

Resource Reliance Revision

Name:

Will we run out of natural resources?		R	A	G
How has increasing demand for resources affected our planet?	Outline the factors leading to demand outstripping supply of food, energy and water.			
	Overview of how environments and ecosystems are used and modified by humans including: <ul style="list-style-type: none"> • Mechanisation of farming and commercial fishing to provide food. • Deforestation and mining to provide energy • Reservoirs and water transfer schemes to provide water. 			
Can we feed nine billion people by 2050?				
What does it mean to be food secure?	Understand the term 'food security' and the human and physical factors which influence this.			
	How world patterns of access to food are illustrated, such as the world hunger index and average daily calorie consumption.			
	Investigate the differences between Malthusian and Boserupian theories about the relationship between population and food supply.			
How can countries ensure their food security?	Case study of attempts to achieve food security in one country to include: <ul style="list-style-type: none"> • Investigation of statistics relating to food consumption and availability over time. • The success of one attempt in helping achieve food security at a local scale such as food banks, urban gardens and allotments. • The effectiveness of one past and one present attempt to achieve food security at a national scale such as global food trade, GM crops, 'The Green Revolution' and food production methods. 			
How sustainable are these strategies?	Explore the environmental, economic and social sustainability of attempts to achieve food security, in relation to: <ul style="list-style-type: none"> • Ethical consumerism, such as fairly traded foods and food waste. • Food production, such as organic methods and intensive farming. • Technological developments, such as GM crops and hydroponics. • Small scale 'bottom up' approaches, such as urban gardens and permaculture. 			

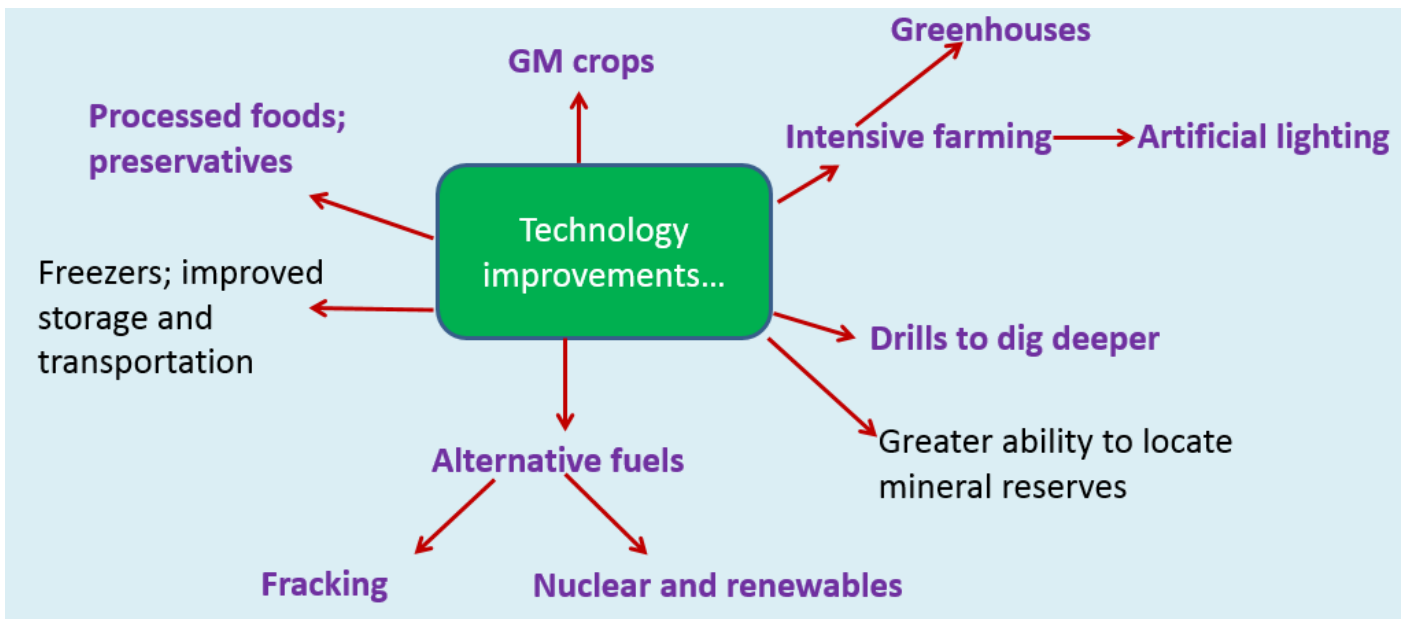
How has increasing demand for resources affected our planet?	Outline the factors leading to demand outstripping supply of food, energy and water.
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A resource is a stock or supply of something that has a purpose. The 3 most important to human development are food, water and energy.

Technology has meant we can grow more, transport more, dig deeper and reach even more remote places than ever before.

Earth has a carrying capacity – a maximum number of species that can be supported.

Whilst this along with our ability to access resources has increased, this growth has been offset by increases in population and people's appetites.



Several factors can prevent or hold back a country from trying to increase their access to energy, food and water supplies.

Climate – low rainfall will limit water supplies and restrict amounts of food that can be grown / reared.

