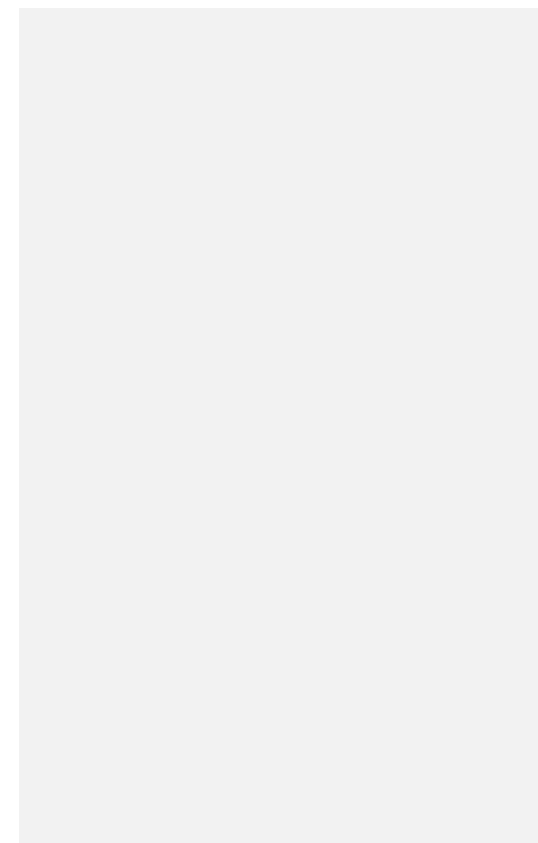




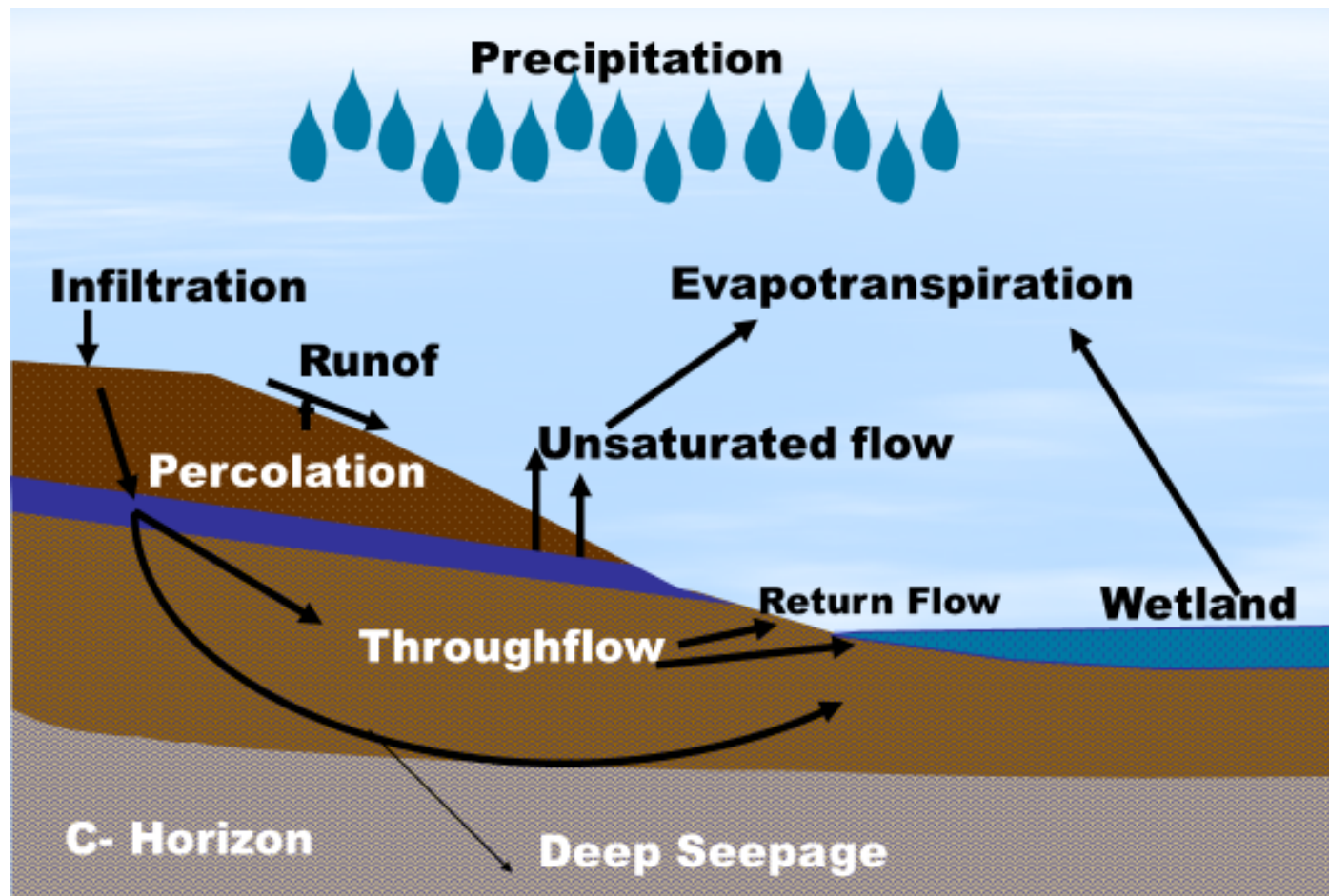
The Importance of Soil, Geology, Hydrology Relationships



