The Challenge of Resource Management

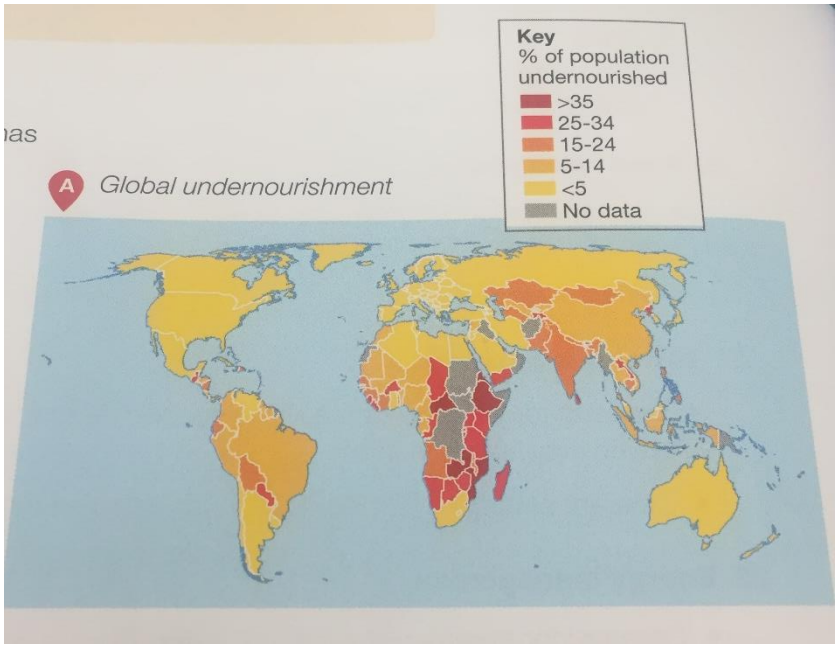
The Global Distribution of Resources

What are resources?

A resource is a stock or supply of something that has a value or a purpose. The 3 most important resources are FOOD, ENERGY AND WATER. **Adequate supplies of these resources are essential for countries to develop.**

The map of Global undernourishment shows:

- UNEVEN DISTRIBUTION across the world.
- Most HICs have plentiful supplies across the world.
- Many poorer countries, e.g. sub Saharan Africa, lack resources and struggle to progress or improve quality of life for their people.



Food

- Your health is affected by how much you eat and the food's nutritional value. The World Health Organisation (WHO) suggests we need 2000-2400 calories per day to be healthy.

- Over 1 billion people in the world fall below this level and are described as **MALNOURISHED.**

- A further 2 billion people suffer from undernutrition (malnutrition)- a poorly balanced diet lacking in minerals and vitamins. This can result in a **range of illnesses and diseases.**

- **It can also lead to economic effects.** People need to be well fed to be productive at work and **contribute to the economic development of their country.**

- **Obesity (being overweight)** is an increasing problem.

Water

Country	Gross National Product (GNP) per head (US$)	Human Development Index (HDI) Ranking	Water per head (m^3)
Canada	22480	1	94000
Australia	20210	7	185000
Saudi Arabia	10120	78	2176
Burkina Faso	1010	171	1535
Niger	850	173	346

- Both quantity and quality of water are important to our wellbeing and for economic development.

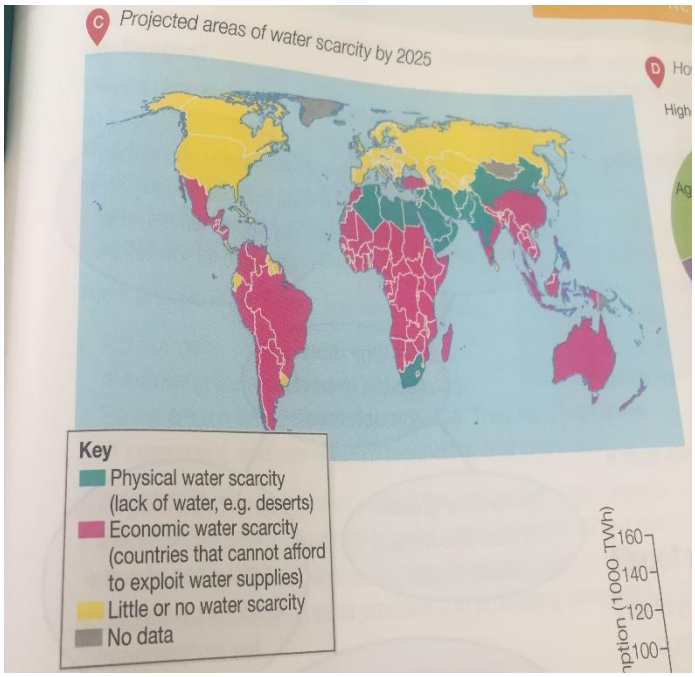
- Water us essential for people, animals, crops and food supply.

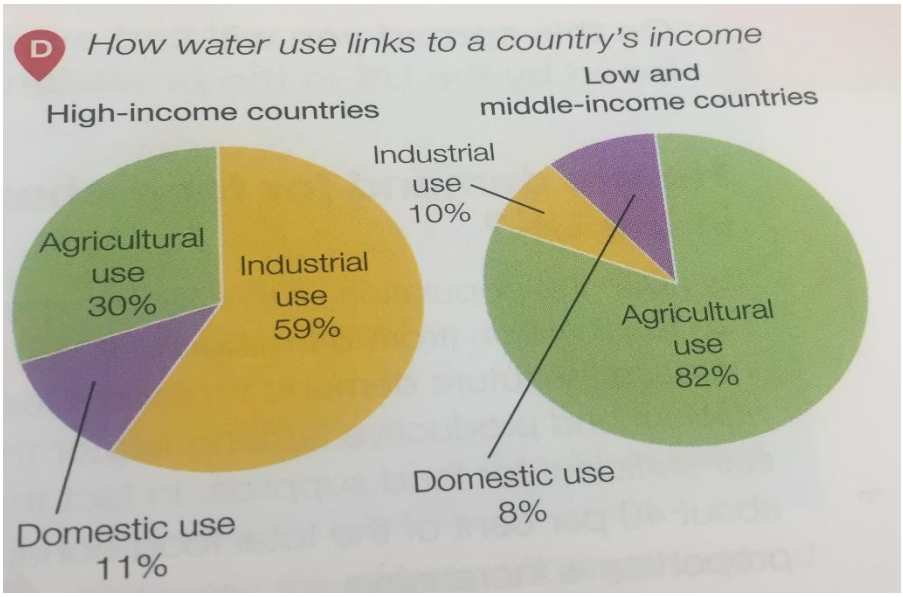
- It is important as a source of power for producing energy.

- There is an **IMBALANCE of water supply**. This is because of **climate and rainfall**.

Many of the world's poorest countries, particular yin Africa, have a shortage of water. They become trapped in a **CYCLE OF POVERTY**. The UN estimates that by 2025 there will be 50 countries facing **water scarcity**.

- The map shows significant differences between low/middle income countries and HICs.

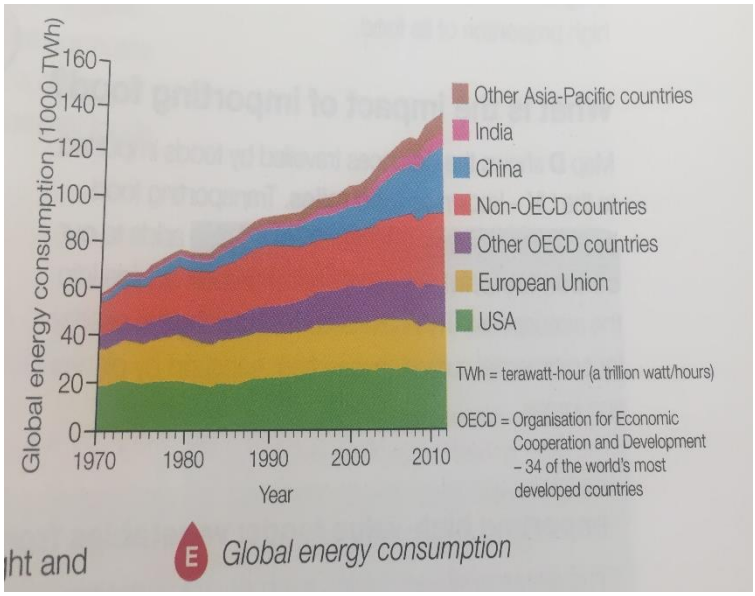




- LICs (e.g. African countries) use a lot more water for agriculture (farming) compared to HICs (e.g UK) where most water is used for industries.

Energy

- Think of energy needed in your home and school for light and heat, and to power things like cookers, TVs and tablets.
- Energy is required for economic development.
- It powers factories and machinery and provided fuel for transport.
- In the past many countries could depend on their own energy resources. It is more complex now, as energy is traded worldwide.



