VA #1 Focus Questions

1. What are the most important crops grown in California's Central Valley?

2. What natural resources (found in the Great Central Valley) do plants need to grow well?

3. What did people in California do to the natural water systems in order to irrigate their crops?

4. How did irrigation affect agricultural production?

5. Are these irrigation systems still in place today?

VA #2 Map of Egypt

VA #3 Map of Mesopotamia

VA #4 Data Tables for Counting the Crops and Crowds 1

POPULATION IN ANCIENT EGYPT CHART

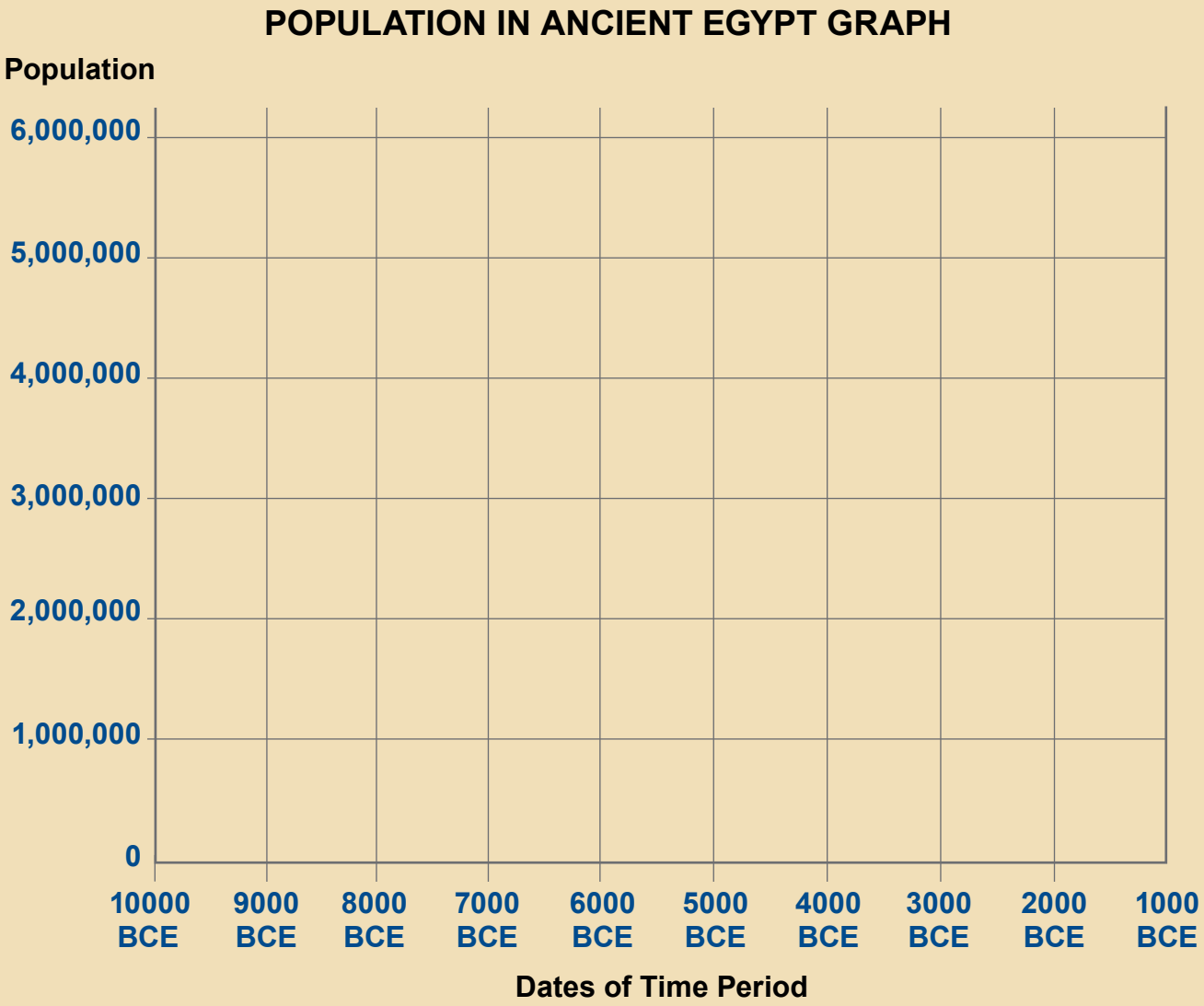
Description of Time Period	Dates	Population
Pre-Agriculture on the Nile	8000 BCE	100,000
Agriculture on the Nile begins; first permanent buildings built	6000 BCE	200,000
Old Kingdom: Invention of the shaduf and irrigation canals	2650 BCE	1 million
Middle Kingdom	2030 BCE	2 million
New Kingdom	1550 BCE	3 million
Late Period	1295 BCE	4 million
Beginning of Common Era	0	5 million

