1.1 Population Dynamics

Theme 1

A country with a high rate of natural population growth - Niger, West Africa
A country which is over populated - Mumbai, India
A country which is under populated - Canada
A country with a low population growth or population decline - Russia

1.2 Migration

International Migration - Honduras to Mexico and USA

1.3 Population structure

A country with a high dependent population - Japan

1.4 Population Density and Distribution

A densely populated country or area - Hong Kong
A sparsely populated country or area - Mongolia

1.5 Settlements and service provision

Settlement and service provision in an area - Cambridge, SE England

1.6 Urban settlements

An urban area - London, SE England

1.7 Urbanisation

A rapidly growing urban area in a developing country and migrating to it - Nairobi, Kenya

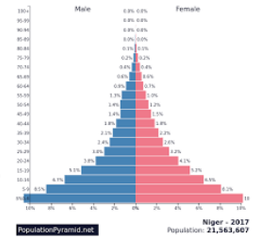
1.1 Population Dynamics

Theme 1

A country with a high rate of natural population growth

Niger, West Africa

Peaceful and politically stable but one of the poorest in the world. it suffers from high unemployment, poverty, lack of healthcare and education. Most are subsistence farmers, but 20% are nomadic/semi-nomadic, raising livestock. Only 40% of 15-24 year olds are literate and HIV is prevalent. 73% of the country practice open defecation. It is a secular state but up to 98% of the population is muslim. Landlocked, with 80% covered by Sahara Desert. The vast majority live in the south of the country



Pop: 23m. Estimated to be 63.1m by 2050. Half of all Nigeriens are under the age of 15.
Birth rate: 44.2 per 1000 (UK = 12.1).
Fertility rate: 7.5 per woman - 50% of women have a baby before 18.
Death rate: 11.8 per 1000.
Migration rate: -1.62 per 1000 (more people leave the country than come into it).
A growth a rate of 3.8% a year, 6th in world for highest population rate.

Why: Extra workers, start families young, only 5%of women use contraception, huge child mortality rate of 250 per 1000, higher status with a larger family, many women marry at 14,

Problems: high birth rate usually means more workers and more economic development, but if there is poverty and famine it exacerbates current problems, depleted resources, soil degradation, death due to pregnancy is the highest killer of 15-19 year old girls, excessive multiple births is a similar health problem for women. Country is already struggling to provide the young with education, healthcare and jobs. Excessive youth unemployment can lead to civil unrest.

Solutions: Education - UN teaches about contraception in schools, although only 19% make it to secondary school.

Theme 2

2.1 Volcanoes

In an MEDC - Eyjafjoll, Iceland (2010)
In an LEDC - Mount Pinatubo, Western Philippines (1991)

2.1 Earthquakes

In an MEDC - Christchurch, New Zealand (2011)
In an LEDC - Haiti (2010)

2.2 Rivers

The opportunities presented by a river or rivers, the associated hazards and their management - River Thames, UK

2.3 Coasts

The opportunities presented by an area or areas of coastline, the associated hazards and their management - Cromer, Norfolk Coast UK

2.5 Climate and natural vegetation

An area of tropical rainforest: The Congo Basin Forest

Theme 3

3.1 Development

A transnational corporation and its global links - Cocacola

3.2 Food Production

A country or region suffering from food shortages - Sienna Leone
A farm or agricultural system - Subsistance farming, in Ganges Valley, India

3.3 Industry

Industrial zone or factory - Cambridge, Silicon Fen, UK.

3.4 Tourism

An area where tourism is important - Doha, Qatar
An area where tourism is important - Reykjavik, Iceland

3.5 Energy

Energy supply in a country or area - Iceland

3.6 Water

Water supply in a country or area - Lima, West Peru

3.7 Environmental risks of economic development

An area where economic development is taking place causing the environment to be at risk - Bandung and Chimahi, Citarum River, West Java, Indonesia

1.1 Population Dynamics

Theme 1

A country which is over populated

Mumbai, India

India: 2nd most pop.ed country in world (1.3bn), set to outstrip China by 2022. A newly industrialised country where it is still an LEDC, but has the fast growing economy more similar to an MEDC.

Mumbia: India's financial capital & largest city with a pop. 21m+. 5th most populous city in the world. Pop. has doubled since 1991. Migration has lead to cultural diversity with 16 Indian languages spoken (due to migration), and multiple faiths practiced (2/3rd are Hindu). Skewed birth demographics due to selective abortion (9 girls to 10 boys). Home to Bollywood & some of the most £££ houses in the world.

Industries: historically, textiles and mills, now media and specialist tech. due to large, skilled workforce and industrialised infrastructure.

Cause of overpopulation: unplanned rapid population growth for internal migration (mainly rural-urban).

Problems: unsafe air pollution, poor sanitation, lack of safe drinking water, poor health due to the other problems, serious traffic congestion, noise pollution, lack of housing with 40-60% living in slums.

Over population is when a country has more people than it can support in terms of space/housing, food, resources, jobs etc., so densely populated places like Singapore may feel overpopulated, but the system is holding up; there is enough to go around (apart from trains). They may in the future become overpopulate, but as yet are not.

1.1

Theme 1

Dharavi , Mumbai, India

Largest slum in India, 2nd largest in Asia, and 3rd largest in the world.
Population: 1m in area 2.1km square, informal
Economy: $1bn+, informal, based on low skilled employment/trade.

Has one of the highest literacy rates for a slum in the world at approx. 69%

Slums offer: cheap housing; cheap, flexible labour force; businesses operating within slums = cheap goods to those outside slum; uses fewer resources to sustain a population = better for environment - reduce, reuse, recycle; those that stay a long time get property rights and find water and electricity supplies.

But: lower life expectancy; many illnesses; overcrowded houses; streets flooded with sewage (particularly after heavy rain— haphazard building means no rainwater drainage systems in place); no rubbish disposal; no 'green' areas; no safe sanitation system; flammable buildings packed in close together; electricity unsafely rerooted from main lines, no proper roads in/out of slum.

(https://www.youtube.com/watch?v=Im0tHRs9Bng
Kevin McCloud: Slumming It (2010) - Ep1, 50mins)

1.1 Population Dynamics

Theme 1

A country which is under populated

Canada

Population: 37.3m, Area: 2nd largest country in the world (after Russia)
Population density: one of the most unpopulated countries in the world, with only 4 people for every square km. This is because much of Canada is actually inhospitable. High GDP, many natural resources, average age of pop is rising (despite having a huge growth rate of around 6% between 2011 and 2016) (41yrs in 2016, from 40.1 yrs in 2011 (Canadian Census)).

Natural population growth is 1/10th of overall increase. world 9th in crude net migration rate (1/5th Canadian's identify themselves as migrants.

Why underpopulated: it cannot fully utilise all the resources available; good GDP, plenty of food, money and space to go around, but in order to increase access to natural resources and increase wealth, position/ status/power of the country on a global scale, and ensure the population is in a position to sustain itself through naturally replacement, it needs more migrants of child-bearing age.

What is being done: Canada has welcomed migrants for decade,
How: great quality of life, state healthcare, jobs, low infant mortality, high life expectancy,

Natural resources: fish, coniferous forests, farm produce, lakes, metals (zinc, aluminium, gold, nickel lead), oil and gas,

Migration: encourages 250,000 every year to increase work force, takes 10% of world's refugees.

Trade: one of world's top ten traders; mainly to USA, Japan and UK
Industries: aircraft and car manufacturing, timber, oil refining, aluminium smelting.

1.1 Population Dynamics

Theme 1

A country with a low population growth or population decline

Russia

Pop: 144m from 148m high in early1990s. It is estimated to fall to 111m by 2050.

Reasons

- High death rate: 13.5 per 1000, per annum (UK is 9.4, world av. is 9) - alcohol is a massive issue, as the growing rates of HIV - life expectancy, m=59, w=72
- Low birth rate: 11 per 1000, fertility rate 1.3 per woman (need 2.1 to sustain a pop.). Women choose not to have children as poor economy, low incomes, high rates of alcoholism in male population, lack of good housing, lack of good medical care and education, lack of food for the very poor.
- High rate of abortion: seen as a method of contraception with more abortions than live births - children are expensive and the gov't will provide you with a pension.
- Low immigration: immigrants treated with great distrust (as are tourists) and there is a 'brain drain' with economic emigration from Russia to the West.

Problems: shrinks the economy, concerns over future young financing the old.

Solutions: Government pay every family that have a second baby a years' wages
Child support payments have increased dramatically. In his 2018 election campaign, President Vladimir Putin pledged to spend $8.6 billion over three years on programs including mortgage subsidies and payouts to families to encourage Russians to have more babies.

Other solutions that have not been put in place: tax alcohol and have a minimum price (1L of Vodka is currently about £3), Promote healthier life styles: smoking, diet and drinking.

1.2 Migration

Theme 1

International Migration

From: **Honduras** To: **Mexico and USA**

Thousands (estimated to be 7000) of migrants moved up through central America in Oct/Nov 2018, mostly Hondurans (with some Guatemalans), half of whom are girls and women, many intending to seek asylum in the US.

Trump argues they are economic migrants without papers, but the the migrants are seeking asylum, which makes it about humanitarian aid rather than immigration.

Migrants have been coming up to the US for a long time. Most used to be Mexican, single adults and seasonal workers, now they are families and children coming unaccompanied from Guatemala, Honduras and El Salvador primarily escaping the gang violence and poverty.

Applications for Asylum have gone up 1000% in Mexico since 2013, but Mexico is cracking down on asylum seekers, and so it is very dangerous for those passing through. People will pay human traffickers to get them through Mexico, which in itself is a danger, so in order to protect themselves, the migrants have chosen to move as one massive 'caravan' in plain site, with the world's media watching.

Push Factors

- Violence
- Gang warfare
- Poverty
- Poor standard of living
- Government and state Corruption

Pull Factors

- Less Violence
- Education
- Better standard of living
- More career prospects
- Higher wages
- Stable government

Future options: invest more in the central American countries, deporting all who fail to get asylum, (poor treatment of asylum seekers does not seem to reduce the numbers of those seeking asylum, and stopping asylum seekers crossing boarders at official ports of entry is against International Law)

https://www.theguardian.com/world/video/2018/nov/05/migrant-caravan-mexico-us-on-the-road

1.3 Population structure

Theme 1

A country with a high dependent population

Japan, South East Asia.

Kane Tanaka, oldest woman in the world at 116

Population is declining as is the proportion of people of working age.
Japanese people are ageing fast.
Fertility rate: 1.47 in 2017, it is well below the replacement level of 2.1.
Life expectancy: Highest in the world at 84.2 years (WHO), 2018.
Average age: 31 in 1970, 40 in the 1990's, expected to be 45 by 2025.
Births: 2017 at 946,000, 2018 at 921,000 - below 1m for the 3rd year in a row.
Deaths: 2018, 1.36 m
2018, a record decline in population of 448k people, 12th year-on-year fall in a row.

