

Impacts on the Hydrologic Cycle

Volcanic eruptions can send ash and aerosols (particles suspended in the air) into the atmosphere. The aerosols reduce the amount of radiant energy that reaches Earth's surface by reflecting the energy back into space. This results in a "global dimming," which decreases the temperature at Earth's surface. A lowering of the surface temperature of the oceans causes a decrease in the amount of water evaporated into the atmosphere, impacting the flow of the hydrologic cycle.



Procedure

In the scenario above, the impact on the hydrologic cycle was caused by a natural catastrophe. Analyze the following scenarios to determine how humans and other organisms impact the hydrologic cycle:

Scenario 1: In India, the burning of fossil fuels in urban areas for energy and transportation combined with the burning of vegetation to clear land for farming has emitted aerosols and ash into the atmosphere, resulting in a blanket of haze over the Indian Ocean. Only one-third of the incoming radiant energy is able to penetrate the haze and reach the surface of the water.

Analysis of Event	
Impact on hydrologic cycle	
Impact caused by	

Scenario 2: Arid mountainous regions typically receive rainfall when moisture-filled air quickly moves up a mountainside, cools, and condenses into rain clouds. However, pollutant-derived aerosols in the atmosphere combine with the water vapor, which results in the condensation of smaller water droplets. Smaller droplets often evaporate before rain clouds can be formed.

Analysis of Event	
Impact on hydrologic cycle	
Impact caused by	

Scenario 3: Sulfates and nitrates released into the atmosphere through the burning of fossil fuels can combine with water droplets and fall as acid rain. Acidic groundwater seeps into the soil, removing nutrients used by plants and leaching out aluminum, which is toxic to plants and animals, resulting in the reduction of plant life in the area.

Analysis of Event	
3.	
Impact on hydrologic cycle	
Impact caused by	

Scenario 4: Urbanization, dams, the storage of water in reservoirs, irrigation, and water mining change the natural flow pattern of groundwater. As a result, 1% less water flows into the oceans each year.

Analysis of Event	
4.	
Impact on hydrologic cycle	
Impact caused by	

Scenario 5: Deforestation is the complete removal of all tree and plant life from an area. An estimated 18 million acres of forest are cleared each year to ready the land for other uses.

Analysis of Event	
5.	
Impact on hydrologic cycle	
Impact caused by	

Follow up Questions:

1. How can humans impact the hydrologic cycle?
2. How do other organisms impact the hydrologic cycle?
3. The increase in global temperatures has increased the melting rate of some glaciers. How does this impact the hydrologic cycle?