Conflict – war can disrupt transport of resources.

Poverty – some countries simply cannot afford the technology needed e.g. Ghana required investment from Irish company to get oil.

Natural hazards – can damage farm land and destroy infrastructure.

Why has our demand for resources changed over time?

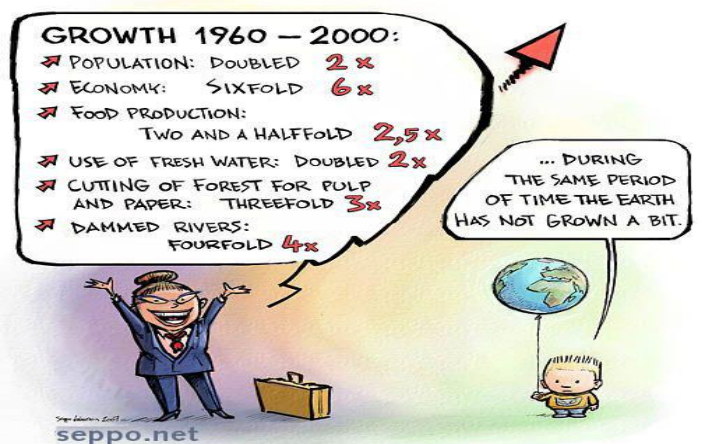
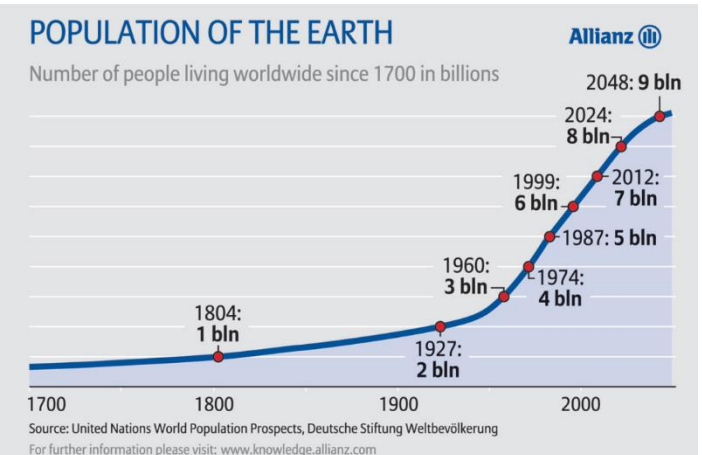
1. Increasing global population

Clearly more people means more demand for resources of food, water, energy, shelter, space, jobs and so on.

Until the 1800s world population was below 1 billion. Then a gradual increase began, reaching 2 billion in 1927. In the twentieth century, the population explosion set in, it took just 84 years to reach 7 billion. We have an average growth now of a billion people every 12 years.

2. Increasing consumption (what people eat / use)

As people become more wealthy, they want more. More varied food, bigger housing, more luxuries and more travelling. All of these rely on resources. Whilst population increase puts pressure on resources, it is our rapid consumption that causes the biggest problems.



3. Changing technology and employment

As countries advance e.g. the Industrial Revolution, people earn more money through using machinery and new resources, and so can afford better food and live longer. As populations grow we take up more space on the planet. This is good as it increases access to resources, but also bad as it needs more construction and / or transportation. Today, most people work in jobs that use new technology, such as electronics, gadgets, phones or robotics. This increases the demand for new resources and the energy needed to charge and use them. there are more mobile devices in the world than people which again causes increased use of finite materials.

PRIMARY ACTIVITIES = Working natural resources e.g. agriculture, fishing, forestry, mining.



SECONDARY ACTIVITIES = Making things, either by manufacturing (e.g. a TV or a car) or construction (e.g. a house, road, new airport).



Economic Sectors



QUATERNARY ACTIVITIES = Concerned with information and communications technology (ICT) and research and development (including universities).



TERTIARY ACTIVITIES = Providing services. These include commercial (e.g. shops and banks), professional (e.g. solicitors and dentists), social (e.g. schools and hospitals), entertainment (e.g. restaurants and cinemas), and personal (e.g. hairdressers and personal trainers).

Resource	Factors affecting demand / supply
Food	<p>Population growth, particularly in LIDCs – more people need more food</p> <p>Climate change – food supply has been impacted by unreliable rainfall, floods and droughts</p> <p>Land degradation – over cultivation, over grazing, soil erosion and desertification have reduced the land's capacity to grow food</p> <p>Changing food demands – demand for greater variety in produce has resulted in more commercial farming in LIDCs at the expense of growing staple foods, increased demand for meat in richer countries has resulted in crops being grown for animals rather than people</p> <p>Trade – trade tends to favour the rich, leaving poor countries having to import basic foods</p> <p>Pests and diseases – 16% of the world's crops are lost to disease each year, pests thrive in wet, warm conditions and threaten new areas as the climate changes</p>
Water	<p>Population – population growth and changing lifestyles have dramatically increased the demand for water</p> <p>Industry – as countries become more developed, the demand for water in industry (for example, food processing) increases, industry currently uses about 20% of the world's freshwater</p> <p>Agriculture – uses 70% of the world's freshwater, demand for irrigation has increased, particularly in response to climate change</p>
Energy	<p>Use of fossil fuels – particularly coal, oil and natural gas is increasing, especially in developing countries, these fossil fuels have a limited life and will begin to run out</p> <p>Improved lifestyles, industrial growth and the development of transport have led to a massive increase in energy demand, recent industrialisation in India and China has increased energy demand significantly</p> <p>Development of renewable resources has increased energy supply in certain regions</p> <p>Waste – over 25% of energy is wasted each year or lost in production / transport, energy conservation is essential to preserve supply, but is limited in its adoption</p>