Why?: Lower birth rate - changing lifestyles, marrying later or not at all, the economic insecurity of younger generations, intolerance of single mothers, women penalised for time off work to have a family,
The raise in **life expectancy** has been attributed to diet and a great healthcare system.

Implication for country: Reduced labour supply, constraint on economic growth, reductions in investment, changes in household savings and increased health insurance premiums.
Also impacts: schools, universities, child focused industries, e.g. clothes, toys, etc., housing
Problems: difficulty funding pensions, caring for the elderly, a country resistant to change will not easily accept many possible solutions.

Steps taken: labour - PM urges businesses to employ and promote women to senior positions, robots, outsource manufacturing to cheaper countries, ease immigration (particularly manual labourers), raise retirement age. **Increase birth rate** - free child care, financial handouts, make child-friendly work places.
Other possible solutions: Birth rate will take a long time to make any real impact, and current rates of immigration are too low, so need to dramatically **increasing immigration**.. **Structural reforms of the economy and labour market** to increase nation's productivity despite the declining manpower. **Fundamental reform of the social security system** that can be sustained by a shrinking and greying population.

1.4 Population Density and Distribution

Theme 1

A densely populated country or area (at any scale from local to regional)

Hong Kong, China

Area: 1104km^2. **Pop.** est.: 7.49m **Density:** 6,785 people per km^2.
HK Island population: **1.27 million** or 16,300 people per km^2.
Belonging to the UK until 1997, it is now Chinese again. One of world's most significant financial centres and commercial ports, The 7th-largest trading entity, with one of the highest per capita incomes in the world. 1/4 of developed land is reclaimed from sea, due to the lack of developable flat land. Most of the undeveloped land is hilly or mountainous. Demand for new high-rises means frequent demolition of older buildings.
Demographics: 80% have no religion, 83% speak Cantones, over 90% Chinese ethnicity, but English is still an official language, despite it being spoken in shrinking numbers.

Quality of life: one of the longest life expectancies in the world, good health service, financial stability, much protected outdoor space, exciting city living.
Decreasing population size: Very low fertility rate (below replacement rate) - women pursuing higher studies, late marriages, higher proportion of people who never marry and an increasing participation by women in the labour force. Gov't action: encouraging more to have families and for people to migrate from the mainland.

Why live here?: a mixture of East & Western cultures, plentiful hiking trails, sandy beaches, outlying islands within reach, great public transport and infrastructure.
Why not?: massive congestion, huge number of shopping tourists, poor air quality, rent is incredible, high cost of living, waiting lists for schools etc., minimal play areas, huge financial inequality.

Boxed in: life inside the 'coffin cubicles' of Hong Kong: https://www.theguardian.com/cities/gallery/2017/jun/07/boxed-life-inside-hong-kong-coffin-cubicles-cage-homes-in-pictures

1.4 Population Density and Distribution

Theme 1

A sparsely populated country or area (at any scale from local to regional)

Mongolia

Area: 1.5mkm^2 Pop: 3m Density: 1.9 pop./km^2
The most sparsely populated sovereign state in the world. About 1/3 of the population live as nomadic herders on sparsely populated grasslands, in very isolated locations. People living this lifestyle are non-globalised. 40% of the population live in the capital Ulaanabaatar. This is one of the coldest capitals in the world, with an average temperature of -0.4 degrees C. There have been political and financial instability resulting in a number of food shortages, until the mid 1990s.
Mongolia is a lower-middle-income economy with 1/3 living below the poverty line. Economic activity was based on herding and agriculture, but mining of copper, coal, tungsten and gold has driven industrial production.

Why live here?: big family culture (people stay in families); 3 in 5 youths now go to university; mining is growing the economy; as a country it is very unspoilt by westernisation and maintains most of its own culture and way of life.
Why not? not much arable land, most is grassy steppe, mountains and dessert; climate is dry, cold and windy; minimal trade with other countries, although it is trying to expand it; the steppes cannot support much wildlife; being nomadic is a very hard way of life and as shown by the storms of 2010, you can lose your entire herd due to bad weather.

1.5 Settlements and service provision

Settlement and service provision in an area

Cambridge, SE England.

Area: 40.7km^2,

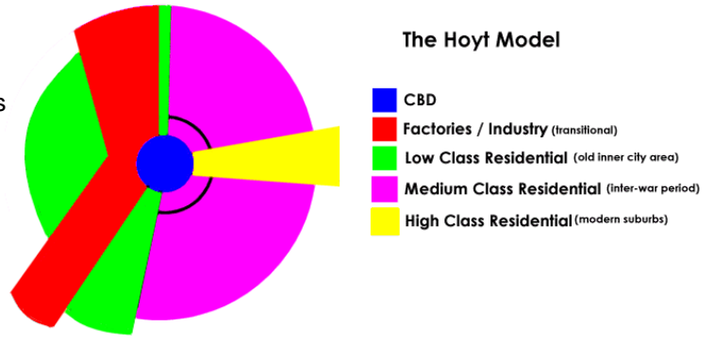
Population: 123,867 including 24,506 students (2011 census).

Settlement hierarchy: City

Universities, department stores, football and rugby clubs, airport, theatres, cinemas, sports centres, shopping centres, secondary schools, colleges, hospital, centre for local government, magistrates court.

Model of land use: closes to the Hoyt model

Opportunities: a growing city, thriving due to universities and science parks, low unemployment, popular tourist spot, good links to London and Stansted, good for shopping, multiple museums and theatres, lots of culture, attractive surrounding country side.



Problems: congestion, air pollution, inequality, house prices, lack of school places, starting to sprawl

Solutions: increasing park and ride car parks, building in surrounding villages, building on greenbelt, ensuring affordable housing in new builds, expansion of Addenbrookes, expansion of most popular local schools, such as St. Bede's, investing in cycle paths, maintaining green space within the built up areas.

1.6 Urban settlements

An urban area or areas

London, SE England, Capital of UK.

Area: City of London (CBD) and Greater London, 32 London Boroughs, 1572km^2,

Population: Greater London, (2019) 9.175m

Importance:

Internationally - one of world's most important global cities/financial centre; HQ of a number of TNC; cultural impact on art, fashion and entertainment, a major tourist and retail hotspot; contains 4 world heritage sites, and many world renowned landmarks

Nationally - UK's largest and wealthiest city, hosts government, diverse population/cultures (over 300 languages spoken), a very high concentration of higher education institutions,

Challenges:

London's population has grown 7.5% from 2011-16. In this time, the UK has grown by 3.7%. It's projected to increase to 9.3m by 2021.

Why?: natural growth, international immigration, and internal migration.

Move in - 20s for huge range and number of job opportunities

Move out - university, 30/40s (with families) due to house prices, but stay in SE as commuters.

Impacts: housing, transport, schooling, healthcare, filling low paid jobs.

https://www.bbc.co.uk/news/uk-47529562

Regeneration. As industries shut down, such as the London Docks, new ones have to take their place. This has lead to the redevelopment of many areas including, London Docklands, Canary Wharf and Stratford Stratford was one of the most deprived communities in the UK, unemployment high, health poor, lack of infrastructure, poor environmental quality. The bid for the 2012 Olympic Games was partly won on the understanding that Stratford would be sustainably regenerated.

Benefits: New school and park areas; by 2030, 10,000 new homes are to be build, 1/3 affordable; links to the rest of London allow commuters to move in; construction work & tourism have had a multiplier effect with 20K+ jobs thought to be created by 2030; walking and cycling routes; protection of green spaces & habitats.

Sustainable Transport: congestion charge, 'Boris bikes', Oyster card scheme, extension of Underground

1.7 Urbanisation

A rapidly growing urban area in a developing country and migrating to it

Kenya, Africa

Population: 49.7m. 30% in cities. By 2033, 1/2 will be in urban areas. Why?: income, services.

population growth = urbanisation (looking for jobs) = economic growth = better services, infrastructure, education and more jobs = more urbanisation and international immigrants = economic growth etc.

Capital, **Nairobi,** like most African cities, is experiencing rapid urbanisation enabling economic growth, but this strains existing infrastructure, presenting socioeconomic and environmental challenges. **Pop: 3.1m**, with **60% live in slums** on 6% of Nairobi. Urbanisation has meant expansion into nearby national parks/forests. It's also raised rates of youth unemployment, crime and poverty.

Kibera, biggest slum in Africa, 4.1miles from centre of **Nairobi, Kenya, Africa**

Pop: 40% of slum dwellers live in Kibera, totalling between 0.5 - 1m+.

Most in extreme poverty. High unemployment, HIV and crime rates, few schools, scarcely any clean water, sanitation, medical care, or electricity, poor hygiene & malnutrition leading to disease.

Communication links: Railway station, but most use buses and private minibuses to reach CBD.

Pollution: Heavy, from human/animal excrement, 'household' and city rubbish, dust and dirt, etc.

Land ownership: Gov't owns the land. 10% of residents shack owners, 90% tenants (no rights). Many tensions, particularly tribal, but also between landlord /tenant and those with/without jobs.

Power: 20% of Kibera has electricity, most of which is stolen from the grid.

Sanitation: Virtually none. One latrine (hole in the ground) is shared by up to 50 shacks. Once full, young boys are employed to empty the contents in the river. Also "flying toilets' and open defecation.

Medical care: No gov't clinics/hospitals. At any one time half of 16-25yr old girls are pregnant. Many 'back street' abortions. Much HIV and many orphans.

Employment: Near industrial area where 50% of the available workforce are employed, rest unemployed.

1.7 Urbanisation

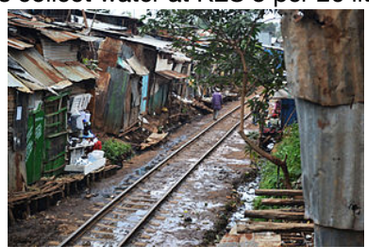
Solutions to…

Urbanisation in Kenya: Gov't plan, Kenya's Vision 2030, to transition to a "newly-industrialising, middle-income country providing a high quality of life to all its citizens in a clean and secure environment. - better services in rural areas means less urbanisation.

Kibera: Gov't is trying to move people out of the slum into new developments, but legal dispute over land ownership (slum dwellers/ gov't). 'Good' accommodation costs tenants more. Kibera is cheap.

Other initiatives underway including schools, building toilets, healthcare provision, drug/alcohol rehabilitation programs, sports programs etc. These are run by the community itself or by **international aid organisations, and other local and national churches, charities and NGO trusts.**

UN-Habitat is in the process of providing electricity it to some parts of Kibera, include street lighting, but it is unaffordable to most. Until recently water had to be collected from the Nairobi dam which is unclean causing typhoid and cholera. Now there are 2 mains water pipes into Kibera from the **municipal council** and the **World Bank**. Residents collect water at KES 3 per 20 litres.