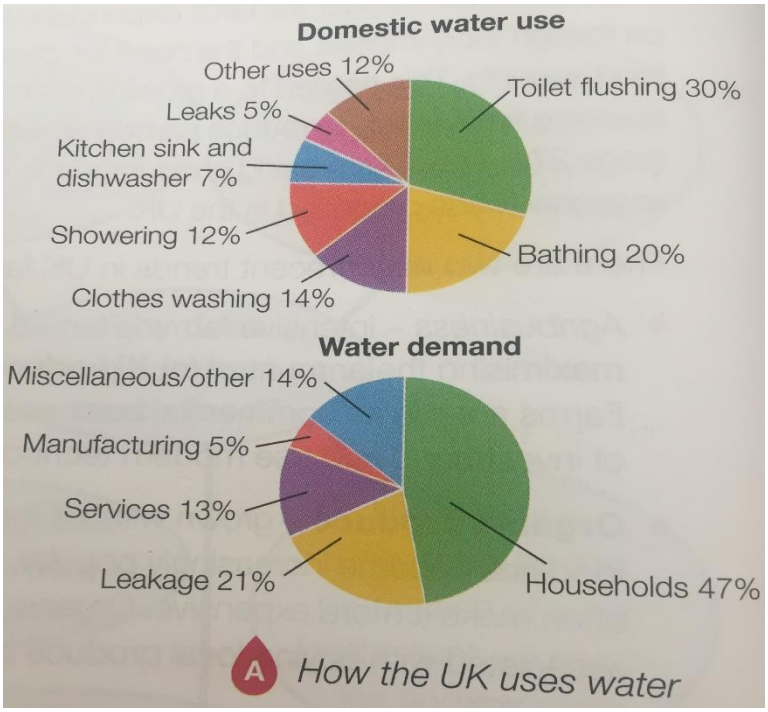
Energy consumption (how it is used) is increasing as the world becomes more developed and demand increases.

- The world's richest countries use far more than poor countries. The **Middle East** supplies much of the **world's oil** yet its own consumption id relatively small.
- As NEEs become more **industrialised,** the demand for energy will increase and patterns of energy trading will change.

The changing demand and provision of resources in the UK create opportunities and challenges:

The provision of water in the UK

Domestic Water Use



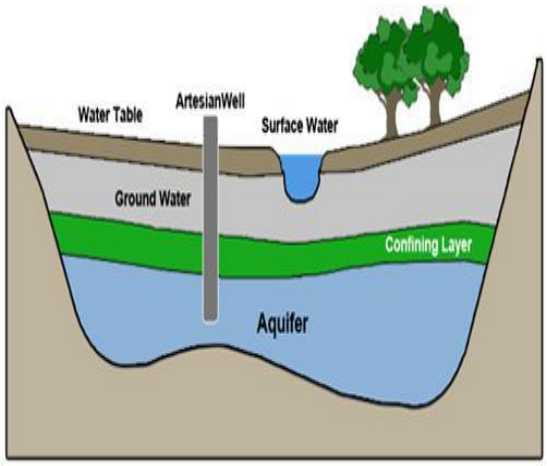
- Almost 50% of the Uk's water supply is used domestically, but 21% is wasted through leakage.

- The Environment Agency estimated that the demand for water in the UK will rise by 5% by 2020 because of:

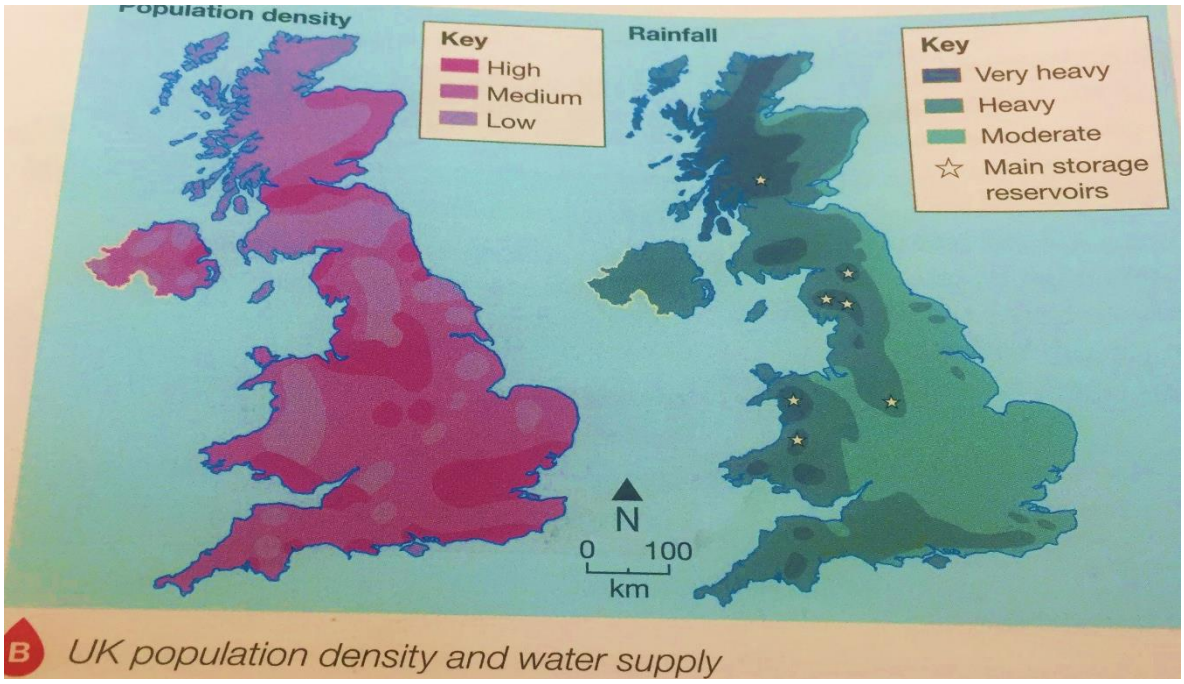
  - Growing population
  - More houses being built
  - An increase in the use of water intensive domestic appliances (e.g dishwashers)

- How far does the UK's water ***supply meet demand.*** The main sources of water in the UK are reservoirs, rivers and groundwater aquifers. The UK currently receives enough rain to supply demand, but rain doesn't always fall where it is most needed

(a reservoir in Wales)



(ground water aquifers)

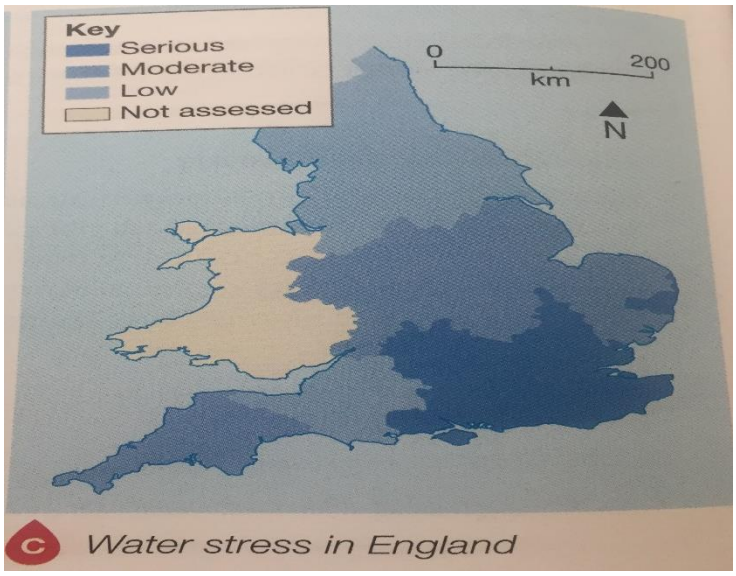


B UK population density and water supply

- The North and the West of the UK has a **water surplus. This is where water exceeds demand.** The higher rainfall, lower evaporation rates and plenty of reservoir sites (they are found in mountainous areas where rainfall is high). These areas have a low population density (not many people live there)

- The South and the East of the country has a **water deficit**. **This is where demand exceeds supply**. (there is not enough water to supply everyone). This is the most densely populated parts of the country and has the lowest annual rainfall (cities such as London are found here

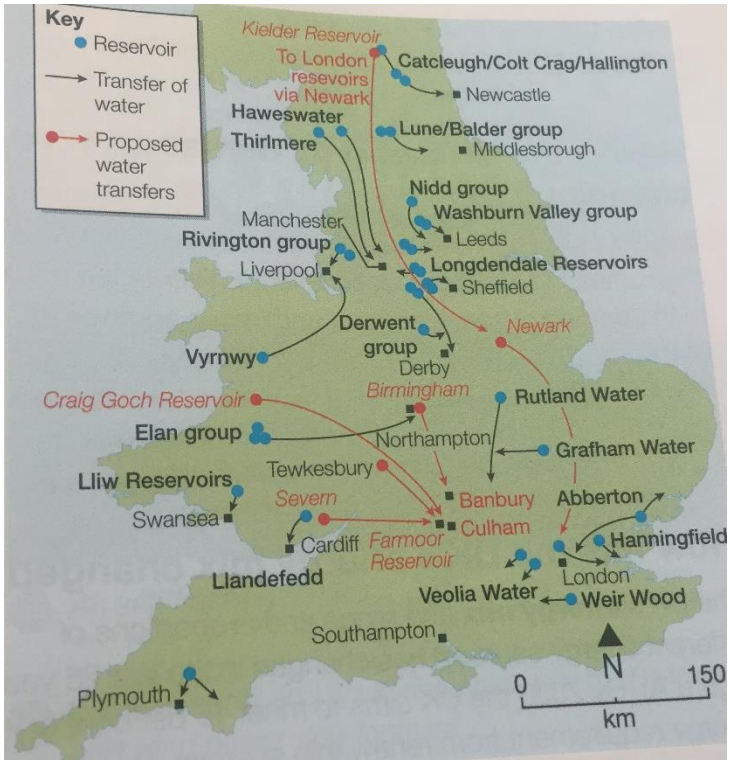
- <u>Water stress (where demand exceeds supply)</u>



- Water stress is experienced in more than half of England.
- The South East of England ranks very low in the world in terms of water availability.
- The situation is made worse in times of drought (e.g. 2010-12)

- Saving water can help manage water supplies. Saving can be made by:
  1) The use of domestic water metres
  2) Increasing the use of recycled water
  3) More efficient domestic appliances.
- Waste water (grey water) from people's homes can be recycled and put to good use. It can be used to irrigate both food and non-food plants. The phosphorus and nitrogen in the water are food sources of nutrients.

