

Kentucky Academic Standards



**Grade 11 Science
Released Items
2020**

Science

DIRECTIONS

Read all the information and the questions carefully.
Choose the best answer(s).

Jamal was learning about ancient civilizations in his social studies class when he came across a picture of a giant stone statue located on the volcanic island Easter Island. He was fascinated by the picture and decided to learn more about where Easter Island is located and who lives there.



He was surprised to learn that Easter Island is now essentially deserted, but at one time as many as 10,000 people lived there. He also learned that the environment is radically different now than it was when the first people arrived. It was once covered by a lush rain forest but now supports only minimal, low vegetation. The people who first colonized this island came in search of new resources to use.

Jamal wondered, "What happened to all of the trees and all of the people?"

Jamal learned how valuable trees were to the inhabitants when he read the passage below:

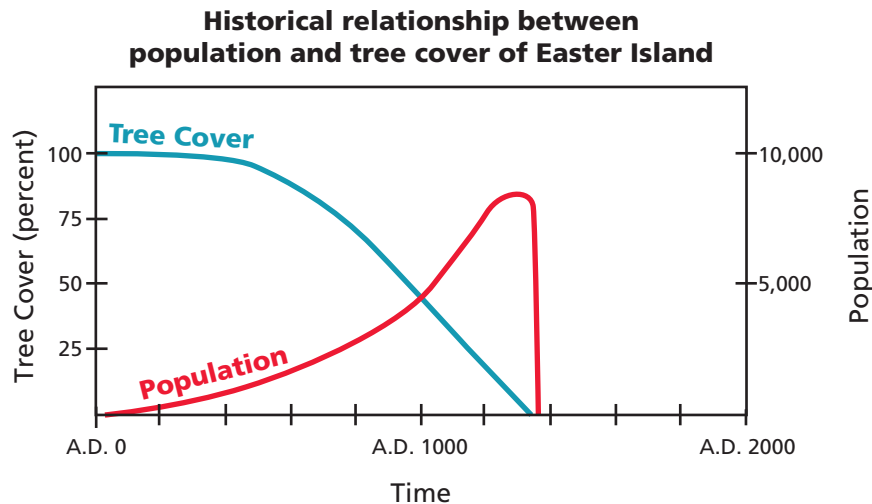
To the people of Easter Island, trees were wealth. In fact, the words for tree and wealth were used interchangeably. The islanders used trees in almost every part of their daily lives. Beyond obvious uses as firewood and for house building, the trees provided fruit and birds for the islanders to eat. The bark was used to make clothes and the fibers for rope. Tree trunks were used to create oceangoing canoes, allowing the islanders to harvest deep-water fish such as tuna, using harpoons made from the branches. Most famously, perhaps, the logs were used to make rollers and other parts of the transport system responsible for moving the hundreds of stone statues that were distributed across the island.

1

What claim might Jamal make about the impacts of the over use of trees on the inhabitants of Easter Island?

- A** Since trees were considered wealth, landowners became even more wealthy and powerful.
- B** The people of Easter Island were no longer able to find resources to make clothes and canoes.
- C** The people of Easter Island began to rely more on an agricultural society versus hunting and gathering.
- D** Bird species that once nested in the trees moved their nests onto the statues and ate fish instead of the berries in the trees.

Jamal discovered that researchers have constructed a model showing the relationship between the island's inhabitants and the percentage of the island that was covered by trees.



2

Assuming the human population had never exceeded 2000 people, what would have been the one **most likely** impact on the tuna populations near the island?

- A** The tuna populations would have increased slightly and then remained stable.
- B** The tuna populations would have decreased slightly and then remained stable.
- C** The tuna populations would have increased greatly and would have varied more.
- D** The tuna populations would have decreased greatly and would have varied more.

