

RAINFALL

INTENSITY
TOTAL DURATION
The amount and intensity of the rainfall determines if the infiltration capacity is exceeded. If it is more overland flow occurs which quickly increases the discharge.

ANTECEDENT RAINFALL

If the antecedent or previous rainfall is high the ground will have reached its field capacity and be saturated. Any further rainfall will produce overland / surface flow which is the fastest way that water can reach the river. Discharge will rise rapidly and give a steep rising limb to the hydrograph.

SOIL PERMEABILITY

If the soil is permeable than there will be more infiltration which will give throughflow and ground water flow which are relatively slow. Impermeable soil will cause more overland flow, rapidly delivering water to the river to increase discharge and give a 'flashy' hydrograph.

ROCK PERMEABILITY

Permeable rock allows more percolation of water to reach the water table and replenish the aquifer. This slows down the movement of water to the river to give a longer lag time and lower peak discharge to the hydrograph. Impermeable rocks are more likely to produce rapid overland flow.

TEMPERATURE

The temperature and humidity of the air affect the ability of the air to accept moisture by evaporation and transpiration (evapotranspiration). Warm dry air will absorb more water vapour, leaving less to reach the river. A build up of snow and ice in winter and a rapid spring or early summer thaw can give very high discharge. A frozen subsoil or permafrost will promote overland flow and flooding.

PHYSICAL FACTORS

AFFECTING DISCHARGE AND THE STORM/FLOOD HYDROGRAPH

VEGETATION

TYPE
COVER
DENSITY
Thick vegetation gives more interception of rainfall. This slows the movement of water to the surface of the earth and produces less overland flow. Forest will also cause more transpiration and interception loss, preventing water from reaching the surface.

DRAINAGE BASIN

SIZE
SHAPE
Smaller drainage basins tend to give a flashier hydrograph than large ones due to the shorter distances involved. Large basins, however, with their greater area are able to accept more water. Round basins give a short lag time to the hydrograph, whereas long, thin basins spread out the arrival of water and tend to have a lower peak discharge.

GRADIENTS

Steep slopes within a drainage basin/catchment area will cause overland flow to be more rapid due to increasing the force of gravity. Gentle slopes will slow down the flow of water giving more time for infiltration and percolation, slowing down the rate at which water reaches the river, increasing the lag time on the hydrograph and lowering the peak discharge.

DRAINAGE DENSITY

This is a measure of the number and length of streams in the drainage basin/catchment area. The higher the drainage density the more streams there are making it more likely that water will quickly enter the river to give a short lag time and a 'flashy' hydrograph. A low drainage density means that water spends more time infiltrating or flowing overland or through the soil, lengthening the time before it reaches the river and lowering the hydrograph.

SEASON

The season, wet or dry, will determine the amount and intensity of the rainfall as well as the possibility that the field capacity of the soil is reached, giving more overland flow. With deciduous vegetation the season also determines the leaf cover to affect the amount of interception, interception loss and transpiration. In the cooler season when the trees lose their leaves rainfall reaches the surface of the earth more quickly promoting more overland flow and higher discharge.