Difficulties faced: improving buildings is hampered by building materials being stolen; the ground is literally made of rubbish with most buildings having no foundations, so during the regular floodings buildings often fall down damaging the new buildings; few houses have vehicle access, and many are at the bottoms of steep inclines (which heightens the flooding risk), meaning construction is more difficult and expensive. Youth unemployment leads some to drink/drug addiction and/or crime. HIV is leaving many orphaned. Disease and malnutrition prevent many working. No money prevents them from getting better.

Further improvements needed: Land/tenancy rights, housing, water, electricity, health clinics, education, employment, security, roads plus much more. Improvement to sanitation is very slow.

2.1 Volcanoes 1

Theme 2

In an MEDC

Eyjafjoll, Iceland (2010) (meaning Island Mountain - The glacier on top is called, Eyjafjallajökull))

A volcano completely covered by an icecap, on the North American and the Eurasian divergent/constructive plate boundaries (separating by 1-5cm every year). It is part of a chain of volcanoes that run across the island from NE to SW.

A relatively small volcano (100km^2), with a 3-4km crater at summit, it is a stratovolcano (a conical volcano built up of many layers of hardened lava, pumice, tephra and ash), standing 1,651m high. Before 2010 it's last exploded in 1823. The eruptions are explosive, but fissure vents also occur.

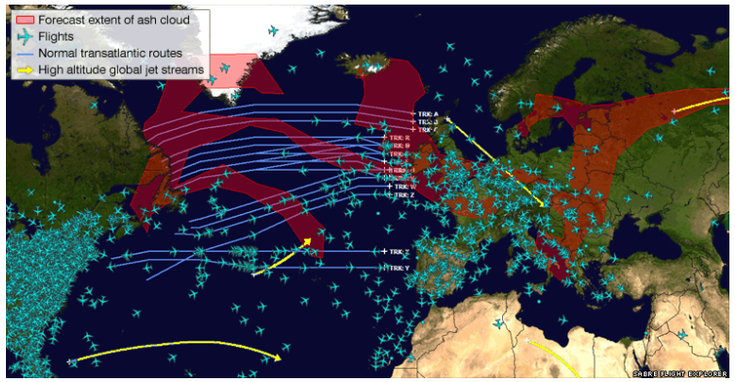
March 20th 2010, eruption started as a fissure vent that continued for a few weeks. After a brief pause, the eruption started up again on 14th April, but this time from the middle of the ice-covered crater. Meltwater running back into the vent made the eruption explosive and ash was thrown 11km into the atmosphere. Weather conditions were such that the ash did not disperse quickly, so hung about in the atmosphere for several weeks. There had been warning signs with 3,000 small earthquakes felt in the month of so before and the volcano was monitored.

2.1 Volcanoes 1

Theme 2

Effects: glacier meltwater floods, 800 evacuated, 20 farms were destroyed by the flooding and the ash, roads shut, those down wind of the volcano had to wear goggles and masks, local water supplies were contaminated, flights all over North Europe and transatlantic were disrupted in April and May (worldwide it was costing airlines and associate businesses £130m a day), 100,000s stranded in foreign countries, during the main 6 day travel ban around 107,000 flights were cancelled accounting for 48% of total air traffic and roughly 10 million passengers. food from LEDCs (e.g. Kenyan beans etc.) perished, many suffered asthma attacks all over Europe.
The main risks were to water and soil courses, and livestock through ingestion of volcanic ash on pasture.

MEDCs: money and technology meant many countries worked together to monitor the ash plume, emergency services were well prepared, texts sent to residents with a 30 min warning, goods and passengers could find their way through by other modes of transport, most countries have their own food supplies, most companies had insurance cover, airlines were legally and financially responsible for getting stranded passengers home, many individuals had insurance cover etc, so unlike LEDCs, the countries involved could handle the problems themselves, both financially and to prevent large scale casualties.



The volcano has remained dormant since August 2010, but continues to be monitored.

(https://www.youtube.com/watch?v=blDXgde1Tpg - BBC - Volcano Live, Iceland Erupts: A Volcano Live Special
http://news.bbc.co.uk/1/hi/uk/8625813.stm - BBC News, Iceland volcano in maps)

2.1 Volcanoes 2

Theme 2

In an LEDC

Mount Pinatubo, Western Philippines (1991)

The volcano is found at a destructive plate margin, where the dense oceanic Pacific plate is being pushed under the lighter Eurasian plate. The volcano was monitored from the 2nd of April 1991 after steam explosions where noted. On the 5th of April ,40 earthquakes where recorded and later on the 9th of June pyroclastic flows occurred. The most violent eruption occurred on the **15th of June** producing a 40km high column of ash and pyroclastic flows at over 80 kph. It was the second largest volcanic explosion in the 20th Century. It had remained inactive for 500 years previously.

Predicted: small earthquakes and steam explosions in March led to monitoring

Effects: high speed avalanches of hot ash and gas, giant mudflows, massive ash cloud, 75,000 people were evacuated, 847 died, 1.2 million lost their homes (mudslides, collapsing under weight of ash etc. after the eruption), bridges destroyed and riverbanks eroded from mudslides, airport closed, heavy typhoon rains collapsed buildings made fragile by the volcano, farmland destroyed and unusable for years after, harvest destroyed, 650,000 lost their jobs,

2.1 Volcanoes 2

Theme 2

Long-term effects: About 20,000 indigenous Aeta highlanders, who had lived on the slopes of the volcano, were completely displaced, and most still wait in resettlement camps until they can return home, about 200,000 people have returned to the low-lands, but still face threats from mudflows on the slopes, some rice paddies and sugar-cane fields are still out of use.

Physically, the stratovolcano is now a massive crater lake as its sides collapsed, and mudslides that blocked tributaries meant the crate filled up with water.

LEDC: The US geological survey helped predict the disaster, so measures could be put in place to save 5000 lives, this included evacuating 75000 people with the help of the US Air Force, government shelters and further monitoring of the volcano

What was needed but never materialised: long term aid, preparing for disease control as many moved to shanty towns.

2.1 Earthquakes 1

Theme 2

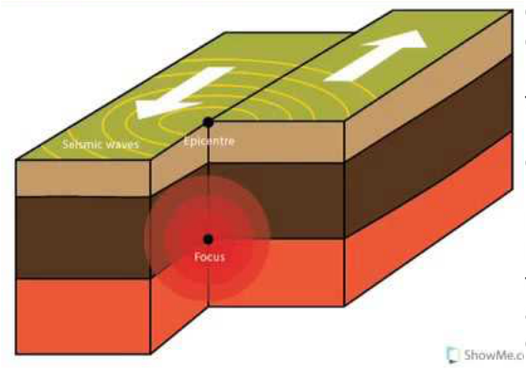
In an MEDC

Christchurch, New Zealand (2011)

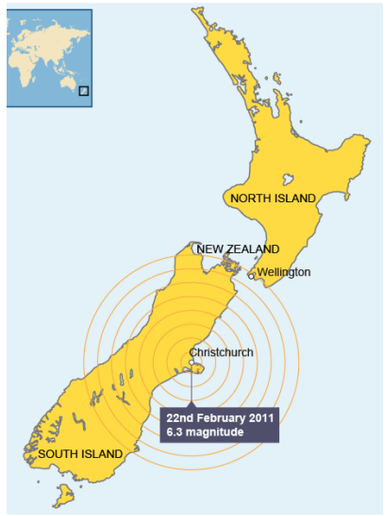
At 12.51pm, a 10 second, 6.3 magnitude earthquake struck Christchurch on 22nd Feb 2011, The focus/ origin was very shallow at only 4.99km deep. It occurred on a conservative/transform plate boundary between the Pacific and Australian plates.

Damage was severe due to the quake a year earlier and the shallowness of the focus.

Effects: a state of national emergency was declared, 185 killed (115 were from a single building collapsing and catching light), 6600/6800 suffered minor injuries with hundreds treated for major injury, power down, major damage to buildings (over 50%) and infrastructure that had already been badly affected by the 2010 mag.7.1 earthquake,



cathedral spire was destroyed, roads were pushed up and 400,000 tonnes of silt were produced from the extreme shaking that makes solid earth behave like a liquid (soil liquefaction), surface flooding, significant aftershocks which further exacerbated problems



2.1 Earthquakes 2

Theme 2

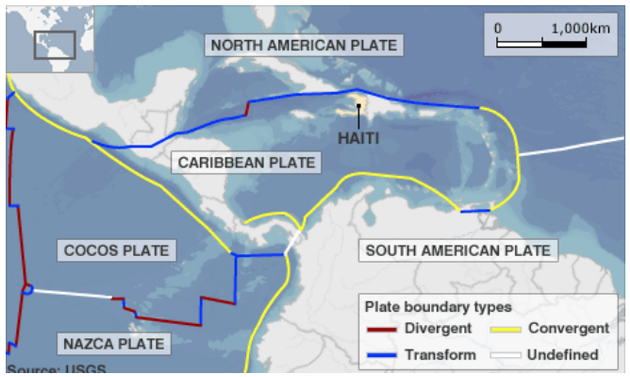
In an LEDC

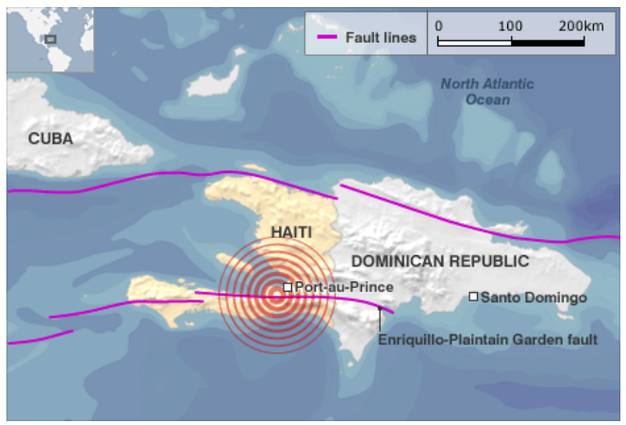
Haiti (2010)

At 16.53pm, on 12th January 2010, a 7.0 magnitude earthquake hit Haiti, 25km from the capital Port-au-Prince,

The focus/origin was very shallow. It occurred on a fault line between the Caribbean plate which was shifting east and the North American plate - their previous position had been 'locked' for 250 years.