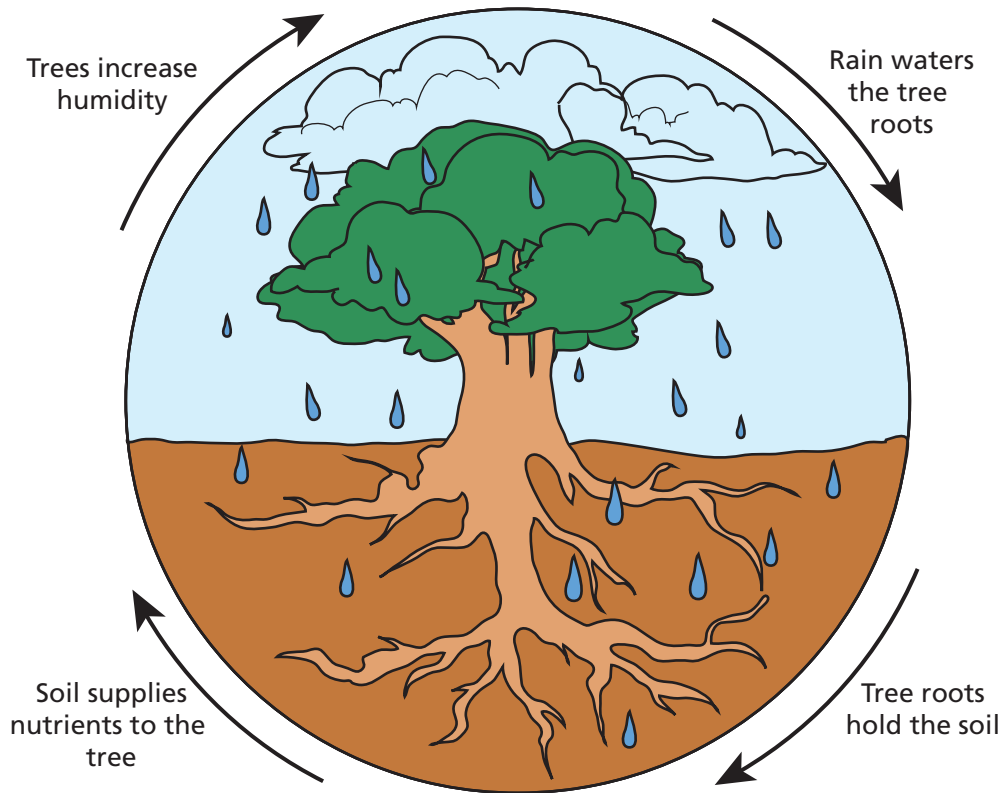
Archaeologists have searched through the garbage of the ancient inhabitants to look for clues about when the tree population decline began to impact other parts of the environment.

3

Which piece of evidence from the garbage excavation would support a conclusion that the tree population had been severely reduced at a certain point in time?

- A** Increase in the use of ropes
- B** Increase in seeds from fruits
- C** Decrease of deep-water fish in their diet
- D** Decrease in consumption of agricultural products

One thing Jamal learns is that the rainfall amounts on the island today are lower than they were in the past, and that scientists believe that people were responsible for changing the amount of rainfall on the island. Jamal finds a model that explains how this might work.



4

Which component of this proposed model provides the one **most likely** explanation for how cutting down trees might impact the amount of rainfall?

- A Tree roots hold the soil
- B Trees increase humidity
- C Rain waters the tree roots
- D Soil supplies nutrients to the tree

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Jamal thought, "I don't understand why the people kept cutting down all the trees. It sure seems like once they knew what was going on that they could have done something to prevent all the trees from being cut down."

5

Use your understanding of environmental impacts due to human involvement to design a solution that could have allowed the Easter Island civilization to maintain itself by preventing deforestation. Be sure your description of the solution explains:

- how the solution's impact would be monitored
- how the solution would be effective in addressing the main cause of the problem

Write your answer on the next page.

