Ppt falling to ground would become part of the hydrologic cycle in different ways.

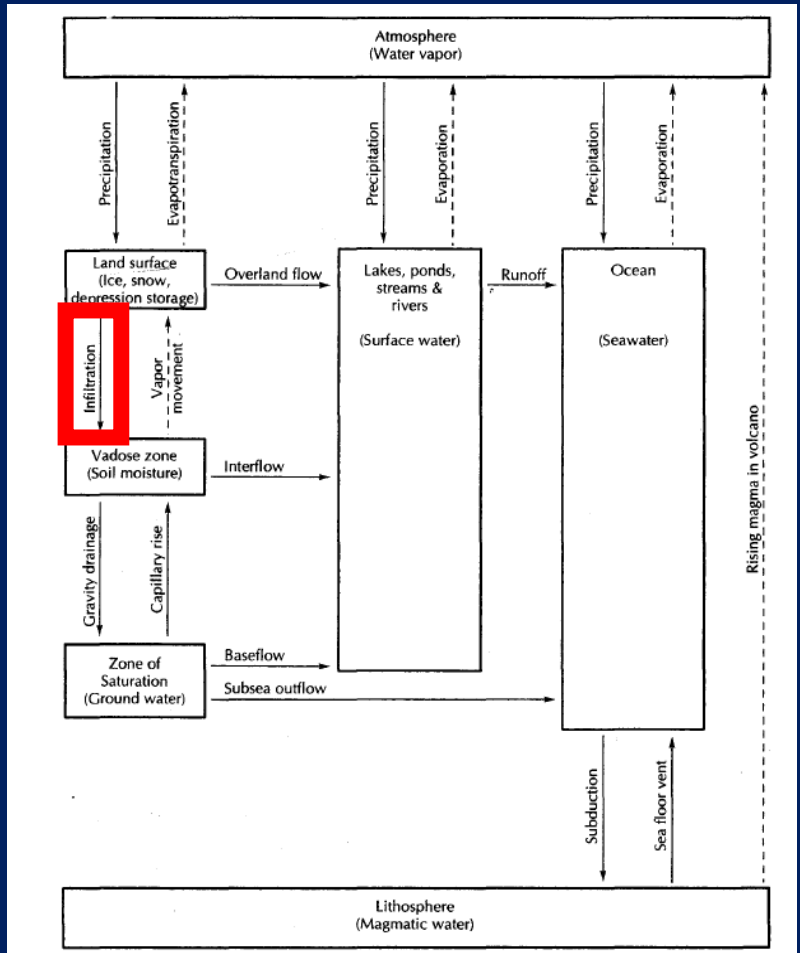
Events during Precipitation:

Interception: During a ppt event, some rainfall is intercepted by vegetation before it reaches the ground. **Temporary storage of water by the leaves.**

Infiltration: Rainfall reaching the landsurface can infiltrate into the pervious soil, which has a finite capacity to absorb water.

-Downward movement of water into the soil layer.

- Infiltration capacity (IC) varies from soil to soil AND also different for dry and moist conditions for the same soil.
    * If soil is initially dry- IC is high
    * As soil moisture increases, infiltration capacity diminishes.
    * Eventually, IC reaches to an equilibrium value.



▲ FIGURE 1.4
Schematic drawing of the hydrologic cycle. Movement of liquid water is shown by a solid line and movement of water vapor is shown by a dashed line.

Fetter, C.W., Applied Hydrogeology

If ppt rate < fc all ppt reaching the land surface will infiltrate.