<p>How has increasing demand for resources affected our planet?</p>	<p>Overview of how environments and ecosystems are used and modified by humans including:</p> <ul style="list-style-type: none"> • Mechanisation of farming and commercial. fishing to provide food. • Deforestation and mining to provide energy • Reservoirs and water transfer schemes to provide water.
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In order to satisfy the increasing demand for resources, people have modified natural environments to increase production.

Mechanisation of farming:

Over time, farming has moved from people doing the work by hand or using animals e.g. horses to pull ploughs, to the use of machinery.

This mechanisation has led to large-scale commercial farming and the use of tractors, combine harvesters, mechanical ploughs and even aircraft and satellite technology.

Subsistence – only producing enough goods to meet your own basic needs, with no extra to trade.

Mechanisation – the process whereby machinery is introduced to complete work normally done by hand e.g. washing machines, tractors.

Commercial – producing goods for sale

Farms have increased in size. This has led to the destruction of hedgerows, which affects the animals which live there and the food webs they are a part of (a decline in biodiversity).

The increase in use of chemical fertilisers and pesticides is expensive and can also pollute water leading to algae growth and starving creatures in the water of oxygen.

People want foods all year round regardless of the time of year. As a result, fields are not given enough time to recover and the soils become useless.



Deforestation

In many parts of the world, forests have been cleared to make the land available for other uses. Trees can be cleared for: mining – for the creation of new roads or for energy e.g. hydroelectric power (HEP), for cows or for plantations where palm oil, sugar or wheat can be grown.

Habitat – environment of plants and animals.

Global warming – atmosphere temperature rises due to more greenhouse gases.

Commercial – producing goods for sale.

Trees store carbon dioxide so cutting them down means more carbon in the air which can lead to more global warming.

Cutting down trees can also lead to more water hitting the soil and taking out nutrients, flooding and landslides.

Habitats of animals and plants are also destroyed.



Commercial fishing

Commercial fishing methods include trawling and dredging. Over 1 billion people relying on fish for their primary food source. Technology has allowed for bigger nets and cages to be used and boats can be fitted with thermal sensors and digital imagery helping workers to identify where fish stocks are located. Fish farms (aquaculture) are also used to breed fish and shellfish in contained spaces.

Over fishing as fish are caught quicker than they can reproduce. Other species killed (e.g. dolphins caught by mistake in large nets). Coral reefs may be damaged by nets being dragged. Fishing boats have to travel further to get a decent catch meaning they use more fuel resulting in water pollution.



Mining

Large areas of vegetation are stripped away to obtain resources near the surface. Fracking involves pumping liquid under high pressure into shale rock causing it to crack and release gas. Mine waste can pollute soil, groundwater, drinking water and the air. Mercury and lead are particularly poisonous. Habitats destroyed. Huge amounts of water used in the processes. Burning of fossil fuels creates greenhouse gases.

Waste management and transfer

Reservoirs are large stores of water behind dams. Reservoirs flood large amounts of land and reduce species diversity. Water transfer uses canals, pipes and rivers to move water from areas where there is a surplus e.g. North West UK to areas where there is a shortage (deficit) e.g. South East. This may put pressure on areas where water comes from during drier spells, pipes and channel construction can damage ecosystems.

What does it mean to be food secure?	Understand the term 'food security' and the human and physical factors which influence this. How world patterns of access to food are illustrated, such as the world hunger index and average daily calorie consumption.
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Food security – when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and preferences for an active and healthy life.

Food insecurity – when people of a certain area do not have access to enough food, or the supply of food goes up and down on a seasonal or annual basis.

It is estimated that some 800 million people do not enjoy food security. Most of these people live in Africa, the Middle East and parts of Asia. While most of the world's richer countries enjoy food security, there are some individuals in these countries who do not.

Several physical and human factors affect food security, many of these are interconnected and affect mostly African LIDCs.

Physical factors affecting food security:

Factor	Effects of food supply
Climate	Drought – results in severe food shortages and migration, can lead to desertification and salinization. Floods – serious flooding results from tropical storms, which can devastate crops. Climate change – patterns of rainfall appear to be changing. Some areas may become more productive whereas others may suffer from more frequent droughts and floods.
Pests and diseases	Many tropical regions suffer from pests and diseases that affect both animals and plants. In poor societies, people may also suffer from disease, reducing their capacity to be productive.
Water stress	Water stress is a serious issue in many LIDCs, particularly in Africa where climate change is expected to make the situation worse. The lack of water security and drought reduces food production. LIDCs cannot afford expensive water transfer schemes.