Effects: 160,000 killed (but this is questioned to be both more and less); 300,000 injured; over 50 sizeable aftershocks; localised tsunami on the beach of Petit Paradis, Haiti, killing two; widespread devastation and damage throughout Port-au-Prince and elsewhere; vital infrastructure necessary to respond to the disaster was severely damaged or destroyed, including all hospitals in the capital (8 in country total), the main sea port, airports, roads, mobile and landline telephones down and radio stations were down for a week; a prison was destroyed allowing 4,000 inmates to escape; 1,300 schools were destroyed; 50 healthcare facilities were destroyed; 1.3m homeless.





2.1 Earthquakes 1

Theme 2

Action:

- A Central City Red Zone was established on the day of the quake to prevent people going into the most unstable areas,
- Army, Navy, AirForce and Reserve Army all called in to help. Amongst other things the special forces operated desalination plants, fed the homeless and transported aid to Christchurch.
- Medical service activated their crisis plan, forming 20 trauma teams.
- Rescue efforts continued for over a week, then shifted into recovery mode.
- Humanitarian aid was provided by Salvation Army, Red Cross and many church groups throughout New Zealand.

Help:

- Australian police were brought in to supplement New Zealand police, and they were aided by
- Disaster Victim Identification teams from Australia, UK, Thailand, Taiwan and Israel.
- Additional search and rescue teams came from Australia, UK, US, Japan, Taiwan, China and Singapore.
- 116 from the Singapore Army.
- Australia pledged $5m to the Red Cross Appeal.
- China gave $0.5m to the earthquake appeal

Longer term effects: businesses were shut for a long time, schools were closed for two weeks, There was $898m in building insurance claims, Water and sewage were restored by August, and temporary housing was provided for the homeless.. Total financial loses for this quake are estimated to be about US$12bn.

Watch: When a City Falls

2.1 Earthquakes 2

Theme 2

Help: Aid was slow in coming due to damaged port and airports; when it did come, it came from many countries; the Dominican Republic were one of the first and sent food, water, heavy lifting machinery, made its hospitals and ports available for the rescue effort, helped restore the telephone networks, co-ordinate early medical relief, and produced 100,000 meals a day from mobile kitchens; US sent rescue teams and 10,000 troops; bottled water and purification tablets were provided; 235,000 were moved out of Port-Au-Prince to less damaged cities; UK government donated $20m - much more came from the US, EU etc. in long-term financial aid.

Longer term effects: country was dependent on foreign aid; 300,000 buildings had to be demolished; 2m without food or water; frequent power cuts; crime increased; shanty housing built up again; November, the was an outbreak of cholera; 6 months on, 98% of rubble remained uncleared; 1 year on, 1m still living in temporary structures; new houses were being built to a better standard than before, but were slow; huge investment was needed to rebuild the port; In 2017, the UN reported that 2.5m Haitians were still in need of humanitarian aid, with about 55,000 people still in makeshift camps in unsanitary conditions.

Why it was so much worse in Haiti than New Zealand:

- buildings were flimsy and of poor quality originally
- action was slow to get started, raising early death tolls
- lack of money meant complete reliance on foreign aid
- they were already short of food and water previously.
- rebuilding was slow due to lack of money, machinery etc.,
- poor alternative housing increased risk of disease outbreaks
- humidity, heat and no where to store the vast numbers of bodies.
- slow distribution of resources lead to mass looting and lawlessness
- Outside rescuers couldn't communicate in Haitian Creole
- Exact numbers of dead etc. not known as fast mass burials.

2.5 Climate and natural vegetation

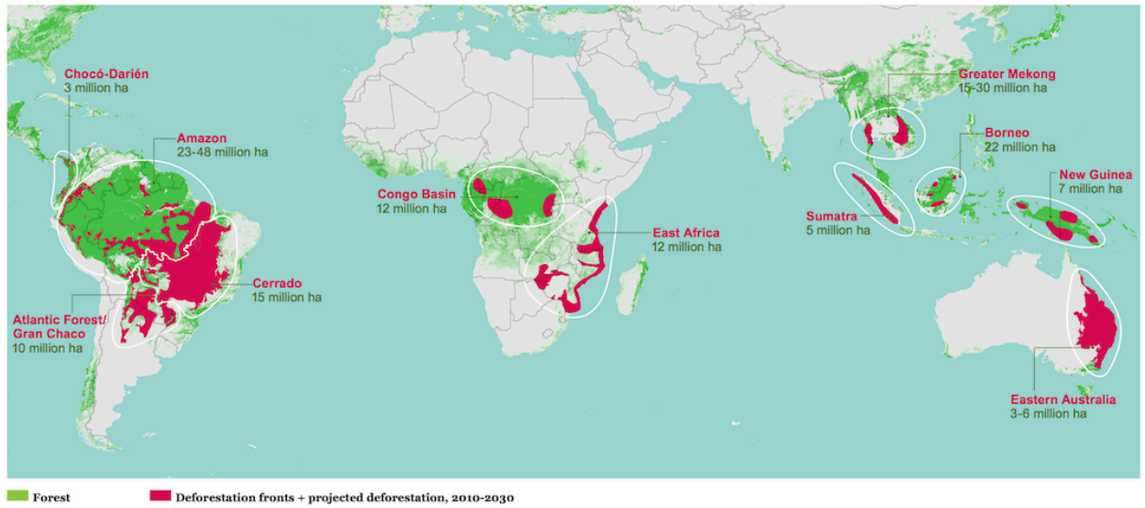
Theme 2

An area of tropical rainforest

Tropical Rainforests

Despite their monumental role, **tropical forests** are restricted to the small land **area** between the latitudes 23.5° North and 23.5° South of the equator.

Rainforests also exist outside the tropics, including temperate North America, South America, Australia, and Russia.



Deforestation of some of the major rainforests:

South America and Asia: industrial pressure for soy, palm oil, and other commodity crops

Solomon Islands and Papua New Guinea: commercial logging,

Congo basis: subsistence farming.

Deforestation and degradation of tropical forests make up 10% of global greenhouse emissions from human activities

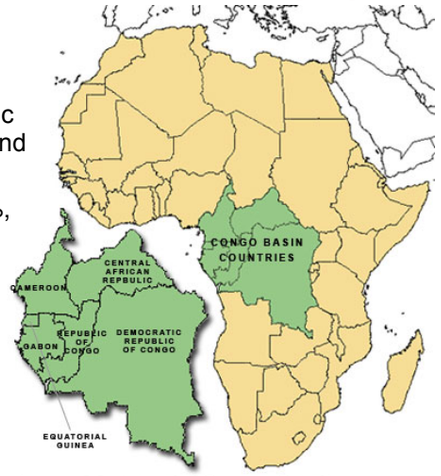
2.5 Climate and natural vegetation

Theme 2

The Congo Basin Forest

1.8mkm^2, world's 2nd largest rainforest, is home to 75m people, 50,000 different plants, 1000 species of bird, and 400 types of mammals.

Covers: Cameroon, Central African Republic (CAR), Democratic Republic of the Congo (DRC) (60%), Republic of the Congo, Equatorial Guiana, and Gabon (Congo Basin).



The DRC and CAR have a human development index in the bottom 10%, meaning that lifespans, education levels and per capita GDP are among the lowest in the world. With few livelihood options, most survive by carving farmland out of the forest. These plots are farmed until the soil runs dry of nutrients, whereupon a new plot is cleared and planted **(shifting cultivation)**. Money is also made from the bushmeat trade, destroying much of the wildlife.

Deforestation 2000-2014

- Clearance larger than Bangladesh, around 165,000km^2
- Small-scale farming contributing to around 84% of deforestation (over 90% in DRC and CAR)
- Poverty due to political instability/conflict in the region
- Gabon, is only country where industrial selective logging is the biggest single cause of forest loss.
- The UN population projection gives an increase of 500% in the Congo Basin by 2100, and if current trends hold, this means that there will be no untouched Congo rainforest left by that date.
- Industrial agriculture currently at 1% but trending upward, particularly in coastal countries.

What is being done?

1/10th of rain forest is in national parks or protected areas. Organisatons such as WWF are working with local communities and governments. The Congo Basin Forest Partnership's It is led by the United States and sponsored by more than 40 international governments and investors. objectives include the preservation of the ecology and biodiversity of the wildlife and forests, and making their use and protection sustainable for the long-term benefit of both the region and its inhabitants.

2.3 Coasts

Theme 2

The opportunities presented by an area or areas of coastline, the associated hazards and their management

Cromer, Norfolk Coast, UK

Cromer is an important seaside town on the North Norfolk coast. It became a popular tourist destination in Victorian times with the rise of the railway, and has remained so with the help of iconic Cromer crabs and the Pier. The major sources of income in the area are from tourism and crab fishing.

Norfolk has a coast line of about 68km, The central 34km of the coastal frontage, from Kelling Hard, through Cromer, to Happisburgh, is characterised by soft glacial cliffs and sandy beaches. Protecting the cliffs and beaches is very important to the survival of Cromer as a tourist spot.

Opportunities: *commercial crab and lobster fishing, cliffs rich in fossils, hotels, pier, Pavilion Theatre, Norfolk Coast Cycle Way, Norfolk Coast Path (83miles), sea angling, beautiful scenery, wildlife-seals, birds etc.*

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Watch: https://www.north-norfolk.gov.uk/tasks/coastal-management/find-out-more-about-the-north-norfolk-coast/
https://www.youtube.com/watch?v=np3nkffPO84

2.3 Coasts

Theme 2

Hazards*: The North Norfolk coast has been shaped by coastal processes for thousands of years and will continue to change. Cliffs and beaches along the coastline are subject to coastal processes which can cause cliff failure and retreat.*
Coastal erosion*: the cliffs being hit by waves in North Norfolk are made up of soft sands, silts, clays and gravels and are susceptible to erosion and failure. The wave erosion is hydraulic, solution, attrition, and abrasion.* ***Toe erosion*** *leading to cliff failure occurs. Over time this the eroded material is removed by the sea and the cliff stabilises. Cliff erosion can limit beach access and impact on coastal communities. Cliffs with groundwater saturated clay layers also become unstable due to the extra weight, leading to mud slides, slumps and cliff failure.*
Beach erosion*: Eroded cliff material makes up the beach. If cliffs are protected, the beach may disappear, as material is not being deposited from he cliffs. On the North Norfolk coast, storm winds from the east and north tend to create destructive waves, often causing beach levels to fall. In periods of more settled weather, constructive waves are more frequent and beach levels begin to increase. Beaches are also subject to longshore drift, a process of sediment transport caused by waves and tides. Many years of coastal protection have led to less material being released onto beaches resulting in a general fall in beach levels. In turn, this exposes the cliff toe to further action of the sea and increases sea defence maintenance costs. Sea level rise and increased storm events resulting from climate change will put greater pressure on sea defences and the coast.*

