Coasts in 2100

Reading regional climate projections

ENV.3.2 "Interpret data and climate models to predict how global and regional climate change can affect Earth's systems (e.g., precipitation, temperature, impacts on sea level, global ice volumes, and atmosphere and ocean composition)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one temperature change and one sea-level change in the table. Circle a phrase in the passage that helps explain each change.

One Scenario, Different Coasts

1 A coastal planner compares one illustrative climate-model scenario for the year 2100 with a late-1900s baseline. The table reports regional changes, not tomorrow's weather. Each number is a projection under continued high greenhouse gas emissions, not a guaranteed outcome. Comparing regions matters because the same global increase in greenhouse gases can produce different local risks.

ILLUSTRATIVE 2100 PROJECTIONS COMPARED WITH A LATE-1900S BASELINE

Region	Temperature change (°C)	Annual precipitation change (%)	Local sea-level rise (cm)
Arctic coast	+5	+12	45
Mediterranean coast	+3	-15	65
Tropical delta	+2	+8	80

2 Arctic warming reduces reflective sea ice, exposing darker water that absorbs more sunlight. Warmer air holds more water vapor, but not every region gets wetter. Shifting storm paths can reduce Mediterranean rainfall. In a tropical delta, warmer air can intensify downpours even if the change in annual rainfall seems modest.

3 Warm ocean water expands, and melting land ice adds water to the sea. Currents and sinking land can change local sea level further. In the delta, sinking ground may contribute to the table's projected rise. These model results show possible futures, not promises; the differences help planners weigh risks.

2 ANSWER WITH EVIDENCE

Use the passage

1. Which region has the largest projected temperature increase? Predict how that increase could lead to further warming there.

2. How do the Mediterranean coast and tropical delta differ in projected annual precipitation? Use the passage to explain why a modest annual change in the delta does not rule out heavier downpours.

3. How much greater is the projected local sea-level rise in the tropical delta than on the Arctic coast? What factor named in the passage may add to the delta's rise?

4. Using two columns of the table, predict two different challenges for the Mediterranean coast.

3 YOUR TURN

Your own words

Write a five-sentence advisory to a tropical delta community. Use two projected values from the table, explain how they combine to affect flooding, propose one response, and name one uncertainty in the projection.

Coasts in 2100

PART 1 · READ AND MARK

Underline one temperature change and one sea-level change in the table. Circle a phrase in the passage that helps explain each change. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Which region has the largest projected temperature increase? Predict how that increase could lead to further warming there.	**The Arctic coast has the largest increase, 5°C. Warming reduces reflective sea ice, exposing darker water that absorbs more sunlight and adds to warming.**
2	How do the Mediterranean coast and tropical delta differ in projected annual precipitation? Use the passage to explain why a modest annual change in the delta does not rule out heavier downpours.	**Mediterranean precipitation decreases 15%, while delta precipitation increases 8%. Warmer air can intensify delta downpours even when the annual change is modest.**
3	How much greater is the projected local sea-level rise in the tropical delta than on the Arctic coast? What factor named in the passage may add to the delta's rise?	**The delta's projected rise is 35 cm greater. Sinking ground may add to its local sea-level rise.**
4	Using two columns of the table, predict two different challenges for the Mediterranean coast.	**A 15% decrease in annual precipitation could strain water supplies, while 65 cm of local sea-level rise could increase coastal flooding.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The model projects 8% more annual precipitation and 80 cm of local sea-level rise in the tropical delta. More rain could increase runoff while higher seas make it harder for floodwater to drain away. Warmer air could also intensify downpours. The community could improve drainage and keep new buildings out of low-lying areas. The exact sea-level rise is uncertain because sinking ground can vary.

Accept other reasonable risks and responses when students connect them to the stated projections. Students should treat the numbers as scenario projections, not certain outcomes.