Human factors affecting food security:

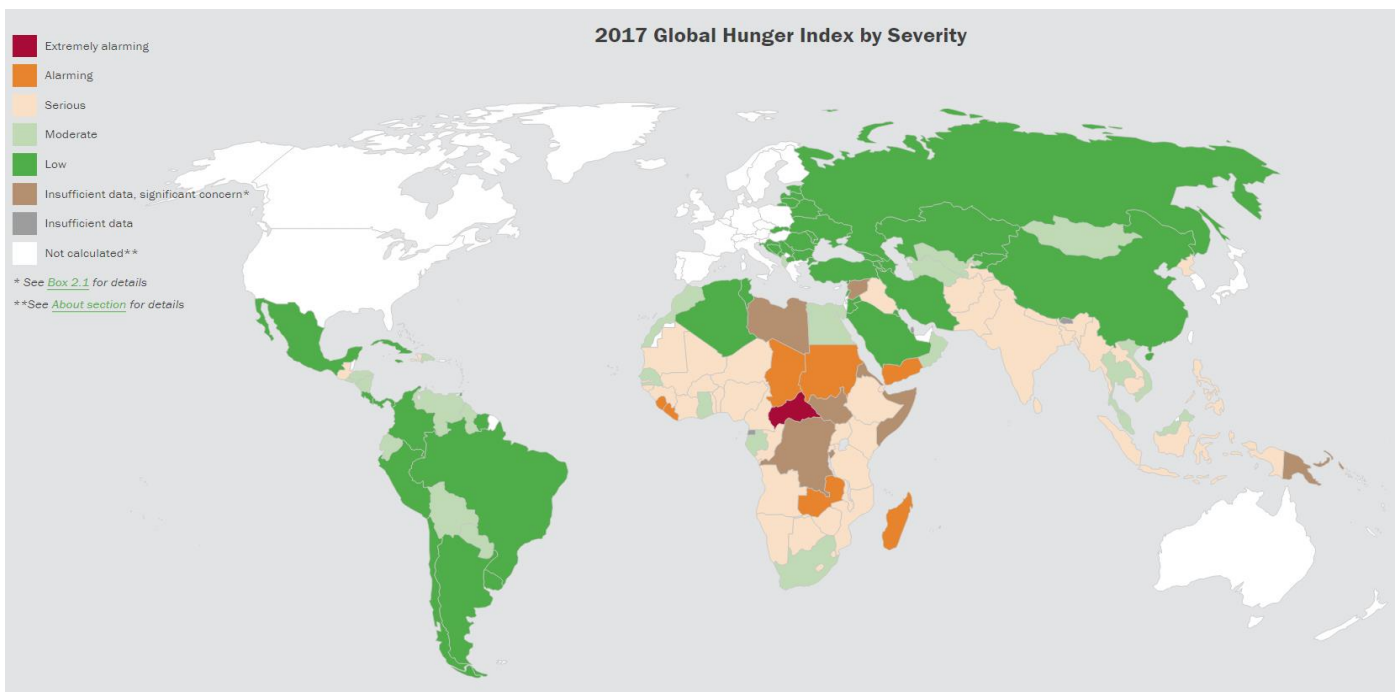
Factor	Effects of food supply
Population growth	Global population has increased since 1950 and is likely to reach 9 billion by 2050. Much of this growth will occur in the world's poorest countries in Africa, which already suffer from food insecurity.
Technology	Lack of technology can affect food supply and distribution in LIDCs. This includes the lack of farm machinery (low yields), poor storage facilities and lack of transport infrastructure (to distribute food).
Food consumption	Average calorie consumption is expected to rise, and dietary changes – particularly the increase in meat consumption – could lead to shortages of staple foods.
Trade	Some countries depend on food imports to achieve food security, which makes them vulnerable to fluctuations in global food prices.

Conflict	Distribution of food is disrupted by war, often being stockpiled by armies. People are forced to move away and land is abandoned. Mined farmland. Restricted food aid in areas of military conflict. Polluted water supplies.
Poverty	Many farmers in LIDCs cannot afford the high-quality seeds, fertiliser or mechanisation required to produce more food.