VA #5 Data Tables for Counting the Crops and Crowds 2

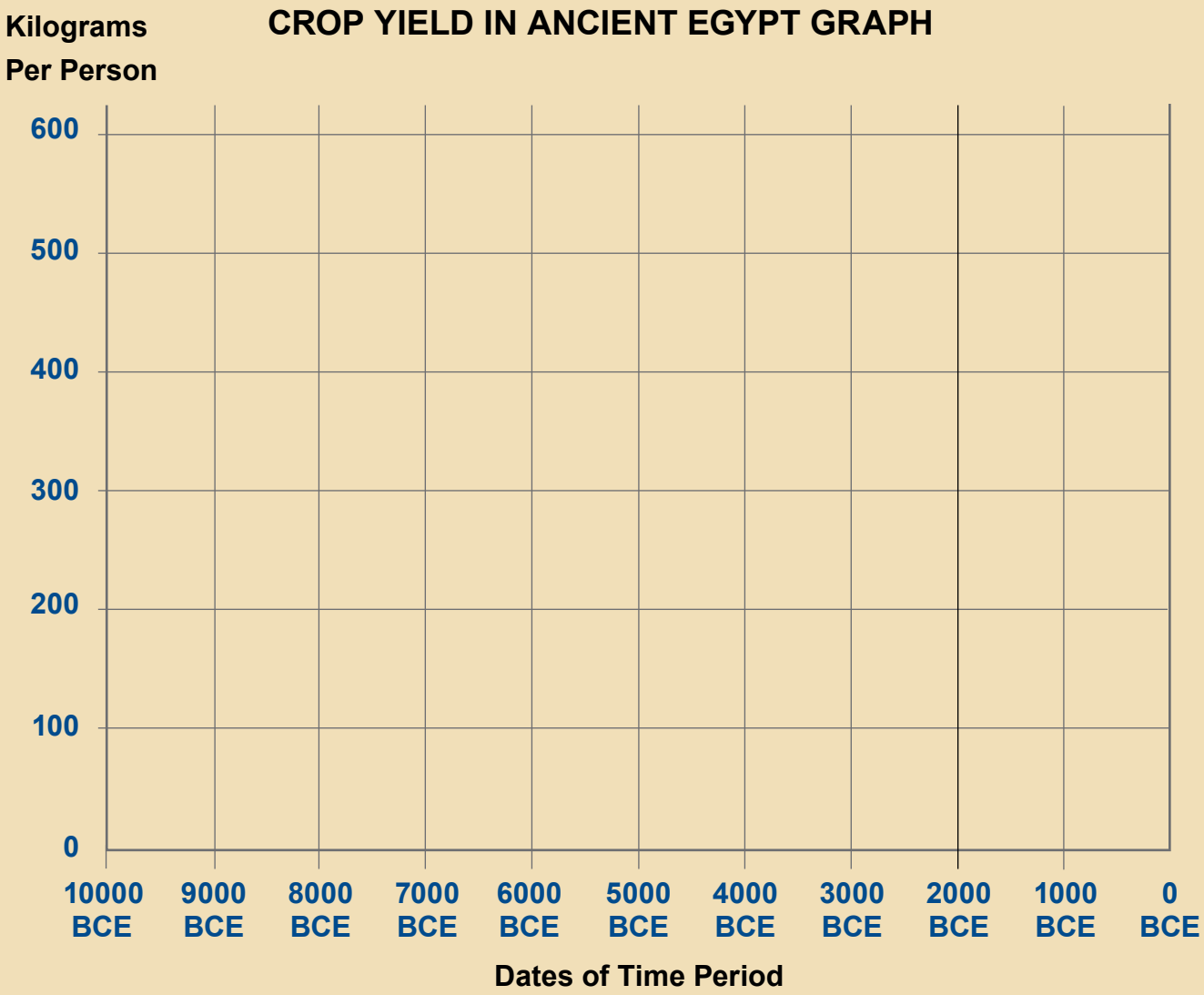
CROP YIELD IN ANCIENT EGYPT CHART

Description of Time Period	Dates of Time Period	Crop Yield per Person (Average)
Pre-Agriculture on the Nile	8000 BCE	2 kilograms
Agriculture on the Nile begins; first permanent buildings built	6000 BCE	100 kilograms
Old Kingdom: Invention of the shaduf and irrigation canals	2650 BCE	350 kilograms
Middle Kingdom	2030 BCE	400 kilograms
New Kingdom	1550 BCE	450 kilograms
Late Period	1295 BCE	550 kilograms
Beginning of Common Era	0	600 kilograms

VA #6 Graphing the Crops and Crowds 1



VA #7 Graphing the Crops and Crowds 2

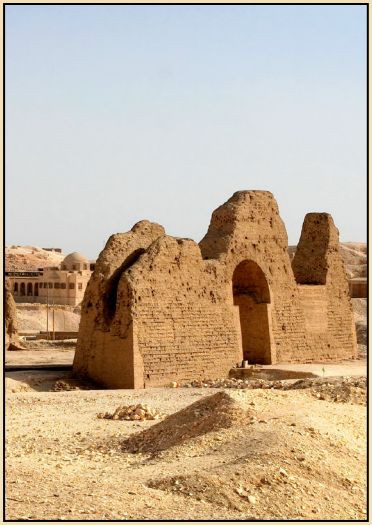


VA #8 Cities of Ancient Mesopotamia

VA #9 Cities of Ancient Egypt

