Layers of Risk

Compare maps to explain environmental change and flood risk

E.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 two places where different maps are compared, circle one human-made change that affects the environment, and number two warnings about what maps cannot show or prove.

Reading New Orleans Through Maps

1. Along Louisiana's coast, a 1930s survey map shows broad stretches of wetlands near the Mississippi River Delta. Recent satellite images show open water in places that earlier maps marked as marsh. Land sank, sea level rose, canals cut through marshes, and river levees reduced the flow of sediment that once helped build new land. These processes worked at different rates in different places. Wetlands can slow some storm surge, so losing marsh may increase exposure for coastal communities. Yet a map of wetland loss alone cannot show which neighborhoods flooded during Hurricane Katrina in 2005.

2. In 2005, satellite images showed water across many New Orleans neighborhoods after Hurricane Katrina. A lidar elevation map uses laser measurements to show low ground and higher ridges. Comparing the layers shows that many flooded areas lay on low ground, but elevation alone does not explain the pattern. Failed levees let water enter parts of the city, while some low areas stayed dry behind intact barriers. Satellite images record visible water at a particular time; cloud cover and buildings can hide details. The maps support a relationship among land elevation, engineered barriers, and flooding, not a claim that low ground always floods.

3. Today, planners can place past flood outlines over current street and population maps in a geographic information system, or GIS. The combined layers reveal where homes and roads overlap areas flooded in 2005, but they do not predict the exact outline of a future flood. A road that appears on a street map may be impassable during a storm. Planners also compare newer satellite images with older coastal surveys to track changes in wetlands outside the city. Together, these maps connect environmental change with a past disaster and current decisions about evacuation, while their different dates warn against treating every layer as a picture of the same moment.

2 ANSWER WITH EVIDENCE

Use the passage

1. What spatial change appears when the 1930s coastal survey is compared with recent satellite images? Name one process that helps explain it.

2. How do the 2005 satellite images and the lidar elevation map together help explain flooding? Why is elevation alone insufficient?

3. Why can't a map of coastal wetland loss identify exactly which New Orleans neighborhoods flooded in 2005?

4. What can planners learn by placing 2005 flood outlines over current street and population maps? Give one reason they should not treat the overlap as a prediction.

3 YOUR TURN

Your own words

Plan a map comparison to help choose a new cooling center for a future heat wave in New Orleans. In 4 to 5 sentences, name three map layers, describe an overlap that would guide your choice, and explain one limit of the evidence.

Layers of Risk

PART 1 · READ AND MARK

Underline two places where different maps are compared, circle one human-made change that affects the environment, and number two warnings about what maps cannot show or prove. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What spatial change appears when the 1930s coastal survey is compared with recent satellite images? Name one process that helps explain it.	**Some places mapped as marsh in the 1930s appear as open water in recent images. Land sinking is one possible contributing process.**
2	How do the 2005 satellite images and the lidar elevation map together help explain flooding? Why is elevation alone insufficient?	**Many flooded neighborhoods were on low ground, but levee failures also affected where water entered. Some low areas stayed dry behind intact barriers.**
3	Why can't a map of coastal wetland loss identify exactly which New Orleans neighborhoods flooded in 2005?	**It shows coastal environmental change, not neighborhood floodwater. Flooding also depended on factors such as elevation and levee failures.**
4	What can planners learn by placing 2005 flood outlines over current street and population maps? Give one reason they should not treat the overlap as a prediction.	**They can find homes and roads that overlap areas flooded in 2005. A future flood may have a different outline, and a mapped road may be impassable during a storm.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would overlay satellite tree-cover images, a map of where older adults live, and a map of existing cooling centers. I would look for a neighborhood with little tree cover, many older adults, and no nearby center. I would consider placing a center there because shade may reduce heat exposure and older adults can be especially vulnerable. Tree cover alone does not measure indoor heat, so I would check local temperatures before making a final choice.

Accept other accurate contributing processes in question 1 and other passage-supported limits in question 4. For the open task, look for three relevant layers, a reasoned spatial overlap, and a specific evidence limit.