<u>Water transfer</u>



- In 2006 the government prosed to establish a water grid to transfer water from **areas of water surplus** to **areas of water deficit**.
- However this was very expensive.
- The only water transferred is via the River Tyne, Derwent, Wear and Tees to as far as South Yorkshire.

Some people disagree with the scheme because of:

The effect on the land and wildlife; the high costs involved; the green houses gases released in the process of pumping water over long distances.

Managing water quality

Water quality is just as important as water quantity. Much has been done to improve the quality of the UK's rivers and water sources. The Environment Agency manages quality by:

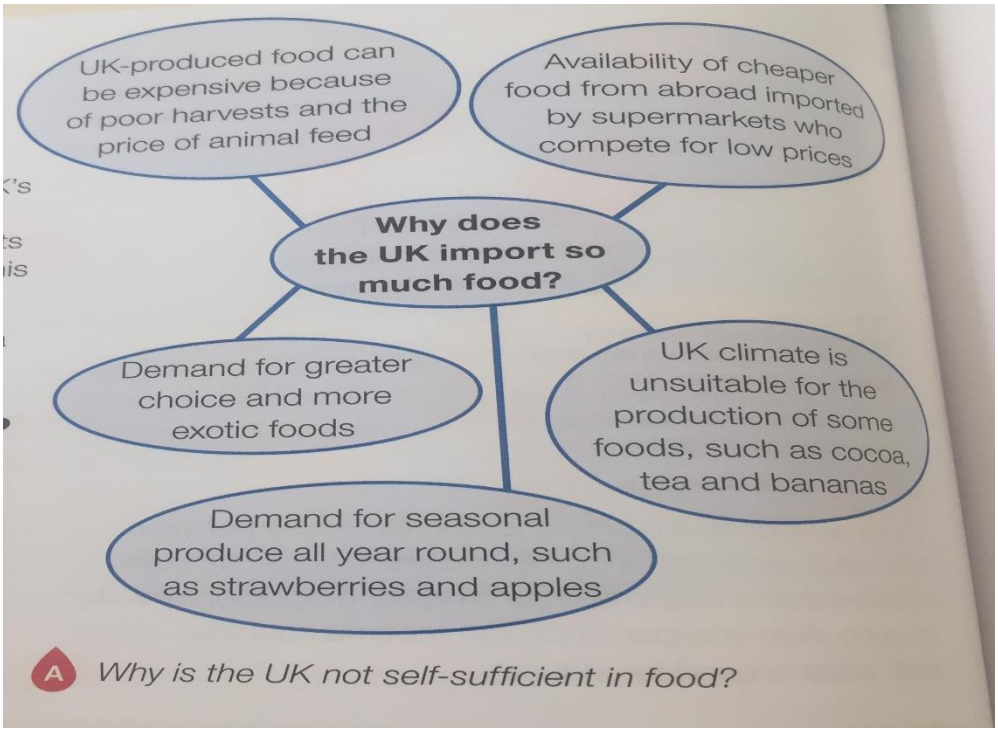
- Monitoring the quality if river water
- Filtering water to remove sediment
- Purifying water by adding chlorine
- Restricting recreational use of water sources
- Imposing strict regulations on the uses of water

But some groundwater sources have deteriorated as a result of pollution. This is because of:

- Leaching from old underground mine workings
- Discharge from industrial sites
- Runoff from chemical fertilisers used on farmland
- Water used for cooling in power stations released back into rivers.

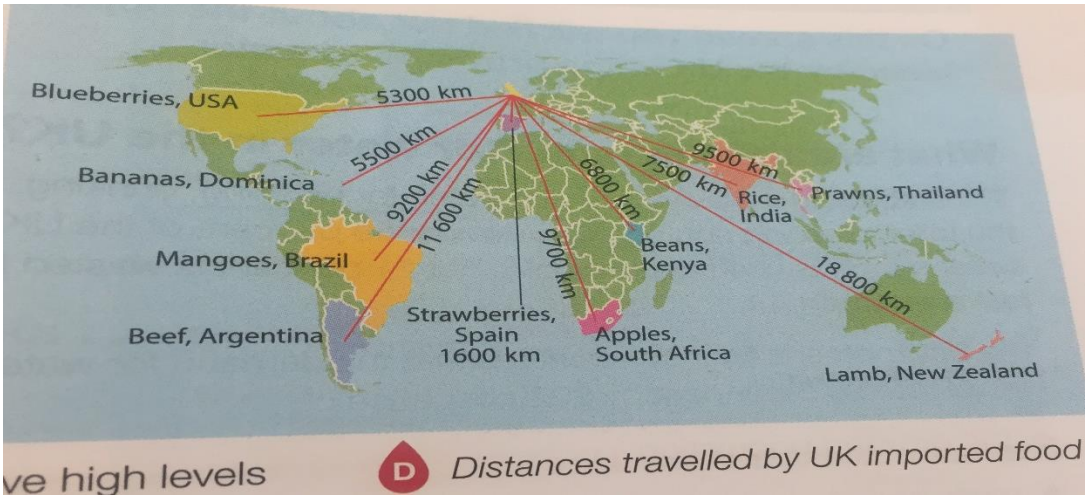
The provision of water in the UK

- By 2037 the UK's population is expected to rise to 73 million.
- This will increase the demand for food. Despite the UK's efficient farming sector it is not SELF SUFFICIENT in food supplies.



A *Why is the UK not self-sufficient in food?*

- **The UK imports 40% of the total food consumed and this is increasing.**



ve high levels D *Distances travelled by UK imported food*

The map above shows distance travelled by foods imported to the UK. This is known as FOOD MILES. Transporting food by air is very expensive. Importing food also adds to our **carbon footprint**- the emission if carbon dioxide into the atmosphere. This comes from producing energy from **commercial cultivation**, and from transport by planes and lorries.

How the UK is responding to the challenges?

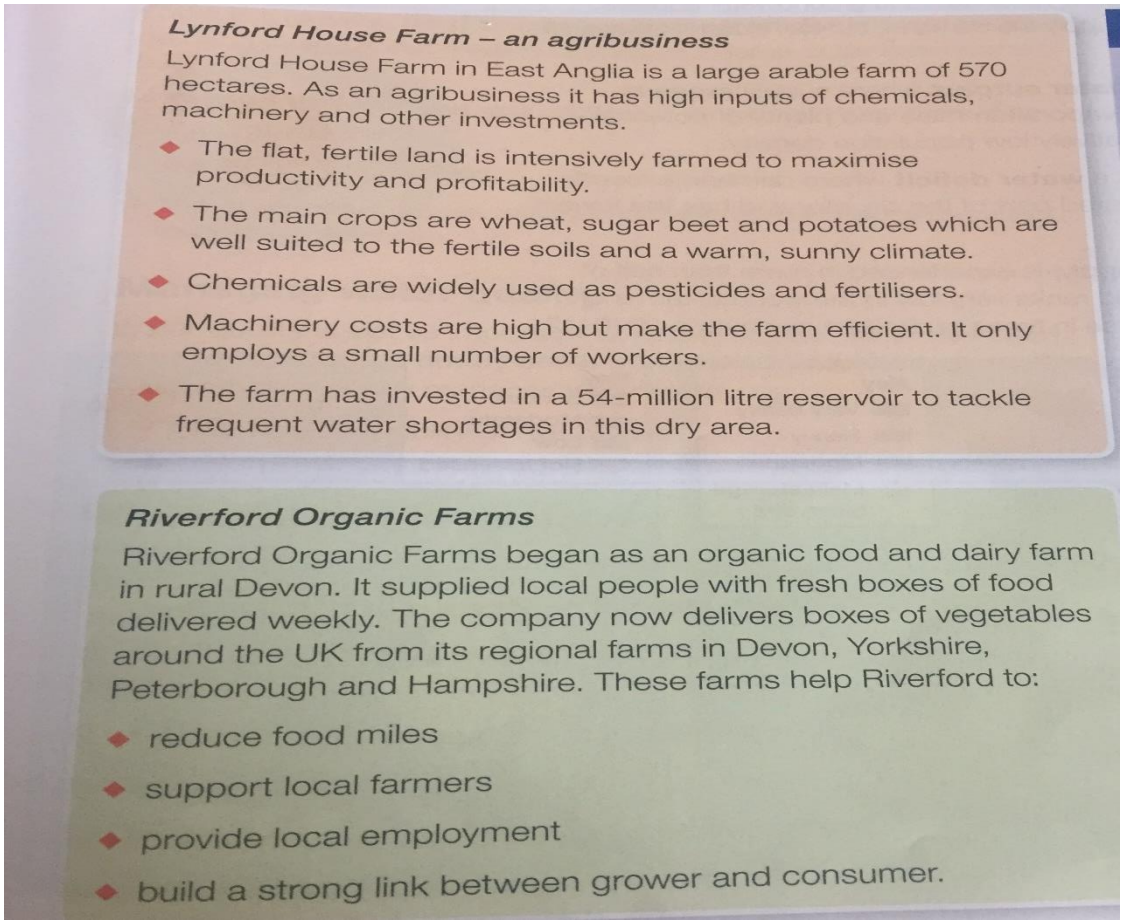
- The UK is trying to source food locally to reduce carbon emissions. People are being encouraged to eat seasonal foods produced in the UK.

