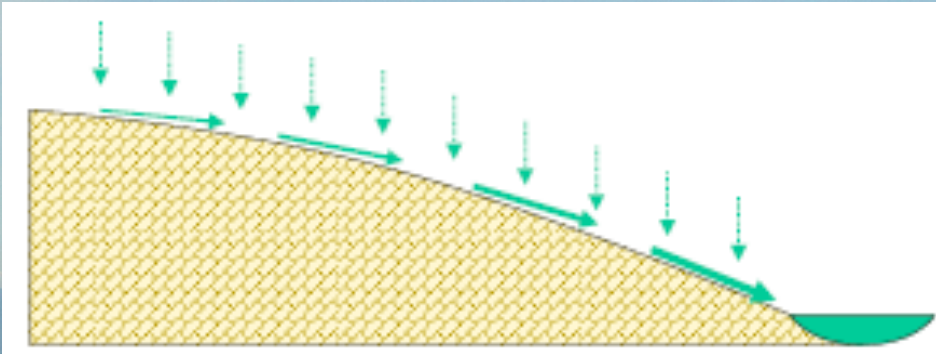
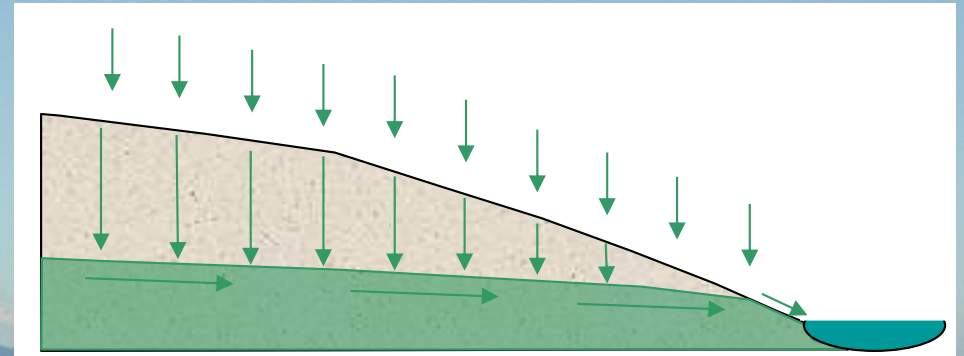