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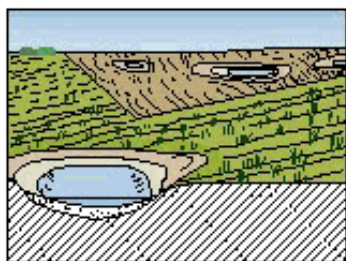
Soil, Geology and the Hydrologic Cycle



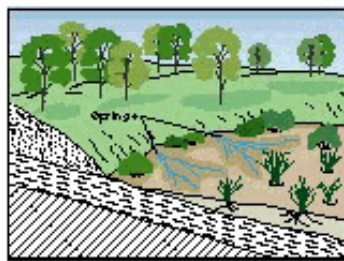
Water movement through soils and geology in an area influence where wetlands will exist in a landscape.



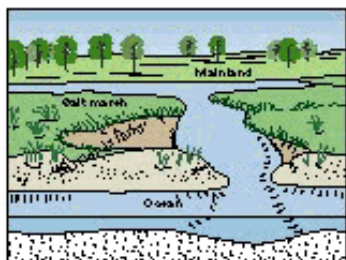
Geology and Wetland Types and Functions



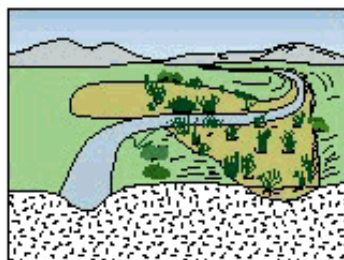
Isolated depressions



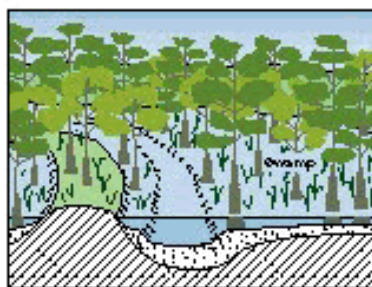
Seepage areas and springs



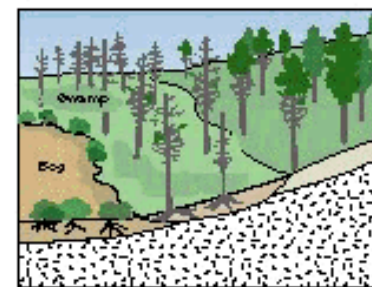
Sheltered embayments



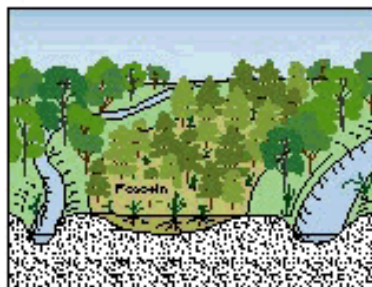
Basins with streams



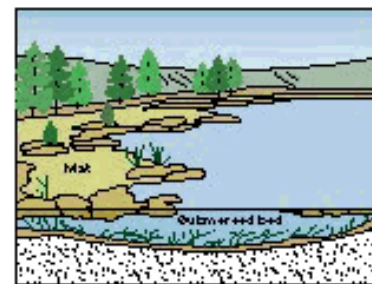
Flood plains



Blanket bogs in boreal and arctic regions



Relatively flat interstream divides (including pocons)



Open water bodies with floating mats and submersed beds

Geology and soils influence the types of wetlands that exist in an area based on their physical and chemical properties.