VA #10 Changes in the Fertile Crescent

This presentation introduces the effects of salinization on the Fertile Crescent.



VA #11 Where Agriculture Began…

Where agriculture began…

…farming suddenly stopped. Lands in southeastern Mesopotamia were abandoned. The people of the area moved north, toward the Mediterranean Sea.

Why?

VA #12 Clues in the Cuneiform

Ancient cuneiform tablets tell of the soil becoming “salty” in this area. They also tell of times thousands of years before where the ancient people cut down trees and cleared land to plant more crops to feed more people. Without plant cover, the ground around the rivers eroded, and the fields flooded.

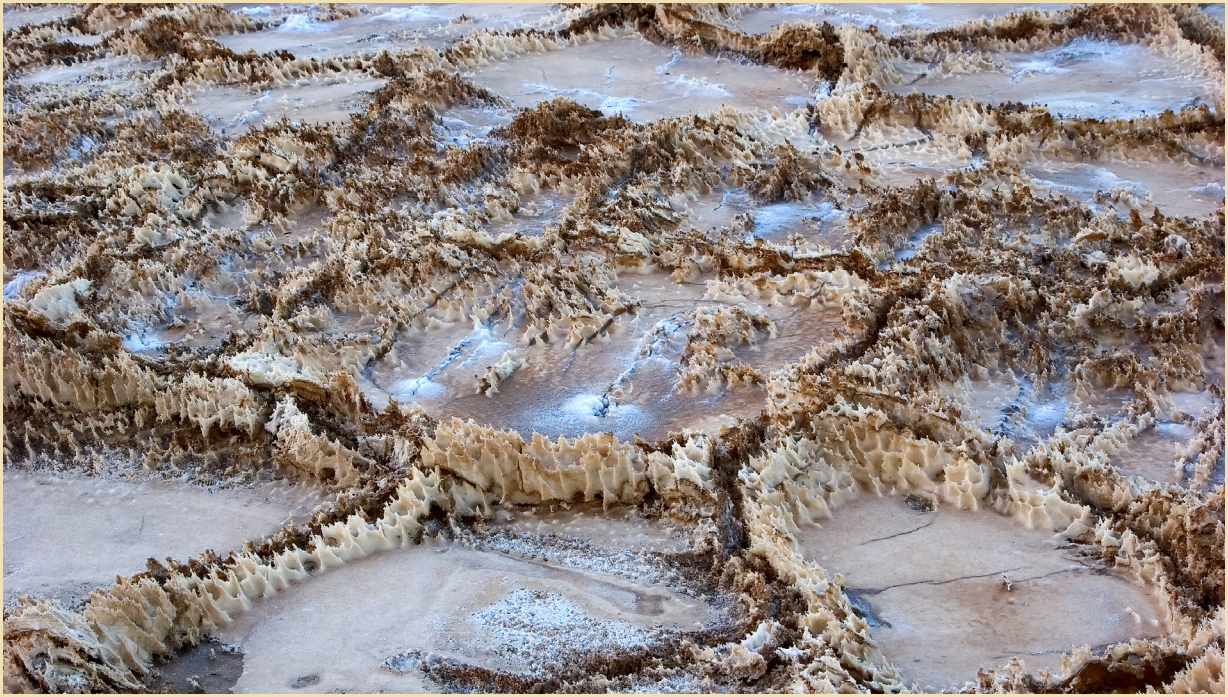
But what does this have to do with salt?