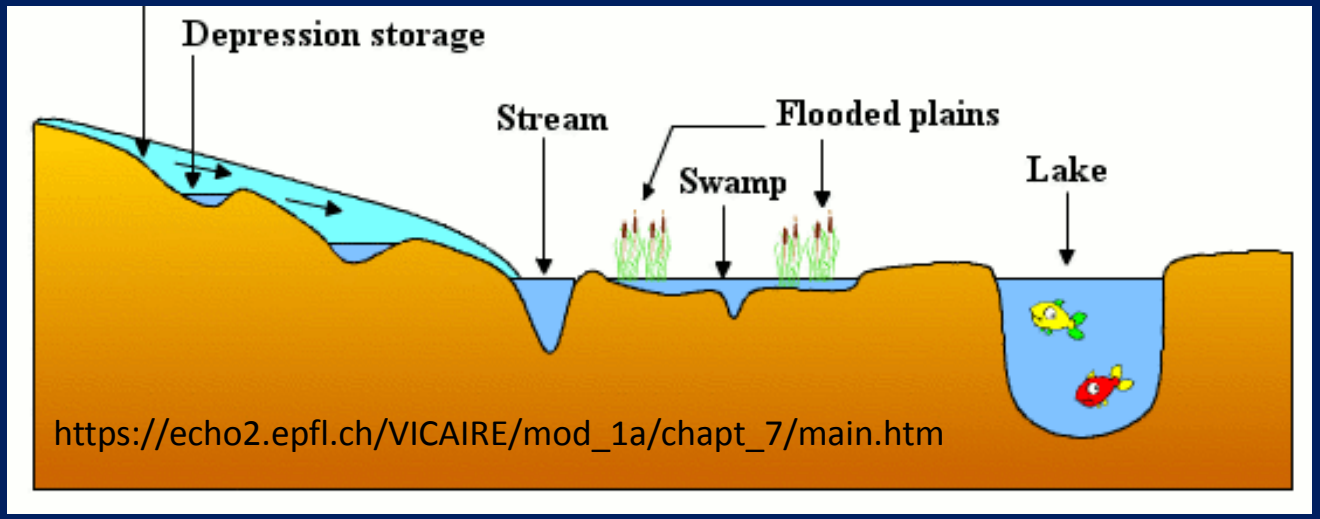
If ppt rate >fo some water will immediately remain on the land surface.

If ppt rate > fc but < fo, the ppt will infiltrate at the beginning but when infiltration rate drops below the ppt rate, some of the ppt will remain on the ground surface.

Conditions encouraging high infiltration rates:

- Coarse soils
- Well vegetated land
- Low soil moisture
- Porous top soil
- Land use practices avoiding soil compaction

Overland flow does not begin until the depression storage is exhausted and continues past the termination of ppt.



Musy, A. 2001. e-drologie. Ecole Polytechnique Fédérale, Lausanne, Suisse.

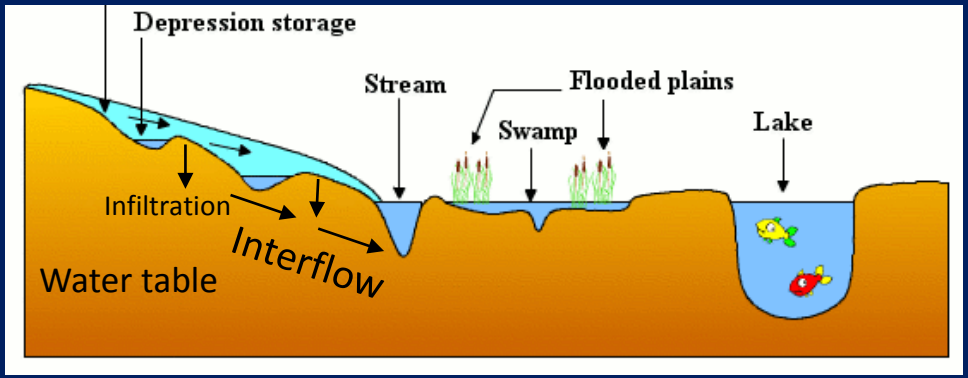
Depression storage: water trapped in puddles- it ultimately evaporates or infiltrates

OVERLAND FLOW OCCURS ONLY WHEN THE PRECIPITATION RATE EXCEEDS THE INFILTRATION CAPACITY (IC).

If soil have a high IC, only intense storms can cause overland flow.

For overland flow to occur:

1) IC must be exceeded
2) Depression storage must be filled.



Interflow- Water moving horizontally in the unsaturated zone.

https://echo2.epfl.ch/VICAIRE/mod_1a/chapt_7/main.htm

Musy, A. 2001. e-drologie. Ecole Polytechnique Fédérale, Lausanne, Suisse.

Streamflow or discharge

It is the volume of water passing a point in a given time. At high flows, large volumes of water are transported through the stream in a given time.

