Edexcel GCSE Geography B

Component One: Global Geographical Issues

Challenges of an Urbanising World

Resource Booklet

Name _____

GCSE Specification – Enquiry Question 1

Overview of rapid urbanisation and contrasting global urban trends	
Enquiry question: What are the causes and challenges of rapid urban change?	
Key idea	**Detailed content**
3.1 The world is becoming increasingly urbanised	a. Past (since 1980) and current global trends in urbanisation, how it varies between global regions, and future projections of global urbanisation. (1)
	b. The global pattern of megacities (size, location, growth rates) and how in many countries some urban areas have disproportionate economic and/or political influence (urban primacy).
3.2 Urbanisation is a result of socio-economic processes and change	a. How economic change and migration (national and international) contributes to the growth and/or decline of cities in the developing, emerging and developed countries.
	b. Why urban economies are different in the developing, emerging and developed countries (formal versus informal employment, relative importance of economic sectors, working conditions).
3.3 Cities change over time and this is reflected in changing land use	a. How urban population numbers, distribution and spatial growth change over time (urbanisation, suburbanisation, de-industrialisation, counter-urbanisation and in some cases, regeneration).
	b. Characteristics of different urban land uses (commercial, industrial, residential) and the factors that influence land-use type (accessibility, availability, cost, planning regulations). (2)
Integrated skills: (1) Use and interpretation of line graphs and calculating of rate of change/annual or decadal percentage growth (2) Using satellite images to identify different land use zones in urban areas.	

Lesson 1 Why is the world becoming more urbanised?

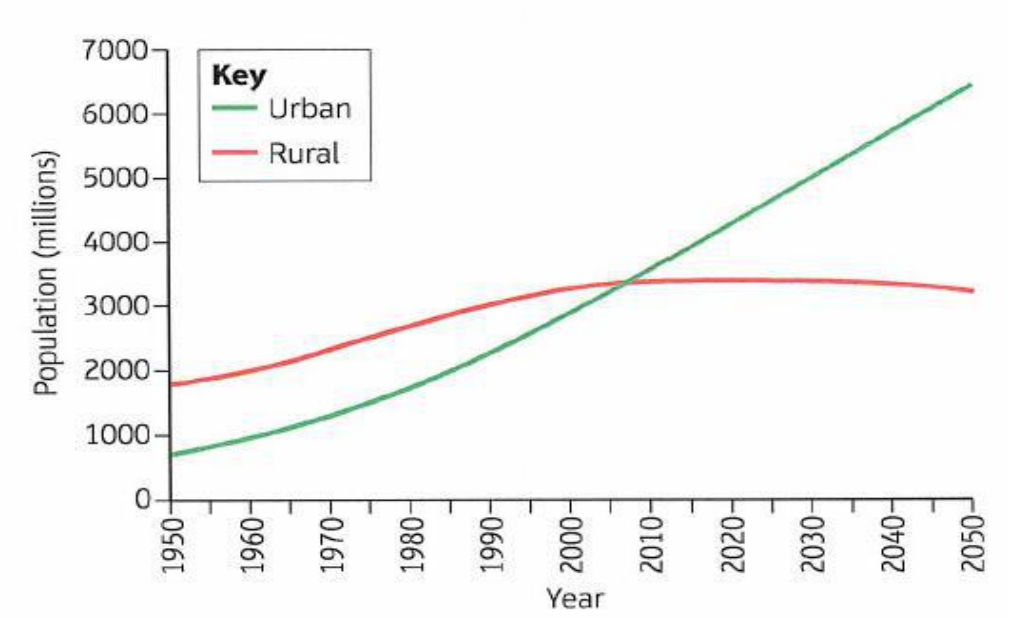


Figure 1 The urban and rural population of the world, 1950–2050

Skill: Calculating percentage rate of change

To calculate the percentage rate of change you must use this formula:

$$\frac{\text{Actual increase}}{\text{Original value}} \times 100\%$$

1. The world's urban population in 2000 was 2.84 billion. By 2005 it had risen to 3.15 billion. Calculate the percentage rate of change from 2000 to 2005. Round your answer to the nearest whole number. Show your working. *(1 mark)*

……

2. In 2016, London had a population of 8.8 million. Calculate the percentage rate of change needed for London to become a megacity. Round your answer to one decimal place. Show your working. *(2 marks)*

……

City	Population
London	8,815,246
Birmingham	1,224,136
Glasgow	801,198
Leeds	761,481
Bristol	617,280
Liverpool	552,267
Manchester	520,739
Sheffield	518,090
Edinburgh	482,005
Cardiff	447,287

Figure 1. The UK's ten largest cities

Figure 2. Major UK airports

Figure 3. The Houses of Parliament

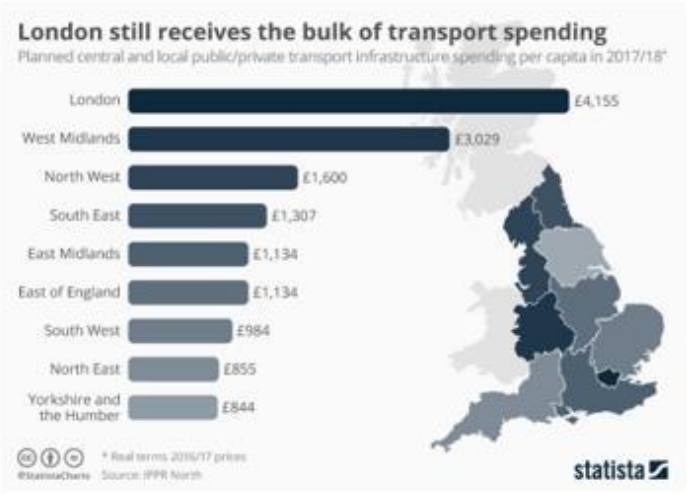


Figure 4. Transport spending per person

Figure 5. Average UK salaries 2018

Lesson 2 How are urban populations affected by social and economic changes?

Kampala, Uganda

Kampala is the capital of Uganda, and typical of African cities. Its growth is driven mainly by **internal (rural-urban) migration**, but **natural increase** (an excess of births over deaths) also plays a part. This migration is a result of factors which 'pull' people to Kampala and others that 'push' them from the countryside. 'Pull' factors include:

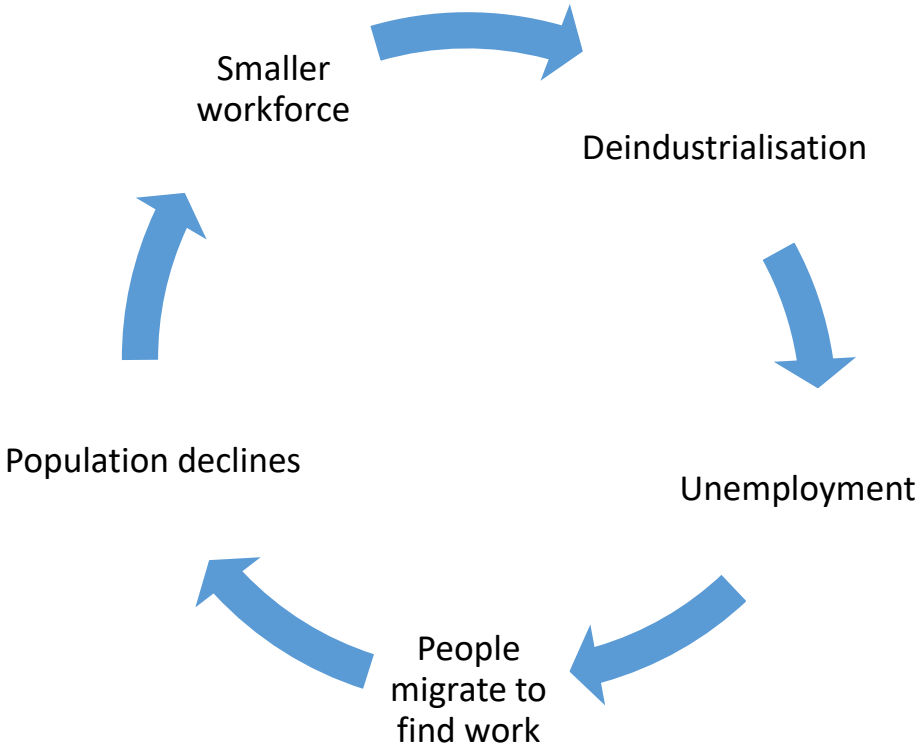
- Jobs in growing businesses. A newly opened steelworks in southern Kampala, owned by a TNC, now employs 2000 people.
- Jobs in construction, building infrastructure (e.g. water pipelines, roads).
- Better services such as healthcare and education which makes life easier than in rural areas.

Chongqing, China

In 1990 the city of Chongqing in central China had a population of 2 million. Since 2001 there has been large-scale **internal migration** of people from rural parts of China into cities. By 2014, Chongqing's population reached 12.9 million. In 2001 China changed its policy on the economy (**economic reform**) and allowed TNCs into the country. Manufacturing industries located in Chongqing; this created a demand for labour (workers) and incomes began to rise. People were attracted from the rural areas where incomes were rising more slowly. Urbanisation led to a loss of farmland around Chongqing so there was less work for local people in rural areas and they moved to the city. New services were provided in Chongqing for the growing population. New schools, hospitals, restaurants, and shops attracted more migrants.

London, UK

In 2001 London had a population of just over 7 million people. Until then, more people were leaving London than coming to live there. By 2011, this situation had changed with London's population increasing by 14% to 8.1 million, mainly due to **international migration**. People born in India made up the largest group followed by Poland, Ireland, Nigeria, and Pakistan. People were attracted to London because of its employment; London is a **World City** (globally important), and it offers a wide range of service jobs at relatively high rates of pay. There are also many services including entertainment and culture, transport, health, and education. The UK and international transport network (Eurostar, Heathrow & Gatwick Airports) has made migration to London easy both on a national and international scale.


Smaller workforce
Deindustrialisation
Unemployment
People migrate to find work
Population declines

Lesson 3 How do urban economies differ?

Developed e.g. London, Paris	**Emerging** e.g. Mexico City, Mumbai	**Developing** e.g. Lagos, Accra
Usually have a broad range of different industries and jobs: • No (or very little) primary industry • Secondary (manufacturing) industries such as engineering and printing • Many tertiary industries such as tourism, education, finance, health and other services • Quaternary industries such as IT, media, consultation and culture, as well as top-level decision-making	Often have: • Little primary industry • Manufacturing that processes primary products, such as sugar refining and flour milling. Some, for example in China and India, have heavy industry such as steel making and engineering • Very large tertiary industries, including government administration and service industries such as tourism, transport and entertainment • Smaller quaternary sector, which is growing rapidly	Usually have: • Little primary industry • Secondary industry that often processes primary products, such as textiles, sugar refining and flour milling. • Very large tertiary industries, including government administration and finance, and service industries such as tourism, transport and entertainment • A small quaternary sector which is starting to grow

Lesson 4 How do cities change over time?

From urbanisation to regeneration

The number of people living in a city, where they live within the city and how the city shapes itself all change over time. A city may move through each of the following stages.

1 **Urbanisation** – In most developed countries, such as the UK or the USA, urbanisation was linked to industrialisation. The industrial revolution and services such as railways, roads and a safe water supply attracted workers to the growing towns. As cities became increasingly urbanised, more factories were built and growing numbers of rural migrants arrived to fill the jobs that were created.

2 **Suburbanisation** – By the early 20th century in developed countries, city centres had become noisy, crowded, polluted places. People who could afford to moved out of the city centre to the new 'suburbs' on the edge of the city where land was cheaper and the air was cleaner.

3 **De-industrialisation** – The industry in the city begins to decline. Often this is the result of technological change, failure to invest or competition from other countries. Detroit is an extreme example.

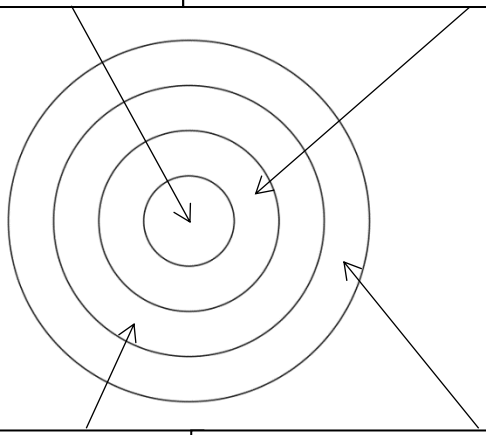
4 **Counter-urbanisation** – In the 1970s and 1980s, in the UK, Europe, USA and Japan, people chose to leave larger towns and cities to move to more rural areas. This led to a pattern of population decline in inner-city areas and population growth in small towns and villages. Counter-urbanisation was made possible by rising car ownership and motorway construction, which allowed people to live in the countryside and still work in cities. Progress in telecommunications and information technology also meant that people could work from home in remote villages.

5 **Regeneration** – Some older cities have started to redevelop their run-down inner-city areas in order to attract people to live close to the amenities of the city centre. New shopping centres, flats, houses and leisure facilities are built to give the city centre a facelift and attract businesses. In Birmingham, this regeneration process has included developments such as the Mailbox, a development of offices, shops, flats and television studios (see Figure 7).

Process	What is it?	When did it happen?	Why did it happen?	*Extension: What was the impact on the city's population size and distribution?*
Urbanisation		18th and 19th centuries		*The city's population grew. Most people lived in the centre of the city.*
Suburbanisation	People move from the city centre to the edge of the city – the **suburbs**			
De-industrialisation		1970s-	Technological change, lack of investment, competition from abroad.	
Counter-urbanisation				
Regeneration	Run-down **inner city** areas are redeveloped	1990s-		

Zone 1: **Central Business District**
Main function: **Commercial**
Characteristics:

Zone 2: **Inner City**
Main function: **Industrial & residential**
Characteristics:



Zone 3: **Suburbs**
Main function: **Residential**
Characteristics:

Zone 4: **Rural-Urban Fringe**
Main function: **Mixed**
Characteristics:

GCSE Specification – Enquiry Question 2

Enquiry question: Why does quality of life vary so much within ONE megacity* in a developing country* OR emerging country*?

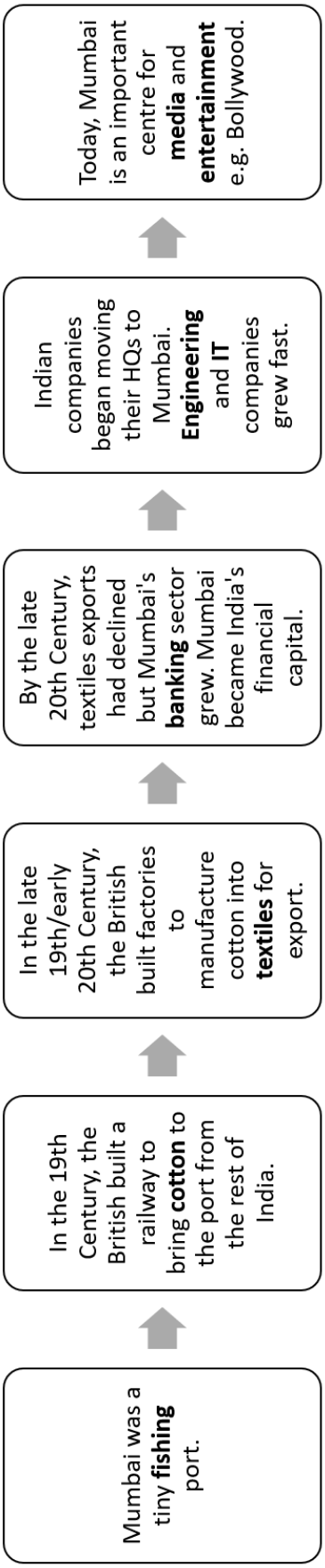
To be studied in the context of ONE megacity in a developing or emerging country.

Key idea	Detailed content
3.4 The location and context of the chosen megacity influences its growth, function and structure	a. Significance of site, situation and connectivity of the megacity in a national (environmental and cultural), regional and global context.
	b. The megacity's structure (Central Business District (CBD), inner city, suburbs, urban-rural fringe) in terms of its functions and building age.
3.5 The megacity in the chosen country is growing rapidly	a. Reasons for past and present trends in population growth (rates of natural increase, national and international migration, economic investment and growth) for the megacity.
	b. How population growth has affected the pattern of spatial growth and changing urban functions and land use. (3)
3.6 Rapid population growth creates opportunities and challenges for people living in the chosen megacity	a. The opportunities for people (access to resources and employment) living in the megacity.
	b. The challenges for people living in the megacity caused by rapid population growth (housing shortages, the development of squatter and slum settlements, inadequate water supply and waste disposal, poor employment conditions, and limited service provision and traffic congestion).
	c. The pattern of residential areas of extreme wealth and contrasted with slums and squatter settlements, and reasons for differences in quality of life within the megacity and the political and economic challenges of managing the megacity. (4)
3.7 Quality of life in the chosen megacity can be improved by different strategies for achieving sustainability	a. Advantages and disadvantages of city-wide government (top-down) strategies for making the megacity more sustainable (managing water supply, waste disposal, transport and air quality).
	b. Advantages and disadvantages of community and NGO-led bottom-up strategies for making the megacity more sustainable (city housing, health and education services in the megacity).

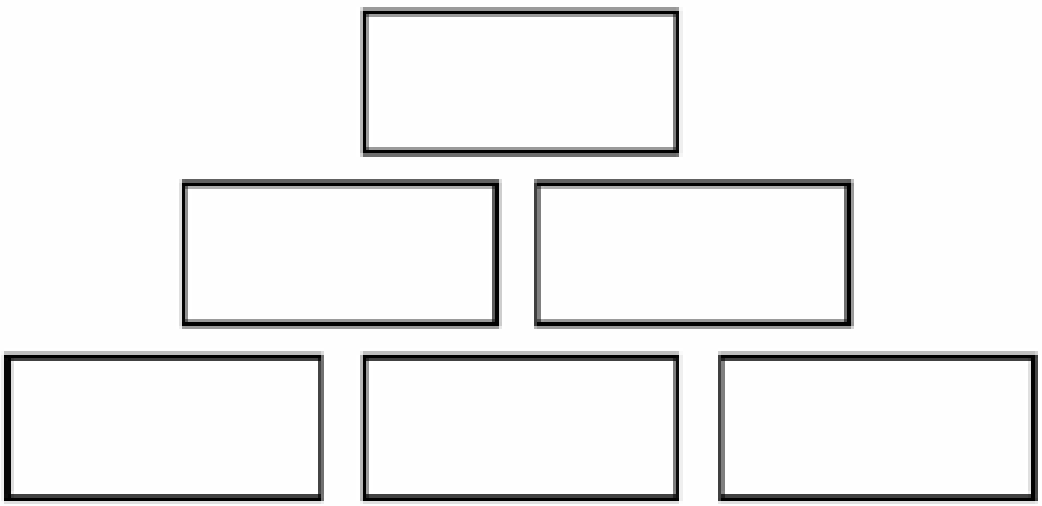
Integrated skills:
(3) Using GIS/satellite images, historic images and maps to investigate spatial growth
(4) Using quantitative and qualitative information to judge the scale of variations in quality of life.

*See *Appendix 2: Definitions*

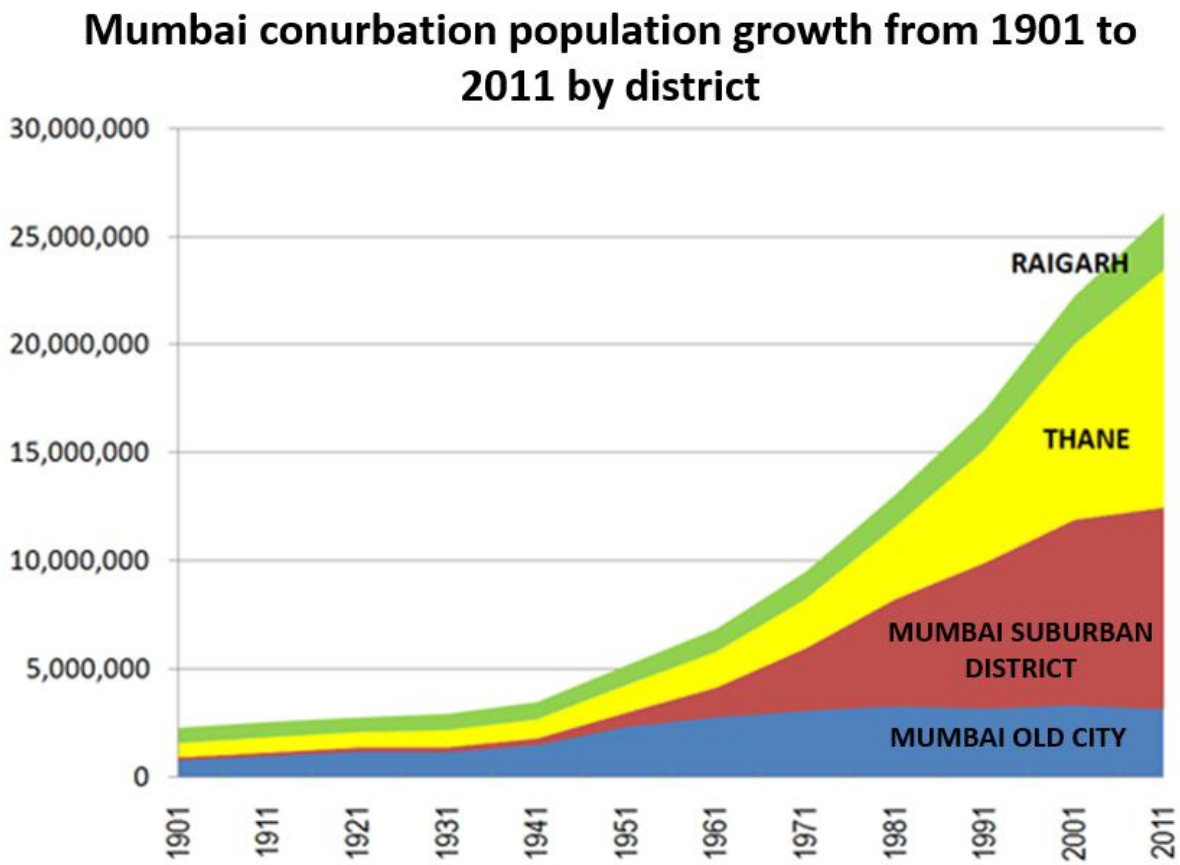
Lesson 5 What makes Mumbai a megacity? (1)



Mumbai is located on the west coast of India, on the Arabian Sea. Ships can travel quickly from Mumbai to the Middle East and Europe via the Suez Canal.	The estuary of the River Ulhas is naturally deep making it accessible to large, modern container ships. Mumbai's port is the largest in India and they handle 25% of India's international trade.	Mumbai is built on low-lying land. Much of the city is just above sea level.
Mumbai is built on a long, narrow peninsula with water on three sides and an area of high ground to the north. The city has little land for expansion, so it is very densely populated.	Mumbai has a large international airport; it is a 9-hour flight from the UK and 3 hours from Dubai in the Middle East. It is possible to fly to Mumbai from most other Indian cities in two hours.	Mumbai is connected to the rest of India by railways. These were built in the 19th Century by the British to transport cotton to 'Bombay' for export. Today they carry 7.5 million commuters a day.



Lesson 6 What makes Mumbai a megacity? (2)



Push factors	Pull Factors
Farming jobs pay very little and new technology means fewer jobs are available.	Wages are higher. The average income in Maharashtra state is nearly double the Indian average.
	Huge range of jobs (highly skilled e.g. IT and banking and low-skilled e.g. manual labourers)
There are few services in rural India. Most people only have access to basic education and healthcare options.	Good education opportunities. Mumbai has 12 universities.
	Entertainment services e.g. Bollywood

The **CBD** is located at the southern end of the peninsula. Company HQs are found here e.g. Tata Steel, VW. Very wealthy people live in new expensive apartments along the waterfront.	Old textile mills near the CBD have been redeveloped and are very expensive to buy.	The **INNER SUBURBS** contain **chawls** – poor quality older houses built for textile mills workers. Older **slums** are located here too e.g. Dharavi.
Mumbai doesn't really have a **RURAL-URBAN FRINGE** but there are green areas in the city such as the Sanjay Ghandi National Park in the north and marshland near the River Ulhas in the east.	The **OUTER SUBURBS** grew along the railway lines. People used the railways to commute to the CBD.	New Mumbai was built in 1970 and is part of Mumbai's **OUTER SUBURBS**. It was built to reduce congestion on the peninsula.

Lesson 7 What is life in Mumbai like?

Life at the bottom

Aditya is 36, lives in Dharavi and shares a 10m² shanty house with her husband, three children and nine other people. It's small and crowded but her rent is only 200 rupees (£2) a month. The house doesn't have running water or a toilet; they share a standpipe and a latrine with the rest of the neighbourhood. Two of Aditya's children have been ill with gastroenteritis (diarrhoea and vomiting) in the last month. She's convinced it's due to the open sewers flowing down their lane; the smell and the flies are unbearable in the summer heat. Aditya's workplace isn't much better; she has no qualifications so makes a living by rag-picking on a local landfill site for a plastic recycling company. She usually earns 500 rupees (£5) a month. Aditya's children don't go to school, but she hopes they'll find work in one of Dharavi's 5000 small businesses once they're old enough.

Life in the middle

The Chopra family are made up of two adults and two young children and live in a small apartment in Mulund in Mumbai's outer suburbs. They all sleep in one room. Mr Chopra teaches at a local school. His monthly salary is 23 000 rupees or £230. It is not enough so he tutors privately, increasing his salary to 75,000 rupees (£750). Nearly every family like the Chopra's has a TV and a mobile phone. India's middle class is growing and their incomes rising. Mr Chopra hopes his children will work in IT, healthcare or perhaps engineering.

Life near the top

Vihaan is 25 and works for India's largest steel company, AccelorMittal, as operations manager with an annual salary of 1.6million rupees (£16,000). He has a degree from Mumbai's top engineering college, speaks English and is part of Mumbai's upper middle class. He works long hours, but in his spare time likes to meet friends at a restaurant, go clubbing and shopping. He has the latest smartphone and designer clothes. His company provide a luxury 10th floor apartment in a gated complex overlooking the harbour in Colaba but he is saving a quarter of his salary to buy his own high-spec one-bedroom apartment which cost around £320,000. In five years, he thinks he'll be able to afford a deposit for one.

	Housing – *name the area they live in and describe their living conditions*	**Jobs** – *list the jobs they do and the wages they earn*	**The Future** – *how might their life/ family's lives change?*
Aditya			
The Chopra Family			
Vihaan			

What are the challenges of living in Mumbai?

Rapid population growth creates many challenges for people living in megacities such as Mumbai.

Figure 19 Challenges of living in a rapidly growing megacity

Rapid expansion

The rapid population growth has meant that Mumbai's expansion has often been faster than infrastructure and services can keep up with. For example, new housing developments are put up in areas without shops, bus services, schools or health care. Rapid population growth has also caused challenges with ensuring reliable electricity supplies and adequate water supplies.

Mumbai's growth has been too rapid for local government to organise waste disposal. Instead this is run by small-scale businesses that use low-paid people to collect, sort, resell or dispose of Mumbai's waste products. This has caused major pollution problems for the Mithi River in Mumbai. Along with the dumping of an estimated 800 million tonnes of untreated sewage, the river is also polluted by batteries, metals, oil and industrial waste.

Traffic congestion

A rapid rise in private cars – currently there are over 1.8 million cars in Mumbai – means that Mumbai's roads are frequently gridlocked, while the combination of cars and other more traditional forms of transport, such as bullock carts, as well as pedestrians is producing traffic chaos. 90% of Mumbaikars travel by rail rather than by car, which has put huge strain on Mumbai's railway system as the population has increased. Every day some 8 million people travel on the suburban lines, often coming long distances from the outlying parts of the Mumbai conurbation. Trains have to be frequent to cope with such high demand but, because there are so many trains running at the same time, it means that any delay to one train holds up hundreds of thousands of people.

Housing

Finding somewhere affordable to live in Mumbai is a major problem. The geography of the city means that space is very limited, leading to high population densities. As the city has spread out to cheaper, less congested areas, rapid population growth has meant that these new areas have quickly become congested too, with the same high population densities. Rents for property in Mumbai are amongst the highest in the world.

This situation has produced the problem of slum settlements in Mumbai. There are two main types of slum housing in Mumbai.

- **Chawls** – these are old tenement buildings (some over 100 years old) that are so overcrowded that conditions inside them are the same as, or worse than, the slums. Often, they are not maintained, which frequently means they are unsafe and in danger of collapse.

- **Squatter settlements** – these arise when people put up makeshift huts on land that belongs to other people or to the government. In Mumbai, 50% of squatter settlements are on private land, though this land is usually not suitable for building on because it is too close to railway lines, is too hilly or too marshy.

The poorest Mumbaikars live on the streets, sleeping under bridges or on pavements near where they work. This is often not a temporary situation – some people live this way all their lives. Nor is it free – local bosses demand a rent from those people sleeping on their stretch of the pavement. It is estimated that over 20,000 people live this way in Mumbai.

Living with slums

People live in slum conditions because it means they can get work and do not have to pay a lot to travel to work. Because squatter settlements are not official settlements, the government and those who own the land they are built on do not have to provide infrastructure for the residents. As a result, Dharavi has:

- problems with water supply – instead of water pipes bringing water to each home, there are standpipes, each used by many hundreds of families. Water is rationed in the slum with 1 million people only able to access the standpipes at 5.30 am for a period of 2 hours
- problems with sanitation – instead of a sewer system connecting toilets in each house so that waste can be safely removed, people have to use streams and rivers running through the settlement. Over 500 people share each public latrine in Dharavi
- not enough clean water each day for washing, so people wash clothes in the same streams and rivers that are also used as toilets and for other waste products.

Living with slums also causes problems for other Mumbaikars. As Mumbai has grown, the land taken up by slums has become more and more valuable. Consequently, the owners want to clear the slums so that new, permanent housing can be built there. The government would like to be able to organise better education, health care and job opportunities for slum residents. People also believe that slums encourage even more migration to Mumbai, because migrants know they will be able to find somewhere to live, even if they are very poor.

Working conditions

The majority of employment in Mumbai is in the 'informal sector', which means that working conditions are poor – there is no protection for workers, hours are very long, and the places where people work are often small, dark, hot rooms without ventilation to remove toxic fumes. Pay is extremely low because there are so many poor people willing to do any sort of work and no organisations to make sure people are paid a reasonable wage. Some work is dangerous – for example, in Mumbai's port, men dismantle ships using only basic tools and work without safety equipment in very dangerous conditions. Others recycle dyes and paints, breathing in toxic fumes.

Exam-style question

For a named megacity in a developing or emerging country, explain **two** reasons why rapid population growth has led to problems with traffic congestion. **(4 marks)**

Exam tip

When responding to an exam question that asks for a named location make sure you include specific facts for your chosen case study.

Command word

Remember, **explain** means to give reasons. In this question you will need to say how the factors you discuss are challenges for the people of Mumbai.

Activity

Make a copy of Figure 19 in the centre of a page.

a Read the text again, annotating details of Mumbai's challenges around your diagram.

b Identify what the biggest challenge is, and its cause.

*For a named megacity, assess the challenges caused by rapid population growth. (**8 marks**)*

Writing Frame 1 (Grade 7-9)

Mumbai is a megacity in India. Its population has increased by more than 12 times in the last 100 years. This has led to many challenges.

The biggest social challenge is…

I think this because…

A significant economic challenge is… because…

The biggest challenge in the long term is… because…

Overall, the biggest challenge for Mumbai is…

I think this because…

It is likely that Mumbai will/will not overcome its challenges because…

Writing Frame 2 (Grade 4-6)

Mumbai is a megacity in India. Its population has increased by more than 12 times in the last 100 years. This has led to many challenges.

One challenge is…

This is caused by rapid population growth because…

A second challenge is…

This is caused by rapid population growth because…

Another challenge is…

Overall, the worst challenge is… because…

Lesson 9 Can top-down strategies improve Mumbai?

Can top-down strategies improve Mumbai?

Learning objectives

- To explain what is meant by sustainability for cities
- To know the advantages and disadvantages of city-wide government (top-down) strategies to making Mumbai more sustainable
- To know the advantages and disadvantages of community and NGO-led (bottom-up) strategies to making Mumbai more sustainable

What are sustainable cities?

A **sustainable** city provides good quality of life for all its residents without using up resources in a way that means future city residents will have to accept lower quality of life. In a sustainable city:

- public transport is very good – this means people do not use private cars to travel around the city, so improving commuting times for everyone and leading to better air quality
- waste is recycled so that the city does not end up dumping its problems in other areas; the city is made as energy-efficient as possible. Waste disposal does not cause pollution
- everyone has access to a good level of services – e.g. education, health
- there is access to affordable housing.

What are top-down strategies?

Top-down strategies involve big, expensive infrastructure projects (see Topic 2, page 70). In cities they are developed and managed by city governments. City governments are able to access the multi-billion-pound funds needed to pay for these projects. They are known as top-down strategies because they tend to be imposed on people in the city by government. Let us look at two examples of top-down strategies that are intended to improve quality of life in Mumbai.

