000 residents. The UK government provided food, shelter, clean water, medicine and other supplies for up to 800,000 victims. Several charities provided emergency aid such as water, food and shelter. The United Nations launched an international aid appeal in December 2013 for £480 million to finance the humanitarian relief effort for 2014. 	<p>An example of a small scale UK ecosystem to illustrate the concept of interrelationships within a natural system : A Pond...</p> <ul style="list-style-type: none"> A hedgerow includes the plants that make up the hedgerow, the organisms that live in it and feed on it, the soil in the area and the rainfall/sunshine it receives. The producers include pond weed The consumers include pond weed <p>The balance between components of an ecosystem and the impact on an ecosystem of changing one component: Some parts of an ecosystem depend on the others e.g. consumers depend on producers for a source of food and some depend on them for a habitat. So if one part changes then it affects all other parts.</p> <p>E.g. Hedgerow Hot dry summer → reduced plants → fewer berries for birds in winter → number of sparrows and thrushes fall → fewer birds for sparrowhawks to hunt so sparrowhawk numbers fall.</p> <p>Factors that can change the balance in ecosystems:</p> <ol style="list-style-type: none"> Climate change: May cause droughts so plants may die Population growth: May cause more plants to be used as sources of food so less plants around. Fertilisers → Put on plants to grow but can be washed into the rivers and cause eutrophication which can cause fish to die.

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<p>UK Coastline and its landforms DURDL DOOR = ARCH CHESIL BEACH = LAGOON LULWORTH COVE = BAY OLD HARRY = STACK OLD HARRY'S WIFE = STUMP SWANAGE BAY = BAY AND HEADLAND</p>	<p><u>UK coastal management – Lyme Regis</u></p> <p>Reasons for the scheme:</p> <ul style="list-style-type: none"> • Most of the town has been built on unstable cliffs. • The coastline is eroding more rapidly than any in Europe due to powerful waves from the south west. • Many properties have been damaged or destroyed. • The existing sea walls have also been breached many times. <p>Management strategy: 1990-1995 – build a new sea wall and promenade to the east of the River Lim. 2003-2004 – a £1.4 million project was installed to stabilise the cliffs. Hundreds of large nails were used to hold the rocks together as well as improving drainage. 2005-2007 - £22 million of improvements to the sea front were made including new sea walls and promenades, wide sand and shingle beach to absorb wave energy and increase the use of the shore. Dredged from the English Channel and imported from France. Extension of rock armour at The Cobb. 2013-2015 - £20 million project to construct another new 390m sea wall in from of the existing wall for extra protection. Additional nailing, piling and drainage to provide cliff stabilisation.</p> <p>Resulting effects and conflicts:</p> <ul style="list-style-type: none"> ✓ The new beaches have increased visitor numbers and seafront businesses are thriving. ✓ The new defences have stood up to recent stormy winters. ✓ The harbour is now better protected, benefitting boat owners and fishermen. <ul style="list-style-type: none"> X Increased visitor numbers have led to conflicts with local people who think traffic congestion and litter have increased. X Some people think the new defences have spoilt the natural landscape. X The new sea wall could interfere with coastal processes and affecting neighbouring stretches of coastline. Badgers habitats have been destroyed X Stabilising cliffs will prevent landslips which may reveal important fossils – a potential conflict. 	<p><u>Deforestation in the Amazon Rainforest</u></p> <p>CAUSES:</p> <ul style="list-style-type: none"> • Logging – This is often of hardwoods which is to make furniture. Logging is also done by the government to repay the debts they made in the 1960s. • Mineral extraction – Mining is common with companies seeking gold. • Population growth – People move from Rio to the rainforest to the new capital = Brasilia • Commercial farming – Large spaces are needed for cattle ranches for example, McDonalds. Slash and burn is often done to create fertile soils. • Road building – Trans-Amazonian Highway has improved communications. • Subsistence farming – Forest is cleared so that farmers can grow food for themselves and their families. • Energy development – Building dams to generate HEP which floods areas of the rainforest. <p>Positive impacts (economic)</p> <ul style="list-style-type: none"> ✓ Companies will pay taxes to the government to improve public services (multiplier effect – economic development) ✓ Farming creates money e.g. \$6.9 million/year trading cattle with McDonalds (economic development). ✓ Improved transport infrastructure opens up more industry and tourism. ✓ 3,100 people are employed in mines and minerals like gold are valuable <p>Negative impacts (environmental)</p> <ul style="list-style-type: none"> X Pollution from the Carajas mine of water sources resulting in water shortages. X Farming mean 55 million tonnes of top soil are lost every year (soil erosion). This is because there are no trees to hold the soil together so the soil gets washed away by the rain. X Plants that could be used for medical benefits may become extinct. X Deforestation will release carbon dioxide which causes global warming/ climate change → contributes to 15% of global co2 emissions per year.
