Exercise walk-through

2.2
Climate change: consequences, vulnerability and responses

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.

Common errors

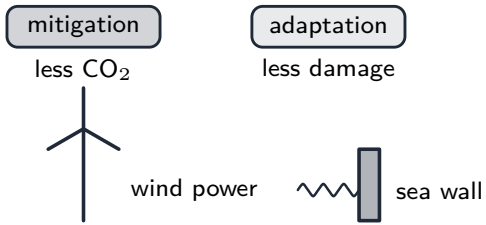
- Confusing the **greenhouse effect** (natural and necessary) with the **enhanced greenhouse effect** (caused by human emissions).
- Using one storm as proof of climate change; the evidence is the trend in many events.
- Confusing **mitigation** (reducing the causes) with adaptation (living with the effects).

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.

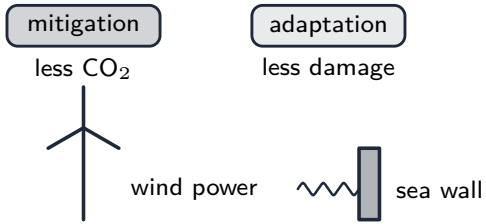
Exercise 2.1

2.1 Distinguish between **mitigation** and **adaptation**, with one example of each. [2]



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2.1

mitigation reduces the cause, i.e. greenhouse gas emissions, e.g. wind and solar power / planting forests; adaptation reduces the damage of the change, e.g. sea walls / drought-resistant crops / early warnings

Exercise 2.2

2.2 Explain how **capacity** affects vulnerability to sea-level rise, using **two** named countries. [3]



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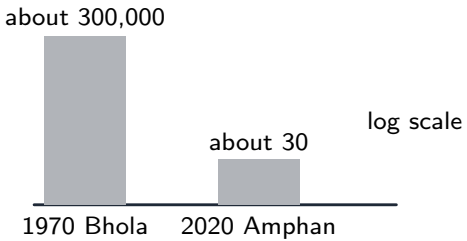


2.2

capacity = the money, knowledge and government to respond; the Netherlands is low-lying but rich, so it can build and maintain strong sea defences, so it is less vulnerable; Tuvalu (or Bangladesh) has low land and little money, so it cannot easily protect itself and is more vulnerable

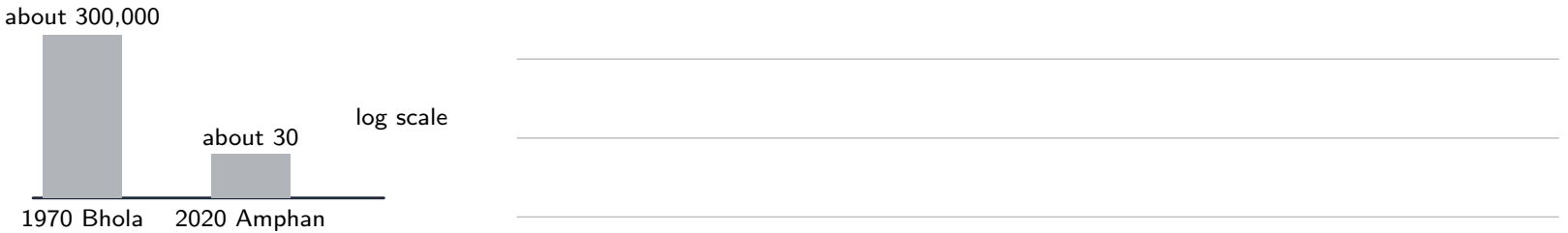
Exercise 2.3

2.3 Deaths in Bangladesh: Bhola cyclone (1970) about 300,000; Cyclone Amphan (2020) about 30. State **two** reasons for the difference. [2]



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2.3

any two: thousands of cyclone shelters; early warnings by radio and phone, and evacuation; trained volunteers; better forecasting

Exercise 2.4

2.4 Outline **three** ways climate change can affect human health or food. [3]



heat



mosquito



dry crop

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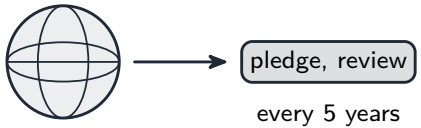

dry crop

2.4

any three: more heat stress and deaths in heatwaves; diseases such as dengue spread to new areas as mosquitoes spread; lower crop yields in hot or dry regions; floods damage crops and spread water-borne disease; warmer, more acidic oceans harm fish and coral, so less food from the sea

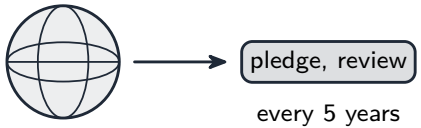
Exercise 2.5

2.5 Evaluate the **Paris Agreement** (2015) as a response to climate change. [4]



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2.5

global: almost every country joined; aim: well below 2 °C, try for 1.5 °C, with pledges reviewed every five years; limit: pledges are voluntary, with no penalty if they are missed; judgement: even if all pledges are met, warming is still expected to pass 2 °C, so it is a step forward but not enough on its own

Exercise 3.1 (a)

3.1 *(Paper 2 style.)* The table compares two cities that both face heavy rain.

(a) Using the table, identify **two** reasons why City B is more vulnerable to floods than City A. [2]

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(a) any two: more people live on the floodplain (60 % against 15 %); no early-warning system; less money to spend per person on drainage; many homes in informal settlements / weaker houses

Exercise 3.1 (b)

3.1 *(Paper 2 style.)* The table compares two cities that both face heavy rain.

(b) Explain **two** adaptation strategies that City B could use to reduce flood damage. [4]

	City A	City B
people living on the floodplain	15 %	60 %
early-warning system	yes	no
drainage spending per person	US$120	US$9
homes in informal settlements	5 %	40 %

Exercise 3.1 (b)

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(b) any two, explained: an early-warning system by phone and radio, so people move to safety before the flood; sponge-city parks, wetlands and porous pavements hold rain where it falls and lower the peak; zoning to stop new building on the floodplain lowers exposure over time; raised houses or embankments keep water out of homes

Exercise 3.2

3.2 "Adaptation is more important than mitigation." Discuss this statement with reference to places at different scales. [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: adaptation saves lives now: Bangladesh shelters and warnings cut cyclone deaths from about 300,000 (1970) to a few dozen (2020); some warming is already locked in (about 1.1 °C), so places must adapt anyway; adaptation is local and visible, e.g. sponge cities such as Wuhan, so governments can act alone; but adaptation has limits: Tuvalu cannot raise its land fast enough, and the Zhengzhou rain of 2021 was far beyond the design; poor places have little capacity to adapt, so adaptation alone increases inequality; mitigation reduces the cause for everyone: the Paris Agreement aims for well below 2 °C; China's pledge to peak CO_2 before 2030 matters because it emits about a third of the world's CO_2; without mitigation, the cost of adaptation keeps rising; conclusion: both are needed; adaptation is urgent locally, but only global mitigation stops the problem growing