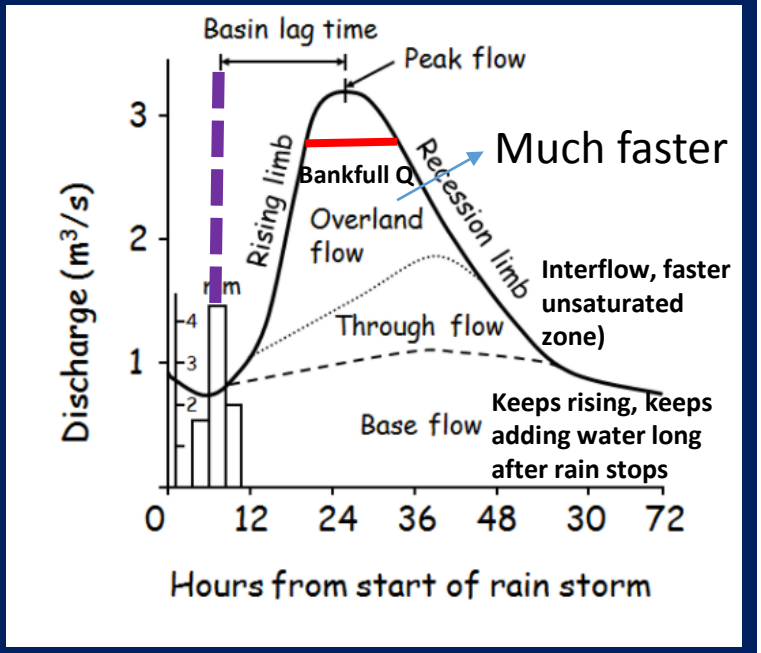
Stream flow is measured at a location along a stream from the water velocity and the cross-sectional flow area.

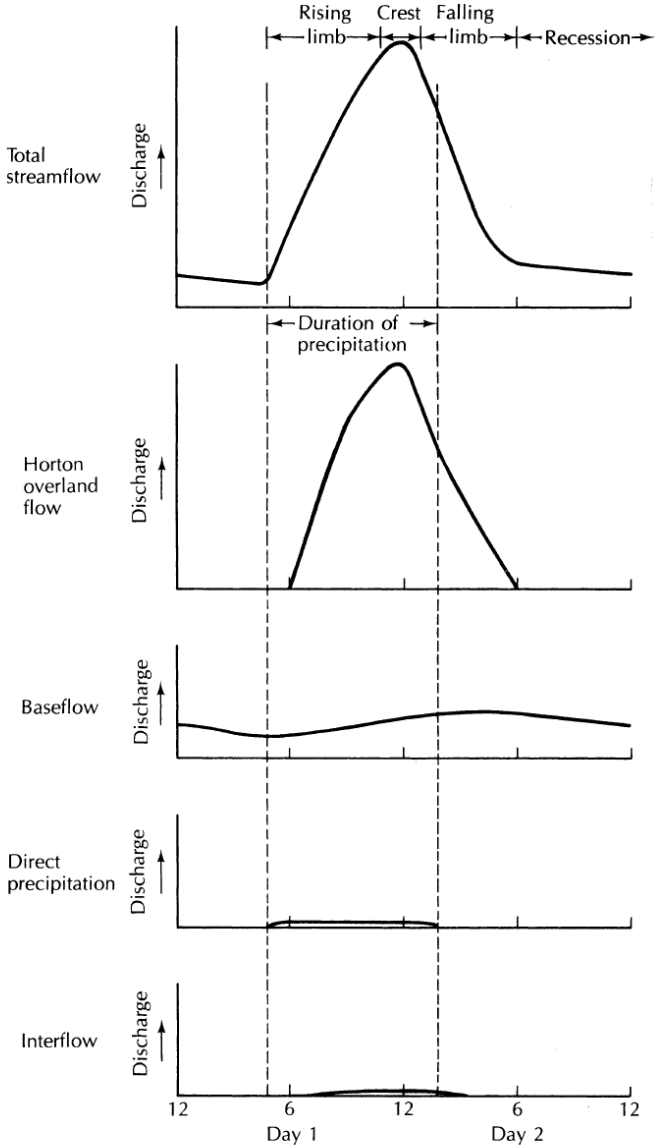
$$Q = V*A$$

$$Q = V*(width*depth)$$

Stream hydrograph shows the discharge of a river at a single location as a function of time.

Components: surface runoff (overland flow), baseflow, interflow, direct ppt





◀ FIGURE 14
Hypothetical storm hydrograph for a period of evenly distributed precipitation, separated into Horton overland flow, baseflow, direct precipitation, and interflow.