Did you know?

Mumbai's government has introduced a number of projects to reduce the air pollution from vehicles. These include banning diesel vehicles with an engine capacity greater than 2000 cc.

The Gorai Garbage Site Closure Project

From 1972 until 2007, 1200 tonnes of Mumbai's solid waste was deposited at the Gorai landfill site every day. This 20 hectare site in the north of the peninsula is close to residential areas, and by 2007 the waste there was 27 metres deep and emitting very unpleasant-smelling methane (a greenhouse gas) and toxic run-off into a nearby creek. Gorai was one of the unhealthiest parts of Mumbai in which to live.

In 2007 Mumbai's supreme court ordered that the site be improved for nearby residents, and in two years the Mumbai government put together and implemented a plan to make the site safe. The waste was reshaped into a gentle hill, covered in layers of lining material to prevent leaching, and planted with grasses to create a 19 hectare park. Methane-capture technology has been installed to use the methane gas created by decomposing waste within the hill to generate power.

In 2014, the scheme was awarded a prize for sustainable urban development in recognition of the significant improvement it has made to local residents' lives. Now the area has fresh air and a popular park beside it. Property prices in Gorai have increased.

Activity

1 What benefits did the Gorai Garbage Site Closure Project bring to Mumbai's residents?

2 In what ways did the project contribute to making Mumbai a more sustainable city?

The Mumbai monorail

In 2005, Mumbai's city government decided that a monorail would be a good solution to Mumbai's public transport problems in areas where buses are the only form of public transport. Buses travel very slowly on Mumbai's congested roads. The advantages of a monorail are that it takes passengers off the roads, it can be constructed over built-up areas without having to clear all the existing roads and buildings out of the way first, it carries passengers quickly (average speed of 40 miles per hour) and it can go up and down gradients.

By 2008, the city government had formed a Public–Private Partnership with foreign engineering companies who provided expertise. Construction began in 2009, with a deadline of 2011 for the first 9 km section. This was not achieved; instead the first section opened in 2014. The cost of the first section was the equivalent of £310 million.

Although tickets are cheap (11 rupees per person, or about 10 pence), passenger numbers have been much lower than expected, perhaps because the route currently goes through industrial sectors rather than into the old city. Only around 15,000 people are taking the trip each day, mostly tourists.

Figure 21 Mumbai's monorail

Activity

1 Explain why the city government's monorail transport strategy is a top-down strategy.

2 Study the table below listing advantages and disadvantages of both projects. Copy the table and add one more advantage or disadvantage (or both) to one (or both) schemes.

Top-down strategy	Top-down advantages	Top-down disadvantages
The Gorai Garbage Site Closure Project	This project had a very big budget – a city government is able to access large funds	The site had been polluting Mumbai for 35 years – action should have been taken sooner
The Mumbai monorail	Governments have the authority to make big decisions affecting the lives of thousands of residents	Attention-grabbing **prestige projects** may not provide the best solution for people's actual needs

Did you know?

A World Bank study has shown that Mumbai's reservoirs hold enough water to supply the megacity with water 24 hours a day, but many parts of the city, including the CBD, are rationed to 6 hours supply per day. The problem is leaks in the city's 100-year-old pipe network; it is so old that there are no accurate maps of the network. Fixing the problem is a massive task.

Sustainability and the future

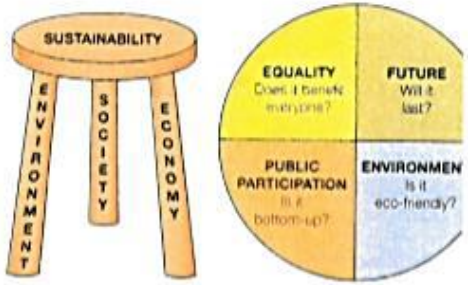
Think about the problems that Mumbai faces, e.g. slums, and pollution. There are many ideas about how Mumbai could improve. How can we know whether an idea is right or not?

One way is to think about **sustainable development**. This was defined in 1987 by the UN as *'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'*. Any new idea can be tested against this definition.

The sustainability of an idea or proposal can be measured in two ways, shown in Figure 1:

1 as a three-legged **'stool'**. This judges an idea on economic, social and environmental benefits and problems. If benefits outnumber problems, then it's a good idea.

2 as a **'quadrant'**. This uses four questions, shown in Figure 1. Ideally, the answer to all four is 'yes'.



▲ ***Figure 1*** *Two ways of measuring sustainability – the 'three legged stool' and the 'quadrant'. Both are just as useful.*

Top down development – 'Vision Mumbai'

In 2003, a report by American firm McKinsey, called 'Vision Mumbai', suggested investing US$40 billion to improve Mumbai. It involved a partnership between government, property companies and investors – so was typical of **top-down development** (see section 2.13). Completion would be by 2050. The basic problem it tried to solve was Mumbai's worsening quality of life. Slums have multiplied, and traffic congestion, pollution and water quality are all worse than in 2000.

The plan was to transform Mumbai with ambitious targets, including:

- building one million low-cost homes and reducing slums
- improving transport infrastructure by road and rail
- improving air and water quality by reducing pollution.

On your planet

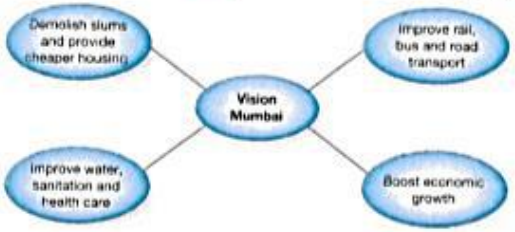
Vision Mumbai has been accused of displacing the poor, not of improving the city.

Putting plans into action

Vision Mumbai was based on targets (see Figure 2). Some things were 'quick wins' – they could be done quickly to improve Mumbai, e.g.:

- restore 325 'green' spaces that were polluted and used for dumping waste
- build 300 extra public toilets

▼ ***Figure 2*** *Vision Mumbai's four core targets*



- widen and 'beautify' main roads
- improve train capacity and safety.

But the main plan was based on property development.

- Dhavari would be demolished. Its location next to Mumbai's financial district made it worth US$10 billion! Developers would buy land at a discount, and redevelop it. For every square metre of cheap housing built, they could have 30% more for offices, which are highly profitable.
- High-rise blocks for slum dwellers would be built next to shopping malls, offices and luxury apartments.

Did Vision Mumbai work?

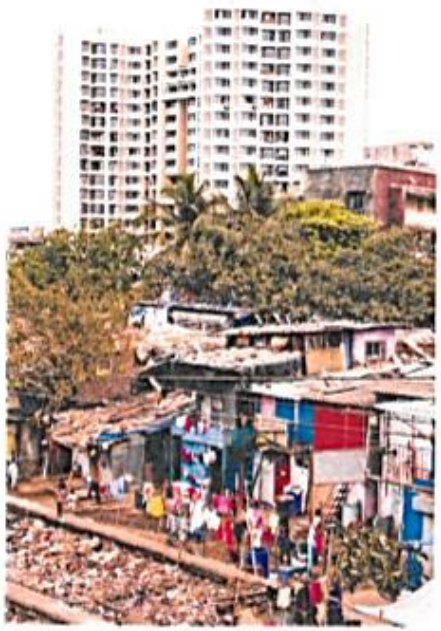
- By 2007, 200 000 people were moved, and 45 000 homes demolished in Dharavi. New flats replaced slums (Figure 3).
- Piped water and sewerage systems were established for the new flats.
- By 2015, 72 new trains were introduced on Mumbai's railways. Platforms were raised to prevent people falling into 'gaps' between trains and platforms – the cause of many deaths.
- In 2015, new measures were introduced to improve air quality (see section 3.11).

But people in Dharavi don't like the changes.

- Many prefer slum improvement (e.g. piped water, sewage treatment) to demolition.
- New 14-storey apartment blocks have split communities.
- Rents cost more than in the slums.
- Small workshops would have to move or go out of business, affecting Mumbai's recycling industry.

Many residents believe that 'Vision Mumbai' benefits only the rich and powerful. In spite of the plans:

- water quality in Mumbai is worsening because of sewage discharge
- its beaches are unsafe for recreation
- slums are growing so rapidly that improving sewage treatment and disposal in line with population growth is a long way off.



▲ ***Figure 3*** *New apartment blocks in Dharavi*

Exam-style question

1 For a named megacity, assess the success of a top-down development project designed to improve quality of life. (12 marks)

Your questions

1 Explain why Vision Mumbai is a 'top-down' development.
2 How well do its targets fit the idea of a 'three legged stool' in Figure 1?
3 Why do people living in Dharavi see Vision Mumbai differently compared to other Mumbai residents?
4 Draw a spider diagram with four 'arms' – water supply, waste disposal, transport and air quality (see section 3.11). Explain what Vision Mumbai has done to improve these.
5 Use the 'quadrant' in Figure 1 to assess whether Vision Mumbai has been sustainable.

Strategy 1. Vision Mumbai

1. What is **Vision Mumbai**?

   ……
   ……

2. List Vision Mumbai's four aims.

   ……
   ……
   ……
   ……

3. What was done to improve ***housing*** as part of Vision Mumbai?

   ……
   ……
   ……
   ……

4. Evaluate Vision Mumbai as a top-down strategy by completing this table:

Advantages	Disadvantages

Strategy 2. Gorai Garbage Site Closure Project

5. Describe the **Gorai Garbage Site** in 2007.

   ……
   ……
   ……
   ……

6. What changes were made to the site to improve the ***environment****?*

   ……
   ……
   ……
   ……

7. Evaluate the Gorai Garbage Site Closure Project as a top-down strategy by completing this table:

Advantages	Disadvantages

Strategy 3. Mumbai Monorail

8. Why did Mumbai City Government choose a monorail to tackle Mumbai's ***transport*** problems?

……
……
……
……

9. Evaluate Mumbai's monorail as a top-down strategy by completing this table:

Advantages	Disadvantages

Challenge*: Look at the three tables you have completed. Summarise the main advantages and disadvantages of top down strategies when trying to improve quality of life?*

……
……
……
……
……
……
……
……
……

Lesson 10 Can bottom-up strategies improve Mumbai?

Can bottom-up strategies improve Mumbai?

What are bottom-up strategies?

If top-down strategies are imposed on residents without their involvement, bottom-up strategies are the opposite – organisations work with local residents to come up with community-based solutions to quality of life challenges (see page 71). Often the organisations involved are NGOs (non-governmental organisations). Let us look at three examples of bottom-up projects that are intended to improve quality of life in Mumbai.

SPARC and community toilet blocks

Toilet blocks that were provided by the city government charged individual prices for each use, which made them much too expensive for families. The city toilets were also badly designed, without running water, and government employees failed to clean them.

SPARC is an Indian NGO that works with communities in Mumbai to build new toilet blocks, connected to city sewers and water supplies. The local community helps to construct the toilet block and families from the community can then purchase monthly permits to use it for a very cheap price – 25 rupees, or about 25 pence. Once they have a permit, they can use the toilet block as many times as they want during the month.

The SPARC toilet blocks have electric lights, making them safer to use at night, and separate toilets for children. In the past five years, SPARC has provided 800 community toilet blocks, each containing eight toilets.

Hamara Foundation

There are an estimated 200,000 street children in Mumbai who have dropped out of school. They are often forced by the police to move from any shelters they have made on the streets because some street children take drugs and steal things.

The Hamara Foundation provides social-work services for street children to help them improve their health, education and job skills. During 2013–2014 the Foundation supported 327 children in going to school. The Foundation has also provided vocational training for 16–18 year olds in computing, motor mechanics and hospitality.

Agora Microfinance India

People living in squatter settlements are not usually able to get bank accounts or loans because they do not earn enough money. Agora Microfinance is a banking service that specialises in **microfinance** for Mumbai's slum residents.

The company provides loans for people who want to improve their homes or invest in their existing business or micro-business. Education loans are available for people who want to take classes to improve their skills or qualifications. Group loans allow people to take a loan together.

Individual loans are for amounts up to around £300. The interest rate is 25% paid in weekly instalments. Before a loan is given, someone (the guarantor of the loan) has to agree to pay the company £150 if the loan is not repaid.

Table 4 Advantages and disadvantages of the three bottom-up projects

Project	Advantages	Disadvantages
SPARC: community toilet blocks	Able to respond directly to community needs and involve the community in providing solutions	It should be the government's responsibility to provide public toilets; not local communities
Hamara Foundation: Mumbai's street children	Able to concentrate funding and expertise on addressing a particular problem	Only very small numbers of children can be helped: 327 out of 200,000
Agora Microfinance India	A service that was impossible for the urban poor to access previously	Interest rates are high, reducing the profits that people can make

Activity

1 What benefits do the SPARC toilet blocks bring to Mumbai's residents?
2 In what ways does the project contribute to making Mumbai a more sustainable city?
3 Explain why the Hamara Foundation's strategy for helping Mumbai's street children is a bottom-up strategy.
4 Copy Table 4, which shows advantages and disadvantages of the three bottom-up projects. Add one more advantage or disadvantage (or both) to each project.

Improving quality of life in Dharavi

Dharavi is located on land worth an estimated US$10 billion, close to the Bandra-Kurla Complex – a new business district – and within easy reach of the main railway lines. The city government is keen to re-develop Dharavi through its top-down strategy of selling the cleared land to developers, on the understanding that free housing is provided for slum residents who can prove they have lived in Dharavi since 2000. Through the redevelopment scheme:

- 1.1 million new low-cost, affordable housing units will be built (as tower blocks, leaving space for higher-value apartments on the rest of the cleared site)
- water supplies and sanitation services will be provided for all residents
- education and health care services will also be built into the new developments, along with shopping malls, restaurants and leisure services.

However, Dharavi residents were strongly opposed to the plan. They were concerned that it would not be possible for Dharavi's many small businesses and micro-industries to continue in tower blocks, that the new housing would destroy the strong community of Dharavi and instead there would be social problems – more crime, for example.

A group of Mumbai urban designers suggested a different approach – to give the people of Dharavi the ownership rights to the land on which Dharavi is built, and then involve them in finding ways to improve living conditions in each neighbourhood of Dharavi.

Activity

1 Describe **one** advantage and **one** disadvantage of the government's top-down strategy for improving quality of life in Dharavi.
2 Suggest what are the advantages and disadvantages of giving local Dharavi communities ownership of the land and a role in deciding how best to improve Dharavi's quality of life.
3 Which do you think has more advantages than disadvantages – top-down or bottom-up?

Exam-style question

For a named megacity in a developing or emerging country, evaluate whether bottom-up solutions can improve the quality of life for residents. **(8 marks)**

Checkpoint

Now it is time to review your understanding of top-down and bottom-up strategies for improving quality of life in Mumbai.

Strengthen

S1 Explain the difference between a top-down strategy and a bottom-up strategy
S2 Why might some residents of Mumbai support top-down and bottom-up solutions to slums?

Challenge

C1 Which do you think would be the best approach for improving water supply, transport services or air quality in Mumbai – top-down or bottom-up? Explain your answer.
C2 Which do you think would be the best approach for improving city housing or health services – top-down or bottom-up? Explain your answer.

What happens when you're ill in Mumbai?

Mumbai's slums are a huge challenge because of poor water quality, waste disposal and lack of sanitation. Disease is rife and spreads easily. India has no national health service. If you need health care you have to pay for it or use insurance. But better health would improve the sustainability of communities.

Some charities focus on health issues, often on specific diseases and conditions. They are Non-Government Organisations (NGOs), and normally work in communities on **bottom-up** development schemes (see section 2.14).

Bottom-up development is where experts work with communities to identify their needs, offer assistance, and let people have more control over their lives.

Leprosy is a slow-developing, contagious, bacterial disease, which affects the skin, mucous membranes, and nerves. It causes skin discoloration and lumps, and at worst can cause body deformities. It is treatable and curable.

LSS – a case study of a health charity

Lok Seva Sangam (LSS) is a health charity working in Mumbai. It raises its own funds and employs volunteers. It was set up in 1976 to control **leprosy** in Chunabhatti slum, on the edge of Dharavi. Leprosy patients often have to put up with prejudice in their communities because the disease disfigures their body (see Figure 1). It is commonly found in slums. It is contagious and that increases the risk of infection.

LSS does a number of jobs:

- surveying communities to detect skin diseases
- setting up dermatology (skin) clinics
- running pharmacies (chemists) to dispense drugs used in treatment
- running kindergartens for young children to help parents.

▲ **Figure 1** *The effects of leprosy on a person's hand. Many people are affected like this over their entire body.*

Health-related work

As it grew, LSS expanded its work to the nearby slum of Baiganwadi (see Figure 2). In the 1980s, it had 4000 leprosy patients there and in Dharavi. By 2007, cases had reduced to 219. In 30 years, it treated 28 000 people for leprosy, of whom 75% were cured. It has now expanded its work further to treat people with tuberculosis (TB).

In 2015, LSS employed full-time medical staff, including three physiotherapists, three nurses, several paramedics (who identify health problems but do not treat or dispense drugs), and volunteers.

▲ **Figure 2** *Baiganwadi slum where LSS carries out its work*

Education

LSS now works mainly in Baiganwadi, focusing upon education. It calls its work 'SET' – **S**urvey, **E**ducation and **T**reatment. It employs five teachers. Their work:

- **surveys** and detects cases of TB and leprosy
- **educates** people about symptoms, so that they can recognise these. They also teach about care and treatment.
- **treats** people by persuading them first that treatment is easy. They follow up patients to complete treatments, and carry out check-ups.

Community work

LSS also works with communities to teach about health, using:

- exhibitions and group talks about diseases such as typhoid, and personal care
- street theatre, using drama to shows disease symptoms, and accessibility of health clinics
- DVDs played to community groups about health care.

Much of its work is with women (see Figure 3), focusing on:

- **sanitation** – like boiling drinking water, washing hands before food preparation, and waste disposal.
- education about **vermiculture** (worms composting waste). Worms reduce the bacteria in household waste by 'eating' it, producing compost as a result – which can then be sold!
- **activities** e.g. paper bag making, or sewing, to aid discussion as well as making items to raise money.

Of course, this is just one project in one community. It focuses on two diseases and education, and tries to extend community understanding of health. It is not city-wide, nor country-wide.

▲ **Figure 3** *Women's craft group run by LSS*

What do you think?

Should India provide free health care for those who can't afford to pay for it?

Exam-style question

1 For a named megacity, assess the success of a bottom-up development project designed to improve the lives of ordinary people. (12 marks)

Your questions

1 Read the definition of 'bottom-up development'. Describe three things about work done by LSS that fit this definition.

2 Look back at the 'three legged stool' of sustainability (section 3.12). List the economic, social and environmental benefits of work done by LSS.

3 What difficulties would there be in trying to expand the work of LSS outside a single slum?

GCSE Geography

Component 2: Coastal Change and Conflict

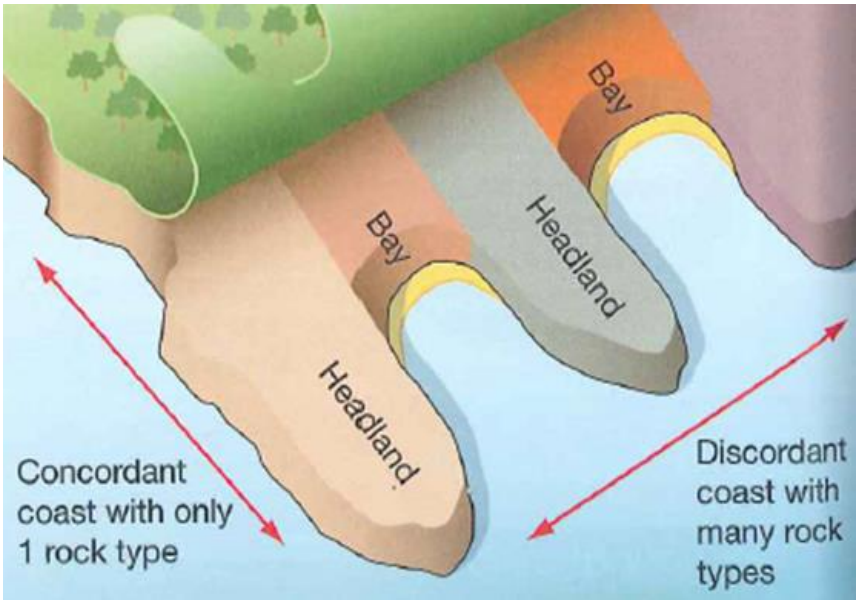
Resource Booklet

Name: _____

Class: _____

Lesson 1. How does geology influence the coastline?

Task Three: Coastlines



Describe the differences between **concordant** and **discordant** coastlines e.g. rock types, landforms etc.

_____
_____
_____
_____
_____
_____
_____

Explain how **coves** form at concordant coastlines.

_____
_____
_____
_____
_____
_____
_____

Lesson 2. Which processes act on the coastline?

Task One: Processes of Erosion

1. In which season will the waves erode the coast the most? ……
   Why? ……..

2. List the 4 main processes of erosion and explain each of them
   a) Hydraulic Action-

   b)

   c)

   d)

3. Draw a diagram to show the process of **hydraulic action**.

4. How might **biological weathering** speed up the erosion rate at the coast?

……
……

Coastal Erosion Definitions

Hydraulic Action – the force of waves hitting cliffs and squeezing air into cracks in the rock.
Abrasion/Corrasion – stones carried by waves are smashed into cliffs and so wearing the cliff away.
Attrition – any material carried by the waves will become rounder and smaller over time as it collides with other particles and all the sharp edges get knocked off.
Corrosion – rocks and minerals are dissolved by weak chemicals in sea water.

Task Three: Mass Movement

Mass movement is the downslope movement of rocks and soil from the cliff top under the influence of gravity. The three key types of mass movement are as follows.

1. **Rock falls** – these happen suddenly when pieces of rock fall from a cliff that has been weathered or undercut (Figure 6). Often this occurs when the rock at the base of the cliff has been undercut by the action of the waves, leaving the rock above unsupported and causing it to collapse.
2. **Slumping** – this often occurs after long periods of rainfall. The rain seeps through soil and **permeable** rocks such as sandstone. At the junction where the permeable rock meets an **impermeable** rock such as clay, the saturated rock slumps and slips, often in a rotational manner along a curved surface.
3. **Sliding** – this is similar to slumping but the movement of material occurs along a flat surface, usually a **bedding plane**. Large amounts of soil and rock move downslope rapidly (Figure 7).

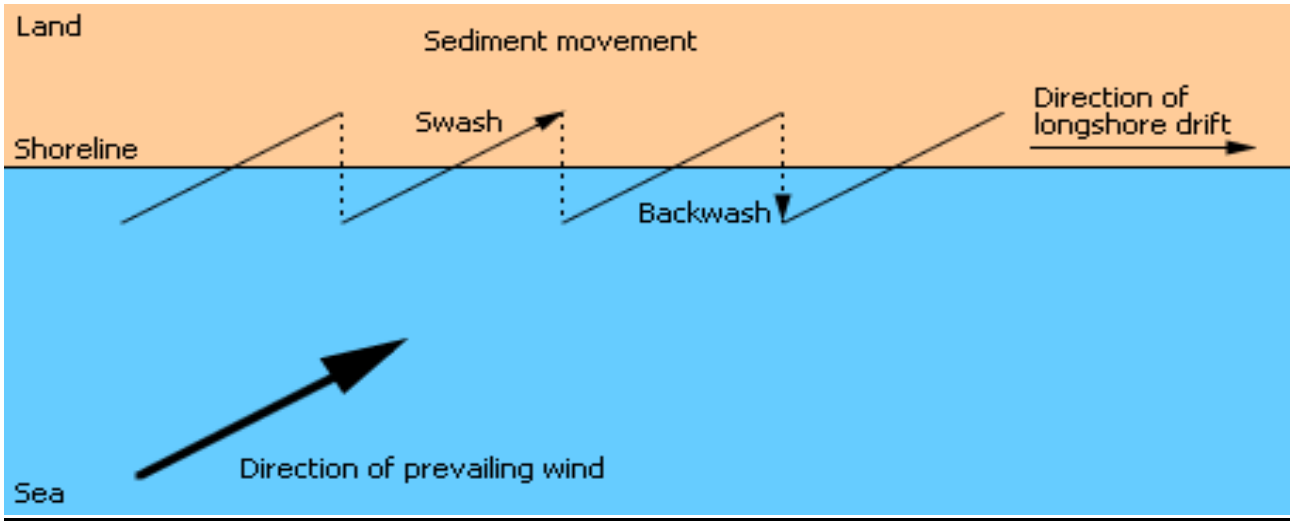
Weathering Information

Weathering is the breakdown of rocks at or near to the surface of the ground. The three key weathering processes that can affect rocks exposed at the coast are as follows.

1. **Mechanical (freeze thaw)** – in cold climates, freezing and thawing of water in cracks or holes in the rock may take place. When water freezes, it expands by about 10%, causing stresses within the rock. When the ice melts, water seeps deeper into the rock along the deepened crack. After repeated cycles of freezing and thawing, fragments of rock may break off. In warmer climates, something similar happens when salty seawater gets into cracks in the sea cliffs. As the water dries, crystals of salt form and build up. When they expand, they break up the rock.
2. **Chemical (acid rain)** – rainwater is slightly acidic (carbonic). When rain falls on rocks such as limestone, a chemical reaction takes place, causing the rock to weaken and break down when it is dissolved.
3. **Biological** – the roots of growing plants can widen cracks in cliff rocks. Burrowing animals and nesting birds on cliff faces can also cause the rock to weaken and break up.

Lesson 4. Which landforms are created by deposition?

Task One: Longshore Drift



Task Four: Beaches

Material eroded from cliffs is called **sediment**; this can be transported along the coast through **longshore drift** and is deposited by **constructive waves** to form a **beach**. A beach is a collection of sediment particles, it is not always sand which is 0.06-2mm in diameter but can include larger pebbles, cobbles and boulders.

Beaches are often found in sheltered **bays**, these beaches slope gently down to the sea and are made of sand. Beach profiles (cross-sections) are rarely smooth and may include a **storm beach** at the top end. Storm beaches are made when boulders and shingle are deposited further up the beach by large waves during storms. Below this a ridge of shingle and sand can form which is called a **berm**, this is made by the high tide. The smallest sediment is found nearest the sea.

Sometimes strong onshore winds can blow sand up the beach to create **sand dunes**. Over time small plants such as marram grass start to grow on the sand dunes which makes them more stable and stops the sand blowing away. These plants have to have long roots to become stable and can survive being sprayed by salt.

Lesson 5. How do human and physical processes impact on the coastline at Tyne and Wear?

Task One: The Coastline

Task Three: Tyne and Wear Information

Geology: The coastline is **discordant** which means coastal erosion creates **the bays and headlands** right up and down the coastline between the Tyne and Wear**.** Marsden Rock is a famous stack formed by hard limestone rock being more resistant to erosion than the softer limestone surrounding it. This has led to a headland. The rock has detached from the main headland over time as a stack.

Weathering: The weather in Tyne and Wear is usually above freezing and therefore salt crystal growth is the predominant type of physical weathering. This is where salty water thrown up by the sea lands on the cliffs, the water evaporates and leaves behind salt which forms crystals, these crystals grow and weaken the rocks.

Waves: The prevailing wind in the North Sea is from the North east, therefore this is the direction of the waves on the Tyne and Wear coastline. Both constructive and destructive waves are found here depending on the location and time of year.

Deposition: There are many depositional features on the Coastline between the Tyne and Wear. The main depositional feature is the sand dunes which have formed due to deposition of material from the constructive waves at Sand haven in South Shields.

Mass movement: Landslides and rockfalls are common on unstable softer cliffs south of Sand haven. The boulder clay on the top of the limestone all along the coast of Tyne and Wear is saturated easily by rainfall and then is prone to slumping.

Development: The vast majority of the Sunderland coastline has been developed. Most of the land is used for tourism including the new Stack development at Seaburn.

Agriculture: Both crop and animal farming take place at the **Whitburn** area of the coast between Tyne and Wear. The flat land and boulder clay on top of the limestone bedrock makes this a great location to farm. Although this has been declining as tourism and other employment opportunities have become available. Fishing takes place at **Roker Marina**.

Industry:

There are different types of industries located along the Dorset coast:

- **Port of Tyne**- uses containers to send products all over the world including Nissan Cars made in the Nissan factory in Washington.
- **Sunderland Docks**- the Spire bridge was created to increase traffic to the port at Sunderland to send good across to Europe.
- Tourism- This includes amusements, caravan parks, fairgrounds found at South Shields
- Leisure- The Seaburn section of the Sunderland coastline has recently been redeveloped with new leisure venues including the Stack (container boxes housing local food and retail stalls and a Thai Restaurant).

Coastal management: As much of the North East coast is valuable for tourism much of it has been protected. **Sunderland Seaburn and Roker** beaches both have sea walls and use beach replenishment to add sand to the beach.

Lesson 6. How does climate change increase the risk of coastal flooding?

Task Two: Flooding impacts

Rank	Effect
	Economic cost: When a storm surge hit Eastern and south East England in 2013 it was estimated that it caused damage of £100 million.
	Death: When a storm surge hit Eastern and south East England in 2013 2 people died.
	Damage to homes: When a storm surge hit Eastern and south East England in 2013 1400 homes were flooded.
	Evacuations: When a storm surge hit Eastern and south East England in 2013 thousands were evacuated.
	Damage to nature reserves: When a storm surge hit Eastern and south East England in 2013 freshwater habitats were inundated (covered) in salt water.
	Erosion: As sea levels rise beaches, spits and river deltas are eroded more quickly.
	Loss of land: As sea levels rise and storm surges become more frequent cliff retreat happens at a greater rate

Lesson 7. How can we protect the coastline?

Task Two: Evaluating coastal defences

Rip rap

Large rocks are placed at the foot of a cliff to absorb and dissipate wave energy. **Igneous** rocks e.g. basalt provide the most resistance to erosion.

Advantages and disadvantages:

- Can be very cheap depending on rock type (£300 per metre).
- Not effective in storm conditions
- Effective for many years (durable)
- Can make the beach inaccessible to tourists.
- Unattractive

Sea Walls

Long concrete walls built at the base of a cliff to absorb wave energy. Modern walls have a **recurved** face to reflect wave energy back into the sea.

Advantages and disadvantages:

- Very visible – makes residents feel safe.
- Can cause **wave scouring** if not positioned correctly.
- Effective for many years (durable).
- Expensive to build and maintain (costs £3000 per metre).
- Can make the beach unattractive to tourists.

Groynes

Wooden, rock or concrete fences which stretch from the coastline into the sea. They prevent **longshore drift** so sand builds up on one side of the groyne, making the beach wider and creating a buffer between the waves and the cliffs.

Advantages and disadvantages:

- Cost £5000 each.
- Keeps the beach in place for the tourist industry.
- Effective for many years.
- Look unnatural/ugly.
- Disrupts LSD so other places lose their beaches and experience more erosion. (**Terminal groyne effect**)

Beach Replenishment

The placing of sand and pebbles on a beach to make the beach wider. Beaches are the best natural defence against waves.

Advantages and disadvantages:

- The sea will continue to erode it.
- Quite cheap (£5000 per metre).
- Needs to be replaced every few years.
- It looks natural.
- Beaches provided for tourists.

Slope stabilisation

Drains are installed at the top of the cliff to remove groundwater. This prevents the rocks from becoming saturated and reduces slumping. Often wire mesh is placed over the cliff and piles and long nails are sunk into the cliffs to hold them in place.

Advantages and disadvantages:

- **Mass movement** is less likely.
- Safer for people on the beach
- Difficult to install.
- Expensive
- Keeps cliff in place.

Gabions

These are wire cages filled with rocks. They absorb the waves energy so that it doesn't reach the cliffs behind, reducing erosion.

Advantages and disadvantages:

- A cheaper type of sea wall (£100 per metre)
- Not very strong, the cages can break and need maintenance.
- If the cages break material used in abrasion is added to the sea.

Lesson 8. How can we manage the coastline sustainably?

Task Two: Options

Hold the line		**Use sea defences to move the coast further into the sea (make more land).**
Advance the line		**Take no action and let nature take its course.**
Strategic realignment		**Gradually let the coast erode and move people and businesses away from areas at risk.**
Do nothing		**Use sea defences to stop erosion so that the coast stays where it is today.**

Task Four: Opinions

Local residents

Local politicians

Environmentalists

Fishermen

Local businesses

Geography Knowledge Organisers

Key Case Studies

Use this booklet to support you with your revision in conjunction with your revision guide.

Knowledge Organiser: Boscastle River Case Study

Causes of flooding in Boscastle	Effects of flooding in Boscastle	Responses to flooding in Boscastle
1. Approximately 200 mm of rain fell in 24 hours. 2. The ground was saturated from previous rain storms i.e. a short lag time. 3. The drainage basin has steep slopes. 4. The drainage basin has areas of impermeable rock. 5. Boscastle is at the confluence of three rivers. 6. The flooding coincided with a high tide.	Social 1. Cars, vans and caravans were washed into the sea. 2. Buildings were flooded and/or destroyed. 3. Loss of communications. Economic 1. Loss of income from tourism 2. Loss of businesses Environmental 1. Two million tonnes of water flowed through Boscastle in one day. 2. Trees were uprooted. 3. Debris was scattered over a large area 4. Loss of habitat	Short-term 1. Helicopters rescued people from trees and roof tops. 2. Buildings were searched. 3. Cars, which had been swept away, were removed from the harbour. 4. Trees were removed from the river channel. 5. Roads were cleared. Long term responses 1. The shop was rebuilt. 2. The river was widened and lowered. 3. A drainage culvert was improved to allow more water to flow through. 4. The car park was raised and given a permeable surface. 5. A new bridge was built. 6. Water gauging stations were installed.