VA #13 Salinization

Salt buildup in soil is called *salinization.*

Many crops cannot grow in soils with too much salt in them.

Certain elements that are naturally in soil (like calcium and sodium) form salts when combined with other elements.



VA #14 Causes of Salinization

Salinization occurs when:

- The soil in an area contains many salts.
- Water used for irrigation in that area contains salts, too.
- The climate of the area is hot and dry; evaporation occurs at a greater rate than precipitation.

VA #15 Why Some Soil is Salty

When water and wind erode rocks and create soil, minerals are released. Some of these minerals form salts that remain in the soil.

As water travels down a river, it can carry dissolved salts from one area to another.

VA #16 Salts Build Up On Soil

In dry climates with low rainfall, there is not enough water to wash the salts out of the soil.

Salts build up on the soil surface where they stunt plant growth.

Water continues to evaporate from the land, leaving salts near the surface.

VA #17 Back in the Fertile Crescent…

In Mesopotamia, the climate was hot and dry. The soil contained some salt, and the river water, used to irrigate the fields, added more salt to the soil.

The fields did not drain well after being irrigated, so the salts built up in the top layer of the soil.

VA #18 Crop Changes

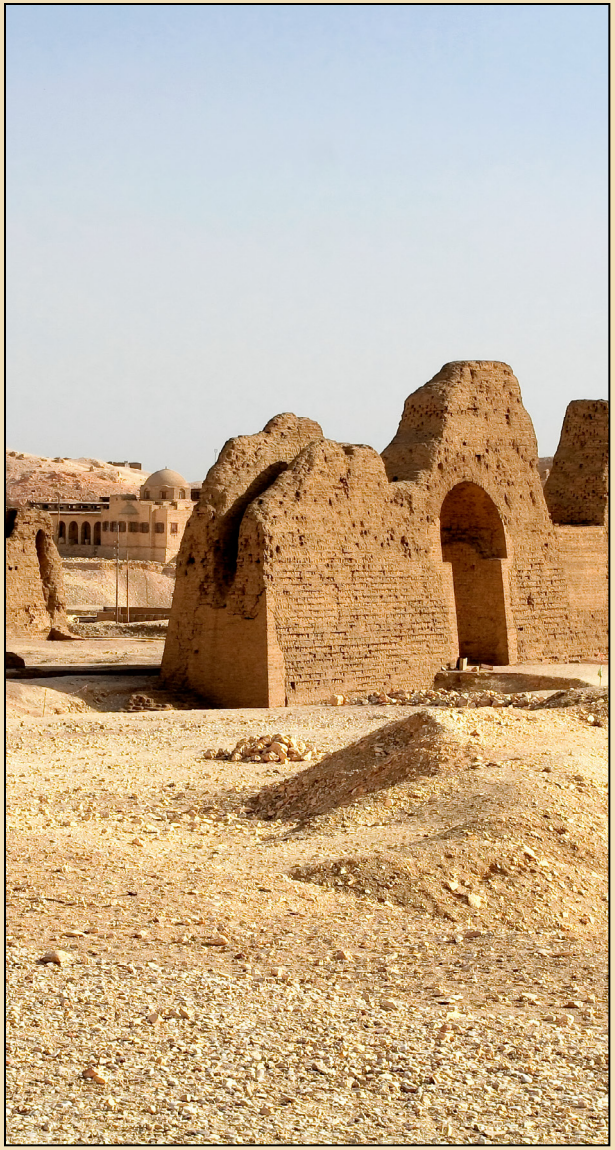
When the soil first started getting salty, Mesopotamians switched from growing wheat to growing barley, which grows better in salty soil.