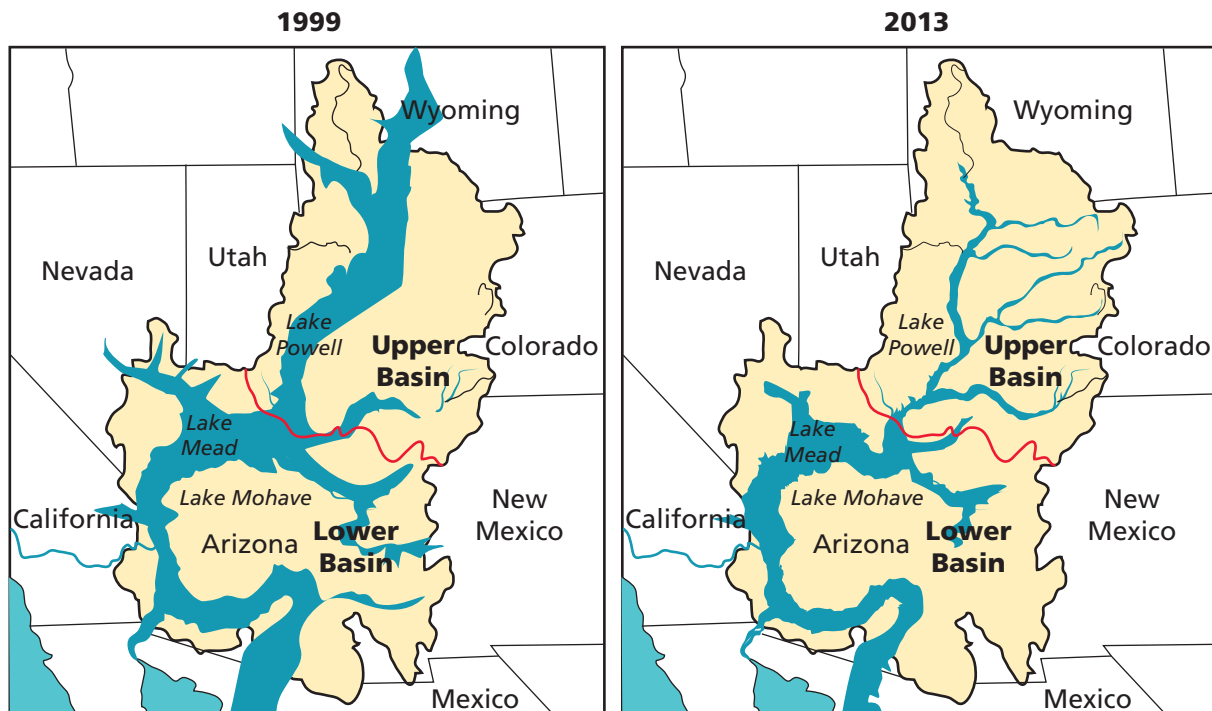
5

A large rectangular area with a red border containing 25 horizontal blue lines for writing.

Jamal wondered if anything like that was happening on Earth today.

“I never really thought of trees as being resources. I always thought stuff that could be used up like coal or oil were what people meant by resources,” said Jamal. Mrs. Johnson, Jamal’s teacher, asks what he does when he gets thirsty. “I go get a drink from the water fountain or buy a bottle of water from the vending machine.” She explains that water is a resource and suggests Jamal research Lake Powell. Jamal finds the following information.

Lake Powell sits behind the 700-foot-tall Glen Canyon Dam that restricts the Colorado River. Its water levels have recently varied between 39 percent and 51 percent full. Glen Canyon Dam provides critical water storage for the Upper Basin states (Colorado, New Mexico, Utah, and Wyoming and a portion of Arizona) and guarantees that the Lower Basin states (California, Nevada, and Arizona) receive their promised water supply. The downstream states use the majority of their water supply for agricultural operations, allowing the arid Southwest to grow fruit and vegetable crops. As a result, Lake Powell risks falling to a level that experts refer to as “dead pool,” meaning the water is no longer high enough to flow through the dam’s gates or generate the hydropower that the West’s electricity grid depends on. The water level of the lake has dropped over 110 feet in the past 15 years.



6

What one piece of evidence presented in the scenario and graphic **best** supports the claim that the Lower Basin states are causing the water level of Lake Powell to decrease?

- A** The Glen Canyon Dam is only able to produce 75% of its intended electrical output.
- B** The Imperial Valley in California produces two-thirds of the vegetables that Americans eat during the winter.
- C** The state of Wyoming is experiencing a 15-year drought that is not refilling Lake Powell as fast as it is being drained.
- D** The Colorado River is still refilling this reservoir from the Upper Basin states, which is dammed by Glen Canyon Dam.

In response to the decline in freshwater availability in California, the state's governor asked that cities reduce outdoor use of water such as outdoor fountains, and washing driveways and sidewalks. California imposed a further water restriction in 2015 requiring all cities to cut their water usage by 25 percent in order to have enough water to support their population of approximately 39 million people.