Management: *The management policy for this section of the coast is to 'hold the line', Cromer's frontage is typical of many old coastal resorts, consisting of a promenade protected by seawalls. The beach is mainly sandy and is retained by eight substantial timber groynes. The Cromer Coast Protection Scheme aims to protect the town to withstand approximately 50 years of sea level rise, and is funded by the Department for Environmental, Food and Rural Affairs (DEFRA) via the Environment Agency with 'Flood and Coastal Risk Management Grant in Aid' of approximately £8 million. The Cromer Coast Protection Scheme was able to attract this funding as the 'cost benefit ratio' is 1:10.42, which means that for every £1 spent, there are £10.42 of assets protected. In other locations it is not currently considered sustainable, and so the cliffs and beaches are left to the mercy of the sea.*

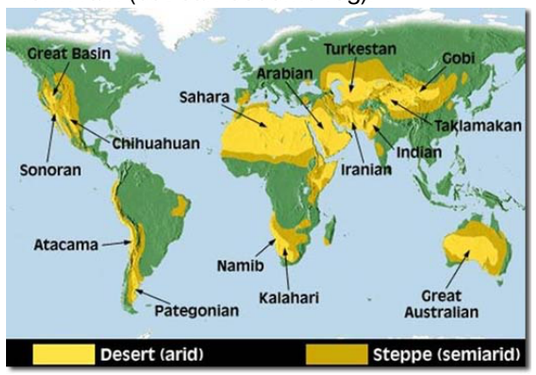
Cost: *Groynes cost in the region of £100,000-£150,000.*
Seawalls protect the base of the cliff from the action of the sea and are intended to reflect and/or refract wave energy. Ideally seawalls should be placed behind a large beach, with the sea only reaching the wall during storm conditions. Therefore seawalls are the final defence from flooding and erosion, costing a minimum of £4000 per metre.

2.5 Climate and natural vegetation

Theme 2

An area of hot desert

Atacama Dessert, Mainly Chile, but also Peru, Bolivia and Argentina.
Average rain fall: 15mm a year, but some parts never receive any rain, giving 350 days of clear skies and a humidity of 10%, making it the driest desert on Earth,
Area: 105,000km^2, mostly composed of stoney terrain, salt lakes, sand and lava flows towards the Andes. Lying between 18 and 30 degrees south of the Equator, at an altitude of 2,500m above sea level.
Why so dry?: Blocked from receiving precipitation by the Andes mountains to the east and, to a lesser extent, the Chilean Coast Range to the west, creating a **double-sided rain shadow**. On the East, SE tradewinds lift warm, moist air. When they hit the Andes, it rains, with only dry air crossing over the Atacama. The Chilean Coast Range is much lower, but has the same effect on the west to much smaller effect.
Air is heated in the tropics, rises, cools, descends 20 degrees north and south of the equator, where it warms again, increasing in pressure. **High pressure** means no rain.
On the Chilean coast the **Humboldt current** (a cold, and low-salinity ocean current that runs up the west coast of South America), cools on-shore winds so that they can only hold fine water droplets, which cannot form rain (but can become fog).

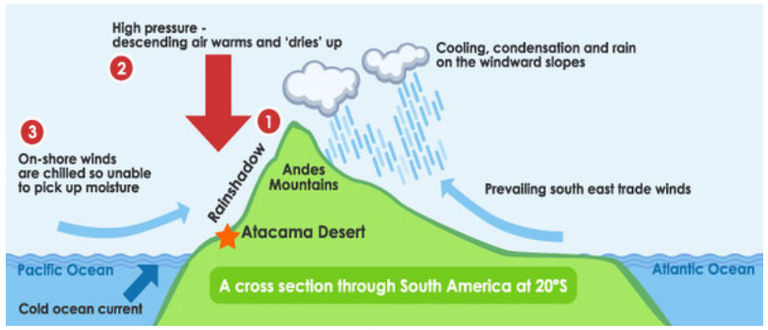


Temp: With minimal vegetation, no clouds, and at a subtropical longitude, the temp can get up to 40C on the low lands, but with nothing to retain heat, it is exceptionally cold in winter and at night going down to 0C

2.5 Climate and natural vegetation

Theme 2

Wild life: Virtually devoid of life because it is so dry, but some areas receive a marine fog, which is enough moisture for certain plants to grow such as lichen, algae and some cacti. In all, 500 types of plants have been found within the boundaries of the dessert, but in some areas there is no life at all. In less arid parts a few specially adapted mammals can survive, such as the South American gray fox and Darwin's leaf-eared mouse. Birds are the biggest animal group, and include Humboldt penguins nesting in the dessert cliffs over-looking the ocean, Andean flamingos on the salt flats and sparrows and humm
Population: sparse, with most towns located along the Pacific coast. In interior areas, oases and some valleys have been populated for millennia and were the location of the most advanced pre-Columbian societies found in Chile.



Threats: Heavily influenced by El Nino and climate change further exaggerating the effects.

Opportunities: Mining natural resources such as copper, gold, silver, iron, and potassium salts (biggest mine is the **Chuquicamata** copper mine, just outside Calama) ; astronomy (high altitude, clear skies); sports (solar car racing, sandboarding, tourism (one of the top three tourist spots in Chile).

2.2 Rivers

Theme 2

The opportunities presented by a river or rivers, the associated hazards and their management

Thames River, UK
Starting in Thames Head in Gloucester, travelling 210 miles through Oxford, Reading, Windsor and London, and finally finishing in the North Sea, coming out between Kent and Essex, it's part of the longest river in England. It has 45 locks, is home to over 25 species of fish, boasts three areas of outstanding natural beauty and it's the only river in Europe to have a national trail follow its entire length.

Opportunities:
Tourism: fishing, wildlife, boating, cycling, walking, Henley Regatta, Oxford and Cambridge boat races
sight seeing tours through London
Water for domestic and industrial use, and recreational use.
Wildlife for environmental health and tourism

Threats:
Pollution - in 1957 the Natural History Museum declared the Thames to be biologically dead. It is now one of the cleanest river in the world that flows through a major city.
Flooding - below Teddington lock, 55miles up from the Thames Estuary, it is a tidal river, subject to North Sea activity.
Climate change - At the time of they built the Thames barrier, the barrier was expected to be used 2–3 times per year. It is now being used 6–7 times per year.

2.2 Rivers

Theme 2

Management:
The Thames Barrier - one of the largest movable flood barriers in the world. It prevents the floodplain of most of Greater London from being flooded by exceptionally high tides and storm surges moving up from the North Sea.
It has been operational since 1982, and spans 520 m across the river near Woolwich, protecting 12 km^2 of central London from flooding caused by tidal surges. It has 10 steel gates that can be raised into position across the River Thames.
The Environment Agency runs and maintains the Thames Barrier as well as London's other flood defences.
The Thames Estuary 2100 plan sets out how flood risk will be managed in the Thames estuary to the end of the century and beyond. It also recommends what actions the Environment Agency and others will need to take in the short term (the next 25 years), medium term (the following 15 years) and long term (to the end of the century).
During the barrier's entire history up to April 2019, there have been 184 flood defence closures. The Environment Agency are examining the Thames Barrier for its potential design life under climate change, with early indications being that subject to appropriate modification, the Thames Barrier will be capable of providing continued protection to London against rising sea levels until at least 2070.
The plan is based on current guidance on climate change, but is adaptable to changes in predictions for sea-level rise and climate change over the century.
Controlled building - near the river with designated flood plain areas. In flood plain areas, housing is not built, with these areas left for grass/park land and often have steep banks.
Pollution - Water quality is set by the EU and is regularly tested, with tight rules on what is allowed to go into the river. It is checked by the Environment Agency, with many other groups taking an active role in preserving the river, such as The River Thames Society.

3.1 Development

Theme 3

A transnational corporation and its global links

Coca-Cola

Headquarters in Atlanta Georgia, USA. Sell nearly 400 different products in more than 200 different countries. 70% of its sales are outside of North America. Production is based on the franchise system: manufacture the drink concentrate in US, marketing also in America, bottlers buy concentrate, mix with water and sweeteners then bottle. Each bottling company has exclusive rights to its region. Coca-Cola owns shares in some of the companies but not all, some are independent. Bottlers are in charge of distributing the products to the retailers.

Bottling plant in the village of Kaladera, Rajasthan, est. 1999.

Kaladera is a small, impoverished village characterised by semi-arid conditions in the desert state of Rajasthan. Farmers rely on access to groundwater for the cultivation of their crops. but since Coca-Cola's arrival, there has been a serious decline in water levels. Locals are increasingly unable to irrigate their lands and sustain their crops, putting whole families at risk of losing their livelihoods.
Official documents from the government's water ministry show that water levels remained stable from 1995 until 2000, when the Coca-Cola plant became operational. Water levels then dropped by almost 10 metres over the following five years. (https://www.youtube.com/watch?v=OnowxqVqmF0 - (2.24))

Coca-Cola has been accused of dehydrating communities, drying up farmers' wells, destroying local agriculture, violated workers' rights in countries such as Colombia, Turkey, Guatemala and Russia. - **It takes almost three litres of water to make one litre of Coca-Cola.**

Advantages of being a TNC rather than just an exporter

. Gov'ts offer incentives to TNC's to locate there, TNCs have financial weight/power
. Labour costs are lower in LEDC's.
. Often the raw material is sourced in the LEDC's **BUT** this does not apply to Coca Cola.
. Coca Cola sometimes subcontract out to pre-existing bottling companies to save money.
. TNC's want to have access to high earning large populations such as India.
. By manufacturing goods close to the intended market they save on transportation costs.

3.1

Theme 3

Positive effects that Coca Cola have on the host country

- Creates jobs
- Many of the bottling firms are local companies, so all that profit stays in the host country.
- TNC's offer training and education.
- Many TNC's improving their image get involved with schemes to help the poor. Coca Cola runs some community schemes in Africa and South East Asia.
- Coca Cola has invested $1.5 billion in the Russian Economy, this includes training, the construction of manufacturing plants and improvements to infrastructure.

Negative effects that TNC's have on the host country

- Management, design and marketing take place in US, good jobs not available for locals
- Coca Cola are adding to the water stress of some areas, impacting agriculture and personal use.
- Pesticides found in Indian coke at levels 30% higher than EU standards
- Environmental regs are often less strict in LEDC's, or unenforced: some TNC's take advantage
- Much of the profits are returned to MEDC.
- Working conditions in some factories are poor: long hours, little pay, no TU, sick pay etc.

What can be done:

- Community campaigns against the co.
- Co. can be refused licence to operate there
- Investigations by the state
- New laws and regulations
- State enforce law

After many local and regional, national and international campaigns, Kaladera bottling plant ceased production in 2016. Co. said it was due to lack of accessible water. It is now used for storage and distribution centre.