Key Term	Vocabulary
Saturated	Soil becomes saturated when it absorbs as much water as possible.
Impermeable rock	Do not allow water to pass through them.
Permeable rock	Allow water to pass through them
Confluence	The point where two rivers meet

Key Facts

The flood on 16 August 2004 in Boscastle in Cornwall was among the most extreme ever experienced in Britain.

Possible Exam Questions

- The UK's weather and climate affects river processes in river landscapes. Explain one way the weather and climate can affect river erosion. (2)

Knowledge Organiser: California (developed country) Drought Case Study

Causes of drought in California	Effects of drought in California	Responses to drought in California
1. January 2014: state of emergency declared. 2. Lower than normal rainfall and snowfall in the west of the USA. 3. Colorado River supplies six states with water all of which extracted too much. 4. High levels of water wastage and over-use	**Social** 1. Lack of drinking water 2. Increased food and water prices **Economic** 1. Power supplies effected e.g. hydro-electric power, thermal power stations. 2. Farmers lost US$1.8 billion. 3. 10,000 jobs lost in farming 4. Food prices increased. **Environmental** 1. Wildfires: ash and debris damaged water supplies and blocked rivers. Caused mudslides and flooding. 2. Seawater intrusion e.g. Santa Barbara 3. Farms affected by saltwater contamination and wildfires. 4. As acquirers empty of water, the structure of the land changes. It settles lower and this causes subsidence.	**Charities** 1. California Water Service Group: gave US$600,000 2. Pacific Water Institute gave money to local people. **Government** 1. State of emergency declared 2. Limited flow of water in winter months 3. Reducing water supplies to the minimum for public health 4. Installing salinity points to stop seawater intrusion 5. Running education and information programmes 6. Increased monitoring of river water levels **Local people (individuals)** 1. Stop using hosepipes in gardens 2. Farmers pump groundwater from ever-deeper supplies or use only certain areas of their land.

Key Term	Vocabulary
Drought	An extended period of lower than normal rainfall causing water shortages
Aquifers	An underground store of water formed when permeable rocks lie on top of impermeable rocks.
Subsidence	Collapse of land

Key Facts about the Californian Drought

- California is one of the wealthiest states in the USA. It is located on the west coast bordering the Pacific Ocean - popular for tourists. I
- t has several large universities and industrial areas such as the Silicon Valley.
- In January 2014 a state of emergency was declared by the governor which meant that laws and regulations could be put in place to help deal with the impact of the drought.

Possible Exam Questions

- Assess the following statement. Drought presents a greater threat to people living in developing countries rather than those living in developed countries. (8)
- Explain one human cause of drought. (2)
- Suggest one impact of drought for people living in a developed country. (3)

Knowledge Organiser: Ethiopia (developing country) Drought Case Study

Causes of drought in Ethiopia	Effects of drought in Ethiopia	Responses to drought in Ethiopia
1. Since the 1980s the short rain season has been getting shorter and increasingly delayed 2. The long rain season has become unpredictable. 3. Warming of the Indian Ocean means rising air loses more moisture as rainfall and dryer air moves westward over East Africa.	**Social** 1. 85% of the population depend on farming. 2. Unreliable rains makes planning for farmers difficult. 3. People in rural areas rely on local trees for building materials – drought reduces availability and increases cost. 4. Hunger and malnutrition. 5. Only 57% of people have access to water: people have to walk several KMs to get water. Time collecting water takes children out of schools and women out of jobs. 6. Water sources often become polluted which leads to disease: typhoid, cholera, dysentery, 7. Causes rural to urban migration. **Economic** 1. Increased cost of food as food supplies decrease. 2. Foreign trade affected e.g. selling coffee beans **Environmental** 1. Crops die 2. Ground dried and cracked 3. Water sources are polluted 4. Marshland dry out 5. Rivers polluted by dead animals	**Media** 1. Band Aid 1985: 'Do they know it's Christmas?' **Charities** 1. NGO's (non-governmental organisations) like UNICEF and Oxfam work with local experts to help the worst affected people. Provide clean water, food and medical care. Help local people develop new farming techniques. 2. UNICEF: US$60 million on aid 3. Red Cross: raised 1.4million Swiss Francs **Government** 1. Government organised relief programmes **Local people (individuals)** 1. Educated on new farming techniques

Key Term	Vocabulary
Drought	An extended period of lower than normal rainfall causing water shortages
NGO	A non-governmental organisation

Key Facts about Ethiopia

- Ethiopia is a developing country in Eastern Africa.
- It has suffered from many droughts which have led to famine and huge loss of life.
- The worst periods have been 1984, 1994, 2004 and 2014-16.

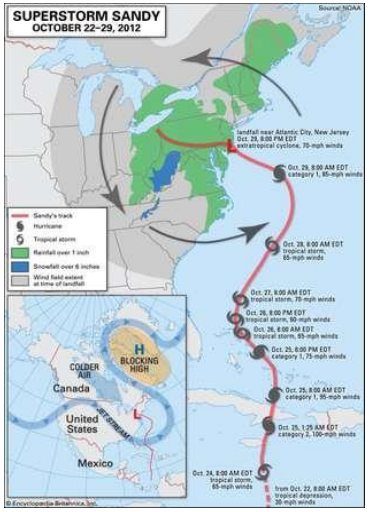
Possible Exam Questions

- Assess the following statement. Drought presents a greater threat to people living in developing countries rather than those living in developed countries. (8)
- Explain one human cause of drought. (2)
- Assess the different responses to drought in a named emerging or developing country. (8)

Knowledge Organiser: Hurricane Sandy, USA (developed country) Tropical Storm Case Study

Causes of Hurricanes

1. **When**: 22-29 October 2012
2. **Where**: Cuba, Dominican Republic, Haiti. United States, Jamaica, The Bahamas,
3. **Size on Saffir-Simpson scale:** Category 1
4. **Wind speeds when it made landfall:** 129km/h



Effects of Hurricanes

Social

1. 150 killed
2. Millions left without electricity
3. Transport links closed: more than 19,729 flights cancelled. New York's LaGuardia and Newark Liberty International Airport remain closed due to storm damage
4. Schools closed
5. Homes and businesses damaged
6. 1 November: Manhattan public schools remain closed

Economic

1. Damage: $65-75 billion
2. New York Stock Exchange forced to close.
3. Petrol in short supply.
4. Tourism industry affected by the cancelling of the New York Marathon

Environmental

1. Nature reserves were damaged by the storm surge e.g. Prime Hook National Wildlife Refuge.
2. Raw and untreated sewage was released into the waters around New York and New Jersey.

Responses to Hurricanes

Media

1. Played a large part in raising funds for example, charity concerts, telethons and corporate donations.
2. Posts on social media helped local people and the government assess the damage caused.

Charities

1. 9,000 people in 13 states spent the night in 171 Red Cross operated-shelters
2. 4000 disaster workers provided by Red Cross.

Government

1. President Obama and New Jersey Governor Chris Christie tour the storm-damaged area near Atlantic City.
2. More than 1500 FEMA personnel used to support.
3. Changed legislation to provide billions of dollars to the affected states to help with rebuilding and supporting victims.
4. State of New York set up a local government office to co-ordinate rebuilding efforts.
5. Used satellite images to assess damage and respond to the worst-affected areas as quickly as possible.

Key Term	Vocabulary
Saffir-Simpson scale	Hurricane Wind **Scale** is a 1 to 5 rating based on a hurricane's sustained wind speed.
Storm surge	a rising of the sea as a result of wind and atmospheric pressure changes associated with a storm.
Stock Exchange	A stock exchange is a workplace where stock brokers and traders can buy and sell shares of stock, bonds, and other securities.
Sewage	Waste water and excrement conveyed in sewers.
Telethons	A very long television programme, typically one broadcast to raise money for a charity.
FEMA	(in the US) Federal Emergency Management Agency.
Legislation	Laws.
Landfall	When the hurricane arrives over land.

Key Facts about…

- The use of social media (Twitter and Flick) helped assess the damage.
- Storm surges caused most of the damage to the East coast of the USA.

Possible Exam Questions

- Explain one economic impact of tropical cyclones (hurricanes and typhoons) on a developed country. (3)
- Evaluate different responses to the environmental impacts of tropical cyclones in a named developed country. (8)

Knowledge Organiser: Typhoon Haiyan, Phillipines (developing country) Tropical Storm Case Study

Causes of Typhoon

When: 2 November 2013

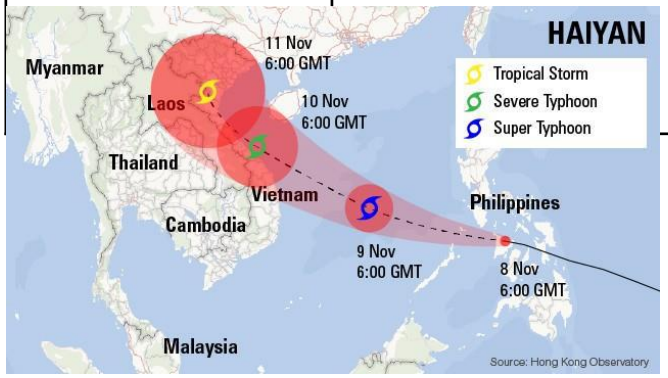
Where: South Pacific Sea, close to the Federation States of Micronesia

Size of Saffir-Simpson scale: Category 5

Wind speeds when it made landfall: 300km/h

Most of the damage on the islands of Samar and Leyte.

Flooding and landslides reported across the Philippines.



Effects of Typhoon

Social
1. 6000+ dead
2. Power was cut off
3. Aid could not reach some areas as they were blocked off by landslides.
4. Tens of thousands were made homeless.

Economic
1. Cost of damage was estimated to be US$2billion.
2. Transport was disrupted.

Environmental
1. Across the islands mangroves were damaged and thousands of trees were uprooted.
2. Chemical leaks from damaged industrial facilities.
3. Tanker ran aground which caused oil spill.

Responses to Typhoon

Media
1. American band Journey donated $350,000 to help relief efforts in the Philippines
2. The Coca-Cola Company says they $2.5 million of their advertising budget to the relief efforts.
3. By mid-December FIFA donated $1 million.

Charities
1. Relief effort was slowed due to damaged infrastructure (roads/airports)
2. *Buddhist Tzu Chi Foundation*: emergency cash aid of 8000, 12000 or 15000 pesos depending on family size for over 60,000 families and has been providing free clinics, hot meals, and temporary class rooms for over 15 schools in the area.

Government
1. 7 provinces placed under a 'state of national calamity': government gave these areas specific funding.
2. Residents evacuated from Tacloban but could only happen during daylight as there was no electricity in the area. This made people panic and rush at evacuation planes: people had to be held by police and the military.

Local people (individuals)
1. Local people were evacuated.
2. Displaced (those who were forced to move) families helped rebuild their own homes.

Key Term	Vocabulary
Aid	financial or material help given to a country or area in need.
Mangroves	a tidal swamp which is dominated by mangroves trees.
Relief	financial or practical assistance given to those in special need or difficulty.
Infrastructure	buildings, roads, power supplies)
Displaced	Forced to leave their home
FIFA	Fédération Internationale de Football Association

Key Facts about ……

The track of Typhoon Haiyan ranged between 1-5.

£10 million package of aid (loans and grants) was given as well as emergency shelter, water and household items.

Knowledge Organiser: The New Forest, UK (developed country) Deciduous Woodland Case Study

Causes of deforestation	Effects of deforestation	Responses to deforestation
Population growth 1. The movement of visitors in TNF is increasing litter, causing erosion of paths and increasing air pollution from traffic. 2. Higher car ownership – demand for wider roads to ease congestion. 3. Land to build news homes – pressure on green belt sites where houses can fetch higher prices. Timber extraction 1. Replanting with conifers – 38% of deciduous woodland cleared in 20th century. 2. Conifers are more economic – faster growing, easier to manage and quicker return of money. Agricultural change 1. Pesticide damage – woods often border farmland so chemicals sprayed on crops can damage trees and wildlife.	Social 1. Visitors cause trampling of delicate plants, erosion of grass, start fires with BBQs and drop litter. Economic 1. Some forestry operations are not compatible with visitors using woodland for recreation Environmental 1. Conifers create a dense canopy which blocks light for other species. Its creates a monoculture. They are a non-native species. Reduces biodiversity. 2. Visitors scare livestock (ponies and pigs) by driving too fast. 3. Visitors scare young foals.	National Park Authority 1. Careful management by creating dedicated walking and cycling routes in delicate areas. 2. Awareness raising through leaflets and posters of the importance of sustainability. 3. Landowners funded to plant native species. 4. Pesticide use limited. 5. Work restricted between April – August to minimize disturbance to nesting birds. 6. New trees planted and tree felling controlled. Green Leaf Tourism Scheme 1. Promotes the use of local products; businesses give percentage of land for wildlife and encourage visitors to walk or use bikes. Sustainable transport schemes 1. Tourists use bikes and electric vehicle hire to ease congestion and air pollution.

Possible Exam Questions

Explain one cause of deforestation in deciduous woodlands. (2)

Evaluate the different approaches used to manage the threats facing deciduous woodlands in a named region. (8)

Key Term	Vocabulary
Deciduous	trees that drop their leaves in Autumn
Agriculture	farming the soil for the growing of crops and the rearing of animals to provide food, wool, and other products.
Congestion	Overcrowded
Conifers	tree that bears cones and needle-like or scale-like leaves that are typically evergreen.
Pesticides	a substance used for destroying insects or other organisms harmful to cultivated plants or to animals.
Monoculture	the cultivation of a single crop in a given area.
Native species	An animal or plant indigenous to a place.
Sustainability	Able to continue without causing damage to the environment.

Key Facts

- The New Forest is on the south coast of England.
- The New Forest is 480 km².
- Around 175,000 people life in The New Forest.
- 15 million people visit The New Forest each year.
- 40% of the woodland is privately owned and is often left unmanaged.

Knowledge Organiser: Amazon Rainforest in Costa Rica (emerging country) Tropical Rainforest Case Study

Causes of deforestation	Effects of deforestation	Responses to deforestation
1. Mining – rising demand and rising prices for minerals in rainforest. 2. Road building – to transport resources like iron ore and timber, often built without proper controls. 3. Illegal logging – high demand in the Western world. 4. Rapid population growth - rising demand for housing and agriculture. 5. Oil palm plantations – in demand as ingredients in foods, cosmetics and as biofuel. 6. Cattle ranching - needs vast areas of land. 7. Subsistence agriculture – land cleared to grow crops quickly loses its nutrients so farmers clear more.	**Social** Loss of homes and livelihoods of local indigenous people. **Economic** Provides resources for people locally and worldwide, including food, water and timber. **Environmental** Loss of natural habitats home to a diverse range of plants and animals (1300 birds and 40000 plant species).	**Direct Government Action in Costa Rica** 1. People did not pay as much tax if they conserved (looked after) the rainforest area. 2. The government give $50 per hectare for forest that has been protected. The areas targeted for protection have high biodiversity. 3. Rainforest is divided into 11 eco-regions. Each area makes its own decisions. **Carbon Credits in Costa Rica** 1. They sell the credits to countries who do make a lot of carbon such as China. 2. It has created $20million dollars for Costa Rica. **NGOs: Central Volcanic Mountains Development Foundation in Costa Rica** 1. It works with 400 landowners who own 46000 hectares of land. 2. It has used a US$10million dollar grant. **Ecotourism in Braulio Carrillo National Park** 1. It looks after 485 hectares of rainforest. 2. The employees are from a local village called Las Horquettas meaning locals are employed. 3. If the ecotourism site did not develop the trees would have been cut down. **Private Reserve: Monterverde Cloud in Costa Rica** 1. 10500 hectares was founded by Americans. 2. They have created a wildlife sanctuary to look after the animals and plants because it has high biodiversity. 3. It allows tourism, but only a few people at a time. 4. It has guided walks and trails so people do not wander off and do damage.

Key Term	Vocabulary
Deforestation	permanently removing forest.
NGO	NGO's are similar to charities. They do not make any profit.
Cattle ranching	Grazing cows on grass
Ecotourism	tourism intended to support conservation efforts and observe wildlife.
Private reserves	those protected areas that are **privately** owned but are used for public benefit
Carbon credits	a permit which allows a country or organisation to produce a certain amount of carbon emissions.
Indigenous	People who originated from that particular place.

Key Facts

- Around the world 7.3 million ha is cleared each year.
- Destroyed 50% of TRF
- Soaks up 10% global CO2 emissions
- Brazil an area the size of Germany has been lost.

Possible Exam Questions

Explain two causes of deforestation in tropical rainforests. (4)

Assess the role of biotic and abiotic characteristics in the functioning of tropical rainforests. (8)

Knowledge Organiser: Mexico City (emerging country) Urbanisation Case Study

Causes of urbanisation

Push factor: Reasons for people moving out of (emigrate) from a place
Pull factor: reasons that make people move into (immigrate) a place

Push Factors

1. High unemployment rate
2. Overpopulation
3. Few schools
4. Lack of running water
5. Lack of health care
6. Trade and communication difficult
7. Poverty

Pull factors

1. Employment opportunities
2. Better schools
3. Better health facilities
4. Good entertainment

Effects of urbanisation

Social

1. Huge pressure on housing; shanty/slum towns built by migrants on city edge
2. Migrants from USA, Germany and France live in richer homes close to the city centre
3. There are many diseases among children and the infant mortality rate is quite high

Economic

1. Jobs are informal and pay very little.
2. Children often have to work and don't go to school

Environmental

1. The road systems are overcrowded and this causes poor air quality and illness
2. Each day 11,000 tons of rubbish is dumped on streets and in waterways.
3. The rubbish clogs up the drainage system and so water flows into open rivers.

Responses to urbanisation

Top-down: Barter Market

1. Who? The mayor and managers of Mexico City.
2. What? After closure of a massive rubbish tip the city set up a farmer's. Families brought their paper, metals and other recyclable waste to exchange for 'green point' vouchers. The vouchers could be used to buy fruit and vegetables. Over 3000 families lined up with rubbish bags on the first day.
3. Result? 11 million tonnes recycled on the first day. But this is a small dent in the very big problem.

Bottom up – Community group in Neza.

1. Who? Community based initiatives in an area called Neza (on the outskirts in the south east of the city). A small group of migrants formed a group and created a plan to develop the area.
2. What? They were able to raise small amounts of money. They built schools and later improved the area by volunteer work. Next they opened a healthcare centre. Finally, they started a programme of self-build houses.
3. Result? there was less crime in this area of Mexico City.

Top down - Green Plan (Plan Verde)

1. Who? The mayor and managers of Mexico City.
2. What? In 2007 a 15 year 'green management' initiative was drawn up. The plan focusses on improving and making environmentally friendly public spaces, waste handling and sanitation. A Metrobus, using eco-friendly vehicles on 16 routes, has reduced air pollution.
3. Result? Air pollution is down by 35% from levels in 2000.

Key Term	Vocabulary
Economic investment and growth.	Increase in job opportunities in factories and offices as investment (putting money in).
Rates of natural increase	The difference between the birth **rate** and the death **rate**
Rural to urban migration	People leaving the rural areas for urban areas.
Spatial inequality	The unequal spread of resources and services an area has.
Informal economy	The part of the economy that is neither taxed nor monitored by the government
Top-down	Actions completed by the government or transnational corporations (TNCs).
Bottom-up	Actions completed by local people or non-governmental organisations - charities (NGOs).

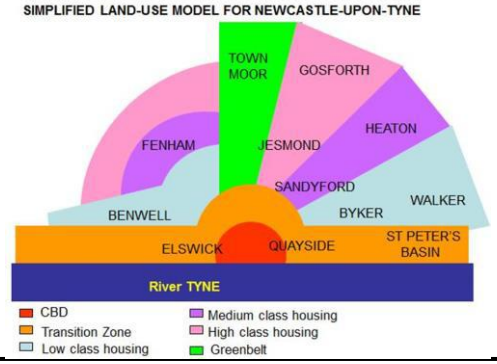
Possible Exam Questions

- Explain two ways that bottom-up approaches have been used in a named major city in either a developing or an emerging country. (4)
- You have studied a major UK city and a major city in a developing or emerging country. Assess the impacts of migration on these cities. (8)
- You have studied a major UK city and a major city in a developing or emerging country. Evaluate which of these cities have been most successful in improving the quality of life for its people. (8)
- You have studied a major city in either a developing or emerging country. Evaluate the ways that the challenges of rapid urbanisation have been managed to improve the quality of life. (8)
- Explain two negative impacts of rapid urbanisation on a city in a developing or emerging country. (4)

Knowledge Organiser: NEWCASTLE-UPON-TYNE
Example of a city in a developed country

What is the structure of Newcastle?

- **Inner City** - The area around the CBD – usually built before 1918 in the UK.
- **CBD** - The main shopping and service area in a city. The CBD is usually found in the middle of a city so that it is easily accessible.
- **Suburbs** - The area on the edge of the city. Many suburbs were built after 1945 and get newer as they reach the edge of the city.



How has Newcastle changed over time?

- Migrants arrived from Pakistan and lived with family and friends in **Elswick.** The mainly live in terraced housing.
- Many families lived in **Byker** as they once worked in shipbuilding.
- In the 1930's council estates were built in the suburbs for example in **Heaton**.
- In the 1960's the old 19th century terraces in the inner city were demolished and families moved to the suburbs for example **Fawdon**.
- Newcastle is popular with students. They live close to the CBD in areas such as the **Ouseburn**.
- More recently people have arrived to Newcastle from Syria. They are **refuges**.
- Old factories in the **inner city** have been redeveloped and turned into apartments. People are moving here from the suburbs.
- Some families who lived in **Jesmond** have now moved to the **Great Park** on the edge of Newcastle as the houses ae larger, more modern and have bigger gardens.

What do the words urbanisation, suburbanisation, counter-urbanisation and re-urbanisation mean?

- Urbanisation: The **increase** in the percentage of **people living in towns and cities**, causing them to grow.
- Suburbanisation: The **outward spread of the built-up area**, often at a lower density compared to the older parts of town.
- Counter-urbanisation: The movement of people and employment from **major cities to smaller settlement and rural areas** located beyond the city or to more distant towns and cities.
- Re-urbanisation: The movement of people **back towards city centres** away from rural areas and suburbs.

How has deindustrialisation affected Newcastle?

Globalisation:
Cities have become part of a 'world market'. Industries, such as shipbuilding, have suffered badly from **competition from China and India**. Whre production costs are much **cheaper** due to **low wages** and **less strict employment laws. Factories closed**, e.g. Swan Hunters shipyard (Wallsend), Vickers shipyard (Elswick) and Armstrong (arms factory) in Elswick.
It left many **brownfield sites**, with **empty factories and warehouses** e.g. the Vickers factory site at Elswick.
There was some **large scale pollution** of the land where former industries had taken place, e.g. at the Tar Works in Walker. Workers were made **redundant** - employment in the shipyards fell by 22% in the 1970s.
De-centralisation:
During the 1970s, there was a period of de-centralisation where many **inner-city areas were re-developed and industry either closed or moved out of the city. New factories which opened tended to be in the suburbs**, e.g. Formica in North Shields, **so people in the inner-city areas find it hard to travel to them.**
Development of infrastructure: The development of the **Central Motorway and the Metro system in Newcastle in the 1970s led to the demolition of older factories and warehouses**. Some of these never reopened; others moved to the rural-urban fringe in more modern developments.

How has migration affected Newcastle?

Reason for moving to Newcastle	Impact on Newcastle
Commonwealth Migrants: In the 1950s, the government encouraged immigration from former colonies	• fill jobs that people no longer wanted to do in transport and industry • Made Newcastle more multi-cultural e.g Mela festival • Lead to decline in housing in Elswick and Byker as people were paid low incomes.
International migrants from Hong Kong	• makes Newcastle more multi-cultural with Chinese restaurants and supermarkets .
Study –There are around 50,000 students in Newcastle.	• Using resources (healthcare, etc.) • can fill up part time/seasonal jobs • spending money which helps the economy
EU migration - Since 2000, many migrants have come from countries in Eastern Europe	• More competition for jobs • fills labour and less desirable jobs • people paying taxes to improve economy
Flight from conflict – refugees from Syria and Afghanistan	• Large number coming at once makes it difficult to prepare • Increase crime and tension • increases inequality • filling jobs with shortages

How has shopping changed in Newcastle?

- In the early 1990s, the CBD changed as a result of **de-centralisation** in the city.
  - The **Metro Centre** in Gateshead opened in 1986; this offered free parking and an under-cover, pedestrianised shopping centre with large department stores like House of Fraser and Debenhams.
  - Other out of town shopping parks developed, such as **Silverlink** in Wallsend, which offered larger retail units and easier access than the CBD.
- Another factor affecting retail in the CBD has been the growth **of internet shopping.**

The CBD fights back

1. Pedestrianising areas of the CBD to make a more pleasant shopping environment
2. Redevelopment of Eldon Square, including a new food court, to provide a similar experience to the Metro Centre.
3. Redeveloping older, run down parts of the CBD such as Pilgrim Street, Stephenson Quarter and St James', to provide a more attractive environment
4. Encouraging stores to have late night opening.
5. Offering free parking on evenings and Sundays.
6. Having special offers such as 'Newcastle Restaurant Week' to attract people back to the city centre.

get into newcastle Alive after five

How is Newcastle becoming more sustainable?

- **Transport schemes** – Car share schemes/Metro system/Park and Ride/Bus network. Go Zero Newcastle is heading towards a zero carbon future! Go Zero is Newcastle City Council's campaign to help reduce the city's carbon footprint by encouraging our residents to travel by more sustainable modes. Car Clubs Newcastle City Council is working with Co-wheels Car Club to offer a convenient greener and cheaper alternative to owning your own car. Electric Vehicles The North East is leading the way in the development of electric car use, and leading the charge when it comes to installing electric vehicle charging points. (80 charge points throughout the city) **Impacts** = Reduced levels of pollution due to less congestion (traffic jams). Quieter/Safer inner city roads/Reduced carbon emissions.
- **Recycling Schemes** – Residents have recycle bins allocated/Ban on open fires within inner city under clean air act. Reduces amount sent to landfill (20% reduction since 2000)
- **Open Space/Green belt** – Protection of habitats/More pollution absorbed by greenery (carbon sink) Linked to better of life.

Knowledge Organiser: India (emerging country) Development Case Study

Causes of development

1. India is a member of global groups such as the World Trade Organisation.
2. India's globally spread population generates income in remittances.
3. Rapid increase in the tertiary sector from 27% in 1947 to 52% now. This has led to increased employment opportunities and a growth in India's economy.
4. Fastest growing telecom markets in the world.
5. Second largest wireless internet access in the world.
6. During the 1990's changes in India's trading policies led to rapid rise in imports and exports.

Effects of development in India

Social

1. Increased population density in cities.
2. Breakdown of the traditional family unit as young people move to cities.
3. Widening development gap between urban and rural areas.
4. Widening development gap between rich and poor.
5. Continuing low status of women
6. Greater investment in schools and education
7. Literacy rate has risen
8. Better access to healthcare which has reduced infant mortality rate.
9. Increasing life expectancy from 54 years in 1985 to 68 years in 2015.
10. High levels of pollution in cities has led to poor public health.
11. Lack of housing means people live in slums.

Economic

1. Development has been uneven between the core and the periphery.
2. In the core, average income is 140,000 rupees per person this is due to investment in industry.
3. In the periphery, average income is 23,435 rupees per person this is due to harsh physical environments.
4. Over 1 million new ICT jobs created.
5. Growing consumer market.
6. Increase in tourism.

Environmental

1. Increase in secondary industry has led to rising air pollution
2. Deforestation
3. Increased CO_2 emissions has contributed to climate change.
4. Increase in water pollution due to chemicals used in industry.

Responses to development in India

The Smart Cities Mission: Vision Mumbai is a new initiative by the government to improve equality and the quality of life. The project will run between 2015 and 2020 and cover 100 cities across the country. Its core infrastructure elements include:

1. adequate water supply
2. assured electricity supply
3. improved sanitation
4. affordable housing, especially for the poor
5. health and education
6. efficient public transport.

Role of Coca-Cola in India

Advantages

1. Invested $2billion until 2011
2. Will invest another $5billion until 2020
3. Created indirect employment for 150,000 people
4. Directly employs 25,000 people
5. Created community development programmes including; "support my school"
6. They have a women empowerment programme
7. Drip irrigation saves 1200kl/hectare of water
8. Holds awareness camps on sanitation. Sanitation is the key element to social and economic development
9. Re-built 18 schools as part of an aid programme after the Bihar floods
10. •Provided schools with education materials, school uniforms and separate toilets for girls and boys.

Disadvantages

1. Increased pressure on ground water due to high water requirements
2. Left land poisoned with sludge
3. Draining water that feeds into wells – farmers lose their job.

Key Term	Vocabulary
Development	The process where people, a place or a country change or make social or economic progress.
Core	Most economically advanced areas
Periphery	Parts of the country outside the core economic zone.
Remittance	Money sent back by migrants to their family in the home country.
Secondary industry	Manufacturing of raw materials
Tertiary Industry	Providing a service

Possible Exam Questions

- For either a named developing or emerging country, explain two negative impacts of growth in the secondary sector. (4)
- Assess the factors that have influenced the growth of core and peripheral areas within either a named developing or emerging country. (8)
- For a named developing or emerging country, explain two reasons the population structure has changed in the last 30 years. (4)
- Assess the social and economic impacts of private investment by TNCs in a named developing/emerging country. (8)
- Assess the positive and negative impacts of rapid development on either a named developing or emerging country. (8)

Knowledge Organiser: Germany (developed country) Energy Management Case Study

Causes of an increase in renewable energy	Effects of an increase in renewable energy	Responses to an increase in renewable energy
1. Germany want to replace nuclear with renewable energy to reduce their greenhouse gas emissions. 2. Following Japan's Fukishima disaster in 2012 Germany closed 8 of its nuclear plants and plans to close the rest by 2022. 3. By 2014 Germany produced 30% of energy from renewables.	Social Peace of mind that there won't be a nuclear disaster like other countries have experienced. Economic Better energy efficiency costs less money. Environmental Improved air quality and less potential environmental disaster if there was a leak.	Bavaria Solarpark 1. 26 hectares (62 acres) and uses 60000 photovoltaic panels. 2. The project is anticipated to reduce CO2 emissions by more than 100000 tonnes over the next 30 years, by producing approximately 215 kilowatt/hour of clean power over the next 20 years. 3. There are incentives to individuals and organisations to install on homes and businesses. Norsee Ost farm in the North Sea. 1. Germany's government plans to have wind energy production of around 6500 MW by 2020. 2. By 2014 Germany was producing approximately 8% of its electricity from wind turbines. 3. Germany is also replacing its old wind turbines with new, more efficient ones, to increase power production. 4. This approach has resulted in less opposition by people who recognize the benefits of switching from nuclear and planning restrictions have been lifted in some areas to install new ones.

Key Term	Vocabulary
Feed-in tariff	A payment that motivates or encourages someone to do something.
Greenhouse gas	A gas that contributes to the greenhouse effect
Efficiency	Achieving maximum productivity with minimum wasted effort or expense.
Photovoltaic panels	Solar panels
Renewable	Energy from a source that will not run out.
Non renewable	Existing in finite quantity; will run out.

Key Facts about

Germany is Europe's strongest economy, and it is the fourth largest economy in the world.

Fukushima **nuclear disaster** (2011), A tsunami flooded and damaged the plant's 5 active reactors, drowning two workers. Loss of backup electrical power led to overheating, meltdowns, and evacuations.

Chernobyl **disaster** (1986) Overheating, steam explosion, fire, and meltdown, necessitating the evacuation of 300,000 people from Chernobyl and dispersing radioactive material across Europe

Possible Exam Questions

- Assess the impacts on people of developing non-renewable and renewable energy resources. (12)
- Explain one way a named developed country has attempted to manage its energy resources in a sustainable way. (4)
- Assess the reasons why the UK and other countries use a mix of different energy resources. (8)

Knowledge Organiser: China (emerging country) Energy Management Case Study

Causes of unsustainable energy use	Effects of unsustainable energy use	Responses to unsustainable energy use.
1. The rise in car ownership, heavy traffic congestion and the use of low grade gasoline are leading causes. 2. China contributes 29% to global carbon emissions – more than any other country. 3. Has seven out of ten of the world's most polluted cities. 4. China burns more coal than USA, Europe and Japan combined. 	Social 1. Air pollution can cause lung disease. 2. Cardiovascular disease, as well as cancer and birth defects. Economic 1. The government is trying to reduce coal consumption by closing polluting mills, factories and smelters. 2. Switching to other eco-friendly energy sources. Environmental 1. Coal contains high levels of ash and Sulphur that when burned cause high levels of pollution.	**The Three Gorges Dam** 1. Generates 98.8 billion kilowatt hours, equivalent of 49 million tonnes of coal. 2. Preventing 100 million tonnes of CO2 emissions. 3. Cost US$30 million although it should pay for itself in 10 years. 4. Construction forced 1.4 million people to be relocated from homes. 5. Flooded 632km2 of habitat. Gobi desert - Solar power 1. China has become one of the world leaders in generating solar energy. 2. It is currently building a giant solar power station in Gobi desert which could potentially produce enough energy to supply 1 million homes. 3. It will cover 10 square miles and generate 200MW of solar energy.

