2.2 Climate change: consequences, vulnerability and responses

Name: _____ Class: _____ Date: _____ **Total: 30 marks**

KEY WORDS vulnerability • resilience • mitigation • adaptation • carbon capture and storage • Paris Agreement • geoengineering

Objective

Build the skills to answer exam questions on the **consequences** of climate change for people and places, why **vulnerability** differs, **resilience**, and responses: **mitigation** and **adaptation** at global, national, city and civil-society scales.

You must be able to:

- explain consequences of climate change for the Earth system and for people
- explain vulnerability with exposure, sensitivity and capacity
- distinguish mitigation and adaptation with examples
- evaluate a response at a stated scale with a number and a limit
- compare two places that face a similar hazard with different capacity

1 Key knowledge and worked examples

Consequences

Hotter heatwaves, heavier rain, longer droughts, warmer and more acidic oceans, coral bleaching and rising seas. People are affected through **health** (heat stress, dengue spreading), **food** (lower yields in hot regions) and **migration** (people leave land that floods or dries). In July 2021, 201.9 mm of rain fell on Zhengzhou in one hour; almost 400 people died across Henan. One storm cannot prove climate change, but warmer air holds more water.

Vulnerability and resilience

factor	meaning	example
exposure	how much of the hazard reaches a place	most of Tuvalu is under 3 m above sea level
sensitivity	how much damage it does	farmers who depend on rain, not irrigation
capacity	money, knowledge and government to respond	the Netherlands can afford strong sea defences

Resilience is the ability to cope and recover. The 1970 Bhola cyclone killed about 300,000 to 500,000 people in what is now Bangladesh; after shelters, volunteers and phone warnings, Cyclone Amphan (2020) killed a few dozen there.

Responses

- **Mitigation** reduces the cause: solar and wind power, electric vehicles, forests, **carbon capture and storage**.
- **Adaptation** reduces the damage: sea walls, heat-resistant crops, sponge cities, early warnings, moving people.

scale	example	judgement
global	**Paris Agreement** (2015): well below 2 °C, try for 1.5 °C	almost every country joined; pledges voluntary and not enough
national	China: CO_2 to peak before 2030, carbon neutral before 2060; carbon trading since 2021	large effect: China emits about a third of world CO_2
city	sponge cities from 2015 (30 pilots, e.g. Wuhan)	helps; but the Zhengzhou rain was far beyond the design
civil society	Fridays for Future school strikes from 2018	raised attention; effect on emissions hard to measure

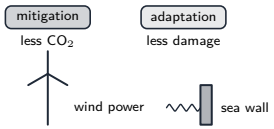
Geoengineering (e.g. particles in the upper air to reflect sunlight) might cool fast, but does not stop ocean acidification and could change rainfall elsewhere.

Worked example. *Evaluate a strategy* in four moves: name it and its scale → how it reduces the cause or the damage → a number → a limit.

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2 Practice

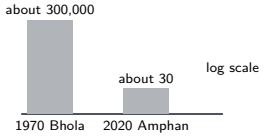
2.1 Distinguish between **mitigation** and **adaptation**, with one example of each. [2]



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



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



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



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



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3 Exam-style questions

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]

(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 %

3.2 "Adaptation is more important than mitigation." Discuss this statement with reference to places at different scales. [10]