# GCSE GEOGRAPHY KNOWLEDGE BOOK



## Unit 2: Challenges in the Human Environment

Section C:

# The Challenge of Resource Management

- Resource Management
- Resources in the UK
- Water

The information here is what all students MUST know. Use this document as a checklist to identify what is clear to you, what you need to work on and what you can tick off once revised. If you have any doubts or questions, please come and see your teacher – we are happy to help

## THE GLOBAL DISTRIBUTION OF FOOD, ENERGY AND WATER

Key content	What you need to know		
Why is food,	These three resource types are crucial to economic and social wellbeing for all countries		
water and	around the world. Economic development will be limited by a lack of these resources. Quality		
energy	of life will also be limited and so the management of available resources has a significant		
important?	impact on global patterns of development.		
important?	Impact on global patterns of development. FOOD Food is measured in populations by calorie intake. In LICs the challenge is often feeding their populations enough calories (low intake of calories = malnourished) This affects over 1 billion people around the world. HICs are increasingly experiencing poor balance in diets (undernutrition or malnutrition). This affects over 2 billion people. Side effects include diabetes and heart disease from obesity. The WHO recommended calorie intake per day is 2000 calories for women and 2,500 for men The world map of undernourishment The world map of undernourishment		
	Prevalence of undernourishment *Percentage of the region/country in the population of the country of the undernourished worldwide		
	Source: FAO (2015), data for the period 2014-2016		
	Food distribution		
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Most of Europe, Asia, North and South America produce a surplus of food thanks to moderate climates, fertile soil and advanced technology (fertilizers, farm machinery). In parts of Africa, climatic conditions are often much drier and increasingly unreliable and this affects supply. Combined with poor economic growth and political instability, availability of food can be very unreliable. (Syria and The Yemen are countries that will currently have high incidents of malnourishment because of war).

#### <u>WATER</u>

Essential for people and animals to drink but also for crop growth. It can also be used as a source of power (HEP) and in industry and manufacture.

Water supply imbalance is caused by variations in climate and rainfall.

country	GNP in US dollars	HDI ranking	Water per head m <sup>3</sup>
Australia	20,210	7	185,000
Niger	850	173	346

#### Water distribution

Water is unevenly distributed across the world. Africa and the Middle East are at risk of shortages and drought. If people have to spend time looking for water they lose out on jobs and education which has huge implications economically and socially.

#### <u>ENERGY</u>

The industrial revolution improved economic and social wellbeing. Fossil fuels such as Oil, Coal and gas have been in constant and growing demand around the world since the industrial revolution began in the UK in the 1750s. Other resources needed for energy include uranium for nuclear power and renewable energy in the form of solar and wind is becoming cheaper and more readily available.

#### Energy distribution

Fossil fuels are unevenly distributed around the world and have partly resulted in the economic success of a number of countries (Saudi Arabia, UAE for example). In theory, renewable energy is available to all but some countries are better located to take advantage of solar (Rajhastan, India) and wind (Scotland).







### **RESOURCES IN THE UK**

Resources in<br/>the UK 2037 the UK population is expected to rise to 73million (from 64 million in 2015) and will<br/>therefore cause demand for resources to increase.

#### FOOD

The UK currently tackles the issue of food availability by **importing 40%**. However, there are many reasons why the UK imports food and it is not just out of necessity:

- UK produced food can be expensive because of poor harvests and animal food costs.
- Demand for greater choice and more exotic foods.
- Demand for seasonal produce all year round.
- Availability of cheaper food from abroad. Supermarkets compete for low cost foods.
- UK climate is not suitable for lots of produce e.g. coffee, tea, bananas.

Importing foods results in high food miles for some foods. This increases our carbon footprint (the amount of Carbon Dioxide that has been released through production and transport).



Resources in the UK: <u>Water</u>	<ul> <li>Water use in UK households has risen by 70% since 1985. Demand has increased because:</li> <li>Growing UK population</li> <li>Increased wealth which means more water use in appliances, watering gardens, etc</li> <li>People are cleaner! More baths and power showers taken now than in the 80s</li> <li>Increased demand for out of season food – watering in greenhouses</li> <li>Industrial production</li> <li>Leisure (golf course, pools)</li> </ul>				
	Distributions				
	In general, areas of high population density have the lowest amount of rainfall and are far				
	Population density High Medium Low Moderate ☆ Main storage reservoirs				



Water stress (or water deficit) occurs when demand for water exceeds supply in the immediate geographical area.