<p><u>UK river management – River Tees</u></p> <p>Location and Background The River Tees is located in the north east of England. The mouth of the Tees drains into the North Sea. The length of the channel from source to mouth is approximately 160 kilometres. The Tees rises on the slopes of Cross Fell at a height of 893 metres. The area received over 2.000 mm of rainfall per year. The rainfall reaches the river very quickly due to the steep slopes, impermeable rocks and saturated peat bogs on the moor.</p> <p>Why does the area need protecting?</p> <p>In the lower course of the River Tees it is very low lying and prone to flooding. There are a lot of built up areas around the river which have impermeable surfaces. These include Middlesbrough, Darlington, Hartlepool and Stockton-on-Tees. There are also large industrial areas in the lower course such as the ICI chemical works.</p> <p>Social impacts</p> <p>687,000 people live in the river catchment – these people are to be protected by using flood defence schemes. There is a huge demand for water use in homes, industry and agriculture. The Tees Barrage helps to maintain water levels for amenity purposes (bathing, cooking, toilets, parks, shops etc). Flood warnings have improved and the Met Office have liaised with the police and emergency services.</p> <p>Economic impacts</p> <p>The Tees Barrage (a man-made barrier across the river) cost £54 million and was completed in 1995. The barrage has acted as an attraction for £500 million investors to the area from offices, housing, educational, leisure and shopping facilities. The flood defence scheme in Yarm cost £2.1 million. This was also completed in 1995. Concrete walls, gabions and embankments have been installed, which are more expensive and also may need to be maintained/repared over time.</p> <p>Environmental impacts</p> <p>The embankments have created a new home (habitat) for animals and plants. The Environment Agency also re-planted many plants as they installed the gabions around the river, thus creating new habitats and maintaining existing ones.</p> <p>Is the River Tees management strategy successful?</p> <ul style="list-style-type: none"> • The Tees Navigation Company cut across the neck of meanders along the River Tees. This new route shortened the river by 4km. Other stretches of the river have also been artificially straightened. This allows the water to move faster along the channels (less energy is lost with the river banks) therefore reducing the flood risk. • New development of the flood defence scheme in Yarm has discouraged people building on low lying flood prone areas next to the river. • The Cow Green Reservoir is a regulating reservoir, this means it stores water in times of plenty and releases it in times of need during low flow. It can also hold back water during times of flood. • The Tees Barrage has improved water quality and the recreational value of the river. The water does not mix with the salt water in the lower estuary. It also reduces the risk of flooding at high tides during a storm surge. • Dredging by the mouth of the river has increased the water capacity in the channel and reduced the flood risk. 	<p><u>Cold environments – developments and challenges in cold environments - Alaska</u></p> <p>Alaska is a cold environment that's part of the USA. The northern parts of Alaska are inside the Arctic Circle.</p> <p>Development opportunities in Alaska:</p> <p>Fishing – There are 3,000 rivers in Alaska and commercial fishing (for salmon) provides 78,500 jobs and creates \$6 billion. Lots of native communities rely on fishing (subsistence fishing) for food, fuel and the bones for clothing and tools. Mineral extraction – One fifth of the area's income comes from mining, mainly gold. It contributed £2.2 billion to Alaska's GDP in 2013. Energy – 50 HEP plants provide a lot of jobs and one fifth of Alaskan electricity. Geothermal energy is also being harnessed in the tourist resort of Chena. Tourism – 2 million tourist visit a year, which provides seasonal jobs. There are numerous National Parks and monuments of the Yup'ik heritage. 60% of people come from cruise ships and people often hike, ski and rock climb.</p> <p>Challenges of developing cold environments:</p> <ol style="list-style-type: none"> 1. Extreme temperatures <ul style="list-style-type: none"> • It is very cold, especially in the north with extreme weather • Extreme cold can cause injury or death • In Prudhoe Bay is it -9c 2. Inaccessibility <ul style="list-style-type: none"> • Some areas are extremely remote, covered with snow/ice. • Frost heave pulls parts of the roads up which makes it hard to drive on. • There are not many roads, especially to small towns and villages • The population is small and scattered across Alaska 3. Buildings and infrastructure <ul style="list-style-type: none"> • Construction work only takes place in summer as days are longer and warmer • Melting permafrost means building can subside and no crops can be grown. • Dark surfaces can melt the permafrost <p>Managing the challenges:</p> <ul style="list-style-type: none"> • High, steep roofs means snow can run off • Triple glazed windows to keep the heat in • Buildings raised on piles which prevents the permafrost melting • Roads built on 1-2m of gravel to stop heat transfer taking place • Utilidors are piles above ground to carry water and gas so they do not freeze. • Airport runways are painted white to reflect sunlight, stopping them warm. 	