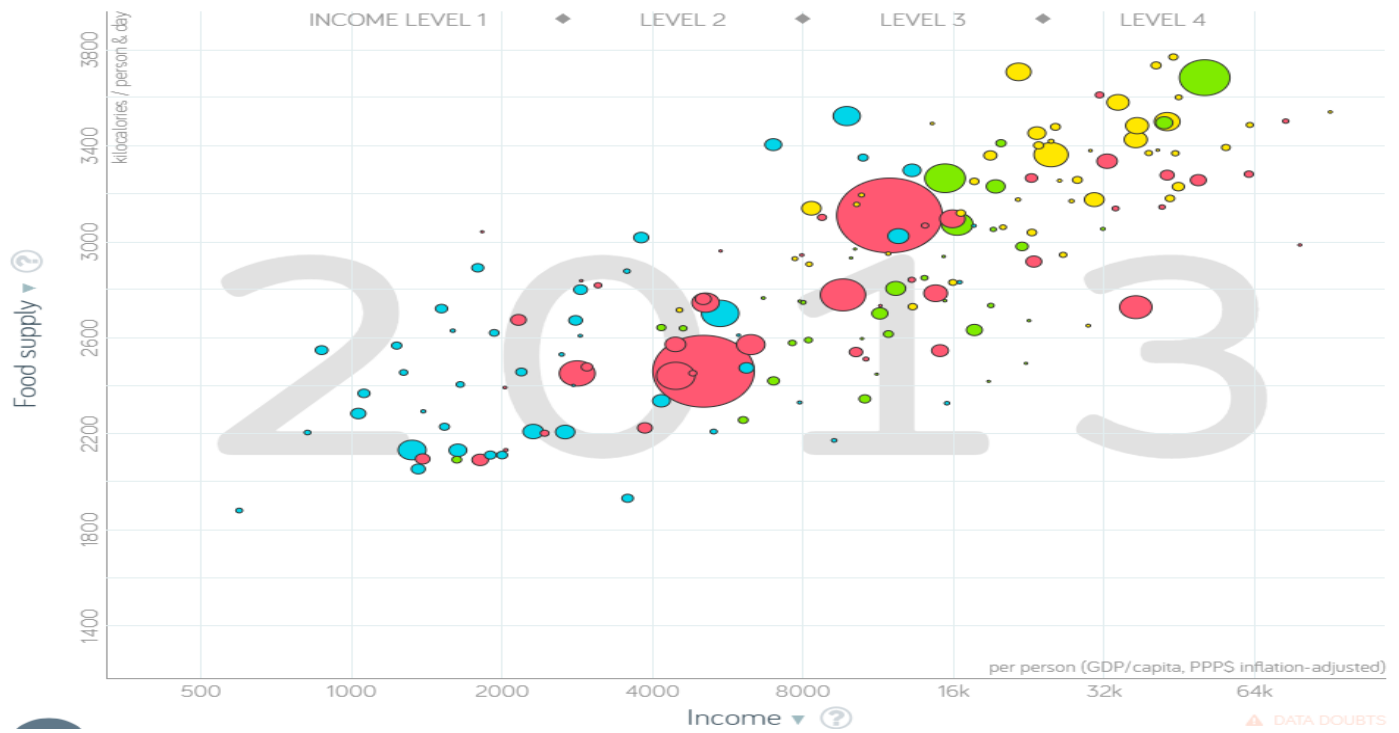
The World Hunger Index (WHI) uses a range of indicators to examine hidden hunger:

1. Undernourishment
2. Proportion of underweight children
3. Rate of child mortality

Each country is given a score of zero (no hunger) to 100. Higher scores are not good. This gives a better average and evens out bias e.g. a country may show a positive for one indicator, but score poorly in another.



Much of Africa is classes as 'serious' as is the Asian sub-continent and many islands across SE Asia. The severity of hunger is low across most of South America and central and northern Asia.



The graph is showing a positive correlation meaning the wealthier a place is the more it can afford technology to grow food and / or import food for its people. The continent which is most food secure is Europe and the least food secure is Africa.

Outline the factors leading to demand outstripping the supply of water. [4]

Suggest how the mechanisation of farming and commercial fishing to provide food can have harmful impacts on ecosystems. [6]

Examine the impact on the environment of deforestation and mining to provide energy. [6]

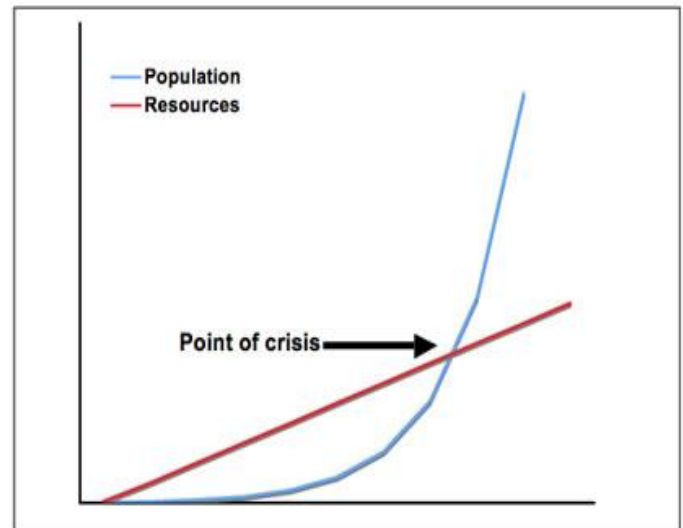
Suggest how the mechanisation of farming and commercial fishing led to p	Investigate the differences between Malthusian and Boserupian theories about the relationship between population and food supply.
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Two people who considered the relationship between population growth and food supply were the Reverend Thomas Malthus and a Danish economist called Ester Boserup. Their opposing theories have led to considerable discussion and debate.

Malthusian Theory:

In 1798, Malthus predicted that food supply would not be able to keep pace with the rapidly growing world population. He suggested that subsequent food shortages would result in global catastrophes, such as devastating famines and wars. He referred to historical famines in countries like China as evidence for his somewhat 'doom and gloom' theory.