- There are 2 main recent trends in farming:

1) Agribusiness
2) Organic produce

Agribusiness – this is intensive farming aimed at maximising the amount of food produced. Farms run as commercial businesses. They have high levels of investment and use modern technology and chemicals.

Organic produce- this is grown without the use of chemicals. Organic food has become very popular, although higher labour costs make it more expensive. Organic food production is often associated with buying local produce and producing seasonal foods.



Lynford House Farm – an agribusiness

Lynford House Farm in East Anglia is a large arable farm of 570 hectares. As an agribusiness it has high inputs of chemicals, machinery and other investments.

- The flat, fertile land is intensively farmed to maximise productivity and profitability.
- The main crops are wheat, sugar beet and potatoes which are well suited to the fertile soils and a warm, sunny climate.
- Chemicals are widely used as pesticides and fertilisers.
- Machinery costs are high but make the farm efficient. It only employs a small number of workers.
- The farm has invested in a 54-million litre reservoir to tackle frequent water shortages in this dry area.

Riverford Organic Farms

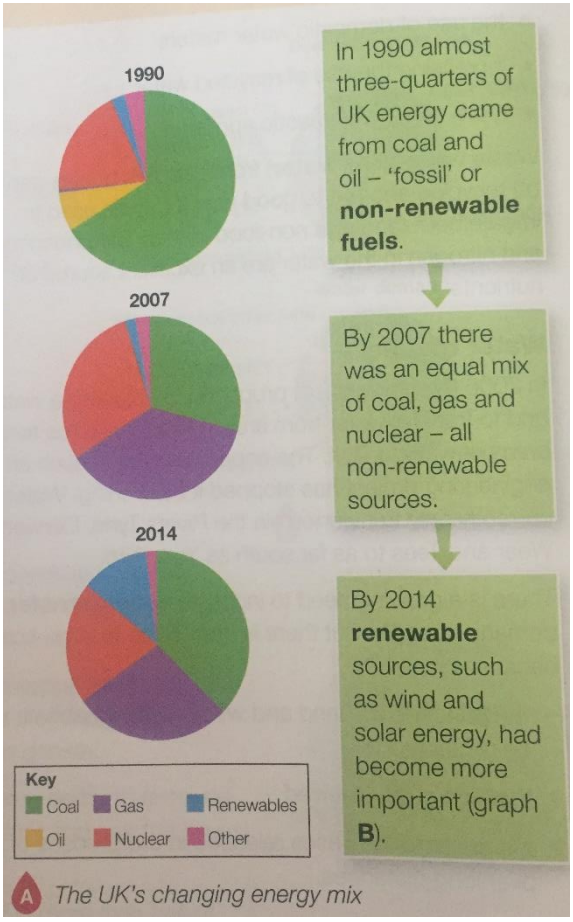
Riverford Organic Farms began as an organic food and dairy farm in rural Devon. It supplied local people with fresh boxes of food delivered weekly. The company now delivers boxes of vegetables around the UK from its regional farms in Devon, Yorkshire, Peterborough and Hampshire. These farms help Riverford to:

- reduce food miles
- support local farmers
- provide local employment
- build a strong link between grower and consumer.

Provision of Energy in the UK

How is the UK's energy demand changing?

- Despite increasing demand for electricity in the UK, energy consumption has fallen in recent years.
- This is due to the decline in heavy industry and improved ENERGY CONSERVATION.
- Low energy appliances, better building insulation and more fuel efficient cars have resulted in a 60% fall in energy use.



A *The UK's changing energy mix*

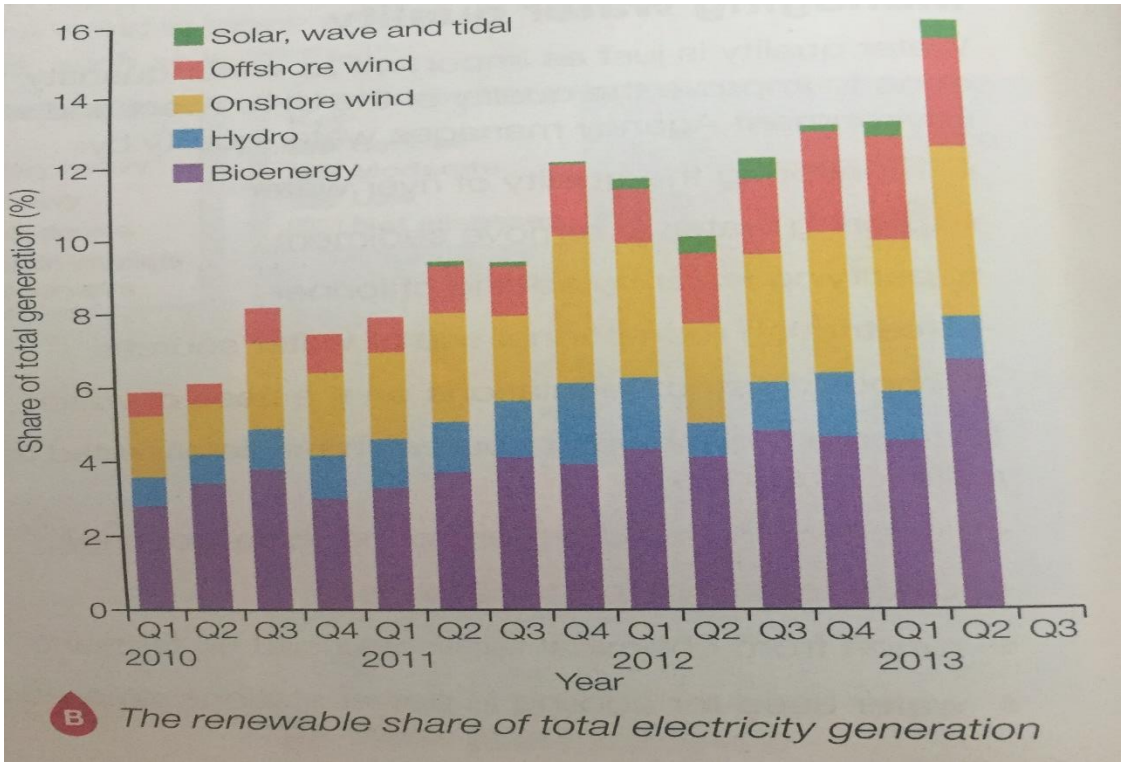
- The UK's **ENERGY MIX** has changed in the last 25 years. By 2020 the UK aims to meet 15% of it's energy requirement from renewable sources.

- However in 3015 the government decided to phase out subsidies (help with money/ financial help) for wind and solar energy development.

- 75% of the UK's oil and natural gas reserves have been exhausted (ran out).

- The UK will probably be importing 75% of energy by 2020. This means the ENERGY SECURITY is affected.

- The major change in the UK energy mix has been the decline of coal. Between 1990 and 2007 there was a steady decline because of concerns about greenhouse gas emissions and ageing coal fired power stations.



B The renewable share of total electricity generation

What is the fracking issue?

- The UK has rich reserves of natural gas trapped deep underground in shale rocks.

- To extract the gas high pressure liquids are introduced to fracture the shale and release the gas. This is called fracking.

- Fracking has become very controversial.

