Factors Affecting Runoff

1. Type of Precipitation

Precipitation may occur in the form of either rain or snow. If precipitation occurs as rain, it immediately produces runoff. However, if it occurs as snow, the runoff is produced much later because the snow must first melt into water before it can flow.

2. Rain Intensity

The intensity of rainfall directly impacts runoff. If the intensity is high, the corresponding runoff will be greater. Conversely, if the intensity is low, the runoff will also be low.

3. Duration of Rainfall

If the duration of rainfall is short, runoff may not occur at all due to infiltration and interception (where water is absorbed by the soil or caught by vegetation). If the duration of rainfall is long, the soil becomes saturated, leading to higher runoff.

4. Distribution of Rainfall

The spatial distribution of rain over a drainage basin significantly affects runoff. A greater aerial extent of rainfall over the basin, combined with a longer duration, produces a larger volume of runoff.

Upstream Rainfall: If rainfall occurs at the upstream end of the drainage basin, it takes more time for the runoff to reach the outlet.

Downstream Rainfall: If rainfall occurs close to the outlet, runoff is quick and the peak flow is higher because the water is converted into runoff almost immediately.

5. Direction of Storm Movement

The direction in which a storm moves relative to the drainage basin plays a vital role:

Upstream Movement: If a storm moves upstream (away from the outlet), runoff at the outlet occurs slowly and at a much later time.

Downstream Movement: If a storm moves toward the outlet, runoff is rapid and has a higher peak magnitude.

6. Soil Moisture Deficiency

Runoff is greatly affected by the existing moisture conditions of the soil:

Low Moisture: If soil moisture is low before it rains, most of the rainfall is lost to infiltration, resulting in low runoff.

High Moisture: If the soil is already saturated or has high moisture content, the rainfall produces high runoff.

7. Other Climatic Factors

Several other climatic factors influence runoff by affecting evaporation and transpiration rates:

Temperature and Wind: Higher temperatures and higher wind velocities increase evaporation losses, thereby reducing runoff.

Frozen Ground: If the temperature is very low, the ground may become saturated and frozen, which prevents infiltration and leads to greater runoff.

Humidity: Higher humidity decreases evaporation and transpiration losses, which can enhance runoff.

Atmospheric Pressure: Variations in atmospheric pressure influence the movement of storms that cause rainfall