Resource Management

Resources are all the things that we use for **basic human development** .
In this case we are focussing on
- ✓ Food
- ✓ Water
- ✓ Energy

Without these basic resources we would not be able to survive and stay healthy. The access to these resources affects the **economic and social well** being of populations around the world.

10 000+ litres of water
to
make a **pair of jeans!!!**

70 litres of water to
make **one apple!!!**

Food

Malnourishment affects a countries ability to develop

- Food is essential to fuel our bodies. Without access to safe nutritious food people can become **malnourished**. e.g. ***iron deficiency*** which can affect a child's development.
- Malnourishment also includes **undernourishment** where people don't get enough food of any kind
- Not getting enough will affect a **child's performance** at school which means they lack the skills to help with a countries economic development in the future. Malnourishment also affects a persons ability to work which will affect the **countries economic development**

Water

People die without access to clean water

- ❖ We need **clean** water for drinking, cooking &washing.
- ❖ Without proper **sanitation** water sources can become polluted by **raw sewage**.
- ❖ Water borne diseases such as **cholera** and **typhoid** kill many people each year.
- ❖ Many people have to walk long distances to collect water, this affects **economic productivity** as they cannot work.
- ❖ Water is used to produce many products so it is a **valuable economic resource**

Resource Management

Energy

Energy allows industry to develop, creates jobs and helps a country to develop

- Energy is used in our homes; to transport us; power machinery and process food.
- The amount and types of energy used depends on where you live and how wealthy you are. **LICs** may use **wood** or **kerosene** for cooking, light and heat. The collection of fuelwood leads to **deforestation** and **desertification**. Kerosene stoves can release harmful fumes
- Traditionally energy comes from **fossil fuels** such as coal, gas and oil but **renewable energy** such as wind and solar are becoming increasingly important.

Global supply & consumption of resources is uneven

Consumption of resources is related to a countries level of wealth and development

- Some countries don't have their own **energy reserves**
- Some countries have very **dry climates** and struggle to **produce food**
- To obtain more resources countries either have to **import resources** or find **technological solutions** e.g. build a ***desalinisation plant*** but this can be very expensive
- **Consumption of resources** is increasing **rapidly in NEEs** but is still **low in LICs** as they can't afford to exploit their own resources or import them.

Key term	Definition	Key term	Definition
Resources		Fracking	
HIC		Energy gap	
LIC		Water surplus	*More water than is needed i.e. high rainfall/low population*
NEE		Water deficit	*Not enough water to meet peoples needs i.e. low rainfall/high population. Whole countries can be water deficit or just areas within those countries can be said to be water deficit i.e. SE England*
Malnourishment		Water stress	*When demand for water exceeds supply during certain periods i.e. summer drought or when water is not of a high enough quality for drinking*
Undernourishment		Water security	*A reliable and safe supply of water to meet everyone's needs.*
Sanitation		Water insecurity	*Not having enough clean water*
Carbon footprint		Groundwater stores	Aquifers
Food miles		Domestically	
Agribusiness		Infrastructure	
Fossil Fuels		Permeable	
Renewable energy		Impermeable	

The changing demand and supply of resources in the UK provides opportunities and challenges

Food in the UK

Carbon footprint and food miles

Food miles = the distance covered supplying food to consumers

Carbon footprints = a measure of the greenhouse gases we produce through our energy consumption i.e. food, transport, energy

- Transporting food, known as **food miles** leads to carbon emissions. These come from the commercial cultivation of the food; the refrigeration needed to keep it fresh and the carbon emissions from air vehicle transportation of the food.
- **Food contributes at least 17%** of the total UK carbon emissions.
- Sometimes growing food in the UK can produce **more CO2 than importing it!** *i.e. importing Spanish tomatoes creates less CO2 than growing tomatoes in heated greenhouses in the UK.*
- It is **better to transport food by sea** than air as it produces less CO2 but highly perishable produce needs to be transported quickly so this is not always an option

Seasonal food but all year round!

Before supermarkets were commonplace (**1960s**) the majority of the food eaten in the **UK was seasonal and home grown**. These days we are used to eating food all year round and **exotic produce** that we cannot grow due to our temperate climate e.g. strawberries and avocados

By 2037 the population of the UK is projected to rise to 73 million. This will increase the demand for food. The UK is **not self-sufficient** in food. The **UK imports 40%** of the total food it consumes and this figure is likely to rise.

There has also been a rise in the demand for **high value foods** as often grown in LICs e.g. coffee, spices and exotic fruit

Organic food is also increasingly popular as people become concerned about the environmental impact of food production and the effect of chemicals on their health

Food in the UK

Agribusiness is BIG business!!