Rainfall plotted as bar graph- Discrete data

Discharge is plotted as a line graph- continuous data

Beyond bankfull discharge- FLOOD

Basin lag time- gap between the peak rainfall and the peak discharge

Lots of overland flow- steep rising and falling limbs- flashy urban surfaces, steep slopes, impermeable rock, thin soil (easily saturated)

https://www.jkgeography.com/river-discharge.html

Baseflow Recession

The hydrograph of a stream during a period with no excess precipitation will decay, following an **exponential curve.** The discharge is composed entirely of groundwater contributions. As the stream drains water from the groundwater reservoir, the water table falls, leaving less and less groundwater to feed the stream. If there were no replenishment of the groundwater reservoir, baseflow to the stream would become zero.

The baseflow recession equation is:

$$Q = Q_0 e^{-at}$$

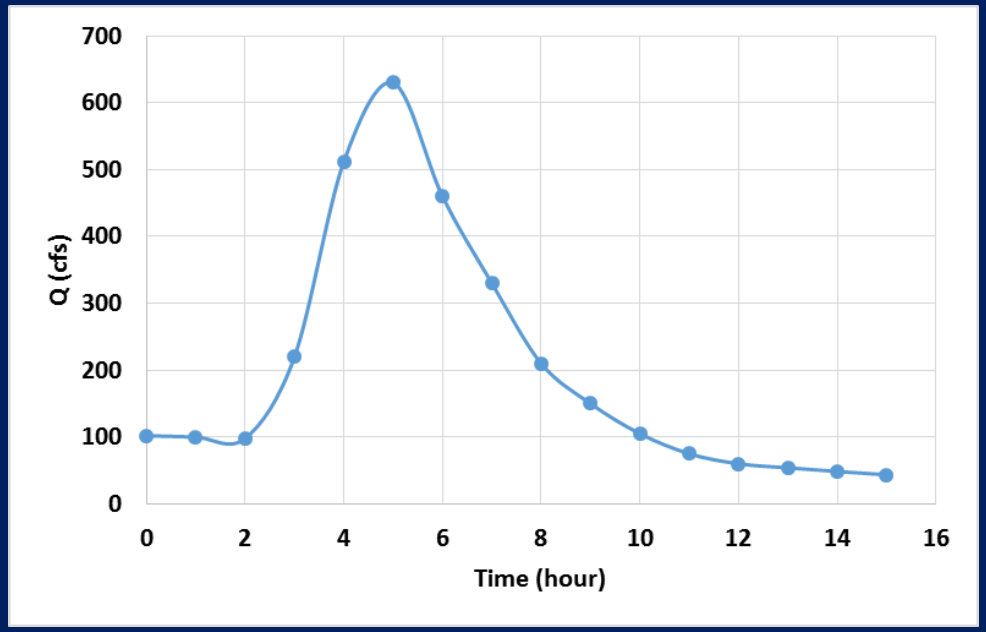
Q flow at some time t after the recession started (m^3/s)
Q_0 flow at the start of the recession (m^3/s)
a recession constant for the basin (d^{-1})
t the time since the start of the recession

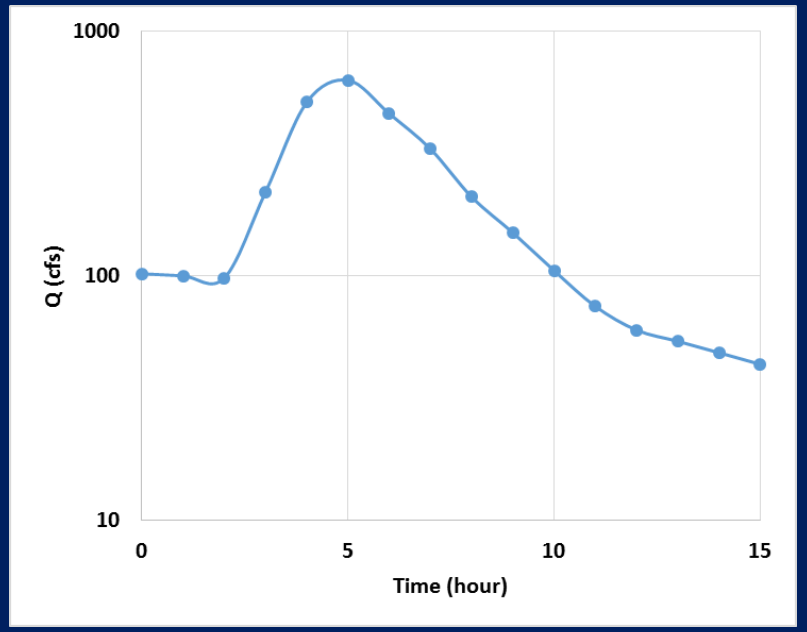
$$Q_t = Q_o K_r^{\ t} \quad \text{Where} \quad a = \ln(K_r)$$

The baseflow recession for a drainage basin is a hydromorphic characteristic. It is a function of the overall topography, drainage pattern, soils, and geology of the watershed.

