Exercise walk-through

2.4
Water, food and energy security

International Baccalaureate · IB Diploma · Geography · HL

Consequences and vulnerability

- Climate change affects the whole Earth system: hotter heatwaves, heavier rain, longer droughts, warmer and more acidic oceans, coral bleaching, and rising seas.
- It affects people through health (heat stress, the spread of diseases such as dengue), food (lower yields in hot regions) and **migration** , when people leave land that floods or dries.
- Not everyone is affected equally. **Vulnerability** depends on three things:
- **Resilience** is the ability to cope and recover.

Water, food and energy security (2)

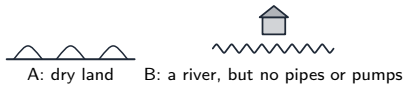
- Water insecurity can be **physical** (too little water, as in the Middle East) or **economic** (water exists but people cannot afford the pipes and pumps, as in parts of sub-Saharan Africa).
- **Food security** has four pillars: **availability** (enough food is produced or imported), **access** (people can afford it and reach it), **utilisation** (the food is safe and nutritious) and **stability** (all three last through bad years).

Key terms (2)

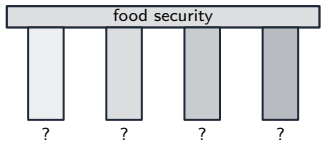
- **Mitigation**: action to reduce the causes of climate change, such as cutting emissions.
- **Adaptation**: action to reduce the harm from climate change, such as sea walls or drought-resistant crops.
- **Ecological footprint**: the area of land and sea needed to supply what a person uses and absorb their waste.
- **Water–food–energy nexus**: the links that make water, food and **energy security** depend on each other.

Exercises 2.1·2.2

2.1 Distinguish between **physical** and **economic** water insecurity. [2]

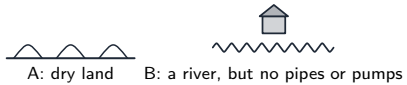


2.2 Outline the **four** pillars of food security. [3]



Exercises 2.1·2.2

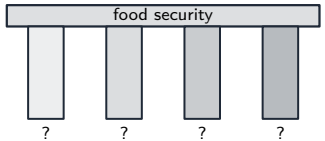
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2.1

physical: there is not enough water in the area for people's needs, e.g. desert countries of the Middle East; economic: water exists, but people cannot afford the pipes, pumps or treatment to use it, e.g. parts of sub-Saharan Africa

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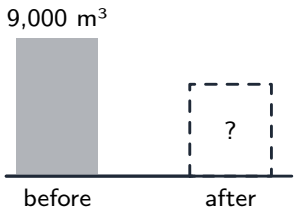
2.2

availability: enough food produced or imported; access: people can afford and reach it; utilization: safe and nutritious food the body can use; stability: all three continue through bad years, e.g. droughts or price rises

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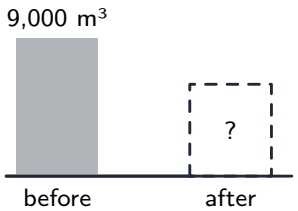
Exercise 2.3

2.3 A farm withdraws 9,000 m^3 of water a year. Drip irrigation cuts its use by 40 %. Calculate the new water use. [2]



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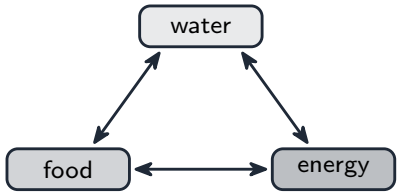


2.3

saving $= 0.40 \times 9{,}000 = 3{,}600$ m^3; new use $= 9{,}000 - 3{,}600 =$ **5,400** m^3