Agribusiness is large scale industrial farming from the production of **seeds** and **fertilisers** to the **processing** and **packaging** of food by large firms

Many small farms in the UK have been taken over by large firms and **farm sizes have increased** to produce food more cheaply

An increased use in **chemicals** to encourage growth

Greater use of **machinery** rather than using workers cuts costs

This has **environmental impacts** – hedgerows are removed so there is a loss in biodiversity and heavy machinery creates soil erosion

Opportunities

- ✓ Large range of food produce all year for a growing population
- ✓ Provides employment and income in UK and in LICs

Challenges

- ❑ Pay farmers in LICs a fair price for food we import (Fairtrade)
- ❑ Reduce our food carbon footprint
- ❑ Reduce the environmental impact of agribusiness

Solutions

- ❖ Eat only seasonal food
- ❖ Limit imported foods to those we can't grow in the UK
- ❖ Red Tractor scheme
- ❖ Food labelling with details of food miles to give consumers more choice
- ❖ Eating locally produced food
- ❖ Encourage farmer markets and farm shops
- ❖ Grow your own! – over 30% use an allotment or our gardens to grow fresh produce

Matching supply and demand for water in the UK

The main sources of water in the UK are **rivers, reservoirs and groundwater aquifers**. There is enough rain in the UK to satisfy demand but rain does not always fall where it is required!

The **north and west** of the UK has a **water surplus** – *high rainfall, plenty of reservoir sites and lower population*

The **south and east** has a **water deficit** - i*t is the most densely populated part of the UK but has the lowest rainfall*

Water stress occurs when demand exceeds supply. The situation is made worse in times of drought.

Water usage in the UK gone up by **70% since 1975** . People have more appliances and more houses being built to accommodate a **growing population** . We have also increased our leisure time e.g. Golf courses need watering!

Almost **50%** of water in the UK is used **domestically. 21%** is wasted through **leakage**.

Water quality and pollution in the UK

Overall the quality of water in the UK is improving

Polluted or **low quality** water puts pressure on existing supplies in the UK

Nitrates & phosphates from fertilisers used on crops are washed into **rivers** and **groundwater supplies**

Pollutants from vehicles are washed into water sources after it rains

Up to **80%** of the heavily populated region of SE England gets its water from groundwater supplies but pollution is affecting nearly **50%** of this water. This makes it very expensive to treat before it is safe to use!

Water transfer schemes to maintain supplies in the UK

Water can be transferred from areas of **surplus** (*North & West of the UK*) to areas of **demand** (*SE England*)

Transferring water to where it is needed is an enormous and costly feat of engineering. Currently water is only transferred via the Rivers Tyne, Derwent, Wear and Tees as far south as Yorkshire.

Opportunities

- ✓ There is enough supply of water the UK but it is unevenly distributed

Challenges

- ❑ The population of the UK will increase by 10 million by 2040
- ❑ Leaking pipes
- ❑ Pollution affects the quality of our water
- ❑ Water transfer scheme are expensive to build e.g. Dams and reservoirs
- ❑ They can affect wildlife habitats

Solutions

- ❖ Water meters in every home
- ❖ Improve drainage systems to delay water entering rivers and groundwater this will allow the soil to naturally breakdown pollutants
- ❖ Stricter controls on the use of chemicals in farming
- ❖ Water transfer schemes

Energy in the UK

<u>Changing energy mix</u>

Fossil fuels = coal, oil & gas

The UK has traditionally relied on **fossil fuels**
1970 - **91%** of the UKs energy needs came from **coal and oil**
1980 - **22%** of our energy came from **gas** (*discovery of gas reserves in the North Sea*)
1990s - The use of **nuclear energy** in the UK increased
2000 - a move towards **renewable energy**
2014 – **19%** of electricity from renewable sources
2025 – all **coal fired power** stations in UK **due to close**

Fossil fuels in the UK are running out!

- Production of **gas** and **oil** in the North Sea has been in **decline** since 2000
- A **decline** in the demand for **coal** as we try to reduce CO_2 emissions
- **Fracking** has increased in the UK but it is controversial

<u>**Renewable energy**</u> = energy that can be used over and over again and won't run out

Wind and **bioenergy** (*energy from biological sources*) are the biggest sources of renewable energy in the UK but the use of **solar** and **HEP** is increasing

<u>Fracking</u>

Fluid is pumped into shale rock at **high pressure** which causes it to crack and release gas that can tend be collected and used.
It is controversial because it can **trigger small earthquakes** and damage homes

Did you know………..?!?