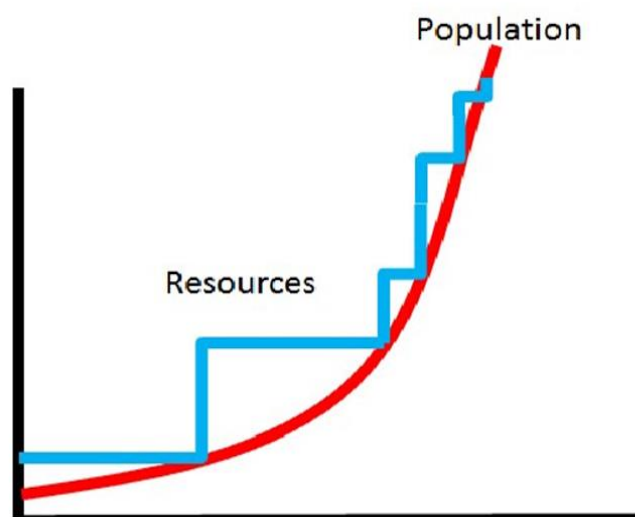
Critics of his theory suggest that he had not taken account of technological improvements in agriculture leading to increased land productivity, neither had he considered that contraception and a reduction in child mortality would reduce the rate of population growth.



Boserupian Theory:

Boserup suggested a more positive relationship between food supply and population growth in the 1960s. She argued that people would respond to future resource depletion by making technological advances that would lead to an increased food supply. She also argued that people can respond to shortages by reducing food consumption.

Globally we currently produce enough food to feed the world's population, but it is unevenly distributed. This explains the global variations in hunger and calorie intake. Population increase is important, but it is one of several factors responsible for food shortages. For example, the serious famine in China that killed 30 million people resulted from a combination of drought, poor weather affecting harvests and Communist Party policies prohibiting farm ownership.



Evidence for the Malthusian and Boserupian theories:

Malthusian Theory	Boserupian Theory
The UN thinks almost half of the world's population will not have enough water supplies by 2050.	The Green Revolution in the 1950s – 1960s led to seeds being created that could produce lots more food (wheat, rice).
800 million people are currently malnourished (not enough food) according to the UN.	Putting 'steps' onto steep slopes and reclaiming land from the sea has meant there is more land now to farm on.
Populations grow rapidly in LIDCs (poorer countries) and these usually struggle to produce enough good in the first place.	The introduction of Genetically Modified (GM) crops – crops that can survive in extreme weather or avoid pest attacks.
	Pesticides, fertilisers, irrigation and mechanisation have all increased food production.

What is meant by 'food security'? [2]

Describe the physical factors that contribute to food insecurity. [4]

Describe the world pattern of food access as illustrated by the World Hunger Index. [4]

Discuss the validity of Malthus and Boserup's theories that considered the relationship between population and food supply. [6]

<p>How can countries ensure their food security?</p>	<p>Case study of attempts to achieve food security in one country to include:</p> <ul style="list-style-type: none"> • Investigation of statistics relating to food consumption and availability over time. • The success of one attempt in helping achieve food security at a local scale such as food banks, urban gardens and allotments. • The effectiveness of one past and one present attempt to achieve food security at a national scale such as global food trade, GM crops, 'The Green Revolution' and food production methods.
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The UK has a population of about 64 million people and it enjoys a high level of food security. Most people have access to sufficient, safe and nutritious food that allows them to maintain a healthy and active life.

Since WWII the number of calories consumed in the UK per person has declined to around 2100 – 2400 calories. People eat fewer calories today than they did 70 years ago because food prices rise, there is more awareness about good nutrition and people were more active in the past, particularly in their jobs. Food availability has increased since WWII (when we had rationing and imports were disrupted by German attacks). UK imports around half of the food we need (30% comes from the EU).

Each year 1.3 billion tons of food, about a third of all that is produced, is wasted. This includes about 45% of all fruit and vegetables, 35% of fish and seafood, 30% of cereals, 20% of dairy products and 20% of meat.