Key Term	Vocabulary
HEP	Hydro-Electricity Power – building a dam and the water flowing through turbines generates electricity
Congestion	Overcrowding of the roads.
Cardiovascular disease	relating to the heart and blood vessels.
Consumption	using up a resource.
HEP	Hydro electricity power
Generate	produce or create.
Relocated	Moved elsewhere
Smelters	an installation or factory for smelting a metal from its ore.

Key Facts

Three Gorges Dam is the biggest producer of power in the world but still meets less than 2% of China's electricity needs.

The dam has an impact on wildlife in the Yangtze and is threatening the lives of a huge number of animal species, including the Yangtze dolphins.

Possible Exam Questions

- Explain one reason why the development of hydro-electric power (HEP) can have negative impacts on people and the environment. (4)
- Evaluate different approaches used by either a named developing or emerging country to manage and use energy resources in a sustainable way. (8)
- Assess the impacts on people of developing non-renewable and renewable energy resources. (8)
- Assess the reasons why the UK and other countries use a mix of different energy resources. (8)

Knowledge Organiser: Paper 3 Urban Fieldwork Ouseburn

What are your fieldwork questions?

To what extent has rebranding in the Ouseburn been successful?

1. Has the environmental quality of the Ouseburn improved?
2. Can people live, work and play in the Ouseburn?
3. How has the Ouseburn and River Tyne impacted on land use?

Sampling types	Summary	Advantages	Disadvantages
Random	Selecting a person to interview or site to measure, at random using a random numbers table.	Least biased of all sampling as all people/area has the same chance to be chosen	If sample size is quite small you might obtain an unrepresentative result
Stratified	Dividing sampling into sub groups that are the same, e.g. 5 people from each age range.	Avoids bias that can arise as ensures that each group is fairly represented Ensures all types of areas are covered	Difficult to know exactly which groups of data you want to include Requires good prior knowledge of an area or population
Systematic	Data is collected at regular intervals., e.g. every 5 metres or every fifth person.	Ensures good coverage of an area Can be easier to carry out than the other 2 types	No every place/person has equal chance of being picked - biased

How successful was your data presentation?

Radar graphs

Advantage: Shows 4 different categories and can be added to a map.

Disadvantage Hard to spot anomalies (data that doesn't fit the pattern)

Scatter graph

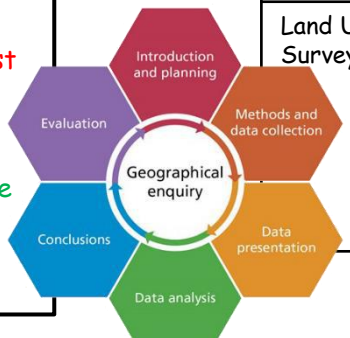
Advantage: Easily shows a positive or negative conclusion.

Disadvantage: Drawing the graph by hand means the line of best fit may be different depending on who drew it.

Wordle

Advantage: Easy to identify most popular words as they are the largest.

Disadvantage: It does not show exact numbers of the words repeated.



How did you collect your data and was it successful?

Method	Description	Evaluation
5 key words	At each site, we chose 5 key words to describe the area.	We did this in partners to get a more accurate description as it was based on two opinions rather than one. Produce qualitative data to compare different areas of the Ouseburn. It is subjective as it is a personal opinion.
Decibel Readings	At each site, we used the app 'Decibel 10' to collect three decibel readings.	Produces quantitative data which makes it easier to compare sites. We created an average for each site. this minimised the risk of a measurement error. Accurate and reliable as an app was used. There could have been a measurement error if the decibel readings were read incorrectly.
Environmental Quality	At each site, as a group we scored each criteria on a score from 0-5 with 0 being the worst score and 5 the best score.	We checked our opinions with each other to make our findings more accurate. Working as a class helped reduce operator error too. It produces quantitative data which can be used to produce graphs. Quantitative data makes it easy to compare different areas. It is subjective as it is a personal opinion. We only collected the data in summer which would give a different opinion of the area as the sun was shining. There could be some operator error as some people could have recorded the incorrect scores.
Land Use Survey	As we walked through the Ouseburn we wrote down what each building was used for on our maps. We used the RICEPOTS codes.	We used the same criteria for all buildings. We only recorded the ground floor land use. Some buildings didn't fit into the RICEPOTS categories

What are the successes and limitations of your investigation (evaluation)?

Successes	Limitations
• Used a range of data collection techniques that were qualitative (EQS, decibel readings) and quantitative (Questionnaire). • Used primary and secondary data (Rightmove, photographs, census data and the video). • Used different sampling methods: random = questionnaires, systematic = 12 sites taken at regular intervals (200 metres). • We worked as a group to avoid subjectivity. • Top set: Spearman's rank was used to test the strength of the correlation between Environmental Quality Survey and Index of Decay Score.	• Selecting sites every 200 metres means some patterns could be missed out. • We only collected data on 1 day, during the day, during the week and in the summer. • All the data presentation, apart from the Wordle, was drawn by hand which could be inaccurate. • Not enough questionnaires from a representative (people of different ages, ethnicity, backgrounds) sample so unreliable data.

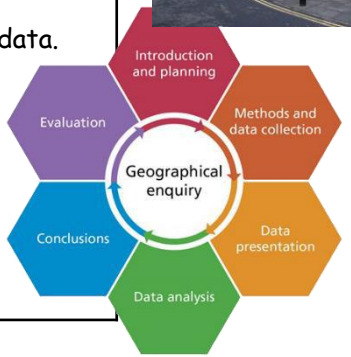
What are your conclusions?

1. Has the environmental quality of the Ouseburn improved?
Environmental Quality Radar graphs showed that overall majority of 12 sites high environmental quality with highest being site 8 The Malings. However, there are three sites recorded as low environmental quality: 3 Under the Arches, 5 Lime Street and 9 Industrial Estate. The photographs (secondary data) back this up. The scatter graph shows the relationship between EQS and Index of decay at 12 sites which had a positive correlation. The old toffee factory at Site 7 was a derelict building which has now be rejuvenated as a modern and contemporary office work space.

2. Can people live, work and play in the Ouseburn?
3 places to live: There is the Malings which is for people who have enough money to buy private housing. There is Farm View which is social housing. There is Stepney Yard for student accommodation. The average house price in Ouseburn according to Rightmove is £24,6472 which means very few people can afford to live in the Ouseburn.

8 places to play particularly at Site 4. For adults there are the bars: The Cluny, The Ship Inn and the Tyne Bar. For children there is Stepney Yard, Ouseburn Community Farm and Seven Stories bookshop.

Lots of places to work Ouseburn is the creative heart of NewcastleGateshead, over 300 creative and cultural organizations and businesses are based here, such as the Toffee Factory.



3. How has the Ouseburn River Tyne impacted on land use?
Spatially, site 3 which is a steep slope of the river valley means it is difficult to build on and doesn't give much space therefore it will be expensive to redevelop and has not been regenerated like the rest of the Ouseburn.

Historically, the River Tyne meant that goods could be transported and therefore the land use in the Ouseburn was industrial as there were factories, e.g. Toffee Factory and warehouses, e.g. Hotel Du Vin was a shipping warehouse.

Geography Knowledge Organisers

Key Case Studies

Use this booklet to support you with your revision in conjunction with your revision guide.

Knowledge Organiser: Boscastle River Case Study

Causes of flooding in Boscastle	Effects of flooding in Boscastle	Responses to flooding in Boscastle
1. Approximately 200 mm of rain fell in 24 hours. 2. The ground was saturated from previous rain storms i.e. a short lag time. 3. The drainage basin has steep slopes. 4. The drainage basin has areas of impermeable rock. 5. Boscastle is at the confluence of three rivers. 6. The flooding coincided with a high tide.	Social 1. Cars, vans and caravans were washed into the sea. 2. Buildings were flooded and/or destroyed. 3. Loss of communications. Economic 1. Loss of income from tourism 2. Loss of businesses Environmental 1. Two million tonnes of water flowed through Boscastle in one day. 2. Trees were uprooted. 3. Debris was scattered over a large area 4. Loss of habitat	Short-term 1. Helicopters rescued people from trees and roof tops. 2. Buildings were searched. 3. Cars, which had been swept away, were removed from the harbour. 4. Trees were removed from the river channel. 5. Roads were cleared. Long term responses 1. The shop was rebuilt. 2. The river was widened and lowered. 3. A drainage culvert was improved to allow more water to flow through. 4. The car park was raised and given a permeable surface. 5. A new bridge was built. 6. Water gauging stations were installed.

Key Term	Vocabulary
Saturated	Soil becomes saturated when it absorbs as much water as possible.
Impermeable rock	Do not allow water to pass through them.
Permeable rock	Allow water to pass through them
Confluence	The point where two rivers meet

Key Facts

The flood on 16 August 2004 in Boscastle in Cornwall was among the most extreme ever experienced in Britain.

Possible Exam Questions

- The UK's weather and climate affects river processes in river landscapes. Explain one way the weather and climate can affect river erosion. (2)

Knowledge Organiser: California (developed country) Drought Case Study

Causes of drought in California	Effects of drought in California	Responses to drought in California
1. January 2014: state of emergency declared. 2. Lower than normal rainfall and snowfall in the west of the USA. 3. Colorado River supplies six states with water all of which extracted too much. 4. High levels of water wastage and over-use	**Social** 1. Lack of drinking water 2. Increased food and water prices **Economic** 1. Power supplies effected e.g. hydro-electric power, thermal power stations. 2. Farmers lost US$1.8 billion. 3. 10,000 jobs lost in farming 4. Food prices increased. **Environmental** 1. Wildfires: ash and debris damaged water supplies and blocked rivers. Caused mudslides and flooding. 2. Seawater intrusion e.g. Santa Barbara 3. Farms affected by saltwater contamination and wildfires. 4. As acquirers empty of water, the structure of the land changes. It settles lower and this causes subsidence.	**Charities** 1. California Water Service Group: gave US$600,000 2. Pacific Water Institute gave money to local people. **Government** 1. State of emergency declared 2. Limited flow of water in winter months 3. Reducing water supplies to the minimum for public health 4. Installing salinity points to stop seawater intrusion 5. Running education and information programmes 6. Increased monitoring of river water levels **Local people (individuals)** 1. Stop using hosepipes in gardens 2. Farmers pump groundwater from ever-deeper supplies or use only certain areas of their land.

Key Term	Vocabulary
Drought	An extended period of lower than normal rainfall causing water shortages
Aquifers	An underground store of water formed when permeable rocks lie on top of impermeable rocks.
Subsidence	Collapse of land

Key Facts about the Californian Drought

- California is one of the wealthiest states in the USA. It is located on the west coast bordering the Pacific Ocean - popular for tourists. I
- t has several large universities and industrial areas such as the Silicon Valley.
- In January 2014 a state of emergency was declared by the governor which meant that laws and regulations could be put in place to help deal with the impact of the drought.

Possible Exam Questions

- Assess the following statement. Drought presents a greater threat to people living in developing countries rather than those living in developed countries. (8)
- Explain one human cause of drought. (2)
- Suggest one impact of drought for people living in a developed country. (3)

Knowledge Organiser: Ethiopia (developing country) Drought Case Study

Causes of drought in Ethiopia	Effects of drought in Ethiopia	Responses to drought in Ethiopia
1. Since the 1980s the short rain season has been getting shorter and increasingly delayed 2. The long rain season has become unpredictable. 3. Warming of the Indian Ocean means rising air loses more moisture as rainfall and dryer air moves westward over East Africa.	**Social** 1. 85% of the population depend on farming. 2. Unreliable rains makes planning for farmers difficult. 3. People in rural areas rely on local trees for building materials – drought reduces availability and increases cost. 4. Hunger and malnutrition. 5. Only 57% of people have access to water: people have to walk several KMs to get water. Time collecting water takes children out of schools and women out of jobs. 6. Water sources often become polluted which leads to disease: typhoid, cholera, dysentery, 7. Causes rural to urban migration. **Economic** 1. Increased cost of food as food supplies decrease. 2. Foreign trade affected e.g. selling coffee beans **Environmental** 1. Crops die 2. Ground dried and cracked 3. Water sources are polluted 4. Marshland dry out 5. Rivers polluted by dead animals	**Media** 1. Band Aid 1985: 'Do they know it's Christmas?' **Charities** 1. NGO's (non-governmental organisations) like UNICEF and Oxfam work with local experts to help the worst affected people. Provide clean water, food and medical care. Help local people develop new farming techniques. 2. UNICEF: US$60 million on aid 3. Red Cross: raised 1.4million Swiss Francs **Government** 1. Government organised relief programmes **Local people (individuals)** 1. Educated on new farming techniques

Key Term	Vocabulary
Drought	An extended period of lower than normal rainfall causing water shortages
NGO	A non-governmental organisation

Key Facts about Ethiopia

- Ethiopia is a developing country in Eastern Africa.
- It has suffered from many droughts which have led to famine and huge loss of life.
- The worst periods have been 1984, 1994, 2004 and 2014-16.

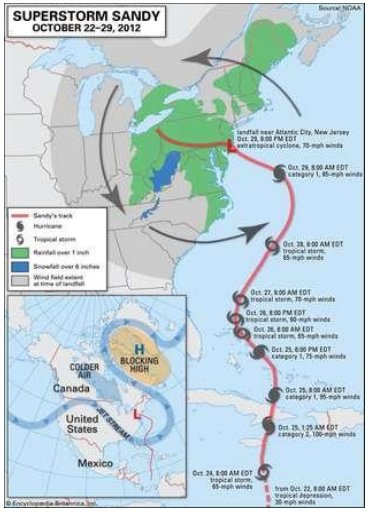
Possible Exam Questions

- Assess the following statement. Drought presents a greater threat to people living in developing countries rather than those living in developed countries. (8)
- Explain one human cause of drought. (2)
- Assess the different responses to drought in a named emerging or developing country. (8)

Knowledge Organiser: Hurricane Sandy, USA (developed country) Tropical Storm Case Study

Causes of Hurricanes

1. **When**: 22-29 October 2012
2. **Where**: Cuba, Dominican Republic, Haiti. United States, Jamaica, The Bahamas,
3. **Size on Saffir-Simpson scale:** Category 1
4. **Wind speeds when it made landfall:** 129km/h



Effects of Hurricanes

Social

1. 150 killed
2. Millions left without electricity
3. Transport links closed: more than 19,729 flights cancelled. New York's LaGuardia and Newark Liberty International Airport remain closed due to storm damage
4. Schools closed
5. Homes and businesses damaged
6. 1 November: Manhattan public schools remain closed

Economic

1. Damage: $65-75 billion
2. New York Stock Exchange forced to close.
3. Petrol in short supply.
4. Tourism industry affected by the cancelling of the New York Marathon

Environmental

1. Nature reserves were damaged by the storm surge e.g. Prime Hook National Wildlife Refuge.
2. Raw and untreated sewage was released into the waters around New York and New Jersey.

Responses to Hurricanes

Media

1. Played a large part in raising funds for example, charity concerts, telethons and corporate donations.
2. Posts on social media helped local people and the government assess the damage caused.

Charities

1. 9,000 people in 13 states spent the night in 171 Red Cross operated-shelters
2. 4000 disaster workers provided by Red Cross.

Government

1. President Obama and New Jersey Governor Chris Christie tour the storm-damaged area near Atlantic City.
2. More than 1500 FEMA personnel used to support.
3. Changed legislation to provide billions of dollars to the affected states to help with rebuilding and supporting victims.
4. State of New York set up a local government office to co-ordinate rebuilding efforts.
5. Used satellite images to assess damage and respond to the worst-affected areas as quickly as possible.

Key Term	Vocabulary
Saffir-Simpson scale	Hurricane Wind **Scale** is a 1 to 5 rating based on a hurricane's sustained wind speed.
Storm surge	a rising of the sea as a result of wind and atmospheric pressure changes associated with a storm.
Stock Exchange	A stock exchange is a workplace where stock brokers and traders can buy and sell shares of stock, bonds, and other securities.
Sewage	Waste water and excrement conveyed in sewers.
Telethons	A very long television programme, typically one broadcast to raise money for a charity.
FEMA	(in the US) Federal Emergency Management Agency.
Legislation	Laws.
Landfall	When the hurricane arrives over land.

Key Facts about…

- The use of social media (Twitter and Flick) helped assess the damage.
- Storm surges caused most of the damage to the East coast of the USA.

Possible Exam Questions

- Explain one economic impact of tropical cyclones (hurricanes and typhoons) on a developed country. (3)
- Evaluate different responses to the environmental impacts of tropical cyclones in a named developed country. (8)

Knowledge Organiser: Typhoon Haiyan, Phillipines (developing country) Tropical Storm Case Study

Causes of Typhoon

When: 2 November 2013

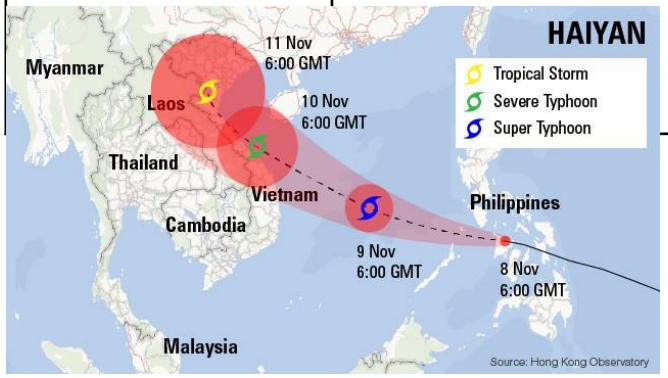
Where: South Pacific Sea, close to the Federation States of Micronesia

Size of Saffir-Simpson scale: Category 5

Wind speeds when it made landfall: 300km/h

Most of the damage on the islands of Samar and Leyte.

Flooding and landslides reported across the Philippines.



Effects of Typhoon

Social
1. 6000+ dead
2. Power was cut off
3. Aid could not reach some areas as they were blocked off by landslides.
4. Tens of thousands were made homeless.

Economic
1. Cost of damage was estimated to be US$2billion.
2. Transport was disrupted.

Environmental
1. Across the islands mangroves were damaged and thousands of trees were uprooted.
2. Chemical leaks from damaged industrial facilities.
3. Tanker ran aground which caused oil spill.

Responses to Typhoon

Media
1. American band Journey donated $350,000 to help relief efforts in the Philippines
2. The Coca-Cola Company says they $2.5 million of their advertising budget to the relief efforts.
3. By mid-December FIFA donated $1 million.

Charities
1. Relief effort was slowed due to damaged infrastructure (roads/airports)
2. *Buddhist Tzu Chi Foundation*: emergency cash aid of 8000, 12000 or 15000 pesos depending on family size for over 60,000 families and has been providing free clinics, hot meals, and temporary class rooms for over 15 schools in the area.

Government
1. 7 provinces placed under a 'state of national calamity': government gave these areas specific funding.
2. Residents evacuated from Tacloban but could only happen during daylight as there was no electricity in the area. This made people panic and rush at evacuation planes: people had to be held by police and the military.

Local people (individuals)
1. Local people were evacuated.
2. Displaced (those who were forced to move) families helped rebuild their own homes.

Key Term	Vocabulary
Aid	financial or material help given to a country or area in need.
Mangroves	a tidal swamp which is dominated by mangroves trees.
Relief	financial or practical assistance given to those in special need or difficulty.
Infrastructure	buildings, roads, power supplies)
Displaced	Forced to leave their home
FIFA	Fédération Internationale de Football Association

Key Facts about ……

The track of Typhoon Haiyan ranged between 1-5.

£10 million package of aid (loans and grants) was given as well as emergency shelter, water and household items.

Knowledge Organiser: The New Forest, UK (developed country) Deciduous Woodland Case Study

Causes of deforestation	Effects of deforestation	Responses to deforestation
Population growth 1. The movement of visitors in TNF is increasing litter, causing erosion of paths and increasing air pollution from traffic. 2. Higher car ownership – demand for wider roads to ease congestion. 3. Land to build news homes – pressure on green belt sites where houses can fetch higher prices. Timber extraction 1. Replanting with conifers – 38% of deciduous woodland cleared in 20th century. 2. Conifers are more economic – faster growing, easier to manage and quicker return of money. Agricultural change 1. Pesticide damage – woods often border farmland so chemicals sprayed on crops can damage trees and wildlife.	Social 1. Visitors cause trampling of delicate plants, erosion of grass, start fires with BBQs and drop litter. Economic 1. Some forestry operations are not compatible with visitors using woodland for recreation Environmental 1. Conifers create a dense canopy which blocks light for other species. Its creates a monoculture. They are a non-native species. Reduces biodiversity. 2. Visitors scare livestock (ponies and pigs) by driving too fast. 3. Visitors scare young foals.	National Park Authority 1. Careful management by creating dedicated walking and cycling routes in delicate areas. 2. Awareness raising through leaflets and posters of the importance of sustainability. 3. Landowners funded to plant native species. 4. Pesticide use limited. 5. Work restricted between April – August to minimize disturbance to nesting birds. 6. New trees planted and tree felling controlled. Green Leaf Tourism Scheme 1. Promotes the use of local products; businesses give percentage of land for wildlife and encourage visitors to walk or use bikes. Sustainable transport schemes 1. Tourists use bikes and electric vehicle hire to ease congestion and air pollution.

Possible Exam Questions

Explain one cause of deforestation in deciduous woodlands. (2)

Evaluate the different approaches used to manage the threats facing deciduous woodlands in a named region. (8)

Key Term	Vocabulary
Deciduous	trees that drop their leaves in Autumn
Agriculture	farming the soil for the growing of crops and the rearing of animals to provide food, wool, and other products.
Congestion	Overcrowded
Conifers	tree that bears cones and needle-like or scale-like leaves that are typically evergreen.
Pesticides	a substance used for destroying insects or other organisms harmful to cultivated plants or to animals.
Monoculture	the cultivation of a single crop in a given area.
Native species	An animal or plant indigenous to a place.
Sustainability	Able to continue without causing damage to the environment.

Key Facts

- The New Forest is on the south coast of England.
- The New Forest is 480 km².
- Around 175,000 people life in The New Forest.
- 15 million people visit The New Forest each year.
- 40% of the woodland is privately owned and is often left unmanaged.

Knowledge Organiser: Amazon Rainforest in Costa Rica (emerging country) Tropical Rainforest Case Study

Causes of deforestation	Effects of deforestation	Responses to deforestation
1. Mining – rising demand and rising prices for minerals in rainforest. 2. Road building – to transport resources like iron ore and timber, often built without proper controls. 3. Illegal logging – high demand in the Western world. 4. Rapid population growth - rising demand for housing and agriculture. 5. Oil palm plantations – in demand as ingredients in foods, cosmetics and as biofuel. 6. Cattle ranching - needs vast areas of land. 7. Subsistence agriculture – land cleared to grow crops quickly loses its nutrients so farmers clear more.	**Social** Loss of homes and livelihoods of local indigenous people. **Economic** Provides resources for people locally and worldwide, including food, water and timber. **Environmental** Loss of natural habitats home to a diverse range of plants and animals (1300 birds and 40000 plant species).	**Direct Government Action in Costa Rica** 1. People did not pay as much tax if they conserved (looked after) the rainforest area. 2. The government give $50 per hectare for forest that has been protected. The areas targeted for protection have high biodiversity. 3. Rainforest is divided into 11 eco-regions. Each area makes its own decisions. **Carbon Credits in Costa Rica** 1. They sell the credits to countries who do make a lot of carbon such as China. 2. It has created $20million dollars for Costa Rica. **NGOs: Central Volcanic Mountains Development Foundation in Costa Rica** 1. It works with 400 landowners who own 46000 hectares of land. 2. It has used a US$10million dollar grant. **Ecotourism in Braulio Carrillo National Park** 1. It looks after 485 hectares of rainforest. 2. The employees are from a local village called Las Horquettas meaning locals are employed. 3. If the ecotourism site did not develop the trees would have been cut down. **Private Reserve: Monterverde Cloud in Costa Rica** 1. 10500 hectares was founded by Americans. 2. They have created a wildlife sanctuary to look after the animals and plants because it has high biodiversity. 3. It allows tourism, but only a few people at a time. 4. It has guided walks and trails so people do not wander off and do damage.

Key Term	Vocabulary
Deforestation	permanently removing forest.
NGO	NGO's are similar to charities. They do not make any profit.
Cattle ranching	Grazing cows on grass
Ecotourism	tourism intended to support conservation efforts and observe wildlife.
Private reserves	those protected areas that are **privately** owned but are used for public benefit
Carbon credits	a permit which allows a country or organisation to produce a certain amount of carbon emissions.
Indigenous	People who originated from that particular place.

Key Facts

- Around the world 7.3 million ha is cleared each year.
- Destroyed 50% of TRF
- Soaks up 10% global CO2 emissions
- Brazil an area the size of Germany has been lost.

Possible Exam Questions

Explain two causes of deforestation in tropical rainforests. (4)

Assess the role of biotic and abiotic characteristics in the functioning of tropical rainforests. (8)

Knowledge Organiser: Mexico City (emerging country) Urbanisation Case Study

Causes of urbanisation

Push factor: Reasons for people moving out of (emigrate) from a place
Pull factor: reasons that make people move into (immigrate) a place

Push Factors

1. High unemployment rate
2. Overpopulation
3. Few schools
4. Lack of running water
5. Lack of health care
6. Trade and communication difficult
7. Poverty

Pull factors

1. Employment opportunities
2. Better schools
3. Better health facilities
4. Good entertainment

Effects of urbanisation

Social

1. Huge pressure on housing; shanty/slum towns built by migrants on city edge
2. Migrants from USA, Germany and France live in richer homes close to the city centre
3. There are many diseases among children and the infant mortality rate is quite high

Economic

1. Jobs are informal and pay very little.
2. Children often have to work and don't go to school

Environmental

1. The road systems are overcrowded and this causes poor air quality and illness
2. Each day 11,000 tons of rubbish is dumped on streets and in waterways.
3. The rubbish clogs up the drainage system and so water flows into open rivers.

Responses to urbanisation

Top-down: Barter Market

1. Who? The mayor and managers of Mexico City.
2. What? After closure of a massive rubbish tip the city set up a farmer's. Families brought their paper, metals and other recyclable waste to exchange for 'green point' vouchers. The vouchers could be used to buy fruit and vegetables. Over 3000 families lined up with rubbish bags on the first day.
3. Result? 11 million tonnes recycled on the first day. But this is a small dent in the very big problem.

Bottom up – Community group in Neza.

1. Who? Community based initiatives in an area called Neza (on the outskirts in the south east of the city). A small group of migrants formed a group and created a plan to develop the area.
2. What? They were able to raise small amounts of money. They built schools and later improved the area by volunteer work. Next they opened a healthcare centre. Finally, they started a programme of self-build houses.
3. Result? there was less crime in this area of Mexico City.

Top down - Green Plan (Plan Verde)

1. Who? The mayor and managers of Mexico City.
2. What? In 2007 a 15 year 'green management' initiative was drawn up. The plan focusses on improving and making environmentally friendly public spaces, waste handling and sanitation. A Metrobus, using eco-friendly vehicles on 16 routes, has reduced air pollution.
3. Result? Air pollution is down by 35% from levels in 2000.

Key Term	Vocabulary
Economic investment and growth.	Increase in job opportunities in factories and offices as investment (putting money in).
Rates of natural increase	The difference between the birth **rate** and the death **rate**
Rural to urban migration	People leaving the rural areas for urban areas.
Spatial inequality	The unequal spread of resources and services an area has.
Informal economy	The part of the economy that is neither taxed nor monitored by the government
Top-down	Actions completed by the government or transnational corporations (TNCs).
Bottom-up	Actions completed by local people or non-governmental organisations - charities (NGOs).

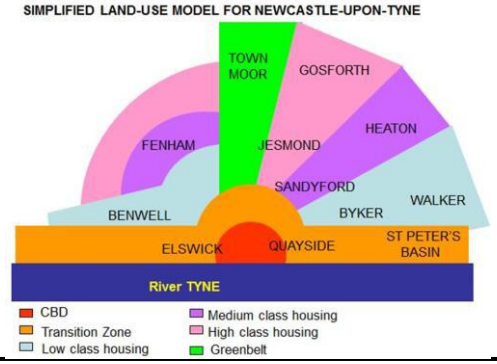
Possible Exam Questions

- Explain two ways that bottom-up approaches have been used in a named major city in either a developing or an emerging country. (4)
- You have studied a major UK city and a major city in a developing or emerging country. Assess the impacts of migration on these cities. (8)
- You have studied a major UK city and a major city in a developing or emerging country. Evaluate which of these cities have been most successful in improving the quality of life for its people. (8)
- You have studied a major city in either a developing or emerging country. Evaluate the ways that the challenges of rapid urbanisation have been managed to improve the quality of life. (8)
- Explain two negative impacts of rapid urbanisation on a city in a developing or emerging country. (4)

Knowledge Organiser: NEWCASTLE-UPON-TYNE
Example of a city in a developed country

What is the structure of Newcastle?

- **Inner City** - The area around the CBD – usually built before 1918 in the UK.
- **CBD** - The main shopping and service area in a city. The CBD is usually found in the middle of a city so that it is easily accessible.
- **Suburbs** - The area on the edge of the city. Many suburbs were built after 1945 and get newer as they reach the edge of the city.



How has Newcastle changed over time?

- Migrants arrived from Pakistan and lived with family and friends in **Elswick.** The mainly live in terraced housing.
- Many families lived in **Byker** as they once worked in shipbuilding.
- In the 1930's council estates were built in the suburbs for example in **Heaton**.
- In the 1960's the old 19th century terraces in the inner city were demolished and families moved to the suburbs for example **Fawdon**.
- Newcastle is popular with students. They live close to the CBD in areas such as the **Ouseburn**.
- More recently people have arrived to Newcastle from Syria. They are **refuges**.
- Old factories in the **inner city** have been redeveloped and turned into apartments. People are moving here from the suburbs.
- Some families who lived in **Jesmond** have now moved to the **Great Park** on the edge of Newcastle as the houses ae larger, more modern and have bigger gardens.

What do the words urbanisation, suburbanisation, counter-urbanisation and re-urbanisation mean?

- Urbanisation: The **increase** in the percentage of **people living in towns and cities**, causing them to grow.
- Suburbanisation: The **outward spread of the built-up area**, often at a lower density compared to the older parts of town.
- Counter-urbanisation: The movement of people and employment from **major cities to smaller settlement and rural areas** located beyond the city or to more distant towns and cities.
- Re-urbanisation: The movement of people **back towards city centres** away from rural areas and suburbs.

How has deindustrialisation affected Newcastle?

Globalisation:
Cities have become part of a 'world market'. Industries, such as shipbuilding, have suffered badly from **competition from China and India**. Whre production costs are much **cheaper** due to **low wages** and **less strict employment laws. Factories closed**, e.g. Swan Hunters shipyard (Wallsend), Vickers shipyard (Elswick) and Armstrong (arms factory) in Elswick.
It left many **brownfield sites**, with **empty factories and warehouses** e.g. the Vickers factory site at Elswick.
There was some **large scale pollution** of the land where former industries had taken place, e.g. at the Tar Works in Walker. Workers were made **redundant** - employment in the shipyards fell by 22% in the 1970s.
De-centralisation:
During the 1970s, there was a period of de-centralisation where many **inner-city areas were re-developed and industry either closed or moved out of the city. New factories which opened tended to be in the suburbs**, e.g. Formica in North Shields, **so people in the inner-city areas find it hard to travel to them.**
Development of infrastructure: The development of the **Central Motorway and the Metro system in Newcastle in the 1970s led to the demolition of older factories and warehouses**. Some of these never reopened; others moved to the rural-urban fringe in more modern developments.

How has migration affected Newcastle?

Reason for moving to Newcastle	Impact on Newcastle
Commonwealth Migrants: In the 1950s, the government encouraged immigration from former colonies	• fill jobs that people no longer wanted to do in transport and industry • Made Newcastle more multi-cultural e.g Mela festival • Lead to decline in housing in Elswick and Byker as people were paid low incomes.
International migrants from Hong Kong	• makes Newcastle more multi-cultural with Chinese restaurants and supermarkets .
Study –There are around 50,000 students in Newcastle.	• Using resources (healthcare, etc.) • can fill up part time/seasonal jobs • spending money which helps the economy
EU migration - Since 2000, many migrants have come from countries in Eastern Europe	• More competition for jobs • fills labour and less desirable jobs • people paying taxes to improve economy
Flight from conflict – refugees from Syria and Afghanistan	• Large number coming at once makes it difficult to prepare • Increase crime and tension • increases inequality • filling jobs with shortages

How has shopping changed in Newcastle?