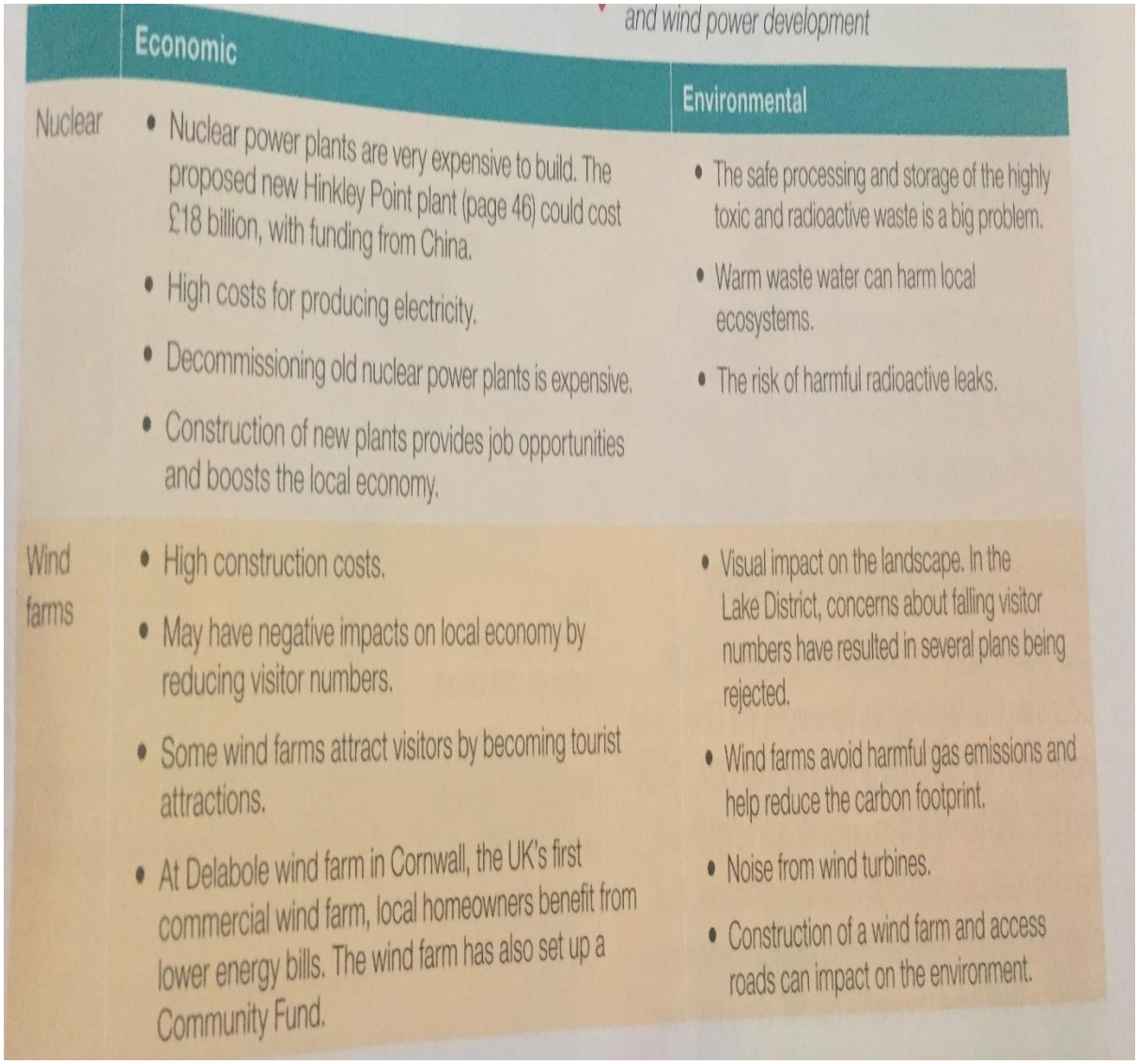
- People are concerned about:
  1)The possibility of earthquakes
  2)The pollution of underground water supplies
  3)The high cost of extraction

C An anti-fracking protest

The impacts of energy exploitation

This is developing and using energy resources to the greatest possible advantage, usually for profit.

There are many economic and environmental impacts of nuclear power and wind farms.



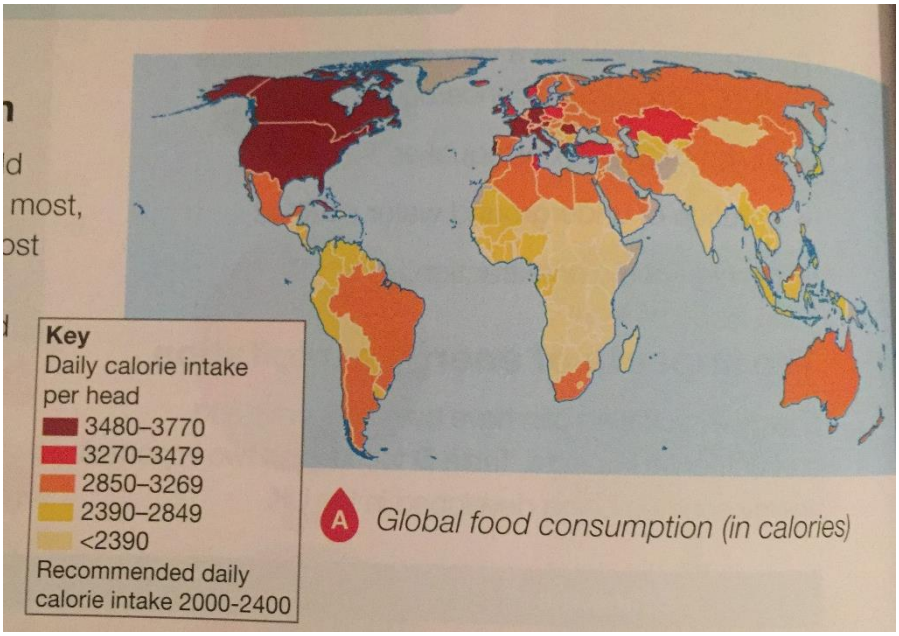
and wind power development

	Economic	Environmental
Nuclear	• Nuclear power plants are very expensive to build. The proposed new Hinkley Point plant (page 46) could cost £18 billion, with funding from China. • High costs for producing electricity. • Decommissioning old nuclear power plants is expensive. • Construction of new plants provides job opportunities and boosts the local economy.	• The safe processing and storage of the highly toxic and radioactive waste is a big problem. • Warm waste water can harm local ecosystems. • The risk of harmful radioactive leaks.
Wind farms	• High construction costs. • May have negative impacts on local economy by reducing visitor numbers. • Some wind farms attract visitors by becoming tourist attractions. • At Delabole wind farm in Cornwall, the UK's first commercial wind farm, local homeowners benefit from lower energy bills. The wind farm has also set up a Community Fund.	• Visual impact on the landscape. In the Lake District, concerns about falling visitor numbers have resulted in several plans being rejected. • Wind farms avoid harmful gas emissions and help reduce the carbon footprint. • Noise from wind turbines. • Construction of a wind farm and access roads can impact on the environment.

Food Management

Global food supply

Global patterns of food consumption

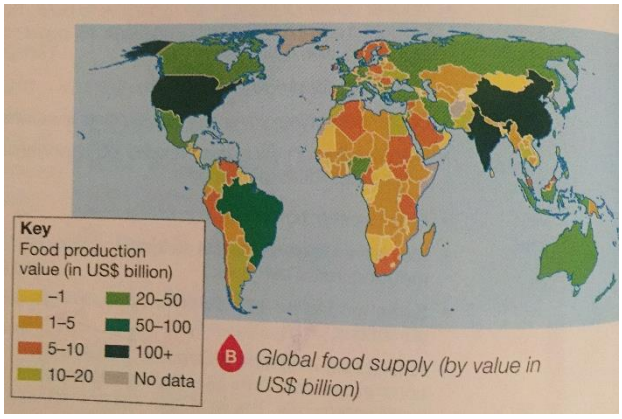


- Level of food consumption varies across the world.
- China, USA and Europe consume the most (over 3400 calories)
- Most countries consume 2000-2400 calouries (daily recommended)
- However sub-Saharan Africa is much lower than this.

Why is this happening?

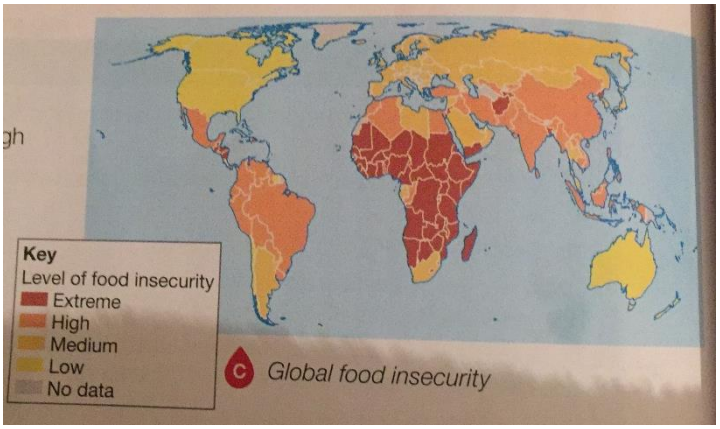
- Increasing levels of development and higher standards of living mean that people can afford to buy more food
- There are growing populations, particularly in India, Indonesia, China and much of Africa.
- There is greater availability of food due to improved transport and storage.

Global patterns of <u>food supply</u>



- There is uneven food supply.
- China and India produce more (farming) food. As do USA, Brazil and UK.
- Sub Sharan African countries produce less food because of the unreliable rain, drought, low investment and lack of education and training.

What is meant by food security?