# Streamflow generation mechanisms

## 1. Infiltration Excess Overland Flow

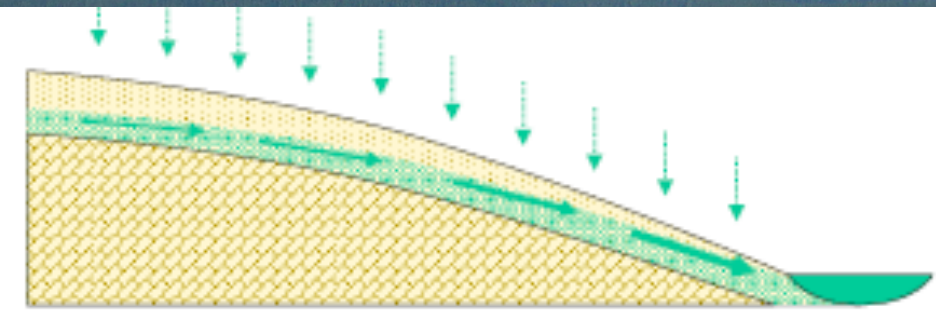


## 2. Saturation Overland Flow

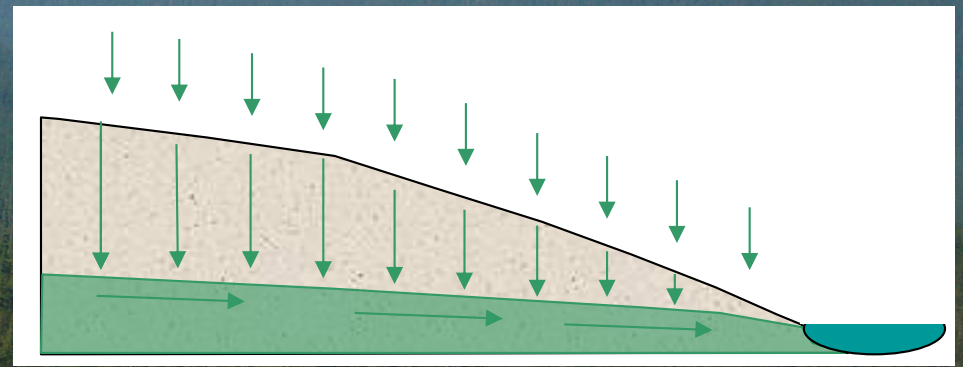


related to variable source area


## 3. Subsurface Storm Flow



## 4. Groundwater Flow





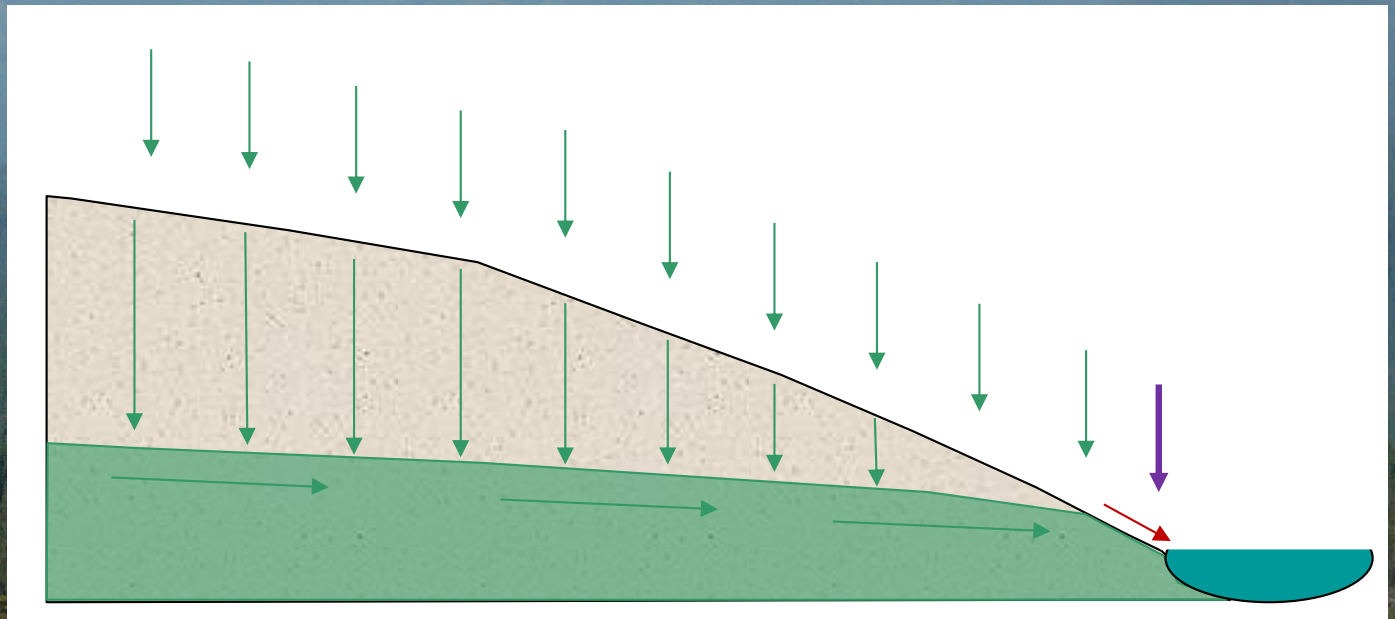
A photograph showing a flooded agricultural field. In the foreground, there are rows of young green plants in a dark, muddy field. A large, calm body of water occupies the middle ground, reflecting the sky. In the background, there are more rows of crops and a line of trees under a cloudy sky.

Prolonged rainfall or snowmelt brings water table to the surface, requiring overland flow.