Despite an increased demand for electricity in the UK in our technology hungry society **energy consumption** has actually fallen in recent years. This is mainly 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 used by industry and 12% fall in domestic use. There has been a big increase in the number of cars on the road however. In 1970 there were 10 million cars in the UK; this is now over 27 million!

Energy in the UK

Economic issues of energy use

Extracting fossil fuels is **expensive** and the price increases as reserves get used up

Many renewable sources **don't** provide a **reliable source** of energy

We may need to import energy in the future to plug the **'energy gap'**

Environmental issues of energy use

The burning of fossil fuels **releases CO2** which is a **greenhouse gas.** This leads to global **climate change**

Fracking may **pollute groundwater** and cause small **earthquakes**

Natural ecosystems can be **damaged** by the exploitation of both renewable and non renewable sources e.g. ***oil spills** and wind farms damaging **bird** populations*

Opportunities

- ✓ Exploiting energy sources creates jobs & wealth in the UK

Challenges

- ❑ Fossil fuels are running out
- ❑ Reducing CO2 levels from the burning of fossil fuels
- ❑ Renewable energy is not always reliable i.e. no wind = no energy!
- ❑ Fracking is controversial
- ❑ Ecosystems can be damaged by energy exploitation

Solutions

- ❖ Find new reserves
- ❖ Develop renewable energy sources to make them more reliable

Water security

A reliable and safe supply of water to meet everyone's needs (for industry, agriculture and personal health)

Depends on the amount of water available e.g. from rainfall, rivers and groundwater supply and the size of the population . It can also mean being able to access the water, which can be hard if you are poor.

Water insecurity

Not having enough clean water to keep the population healthy or enable them to make a living

Water stress

When demand for water exceeds supply during certain periods i.e. summer drought or when water is not of a high enough quality for drinking

Water surplus

More water than is needed i.e. high rainfall/low population

Water deficit

Not enough water to meet peoples needs i.e. low rainfall/high population

Whole countries can be water deficit or just areas within those countries can be said to be water deficit i.e. SE England

Global water security and insecurity

Put in map from p.101 of the revision guide (scan it)

Global demand for water

Water demand is rising in the world because there is a ***rising population*** and ***increased economic development***

Rising population

The current world population is 7.5bn. This is estimated to increased to **10bn by 2050** – *all these people need water for drinking, cooking, washing etc.*

More people also requires more food to be grown. Irrigation for agriculture uses 70% of the worlds freshwater resources

Economic development

As countries become more developed they **produce more goods**. Producing or manufacturing more goods uses a lot of water

15% of all water withdrawn globally is for **energy production** – we are an energy hungry world! As the quality of life improves for people around the world water use goes up e.g. flushing toilets, showers, dishwashers etc.

Physical factors

Climate – most places rely on enough rainfall to feed rivers and lakes for their water supply. If the climate is very warm water can be lost through evaporation

Climate change – many dry areas are getting drier and rain is less reliable

Geology – **impermeable rock** can make water easier to get to as water cannot soak in to the ground and so rainfall tends to flow into the rivers and lakes. If the rock is **permeable** and water soaks in it creates underground **aquifers** which are harder to access. Groundwater supplies are useful in dry areas though as water **doesn't evaporate**

Water availability is affected by many factors

Economic and social factors

Over-abstraction – when more water is used than is being replaced. **Population growth or high demand** from business e.g. height of the tourist season both cause over abstraction

Pollution – this is often a problem in rapidly industrialising countries where a lot of **industrial waste** is dumped into rivers. Animal and human waste will also pollute rivers if not controlled or treated

Limited infrastructure – rapid population growth may mean that water pipes and sewers cannot be built quickly enough to supply the population and stop sewage from contaminating supply

Poverty – many of the worlds population collect their own drinking water from nearby rivers and watering holes. It has not been treated and is **unsafe to drink**

The impact of water insecurity

- **Waterborne diseases & water pollution** - *Contaminated water can lead to outbreaks of cholera and dysentery which many LICs do not have the resources to treat*
- **Health & productivity** – *if people are sick due to poor water supplies they cannot go to school or work and this affects a countries ability to produce goods and develop.*
- **The demand for water for agricultural and industrial development** – *if water is scarce countries cannot produce so many goods and will not be able to reinvest money into improving future water supplies*
- **Conflict** – *some countries share water supplies and this can cause conflict if it is felt that one country is taking more.*

Water is often not where it is needed!