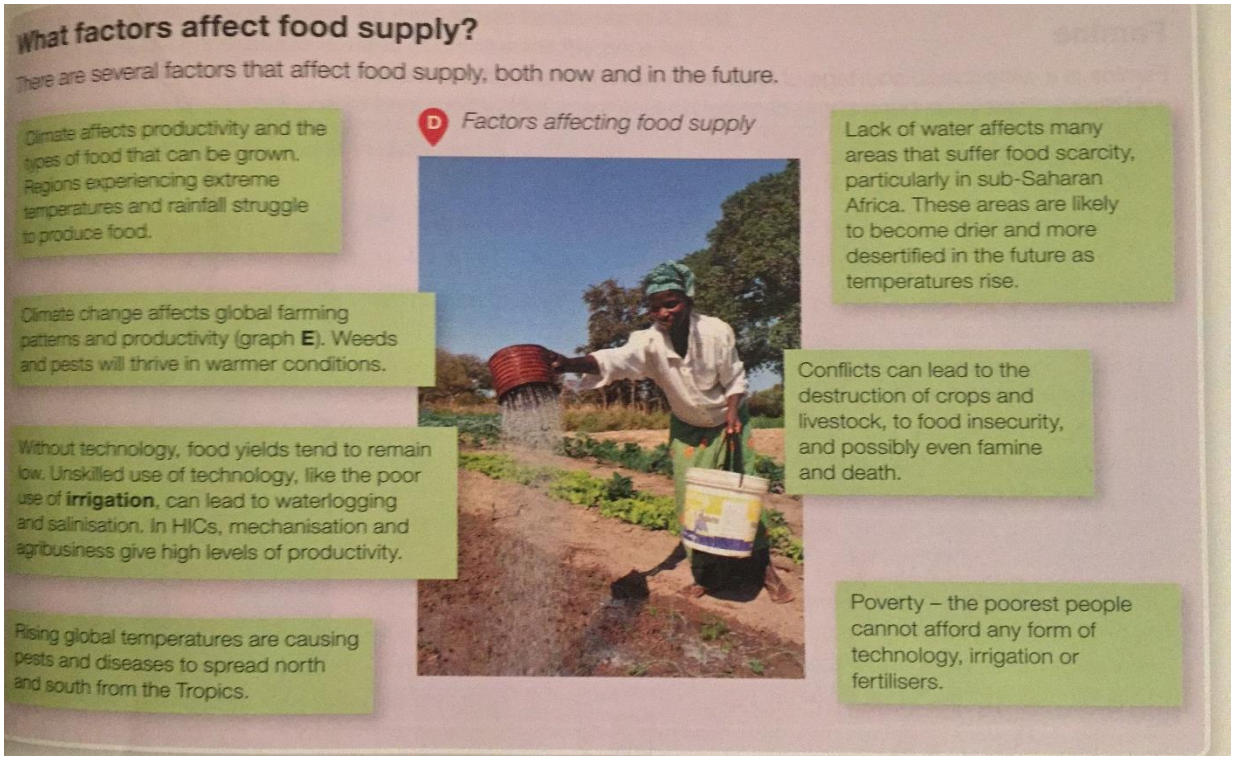


- **Food security** means having access to enough safe affordable nutritious food to maintain a healthy and active lifestyle.
- The map shows food security as measured by the FSI (Food security index).

- This is calculated using indicators including country's level of nutrition, food stocks and political stability.

- Sub Saharan Africa have the highest concentration if countries at risk of food security. Other countries with food insecurity include Afghanistan, Haiti, and Bangladesh.

- Counties which produce more food than is needed by their population have a FOOD SURPLUS. Most countries in the world do not produce enough food to feed their people and rely on imported food. Many countries which have a FOOD DEFICIT also experience FOOD SECURITY.



Impact of Food Insecurity

Famine

- Famine is a widespread shortage of food often causing malnutrition, starvation and death. There have been some devastating famines resulting from food insecurity:

- Former Soviet Union – droughts and crop failures resulted in death of 9 million people in 1920's and 30s.

- China- drought and political decisions led to serious famines when millions died. There were famines in 1928-30, 1942-43 and 1959-60.

- Ethiopia- in 1980s an estimated 400 000 people died of starvation due to drought and political conflict

Famine in Somalia (2010–12)

The UN estimates that 258 000 people died in Somalia as a result of food insecurity during the famine of 2010–12. In southern Somalia an estimated 18 per cent of the child population died due to lack of food or because they were too weak to resist disease (photo **A**). At the height of the crisis 30 000 people were dying each month.

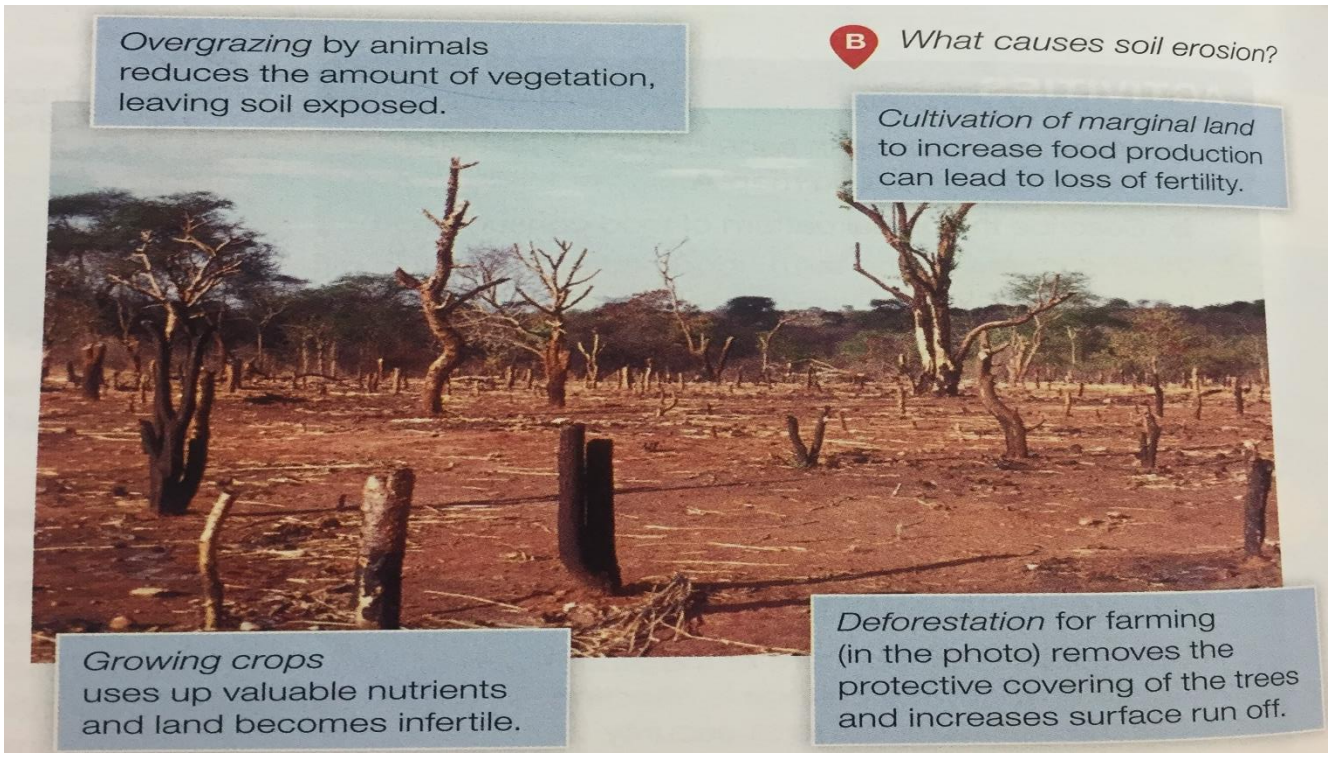
The famine was the result of two successive seasons of low rainfall, poor harvests and the death of livestock. The worst-hit areas, in southern and central Somalia, were under the control of the al-Shabab militant group. They blocked aid from humanitarian agencies, making the crisis worse.

Undernutrition

- This is the lack of a balanced diet, and deficiency in minerals and vitamins.
- The Food and Agricultural Organisation (FAO) estimates 805 million people suffered from this from 2012 and 2014.
- It is a major health problem in S Asia and Sub Saharan Africa.
- Diets in these regions are frequently deficient in protein, carbohydrates, fats, minerals and vitamins.
- This causes 300 000 deaths per year and contributes to half of all child deaths.

Soil Erosion

This is the removal of fertile top soil layers by wind and water. There are several causes of this:



Rising Prices

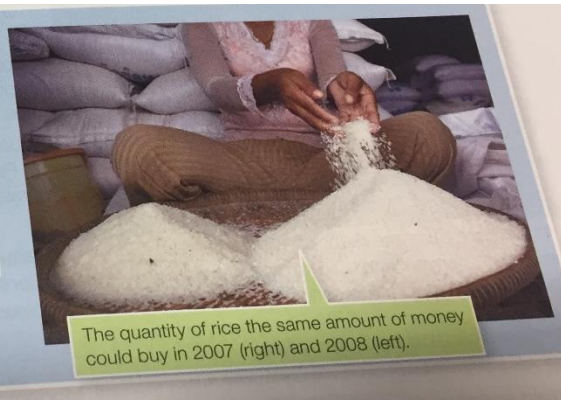
Food prices are rising across the world. This is because of increased prices for fertilisers, animal feed, food storage, processing and transportation.

LICs and the poorest people in NEEs are hit hardest but higher food costs. This is because food represents a larger share of their spending.