The **Environment Agency** manages UK water. Water is now cleaner than at anytime since the Industrial Revolution but **only 27%** is classified as **"good Status"** under the EU Water Framework Directive.

POLLUTION (lakes, rivers, coastal waters) Causes

• Pesticides and fertilisers from intensive farming

- Hot water from industrial output
- Oil from shipping
- Untreated waste
- Heavy metals from road runoff
- Sewage containing bacteria released into rivers and seas
- Inappropriate items but own drains and loos (engine oil, wet wipes)

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#### Effects

- Pesticides kill animals and aquatic life
- Fertilisers speed up the growth of algae this leads to insufficient oxygen in the water
- Increased water temperature leads to death of wildlife
- Toxic waste and plastic particles poison wildlife and can be transferred to humans







Renewable energy such as wind power has had mixed success in this country as nimby (not in my backyard) reaction to onshore wind farms meant few were given the go ahead for construction except in Scotland. Those rules have recently been relaxed and offshore wind farms have also been built in great number in the last 10 years.

map of offshore wind farms, 2010

#### WATER

Water supply and demand



Water deficit – regions where there is a shortage of water and demand exceeds supply e.g. Northern & southern Africa, the Middle East, Australia

**Water security** – means having access to enough water to sustain well-being, good health and economic development.

Water insecurity - means not having access to adequate, safe supplies.

Water stress – means more than 80% of available water is used every year, leaving the threat of water scarcity. A country experiences water stress when less than 1700m<sup>3</sup> is available per person.

Why is global consumption increasing?	1. Economic development         Agriculture: Intensive farming requires huge amounts of water. Food consumption will         increase by 70% by 2050. This will require water for irrigation & food processing.         Industry: Processing & manufacturing industries require huge amounts of water. They also         discharge lots of pollution reducing water available for other uses.         Urbanisation: As the world becomes increasingly urbanised, water demand for drinking,         washing and sanitation increases. This is a problem as water stress areas are those most likely         to urbanise in future.         Wealth: As people become more wealthy, their demands for water increase (e.g. golf courses,         domestic appliances, air con, swimming pools etc)	
	The world's population has grown rapidly since 1950 with a current population of <b>7.5billion.</b> Most of this growth is in LICs and NEEs – many of these suffer from water stress or deficit.	
	<ul> <li>Factors affecting water availability</li> <li>Climate: High rainfall areas water surplus. Drier climates have less water available.</li> <li>Geology: Infiltration through permeable rocks build up groundwater supplies. London Bachalk aquifer underlying city.</li> <li>Over-abstraction: Pumping water from the ground faster than it can be replenished. Lead wells drying up, water tables sinking &amp; higher pumping costs. Low water tables mean rive not fed by springs in dry season.</li> <li>Limited infrastructure: LIC's lack ability to transport water to areas of need.</li> <li>Poverty: Poor communities lack mains supply.</li> <li>Pollution: Increased waste and use of chemicals from farming. LIC &amp; NEE sometimes wat sources used as open sewers which spread waterborne diseases.</li> <li>Limited infrastructure: LIC's lack ability to transport water to areas of need.</li> </ul>	
	Waterborne disease and water pollution: Untreated drinking water and open sewers	
	result in reduced productivity and reduced income from ill health and death. E.g. River <b>Ganges, India</b> contains raw sewage, industrial effluent, domestic waste, ashes of cremated bodies.	
	Food Production: Agriculture uses more water than anything else. If farmers are unable to irrigate their crops because of water insecurity, the consequences could be very damaging for an LIC in particular. Some areas are farmed when they perhaps shouldn't be! Inappropriate crops in	

drought risk areas will cause irrigation to increase. The depletion of the Aral Sea in Kazakhstan is the most famous example. Over-abstraction for farming from rivers that fed the sea during the Soviet era led to a reduction in size by 13,000square miles.



#### Industrial Output:

Manufacturing can depend heavily on water e.g. metal smelting, food processing, paper, textiles. Nuclear power requires water for cooling, HEP requires a lot of water and reduces availability downstream. If there is not enough water for industry then there can be significant economic impacts.