3.2 Food Production

Theme 3

A country or region suffering from food shortages

Sierra Leone

Situated on the North Atlantic coast of West Africa, Sierra Leone is small but **densely populated.** Ranked 179 out of 188 in the 2017 Human Development Index, it is one of the poorest countries in the world with **50 percent of the population lacking access to sufficient nutritious food.** Chronic malnutrition is widespread, with the prevalence of **stunting at 31.3 percent.**

Reasons for shortages:

- 11 years of civil war (ended in 2002) - took many lives
- Ebola in 2004 took 4000 lives -impact on people able to work, and the economy
- low agricultural productivity: most farmers are subsistence farmers, only 4% grow enough rice to be able to feed themselves - Agricultural output and development are constrained by labour shortages, lack of agricultural equipment, poor quality seeds and high post-harvest losses. Less than 15% of arable land is currently cultivated.
- Extreme weather - 2015 climate change vulnerability index (CCVI), Sierra Leone is the **2nd most vulnerable country to the effects of climate change:** extremely vulnerable in terms of impact on food production, poverty, migration and social stability. **Major flooding in 2015 and a devastating landslide in 2017,** resulting in significant loss of life.
- Lack of finance. Most rice, is now imported, increasing vulnerability to price fluctuations.

What can be done: The World Food Programme (WFP) has been present in Sierra Leone since 1968. WFP supports the Government of Sierra Leone through food, cash, nutrition assistance and innovative approaches to **improve nutrition, empower women, build local capacities and enhance both local and national preparedness to climate-related shocks.**

3.3 Industry

Theme 3

Industrial zone or factory

Cambridge, Silicon Fen

Location: Cambridge Science Park
Tertiary/Quaternary industry - high-tech (science-based) industry using the latest and most advanced technology and techniques, offering information, r&d.
Why:

- Cheaper than Cambridge
- Flat, so cheaper to build on.
- Near to universities - highly skilled and qualified, potential employees
- Near to other high-tech companies
- Part funded by University - unis/Addenbrookes/Astrazenica share research
- Close to: M11 (London) A14 (cross country), A1 (North), good rail links to London, Stansted
- Room to expand
- Space for parking
- Can exchange ideas with neighbouring businesses
- Nice place to work, with lots of 'green' surrounding it

Problems:

- Increases housing issues in an area already under housed
- Air pollution as no public transport there
- People bring families so extra strain on schools etc.
- Building it damages local environment

Specifics, Astrazenica, pharmaceutical company, to be near R&D opportunities: Addenbrookes/uni
Inputs: land, offices, labs, staff, capital,
Processes: research, development, information sharing
Outputs: profit, information, intellectual property, medicines

3.4 Tourism

Theme 3

An area where tourism is important

Doha, Qatar,

Pop: 2.6m, 313,000 Qatari citizens, 2.3m expats
Highest GDP per capita in the world: $128,000, 54th in total
High human development, and money made from having the third largest natural gas and oil reserves in the world.
Capital: Doha, home to most of population, 1.5m

Tourist attractions: shopping, harbour, architecture, museums, luxury hotels, desert, beaches, local culture and markets, hosted a number of sporting events including Asian Games in 2006. Hot desert climate, so people attracted to consistent weather.

Aim: to move into tourism, hence the bid for the 2022 FIFA World Cup, Previously, it has been the holiday hotspot for the middle-east, but due to poor political relations there, it is now looking to increasing its customer based from India and Russia.

Environmental impact: Qatar has had the highest per-capita carbon dioxide emissions in the world, at 49.1 metric tons per person in 2008. Qataris are also some of the highest consumers of water per capita per day, using around 400 litres. Tourism will just add to this consumption. Plans to add a further 17,000 hotel rooms to the 26,000 it already has. Reclaimed land off the coast.

Sustainability: there are questions regarding human rights of labourers. Water use and future water supply is a big problem. Food grown there or flown in have a huge carbon footprint.

What is to be done about it: In 2008 Qatar launched its National Vision 2030 which highlights environmental development as one of the four main goals for Qatar over the next two decades. The National Vision pledges to develop sustainable alternatives to oil-based energy to preserve the local and global environment.

3.5 Energy

Theme 3

Energy supply in a country or area

Iceland: The world's largest green energy producer

In 2016, geothermal energy provided 65%, hydropower 20%, fossil fuels 15% (mainly for transport). Renewable energy provides 100% of electricity (73% hydropower). Geothermal used for 85% of heating.

Why

- located on mid-atlantic ridge, most unique geology, 200 volcanos, over 600 hot springs, over 20 steam fields that are at least 150C - geothermal - used to heat houses, swimming pools, fish farms, greenhouses etc.
- Glacial rivers and waterfalls - hydroelectric
- they are still investigating wind power for feasibility
- solar energy - not enough light, particularly in winter
- aiming to be first hydrogen society by 2050 - hydrogen easy to produce from natural energy sources. Small population 320,000, 60% live in capital, Reykjavik, so relatively easy to switch from oil to hydrogen for transport, but it may prove easier to switch to electric cars, as electricity is easily generated

Sparsely populated, so man-made air pollution only in capital, due to traffic, and particularly in winter due to the use of studded tyres.

Benefits

- better for environment
- cheaper - has fuelled aluminium manufacturing
- less dependent on other countries

https://www.youtube.com/watch?v=3KepmDQfEHg (8.52)

3.6 Water

Theme 3

Water supply in a country or area

Lima, West Peru
Population: 8 million.
Climate: dessert, second driest capital in the world(after Cairo)
On average, surface water in Peru is abundant, but it is unevenly distributed. In coastal area, where 2/3rd of the population live, is very dry - 2% of country's water supply. Lima receives its water from the River Rimac and two other rivers that source in the Andes. Currently 1m are not connected to the mains water supply due to rising population and the countries inability to invest in the utility.
The dry western half, rely on water from the tropical glaciers (Peru contains 2/3rds of all of them). They melt in the summer, and the run-off into streams and rivers supplies the inhabitants. Climate change and increase in demand will lead to a lack of water, possibly by 2025. However, many do not see the imminent dangers, and do not change their behaviour with regard to water usage.

Climate change
Glaciers are rapidly melting, making flow to rivers irregular, leading to more droughts and floods. It is predicted that many of the low glacier in the Andies will be gone in the next 10 years or so, and glacial runoff in 20 years.
El Nino: weaker trade winds, so less upwelling, = less fishing, but more rain and flash flooding
El Nina: stronger trade winds, = more upwelling, but could also lead to drought.
The Quelccaya ice cap (second largest in Peruvian Andes), has shrunk by 30%in the last 33 years.

What is to be done:
The country is investing in systems that can ensure 'water to everyone', but this is the result of a world issue, and cannot be combated by one country alone. An initiative with gov't bodies, radio, and the World Bank's Water and Sanitation Program launched an initiative called "*Culture of Water*." The initiative aims to promote 1) reasonable use of water, 2) willingness to pay proper water tariffs and 3) raise environmental conscience among target audiences.

3.7 Environmental risks of economic development

Theme 3

An area where economic development is taking place causing the environment to be at risk

Bandung and Chimahi, Citarum River, West Java, Indonesia

A major textile manufacturing industry, in a developing country, exporting to all over the world. Over 2000 factories operate in the area.

River used as a sewer from factories, making it one of the most polluted rivers in the world.

Aside from plastic, general rubbish and human waste, it also contains chemicals from the textile factories, including heavy metals, such as lead, arsenic and mercury. The water is filthy and smells.

Used by people for recreation, personal needs, fishing (although not so much now), and farming.

Problems: health, eutrophication, sight, smell, goes on crops and so contaminates food supply, kills wildlife.

Health Problems from long-term usage: brain damage, affects development of intelligence in children and unborn, skin conditions, joint issues. Short-term: E-coli bacteria, leading to high infant mortality

Solutions: Army called in to clean up river, but companies just dump at night, or have outlet pipes entering the river under the surface.

3.2 Food Production
A farm or agricultural system

Theme 3

Subsistance farming, in Ganges Valley, India

(https://www.youtube.com/watch?v=-HMK2LA7hPE) How does rice grow: https://www.youtube.com/watch?v=kxAEiHCErSA (2.45)

Why: poverty, lack of land, lack of markets, no technology, tradition, lack of education and skills,

- Climate - Hot with wet and dry seasons - all year growing season, temps over 21oC, Monsoon rainfall over 2000mm, dry time for harvest
- Land - the land is very flat so enables flooding - padi fields
- Soils - rich, fertile alluvial soil. denser layer of soil underneath to prevent water draining away
- Rice - high nutritional value - 3/4 of locals diet, and can be sustainably farmed.

Characteristics of farm

- Farms are small and broken into tiny plots over a wide space, making efficient farming difficult. Irrigation channels are dug around the fields, channeling water from the river to the fields

What can be done:

- Land reform: increase land size for those with little land, give surplus land to landless, set an upper limit on the amount of land a wealthy family can own.
- Good medical care, so families can continue to work
- easy to use/maintain, hand water pumps for irrigation
- animal excrement instead of expensive fertilisers.

Inputs: climate, land, soils, rice, water buffalos for ploughing, lots of labour,
Processes: plant rice in nursery, ploughing, planting in field, harvesting, thrashing, weeding, planting winter wheat and vegetables, harvesting, looking after live stock
Outputs: rice, buffalo manure for fertiliser, rice seeds, maybe a small amount of money,
Diversification: in dry season, vegetables and cereal crops are grown

3.2 Food Production
A farm or agricultural system

Theme 3

Commercial Farming in East Anglia, Trumpington Estate, Cambridge UK

Why: Profit

- Climate - average annual rainfall is approx 577mm, so fairly dry (by UK standards), oceanic climate, with warm summers around 16.6 - 20oC, and cool winters 3.1 - 1oC, but not extreme in any direction.
- Land - the land is very flat in this area, ideal for machinery
- Soils - heavy clay, which restricts crop choices.
- Market - densely populated region (just North of London), with a large market for selling crops, supplying Warbutons, and other buyer in the UK and abroad
- Transport links - major road links, including the A1 and M11 which enable rapid transport of crops to market.

Characteristics of farm

- Crops grown: 2/3s wheat, 1/3 oilseed,
- Size: 3,000 hectares, managed by the estate for a number of different land owners

Inputs: climate, land, soil, high mechanisation - large specialist machinery and buildings - grain stores with drying facilities
Uses good quality, hybrid seeds which are used to maximise the yields produced
Heavy use of fertilisers and pesticides
Processes: planting, spraying, harvest, store and dry, maintain buildings, machinery, woodland, hedges
Outputs: High output of cash crops which are produced and sold for profit
Diversification: aslo angling

3.4 Tourism
An area where tourism is important

Theme 3

Reykjavik, Iceland

Country Population 330,000, had 1.7 million visitors in 2017. And the numbers are expected to continue to keep rising. Generated 5-6% of countries GDP (double most other European countries)

Why:

- After 2008 financial crisis, it deliberately made attempts to attract tourisms.
- Decrease in cost of air travel, from Europe and US.
- growing awareness of the country
- Icelandair has a 'free stop-off' offer for people travelling across the Atlantic, so they decide to split up their flight and spend a few nights in Iceland**.**

Pros:

- More jobs for locals working in the tourist industry, or suppling the tourist industry, as well as builders
- local farmers have high demand for food grown in geothermal heated greenhouses
- A strong boost to the economy, when it most needed it.