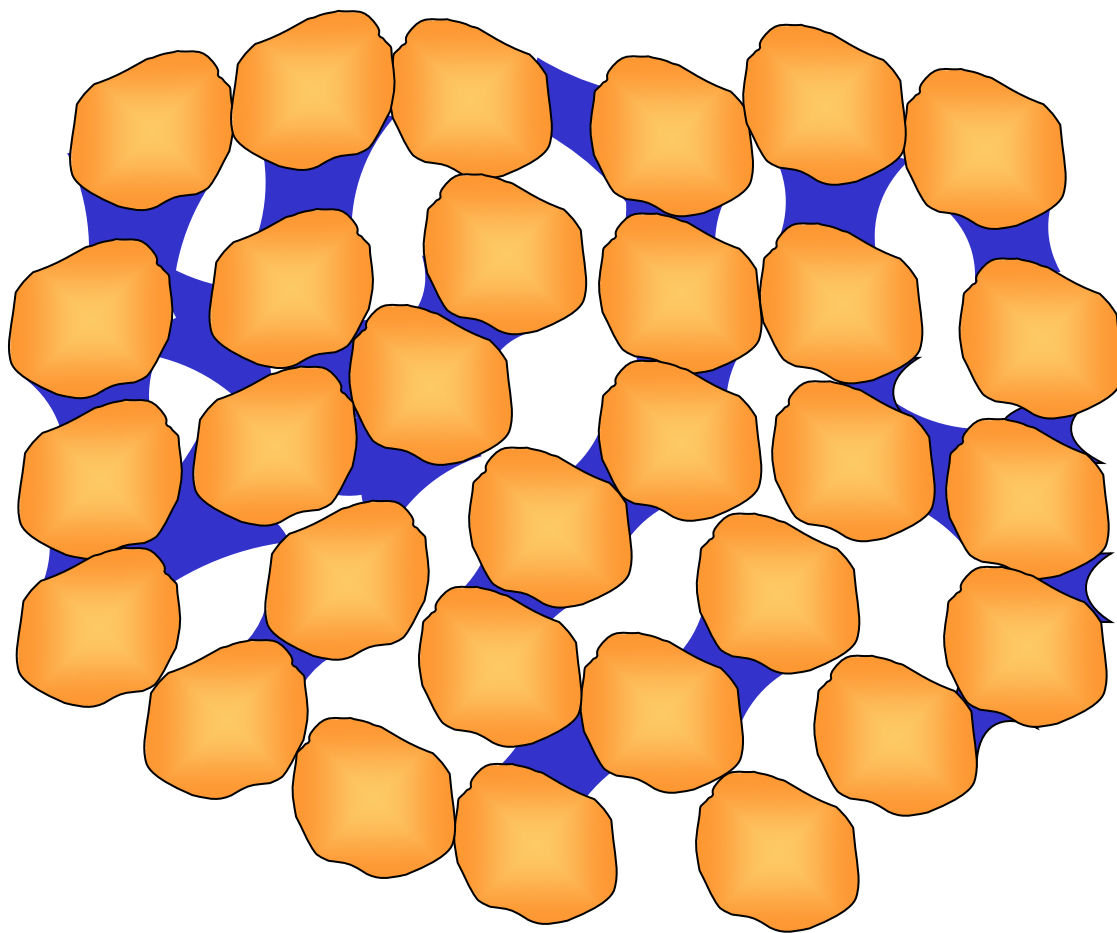


Saturation

- A soil layer is saturated when the soil **water pressure** is zero or positive.
- This water has a pressure greater than atmospheric pressure, and **pushes air out** of holes in the ground.