#### WATER USE BY POWER PLANTS\*



#### Conflict:

Water sources such as aquifers and rivers cross country borders. Countries further down the course of a river are reliant on appropriate abstraction from countries up stream. Without this agreement, conflict can quickly escalate if it coincides with a period of drought. The **Nurek Dam** in **Tajikistan** has reduced water supply on the **Vaksh River** that flows into Uzbekistan. **Uzbekistan** relies heavily on water for its cotton production. **Rogun Dam** is also now under construction, against fierce opposition.

The **River Jordan** flows through Syria, Lebanon, Israel and Jordan. This area has suffered severe drought in recent years and political tensions and conflict.



#### What strategies can be used to increase water supply?

**1.Desalination:** This involves the removal of **salt** from seawater to produce freshwater. One method is reverse osmosis where the sea water is pumped through membranes that allow water to pass through leaving the larger salt molecules behind. Another involves heating the saltwater



to high temperatures so the water **evaporates**. The gas is cooled to generate freshwater leaving the salt behind. E.g. California

#### 2.Dams and Reservoirs:

Dams control water flow in rivers by storing excess water in reservoirs. Rainfall is stored behind the dam when it is plentiful and released downstream at times of scarcity. Often the water is used to power turbines that generate electricity. e.g. Kielder Water, Northumberland



	Advantages		
	SOUTH AFRICA LESOTHO		
	Provides water to an area with regular	Provides 75% of Lesotho's GDP	
	Fresh water reduces the acidity of the Vaal	Supplies all of Lesotho's hydro-electric (HEP)	
	Provides safe water to an extra 10% of the	Sanitation coverage will increase from 15 to	
	Disadvantages	2070	
		IFEOTUO	
	SOUTH AFRICA		
	Costs are likely to reach US\$4 billion.	Building the first two dams displaced 30,000 people	
	40% of water is lost through leakages	Destruction of a unique wetland ecosystem	
	Corruption has plagued the whole project	Corruption has prevented money reaching those affected by construction	
Custoinstele			
Water Supplies	Sustainable water supplies mean those which do not damage the environment when used. There are 4 main types that are available to use in HICs and LICs:		
	<ul> <li>Fixing leaks (accounts for 25-30% of the UK supply)</li> <li>Preventing pollution</li> <li>Raising tariffs/prices on water bills</li> <li>Installing metred supplies</li> <li>Educating the public on the importance of conservation</li> </ul> <b>2. Groundwater Management:</b> Groundwater refers to water underground in either the soil or pores and crevices in the rock. These stores of water can be tapped into for water supply and therefore require careful management. A balance is required between <b>abstraction</b> (loss) and <b>recharge</b> (gain) to ensure supplies remain sustainable. If groundwater levels fall, the water can become contaminated making expensive water treatment necessary.		
	Evapotranspiration Phreatophytes Diversion Canal Wildlife Refuge Unconfined Aquifer Confined Aquifer Aquitard	Runoff Runoff Stream Echarge Basin Shallow Monitoring Vell Deep Monitoring Well	

![](_page_11_Figure_0.jpeg)

**Background:** Located in southern **Rajasthan**, the **River Wakel** flows through a semi-arid area which suffers from water insecurity. This is due to **over-abstraction** for irrigation of crops which has reduced the groundwater level.

In many parts of Rajasthan, the annual rainfall is very low (between 450 and 600 mm) with monsoon rainfall occurring in July and August. 44% of the people work as farmers, so having water is a significant issue. The average income is \$1600 per person.

**Problems:** water management in the region has been poor Over-use of water for irrigation has led to waterlogging and salinization Over-abstraction from unregulated pumps has resulted in failing harvests for others.

**Project:** Supported by the US Agency for International Development. It aims to increase supplies by improving **1**. **management practices:** 

Improvements are made at a local level by farmers building small dams to block river channels and diverting water into fields (irrigation). This is sustainable and fair as it is managed by the community.

Improving **2**. **storage:** is done by building underground storage tanks called **"taankas"** to store

![](_page_12_Picture_6.jpeg)

water and prevent it **evaporating.** Small earth dams, called **"johed**" interrupt and slow the flow of surface water which encourages it to **infiltrate** into the soil thereby raising the water table.