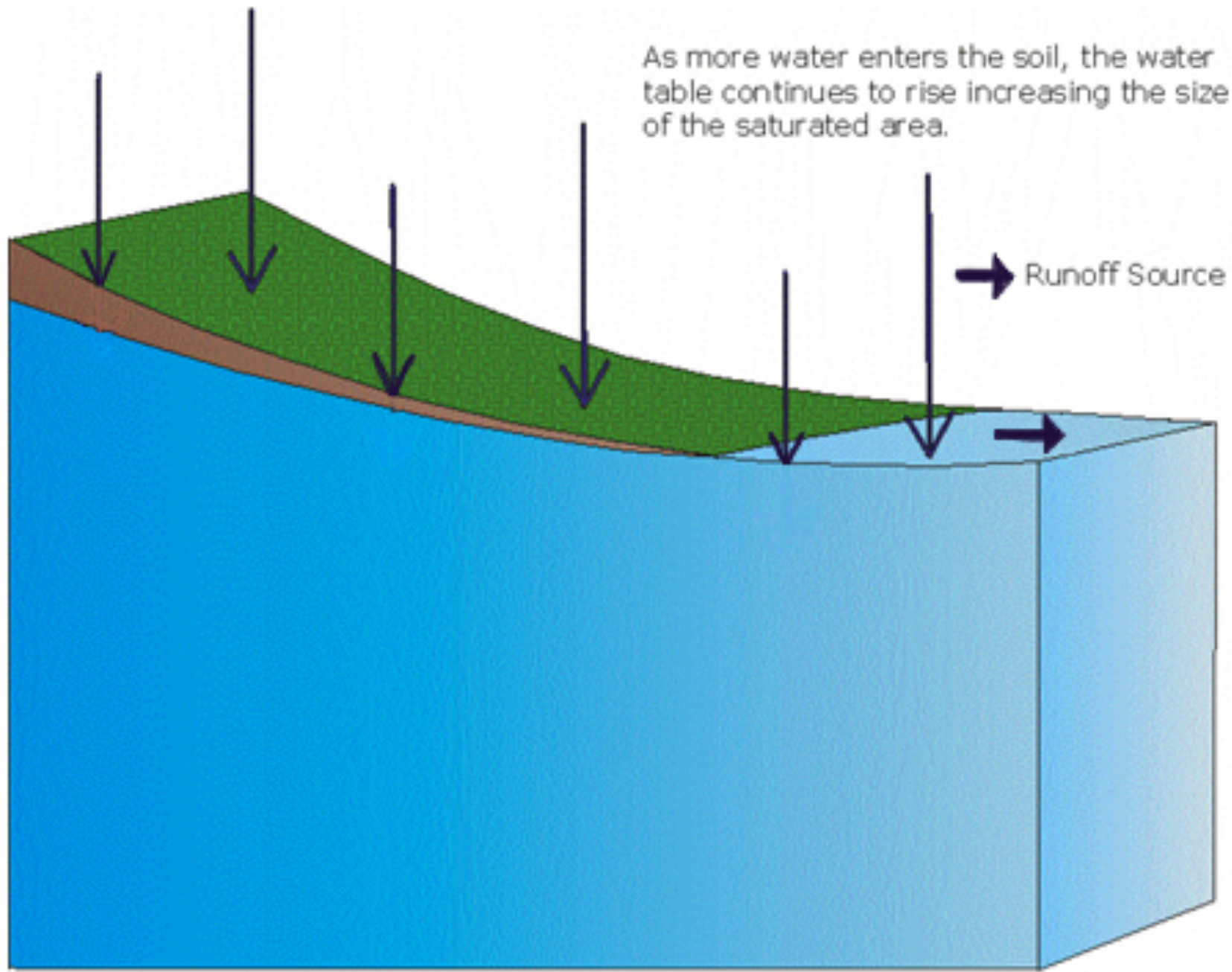
# Saturation Overland Flow (SOF)