Water transfer schemes divert water from areas of surplus to deficit. Also increasing storage to cope with seasonal variations can create a more reliable all year round source of water

Dams and reservoirs

Building a dam across a river creates a reservoir.

Water can be released and **controlled** through the dam which gives water all year round

Dams are **expensive** to build and can involve the **displacement** of entire **settlements** as valleys are flooded

https://www.youtube.com/watch?v=eBLkJbloXhA (2:54) Hoover Dam
https://www.youtube.com/watch?v=WRalttPgLqU (3:02) – three gorges, China

Water transfer schemes

These are **large scale engineering** projects that move water (*usually via rivers*)

Water is **transferred by canals** and **pipes** across country. Water transfer schemes can be **unpopular** because they are **expensive** and can have **big impacts** on people and the environment

https://www.youtube.com/watch?v=8VwlIbP72yY (2:04)
https://www.youtube.com/watch?v=6rQJv8D8D1U (1:17)

Desalinisation

This is the **removal of salt** from seawater so that it can be used for human consumption.

Seawater is heated and freshwater collected through condensation **or** seawater is passed through a special membrane to remove the salt

- It is a very **expensive process** and creates **CO2 emissions**
- **London** has a desalinisation plant on the River Thames which is used to top up water in times of need rather than being the main water supply.
- **Dubai** supplies 99% of its water through desalinisation plants!

Case Study: The Lesotho Highland Water Project

An example of a **large scale water transfer scheme** to show how its development has both **advantages** and **disadvantages**

- Be able to say where **Lesotho** is and what it is like in terms of its levels of development
- Be able to identify whether Lesotho has a **water surplus or water deficit** and explain why
- Details of the actual Lesotho Highland Water Project
  - **Advantages** of the scheme
  - **Disadvantages** of the scheme
- Overall who are the **winners and losers**?

Alternative case study for large scale water transfer scheme: China

China is transferring water from the **wetter south** to the **dry north**.

A **£62bn project** funded by the Chinese government to transfer 44.8 billion cubic metres of water every year from the south to the north of the country

- ✓ Learn the **advantages** of the **scheme** and be able to explain them
- ✓ Learn the **disadvantages** of the **scheme** and be able to explain them

Sustainable water supply

Population growth and continued **economic development** will lead to a greater demand for water in the future. It is vital that water is managed in a sustainable way so that future needs are met.

Sustainable approaches to water management aim to reduce waste and excessive demand.

Water conservation

This is about trying to use less water

- **Fixing leaks** from pipes and reservoirs - *25-30% of global water supply is lost through leaks.*
- **More water/energy efficient appliances** in the home - *Dual flush toilets; washing machines*
- **Education & Campaigns** to raise public awareness on water conservation – *take showers, turn off taps*
- **Water meters** to encourage people to use less

Recycling

This involves re-using treated domestic or industrial wastewater for useful purposes like irrigation and industrial process.

- ✓ Large quantities of recycled water can be used to **cool power stations** such as **Nuclear Power** plants.
- ✓ **Sainsbury's in Dawlish** uses rainwater to flush the toilets in store
- ✓ **Sewage water** is reused for **fish farming** and **agriculture** in Kolkata, India. Sewage is pumped into shallow lagoons where the sunlight helps algae to photosynthesise. This oxygenates the water so it can be reused.
- ✓ **Using grey water -** Grey water is taken from showers, sinks and washing machines. Although it may contain traces of dirt, food or grease if used within 24 hours it contains valuable fertilisers for plants. Grey water is mainly use on a domestic level for watering gardens. In Jordan 70% of the water used is for irrigation and gardens.

Groundwater management

Groundwater stored in underground aquifers has to be managed to maintain the **quantity** and **quality** of water.

If too much water is **abstracted** groundwater can become contaminated and then expensive water treatment is necessary

Farmers can be encouraged to use less chemicals and companies creating industrial waste can be fined

NEE Case Study:

A local scheme to increase **sustainable supplies** of water
The Wakel River Basin Project, Rajasthan, India

Be able to describe where the **Rajasthan region** is and what it is like

Be able to explain why a **sustainable water supply** is necessary

Identify the **<u>two</u>** main **aims** of the Wakel River Basin Project and what **methods** have been used to increase water supply

Be able to explain why it was necessary to involve **local people** in the decision making process?

Be able to comment on how **sustainable** the scheme has been

OR

<u>Example from</u>
<u>Revision guide (P.105)</u>

Kenya is using **Sand Dams** to create a Sustainable Water Supply

1. Why does Kenya need a sustainable water supply?
2. Outline how the Sand Dams work to provide a water supply
3. Explain why it is sustainable (at least two reasons)