- In the early 1990s, the CBD changed as a result of **de-centralisation** in the city.
  - The **Metro Centre** in Gateshead opened in 1986; this offered free parking and an under-cover, pedestrianised shopping centre with large department stores like House of Fraser and Debenhams.
  - Other out of town shopping parks developed, such as **Silverlink** in Wallsend, which offered larger retail units and easier access than the CBD.
- Another factor affecting retail in the CBD has been the growth **of internet shopping.**

The CBD fights back

1. Pedestrianising areas of the CBD to make a more pleasant shopping environment
2. Redevelopment of Eldon Square, including a new food court, to provide a similar experience to the Metro Centre.
3. Redeveloping older, run down parts of the CBD such as Pilgrim Street, Stephenson Quarter and St James', to provide a more attractive environment
4. Encouraging stores to have late night opening.
5. Offering free parking on evenings and Sundays.
6. Having special offers such as 'Newcastle Restaurant Week' to attract people back to the city centre.

get into newcastle Alive after five

How is Newcastle becoming more sustainable?

- **Transport schemes** – Car share schemes/Metro system/Park and Ride/Bus network. Go Zero Newcastle is heading towards a zero carbon future! Go Zero is Newcastle City Council's campaign to help reduce the city's carbon footprint by encouraging our residents to travel by more sustainable modes. Car Clubs Newcastle City Council is working with Co-wheels Car Club to offer a convenient greener and cheaper alternative to owning your own car. Electric Vehicles The North East is leading the way in the development of electric car use, and leading the charge when it comes to installing electric vehicle charging points. (80 charge points throughout the city) **Impacts** = Reduced levels of pollution due to less congestion (traffic jams). Quieter/Safer inner city roads/Reduced carbon emissions.
- **Recycling Schemes** – Residents have recycle bins allocated/Ban on open fires within inner city under clean air act. Reduces amount sent to landfill (20% reduction since 2000)
- **Open Space/Green belt** – Protection of habitats/More pollution absorbed by greenery (carbon sink) Linked to better of life.

Knowledge Organiser: India (emerging country) Development Case Study

Causes of development

1. India is a member of global groups such as the World Trade Organisation.
2. India's globally spread population generates income in remittances.
3. Rapid increase in the tertiary sector from 27% in 1947 to 52% now. This has led to increased employment opportunities and a growth in India's economy.
4. Fastest growing telecom markets in the world.
5. Second largest wireless internet access in the world.
6. During the 1990's changes in India's trading policies led to rapid rise in imports and exports.

Effects of development in India

Social

1. Increased population density in cities.
2. Breakdown of the traditional family unit as young people move to cities.
3. Widening development gap between urban and rural areas.
4. Widening development gap between rich and poor.
5. Continuing low status of women
6. Greater investment in schools and education
7. Literacy rate has risen
8. Better access to healthcare which has reduced infant mortality rate.
9. Increasing life expectancy from 54 years in 1985 to 68 years in 2015.
10. High levels of pollution in cities has led to poor public health.
11. Lack of housing means people live in slums.

Economic

1. Development has been uneven between the core and the periphery.
2. In the core, average income is 140,000 rupees per person this is due to investment in industry.
3. In the periphery, average income is 23,435 rupees per person this is due to harsh physical environments.
4. Over 1 million new ICT jobs created.
5. Growing consumer market.
6. Increase in tourism.

Environmental

1. Increase in secondary industry has led to rising air pollution
2. Deforestation
3. Increased CO_2 emissions has contributed to climate change.
4. Increase in water pollution due to chemicals used in industry.

Responses to development in India

The Smart Cities Mission: Vision Mumbai is a new initiative by the government to improve equality and the quality of life. The project will run between 2015 and 2020 and cover 100 cities across the country. Its core infrastructure elements include:

1. adequate water supply
2. assured electricity supply
3. improved sanitation
4. affordable housing, especially for the poor
5. health and education
6. efficient public transport.

Role of Coca-Cola in India

Advantages

1. Invested $2billion until 2011
2. Will invest another $5billion until 2020
3. Created indirect employment for 150,000 people
4. Directly employs 25,000 people
5. Created community development programmes including; "support my school"
6. They have a women empowerment programme
7. Drip irrigation saves 1200kl/hectare of water
8. Holds awareness camps on sanitation. Sanitation is the key element to social and economic development
9. Re-built 18 schools as part of an aid programme after the Bihar floods
10. •Provided schools with education materials, school uniforms and separate toilets for girls and boys.

Disadvantages

1. Increased pressure on ground water due to high water requirements
2. Left land poisoned with sludge
3. Draining water that feeds into wells – farmers lose their job.

Key Term	Vocabulary
Development	The process where people, a place or a country change or make social or economic progress.
Core	Most economically advanced areas
Periphery	Parts of the country outside the core economic zone.
Remittance	Money sent back by migrants to their family in the home country.
Secondary industry	Manufacturing of raw materials
Tertiary Industry	Providing a service

Possible Exam Questions

- For either a named developing or emerging country, explain two negative impacts of growth in the secondary sector. (4)
- Assess the factors that have influenced the growth of core and peripheral areas within either a named developing or emerging country. (8)
- For a named developing or emerging country, explain two reasons the population structure has changed in the last 30 years. (4)
- Assess the social and economic impacts of private investment by TNCs in a named developing/emerging country. (8)
- Assess the positive and negative impacts of rapid development on either a named developing or emerging country. (8)

Knowledge Organiser: Germany (developed country) Energy Management Case Study

Causes of an increase in renewable energy	Effects of an increase in renewable energy	Responses to an increase in renewable energy
1. Germany want to replace nuclear with renewable energy to reduce their greenhouse gas emissions. 2. Following Japan's Fukishima disaster in 2012 Germany closed 8 of its nuclear plants and plans to close the rest by 2022. 3. By 2014 Germany produced 30% of energy from renewables.	Social Peace of mind that there won't be a nuclear disaster like other countries have experienced. Economic Better energy efficiency costs less money. Environmental Improved air quality and less potential environmental disaster if there was a leak.	Bavaria Solarpark 1. 26 hectares (62 acres) and uses 60000 photovoltaic panels. 2. The project is anticipated to reduce CO2 emissions by more than 100000 tonnes over the next 30 years, by producing approximately 215 kilowatt/hour of clean power over the next 20 years. 3. There are incentives to individuals and organisations to install on homes and businesses. Norsee Ost farm in the North Sea. 1. Germany's government plans to have wind energy production of around 6500 MW by 2020. 2. By 2014 Germany was producing approximately 8% of its electricity from wind turbines. 3. Germany is also replacing its old wind turbines with new, more efficient ones, to increase power production. 4. This approach has resulted in less opposition by people who recognize the benefits of switching from nuclear and planning restrictions have been lifted in some areas to install new ones.

Key Term	Vocabulary
Feed-in tariff	A payment that motivates or encourages someone to do something.
Greenhouse gas	A gas that contributes to the greenhouse effect
Efficiency	Achieving maximum productivity with minimum wasted effort or expense.
Photovoltaic panels	Solar panels
Renewable	Energy from a source that will not run out.
Non renewable	Existing in finite quantity; will run out.

Key Facts about

Germany is Europe's strongest economy, and it is the fourth largest economy in the world.

Fukushima **nuclear disaster** (2011), A tsunami flooded and damaged the plant's 5 active reactors, drowning two workers. Loss of backup electrical power led to overheating, meltdowns, and evacuations.

Chernobyl **disaster** (1986) Overheating, steam explosion, fire, and meltdown, necessitating the evacuation of 300,000 people from Chernobyl and dispersing radioactive material across Europe

Possible Exam Questions

- Assess the impacts on people of developing non-renewable and renewable energy resources. (12)
- Explain one way a named developed country has attempted to manage its energy resources in a sustainable way. (4)
- Assess the reasons why the UK and other countries use a mix of different energy resources. (8)

Knowledge Organiser: China (emerging country) Energy Management Case Study

Causes of unsustainable energy use	Effects of unsustainable energy use	Responses to unsustainable energy use.
1. The rise in car ownership, heavy traffic congestion and the use of low grade gasoline are leading causes. 2. China contributes 29% to global carbon emissions – more than any other country. 3. Has seven out of ten of the world's most polluted cities. 4. China burns more coal than USA, Europe and Japan combined. 	Social 1. Air pollution can cause lung disease. 2. Cardiovascular disease, as well as cancer and birth defects. Economic 1. The government is trying to reduce coal consumption by closing polluting mills, factories and smelters. 2. Switching to other eco-friendly energy sources. Environmental 1. Coal contains high levels of ash and Sulphur that when burned cause high levels of pollution.	**The Three Gorges Dam** 1. Generates 98.8 billion kilowatt hours, equivalent of 49 million tonnes of coal. 2. Preventing 100 million tonnes of CO2 emissions. 3. Cost US$30 million although it should pay for itself in 10 years. 4. Construction forced 1.4 million people to be relocated from homes. 5. Flooded 632km2 of habitat. Gobi desert - Solar power 1. China has become one of the world leaders in generating solar energy. 2. It is currently building a giant solar power station in Gobi desert which could potentially produce enough energy to supply 1 million homes. 3. It will cover 10 square miles and generate 200MW of solar energy.

Key Term	Vocabulary
HEP	Hydro-Electricity Power – building a dam and the water flowing through turbines generates electricity
Congestion	Overcrowding of the roads.
Cardiovascular disease	relating to the heart and blood vessels.
Consumption	using up a resource.
HEP	Hydro electricity power
Generate	produce or create.
Relocated	Moved elsewhere
Smelters	an installation or factory for smelting a metal from its ore.

Key Facts

Three Gorges Dam is the biggest producer of power in the world but still meets less than 2% of China's electricity needs.

The dam has an impact on wildlife in the Yangtze and is threatening the lives of a huge number of animal species, including the Yangtze dolphins.

Possible Exam Questions

- Explain one reason why the development of hydro-electric power (HEP) can have negative impacts on people and the environment. (4)
- Evaluate different approaches used by either a named developing or emerging country to manage and use energy resources in a sustainable way. (8)
- Assess the impacts on people of developing non-renewable and renewable energy resources. (8)
- Assess the reasons why the UK and other countries use a mix of different energy resources. (8)

Knowledge Organiser: Paper 3 Urban Fieldwork Ouseburn

What are your fieldwork questions?

To what extent has rebranding in the Ouseburn been successful?

1. Has the environmental quality of the Ouseburn improved?
2. Can people live, work and play in the Ouseburn?
3. How has the Ouseburn and River Tyne impacted on land use?

Sampling types	Summary	Advantages	Disadvantages
Random	Selecting a person to interview or site to measure, at random using a random numbers table.	Least biased of all sampling as all people/area has the same chance to be chosen	If sample size is quite small you might obtain an unrepresentative result
Stratified	Dividing sampling into sub groups that are the same, e.g. 5 people from each age range.	Avoids bias that can arise as ensures that each group is fairly represented Ensures all types of areas are covered	Difficult to know exactly which groups of data you want to include Requires good prior knowledge of an area or population
Systematic	Data is collected at regular intervals., e.g. every 5 metres or every fifth person.	Ensures good coverage of an area Can be easier to carry out than the other 2 types	No every place/person has equal chance of being picked - biased

How successful was your data presentation?

Radar graphs

Advantage: Shows 4 different categories and can be added to a map.

Disadvantage Hard to spot anomalies (data that doesn't fit the pattern)

Scatter graph

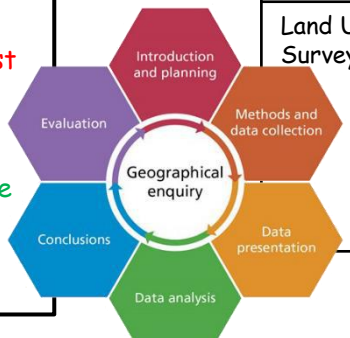
Advantage: Easily shows a positive or negative conclusion.

Disadvantage: Drawing the graph by hand means the line of best fit may be different depending on who drew it.

Wordle

Advantage: Easy to identify most popular words as they are the largest.

Disadvantage: It does not show exact numbers of the words repeated.



How did you collect your data and was it successful?

Method	Description	Evaluation
5 key words	At each site, we chose 5 key words to describe the area.	We did this in partners to get a more accurate description as it was based on two opinions rather than one. Produce qualitative data to compare different areas of the Ouseburn. It is subjective as it is a personal opinion.
Decibel Readings	At each site, we used the app 'Decibel 10' to collect three decibel readings.	Produces quantitative data which makes it easier to compare sites. We created an average for each site. this minimised the risk of a measurement error. Accurate and reliable as an app was used. There could have been a measurement error if the decibel readings were read incorrectly.
Environmental Quality	At each site, as a group we scored each criteria on a score from 0-5 with 0 being the worst score and 5 the best score.	We checked our opinions with each other to make our findings more accurate. Working as a class helped reduce operator error too. It produces quantitative data which can be used to produce graphs. Quantitative data makes it easy to compare different areas. It is subjective as it is a personal opinion. We only collected the data in summer which would give a different opinion of the area as the sun was shining. There could be some operator error as some people could have recorded the incorrect scores.
Land Use Survey	As we walked through the Ouseburn we wrote down what each building was used for on our maps. We used the RICEPOTS codes.	We used the same criteria for all buildings. We only recorded the ground floor land use. Some buildings didn't fit into the RICEPOTS categories

What are the successes and limitations of your investigation (evaluation)?

Successes	Limitations
• Used a range of data collection techniques that were qualitative (EQS, decibel readings) and quantitative (Questionnaire). • Used primary and secondary data (Rightmove, photographs, census data and the video). • Used different sampling methods: random = questionnaires, systematic = 12 sites taken at regular intervals (200 metres). • We worked as a group to avoid subjectivity. • Top set: Spearman's rank was used to test the strength of the correlation between Environmental Quality Survey and Index of Decay Score.	• Selecting sites every 200 metres means some patterns could be missed out. • We only collected data on 1 day, during the day, during the week and in the summer. • All the data presentation, apart from the Wordle, was drawn by hand which could be inaccurate. • Not enough questionnaires from a representative (people of different ages, ethnicity, backgrounds) sample so unreliable data.

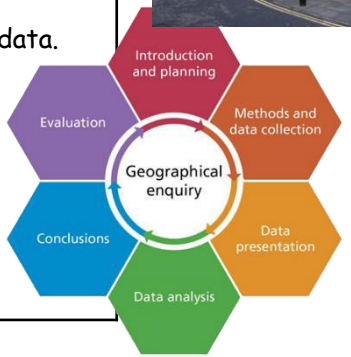
What are your conclusions?

1. Has the environmental quality of the Ouseburn improved?
Environmental Quality Radar graphs showed that overall majority of 12 sites high environmental quality with highest being site 8 The Malings. However, there are three sites recorded as low environmental quality: 3 Under the Arches, 5 Lime Street and 9 Industrial Estate. The photographs (secondary data) back this up. The scatter graph shows the relationship between EQS and Index of decay at 12 sites which had a positive correlation. The old toffee factory at Site 7 was a derelict building which has now be rejuvenated as a modern and contemporary office work space.

2. Can people live, work and play in the Ouseburn?
3 places to live: There is the Malings which is for people who have enough money to buy private housing. There is Farm View which is social housing. There is Stepney Yard for student accommodation. The average house price in Ouseburn according to Rightmove is £24,6472 which means very few people can afford to live in the Ouseburn.

8 places to play particularly at Site 4. For adults there are the bars: The Cluny, The Ship Inn and the Tyne Bar. For children there is Stepney Yard, Ouseburn Community Farm and Seven Stories bookshop.

Lots of places to work Ouseburn is the creative heart of NewcastleGateshead, over 300 creative and cultural organizations and businesses are based here, such as the Toffee Factory.



3. How has the Ouseburn River Tyne impacted on land use?
Spatially, site 3 which is a steep slope of the river valley means it is difficult to build on and doesn't give much space therefore it will be expensive to redevelop and has not been regenerated like the rest of the Ouseburn.

Historically, the River Tyne meant that goods could be transported and therefore the land use in the Ouseburn was industrial as there were factories, e.g. Toffee Factory and warehouses, e.g. Hotel Du Vin was a shipping warehouse.

Edexcel GCSE Geography B

Component One: Global Geographical Issues

Development Dynamics EQ1 Resource Booklet

Name _____

GCSE Specification

Enquiry question: What is the scale of global inequality and how can it be reduced?	
Key idea	**Detailed content**
2.1 There are different ways of defining and measuring development	a. Contrasting ways of defining development (economic criteria and broader social and political measure) and measuring development (Gross Domestic Product (GDP) per capita, the Human Development Index (HDI), measures of inequality and indices of political corruption). (1)
	b. How countries at different levels of development (developing, emerging and developed) have differences in their demographic data (fertility rates, death rates, population structures, maternal and infant mortality rates). (2)
2.2 There is global inequality in development and different theories in how it can be reduced	a. The causes and consequences of global inequalities; social (education, health), historical (colonialism, neo-colonialism), environmental (climate, topography), economic and political (systems of governance, international relations) (3)
	b How Rostow's modernisation theory and Frank's dependency theory can be used to explain how and why countries develop over time.
2.3 Approaches to development vary in type and success	a. Characteristics of top-down and bottom-up strategies in terms of their scale, aims, funding and technology. The processes and players (transnational corporations (TNCs), governments) contributing to globalisation and why some countries have benefitted more than others.
	b. Advantages and disadvantages of different approaches to development: Non-governmental organisation-led (NGO-led) intermediate technology, Inter-governmental organisation (IGO)-funded large infrastructure and investment by TNCs.
Integrated skills: (1) Comparing the relative ranking of countries using single versus composite (indices) development measures (2) Interpreting population pyramid graphs for countries at different levels of development (3) Using income quintiles to analyse global inequality.	

Knowledge Organiser – Development Dynamics

Defining and measuring development	Development	**Development**: the economic, social or political progress a country or people make. **Economic development**: improvements in a country's or people's employment, income and living standards. **Social development**: Improvement in people's quality of life, health, education and culture **Political development**: improvements in a country's system of government or the involvement of people, for example through greater democracy or freedom of speech.
	Levels of development	**Developed countries**: countries with very high human development e.g. the UK. **Emerging countries**: countries with medium or high human development e.g. India. **Developing countries**: countries with low human development e.g. Malawi. The difference in levels of development between the wealthiest developed countries and the poorest developing countries is the **development gap**.
	Development Indicators	Development can be measured using economic, social, demographic and political indicators. <u>Economic:</u> • **Gross Domestic Product (GDP)**: the total value of goods and services produced by a country in a year. **GDP per capita (PPP)** is a better measure; it shows how the GDP is shared between the population and how much $1 would buy. • **Gross National Income (GNI)**: GDP plus money earned abroad e.g. by TNCs, and minus a country's **debt**. • **Poverty line**: the minimum income required to meet someone's basic needs. World Bank definition: $1.25 per day. <u>Social:</u> • **Human Development Index (HDI)**: a measure of people's quality of life using four indicators – GPD per capita (PPP), life expectancy, literacy rate and years of schooling. • **Literacy rate**: The percentage of the population, aged over 15, who can read and write. • **Access to safe drinking water**: The percentage of the population with access to an **improved** (piped) water supply within 1km. <u>Demographic (social measures linked to a country's population):</u> • **Birth rate**: the number of live births per 1000 people per year. • **Death rate**: the number of deaths per 1000 people per year. • **Life expectancy**: the average number of years a person can expect to live. • **Fertility rate**: the average number of births per woman. • **Infant mortality rate**: the number of children per 1000 who die before they are one. • **Maternal mortality rate**: the number of mothers per 100,000 who die in childbirth. • **Population structure**: the age-sex distribution in a country, shown by population pyramids. <u>Political:</u> • **Corruption Perceptions Index (CPI)**: A measure of how dishonest a government is. 0 = 'highly corrupt', 100 = 'very clean'.
Causes of global inequality in development	Social	Countries that have invested in education and healthcare have generally developed faster than other countries. A healthy, well-educated population attracts investors and encourages development e.g. India.
	Historical	**Colonialism** – where one country takes control over another and occupies it with settlers – occurred mainly in the 18th and 19th centuries when European countries like the UK and France colonised countries in Africa and Asia. Workers were paid very little if at all and resources like coffee, tea and gold were exploited and sold with profits going to Europe, rather than the **colonies**. Nowadays, unfair **terms of trade** mean than developing countries like Malawi are still exploited by developed countries. This is **neo-colonialism**.
	Environmental	**Landlocked** countries develop more slowly than countries with a coastline, as trade is more difficult. Countries with a **tropical climate** can struggle to develop compared to countries with a temperate climate, as diseases are more common e.g. malaria. **Natural hazards** such as earthquakes, cyclones and floods can also hold countries back.
	Economic and political	Countries with **open economies** e.g. the UK are more **globalised** and encourage **Foreign Direct Investment** and develop faster than those with **closed economies** e.g. North Korea. Corrupt governments can prevent development by spending GDP on themselves, rather than the country e.g. Robert Mugabe in Zimbabwe.
Development theories	Modernisation Theory	A theory by Walt Rostow based on the economic history of a number of developed countries e.g. the USA and the UK. Countries develop through five stages: traditional society, pre-conditions for take-off, take-off, drive to maturity and high mass consumption.
	Dependency Theory	A theory by Andre Frank that blames the underdevelopment of the developing world (the **periphery**) on exploitation by developed countries (the **core**), first through colonialism then by neo-colonialism.
Approaches to development	Top-down	An approach to development where decisions are made by governments or large companies e.g. **TNCs**. TNCs bring foreign direct investment and create jobs. But top-down strategies often involve big infrastructure projects so are expensive and local communities usually have very little say. Example: **hydroelectric dams**.
	Bottom-up	**Non-Governmental Organisations (NGOs)** lead small-scale projects that target aid at poor communities, particularly women and children. They use **intermediate technology** (low-tech and low-cost) and involve local people in decision-making. Most projects are sustainable. Example: **microcredit**.

Lesson 1 What is development and how is it measured?

GDP (Gross Domestic Product)	The minimum income required to meet someone's basic needs – the World Bank uses $1.25 per person per day.
Poverty Line	A measure of wealth. It is the total value of goods and services produced by a country in a year. It can be measured per capita (per person) or in PPP (purchasing power parity – this shows how much $1 would buy in a country).
HDI (Human Development Index)	The percentage of the population, aged over 15, who can read and write.
Access to safe drinking water	The percentage of the population with access to an **improved** (piped) water supply within 1km.
Literacy rate	A measure made up of four development indicators – life expectancy, literacy rate, average length of schooling and GDP per capita (PPP). It gives a rank from 0-1, the higher the better.
Corruption Perceptions Index	A measure of how corrupt (dishonest) a government is. It gives a rank from 0 (corrupt) to 10 (honest). It helps companies work out how safe their money would be if it was invested in a country. Corrupt governments sometimes spend money to bribe officials or buy weapons.

	Malawi	**India**	**UK**
GDP per capita (PPP)	$1,200		
Living below poverty line (%)	50.7		
Access to safe drinking water (%)	90.2		
Literacy rate %	62.1		
HDI	0.41	0.59	0.91

Lesson 2 How do populations change as countries develop?

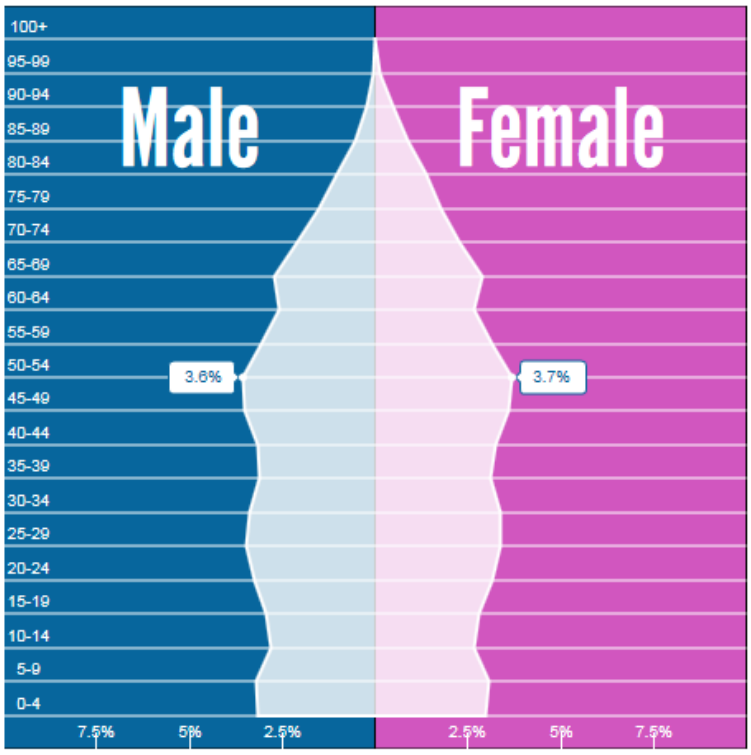
Key Term: **Demography**

Definition	**Etymology/Morphology**
Examples	**Non-examples**

Demographic Indicator	**Definition**
	The number of live births per 1000 people per year.
	The number of deaths per 1000 people per year.
	The proportion of people below or above normal working age (under 15 and over 65). It is calculate liked this: number of dependents ÷ number of workers x 100. The lower the number, the greater the number of people who work and are less dependent
	The average number of births per woman.
	The number of children per 1000 who die before they are one.
	The average number of years a person can expect to live.
	The number of mothers per 100,000 who die in childbirth.

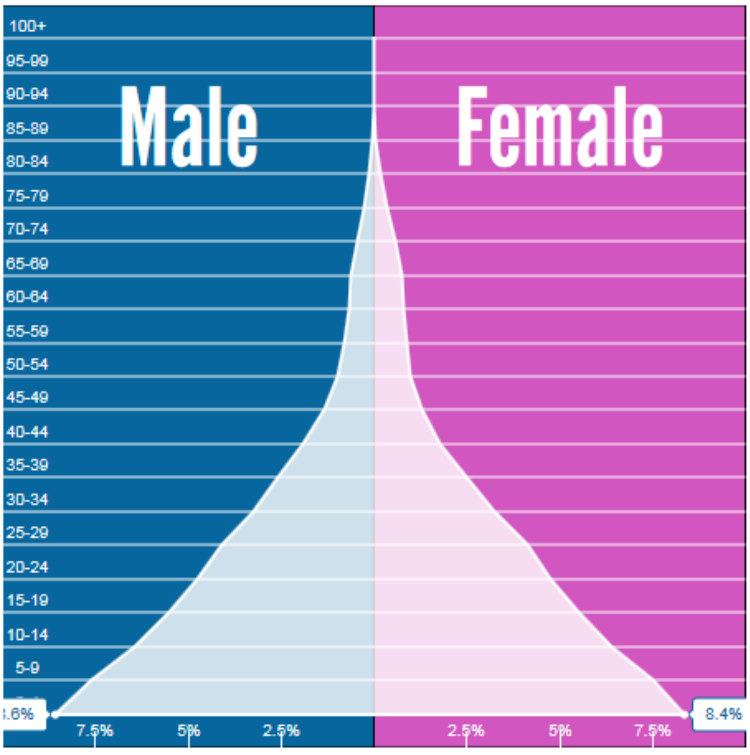
United Kingdom
2016

Population: 65.111.000



Malawi
2016

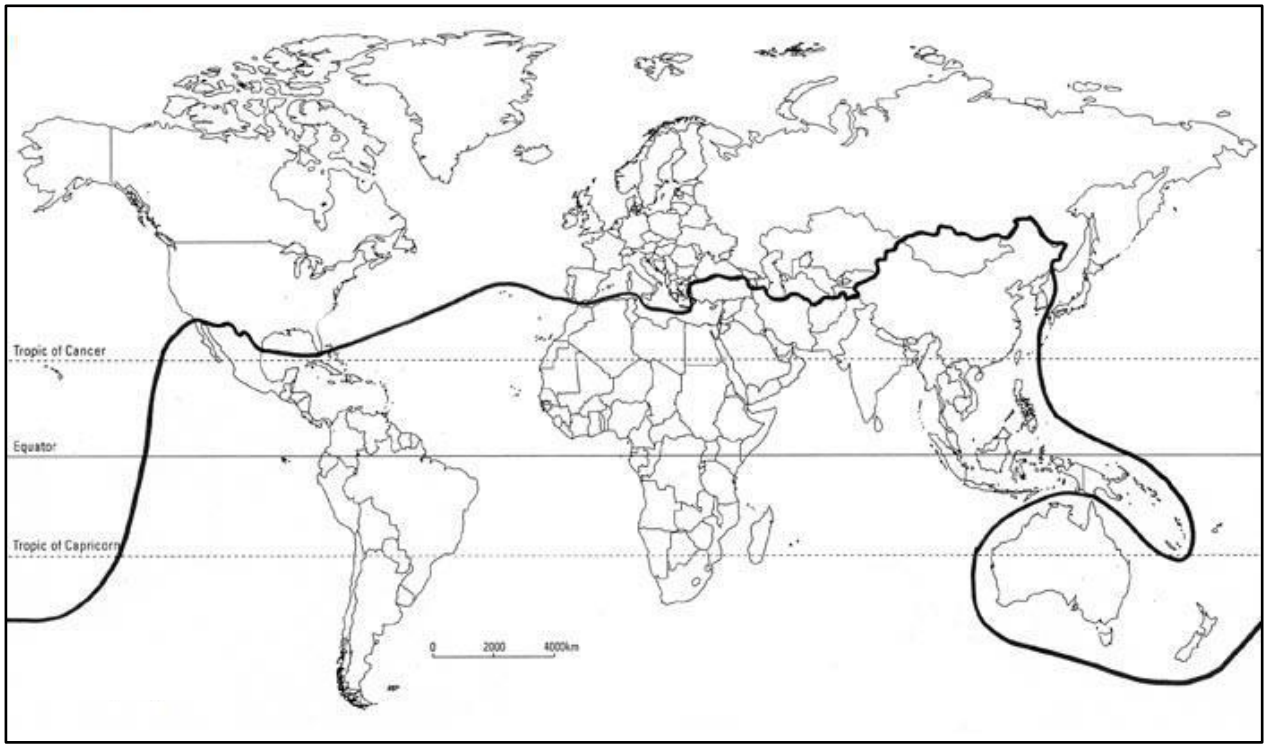
Population: 17.749.000



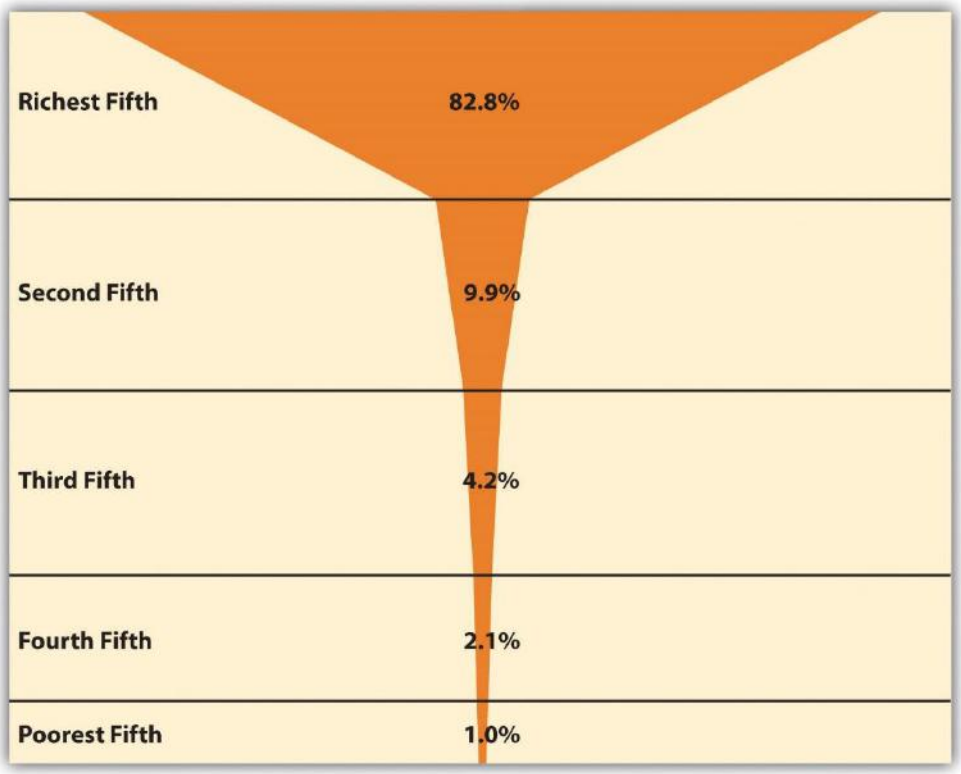
Data	Malawi	Brazil	UK
Population			
Birth rate (per 1000 people) (2014)	41.8	14.7	12.2
Death rate (per 1000 people) (2014)	8.7	6.5	9.3
Fertility rate (2014)	5.7	1.8	1.9
% population aged 0-14	46.9	23.8	17.3
% population aged 65 and over	2.7	7.6	17.3
Dependency ratio %	93.3	45.8	54.8
Health			
Life expectancy (years)	60	73.3	80.4
Infant mortality per 1000 live births	48	19.2	4.4
Maternal mortality per 100 000 births (2010)	460	69	12
Number of doctors per 100 000 population	2 (2008)	19	28
Education			
Average number of years in school	11	12	16
Literacy rate %	74.8	91 (2012)	99
Average age of first marriage for women	19.6 (2009)	29	31.8

	Malawi	UK	Reasons for difference
Largest age group			
Birth rate – high or low?			
Infant mortality rate – high or low?			
Life expectancy – high or low?			