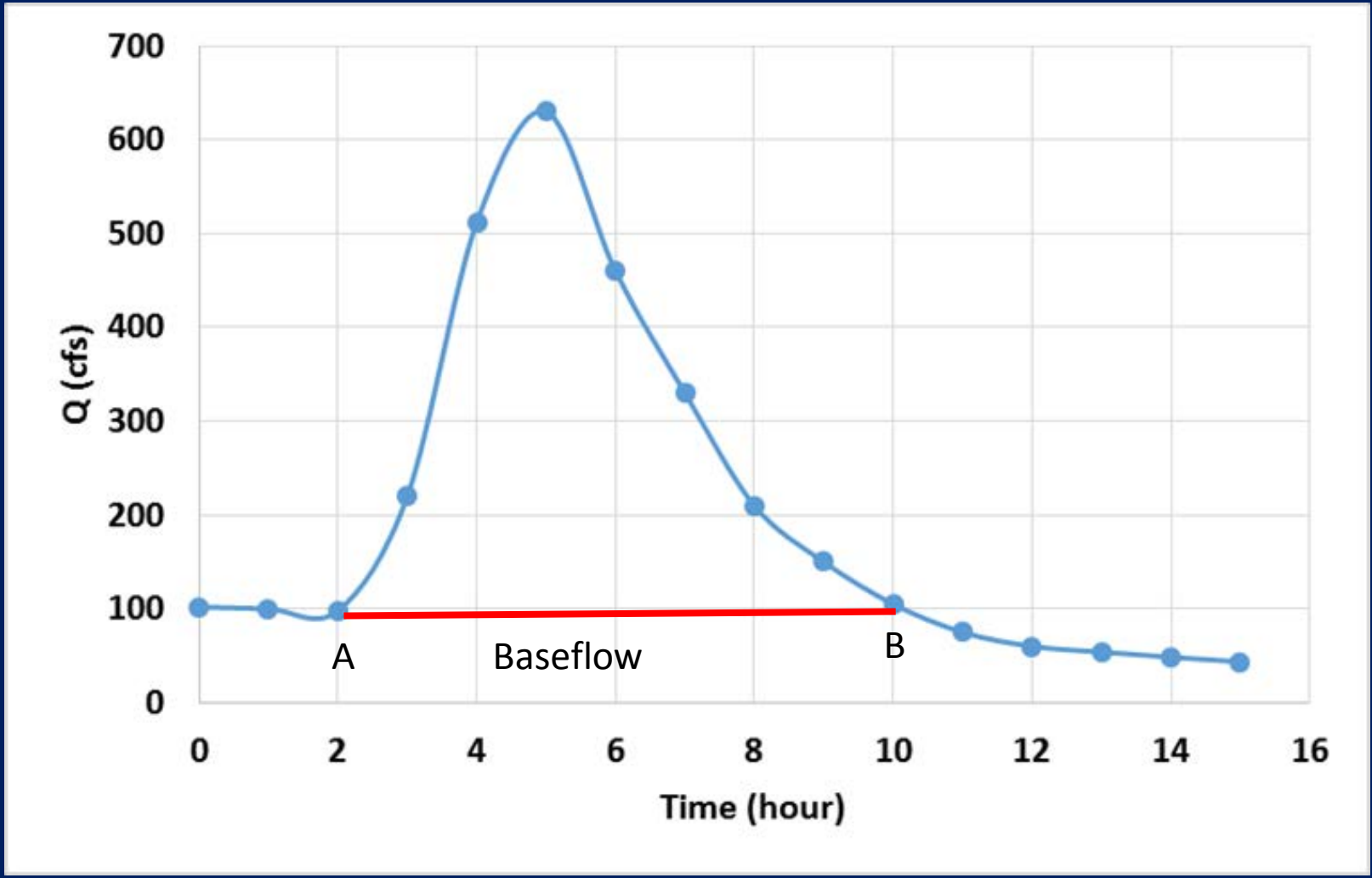
Baseflow recession equation will yield a straight line on semi-logarithmic paper.