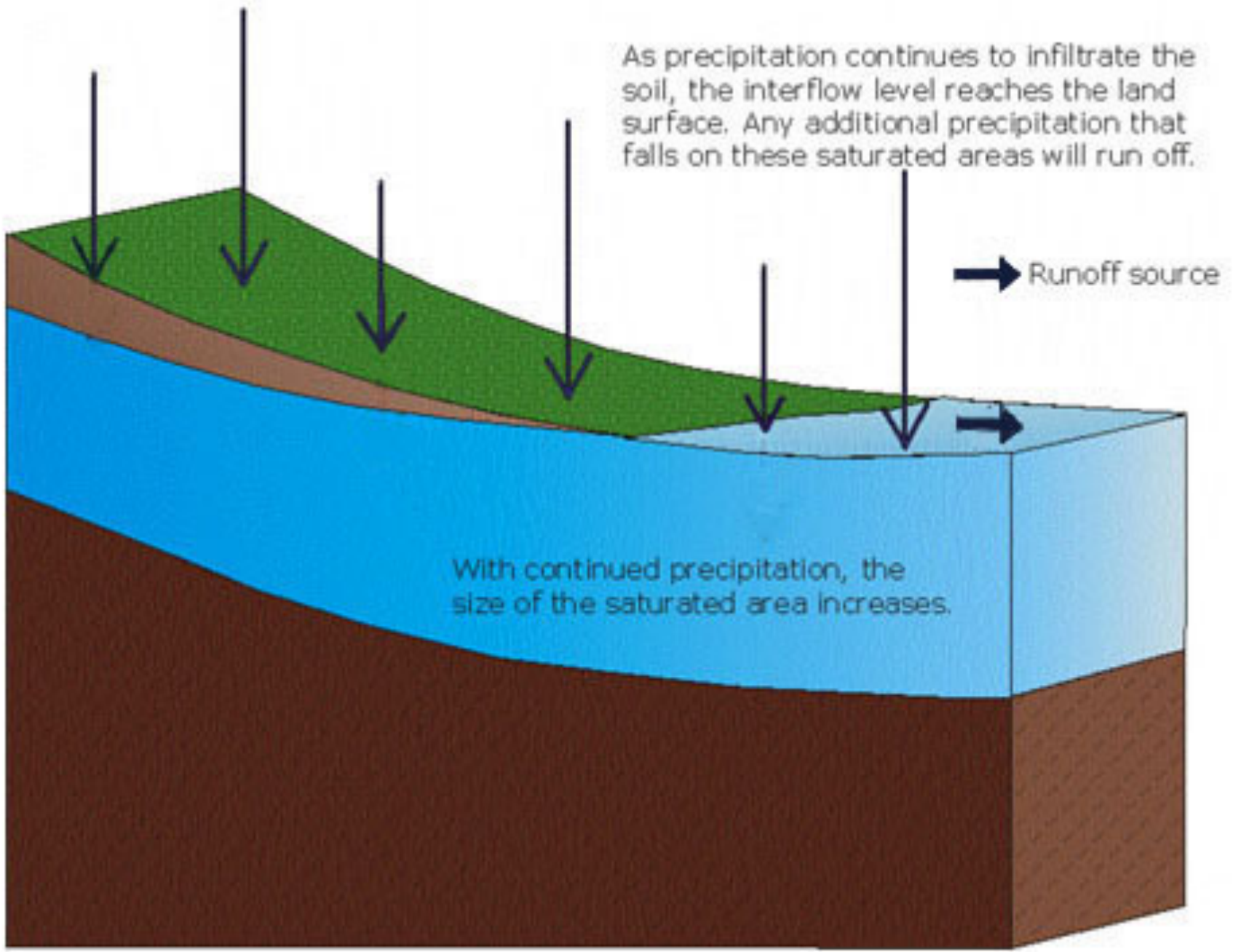
- Starts with **subsurface flow**.
- As soil saturates, flow moves closer to surface, eventually emerging as “return flow”
- Direct precipitation on saturated area flows overland





As more water enters the soil, the water table continues to rise increasing the size of the saturated area.