Unsaturated Soils with Suction (Tension) Forces

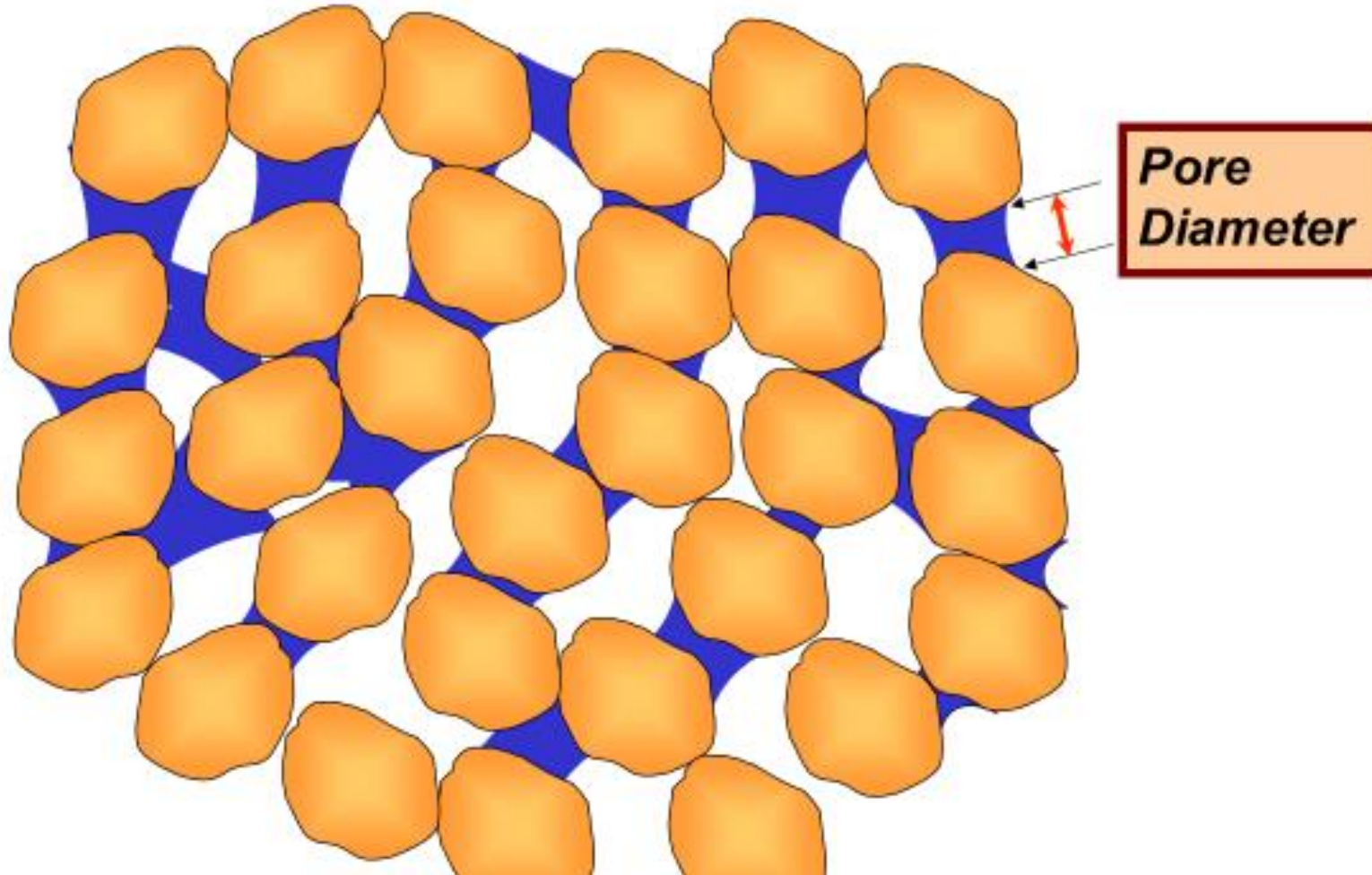


Water under a **suction**, pulls particles together.

This water is not “free water”, it is not free to Move.