	2007	2008	2009	2010	2015
Maize	141	179	186	176	155
Wheat	157	219	211	204	157
Rice	132	201	207	213	192
Soya beans	121	156	150	144	127
Soya oil	138	170	162	153	119
Sugar	135	169	180	190	185

C *The rising cost of food (using base index of 100 in 2004)*

(Base index = 100 in 2004)

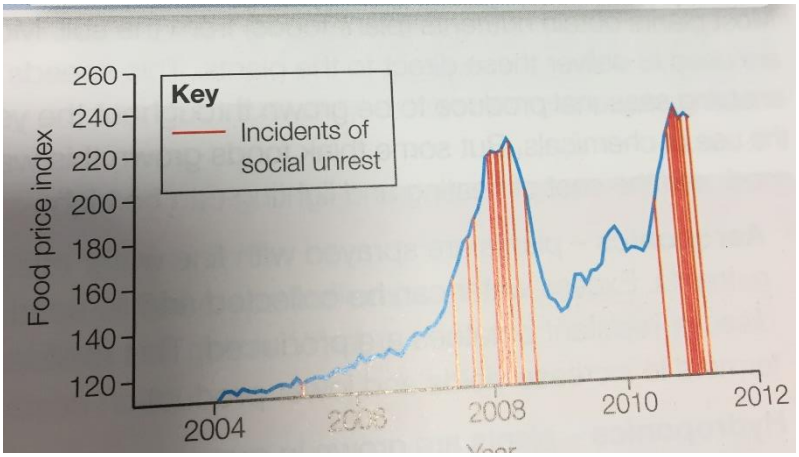


The quantity of rice the same amount of money could buy in 2007 (right) and 2008 (left).

Social unrest

- There has been social unrest, especially in North Africa and the Middle East. These are sometimes called '**food riots**'. These food riots correspond with high rises in the prices of food.

- The food Price Index increased dramatically in 2008 (start of the global recession) and again in 2011.



- The graph shows how both these spikes in food prices coincide with with outbreaks of social unrest.
- Most of these incidents occurred in LICs or NEEs in Africa and Middle East.
- E.G. in 2011 the price of cooking oil and flour doubled. In Algeria this price rise led to 5 days of rioting, with 4 people killed.

Increasing Food Supply

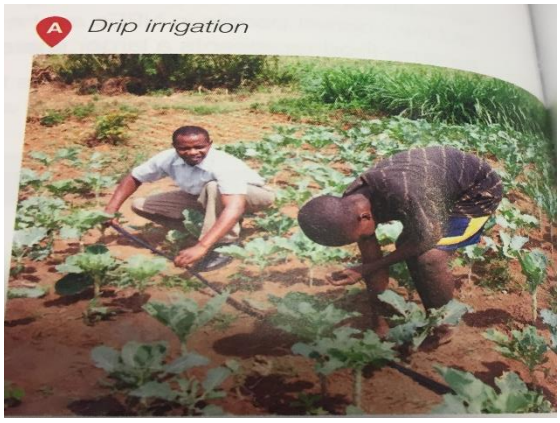
How can food supply be increased?

- Globally there is enough (sufficient) food to feed the world's population. Food supply is **unevenly distributed** and food consumption varies (differs) greatly from one region to another. As the world's population grows traditional methods and modern technology are being used to increase food production. These are:

1 IRRIGATION 2 AEROPONICS 3 HYDROPONICS 4 GREEN REVOLUTION 5 BIOTECHNOLOGY 6APPROPRIATE TECHNOLOGY

Irrigation

- This is the artificial watering of land. Most methods involve the extraction (removal) of water from rivers or aquifers.
- Irrigation is needed where there are water shortages during the growing season.
- In some countries irrigation projects involve the building (construction) of expensive dams and reservoirs (see Indus Valley of Pakistan).
- These high profile projects often benefit larger commercial farming rather than smaller scale farmers.



There are many smaller schemes such as Makueni County in eastern kenya that use drip irrigation.

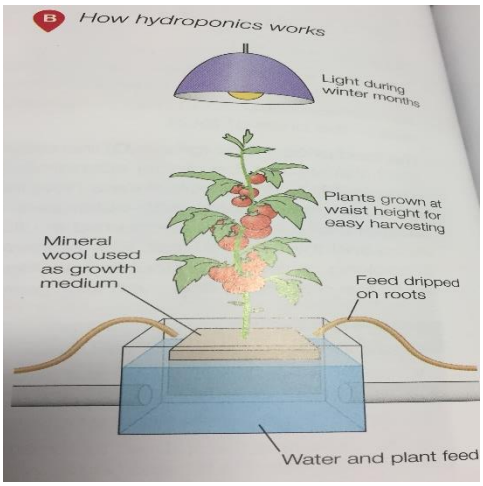
- A 35 km pipeline and use of water storage tanks has helped this irrigation support food cultivation. This has helped and increased Kenya's food security.

Aeroponics and Hydroponics

- Most plants obtain nutrients from the soil. Modern technologies are used to deliver these direct to the plants.
- This speeds up growth, enabling seasonal produce to be grown throughout the year and reducing the use of chemicals.
- But some think foods grown this way don't taste as good, and the cost of heating and lighting might be high.

Aeroponics – Plants are sprayed with fine water mist containing plant nutrients. Excess water can be collected and reused. In Vietnam disease- resistant potatoes are produced. This enables small scale farmers to increase yields and lower production costs.

Hydroponics- plants are grown in gravel or mineral-rich water



The 'new' Green Revolution

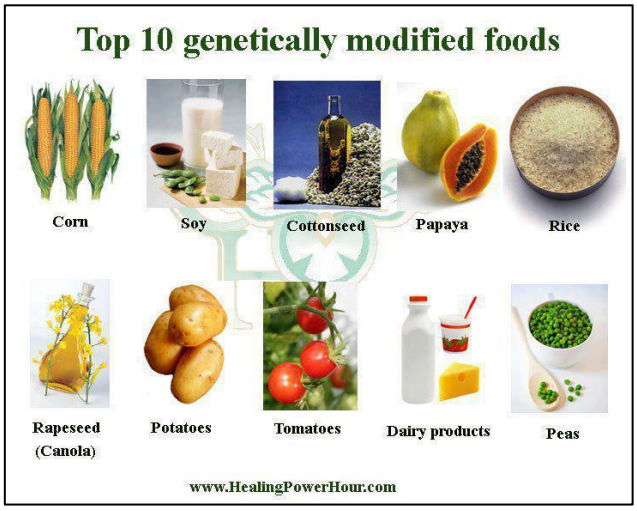
- This phrase was first used in the 1950s and 60s. Modern farming techniques – such as the use of machines, chemicals and new strains of plants – were used to increase food production in poorer parts of the world.
- Today there is a 'new' green revolution focusing on **sustainability and community**.

- In 2006, the Indian government began a 'second' Green Revolution using techniques such as:
  Water harvesting, soil conservation, irrigation, improving seed and livestock quality using science and technology.

Biotechnology

- This uses living organisms to make or modify products or processes.

- In farming this includes the development of genetically modified (GM) crops. These produce higher yields, use fewer chemicals and reduce carbon dioxide emissions.



- In the UK there is opposition to GM crops because of the possible effects on the environment and human health.

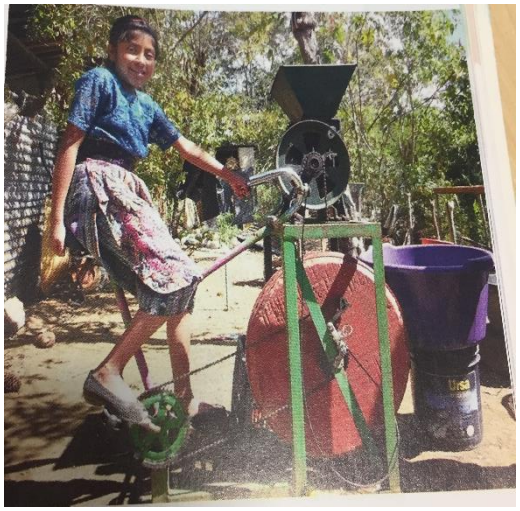
- Despite these concerns, GM crops are grown elsewhere in the world. E>G half the world's soya beans are GM. In the Philippines GM maize has given a 24% increase in yield.

Appropriate technology

- Appropriate technology means using skills or materials that are cheap and easily available t increase output without putting people out of work.

- This form of technology involved small scale water harvesting equipment, irrigation methods or farming techniques.

- It is particularly appropriate for people living in the poorer countries of the world.
- The photo shows how a bicycle can produce the power needed to remove the outer shell of coffee beans.
- Farmers can then roast their own beans in the sun and add value to their products.



The Indus Basin Irrigation System (pg 270 and 271AQA text book)

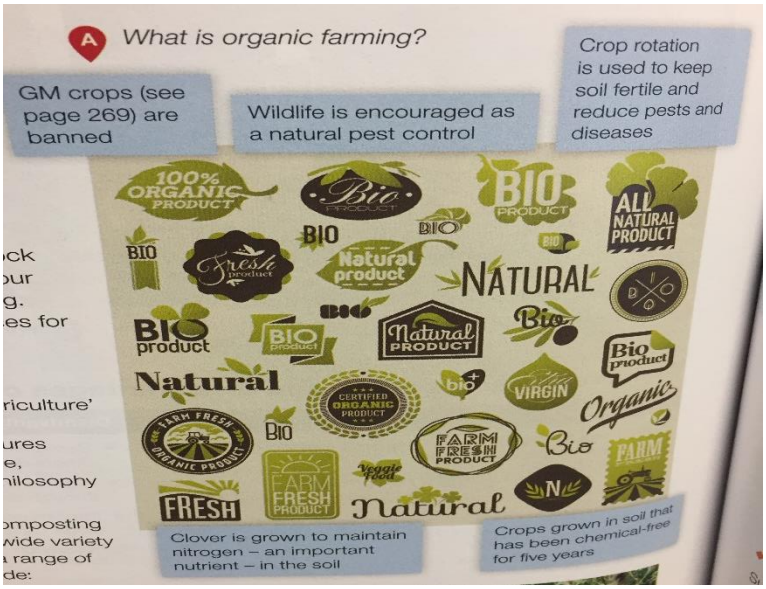
Page 28 and 29 of these notes

Sustainable Food Production

What is sustainable food supply?

