Water Cycle

Water stores and transfers

The water cycle describes water moving between stores in the atmosphere, on land and in the oceans. Evaporation changes liquid water into water vapour. Energy from the Sun supports evaporation from seas, lakes and wet surfaces. Transpiration is the release of water vapour from plants. Evapotranspiration combines evaporation and transpiration as transfers to the atmosphere.

Condensation changes water vapour into liquid droplets as moist air cools. Clouds contain tiny water droplets or ice crystals, not just invisible water vapour. Precipitation includes rain, snow, sleet and hail falling from the atmosphere. Oceans are a major water store. Glaciers and ice sheets hold frozen water, while groundwater occupies spaces in soil and rock below the surface.

Water Cycle

Drainage basins

A drainage basin is the area of land drained by a river and its tributaries. A watershed is the boundary between neighbouring drainage basins. A tributary is a smaller stream or river that joins a larger river. The confluence is the place where two streams or rivers meet. River discharge is the volume of water passing a point per unit time.

Infiltration is water entering the soil surface. Percolation is downward movement through soil or rock. Surface runoff moves over the land towards channels when water cannot infiltrate fast enough. Impermeable surfaces can increase runoff. Vegetation can intercept rainfall and help slow its transfer to a river. These effects depend on soil, slope, rainfall intensity and the condition of the basin.

Water Cycle

Flood response

A storm hydrograph shows river discharge changing with time after rainfall. Peak discharge is the highest discharge reached during the event. Lag time is the interval between peak rainfall and peak discharge. A short lag time indicates a rapid response to rainfall. The rising limb shows increasing discharge, and the falling limb shows discharge decreasing after the peak.

Urban surfaces such as roads often reduce infiltration and route water rapidly into drains. This can shorten lag time compared with a similar vegetated basin. Flood risk is affected by rainfall, drainage, land use and channel capacity. Floodplains can store water during high flows. A single hydrograph does not establish every cause of a flood, and local measurements are needed for specific flood-risk decisions.