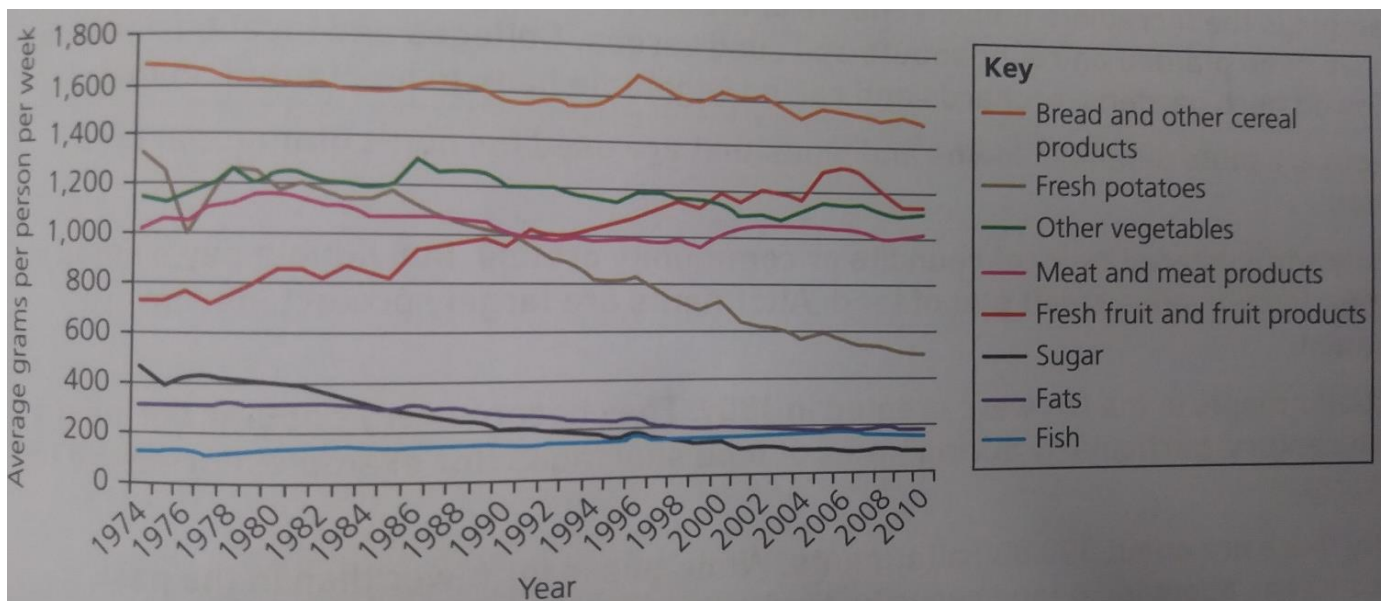
Recent trends in food consumption:

Calorie intake has actually decreased by about 20% since the 1980s. despite this decrease, the average weight of the population has increased. Levels of obesity in the UK have also risen. Much of this is linked to our increasingly sedentary lifestyle – we sit for most of our activities, including working and socialising – and lack of exercise.

The graph below shows some recent trends in food consumption. The main trends include:

- An increase in consumption of fresh fruit and fruit products, reflecting the expansion of supermarkets and increased imports enabling fruit to be available throughout the year.
- A reduction in potatoes, due to the availability of a wider range of vegetables, the availability of processed potatoes (chips) and alternatives such as rice and pasta.

- A reduction in sugar, in response to health concerns and dietary changes.



The UK exported £18.9 billion worth of food and drink in 2013, £6 billion more than in 2005.

Imports of food and drink were much higher than exports, at £40.2 billion in 2013.

In 2012, 53% of the UK's food consumption was produced in the UK. The leading foreign suppliers to the UK were European countries, mainly the Netherlands (5.8%), Spain (5.3%), France (3.5%), Germany (3.3%) and Ireland (3%).

Strategies for achieving food security at a local scale:

Strategy	How food security can be achieved
Food banks	<p>Food banks are stores of food that can be accessed by people in need.</p> <p>Held in central locations, food banks are supported by food donated by the public and organisations such as schools, churches and local businesses.</p> <p>Doctors, health visitors and social workers provide vouchers to people in need, entitling them for three days' worth of food.</p> <p>An estimated 1 million people are dependent on over 400 food banks in the UK.</p> <p>Despite low rates of unemployment, many people do not earn enough money to support themselves and their families.</p> <p>Case study:</p> <p>Newcastle is a city in NE England, where 8% of people have used a food bank. The Trussell Trust has a network of 424 foodbanks that help communities across the UK and has 4 food banks in Newcastle alone. Together, these provided over 50,000 three day nutritionally balanced food parcels in 2015, almost 90% of these being from the West End Foodbank suggesting that this part of the city is most deprived. These food parcels have helped reduce food insecurity by reducing hunger and improving diets; reducing shop food waste – much that would have been thrown away is now donated and by providing advice on how to buy food on a budget and cook it. However, the main issues are that food banks cannot solve the underlying problems that lead people to need to use them. such problems include job losses,</p>

	domestic abuse, the roll out of the government's Universal Credit system and benefit delays.
Urban gardens	Urban gardens are productive plots of land in towns and cities that are used by individuals or community groups to grow food (vegetables, fruit, herbs and so on). Some schemes make use of ground that was previously wasteland. Community run gardens engage local people and help to encourage healthy eating. One example is the Incredible Edible scheme in the West Yorkshire town of Todmorden. Crops have been planted on roundabouts and road verges. Colleges and local businesses have allowed herb gardens, orchards and raised vegetable beds to be planted on their land.
Allotments	Allotments are plots of land in towns and cities that are used for non-commercial crop production. Commonly administered by local councils or community groups, individuals pay a small annual rent to cultivate a small plot of land. Allotments are largely protected from development. The first allotments in the UK were created in 1809. They became very popular during the 20 th Century, particularly during times of food shortages (for example, during the two World Wars). Currently there are about 300,000 allotments. While this is far fewer than in the past recent concerns about local food security, food miles and global warming have led to a surge in popularity, particularly among younger people.

Achieving food security at a national scale:

Past attempt – intensification 1940s – 1980s.