A **sustainable food supply** ensures that fertile soil, water and environmental resources are available to **future generations**.

Organic Farming



- This is growing crops or rearing livestock without the use of chemicals.
- Production and labour costs may be higher than in other forms of farming.
- However many people choose to pay higher prices for **organic produce**.

Permaculture

- The word permaculture comes from 'permanent agriculture' and 'permanent culture'.
- It is a system of food production which follows the patterns and features of natural ecosystems.
- It aims to be sustainable, productive, non-polluting and healthy. It is a philosophy of living well as a system of farming.

- Permaculture includes harvesting rainwater, composting waste and re-designing gardens to include a wide variety of plants and trees. These provide a range of wildlife habitats.

- Permaculture include:

-Organic gardening

-Use of crop rotation

-Keeping animals like sheep and pigs, and bees

-Managing woodland.

Urban Farming

This is the cultivation, processing and distribution of food in and around settlements. It is becoming more popular because:

- A greater choice of fresh foods is available for a healthier diet.
- New jobs are created.
- It brightens up urban environments.
- It attracts wildfire such as birds and butterflies
- There are social benefits from communities working together on joint farming projects.

The Michigan Urban Farming Initiative

The Michigan Urban Faming Initiative in the USA aims to address problems of urban decay, poor diet and food insecurity in Detroit, Michigan. Urban communities are encouraged to work together to turn wasteland into productive farmland, providing jobs and easier access to healthy food. A community resource centre and 'demo' farm have been set up (photo **C**). Over 150 raised garden beds have been created on waste ground for use by local community groups.

Fish from sustainable sources

- 90% of the world's fisheries are fully or over-exploited.

- Commercial trawlers using close meshed nets catch all fish large and small, discarding smaller ones.
- Nets can damage marine ecosystems and fish breeding grounds. These practices are unsustainable.

Intensive fish farming (salmon, trout and prawns) using chemicals has boomed in recent years.

Ecosystems can be harmed and diseases spread to wild fish populations.

- Sustainable fishing involves setting catch limits (quotas) and monitoring fish breeding and fishing practices.
- The European Union sets standards as part of its Common Fishery Policy, with limits on fish to reduce the possible spread of disease.
- Public awareness has increased in recent years and sales of fish from sustainable sources have increased.

Meat from Sustainable Sources

Intensive livestock production often involves practices that are unsustainable.

- Large amounts of energy (heat and light) are used for indoor rearing.
- Chemicals are used to maximise production
- Large volumes of waste need to be removed and safely disposed of without polluting the environment.
- High concentrations of animals can damage the environment.

Sustainable meat production involved small scale livestock farms, using free- range or organic methods. Stocking levels are low and there is minimal impacts on the environment. Prices may be higher in the shops but quality and animal welfare standards are higher.

(Cattle grazing on a biodynamic organic farm in Wales)

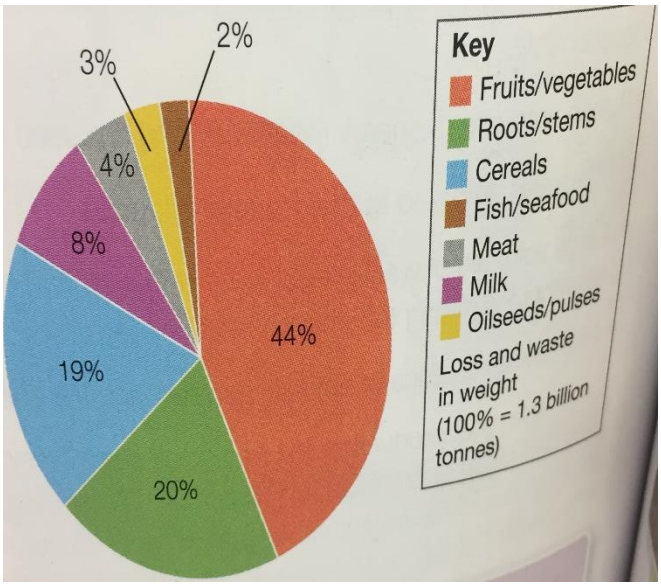
Seasonal food consumption

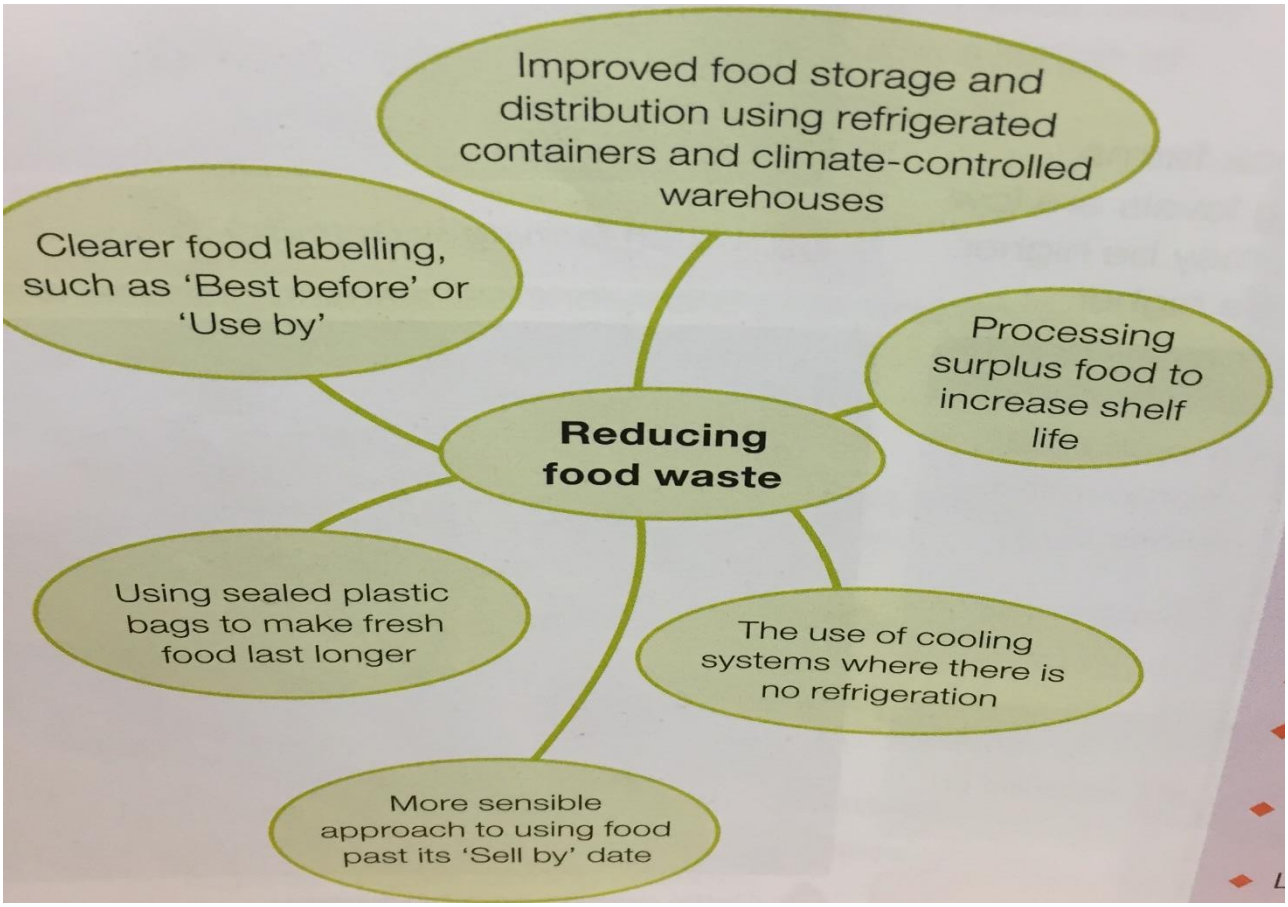
- In the past, food was bought from local sources- farms or markets. Fruit and vegetables were only available when 'in season', for example, strawberries in the summer and apples in the autumn.
- With better storage and faster transport around the world, it is now possible to eat every type of food throughout the year!

- **Local food sourcing** is more sustainable. It reduces both 'food miles' and our carbon footprint.
- Local farmers' markets and other initiatives make fresh locally produced seasonal foods more readily available.

Reducing food loss and waste

- 32% of all food produced is lost or wasted each year, most in rich countries.
- Almost is half of this is fruit and vegetables.
- This is because they have to be kept and stored in cool conditions, with careful packaging and transportation.





EXAMPLE

Increasing sustainable food supplies in Makueni, Kenya

(page 275 GEOG GCSE text book)

Page 30 of these notes