$$\log(q_t) = \log(q_o) + t\log(K_r)$$





Baseflow separation techniques:
1) Horizontal straight line method

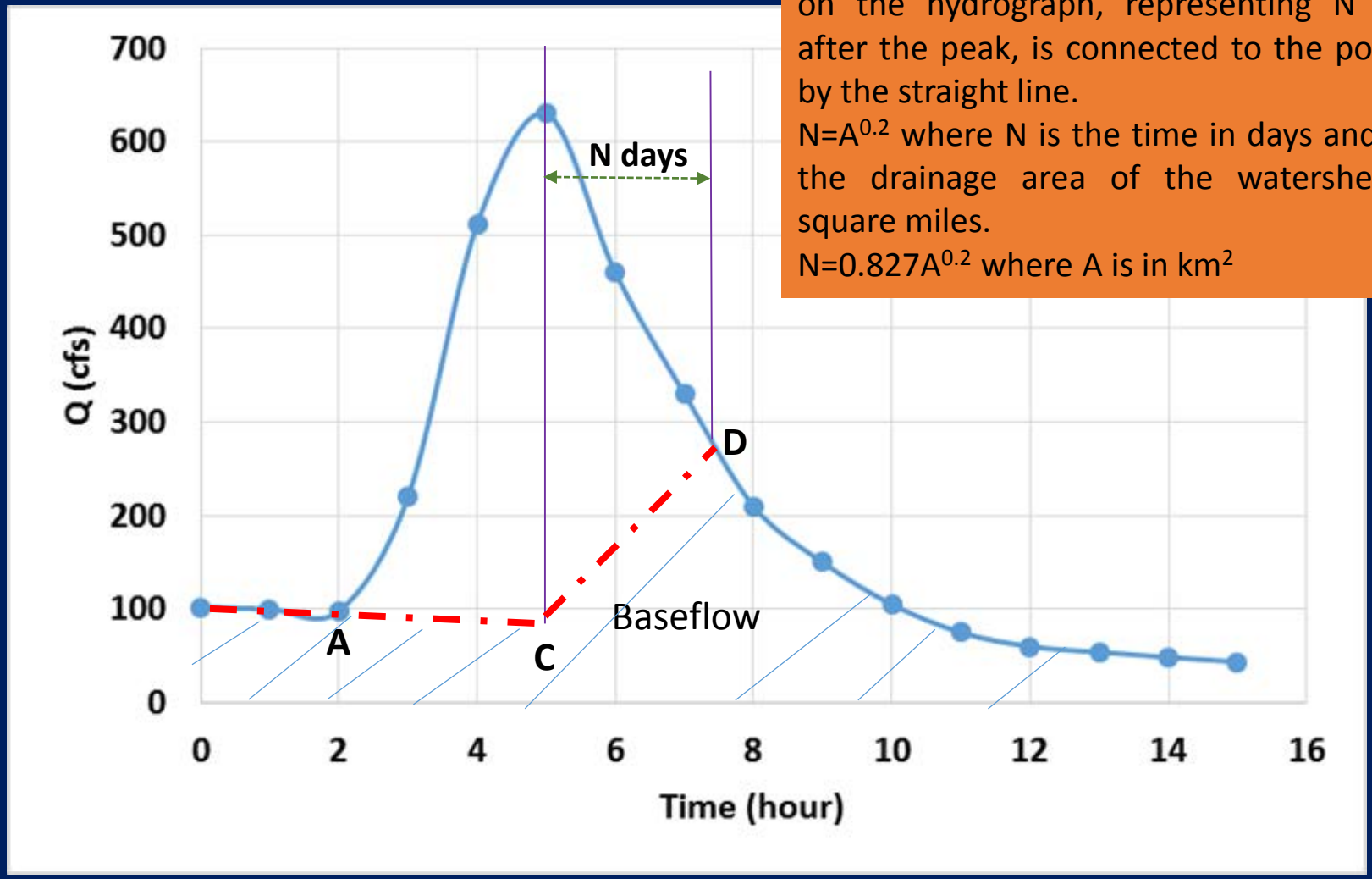


Baseflow separation techniques:
2) Fixed base-length method

Project the initial recession curve downward from A to C which lies directly below the peak rate of flow. Then, point D on the hydrograph, representing N days after the peak, is connected to the point C by the straight line.

$N=A^{0.2}$ where N is the time in days and A is the drainage area of the watershed in square miles.

$N=0.827A^{0.2}$ where A is in km^2



Baseflow separation techniques:
3) Baseflow recession method

The semilog graph of the recession is used to find the point at which overland flow stops. Ordinates of baseflow recession curve is then computed in a time-decreasing fashion until some point E and its shape from A to E is arbitrarily assigned.