Reading Flood Layers

Compare map evidence to explain Houston's flood patterns.

AWH.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 each map layer or image named in the passage. Number two sentences that connect information from different layers to explain where flooding occurs.

Mapping Hurricane Harvey's Flooding

1. In August 2017, Hurricane Harvey brought days of intense rain to the Houston area. A map of rain measured by weather radar would show where the heaviest rain fell, but it would not show where water collected. A digital elevation map, made from measurements of ground height, shows low land beside bayous, the streams that drain the city. Comparing these two layers suggests that places where heavy rain overlaps low ground may face especially high flood risk. Yet a low place receiving less rain might flood too, if water flows into it from upstream.

2. In some parts of western Houston, land that was fields or open ground in the 1950s had become roads, roofs, and parking lots by 2017. Comparing land-use maps from those years reveals a shift toward built surfaces near bayous. Pavement keeps some rain from soaking into soil, increasing runoff that can reach streams quickly. But land-use maps alone cannot show exactly which streets flooded. An optical satellite image taken during Harvey's flooding can locate water across neighborhoods, although clouds or trees can hide some areas. These layers answer different questions: where building spread, and where floodwater appeared during one storm.

3. Now imagine placing the flood image over the elevation and land-use maps. Water may appear far from the places with the highest radar rainfall because bayous carry water downstream. Low ground and paved areas can overlap a flooded neighborhood, suggesting several possible contributors rather than a single cause. A 1950s map cannot tell us how much rain fell there in 2017, and one storm image cannot prove pavement caused a particular flood. To test that claim, investigators would compare rainfall, stream levels, ground height, and land cover across several storms. Map layers reveal patterns, but their dates and measurements shape what those patterns mean.

2 ANSWER WITH EVIDENCE

Use the passage

1. How would comparing the radar rainfall map with the elevation map help you identify places at risk of flooding?

2. What change would the two land-use maps show near some western Houston bayous, and how might that change affect runoff?

3. Suppose the satellite image shows flooding far from the heaviest rainfall on the radar map. What feature shown by another map could help explain that pattern?

4. Why would comparing a 1950s land-use map with one flood image from 2017 be insufficient to prove that pavement caused flooding on a particular street?

3 YOUR TURN

Your own words

Imagine a city replaces a paved lot on low ground near a bayou with a park. In four sentences, predict how a flood-extent image after a future storm might differ from the 2017 image, using both land cover and elevation; explain why the images alone could not prove the park caused any difference.

ANSWER KEY

Reading Flood Layers

HIGH SCHOOL · AWH.P.2.3.B

PART 1 · READ AND MARK

Underline each map layer or image named in the passage. Number two sentences that connect information from different layers to explain where flooding occurs. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How would comparing the radar rainfall map with the elevation map help you identify places at risk of flooding?	**The rainfall map shows where heavy rain fell, while the elevation map shows low ground. Places where heavy rain overlaps low ground may face especially high risk.**
2	What change would the two land-use maps show near some western Houston bayous, and how might that change affect runoff?	**They would show some fields or open ground becoming built surfaces. Pavement reduces soaking into soil, so more runoff can reach streams quickly.**
3	Suppose the satellite image shows flooding far from the heaviest rainfall on the radar map. What feature shown by another map could help explain that pattern?	**The elevation map shows low land beside bayous. Bayous can carry water downstream into low areas far from the heaviest rain.**
4	Why would comparing a 1950s land-use map with one flood image from 2017 be insufficient to prove that pavement caused flooding on a particular street?	**The maps show a land-use change and flooding during one storm, not the cause of flooding on that street. Investigators would also need evidence such as rainfall, stream levels, and ground height across several storms.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The park might let more rain soak into the soil than the paved lot did. A future flood-extent image might show less water near that site than the 2017 image. Because the site is low and near a bayou, water could still collect there or flow in from upstream. The two images alone could not prove the park caused a change because the storms might have brought different amounts of rain.

Accept other supported explanations of flood patterns that compare what different layers measure. For Part 3, the prediction may show no reduction in flooding if the student explains the role of low ground or water arriving from upstream.