Strength of suction force related to pore diameter

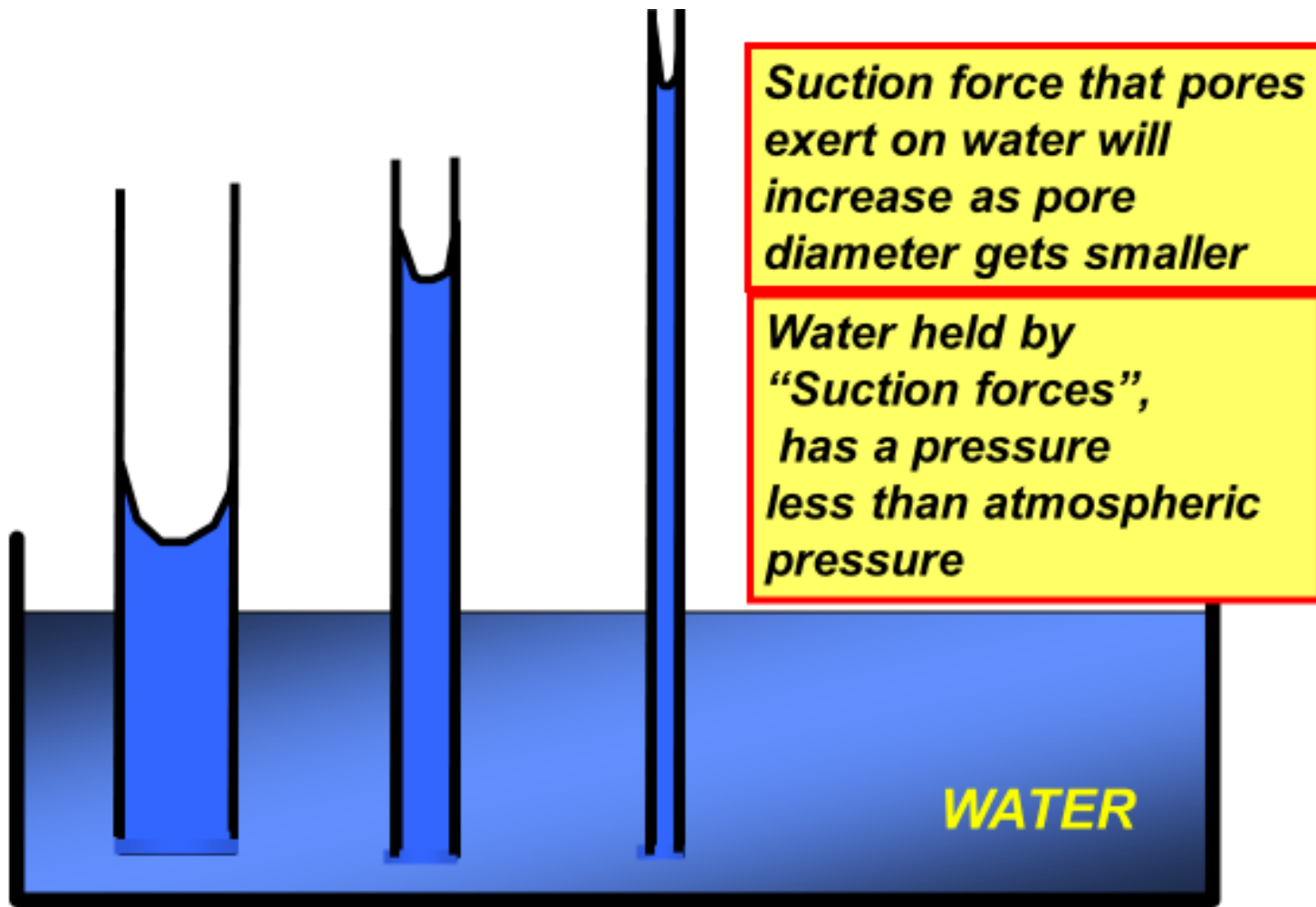


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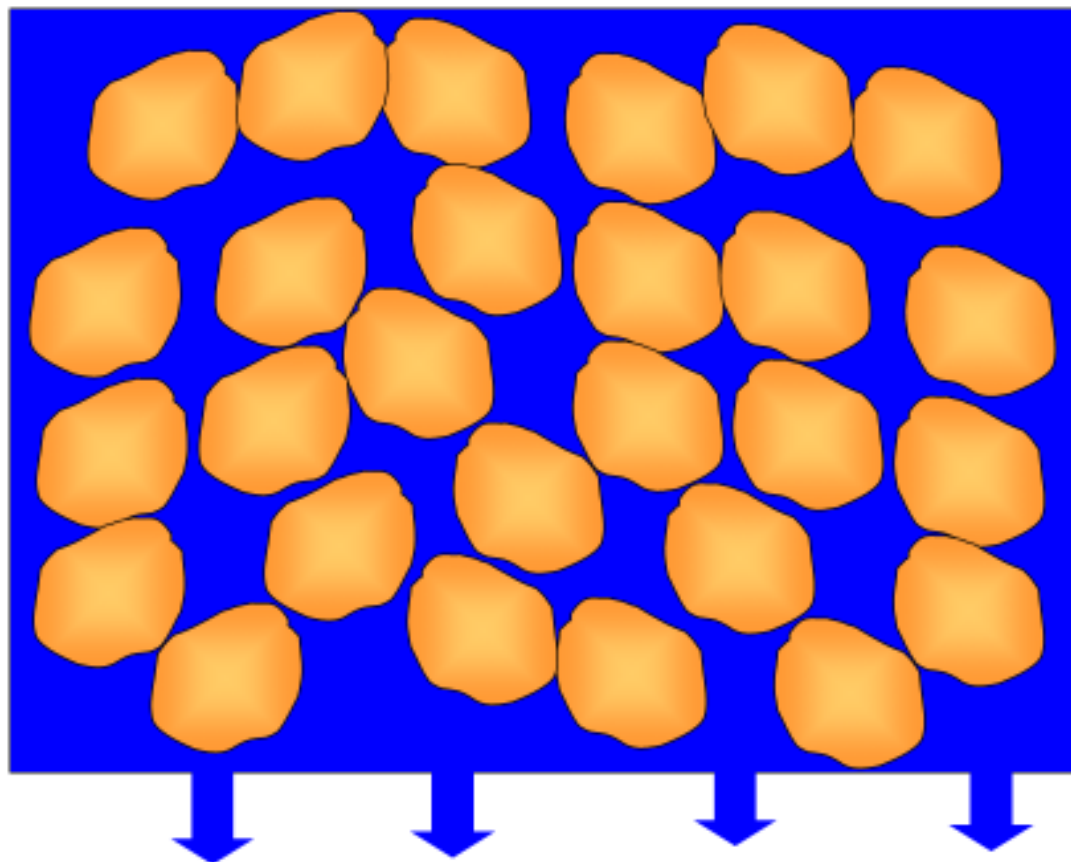