Lesson 3 What is the development gap?



	MICs	NICs	RICs	LDCs (poorest 50)
When did they start to develop?			*2000s*	*Few have developed*
Why did their economies grow?			*Governments **liberalised** their economies to attract foreign investment from TNCs*	*Most people are still **subsistence farmers** (live off the land)*
Named examples				*Malawi Niger Mozambique*



Wealth is shared _____. The **top quintile** (GDP rank 1-46) own nearly _____ of the world's wealth whereas the **bottom two quintiles** (GDP rank 185-230) own just over _____.

3% ***EQUALLY*** ***82%*** ***UNEQUALLY*** ***83%*** ***1%***

Lesson 4 What are the causes and consequences of global inequalities?

Studies have shown that a variety of factors have led to inequality in the world.

Access to the sea is an important influence. For example, many landlocked countries and countries with mountainous topography have developed more slowly than coastal nations because trade is more difficult for them. Climate is also influential. Tropical countries have grown more slowly than those in temperate latitudes because they experience a higher incidence of climate-related diseases, which are often carried in the water. Natural hazards, such as earthquakes, hurricanes, floods and drought, can also slow or reverse development in some countries. Haiti has struggled to recover from the impacts of a devastating earthquake in 2010.

Colonialism occurred mainly in the 18th and 19th centuries as European powers, such as the UK, France and Spain, expanded their territories around the world. It was common for these powerful countries to take resources and people from their colonies as sources of wealth. Much of Africa was colonised in this way with lasting consequences for its people.

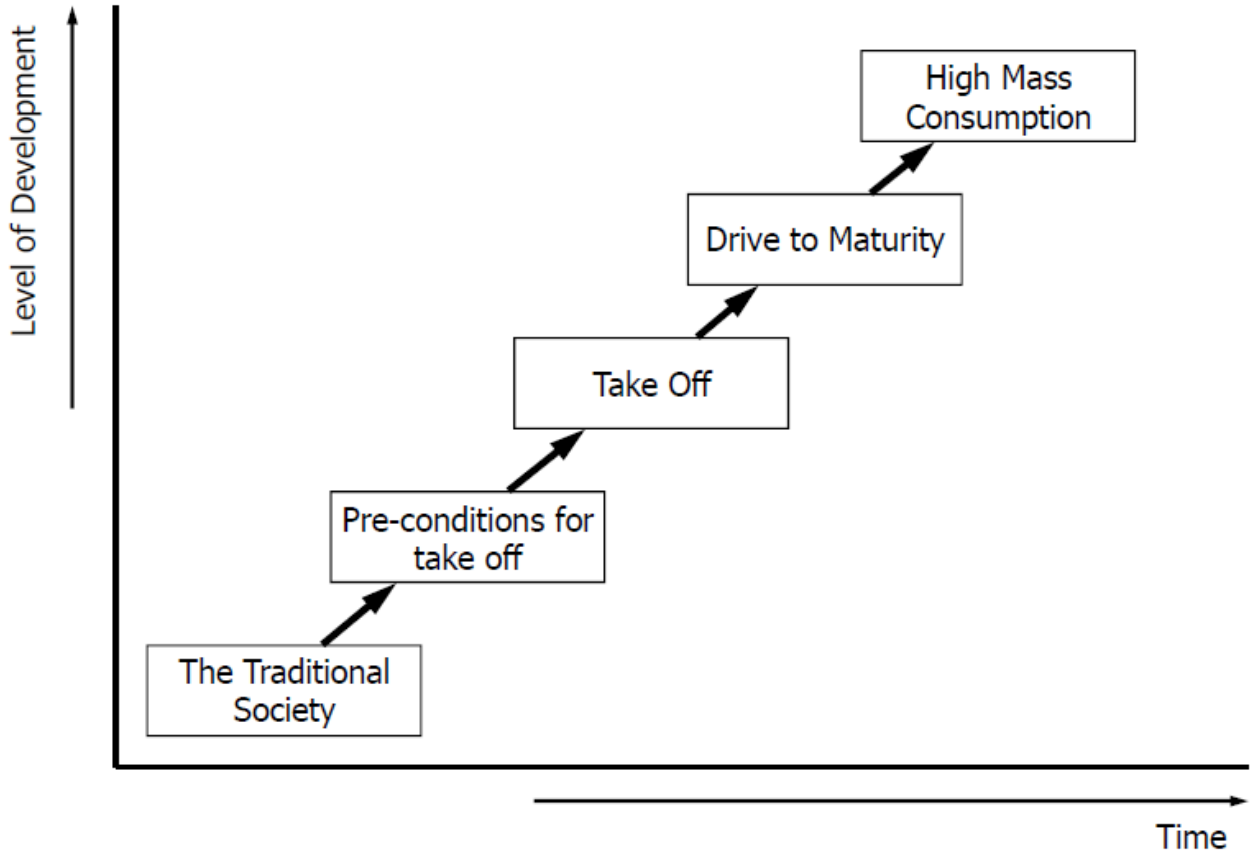
In the modern world, the term neo-colonialism is used to describe how rich countries can still dominate poorer ones. This is often through trade. Poorer countries generally export low value raw materials such as food crops and import high value processed or manufactured goods such as cars. These poor terms of trade mean they experience a trade deficit – they spend more than they earn. The opposite is true of richer countries who use trade to increase their GDP.

Open economies, such as the UK, encourage foreign investment and have developed faster than closed economies, such as North Korea, where imports and exports are not allowed. Investment creates jobs and helps to fund infrastructure. Political mismanagement and corruption can slow or reverse development. Zimbabwe, once one of the most developed African countries, has suffered severe setbacks in welfare and human rights because of poor governance.

Countries that have prioritised investment in education and health care have generally developed at a faster rate than nations that have invested less in these sectors. When Sierra Leone gained independence in 1963 it stopped investing in its health system. Since then, the country's economy has rapidly declined. A healthy and well-educated population attracts investors and therefore encourages development.

About one in five of the world's population live on less than US$1 a day, almost half on less than US$2.	Developing countries have increased vulnerability to natural disasters. They lack the capacity to adapt to climate change threats such as drought too.	Many developing countries do not have the ability to combat the effects of health emergencies such as HIV/AIDS or Covid-19.
Poor farming practices lead to environmental degradation.	Nearly one billion people do not have access to clean water and 2.4 billion lack basic sanitation (toilets).	Raw materials are exploited with limited economic benefit to developing countries and little concern for the environment.
Some developing countries have non-democratic governments or they are democracies that function poorly. This can worsen the plight of minority groups.	Developing countries frequently lack the ability to pay for food, farming technology and investment in rural areas.	More than 775 million people in developing countries cannot read or write.

Lesson 5. How do countries develop?



a) Manufacturing industries grow rapidly from investment in infrastructure and new technologies. The economy grows rapidly. Urban populations increase.

b) There is a shift from agriculture to manufacturing and trade with other countries increases. Profits are invested in infrastructure e.g. railways. Agriculture starts to produce cash crops (crops for sale).

c) A period of comfort. Consumers enjoy a wide range of goods. Societies choose to spend GDP wealth on education, healthcare and/or military strength.

d) Heavy industry is replaced by new industries that produce consumer goods. Economy grows steadily.

e) Most people work in agriculture as subsistence farmers. They eat almost everything they grow so there is little to sell. Most people live in rural areas.

Key Term	Definition
Colonialism	Direct political control of one country by another e.g. the British Empire was a colonial power and had full control over its **colonies** such as India.
Neo-colonialism	The dominance of poor countries by rich countries, not by direct political control (as in colonialism) but by trade and cultural influence.
Economic core	The economic centre of a country or region where businesses prosper, people have opportunities and are relatively wealthy; a highly developed area.
Economic periphery	The economic edge of a country or region; a more remote, difficult area where people tend to be poorer than average and have fewer opportunities. A less developed area.

Lesson 6 How has globalisation affected development?

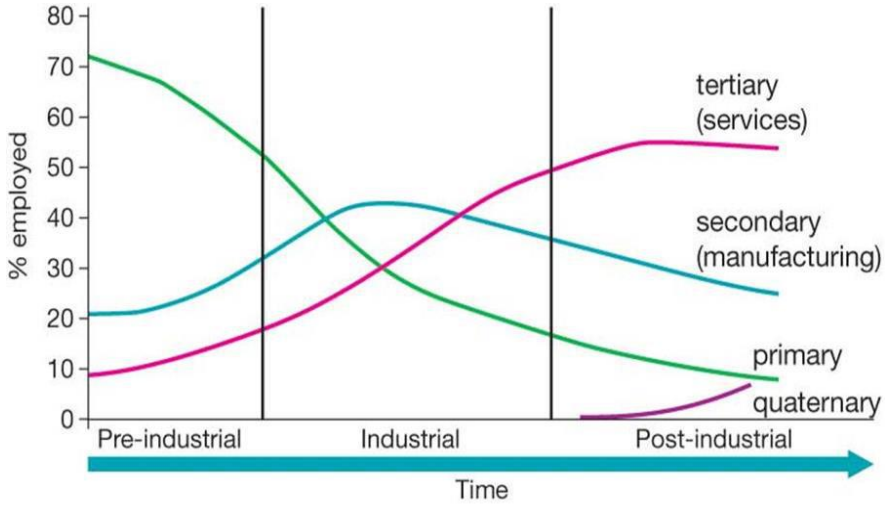
Improvements in transportation - larger container ships mean that the cost of transporting goods between countries has decreased. Transport improvements also mean that goods and people can travel more quickly, for example by air.

Freedom of trade - organisations like the World Trade Organisation (WTO) promote free trade between countries, which help to remove barriers between countries e.g. import tariffs (taxes).

Reasons for globalisation

Improvements in communication technology - the internet and mobile technology have allowed greater communication between people in different countries.

TNCs - LICs and MICs have lower labour costs and some also have also high skill levels. Transnational companies (TNCs) locate in these countries to increase their profits.



Lesson 7 What are the approaches to development?

Advantages of TNCs

- TNCs create jobs and offer education and training to employees
- Some TNCs set up schemes to provide new facilities for local communities
- TNCs invest in the infrastructure of the country e.g. new roads and internet cabling
- TNCs pay tax to the government, which can be spent on development projects

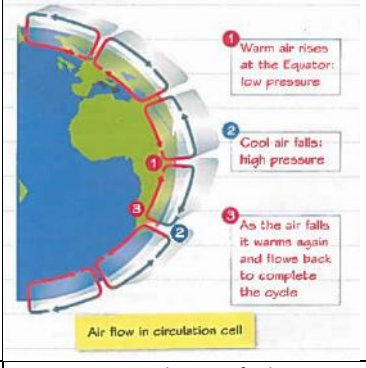
Disadvantages of TNCs

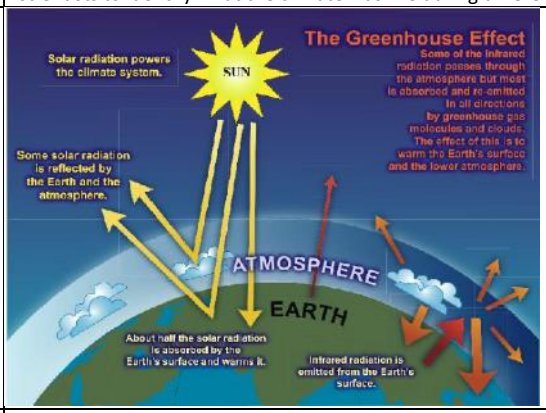
- Some corporation leaders take advantage of the relaxed environmental laws in the host country by creating lots of pollution
- The conditions for workers in factories can be very harsh
- Many TNCs are owned by foreign countries so economic leakage occurs, where profit is sent abroad
- The best jobs are often given to foreign workers from the TNC's country of origin
- TNCs use many of the country's natural resources e.g. water, leaving less for communities.

Component 1 Topic A Hazardous Earth
Case Study Knowledge Organiser

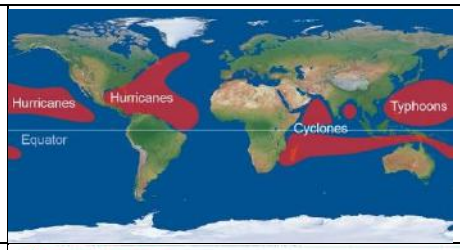
Cyclone management in a **developing** country: **Bangladesh**	Weather forecasting	Bangladesh's Meteorological Department issues forecasts and warnings on TV and radio. However outside Dhaka few people have access to these.	
	Satellite technology	Digital images are bought from the US, China and Japan's satellites costing $12 million a year. This can help track the cyclone and its formation live.	
	Warning systems	Since Cyclone Bhola in 1970 the government has developed an early warning system which allows communities to be evacuated. There are 45,000 cyclone warning volunteers.	
	Evacuation strategies	There are 3500 cyclone shelters in coastal districts which can take up to 5000 people each. Death rates are double where there are no shelters. More are needed.	
	Storm surge defences	Embankments have been built to protect against storm surges. However there are 400km of coastline & thousands of km of low-lying rivers so total protection is impossible.	
Cyclone management in a **developed** country: **USA**	Weather forecasting	There is a National Hurricane Center in Miami who issue forecasts and educate people.	
	Satellite technology	20 weather satellites operate every day. However many are ageing and in October 2012 one didn't work when hurricane Sandy was first developing.	
	Warning systems	Warnings are issued on radio, TV and via phones. There are 103 phones per 100 people so people have access to warnings	
	Evacuation strategies	In Florida towns and cities such as Fort Myers are classified into risk zones so only those that need to be evacuated are, this stops the system being overwhelmed. The poor and elderly can be left behind.	
	Storm surge defences	There are many embankments such as in New Orleans, however these collapsed during Hurricane Katrina causing flooding and deaths of people who felt safe.	
Earthquake effects in a **developing** country: **Haiti**	Background	An earthquake of 7.0 on the Richter scale occurred at 4.53pm on 12th January 2010 due to the conservative plate boundary between the North American and Caribbean plate.	
	Primary effects	• 316,000 people died • The port at Port-au-Prince was damaged • All 8 hospitals collapsed or were badly damaged • Electricity, water, sanitation and communications were badly disrupted or destroyed • 1.5 million homeless	
	Secondary effects	• Economic losses increased through loss of tourism and factories • Cholera spread through squatter camps • Looting and crime increased as the government and police force collapsed • Economic cost was between $7 and $14 billion	
Earthquake management in a **developing** country: **Haiti**	Short-term relief	The USA and Dominican Republic provided food, water, medical supplies and temporary shelters. The UK's Disaster Emergency committee raised more than £100 million for emergency aid.	
	Long-term planning	Aid workers reported that no one seemed to be in charge; lack of trained emergency services.	
	Preparation	Few buildings were 'earthquake proofed'.	
	Prediction	None within Haiti	
Earthquake effects in a **developed** country: **Japan**	Background	An earthquake of 9.0 on the Richter scale occurred at 2.47pm on 11th March 2011 due to the convergent (destructive) plate boundary between the Pacific and Eurasian plate.	
	Primary effects	• Collapsing buildings caused 667-1479 deaths • Reclaimed land in Tokyo suffered from liquefaction • The Fukushima Dam burst • Electricity was lost to the Fukushima Daiichi nuclear power station	
	Secondary effects	• 56 bridges collapsed due to the tsunami • Over 17,000 deaths caused by the tsunami • 56 bridges collapsed due to the tsunami • 1.2 million buildings were damaged because of the tsunami • The World Bank estimates the damage to be in excess of $300 billion	
Earthquake management in a **developed** country: **Japan**	Short-term relief	People keep emergency kits of water, food, a torch and a radio in their house. The government requested international aid	
	Long-term planning	Japanese rescue workers and soldiers responded to the crisis.	
	Preparation	Japan has 'disaster prevention day' on the 1st September every year where earthquake drills are undertaken. Buildings are built to strict national code so that buildings can 'move with the quake'. Immediately after an earthquake strikes in Japan, all television and radio stations switch immediately to official earthquake coverage which informs the public of risks. 40% of Japan's coastline has sea walls of up to 10m high to withstand incoming tsunami waves	
	Prediction	The Pacific Tsunami Warning Centre warned the coastal communities in Japan. To monitor earthquakes, the Japanese Meteorological Agency operates network of about 200 seismographs and 600 seismic intensity meters. It also collects data from over 3,600 seismic intensity meters managed by local governments and the National Research Institute for Earth Science and Disaster Prevention (NIED).	

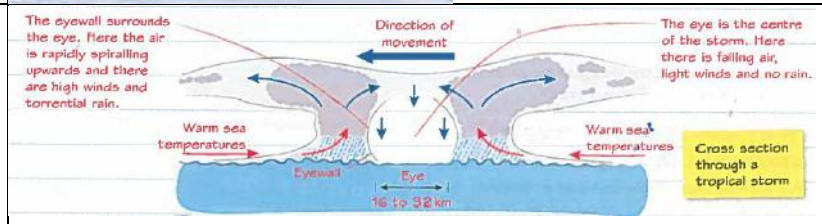
Component 1 Topic A Hazardous Earth
Knowledge Organiser

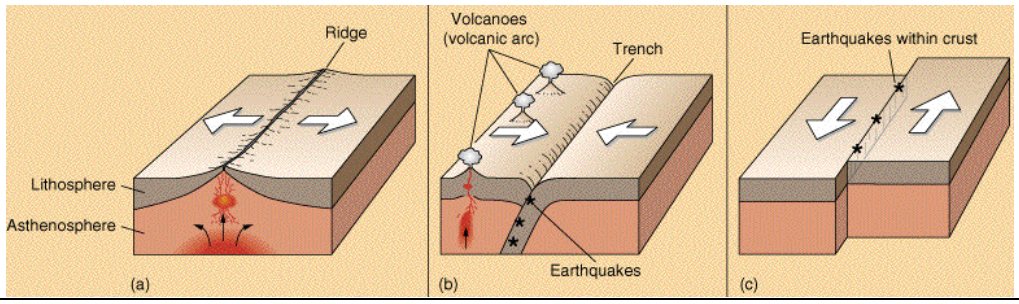
<table>
<tr><td rowspan="2">Global Circulation</td><td>Atmospheric Circulation Cells</td><td> 

1. The Earth receives its energy form the sun. These rays create intense heat energy at the equator. This powers huge circular air movement called circulation cells.
2. Hot air at the equator rises around 15km into the atmosphere. This air cools and travels north and south of the equator to around 30˚ in latitude. This is where the air sinks back towards the surface.
3. When the warm air rises, it creates low pressure. Cooling, Condensing and Cloud formation leads to precipitation here. There is a belt of low air pressure around the equator.
4. When cool air falls at 30˚ latitude, it creates a belt of high pressure. High pressure conditions have clear skies with little precipitation, these are arid areas e.g.the Sahara Desert.</td><td></td></tr>
<tr><td>Ocean Circulation</td><td>Ocean currents also transfer heat around the globe. They are powered by winds due to atmospheric circulation cells or by density differences due to water temperature and salinity (saltiness).</td><td></td></tr>
<tr><td rowspan="4">Natural Causes of Climate Change</td><td>Eruption Theory</td><td>Large, explosive volcanic eruptions can change the Earth’s climate in the short-term.
1. Eruption releases ash and sulphur dioxide.
2. The ash and gas rises into the middle atmosphere (stratosphere).
3. Ash and gas is carried by winds around the earth.
4. The ash and gas reflects solar radiation back into space.
5. This cools the planet and reduces average temperatures.</td><td></td></tr>
<tr><td>Sunspot Theory</td><td>The Sun’s output is not constant. Cycles have been detected that reduce or increase the amount of solar energy. This causes medium-term changes in Earth’s climate.
1. Sunspots are black areas on the surface of the sun.
2. Sometimes the sun has many of these spots.
3. Many spots means more solar energy is being fired out from the sun towards Earth.
4. Temperatures increase when there are more sunspots.
May have caused the Little Ice Age between 1645 and 1715 as fewer sunspots were recorded at this time.</td><td></td></tr>
<tr><td>Orbital Theory</td><td>In the long-term, there have been large changes in climate. Ice ages were 5-6˚C than today and interglacial periods 2-3˚C warmer. These are due to changes in Earth’s:
1. Eccentricity. The Earth’s orbit changes from an ellipse (warmer) to circular (colder) over 100,000yrs.
2. Obliquity. The Earth’s axis tilts between more upright to more on its side, over 40,000yrs, (less tilt = cooler temperatures).
3. Procession. The Earth’s wobble on its axis changes between 19,000 and 23,000yrs. This changes the amount of heat reaching different parts of the earth.
These three changes make up the Milankovitch Theory and are thought to cause ice ages.</td><td></td></tr>
<tr><td>Asteroid Collision</td><td>Asteroid impacts kick up large volumes of dust into atmosphere. This blocks out incoming solar radiation leading to a cooling of the planet.</td><td></td></tr>
<tr><td rowspan="3">Evidence for Natural Climate Change</td><td>Ice Cores</td><td>Large cylinders of ice drilled out of ice sheets. Carbon dioxide levels can be calculated by analysing trapped bubbles of air. The more carbon dioxide, the higher the temperatures. Can be used to work out how climate has changed over very long timescales.</td><td></td></tr>
<tr><td>Tree Rings</td><td>New tree ring added every year. Wider tree rings show conditions were good for growing – warm and wet. However, only medium term climate change can be measured as trees rarely live more than a few hundred years.</td><td></td></tr>
<tr><td>Historical Sources</td><td>Written sources (e.g. diaries, books), artistic sources (e.g. paintings) and records of regular events (e.g. harvests) allow scientists to identify what the climate was like during different time-periods.</td><td></td></tr>
<tr><td rowspan="3">Human Activity and Climate Change</td><td>Enhanced Greenhouse Effect</td><td> 

<u>Human sources of Greenhouse Gases</u>
Carbon Dioxide – burning fossil fuels, waste and wood. Deforestation (releases CO2 in trees back into the atmosphere).
Methane – livestock (cattle), rice farming, landfill.
Nitrous Oxide - Agricultural and industrial processes, car and aircraft engines.
Sulphur Dioxide – burning fossil fuels.</td><td></td></tr>
<tr><td>Evidence of human impact on climate</td><td>• Global temperatures are rising
• Atmospheric carbon dioxide levels are rising parallel with global temperatures
• Oceans warmed by 0.11°C per decade between 1971 and 2010
• Sea levels rose globally by approximately 14cm during the 20th century
• Arctic sea ice covers 13% less of the sea each decade
• Extreme weather events have become more frequent e.g. tropical cyclones and drought</td><td></td></tr>
<tr><td>Future climates</td><td>Uncertainty due to number of unknown factors (e.g. population growth, economic growth of different countries, uptake of technologies etc.). This makes determining the amount of greenhouse gases that will be added difficult to predict, hence any impacts on climates difficult to predict.</td><td></td></tr>
</table>

<table>
<tr><td rowspan="3">Tropical Cyclones</td><td>Where do they occur?</td><td> 

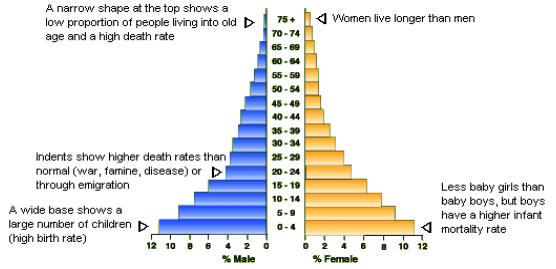
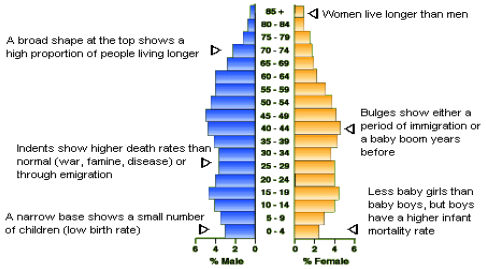
1. They only occur over water that is 26.5˚C or above.
2. They occur between 5˚ and 30˚ north and south of the equator.
3. They do not occur closer to or on the equator because the coriolis effect is not strong enough to make the air spin.
4.The heat in this area makes the air unstable causing it to rise radiply, condense and form huge clouds.</td><td></td></tr>
<tr><td>Formation</td><td> 

1. Warm, moist air rises and condenses, releasing huge amounts of energy.
2. As the air rises, it pulls in more warm, moist air behind it.
3. The air spirals upwards rapidly, intensifying the low air pressure and pulling in surface winds. Wind speed increases.
4. Stage 1 is repeated, generating more energy. Huge cumulonimbus clouds form, there is heavy rainfall.
5. An 'eye' develops at the centre when drier air is falling again, giving a period of calm</td><td></td></tr>
<tr><td>Classification</td><td>Saffir-Simpson scale used to classify tropical cyclones into five categories.
<table>
<tr><td>Category</td><td>Wind Speed</td><td>Description of effects</td></tr>
<tr><td>1</td><td>119-153 km/h</td><td>1. Low level of damage. (e.g. Roof coverings removed)</td></tr>
<tr><td>2</td><td>154-177 km/h</td><td>2. Moderate damage. (e.g. Roof structures on some houses ripped off)</td></tr>
<tr><td>3</td><td>178-208 km/h</td><td>3. Extensive level of damage. (e.g. Trees could be uprooted)</td></tr>
<tr><td>4</td><td>209-251 km/h</td><td>4. Extreme level of damage (e.g. Windows from many building blown out)</td></tr>
<tr><td>5</td><td>> 252 km/h</td><td>5. Catastrophic level of damage. (e.g. Complete devastation)</td></tr>
</table></td><td></td></tr>
<tr><td rowspan="9">Tectonics</td><td>Structure of the Earth</td><td>Crust – solid and rigid – tectonic plates. Two types of crust: Continental (Less dense and lighter, cannot be destroyed, can change shape) or Oceanic (More dense and heavier, is constantly being destroyed and created).
Mantle – upper asthenosphere (solid but 'plastic' type layer under such high pressure that the rock flows. Lower mantle – liquid magma at 3000^{0}C
Outer core – liquid iron and nickel. Temperatures 4000-6000^{0}C
Inner Core –iron at temperature of 5000-6000^{0}C. Pressure so high that iron is solid.</td><td></td></tr>
<tr><td>Plate movement</td><td>Radioactive decay in core heats molten rock in mantle, creating convection currents. Heated rock from mantle rises to Earth's surface. At surface, convection currents move tectonic plates in the crust. Molten cools and flows back to the core to be reheated.</td><td></td></tr>
<tr><td>Plate boundaries</td><td>a) Convergent (destructive) boundary: plates are pushing into each other e.g. Nazca and South American Plate. Oceanic plate subducts under continental plate creating viscous (sticky) magma which erupts violently to produce composite/stratovolcanoes. Friction between plates causes high-magnitude earthquakes.
Convergent (Collison) boundary: two continental plates e.g. Indo-Australian and Eurasian Plate collide and plates buckle, creating fold mountains. Many earthquakes and landslides due to steep slopes.
b) Divergent (constructive) boundary: Plates are moving apart e.g. North American/Eurasian Plate, allowing magma to rise to the surface and erupt runny basalt lava forming shield volcanoes which erupt gently.
c) Conservative boundary: plates are sliding past each other creating friction. Here you get high magnitude earthquakes, but no volcanoes as no magma is produced. e.g. Pacific and North American Plate.
 
</td><td></td></tr>
<tr><td>Hotspots</td><td>Points on the Earth's crust with very high heat flow, which is linked to increased volcanic activity. Many are not on plate boundaries.</td><td></td></tr>
<tr><td>Types of volcanoes</td><td>Shield – found on constructive plate boundaries of hotspots. Formed by eruptions of thin, runny lava which flows a long way before it solidifies. Gently sloping sides and wide base. Contain basaltic magma which is very hot with low silica and gas content. Erupt frequently but not violently.
Composite – found on destructive plate boundaries. Formed by eruptions of viscous, sticky lava and ash that do not flow far. Steep sloping sides and a narrow base. Made up of layers of ash and lava. Contain andesitic magma which is less hot than basaltic lava but which contains lots of silica and gas. Erupt infrequently but violently, including pyroclastic flows (mix of ash, gases and rock)</td><td></td></tr>
<tr><td>Earthquakes</td><td>Occur along all three plate boundaries. Magnitude (size of the earthquake) is measured on the Richter Scale. Severe earthquakes have a shallow focus (near to the surface). Focus – central point of the earthquake under the surface where the activity happens. Epicentre – the point on the surface directly above the focus.</td><td></td></tr>
<tr><td>Effects of volcanic eruptions</td><td><u>Primary Effects</u> - Buildings destroyed by fires, Explosions, Ash, Crops/livestock destroyed/killed.
<u>Secondary Effects</u> - Mudflows, Changes in landscape, Climate, Food/water supply disrupted, Homelessness, Businesses forced to close, Cost of insurance claims, Unemployment</td><td></td></tr>
<tr><td>Effects of earthquakes</td><td><u>Primary Effects</u> - Buildings and bridges collapse, Roads crack, Glass shatters, Gas pipes break, Electricity pylons fall, Water pipes break
<u>Secondary Effects</u> - Fires and explosions, Floods, Homelessness, Tsunamis, Disease, Landslides, Businesses forced to close, Cost of insurance claims, Unemployment.</td><td></td></tr>
</table>

Component 1 Topic A Hazardous Earth
Case Study Knowledge Organiser

Cyclone management in a **developing** country: **The Philippines (Typhoon Haiyan)**	Weather forecasting	PAGASA, the Philippines' meteorological agency broadcast warnings two days before Typhoon Haiyan hit.	
	Satellite technology	The Philippines uses satellite technology from Japan to track tropical cyclones.	
	Warning systems	Warning were issued via the Public Storm Warning Signal (PSWS) system.	
	Evacuation strategies	750,000 residents were evacuated. In Tacloban, the government built emergency shelters to house people but many were flooded by the 5m storm surge. Weeks later only 20% of those in needs of aid had received it.	
	Storm surge defences	The UN is leading mangrove planting projects throughout the Philippines.	
Cyclone management in a **developed** country: **USA (Hurricane Sandy)**	Weather forecasting	There is a National Hurricane Centre in Miami who issue forecasts and educate people.	
	Satellite technology	20 weather satellites operate every day. However many are old, some are broken, and the forecast was wrong.	
	Warning systems	Warnings are issued on radio, TV and via phones. There are 103 phones per 100 people so people have access to warnings	
	Evacuation strategies	45,000 personnel from the National Guard and US Air Force were put on duty. They helped staff evacuation shelters and distribute clean water and food. 76 'temporary' evacuation shelters were opened in New York; but a year later, 30,000 people were still displaced.	
	Storm surge defences	The New York subway was closed to passengers and entrances were covered with plywood and sandbags but all 10 tunnels in lower Manhattan still flooded, causing $5bn in damages.	
Earthquake effects in a **developing** country: **Haiti**	Background	An earthquake of 7.0 on the Richter scale occurred at 4.53pm on 12th January 2010 due to the conservative plate boundary between the North American and Caribbean plate.	
	Primary effects	• 316,000 people died • The port at Port-au-Prince was damaged • All 8 hospitals collapsed or were badly damaged • Electricity, water, sanitation and communications were badly disrupted or destroyed • 1.5 million homeless	
	Secondary effects	• Economic losses increased through loss of tourism and factories • Cholera spread through squatter camps • Looting and crime increased as the government and police force collapsed • Economic cost was between $7 and $14 billion	
Earthquake management in a **developing** country: **Haiti**	Short-term relief	The USA and Dominican Republic provided food, water, medical supplies and temporary shelters. The UK's Disaster Emergency committee raised more than £100 million for emergency aid.	
	Long-term planning	Aid workers reported that no one seemed to be in charge; lack of trained emergency services.	
	Preparation	Few buildings were 'earthquake proofed'.	
	Prediction	None within Haiti	
Earthquake effects in a **developed** country: **Japan**	Background	An earthquake of 9.0 on the Richter scale occurred at 2.47pm on 11th March 2011 due to the convergent (destructive) plate boundary between the Pacific and Eurasian plate.	
	Primary effects	• Collapsing buildings caused 667-1479 deaths • Reclaimed land in Tokyo suffered from liquefaction • The Fukushima Dam burst • Electricity was lost to the Fukushima Daiichi nuclear power station	
	Secondary effects	• 56 bridges collapsed due to the tsunami • Over 17,000 deaths caused by the tsunami • 56 bridges collapsed due to the tsunami • 1.2 million buildings were damaged because of the tsunami • The World Bank estimates the damage to be in excess of $300 billion	
Earthquake management in a **developed** country: **Japan**	Short-term relief	People keep emergency kits of water, food, a torch and a radio in their house. The government requested international aid	
	Long-term planning	Japanese rescue workers and soldiers responded to the crisis.	
	Preparation	Japan has 'disaster prevention day' on the 1st September every year where earthquake drills are undertaken. Buildings are built to strict national code so that buildings can 'move with the quake'. Immediately after an earthquake strikes in Japan, all television and radio stations switch immediately to official earthquake coverage which informs the public of risks. 40% of Japan's coastline has sea walls of up to 10m high to withstand incoming tsunami waves	
	Prediction	The Pacific Tsunami Warning Centre warned the coastal communities in Japan. To monitor earthquakes, the Japanese Meteorological Agency operates network of about 200 seismographs and 600 seismic intensity meters. It also collects data from over 3,600 seismic intensity meters managed by local governments and the National Research Institute for Earth Science and Disaster Prevention (NIED).	