This worked for a while, until the “earth turned white” with salt. Mesopotamians started growing date palms, the only plant that could handle the super-salty soil.

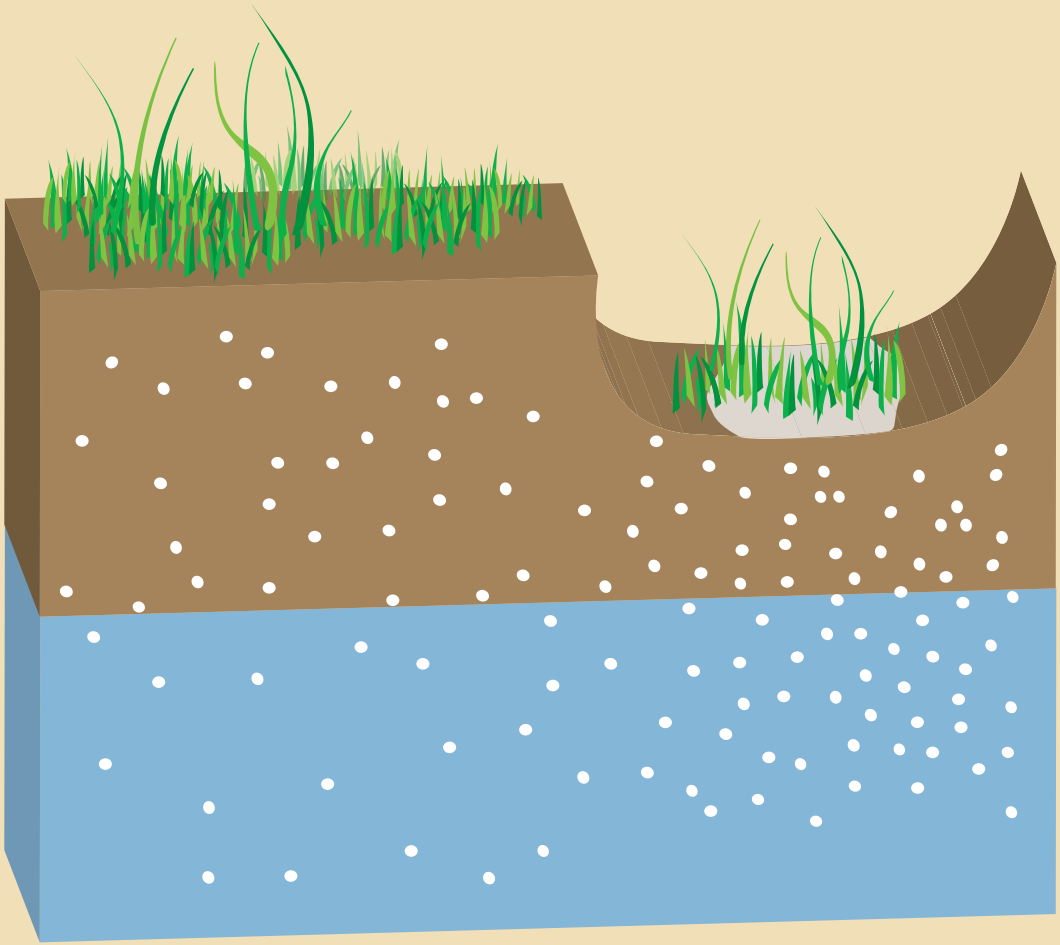
VA #19 Problem Solved?