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Capillary Rise



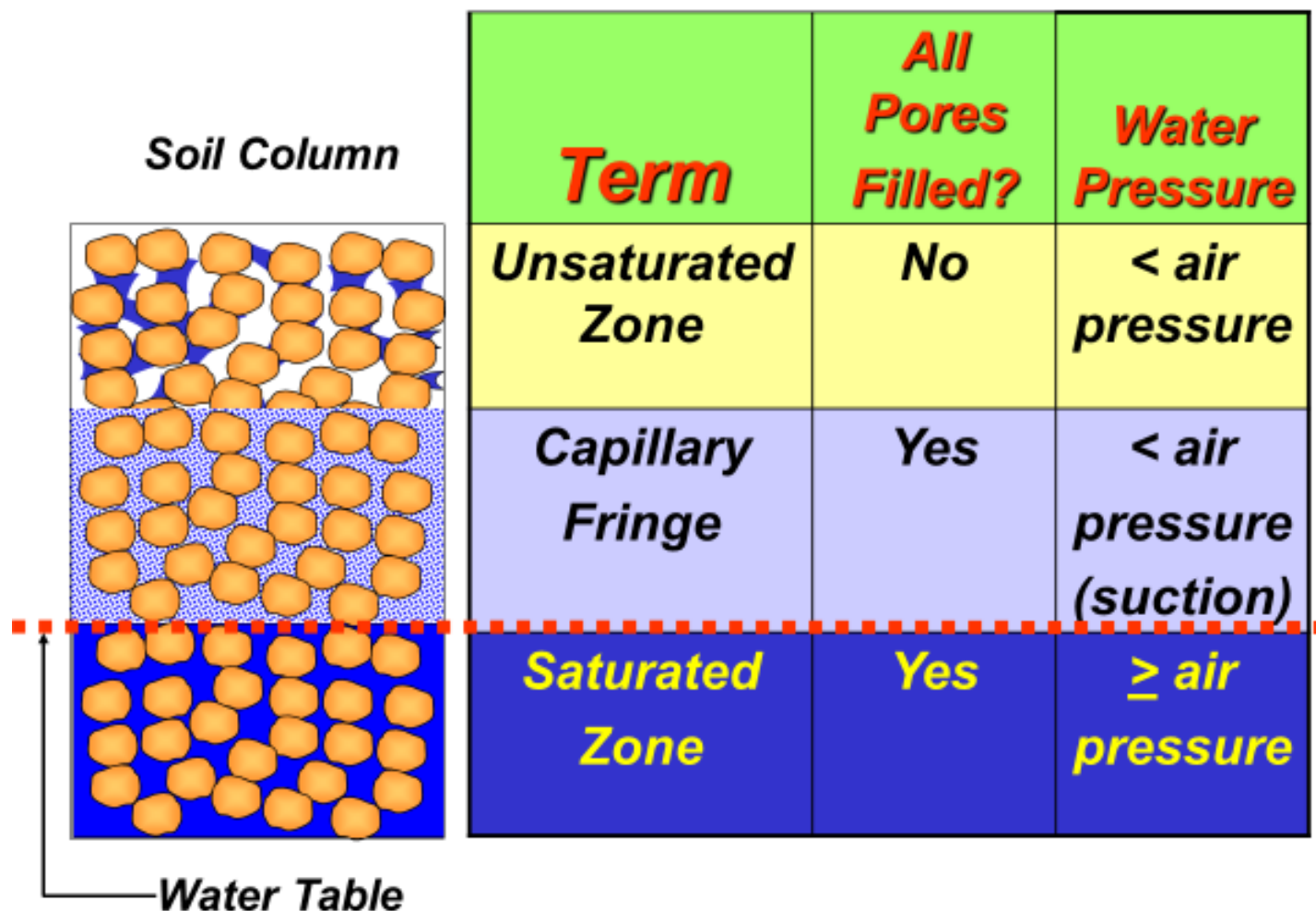
Saturated Soils with Free Water (no Suction)