Component 1 Topic B Development Dynamics
Knowledge Organiser

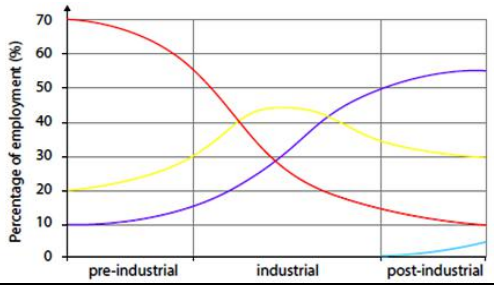
<table>
<tr><td rowspan="3">Defining and measuring development</td><td>Development</td><td>Development: the economic, social or political progress a country or people make.
Economic development: improvements in a country's or people's employment, income and living standards.
Social development: Improvement in people's quality of life, health, education and culture
Political development: improvements in a country's system of government or the involvement of people, for example through greater democracy or freedom of speech.</td><td></td></tr>
<tr><td>Levels of development</td><td>Developed countries: countries with very high human development e.g. the UK.
Emerging countries: countries with medium or high human development e.g. India.
Developing countries: countries with low human development e.g. Malawi.
The difference in levels of development between the wealthiest developed countries and the poorest developing countries is the development gap.</td><td></td></tr>
<tr><td>Development Indicators</td><td>Development can be measured using economic, social, demographic and political indicators.
<u>Economic:</u>
• Gross Domestic Product (GDP): the total value of goods and services produced by a country in a year. GDP per capita (PPP) is a better measure; it shows how the GDP is shared between the population and how much $1 would buy.
• Gross National Income (GNI): GDP plus money earned abroad e.g. by TNCs, and minus a country's debt.
• Poverty line: the minimum income required to meet someone's basic needs. World Bank definition: $1.25 per day.
<u>Social:</u>
• Human Development Index (HDI): a measure of people's quality of life using four indicators – GPD per capita (PPP), life expectancy, literacy rate and years of schooling.
• Literacy rate: The percentage of the population, aged over 15, who can read and write.
• Access to safe drinking water: The percentage of the population with access to an improved (piped) water supply within 1km.
<u>Demographic (social measures linked to a country's population):</u>
• Birth rate: the number of live births per 1000 people per year.
• Death rate: the number of deaths per 1000 people per year.
• Life expectancy: the average number of years a person can expect to live.
• Fertility rate: the average number of births per woman.
• Infant mortality rate: the number of children per 1000 who die before they are one.
• Maternal mortality rate: the number of mothers per 100,000 who die in childbirth.
• Population structure: the age-sex distribution in a country, shown by population pyramids.
 
 
<u>Political:</u>
• Corruption Perceptions Index (CPI): A measure of how dishonest a government is. 0 = 'highly corrupt', 100 = 'very clean'.</td><td></td></tr>
<tr><td rowspan="4">Causes of global inequality in development</td><td>Social</td><td>Countries that have invested in education and healthcare have generally developed faster than other countries. A healthy, well-educated population attracts investors and encourages development e.g. India.</td><td></td></tr>
<tr><td>Historical</td><td>Colonialism – where one country takes control over another and occupies it with settlers – occurred mainly in the 18th and 19th centuries when European countries like the UK and France colonised countries in Africa and Asia. Workers were paid very little if at all and resources like coffee, tea and gold were exploited and sold with profits going to Europe, rather than the colonies. Nowadays, unfair terms of trade mean than developing countries like Malawi are still exploited by developed countries. This is neo-colonialism.</td><td></td></tr>
<tr><td>Environmental</td><td>Landlocked countries develop more slowly than countries with a coastline, as trade is more difficult. Countries with a tropical climate can struggle to develop compared to countries with a temperate climate, as diseases are more common e.g. malaria. Natural hazards such as earthquakes, cyclones and floods can also hold countries back.</td><td></td></tr>
<tr><td>Economic and political</td><td>Countries with open economies e.g. the UK are more globalised and encourage Foreign Direct Investment and develop faster than those with closed economies e.g. North Korea. Corrupt governments can prevent development by spending GDP on themselves, rather than the country e.g. Robert Mugabe in Zimbabwe.</td><td></td></tr>
<tr><td rowspan="2">Development theories</td><td>Rostow's Modernisation Theory</td><td>A theory based on the economic history of a number of developed countries e.g. the USA and the UK. Countries develop through five stages: traditional society, pre-conditions for take-off, take-off, drive to maturity and high mass consumption.</td><td></td></tr>
<tr><td>Frank's Dependency Theory</td><td>A theory that blames the underdevelopment of the developing world (the periphery) on exploitation by developed countries (the core), first through colonialism then by neo-colonialism.</td><td></td></tr>
<tr><td rowspan="2">Approaches to development</td><td>Top-down</td><td>An approach to development where decisions are made by governments or large companies e.g. TNCs. TNCs bring foreign direct investment and create jobs. But top-down strategies often involve big infrastructure projects so are expensive and local communities usually have very little say. Example: hydroelectric dams.</td><td></td></tr>
<tr><td>Bottom-up</td><td>Non-Governmental Organisations (NGOs) lead small-scale projects that target aid at poor communities, particularly women and children. They use intermediate technology (low-tech and low-cost) and involve local people in decision-making. Most projects are sustainable. Example: microcredit.</td><td></td></tr>
</table>

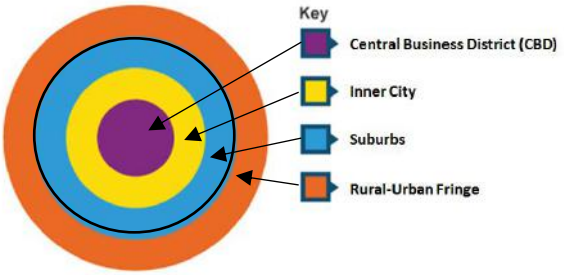
Component 1 Topic B Development Dynamics
India Knowledge Organiser

Context	Site	Part of continental Asia. Forms a peninsula with a 7500km long coast. Allows for port development and trade by sea.
	Situation	International borders with 6 countries including China and other emerging economies such as Malaysia; provides a large market for India to trade with. Arabian Sea to the west.
	Connectivity	East-west oil shipping routes are not far to the South of India. India is a member of the UN and WTO.
	Society	2nd largest World population with 1.25 billion people. World's 4th & 5th largest cities are in India (Mumbai & Kolkata).
	Culture	Birthplace of 4 world religions including Hinduism. Has the world's largest film industry, Bollywood produces over 1200 films each year.
	Environment	It is very biodiverse with 6% of the world's bird and plant species. India is the World's 3rd largest emitter of greenhouse gases.
Economic Trends	GDP	Increased from $1.2 trillion in 1991 to $7.3 trillion in 2014.
	GNI per capita	Increased from $1150 in 1991 to $5800 in 2014.
	Economic sectors	Decrease in agriculture from 37.2% in 1980 to 14.5% in 2011. Services increased from 45.8% to 67.1%. Slight increase in manufacturing.
	Imports & exports	Imports and exports have both increased. Exports increased from $17.2 billion in 1991 to $342 billion in 2014. Imports increased too, from $24.7 billion in 1991 to $508 billion in 2014.
	FDI	Increased from $5.6 billion in 1995 to $252.3 billion in 2014. India received more FDI than any other country in 2014.
The role of globalisation and government policy in development	Communication	Has the 2nd largest wireless internet network in the world.
	Transport	India's road system has doubled in length. There are 12 major and 185 minor seaports where 70% of trade is carried out. 11 international and 86 domestic airports.
	TNCs	India attracts FDI from TNCs because it has a large, well-educated, English-speaking population. Many TNCs outsource work to India e.g. call centres. The government has reduced taxes in Bangalore to encourage TNCs and BT do software development in the area.
	Multi-lateral aid	India has been given the most international aid in history although this is declining now as the country develops.
	Education	Education is free and compulsory for all 6-14 year olds. There are more than 1.4 million schools and 36,000 higher education facilities. The literacy rate has gone from 64.8% in 2001 to 74% in 2011.
Impacts of economic growth	Demographic changes	Birth rate has fallen from 30 in 1991 to 19.9 in 2014. Death rate has fallen from 10 in 1991 to 7.35 in 2014. Fertility rate has fallen from 4 in 1991 to 2.5 in 2014. The percentage of people living in urban areas has increased from 25% in 1990 to 33% in 2015 due to rural-urban migration.
	Development changes	HDI has increased from 0.38 in 1991 to 0.59 in 2014. Life expectancy has increased from 59.7 in 1991 to 68 in 2014. The country has not benefitted equally: GDP of the wealthiest state **Maharashtra** (India's core) is over four times that of **Bihar** (India's periphery). Women are poorest in Bihar with India's lowest literacy rates. The higher castes are literate and the lower castes are illiterate.
	Environmental changes	13 of the World's top 20 polluted cities are in India e.g. Delhi. Air pollution reduces life expectancy by 3.2 years for Indians who live in cities. From 2010 to 2015 the number of polluted rivers rose from 121 to 275 due to extra sewage. Land degradation is costing $80 billion a year.
International role	Description	India is one of the **BRICS**, together they have 20% of the world's GDP. They set up the **New Development Bank** to provide resources for BRICS and other emerging or developing countries - giving them more political power. India is a member of the **G20** (largest 20 global economies). The EU and USA have strong trade links with India, imports and exports balance with the EU but there are $45,200 million in exports to the USA compared to $21,600 million imports. India would like a seat on the **UN Security Council** so that it can make decisions about global conflicts. This could lead to more conflict with Pakistan over Kashmir. India is a major polluter but it is investing in more renewable energies such as wind. It could lead the way in global talks on climate change.
	Benefits	The percentage of people living below the national poverty line has decreased from 37% in 2005 to 22% in 2012.
	Costs	The percentage of people living in poverty is still too high at 33% according to the US poverty line. TNCs can move out of a country quickly and exploit workers. Income equality is rising.

Component 1 Topic C Challenges of an Urbanising World
Knowledge Organiser

<table>
<tr><td rowspan="4">Why is the world becoming more urbanised?</td><td>Urbanisation trends</td><td>Urbanisation is an increase in the percentage of people living in urban areas (towns and cities), compared to rural areas (the countryside). In 1950, 1 billion more people lived in rural areas compared to urban areas. The population in both areas grew, but by 2007, more people were living in urban areas. In the future, the urban population is expected to increase rapidly to more than 6 billion, more than double the rural population. Some urban areas have grown more quickly than others with the fastest growth in cities in developing and emerging countries in Asia and Africa. Urban areas in developed regions like Europe will grow too, but more slowly.</td></tr>
<tr><td>Causes of urbanisation</td><td>Reason 1: Rural to urban migration – people move into towns and cities from the countryside. Countries in Asia and Africa have recently industrialised and factories built in towns and cities there attract workers. Most people in developed countries already live in urban areas so less migration is possible.
Reason 2: Natural increase – birth rates are higher than death rates in developing and emerging countries whereas the rate of natural increase in developed countries is often low or even negative.</td></tr>
<tr><td>Megacities</td><td>A megacity is a city with a population of more than 10 million people. In 1950 there were only two megacities – New York and Tokyo – but today there are 28! In 1975 six of the top ten megacities were in developed countries. By 2000, this had halved to three and by 2025 there is likely to be only two – New York and Tokyo. None of the top ten are located in Europe but Asia has five. In the future, six of the world's top ten megacities will be in India and China, emerging countries.</td></tr>
<tr><td>Urban primacy</td><td>Some urban areas dominate the economic and political systems in a country. These powerful cities are called primate cities. Most are megacities but not all. London is a primate city because it has a population of 8 million, whereas the next biggest city, Birmingham only has 1 million. Additionally it has the Houses of Parliament, the head of government in the UK. The average salary in London is £40,191, the highest in the country and it has the most airports of any UK city (5).</td></tr>
<tr><td rowspan="4">How are urban populations affected by social and economic changes?</td><td>Key terms</td><td>Migration: The movement of people from one place to another.
Internal/National migration: Movement of people from one part of a country to another.
International migration: Movement of people from one country to another country.
Socio-economic processes: Changes related to people and jobs, money or trade.</td></tr>
<tr><td>Migration</td><td>Migration has a significant impact on urban populations. People migrate due to pull factors – something attractive about a new place and push factors – something they dislike about the place they are living in.</td></tr>
<tr><td>Urban growth</td><td>In developing and emerging countries, economic change is leading to the growth of cities like Kampala and Chongqing. The economic change responsible is industrialisation (growth of industry).
<table>
<tr><th></th><th>Kampala (Uganda)</th><th>Chongqing (China)</th><th>London (UK)</th></tr>
<tr><td>Continent</td><td>Africa</td><td>Asia</td><td>Europe</td></tr>
<tr><td>Level of development</td><td>Developing</td><td>Emerging</td><td>Developed</td></tr>
<tr><td>Main type of migration</td><td>Internal (rural-urban)</td><td>Internal (rural-urban)</td><td>International</td></tr>
<tr><td>Causes of migration</td><td>• Jobs in manufacturing e.g. steelworks
• Difficult living conditions in rural areas e.g. no electricity</td><td>• Economic reform (Chinese government invited TNCs to locate there to create manufacturing jobs)
• Loss of farmland and jobs in agriculture
• Attractive services e.g. education and healthcare</td><td>• Service jobs e.g. banking
• High rates of pay
• Attractive services e.g. entertainment and culture
• Easily accessible</td></tr>
</table></td></tr>
<tr><td>Urban decline</td><td>Some urban areas in developed countries are in decline and their populations are falling. This is a result of deindustrialisation (industrial decline). Detroit in the USA is a city in decline. Decline began in the 1950s when Detroit's three major car manufacturers (Ford, GM and Chrysler) closed down. Many people lost their jobs and migrated to other cities to find work. This left a small workforce behind so no new industries were attracted to the city. Buildings became derelict and crime increased, pushing more people out of the city. A third of the population has left since the 1970s.</td></tr>
<tr><td rowspan="2">How do urban economies differ?</td><td>Employment sectors</td><td>Primary – the extraction of raw materials from the ground or sea.
Secondary – the manufacture of goods using raw materials.
Tertiary – the provision of a service.
Quaternary – the provision of information and expert help.

As countries develop, their economies and the jobs people do change. This is shown by the Clark-Fisher Model. Developing countries have a pre-industrial economy, emerging countries have an industrial economy and developed countries have a post-industrial economy.
 
</td></tr>
<tr><td>Differences in economies</td><td>Developing cities: The city is likely to be an important point of trade, regionally, nationally and maybe internationally. There are likely to be large markets (food/clothing) and maybe transport hubs such as ports, e.g. Bamako in Mali or Dar es Salaam in Tanzania. The main employment is low-paid service work. The secondary sector is likely to be growing. There may be some FDI into industry as TNCs move from emerging countries to find cheaper wages, e.g. Karachi in Pakistan. The high skilled tertiary sector may be small – concentrated in government offices, headquarters of national companies – but may be growing, particularly in ICT.
Emerging cities: The secondary sector is important and there will be established industrial infrastructure and good national and international transport connections. There maybe special economic zones (SEZs) e.g. Shanghai in China. The middle class is growing which is likely to create a larger tertiary sector. Some emerging world cities will have large specialised tertiary sectors, e.g. ICT and call centres in Bangalore, India.
Developed cities: The tertiary sector dominates in developed cities and skill and pay varies. Some cities, particularly 'world cities', have a concentration of specialist quaternary jobs, e.g. ICT and design in 'Silicon Valley' outside San Francisco, USA. Smaller, regional urban areas can have lower-paid service office jobs with local and large financial companies, e.g. JP Morgan Chase in Bournemouth, UK.</td></tr>
</table>

<table>
<tr><td></td><td>Types of employment</td><td>Formal: jobs (some highly skilled) where people work for regular pay, have employment rights and pay taxes e.g. street vendors. There are contracted hours e.g. 9-5, the working environment is relatively safe, there are some worker protections and employers may offer sick/holiday pay. Formal employment dominates developed economies. Less than 10% of people in London work informally.
Informal: unofficial work, often unskilled, without regular pay and employment rights e.g. factory workers. There is often no formal workplace and no set hours, many workers will be self-employed, no protection or rights are offered. Informal work is most common in developing and emerging countries. 80% of people in Kampala work in the informal sector.</td></tr>
<tr><td rowspan="3">How do cities change over time?</td><td>Key processes</td><td>
<table>
<tr><th>Process</th><th>What is it?</th><th>When did it happen?</th><th>Why did it happen?</th></tr>
<tr><td>Urbanisation</td><td>An increase in the percentage of people living in urban areas</td><td>18th and 19th centuries</td><td>Industrial revolution saw factories attract migrants from rural areas.</td></tr>
<tr><td>Suburbanisation</td><td>People move from the city centre to the edge of the city – the suburbs</td><td>Early 20th century</td><td>City centres were polluted and noisy. Wealthy people moved away. Public transport meant people could commute.</td></tr>
<tr><td>De-industrialisation</td><td>Industry begins to decline</td><td>1970s-</td><td>Technological change, lack of investment, competition from abroad.</td></tr>
<tr><td>Counter-urbanisation</td><td>People move out of larger towns and cities into villages and rural areas</td><td>1970s-1980s</td><td>Rising car ownership meant people could commute. Telecommunications allowed people to work from home.</td></tr>
<tr><td>Regeneration</td><td>Run-down inner city areas are redeveloped</td><td>1990s-</td><td>City planners want to attract businesses and tourists so give the inner city a ‘facelift’.</td></tr>
</table>
</td></tr>
<tr><td>Land use</td><td>Land use means ‘function of the land’ e.g. what land is used for’. Land use can be:
• Commercial – offices and shops
• Industrial – factories and warehouses
• Residential – houses
Cities can be modelled to show zones of land use. One such model is the Burgess Model.
 
</td></tr>
<tr><td>Characteristics of land use zones</td><td>CBD: Tightly packed roads, town hall, city centre, bus and railway stations, car parks, shops and government offices. Land is <u>expensive</u> in the CBD as it is the most <u>accessible</u> part of the city. Commercial land uses can afford the high rents.
Inner City: Straight roads with terraced houses, factories and industrial areas, possibly evidence of some re-development. Houses are high density as they were built cheaply for factory workers. Deindustrialisation caused inner city decline and <u>planners</u> have encouraged regeneration of brownfield sites.
Suburbs: Residential areas, with bigger houses, garages and more space. Roads will not be as straight and possible cul-de-sacs. Land is <u>cheaper</u> further from the CBD so houses are bigger
Rural-urban fringe: Much further from the CBD, often beyond the edge of the city, on the other side of green space. Large housing estates. Leisure facilities such as golf courses. Low-rise commercial and industrial properties e.g. retail and business parks. All connected to the city centre by motorways.</td></tr>
</table>

Component 1 Topic C Challenges of an Urbanising World
Mumbai Knowledge Organiser

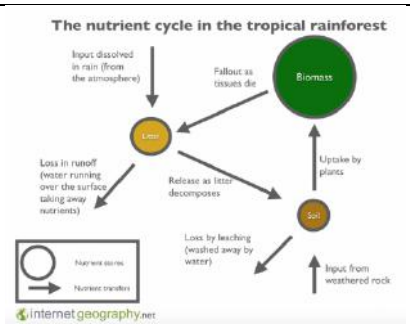
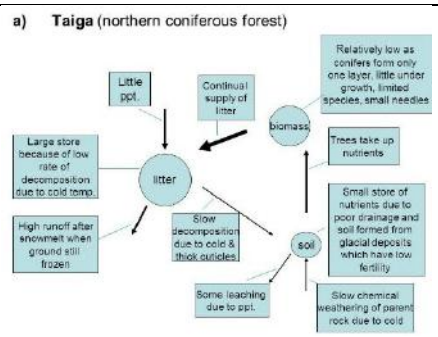
Geographical location	Site	Main city lies on a peninsula on the deep water estuary of the Ulhas river. Much of the city is low-lying, just above sea level.	
	Situation	It lies 19°N of the equator. On India's west coast making it closer to Europe via the Suez Canal.	
	Connectivity	The waterfront is 10km long allowing huge port development. Shipping times to Europe are 5 days shorter than from Kolkata on the East coast. Mumbai is 9 hours from UK airports.	
The structure of the city	CBD	On the Southern tip of the peninsula. Oldest part of the city. Many firms have their Indian headquarters here e.g. Bank of America. Housing is very expensive, old textile mills have been redeveloped in areas such as Colaba. The port area is economically active and up to 25,000 people work here and live in the nearby slums.	
	Inner suburbs	This area was developed in 1900s-1930s to house workers in the old textile mills. This is now mainly a slum area with chawls and shanty houses. Dharavi is located here.	
	Outer suburbs	Built post 1970s along Mumbai's railway lines. Allowed commuters to travel into New Mumbai. Some industrial sectors are also found here.	
	Rural-urban fringe	Very difficult to define as the area has sprawled into nearby towns. Rural areas are only found where the land is not suitable for building on e.g. the river estuary land and the large area of National Park in the hills to the North of Mumbai.	
Reasons for rapid population growth	Natural increase	Natural increase is 1.4% per year due to the migrants moving into the area generally being in their 20s and 30s. It accounts for nearly half of Mumbai's growth.	
	Migration	1000 migrants arrive in Mumbai every day. They have moved from rural areas of India to Mumbai. From 2001 to 2011 1.7 million migrants came to Mumbai. This is due to more jobs, better education (95% literacy rate) and higher incomes.	
	Economic growth	Mumbai is the commercial capital of India and there has been much investment in services e.g. banking & call centres, manufacturing e.g. textiles, construction and entertainment e.g. Bollywood. All of this has led to migration causing population growth.	
Challenges of rapid population growth	Housing shortages	1000 migrants arrive every day and housing cannot keep up with this so they build slums.	
	Inadequate water supply & waste disposal	60% of Mumbai's population uses communal taps. In some slums water only runs for 30 minutes a day. 800 million litres of untreated sewage go into the rivers every day.	
	Poor employment conditions	Most work in the informal sector so there are no conditions, pay is very low and some work is dangerous, in the port men dismantle ships using basic tools and without safety equipment.	
	Limited service provision	There is very little formal education or health care in the slums as they have grown too rapidly and the government does not have the money to invest.	
	Traffic congestion	Commuter trains and buses are overcrowded, 3500 people die on Mumbai's railways every year, most from hanging from doors or windows. There are 1.8 million cars so roads are usually grid locked.	
Opportunities of rapid population growth	Access to resources	Even in slums people have access to electricity and satellite TV.	
	Employment	Jobs are available in call centres earning educated people £3000 per year. There are many job opportunities in the informal sector for unskilled workers. There are 5000 small-scale businesses in Dharavi worth £350 million per year.	
Quality of life differences	Housing	40% live in slums, 20% in chawls, 10% on the streets and 30% in apartments of bungalows. Mumbai's richest residents live in gated communities.	
	Sanitation	Slum dwellers have to share water sources and toilets, 1 per 500 people. Skilled workers/upper middle classes can afford an apartment with a bathroom in it.	
	Income	Income is variable in the slums as most employment is in the informal sector. As a teacher a Mumbaikar can earn £230 per month. The upper middle class can earn £1250 per month.	
Challenges of managing Mumbai	Government	The government is inefficient and bureaucratic so decisions take time. There is much corruption and land is often sold to the highest bidder.	
	Housing	Much is rent controlled so there is a limit on what can be gained from improving rented buildings. People do not want to move out of the slums but would prefer these to be improved, this is very expensive.	
	Policing	Making working conditions better would need new laws and these laws would need to be enforced. This would prove very difficult.	
Top down strategies	Water supply	Vision Mumbai was a strategy introduced by the government to solve the worsening quality of life in Mumbai. They cleared slums and built new flats with piped water and sewerage.	
	Waste disposal	The Gorai garbage site had 1200 tonnes to waste put in every day and released methane in 2007 the supreme court ordered for this to be improved. The waste was reshaped into a gentle hill and covered with grasses to make a park. Methane-capture technology has been used to take the gas produced and generate power. In 2014 it won a prize for sustainable urban development.	
	Transport	In 2005 the government built a monorail to ease congestion. Tickets were made cheap at 11 rupees but it has been underused as it goes through industrial sectors instead of the old city. Most of the 15,000 people that use it are tourists. 72 trains were added to Mumbai's railways by Vision Mumbai.	
	Air quality	The government banned diesel vehicles with an engine capacity greater that 2000cc. Vision Mumbai brought in new measures in 2015 to improve air quality.	
Bottom-up strategies	City housing	Agora Microfinance is a bank service that provides small loans for people who want to improve their homes. They can gain up to a maximum of £300 and the interest rate is 25% paid in weekly instalments.	
	Sanitation	SPARC is an Indian NGO that has put cheaper toilets into communities. They are 25 rupees for a monthly permit and families can then use them as much as they want. 800 community toilet blocks have been built.	
	Health services	LSS is a health charity that tried to control leprosy in the 1980s it had 4000 patients by 2007 there were only 219 cases. It educates people about symptoms and treatment.	

Component 3: People and Environment Issues- Making Geographical Decisions

People and the Biosphere

Global factors affecting location of biomes	Climate, including temperature, precipitation and sunshine hours, is the main global factor influencing the location of World biomes. Temperature and precipitation are influenced by latitude.	
Local factors affecting biomes	Altitude	Temperatures drop by approximately 6.5°C for every 1000m increase in height, at high altitudes temperatures that are below freezing are common which limits the types of plants that can grow. Soils on mountains also gets thinner making it difficult for larger plants to grow. At a certain point it becomes too cold and trees cannot grow- this is called the treeline. Grasses tend to grow after this.
	Rock and soil type	Some rocks are harder than others which may make it more difficult from plants to grow through them. The permeability of rocks will also affect whether or not there is enough water for plants to grow. When rocks are chemically weathered they release nutrients and chemical into the soil. Sandy soil has lots of small air gaps and water flows through it easily so plants must be able to stand dry conditions eg barley. Clay soil has few air gaps and water will not flow through it so plants need to be able to grow in wet conditions eg wheat. Peat is different from other types of soils as it does not contain rock particles it is rich in nutrients so forests can grow.
	Drainage	Where there are impermeable rocks the surface may often be, only some plants like to grow in these conditions. The amount of drainage also affects the amount of evaporation from the soil.
Characteristics of biomes	Tropical forest	Hot and wet all year, very dense forests
	Tropical grasslands (savannah)	Hot all year, has a dry season, tall grasses and drought-adapted plants eg baobab
	Deserts	Very hot all year but with cool nights, very low rainfall. Plants are scarce.
	Temperate grasslands	Hot in summer, very cold in winter, most rain in late spring and summer. Short grasses found.
	Temperate forest	Warm summer and cool winters, precipitation all year round. Deciduous trees such as oak.
	Boreal forest	Mild summer and very cold winters, low precipitation. Coniferous trees such as pine.
	Tundra	Temperatures are below freezing most of the year, low precipitation and short daylight hours in winter. Very few plants can live.
Goods and services provided	Indigenous and local people	The biosphere provides food, medicine, building materials and fuel resources.
	Exploitation	The biosphere can be exploited for commercial gain for energy eg HEP or mining, water can be extracted and other mineral resources can be mined.
	Services	The biosphere regulates the composition of the atmosphere eg trees take in carbon dioxide and give out oxygen. It also maintains soil health by rotting litter providing humus. The hydrological cycle (water cycle) is also regulated by the biosphere.
Trends	There is increasing demand for food, energy and water globally but it is rising most steeply in regions such as South East Asia as emerging countries' populations and economies are growing rapidly.	
Geographical theories	Thomas Malthus	Populations will eventually grow so large and so quickly that food production cannot keep up. This will lead to food shortages and in turn war and famine. These events will cause the population to decrease until it reaches a sustainable level.
	Ester Boserup	As populations grow new technologies will be invented in order to increase the supply of resources to cater for everyone. "Necessity is the mother of invention".

Forests Under Threat

	Tropical rainforest		Taiga
Characteristics	Most are located within 20 north or south of the equator. Hot all year rounbd with temps between 27-30C and rainfall of 2000-3000mm. This leads to a very productive environment with high levels of biodiversity.		Largest biome on earth. It is found from 50-70 North. There are long cold winters -40C, summers are short and mild about 16C. There can be snow on the ground for many months and annual precipitation is low, less than 500mm.
Adaptations	Plants: There are 4 **stratified layers** in the rainforest as so much vegetation can grow. Emergent trees have large **buttress roots** to keep them stable and allow them to grow so tall. Plants in the canopy have **drip tips** to allow the water to fall off and prevent the plants being damaged. Animals: Sloths have huge claws to allow them to hang upside down and their fur grows away from them to help the rain water drip off. Primates have adapted to live in the trees as that is where most of the food is.		Plants: Trees have needles for leaves as these have a very small surface area to avoid water loss. Trees have a cone-shape with branches pointing down to help snow fall off. The structures are simple to avoid freezing. Animals: Birds migrate during the cold winter months, in Canada there are 300 species in the summer but only 30 stay for the winter. Many animals **hibernate** and have thick fur coats for insulation.
Nutrient cycling			
Productivity	There is a huge amount of biomass as **productivity** is high and **biodiversity** is high. There are complex food webs because most animals are selective about what they eat.		**Biodiversity** is low in the taiga because plants and animals can only survive if specially adapted. The growing season is only 4-5 months long. There is only one layer of vegetation so **productivity** is low.
Threats	Direct	There are many causes of deforestation including commercial hardwood logging, subsistence and commercial agriculture and local demand for fuelwood. Further deforestation is caused by demand for biofuels, mineral resources and electricity (HEP).	Deforestation is caused by logging for softwood, pulp and paper production. Much deforestation has already occurred in these areas.
	Indirect	Climate change threatens the health of rainforests as there is likely to be less rain in these areas, there is also likely to be higher temperatures and more droughts leading to more fires.	Exploitation of minerals, fossil fuels and HEP are also causing damage. Acid raid, forest fires, pests and diseases also threaten the health of the taiga.
Management	Global actions: CITES is to stop trade of protected species and therefore protect the rainforest, however this is difficult to police. REDD is a scheme for developed countries to give money to countries who have rainforests to keep them intact. Some governments however are still allowing the removal of natural forests when replaced by palm plantations.		Wilderness areas and national parks are set up to provide protection for areas. However this can increase tourism to areas which may cause more damage. Sustainable forestry is a strategy used to maintain corridors of vegetation to allow the movement of species.
	Sustainable management: ecotourism can be used to manage damage to the rainforest. This is where only small groups of tourists enter an area and are educated about how best to protect the area. Farming can also be done sustainably by having mixed crops and only cutting down individual trees.		Conflicting views: Some countries rely on logging for their economy as well as energy production. Indigenous people often wish to maintain their way of life rather than allowing the area to become a national park.