But you cannot live on dates alone. Without wheat or barley, the people of southern Mesopotamia could not survive. They had to be able to raise grain for themselves and for their livestock.

There was no choice but to move. The cites in southeastern Mesopotamia were abandoned as the people moved north to lands with better soil.

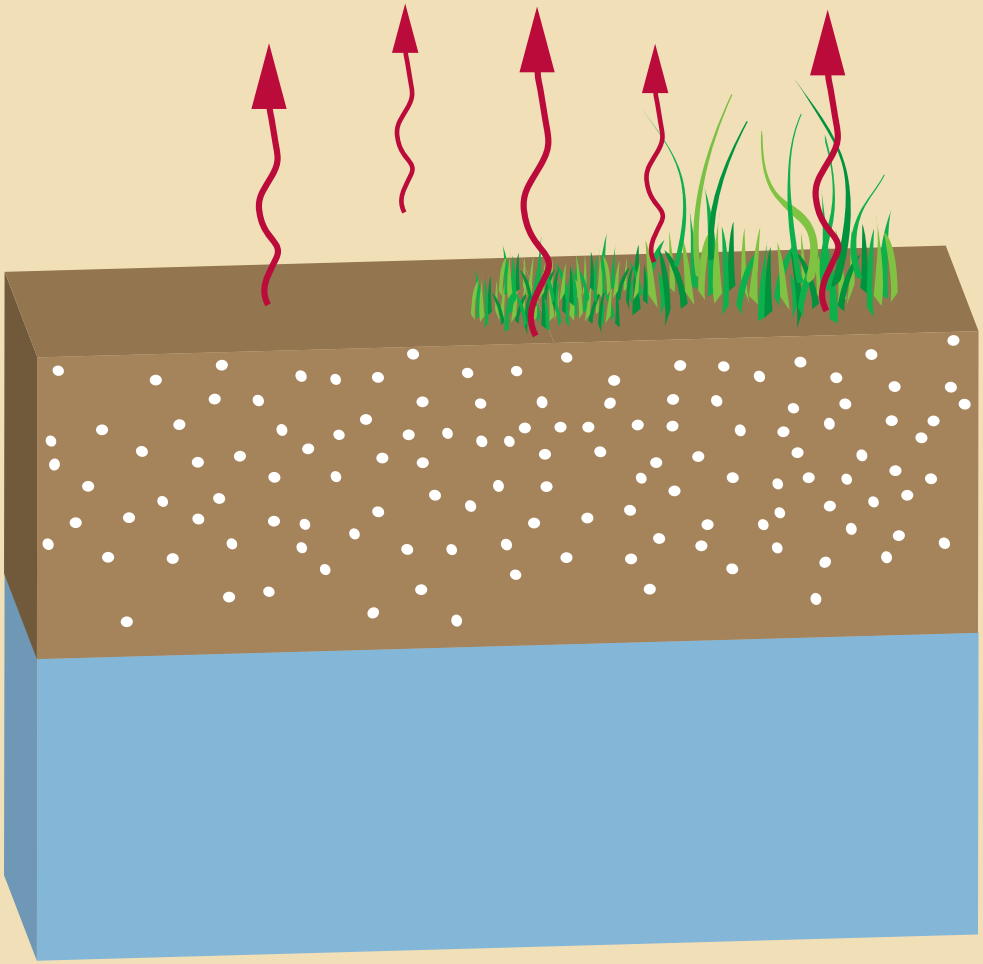


VA #20 Why Does Some Land Become Salinized?



Poor drainage of water (blue), combined with evaporation, leads to an increase in saltiness at the surface of the soil (brown).