Free water is not under a suction, and flows in response to gravity.



Unsaturated Zone, Capillary Fringe, Saturated Zone

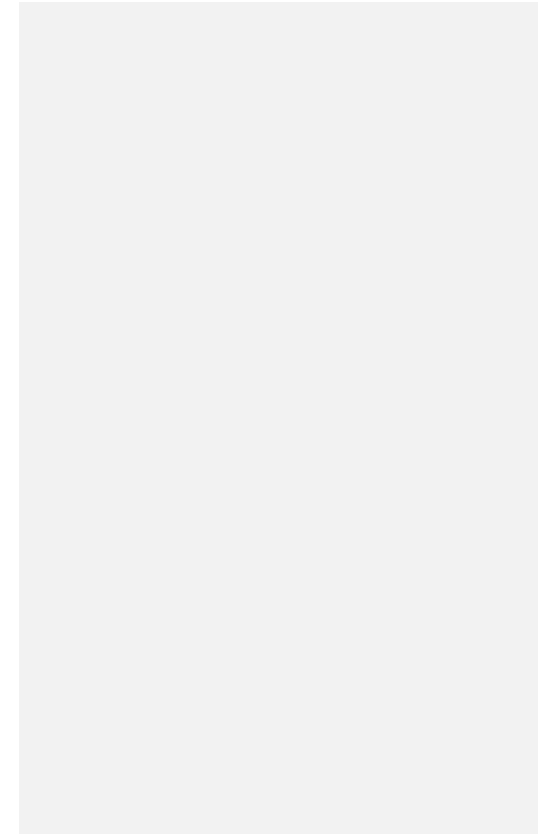


Effect of Hydraulic Gradient



- **Large Hydraulic Gradient ($\geq 2\%$)**
 - Water flows through soil “fast”
 - Chemicals are added to or removed from soil

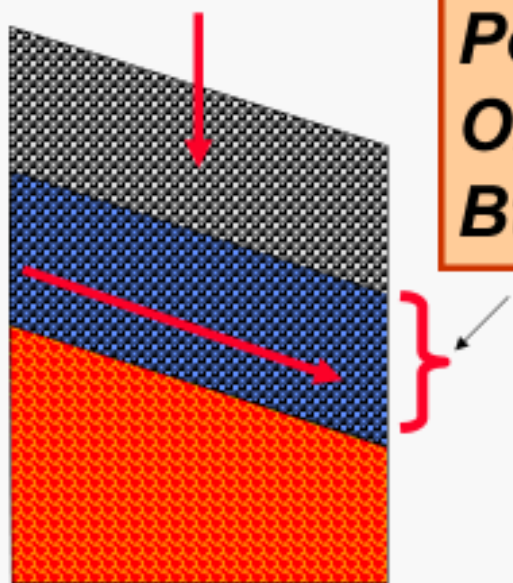
- **Small Hydraulic Gradient ($\leq 1\%$)**
 - Water flows through soil “slowly”
 - Chemicals move internally within soil