Cons:

- Hotels being built in the centre pushing up the price of land, AirBnB pushing out locals
- Restaurants struggle to source all the food tourists demand - Iceland imports most of its food anyway.
- Reykjavik may lose its own personality, and become like every other big city in Europe
- Impact on the highlands - traffic and cars, it what is known as an 'untouched' area - both parking and off-roading - young plant life, delicate moss and rock formations easily destroyed. Litter and human waste left - lack of bins/loos etc.

Other interesting stuff

- eruptions of Eyjafjallajökull in 2010, grounded flights across Europe

What can be done:

- Talk of turning the highlands into a protected area./charging for access
- more rangers to keep tourists on right paths/prevent littering/ unwanted behaviour
- better roads and paths
- more loos, bins etc.

3.?

Theme 3

??????????????????????

Geographical Enquiry

GE

1. **Identification of issue, question or problem - Knowledge and understanding**

Physical environment: **weather, rivers**
Human environment: ID **CBD**, land use, building heights, traffic, pedestrians, **tourism**

2. **Objectives of the study defined**

two or three hypotheses

3. **Collection of data - observation and data collection**

Primary data: questionnaires, sampling techniques, field sketches, maps, observation, measuring, recording counts
Secondary data: census, internet, books, newspapers
Pilot Study: a pre-test of your final test - does it work, changes needed, improvements to final test.

4. **Selection and collation of data - organisation and data collection**

full enough section to be able to process data for presentation.

5. **Presentation and recoding of the results**

Tables, graphs, maps and diagrams

6. **Analysis and interpretation - analysis and interpretation**

Beyond basic description: findings, anomalies, trends, reasons and explanations, reference to data and evidence to support statements

7. **Making effective conclusions, evaluation and suggestions for further work - judgement and decision making, which includes evaluation and conclusions**

Brief summary of main findings and conclusions: what has investigation shown, do you agree with hypothesis, could investigation been done better, how, what further work should be done to complete investigation.

Alt to coursework: enquiry question
statements to investigate
hypothesis to test

Central Business District

GE

Where - does it start and end?, do the people live?
What - function are the buildings; they will change with height
How - congested are the pavements/roads? how big are the roads? tall are the buildings? old are the buildings?
When - was it built? is it (time of day)?
Why - here?
Who - are the people you can see: commuters, residence, tourists?

Main features: high rise, office buildings, maybe some small residential, churches, roof gardens, roads, fields in the distance, haze from pollution

Types of enquiry: e.g. traffic flow, migration, land use, air pollution
Equipment
Method
Safety Issues

Human geography

- **Urban land use**
- **pedestrian count**
- **traffic count**

Rivers

GE

Where - along the river?
What - is around it?
How - is it shaped?
When - season?
Why - at this point?
Who - could be affected by it?
Main features:
Types of enquiry: (e.g. width of river, speed of flow, channel size and shape, load size and shape, valley shape, gradient valley, gradient channel, depth, impact of human activity)
Equipment
Method
Safety Issues
Need two or more measurements along the river to describe and compare river features and processes along its length.

Weather

Where -
What -
How -
When -
Why -
Who -
Measuring: Stevenson Screen -
Not in a Stevenson Screen: rainfall, max temp., hours of sunshine, wind speed, relative humidity, air pressure, wind direction, cloud cover.
observation - cloud amount and type
Types of enquiry: (e.g. traffic flow)
Equipment
Method
Safety Issues

Tourism

GE

Where - place
What - kind of tourists - activities, families, day trippers. kind of place - resort, beach
How -
When - is it (time of day)?
Why - here?
Who - are the people you can see: commuters, residence, tourists?

Main features: high rise, office buildings, maybe some small residential, churches, roof gardens, roads, fields in the distance, haze from pollution

Types of enquiry: e.g. traffic flow, migrants, why tourists visiting, impacts or tourism, tourism and weather
Equipment
Method
Safety Issues

Geographical Enquiry

GE1

1. Formulate a hypothesis or devise a question
- Physical environment: rivers, weather
- Human environment: CBD, migration, tourism, pollution, traffic, land use

2. Plan the fieldwork
- sampling method
- H&S considerations
- equipment
- pilot study?

3. Collect the data
- types of data: primary, secondary
- designing recording sheets
- counting methods
- sampling
- measuring accurately
- designing a questionnaire
- recording observations in the field

4. Present the data
- graphs and diagrams
- write account of your findings

5. Analyse and interpret the data
- simple statistical analysis (rank, range, mean, mode, median)
- trends
- patterns, relationships and anomalies
- Suggest explanations for findings

6. Make conclusions based on results
- accept/reject hypothesis
- to what extent was it accurate?

7. Evaluate your investigation
- what extent successful?
- can it be improved?
- can it be extended?

2. Plan Fieldwork: Sampling

GE2

Sampling: You use sampling if you can't ask/observe/research everyone/thing - there are always time, money, equipment etc. constraints. The aim is to investigate the smallest number that is still large enough to be truly representative of the whole population.

A sample: is a group selected from a larger 'population'. The larger the sample, the more reliable the data. The most accurate sample is a census.

Systematic sampling: having a system/pattern/order for picking respondents, e.g. ask every second person, every 5m along a line
Random sampling: picking at random, often generated by a computer
Stratified sampling: so respondents are proportional to the whole, i.e. more representative, e.g. 20% Indian, 80% British, but those picked within the groups can be either systematic or random. It allows significant differences to be noted between the sub-groups.

Pilot study: a pre-study study. Often carrying out first, to see what doesn't work, can be improved

Fair tests: for the sample to be selected without bias - so every individual within the population must have an equal chance of being included in the investigation.

Sampling an area on a map or in the field:
- Point sampling: a specific spot, good for interviewing shoppers, tourists etc.
- Area sampling: using a square quadrat, good for sampling vegetation cover
- Line sampling: sampling at intervals along a line, e.g. peddle size from low-high water mark.

When investigating relationships need a sample of about 30, or more if you can get it.
Sampling must be done at exactly the same moment unless it is the effects of time that is being studied, so many students might be needed for one project.

2. Plan Fieldwork: Health and Safety

GE3

Location considerations
River: slippery river banks, depth of riverbed and depths suddenly changing, water-borne/bred diseases, dangerous animals, insects, fast/strong currents
City: traffic, air pollution, times of day - stranger danger, dangerous areas, cover from elements
Beach: know high tide, work at low tide, water depth, weak cliffs, wildlife

Safety must come first, so you may change the place to sample if another was safer, e.g. water is faster and deeper on the outside of a river bend, so you might choose to sample a straight bit of river instead

General:
work in pairs or more, take and give contact numbers for home/school/mobile etc., keep away form military areas, need permission for entering private property, appropriate footwear, clothing and cream suitable for weather

2. Plan Fieldwork: Equipment

GE4

Always: Appropriate footwear and clothing, and sun cream
Measuring equipment
(https://igcsegeography.wordpress.com/revision-materials/paper-4-alternative-to-coursework/)
- **quadrats:** portable frame, typically with an internal grid, used to mark out a quadrant of generally 1m squared.
- **clinometers:** used for measuring the angle or elevation of a slope.
- **pebbleometers** - used to measure the roundness/angularity of pebbles
- **callipers** - used to measure the width, length or height of small objects.
- **rulers:** measure a small object
- **measuring tape:** measure a short distance
- **ranging poles:** used to measure the depth of a river, or the angle of a slope with a clinometer
- **flowmeters:** used for measuring the velocity of water eg. in rivers
- **stopwatches:** measure time
- **Stevenson Screen:** shelters meteorological equipment. Mainly:
  - **Max-min thermometers**: measures max and min temps throughout the day
  - **hygrometers:** measures humidity, amount of water vapour in air
  - **barometer:** to measure air pressure
- **sunshine recorders:** measures hours of sunshine in a day
- **anemometers:** measures speed of wind
- **Wind vanes:** shows direction of wind
- **cloud type charts:** enables you to recognise cloud types
- **cloud cover estimates by eye:** the fraction of the sky covers by cloud
- **rain gauge:** measures how much rain there has been over a set period.
- **simple digital instruments:** e.g. digital thermometer
- **click counters:** counts every time you press the button.

River: clip boards with waterproof covers, floats (for measuring speed of water etc.)
City: clip boards, questionnaires, pens, timer/watch
Beach: hard hat if working under loose cliffs

3. Collecting data: GE5

Primary: data you have collected yourself
Pros: current, exactly what you need
Cons: expensive, scale maybe small, can be difficult to get

Secondary: data collected by someone else
Pros: cheaper, can be huge scale, like a census, quick and easy to get
Cons: may not be exactly what you need, can't check methodology or biases

Subjective data: collected by personal communication, could be different depending on who collects it. Asking shoppers how busy the CBD is at the weekend.

Objective data: collected via observations, should be the same no matter who collects it, e.g. counting the number of car going past over a 30 min period.

Qualitative: word data, e.g. feelings

Quantitative: numerical data

Continuous data: is measured - can be any number within the range

Discrete data: is counted - integers, whole numbers

Methods for recording data: tally, observation, estimate, sample, measure,

Tally chart: One line for each thing counted, in groups of five for easy adding up.

Surveys: To gather information through individual samples so as to learn about the whole thing.

Questionnaires: set of questions with a choice of answers, used for surveys and statistical data.

Methods for recording data: tally, observation, estimate, sample, measure,

Observation data collection: field sketches/maps/photos
recording sheets cloud types and cover

3. Collecting data: Questionnaires GE6

Questionnaire considerations:
- layout
- format of questions
- number of questions
- wording of questions
- age/gender issues

Collecting data considerations:
- where?
- who and how many to ask?
- How long should interview be?
- Who asks questions and who fills in questionnaire?

In general:
- Choose a variety of respondents: different ages, gender, but not under 16s, and not just people you know. Although, avoid busy people, they will not appreciate being pestered.
- Have a system for choosing respondents: systematic (every 10th person) or random (computer generated numbers)
- Introduce yourself and explain the purpose of the survey
- Manners: don't push people to fill in the survey, be polite, thank people who do
- Work in pairs: big groups will put people off, safer not on your own
- Stay in public places
- Don't block pavements or doorways
- Go to different parts of the CBD, and all busy parts

Possible problems when standing outside doing surveys: boredom, weather, health problems when standing in very polluted areas.

