

Appendix C: Discussion Questions

What are the water cycle zones?

The water cycle occurs everywhere that water is found. These areas can be broken down into three water cycle zones, atmosphere, water surface, and underground. The atmosphere consists of all the water in the thin layer of gas surrounding the earth. Surface water includes all of the water in water bodies (oceans, rivers, streams, lakes, reservoirs, and wetlands), organisms (plants and animals), surface layers of soil, and ice (glaciers and polar ice caps). Water below the surface layer of soil (groundwater) is in the underground zone.

How does the water cycle affect water quality?

Water is known as the universal solvent. This means that more materials (solids, liquids, and gases) dissolve in water more than any other substance. Water is constantly picking up pollutants in various states. Because water is constantly moving through a cycle pollutants can be carried far from their source. For example fertilizer on lawns and motor oil on roads can be carried by runoff into rivers or streams and be transported far away. However, nature can filter some pollutants from water. As water percolates through the ground, soil particles can filter out some pollutants. When water evaporates individual water molecules break apart and leave pollutants behind. This is known as distillation. Even though the water can be free of pollutants through this process, the pollutants remain in the environment.

What affects precipitation patterns in different geographical regions i.e. why does it rain more in Oregon than in Arizona?

The general circulation of the atmosphere, topography, and proximity to large bodies of water all influence precipitation patterns. The earth's atmosphere has large regions of rising and descending air. The wettest areas are found in the rising air regions (primarily in the mid latitudes and equator) while the driest areas are found in the descending air regions (subtropical deserts and poles). Mountains are a type of topography that affects precipitation. When moving air encounters a mountain it is forced to rise. Rising air cools and condenses so precipitation is likely to occur on the upwind side of a mountain. On the downwind side the opposite occurs, the air descends, warms, and less precipitation occurs. Large bodies of water with warm surface temperatures evaporate tremendous amounts of water into the atmosphere. Cold oceans or lakes, on the other hand, have less water evaporating.

What causes precipitation to fall in different forms? Why does it rain sometimes and snow other times?

The atmosphere is variable and is rarely evenly cold or warm. Temperatures above the surface of the earth and the mid-levels of the atmosphere play a large role in determining what type of

precipitation will fall. Snow is the simplest and most common form of precipitation. Snow forms when temperatures are at or below freezing at all points in the atmosphere. Sleet (partially melted snow) forms when temperatures near the cloud layer are below freezing, closer to the surface they are barely above freezing for a short period, and then below freezing again at the earth's surface. Rain forms when temperature is above freezing. If temperatures are warm and the air is compressed, precipitation can evaporate before reaching the surface of the earth. This is known as virga.

How does human development change the water cycle?

The development of roads, parking lots, houses, and other buildings, along with the removal of soil and vegetation can affect the water cycle. Removal of vegetation and soil can shorten the runoff time from rainfall and snowmelt into streams and rivers. The vegetation and soil act as a sponge that soaks up water and releases it slowly. When vegetation is taken out or the soil is covered by impervious surfaces (e.g., roads, parking lots, buildings) less water can infiltrate into the ground and more water runs off into streams and rivers.