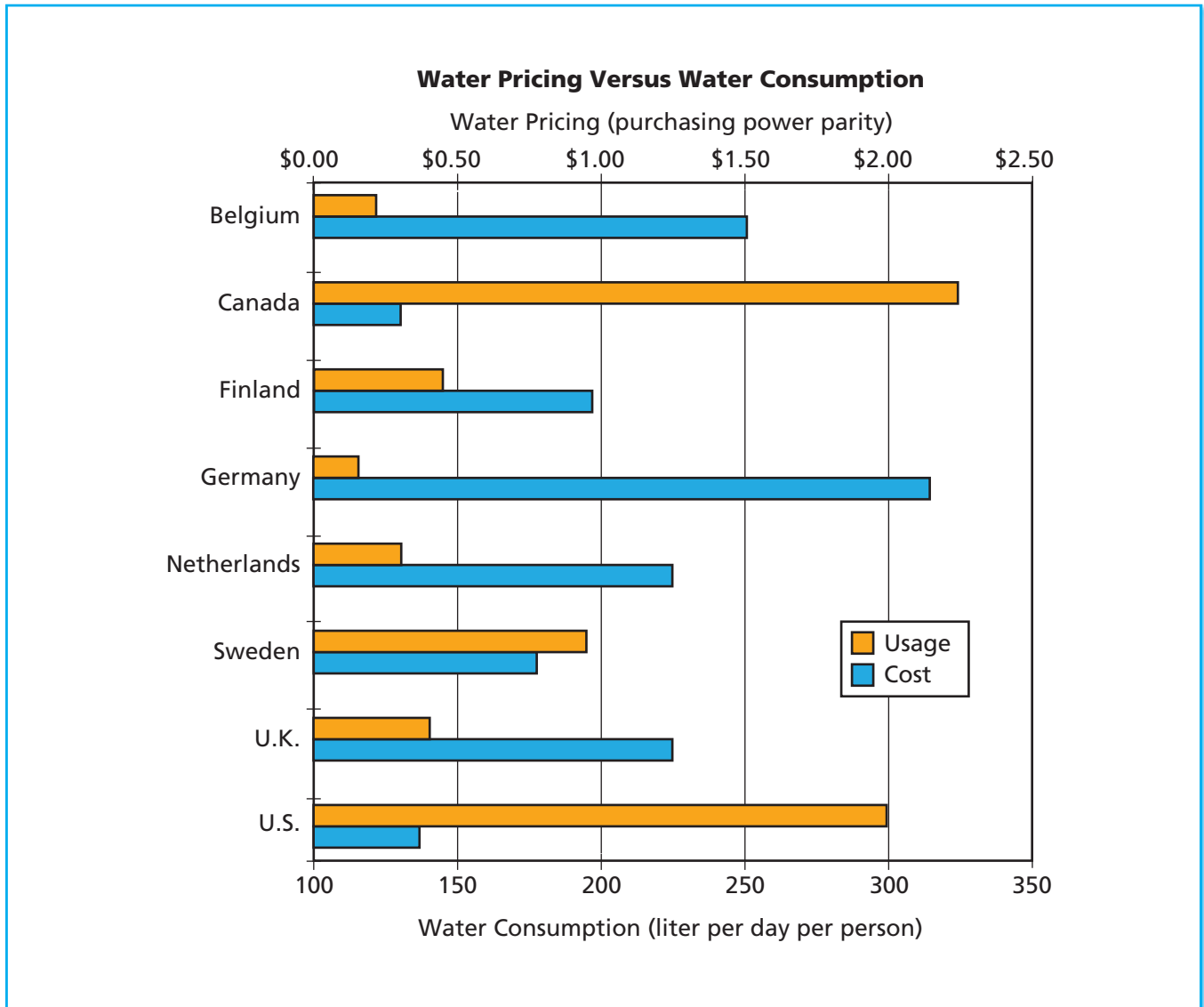
7

Which possible environmental results **most likely** occurred as a result of implementing the water conservation act mandated by the California governor?

Select the TWO **best** answers.

- A** Water prices will remain constant instead of increasing because of supply and demand.
- B** Agricultural production will remain relatively stable because there will be enough water to irrigate crops.
- C** People will plant more drought-friendly lawns and landscaping to reduce the amount of water needed to irrigate their land.
- D** Outdoor recreation facilities such as golf courses and water parks will see a drop in attendance because they will have to increase their entrance ticket prices.

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8

Jamal looks at the graph that shows the cost of water in several countries around the world and how much water the countries use each day per person.

Which statement about the water conservation habits of the various countries is supported by the patterns in the graph?

- A** The combination of a low cost of water with high water usage can result in increased groundwater levels.
- B** The combination of moderate costs and moderate water usage in Sweden suggests that Sweden needs to conserve water.
- C** The combination of low costs and high water usage in the United States suggests the lack of a water-conservation policy
- D** The combination of a high cost of water with low water usage can result in a decrease in the amount of hydroelectric power a country can produce.

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ACKNOWLEDGMENTS

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