Increase food security by increasing production. This was done through monoculture – just one crop being grown over a large area, irrigation (watering) crops through electric sprinklers, chemicals such as fertilisers and pesticides, mechanisation (the use of machinery) and higher yielding crops and animals developed.

Advantages of intensification include increased UK food security e.g. in 1940 we imported 70% of cereal crops but by 1980 this had fallen to 20%.

Disadvantages of intensification include monoculture crops can be wiped out by a single pest, drought or disease, environmental damage results in the reduction of biodiversity and chemical pollute soil and waterways and the over use of land led to soil erosion and fertility loss.

Present attempt – hydroponics.

Hydroponics is a method of growing plants without soil. Instead, plants are grown in water containing nutrients. A material base supports their root system. The plants produced usually grow fast and are healthy because conditions are carefully controlled. Examples include Grown Underground (tunnels below Clapham, London) and Thanet Earth, Kent.

Advantages of hydroponics include hydroponic units can be built in places where crops would normally never grow e.g. old factories and warehouses, or even underground. A hydroponic unit on a window sill can provide a continuous supply of fresh salad for a

family. There is no soil to carry diseases. Pests can be controlled within the unit – often by natural predators like ladybirds so reducing needs for insecticides. Plants can be grown closer together or even in vertical layers, saving space. It creates jobs – Thanet Earth there are up to 700 jobs and it provides 10% of UK's salad greens.

Disadvantages of hydroponics include a high tech hydroponic unit can be expensive to set up and to run. They can require a large amount of energy to power greenhouses though the use of LEDs does offset this. Emissions from transporting products across the country.

Explain the benefits of the increasing use of locally produced food. [4]

Evaluate the success of **one** attempt to increase food security at the local scale. [6]

With reference to **one past** attempt, discuss the effectiveness in increasing food security at the national scale. [6]

Pressure on the UK's food security are here to stay. Discuss to what extent you agree with this statement. [6]

How sustainable are these strategies?	<p>Explore the environmental, economic and social sustainability of attempts to achieve food security, in relation to:</p> <ul style="list-style-type: none"> • Ethical consumerism, such as fairly traded foods and food waste. • Food production, such as organic methods and intensive farming. • Technological developments, such as GM crops and hydroponics. • Small scale 'bottom up' approaches, such as urban gardens and permaculture.
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Environmental sustainability – involves no long term damage to the environment or any harmful effects on ecosystems.

Economic sustainability – ensures economic and job security, providing sufficient wealth for the community.

Social sustainability – promotes community cohesion and support mechanisms for vulnerable people.

Ethical consumerism:

Buying products produced, and which can be used, in a manner that is not harmful to the environment and society e.g. buying free-range eggs or boycotting (refusing to buy) goods produced by child labour.



Fairtrade is a global movement that began in 1988. Today there are over 1.4 million farmers from over 70 countries whose produce is sold with the Fairtrade label. Fairtrade pays farmers a higher price and supports local community projects.

An important aspect of Fairtrade is the social premium that is paid to local producers, who are often organised into co-operatives (groups of farmers sharing benefits). The social premium funds community improvements, such as water supply and education. This is a good example of social sustainability.

Intensive farming:

Promoted by the UK as a national scheme (past) after WWII. The aim is to produce as much food as possible in as small a space as possible.

Method	Issues
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Machinery – mechanisation	Involves hedgerow removal on fields to make more room for tractors – loss of biodiversity / habitats. Cost of running and maintenance, energy required to run (burning of fossil fuels).
Fertiliser / pesticide / herbicide	Cost of purchase – small farm holders may get into debt and be forced to sell up. Use may harm other animals / plants, can get into waterways and pollute water – eutrophication. Possible harm to human from food consumption.
Factory farms	Animals crammed into small spaces, use of growth hormones, allegations of animal cruelty.
Transporting long distances	Release of greenhouse gases.

Organic farming:

The aim is to use natural processes to return nutrients to the soil so that crops can continue to be grown.

Method	Benefits
Natural fertiliser and pest control (use of insects to kill crop pests)	Less damaging to the environment so preserves biodiversity. Recycling of products e.g. cow manure used as fertiliser. Cheaper than artificial products.
Local sales encouraged	Amount of transportation is limited reducing greenhouse gas emissions.
Crop / animal rotation	The use of fields (including leaving it empty (fallow) is rotated to allow nutrients to recover.

The main problems are that it is not possible to produce the same quantity as non-organic and it is more expensive to the consumer than non-organic.

Permaculture:

Refers to permanent agriculture, or agriculture that we can use for ever. It involves developing agricultural systems that co-operate with nature rather than working against it. An agriculture that respects the plants and animals that are produced. It aims to recreate how nature operates without human interference e.g.

- Ladybirds used to tackle aphids rather than the use of chemicals.
- Diversity – different species of crops grown together – use different nutrients and harvest at different times of the year.
- Stacking – grow species of different heights on same plot of land to maximise space.

Describe the food production technique of hydroponics.

[4]

Explain why bottom up approaches to food security are often sustainable and successful.

[6]

Evaluated the sustainability of ethical consumerism in achieving food security.

[6]