VA #21 Evaporation and Transpiration

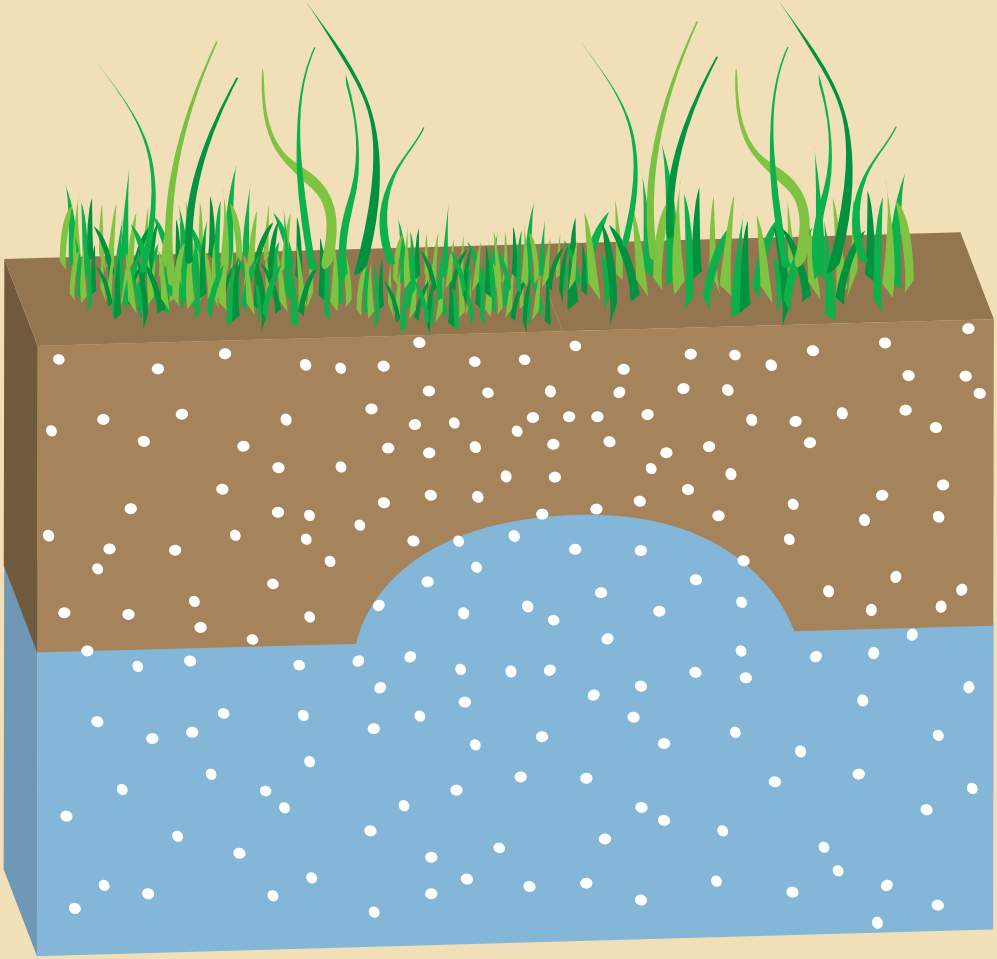


Together, evaporation and transpiration cause salts to build up on the soil's surface.

VA #22 How Does Land Become Salinized?

- Water from rivers, irrigation channels, and flood-irrigated fields seeps into the groundwater deep beneath the surface.
- The groundwater level rises.
- The groundwater has salts in it.
- The higher the groundwater, the more likely the salt will end up near the surface of the soil.

VA #23 Salt Reaches the Surface



The more shallow the groundwater (blue), the more likely the salt will end up near the surface of the soil (brown).

VA #24 Salinization Affects the Land

From this…

VA #25 The Effects Can Be Large

To this…

VA #26 Salinization in the San Joaquin Valley

The soil in California's San Joaquin Valley contains salts.

The irrigation water used in this important agricultural area also contains salts.

VA #27 The San Joaquin River

The groundwater is shallow and also adds salt to the San Joaquin River.

Water that runs over the surface of the land and drains into the San Joaquin River picks up salts.

Treated wastewater contains salt. These waters drain into the river, too.