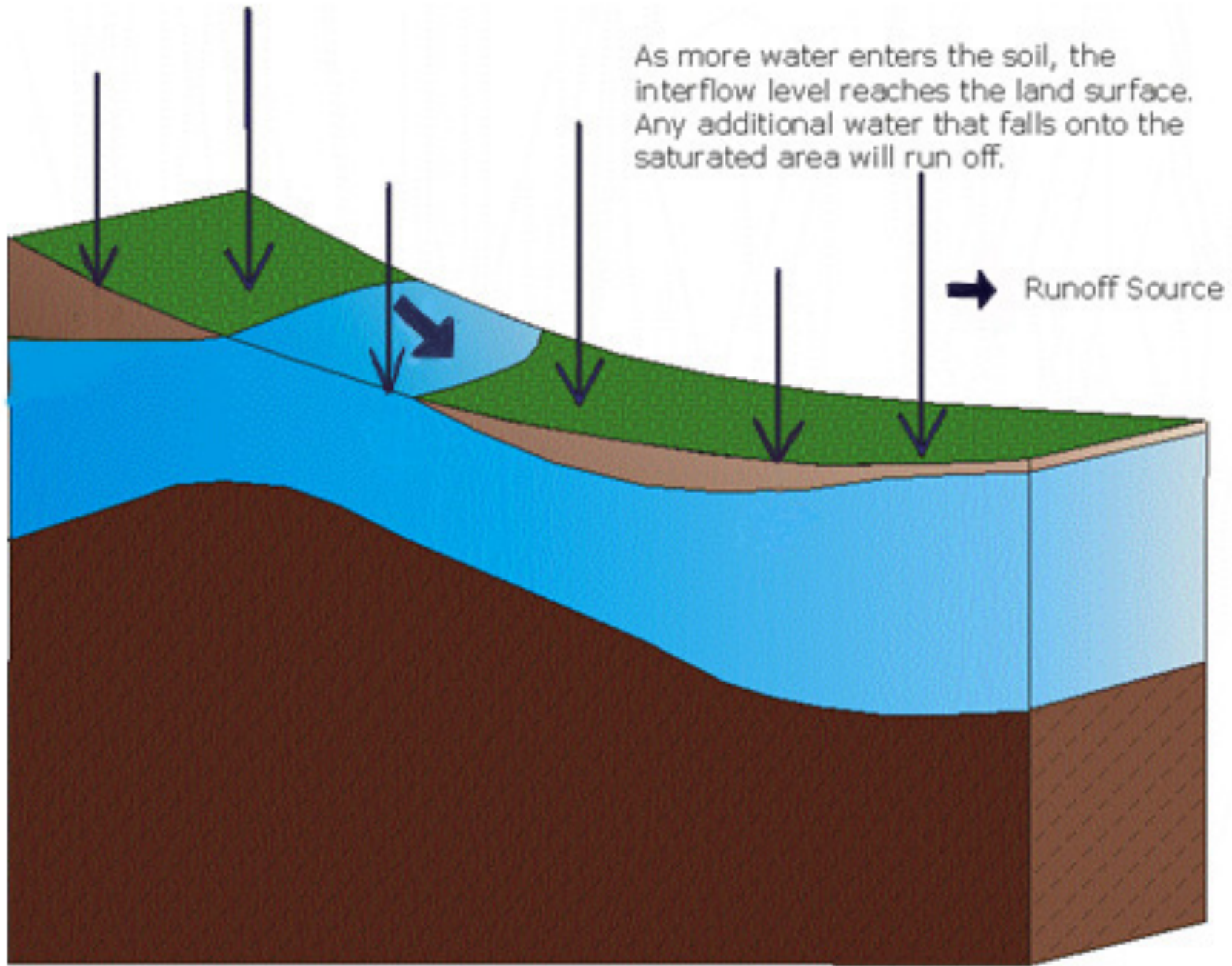




[http://soilandwater.bee.cornell.edu/research/VSA/processes/processes\\_sat.html](http://soilandwater.bee.cornell.edu/research/VSA/processes/processes_sat.html)



As more water enters the soil, the interflow level reaches the land surface. Any additional water that falls onto the saturated area will run off.