4. Presenting the data: Graphs GE8

Types of graph:

- **Bar:** has bars showing different categories and the amounts in each category. The categories must be discrete. Bars can also be grouped, which means you can show several elements within each category.
  - Pros: clear comparisons, can compare multiple things at once, flexible - can show percentages or absolute amounts
  - Cons: can't use a lot of categories as take up too much space, boring to look at, can only show two things in relation to each other.
- **Divided, segmented or stacked bar:** Like a bar chart, but can show multiple aspects of each category, with each aspect on top of each other in the bar. Can be absolute values or percentages.
  - Pros: can give more info than a standard bar graph
  - Cons: more complicated to read, can be harder to read exact amounts, Key more important than in a standard bar graph
- **Pie:** circle divided by percentages
  - Pros: can see percentage of the whole, easy and quick to read
  - Cons: cannot see exact or total values unless they are written on, only show proportion of one thing, quick and easy to misread, hard to see which are the biggest bits unless they are put in size order.
- **Line:** measures two things in relation to each other, plotted as points and then joined with a line
  - Pros: more lines can be added; measuring more things; easy to spot trends and patterns; can be used over a bar graph to show multiple things (like a climate graph); good for handling big series of data
  - Cons: can be confusing if too many lines/poor key; trends and patterns can be given too much emphasis if only a chosen section of data is given; if the axis is suitable for one line, it might not be suitable for others on the chart.

4. Presenting the data: Graphs GE9

- **Pictogram:** like a bar graph, but the bars are made up of pictures
  - Pros: more fun to read; shows simple relationships easily
  - Cons: easy to misread; easy to manipulate, less precise, cannot do decimals
- **Histogram:** Like a bar graph, but the bars are always next to each other, as they are showing continuous numerical data - each bar is a range, e.g. 1>11, 11>21 etc.
  - Pros: can accommodate decimals, good for showing shape of one set of data
  - Cons: cannot read exact values as data is grouped into categories, difficult to compare more one lot of data **Flow diagram:** shows relationship and sequence of events in a complex system
- **Scatter:** two numerical data sets plotted as points on a graph, e.g. height and wealth
  - Pros: shows relationship between the two variable, easy to read, good for showing info that doesn't make a straight line, can show large quantities of data, easy to see patterns
  - Cons: can be inaccurate, can lead you to believe there is a relationship when there isn't
- **Choropleth map:** map split by areas, e.g. forest/farming land, opinions, wealth etc., with colours denoting value.
  - Pros: Easy and fun to read, can show patterns
  - Cons: Not specific - doesn't give exact data, can be misleading (might not be proportional), only shows you one bit of data
- **Proportional symbol map:** like a choropleth map, but instead of using colour, uses a symbol (often a bubble) to represent distribution of data.
  - Pros: Easy and fun to read, more precise than a choropleth map, less skewed by size of regions
  - Cons: Not specific or exact, need a good key

3. Collecting data: Labelling and annotating a photo GE7

Title, date, time, weather conditions.

Label = anything less than 10 words long: Key term + adjective
e.g steep slope, gentle slope, sandy beach, calm water, dense, deciduous forest etc.
Annotation = any label exceeding 10 words long: explanation of physical processes, e.g. cliff, cave, arch, stack erosion.

Physical features - C Lo Ve Re D
Climate - weather conditions
Location - (note title, relief and topography [shape and features of land surfaces]) - where are place is
Vegetation - plant life: woodland, moor land, farm land, grass land, scrub land
Relief - height and shape of the land
Drainage - all water features: rivers, lakes, marches, reservoirs, sea etc.

Human features - CoPS Work
Communications - Accessible modes of transport: roads, railway lines, airports
Population - signs of, e.g. densely populated cities, small hamlets,
Settlements - pattern: isolated houses, village, housing estates; locations; patterns of land use, height of buildings, use of buildings, CBD
Work - signs of employment in the area: tourism, factories, farms, office buildings

Extras - Animal feat
Animals - humans, wildlife, farm stock
Features (topography) - natural: stacks, arches, glaciers, spits
man-made: bridges, stadiums, sea defences, parks, walls

4. Presenting the data: Graphs GE10

- **Isoline maps:** connect points of equal value on a map, e.g. OS map gradient lines
  - Pros: gives a good general impression of things - patterns
  - Cons: Not specific, can get confusing when there are too many, suggests continuation of data
- **Flow line map:** shows movement from one place to another
  - Pros: shows who has gone were, and in what numbers (thickness of line), easy to note patterns and trends, easy to read
  - Cons: specific numbers have to be written as the arrows cover ranges of data, easy to misinterpret
- **Triangular:** can compare three sets of data
  - Pros: done as percentages, trends easily shown
  - Cons: harder to read, don't give absolute values, hard to read exact percentages, not suitable for most data sets
- **Radial:** A circular line graph
  - Pros: good for time data (circle the same as a clock), directional data (can show compass points)
  - Cons: difficult to read, particularly when looking at more than one data set

Specialist graphs:
- **Wind-rose diagram:** to show wind speed and direction over a period of time
- **Climate (or climograph):** as bar - rainfall, as line - temp (sometimes max and min lines)

Show how something changes (often over time): Line, bar (possibly)
Show how two things are linked: Line&line, line&bar, scatter,
Compare different things: bar, line
Show something in an interesting way: Pictogram, choropleth map, radial, flow line
Show how something is divided up: Pie, divided/segmented/stacked bar,

6/7. Conclusions and Evaluations GE15

This part is about making judgements and decision making, which includes evaluation and conclusions.

Brief summary fo main findings and conclusions:
- what has the investigation shown?
- do you agree with the hypothesis?
- To what extent do you agree with it?
- What could have been done better and how?
- What further work should be done to complete the investigation?

5. Analysing and interpreting Data GE14

Line of best fit: used on a scattergraph. a line that fits in with the general pattern of the data, revealing the underlying trend in the data. There should be approximately as many points below the line as above.

Stats: **mean** (average average)
mode (most often average)
median (middle value average)
range (the difference between highest and lowest value)
percentage change ((new value divided by original value and times by 100%)

Annotated pictures: Explaining the processes that can be seen in the photograph or sketch.

Correlation: a relationship between two variables, when one goes up, so does the other, and when one goes down, so does the other.

Inverse correlation: a relationship between two variables, but when one goes us, the other goes down.

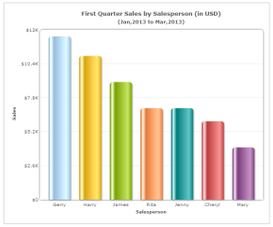
Oscillation: going up and down

Trend: General pattern seen over time

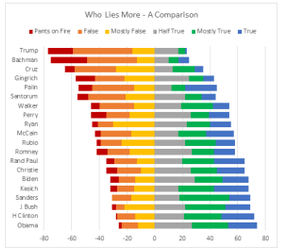
Pattern: Evidence of a relationship between two or more variables.

Anomalies: something that doesn't fit the general pattern of things.

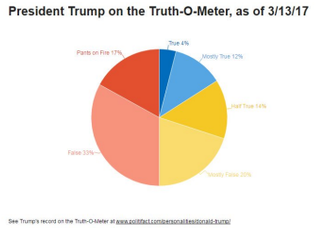
4. Presenting the data: Graphs



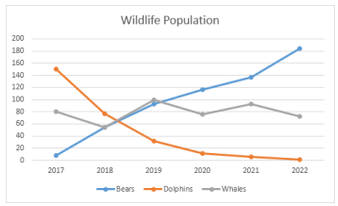
Bar Graph



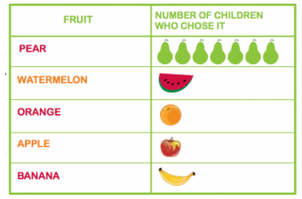
Stacked Bar Graph



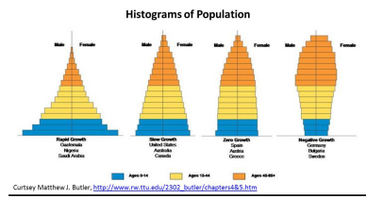
Pie Graph



Line Graph

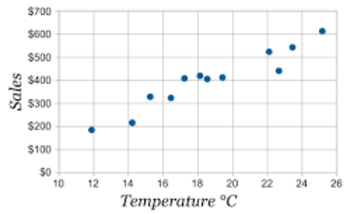


Pictogram

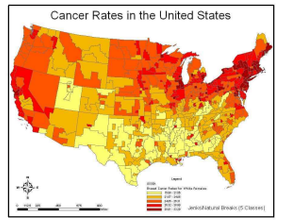


Histogram

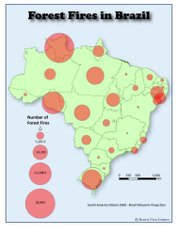
4. Presenting the data: Graphs



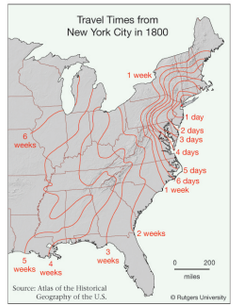
Scatter Graph



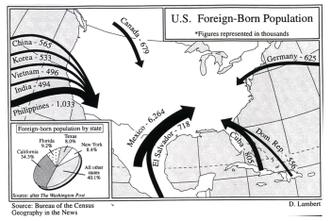
Choropleth Map



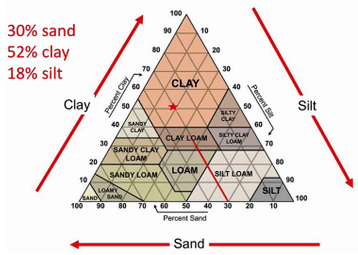
Proportional Symbol Map



Isoline Map

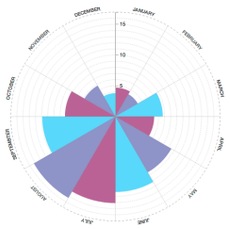


Flow Line Map



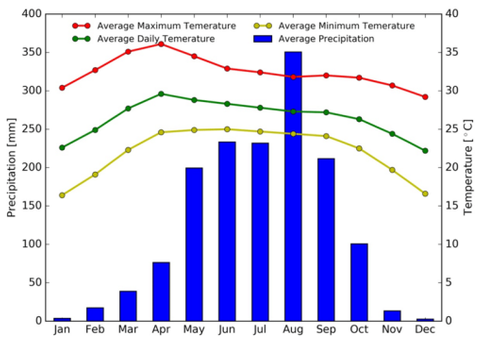
Triangular Graph

4. Presenting the data: Graphs



Radial Graph

Climate Graph



Wind Rose Graph