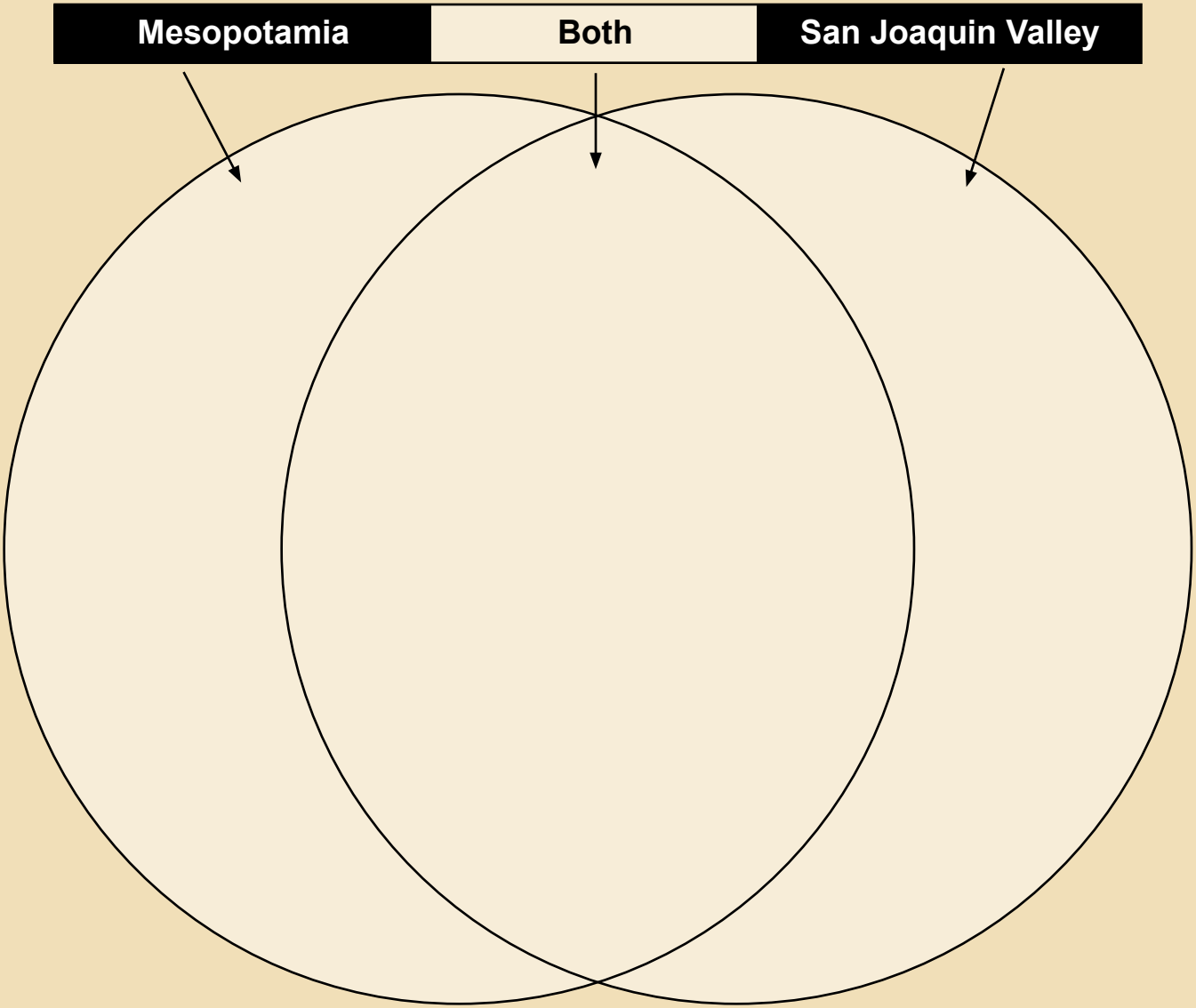
Fertilizers, spread on soils to make plants grow, can also add salt to the soil over time.

VA #28 Will it Happen Again?

Soils are becoming saltier in places in the San Joaquin Valley, making some of the land impossible to farm. People are trying to solve this problem before valuable cropland in California is lost. Losing fertile land can affect our state's economy and the people that live in the state.

Can we learn from the past and sustain our current political, economic, and social practices and systems?

VA #29 CSI: Crop Science Investigation: Part 2



VA #30 CSI: Crop Science Investigation: Part 3

1. Describe how agriculture changed the land of Mesopotamia and what effect those changes had on the civilization. (5 points)

2. What can California learn from the example of ancient Mesopotamia? (10 points)