[http://soilandwater.bee.cornell.edu/research/VSA/processes/processes\\_sat.html](http://soilandwater.bee.cornell.edu/research/VSA/processes/processes_sat.html)

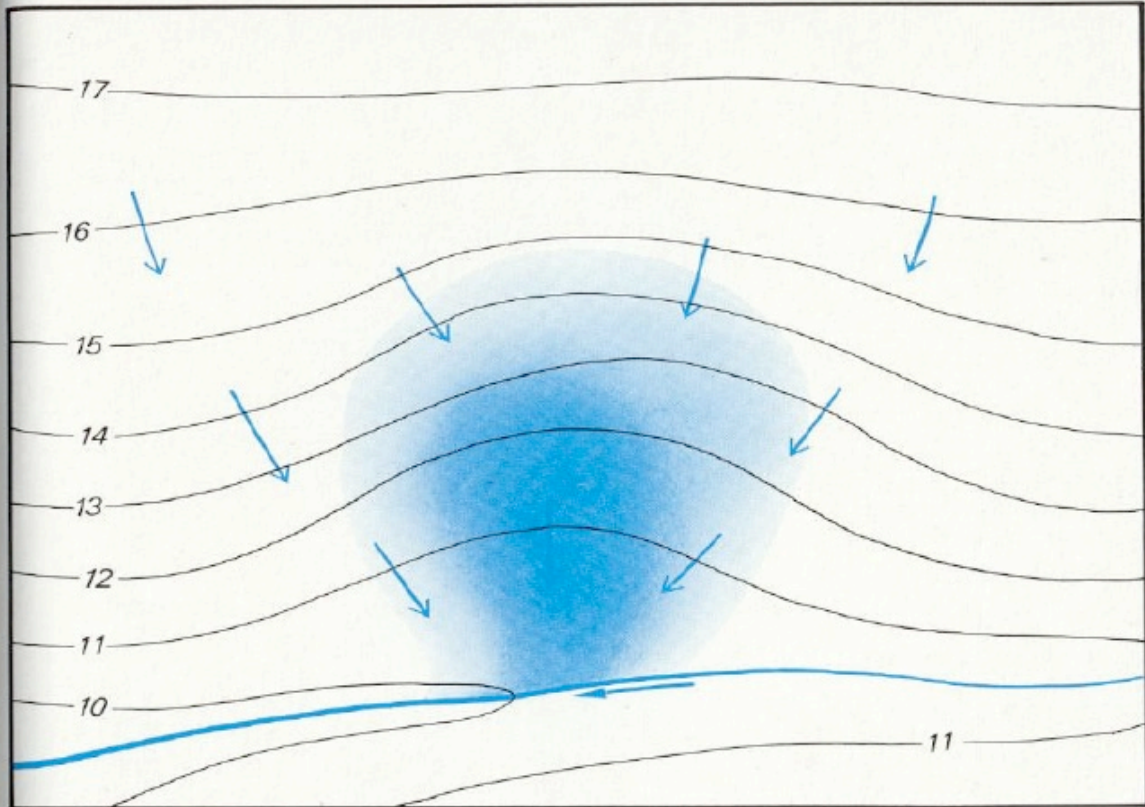


# Saturation Overland Flow (SOF)

Common in humid regions

Occurs on

- concave slopes,
- hillslope hollows,
- foot slopes,
- shallow soils



after storm. (From an original diagram by Anderson and Burt, 1978, by permission of John Wiley and Sons Ltd.)





# Saturation overland flow (SOF)

- Size of SOF area varies within and between storms
- Depends on antecedent wetness

→ Variable Source Area Concept





# Variable Source Area Concept

- **Majority of flow exiting a watershed is driven by a relatively small portion of the watershed.**
- Which variable source areas (VSAs) contribute flow varies within and between storms. (how much they contribute also varies.)
- VSAs include saturation (SOF) and infiltration-excess overland flow (HOF) and fast subsurface stormflow (SSF)