Consuming Energy Resources

Key terms	Non-renewable	Finite stock resources that will run out.		Coal, oil, gas (fossil fuels)
	Renewable	Flow resources which do not run out.		Wind, HEP, Solar, tidal, wave, geothermal
	Recyclable	Can be reused so will last into the future		Biofuels (can be grown within a lifetime), nuclear (uranium can be reprocessed)
Factors affecting access to energy sources	Access to technology	The economic development of a country can influence its ability to invest in and use new technologies and explore for and develop new resources.		
	Geology	**Fossil fuels** – they are found in sedimentary rocks. Countries in the Middle East such as Saudi Arabia and Iran have the greatest oil and gas reserves. Coal is quite widely distributed. **Geothermal energy** – volcanic activity at plate boundaries produces magma that can be used to heat water or generate electricity. Iceland and New Zealand use geothermal energy.		
	Accessibility	Remote areas can be difficult to access and to build infrastructure to so may not have access to electricity. It takes high-technology in order to mine resources in mountainous areas.		
	Climate	**HEP** – Large volumes of water are needed to power hydroelectric dams so high volumes of rainfall are needed too. 80% of Brazil's energy comes from hydroelectric dams. **Wind power** – exposed areas have the highest wind speeds. The largest offshore windfarm in the UK is the London Array in the North Sea. **Solar power** – places with longer hours of and more intense sunlight are best. The largest solar farm is located in the Mojave Desert in California, USA		
Global pattern of energy use	Developed countries consume 7 times as much energy per capita as emerging countries and more than 14 times as much as developing countries. Technology is easily available in developed countries e.g. TVs and car ownership is higher increasing oil consumption. Emerging countries have a large secondary sector using coal power.			
Oil distribution and consumption	Distribution	The Middle East (Saudi Arabia, Iran, Iraq, Kuwait and UAE) has the largest oil reserves. They have an estimated 804 billion barrels of oil left, enough for 200 years of production. Saudi Arabia, Russia and the USA are the three biggest producers.		
	Consumption	70% of oil is used in transport (moving goods and people), 19% is used in electricity production and heating, 4% is used to make plastics, 3% is used in to make tarmac. 4% used for products. Oil consumption has increased due to a growing and wealthier global population.		
Factors affecting oil prices	Since 1988 oil prices have risen from around $15 per barrel to just over $64 per barrel. Oil prices are affecting by: • Supply: the amount of oil produced • Demand: the amount oil of consumed Global **economic growth** increases demand and therefore price of oil. **War/conflict** in oil producing regions disrupts supply, oil prices spike. **Poor diplomatic relations** between oil producing regions can lead to price wars. Oil price spikes caused by **disruption to supply**. **Discovery of new energy sources** such as shale gas in the USA increase energy supply. Periods of **economic recession**, mean lower demand for goods and therefore oil.			
Oil and gas development	Ecologically sensitive and isolated areas	**Conventional oil**	The Arctic	Economic benefits: New jobs for 800 workers, sold for profit. Economic costs: Constructing the facility will cost $4 billion, damage from oil spills would be expensive to clean up.
		Unconventional oil	Tar Sands	This is where bitumen in mixed with sand, it is expensive, uses a lot of water and causes deforestation. The contamination of water sources leads to an increase in cancers.
			Fracking	Drilling down into shale rock deposits, injecting water, sand and chemicals into the rock at high pressure frees shale gas. This can lead to contamination of water sources and minor earthquakes.

Impacts of energy sources	Type of energy	Benefits	Costs
	Fossil fuels	Infrastructure is already in place, can be used for transport, reliable.	Produces greenhouse gases, will run out, some produce higher levels of pollution.
	Wind	Produces no GHG, cheap for the consumer, offshore turbines generate a lot of electricity.	Takes up a lot of land and spoils the view, wind is unreliable.
	Solar	Creates jobs, requires little maintenance once set up, no greenhouse gas emissions.	Takes up land that could be used for crops.
	HEP	Reliable source, dams and reservoirs are created which can help with water supplies.	Expensive to build and spoil the natural landscape, people often have to be moved, changes the river habitat.
	Biofuels	Fewer emission produced than with fossil fuels, could become cheaper than fossil fuels.	Takes up large quantities of water and land that could be used for growing crops.
	Hydrogen	Produces no greenhouse gases, made from water so more accessible, very efficient.	Lots of energy is needed to do this, difficult to store hydrogen safely.

GCSE Geography

Component 2: Rivers Processes and Pressures

Resource Booklet

Name: _____

Class: _____

Geography teacher: _____

Lesson 1. How do rivers change over their course?

Starter: The Bradshaw Model

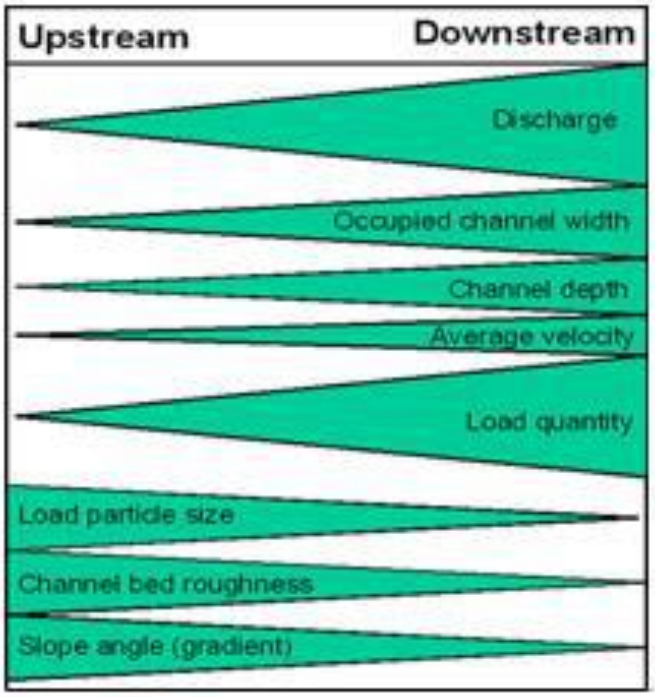


Figure 1 ***Bradshaw's Model***

Characteristic	**Definition**	**Change from source to mouth**
Width	The distance from one bank to the other	
Depth	The distance from the water surface to the bed	
Velocity	How fast the water is flowing	
Discharge	The volume and speed at which water flows through the river channel. It is measured as cross sectional area x velocity	
Gradient	The steepness of the river bed	
Channel roughness	How rough the river's bed and bank are	
Load size	The size of the sediment carried by the river	

Task Two: The River Severn

The upper course

The source of the River Severn is 610m above sea level in the Welsh Mountains. The climate in this upland area is very wet with more than 2500mm of rainfall a year. The geology is mainly hard, impermeable rocks like shale so **runoff** (water running across the land) is high. Near the source, the river channel is narrow, shallow and full of large, angular stones. This creates lots of friction which slows the river down. In the upper course, the river erodes vertically, cutting down into the land and forming a **v-shaped valley** with steep slopes. Processes such as soil creep and landslides are very active.

The middle course

By the time the River Severn reaches Shrewsbury, it is in its middle course. It is much drier here with less than 700mm of rainfall a year. The rocks in the landscape are softer and more permeable such as sandstone. The river channel is wider and deeper. As well as eroding downwards, the river erodes sideways too so the valley becomes wider and flatter. Deposition also takes place in the middle course, for example on meander bends and on the floodplain when the river floods, but lots of sediment is transported further downstream, becoming smaller and rounder as it goes.

The lower course

The River Severn flows into its lower course at Tewkesbury. Here the river channel is wide, deep and smooth. There is less friction with the bed and banks so the river's velocity is greatest. Discharge is greatest here too as many smaller rivers (**tributaries**) such as the River Avon have now joined the Severn. As the river reaches its mouth in the Bristol Channel, it looks muddy showing just how much **load** the river is carrying. The geology in the lower course is mainly soft mudstones covered with sands, gravels and **alluvium** (river sediment) from years of river flooding.

Lesson 2. How do rivers shape the landscape in the upper course?

Starter: Erosion Processes

River erosion involves the action of water wearing away the rocks and soils on the valley bottom and sides. There are four erosion processes:		
Process	Definition	Analogy
Hydraulic action	Water forces air into cracks in the river bed and banks, wearing them away. Hydraulic action is most powerful where velocity is high.	
Abrasion	Sediment carried by the river rubs against the bed and banks wearing them away. Abrasion causes the most erosion.	
Solution	River water is slightly acidic, so it can dissolve some rocks and minerals. Limestone and chalk rocks are most affected.	
Attrition	Sediment particles carried in the river collide with each other, causing the edges to be knocked off. As this continues, the particles get smaller and rounder.	

Task One: Interlocking Spurs

Lesson 3. How do rivers shape the landscape in the middle course?

Bell Task:

(v) Complete the sentences to outline the formation of a waterfall.

Use some of the words in the box below.

(5)

bands	**hard**	**soft**	**gorge**	**permeable**	**drop**	**meander**

Waterfalls occur when there is a sudden ..... in the course of a river.

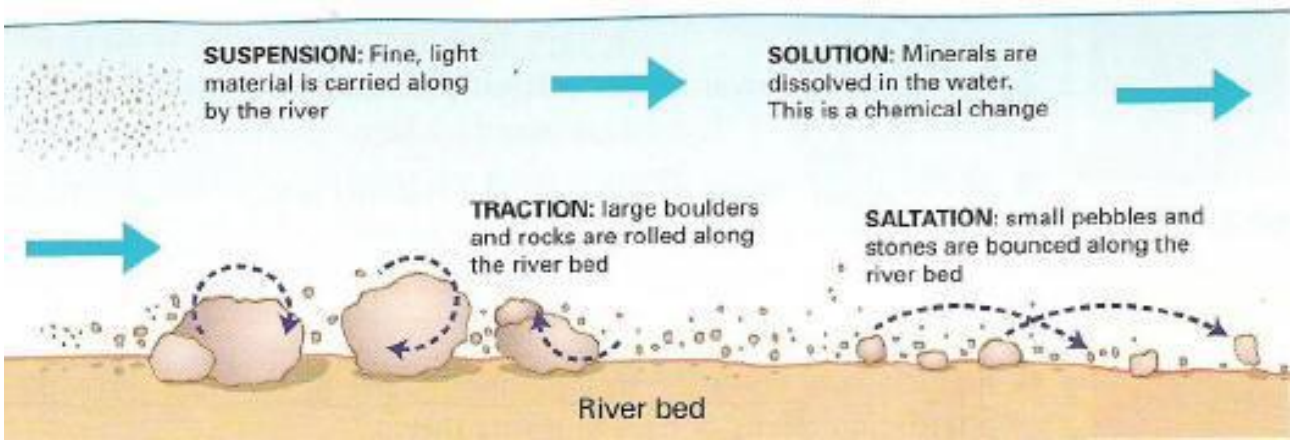
This happens as a river crosses ..... of hard and soft rock.

The ..... rock is worn back leaving an overhang of rock.

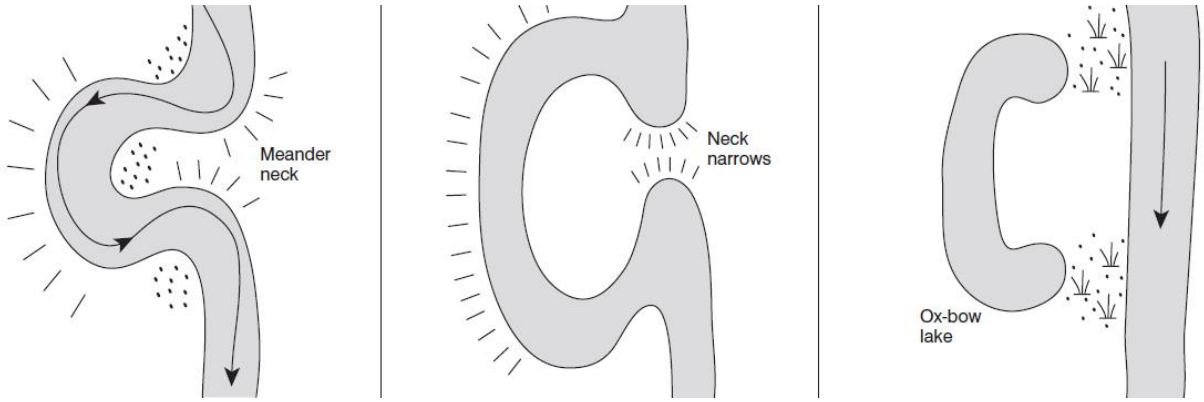
The overhang of ..... rock eventually collapses into the plunge pool.

Over time a ..... is formed as the waterfall retreats upstream.

Starter:



Task Two: Meander evolution



Lesson 4. How do rivers shape the landscape in the lower course?

Task Two: Levee formation

Levees are formed during _____. As the water moves away from its channel it becomes shallower and _____ increases. The river has less _____ and must deposit some of the _____ it is carrying. The larger, _____ pieces of sediment are deposited first forming mounds on the river banks. These mounds of sediment are called _____. Over time, the process repeats and the levees grow _____.

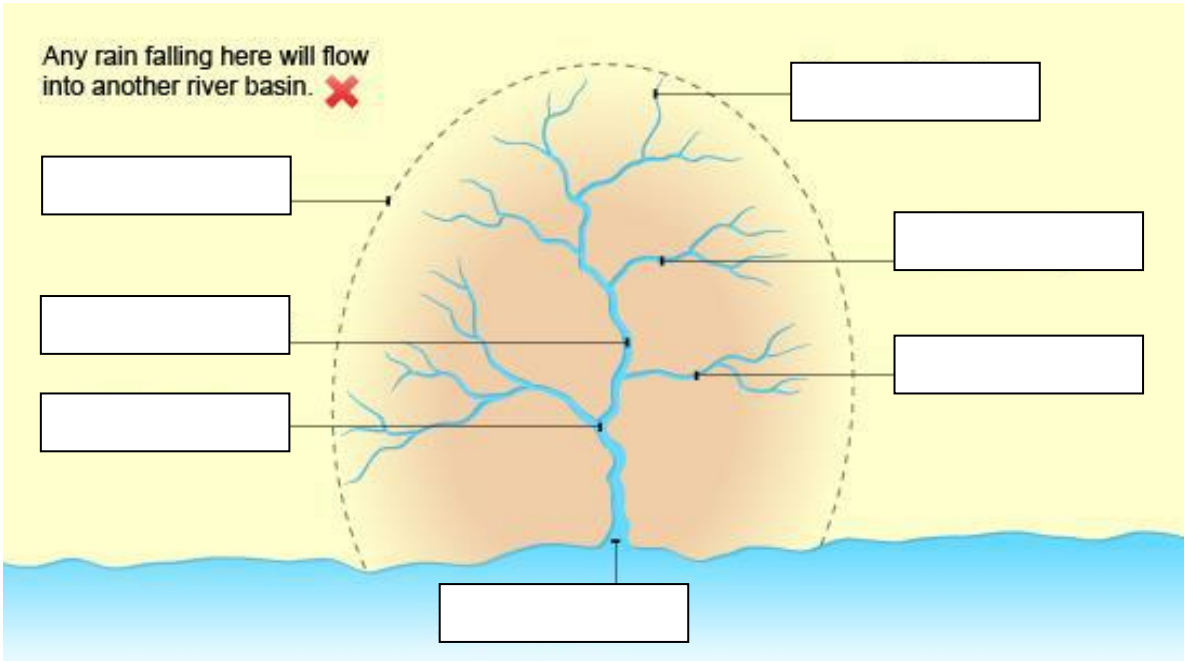
Heavy ***Flooding*** ***Friction*** ***Load*** ***Light***
Larger ***Energy*** ***Smaller***

Review: Comparing roles

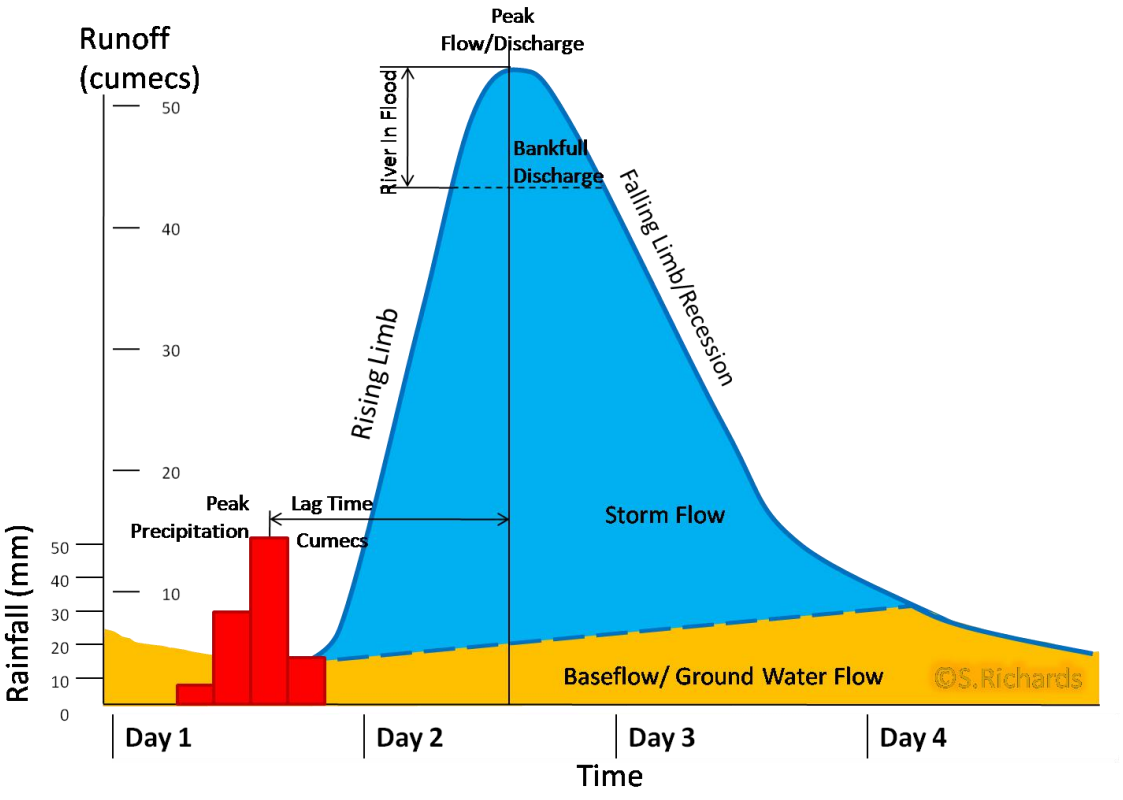
Landform	Erosion	Transportation	Deposition
Interlocking spurs			
Waterfalls			
Meanders			
Oxbow lakes			
Levees and floodplains			
Deltas			

Lesson 5. How do rivers respond to rainfall?

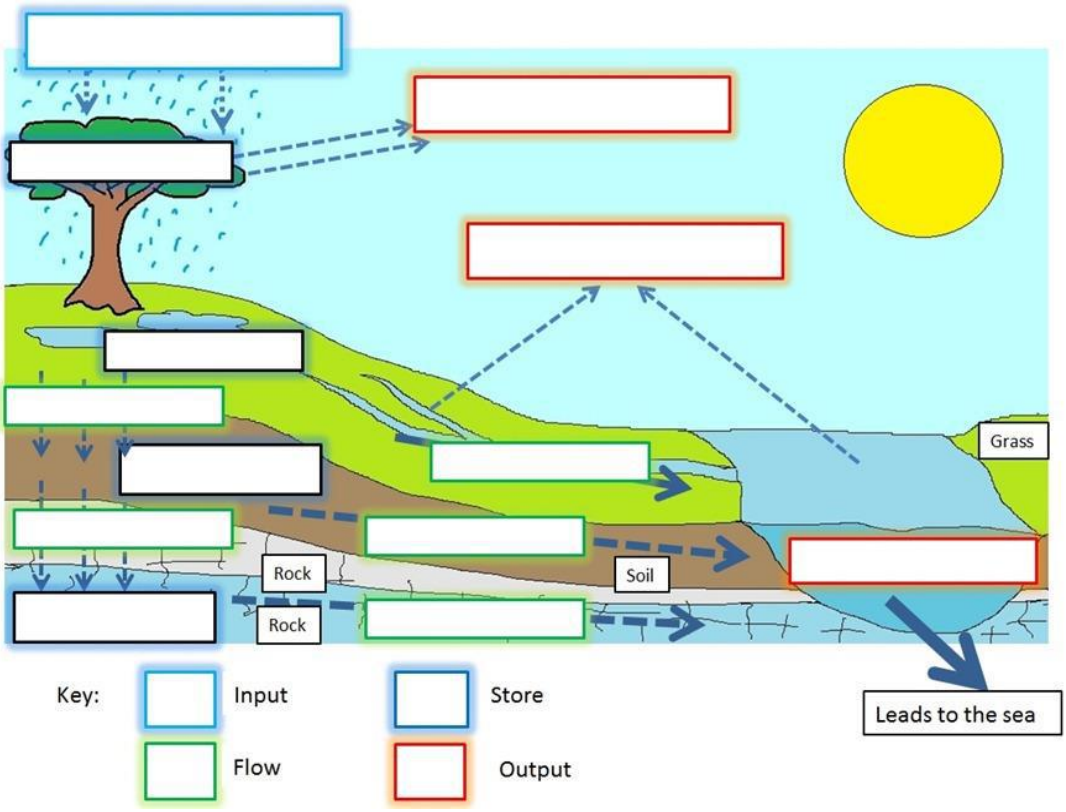
Task One: The drainage basin



Task Three: Storm Hydrographs



Task Two: The Hydrological Cycle



Key Term	Definition
	Water prevented from reaching the surface by trees or grass
	Water flowing horizontally through the soil layer towards the river
	Water sinking vertically into soil from the ground surface
	Water flowing horizontally through the rock layer towards the river
	Water lost from the ground surface
	Any source of moisture reaching the ground e.g. rain, snow, sleet
	Water sinking vertically from the soil into the rock layer below
	Water flowing on top of the ground
	Water lost through pores in vegetation

Key term box:

Interception Precipitation Infiltration Transpiration Groundwater flow Percolation

Throughflow Surface run-off Channel flow Evaporation

Task Four: Physical factors affecting storm hydrographs

Geology

Geology means the type of rock that a drainage basin is made of. **Impermeable** rocks are rocks that water cannot seep into (infiltrate) these mean that water flows over the land as surface runoff. If rocks are permeable, then water can infiltrate, therefore more water is stored in the ground and moves towards the river much more slowly.

Soil type

Soil is the broken down material on top of the bedrock. Some soils are made of clay, these have small pore spaces which means less water can infiltrate and more will become surface runoff. On the other hand sandy soils have much bigger pores and so they can hold more water. Sometimes soils can be frozen or **saturated** (full of water), this prevents infiltration and creates more surface runoff, whereas dry soils can hold more water.

Slope

The gradient of the drainage basin is called the slope. If it is a steep slope the angle makes it hard for water to infiltrate and more flows as surface runoff. Gentle slopes allow more time for infiltration and therefore less of the precipitation becomes surface runoff.

Drainage basin shape

Drainage basins are the area drained by a river. Some drainage basins are large, this means precipitation has further to travel to reach the river, whereas rain can reach the river quickly in smaller drainage basins. The shape itself of the drainage basin can also make a difference, circular drainage basins mean much of the precipitation has further to travel to the river, but elongated (oval) drainage basins means more water can travel quickly to the river.

Antecedent conditions

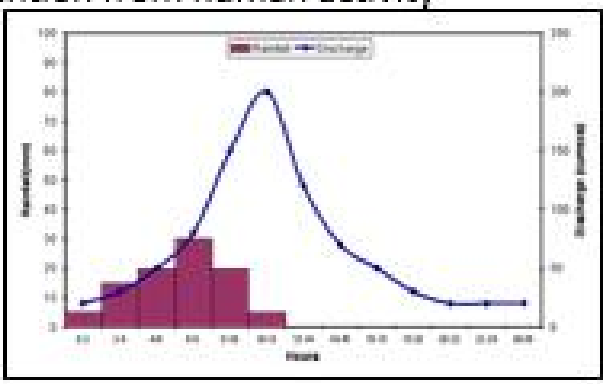
Antecedent conditions means how full (saturated) the ground in the drainage basin is before the rainfall event. If there has already been rainfall the ground will become saturated more quickly, therefore more water will flow as surface runoff and reach the river quickly. If the ground is dry before then saturation will take much longer.

Physical factors affecting storm hydrographs

Factor	Definition	How and why will it affect peak discharge?	How and why will it affect the lag time?
Geology			
Soil type			
Slope			
Drainage basin shape			
Antecedent conditions			

Lesson 6. How do human factors increase flooding?

A. No intervention from human activity



B. Deforestation

C. Land use change from woodland to crop farming

D. Urbanisation

Lesson 7. Why do rivers flood?

Task Two: Flooding in Sheffield

A June to remember

In June and July 2007, several periods of extreme rainfall gave rise to widespread flooding in parts of England and Wales. It was the wettest May – July period since 1766. Nationally, 49 000 households and 7000 businesses were flooded. South Yorkshire suffered record-breaking floods, and Sheffield was especially badly affected, as shown in the text panel.

What caused the Sheffield floods?

1 Prolonged rain

Sheffield's flood story began when extreme wet weather hit northern England. Heavy prolonged rain (antecedent rainfall) fell across South Yorkshire as a depression reached northern England.

- On 15 June, 90 mm of rain fell over Sheffield – more than one month's normal rainfall! This saturated the soil.
- Even heavier rain occurred on 25 June, when almost 100 mm fell in just 24 hours – the most Sheffield had ever had in one day. With ground already saturated, the city's drains were unable to cope.

With nearly 190 mm in those two days, June was the wettest month in Yorkshire since 1882 (see Figure 1). The result was a hydrograph shape just like 'Hydrograph A' on page 151.

2 Rivers and the landscape

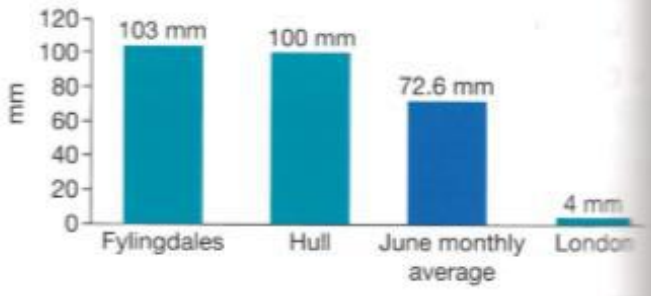
Figure 2 shows where the worst flooding occurred, in the Hillsborough area near the football ground. This was due to a combination of circumstances.

- Sheffield is known as the city of seven hills. They're steep – so any surface run-off occurs quickly.
- The city lies at the foot of the Pennines, where three rivers (the Rivelin, Loxley and Don) meet. Several reservoirs in the upper courses of these rivers store water for Sheffield, and also help to regulate river flow in rainy periods. This time they filled and overflowed.
- The River Rivelin joins the River Loxley at confluence X. The volume of water increased hugely at this point, and flooding became likely.

The impacts of the Sheffield floods in June 2007

- Two people drowned in floodwaters.
- Over 1200 homes were flooded, and 1000 businesses affected.
- Roads were damaged or blocked, and rail links flooded for several days.
- 13 000 people were without power for two days.
- Hillsborough Football Stadium was under 8 metres of water and cost several million pounds to repair.
- There were health risks from raw sewage escaping into floodwater.
- One company (Clarkson Osborn) suffered £15 million in flood damage, with equal damage to Sheffield Forgemasters International and Cadbury Trebor Bassett.
- Meadowhall Shopping Centre was flooded and had to be closed for a week.

▼ ***Figure 1*** *Rainfall in Yorkshire on 25 June, compared to a) June's average monthly rainfall total and b) the London area*



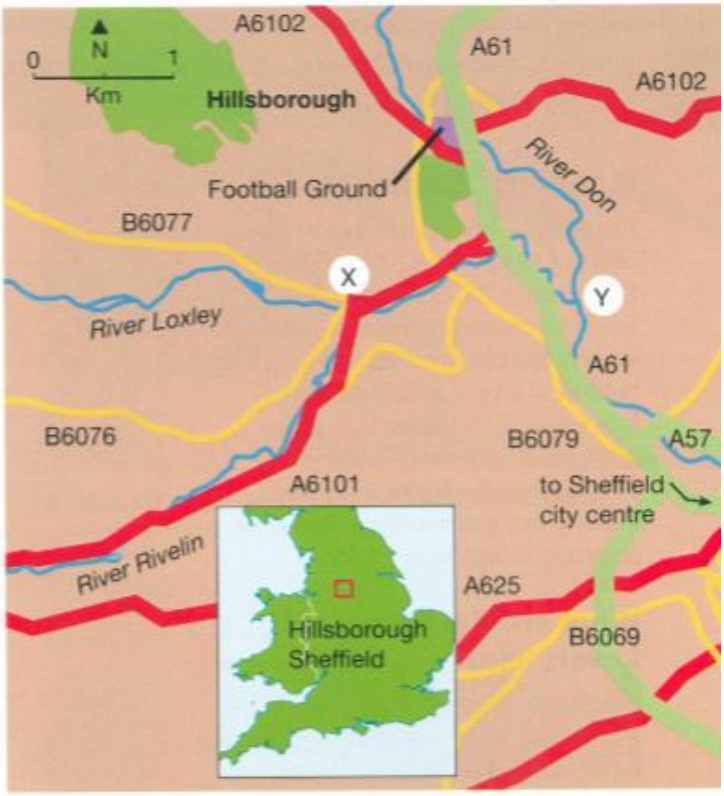
- Nearby, confluence Y occurs – this time with the River Don. The River Don was already almost up to its banks so that a backlog of water occurred, causing water to back up along the Rivelin and Loxley, and overflow.

Human causes

Most of Sheffield is built up. Like most heavily urbanised areas, its surfaces are concrete, brick and tarmac – all impermeable. The only way cities cope with rainfall is with extensive drain networks.

However, Sheffield's drains, channels and flood defences were overwhelmed by extreme flows of water. Sudden downpours were so quick that predicting where flooding might occur was difficult. As surface run-off raced down Sheffield's hills, drains were blocked and overflowed. To make matters worse, fallen trees along the rivers Sheaf, Loxley and Don blocked river channels.

Sheffield City Council denied that the city's drains were to blame for the flooding. The city's drainage system was designed to deal with rainfall amounts that might occur once in 30 years. The Council claimed that rains were the heaviest for 35 years, so planning could not have prevented it. The 2007 floods were a *1 in 400* year event! Rivers, drains and streams simply weren't big enough. The Council asked whether *anything* could have protected the city. Meadowhall Shopping Centre in eastern Sheffield flooded (see Figure 3) in spite of having defences to protect it against a 1 in 100 year flood!



▲ ***Figure 2*** *The area around Hillsborough, north-west Sheffield, where some of the worst flooding occurred*

Lesson 8. How and why should rivers be managed?

Bell Task: Quick quiz

1. How much rainfall did Sheffield receive in June? (1) ……
2. Sheffield lies at the foot/bottom of which hills? (1) ……
3. Name three rivers that flow through Sheffield. (3)

   ……
   ……
   ……

4. Sheffield's rivers form two **confluences** just to the north west of the city centre. Why is this fact important? (2)
   ……
   ……
5. Suggest one **human** cause of the floods. (2)

   ……

6. In your opinion, what was the main cause of the floods? Give a reason.
   ……
   ……

Task One: Impacts

UK Flood Event	Impact	People or Environment?
Boscastle 2004	100 homes and businesses damaged	
	75 cars washed into the sea	
	Tourist industry affected	
	Local wildlife habitats lost	
Sheffield 2007	Hillsborough Football Club flooded	
	1200 homes were flooded	
	Two people drowned	
	One bridge collapsed	
Somerset Levels 2014	Flood waters took 12 weeks to drain away, disrupting transport	
	1000 hectares of farmland left underwater	
	Local residents of Moorland and Fordgate were evacuated	

Flood walls: Flood walls are artificial (man-made) barriers built along the side of the river to raise the height of the river channel, this increases the river's **capacity** so that it can hold more water and floods less easily.

The cost depends on the material used but the stronger the building materials the more expensive flood walls are. Floodwalls are useful because they can be built in areas with high risk of floods such as through towns and housing estates and should prevent the river overflowing. They can, however cause problems further downstream as water can move through these channels quickly as there is less friction and therefore the water can build up further down the river. They also look unnatural and can spoil the beauty of the river.

Embankments: Embankments are artificial (man-made) **levees** - raised banks built along the side of the river. They raise the height of the river channel, this increases the river's **capacity** so that it can hold more water and floods less easily.

These are cheaper than floodwalls, usually up to a maximum of £1 million. They are made of earth and so they look more natural and can blend in with the environment.

However as they are made of earth they can be prone to slumping or erosion which makes them ineffective. If the embankments are overtopped or they burst under pressure, water can be stuck behind them, on the land, which can make flooding worse.

Flood barriers: Flood barriers are gates that are built near the mouth of a river. When a **storm** surge from the sea is expected the floodgates are closed which stops sea water from pushing river water back up the river causing a flood.

These are effective at preventing flooding of large areas from storm surges as they protect the whole area upstream of them. However they are very expensive, the Thames Barrier is the most famous and it cost £534 million in 1984 - the equivalent of £1.6 billion today. They also require regular maintenance to ensure they work and effective prediction technology so they are raised at the correct times.

Floodplain retention: Floodplain retention involves maintaining and restoring the river's original floodplain. This can involve lowering the level of the floodplains and planting grass and shrubs on the surface to make the area natural again. The floodplains are then allowed to flood.

By allowing rivers to flood water is stored in these areas and other areas further downstream are less likely to flood. Planting grass and shrubs also helps the floodplain retain some of the water so that flooding is less likely. This strategy can mean that floodplains may lose their current use as the land will be **inundated** with water, it will not protect any building already built in this area - they would have to be demolished and rebuilt elsewhere.

River restoration: River restoration involves using a range of strategies to restore the rivers original course. One key part of this is restoring meanders, this slows down water so it will not move through the river quickly which can lead to a build-up of water and a subsequent flood. All artificial hard engineering strategies are taken away and replaced with sediment and planted with trees. This can increase interception and infiltration so water takes longer to reach the river.

Natural rivers are more attractive for recreation and create natural habitats for the benefit of wildlife. However flooding will still occur with this method and land use already in place may have to be changed if it cannot withstand flooding.

		What is it and how does it work?	Benefits	Costs	*Challenge: When would benefits outweigh costs?*
Hard engineering	**Flood walls**				
	Embankments				
	Flood barriers				
Soft Engineering	**Floodplain retention**				
	River restoration				