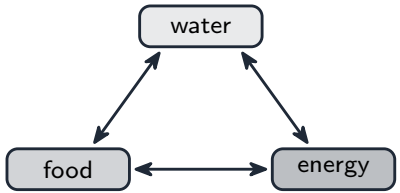
Exercise 2.4

2.4 Explain **one** link between water and energy in the water–food–energy nexus. [3]



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2.4

any one link, developed: power stations need large amounts of water for cooling, so in a drought they may have to cut output, e.g. lower river levels limiting power stations or hydropower; or: pumping, moving and desalinating water uses energy, so water supply depends on an energy supply, e.g. desalination plants in the Gulf states run on oil and gas

Exercise 2.5

2.5 China imports about 70 % of the crude oil it uses. Explain **two** ways China is trying to improve its energy security. [4]



oil by sea



solar

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2.5

any two, explained: building solar and wind power, so less oil and gas has to be imported; electric cars cut the need for imported petrol; nuclear power gives a steady domestic supply; oil from several countries and by pipeline as well as by sea, so one blocked route does not stop supply

Exercise 3.1 (a)

3.1 *(Paper 2 style.)* The diagram shows the water–food–energy nexus.

(a) Using **one** example, explain how using a resource for energy can reduce food security. [2]

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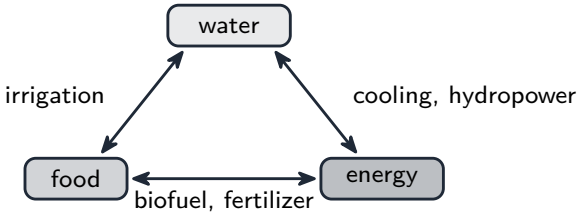
(a) Using **one** example, explain how using a resource for energy can reduce food security. [2]

(a) growing maize (or sugar cane) for biofuel uses farmland and water that could grow food, which can raise food prices

Exercise 3.1 (b)

3.1 *(Paper 2 style.)* The diagram shows the water–food–energy nexus.

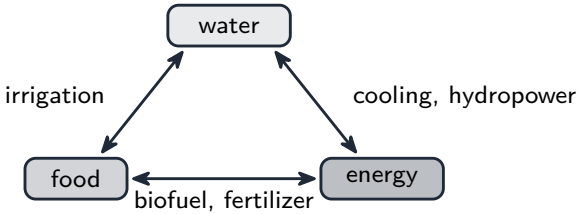
(b) Explain **two** reasons why food insecurity can happen in a country that produces enough food. [4]



Exercise 3.1 (b)

3.1 *(Paper 2 style.)* The diagram shows the water–food–energy nexus.

(b) Explain **two** reasons why food insecurity can happen in a country that produces enough food. [4]



(b) any two, explained: poor people cannot afford food when prices rise faster than wages, e.g. Sen on the Bengal famine of 1943; food cannot reach people because of poor roads or conflict, so access fails even though food exists; food is lost after harvest because of poor storage; unsafe water or disease means the body cannot use the food (utilization)

Exercise 3.2

3.2 Evaluate the strategies used to improve water security in places you have studied. [10]

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3.2

Mark with the markbands: [9-10] focused on the command term, detailed and accurate knowledge, well-developed explanation, specific named examples (places, dates, numbers), balanced evaluation and a supported conclusion; [7-8] mostly focused, good knowledge and examples, some evaluation; [5-6] relevant knowledge and examples, explanation partly developed, little evaluation; [3-4] general knowledge, few examples, mostly description; [1-2] little that is relevant. Points that may be included: dams and reservoirs store water and make electricity, e.g. the Three Gorges Dam; but they flood land and move

people (about 1.3 million) and trap sediment; desalination supplies cities in dry places such as the Gulf states; but it uses a lot of energy and produces salty waste, so it links water to energy security; drip irrigation cuts farm water use, which is about 70 % of withdrawals; but small farmers may not afford it; water transfers move water between basins, e.g. China's South–North Water Transfer Project; pricing and cutting leaks reduce waste in cities, but higher prices can hurt the poor (economic water insecurity); conclusion: technical strategies increase supply, but water security lasts only with saving water and fair prices; the best choice depends on whether the problem is physical or economic