Layers of Risk

Compare maps to explain changing flood patterns

WG.P.2.3.B "Compare and analyze complex maps and mapping technologies to analyze spatial patterns of human and physical environments, explaining relationships between the environment and events, past and present."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline three kinds of maps or mapping technologies, circle physical features, and number two places where built structures affected flooding. Use your marks to compare what each source reveals.

Mapping Floods in New Orleans

1 New Orleans offers a test of how maps tell different parts of one story. A topographic map shows the city's higher ground along the Mississippi River and lower areas toward Lake Pontchartrain. A lidar elevation map, made with laser measurements, reveals smaller changes in height that a general map may hide. A land-use map shows where streets and homes occupy those low areas. Read together, the maps suggest which neighborhoods could face deep flooding, but elevation alone cannot predict where a floodwall will fail or whether pumps will work during a storm.

2 After Hurricane Katrina in 2005, breaks in floodwalls along drainage canals let water enter parts of New Orleans. About 80 percent of the city flooded. Satellite images recorded the spread of water, while flood-depth maps estimated how high it rose in different places. Comparing those maps with elevation and canal locations helps explain why some low neighborhoods flooded badly, but the pattern was not caused by low ground alone. The damaged floodwalls mattered. Satellite images from different days may show different flood boundaries because water moves and drains, so the date on each image matters.

3 After Katrina, engineers strengthened the area's flood protection system with levees, floodwalls, gates, and pumps. When Hurricane Ida struck Louisiana in 2021, New Orleans did not experience the widespread flooding seen in 2005, although the city lost electrical power. Comparing flood-extent maps from the two storms with maps of protection structures points to the role of infrastructure, not just elevation, in shaping flood patterns. Yet the storms differed, so the maps alone cannot measure how much the rebuilt system changed the outcome. A power-outage map would show another impact that a flood map could miss.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do elevation and land-use maps together reveal a flood risk that either map alone might miss?

2. Why is a map of the 2005 flood more informative when compared with maps of canal locations and elevation?

3. How did the flood patterns in 2005 and 2021 differ? What change might help explain the difference, and why cannot the maps prove it was the only cause?

4. What different impacts could 2021 flood-extent and power-outage maps show? Why should a planner compare both?

3 YOUR TURN

Your own words

Imagine a river town choosing a site for a new library after a major flood. In 75 to 100 words, propose at least two map layers and one mapping technology, explain how comparing past and present maps would guide your choice, and identify one limit of the evidence.

Layers of Risk

PART 1 · READ AND MARK

Underline three kinds of maps or mapping technologies, circle physical features, and number two places where built structures affected flooding. Use your marks to compare what each source reveals. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do elevation and land-use maps together reveal a flood risk that either map alone might miss?	**The elevation map identifies low ground, while the land-use map shows where homes and streets occupy it. Together they identify developed areas that could face deep flooding.**
2	Why is a map of the 2005 flood more informative when compared with maps of canal locations and elevation?	**The comparison shows where floodwater spread relative to low ground and the canals where floodwalls broke. It helps explain why low elevation was not the only cause of flooding.**
3	How did the flood patterns in 2005 and 2021 differ? What change might help explain the difference, and why cannot the maps prove it was the only cause?	**Much of New Orleans flooded in 2005, but widespread flooding did not recur in 2021. The strengthened flood protection system may help explain the difference, but the storms also differed.**
4	What different impacts could 2021 flood-extent and power-outage maps show? Why should a planner compare both?	**A flood-extent map would show where water spread, while a power-outage map would show where electricity failed. Comparing both would reveal impacts that a flood map alone could miss.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would compare older and recent flood-extent maps with an elevation layer and a road layer. Satellite images could help locate water after each flood. I would choose a library site on higher ground near a road that stayed outside both mapped flood areas. If the recent flood reached new streets, I would investigate whether changes to the land affected runoff before deciding. The maps show patterns, but they cannot guarantee that the next flood will follow the same path.

Accept explanations that connect mapped patterns to both physical conditions and human-built systems. For the open task, accept any plausible site choice supported by past and present map comparisons and an evidence limit.