Exercise walk-through

2.3
Resource consumption and stewardship

International Baccalaureate · IB Diploma · Geography · SL

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.

Resource consumption

- The world population passed 8 billion in November 2022.
- Consumption grows faster than population, because more people join the **middle class** and buy more meat, cars and electronics.
- The **ecological footprint** is the area of land and sea needed to supply what a person uses and absorb their waste, in global hectares (gha).
- The world average is about 2.6 gha per person, but the Earth can supply only about 1.6 gha per person.

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.

Exercise 2.1

2.1 Define **ecological footprint**. [2]



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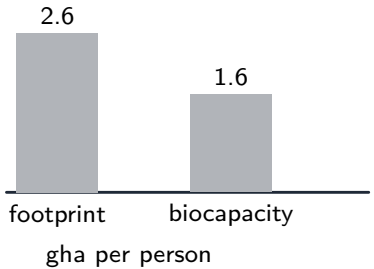


2.1

the area of productive land and sea needed to supply the resources a person (or population) uses and to absorb their waste, measured in global hectares

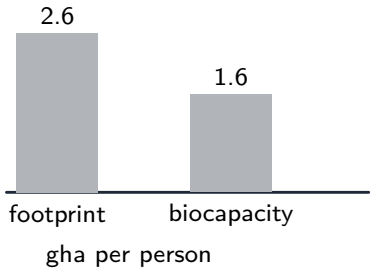
Exercise 2.2

2.2 The world average ecological footprint is about 2.6 gha per person, and the Earth can supply about 1.6 gha per person. Calculate how many Earths humanity uses, and explain what this means. [3]



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2.2

$2.6 \div 1.6 \approx$ **1.6** Earths; humanity uses resources faster than nature renews them, by using up stocks (e.g. fish, forests) and letting waste such as CO_2 build up

Exercise 2.3

2.3 Distinguish between **renewable** and **non-renewable** resources, with an example of each. [2]



wind



oil

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wind



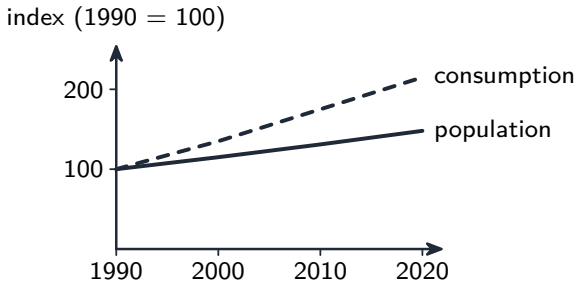
oil

2.3

renewable: can be used again if used no faster than it renews, e.g. forests, fish, wind; non-renewable: exists in a fixed amount and is used up, e.g. coal, oil, metals

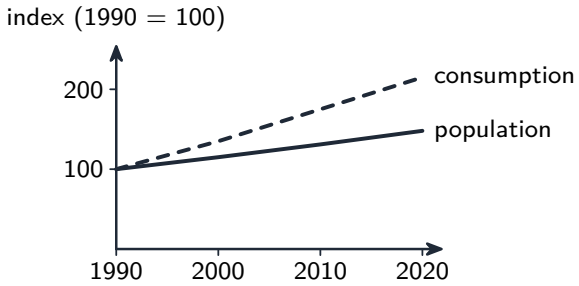
Exercise 2.4

2.4 Explain why world resource consumption has grown faster than world population. [3]



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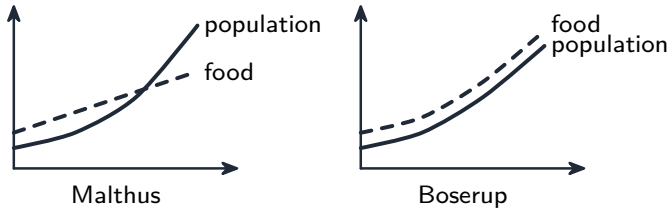


2.4

more people join the middle class as incomes rise, especially in Asia; each person then uses more: more meat, cars, electronics and energy; so consumption per person rises as well as the number of people

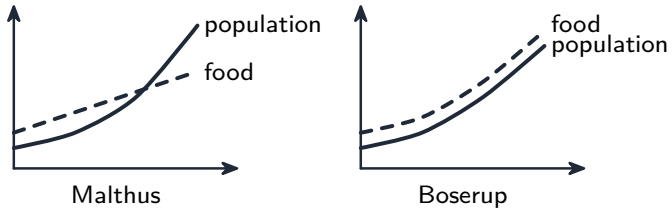
Exercise 2.5

2.5 Compare the views of **Malthus** and **Boserup** on population and resources. [4]



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2.5

Malthus: population grows faster than food supply, so famine, disease and war will stop growth; Boserup: population growth pushes people to invent new ways to grow more food, so food supply can keep up with population

Exercise 3.1 (a)

3.1 *(Paper 2 style.)* The table shows ecological footprint and biocapacity per person for four countries.

(a) Identify the country with the largest **ecological deficit** per person, and calculate its size. [2]

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(a) Country X; $5.0 - 1.0 = \mathbf{4.0}$ gha per person

Exercise 3.1 (b)

3.1 *(Paper 2 style.)* The table shows ecological footprint and biocapacity per person for four countries.

(b) Suggest **two** reasons why the footprint per person differs between Country W and Country Z. [4]

country	footprint	biocapacity
W	6.0	3.5
X	5.0	1.0
Y	2.5	2.2
Z	1.2	0.7

Exercise 3.1 (b)

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(b) any two, explained: Country W is richer, so people eat more meat and buy more goods; more energy use from cars, heating and air conditioning, often from fossil fuels; more waste and more imports of goods made elsewhere; Country Z is poorer and more rural, with lower energy use per person

Exercise 3.2

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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: Boserup: the Green Revolution (new seeds, fertilizer, irrigation) raised world grain output faster than population; world population passed 8 billion in 2022 without a world famine; new technology keeps raising supply: drip irrigation, new varieties, solar and wind energy; Malthus: famines still happen, though usually because people cannot afford food, not because there is none (Sen); humanity uses about 1.6 Earths, so stocks such as fish and forests are being used up; the Green Revolution needed a lot of water and fertilizer, causing falling water tables

and polluted rivers; climate change could cut yields in hot regions, a limit Malthus did not foresee; scale: at the global scale Boserup fits better; at a local scale, overuse of land and water fits Malthus; conclusion: Boserup has been more accurate so far, but a Malthusian limit may come from the environment instead of from food