# Variable Source Area Concept

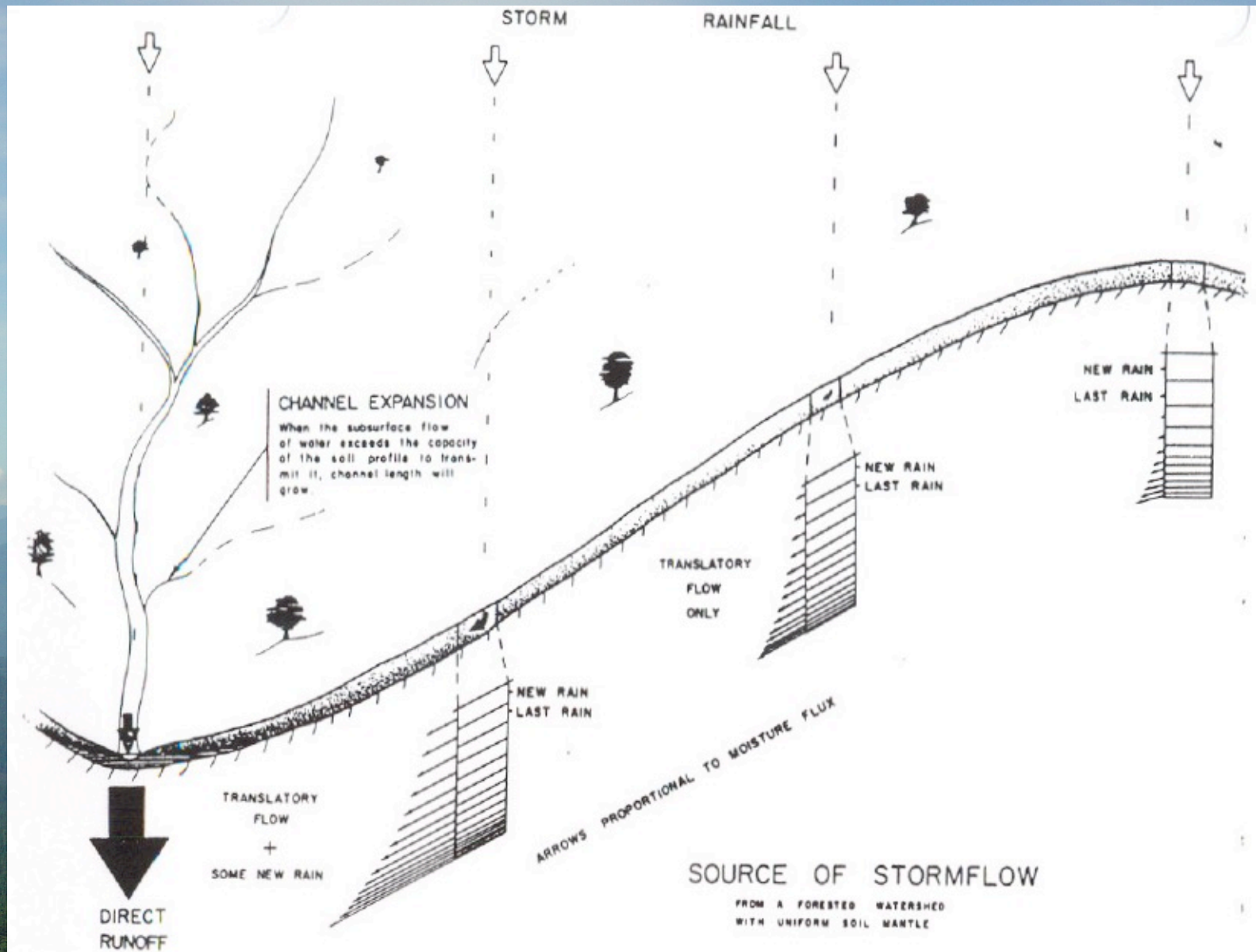


FIG. 1. Diagram showing the source of stormflow (direct runoff) from a forested watershed with a uniform soil mantle. The interaction between the factors illustrated constitutes the variable source area concept of runoffs from small watersheds.

Hewlett and Hibbert 1967





Sleepers River watershed (Shanley et al., 2015)