Perched Water Tables



Rain Infiltrates

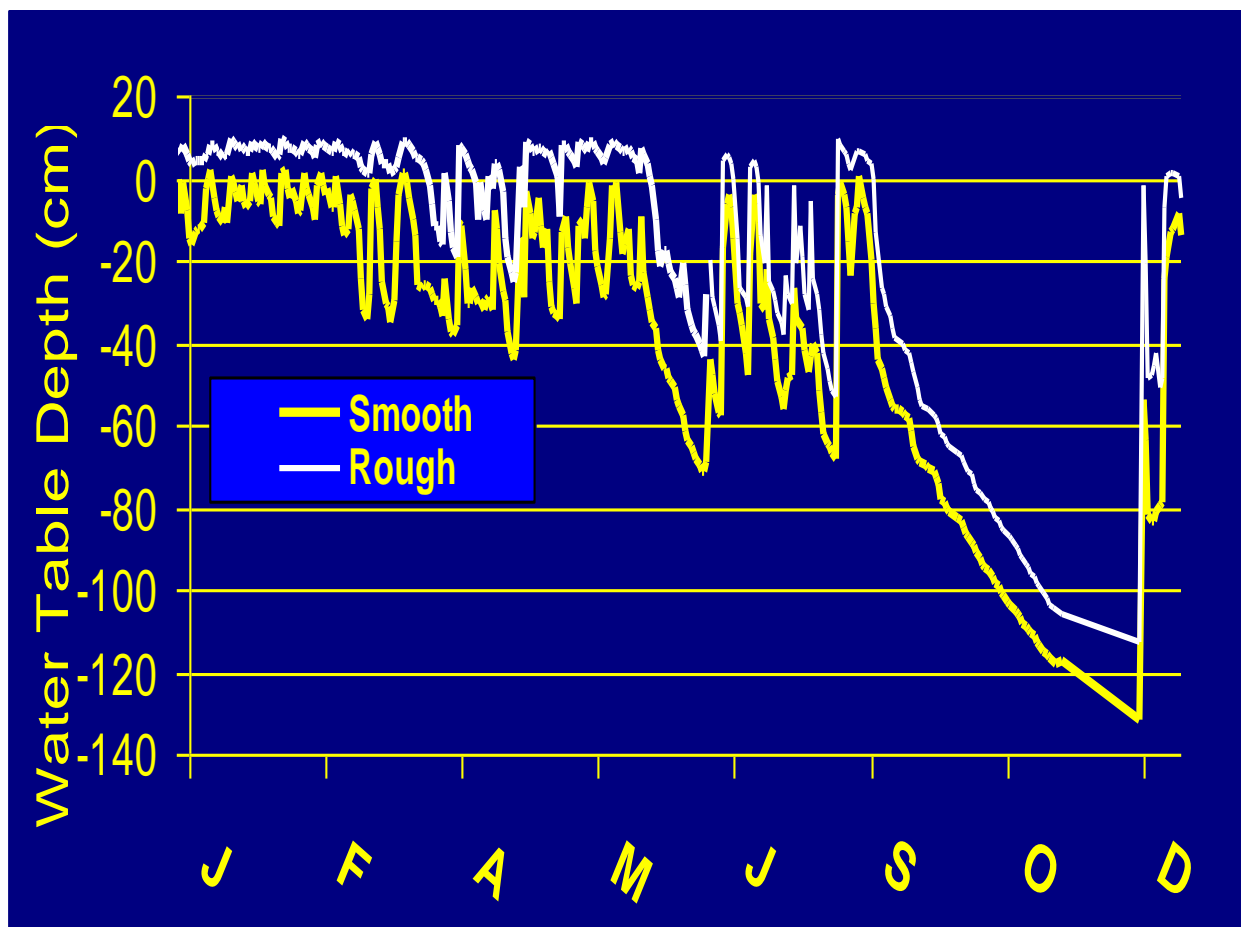


***Perched water table develops
On top of slowly permeable
Bt***

***Flow is lateral, in
downslope direction***



Hydroperiod



- The duration and frequency a soil stays saturated.
 - Different hydroperiods produce different soils that provide different functions.



Organic Soils



A1. Histosol or Histels



Low gradient,
constant
hydroperiod with
periods of ponding



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Soils with Dark Surfaces High in Organic Carbon



A11. Depleted Below Dark Surface



Low gradient,
constant
hydroperiod in
wetter months and
fluctuating in drier
months



Dark Surfaces High in Organic Matter with Redox



F6. Redox Dark Surface



Slight gradient,
fluctuating
hydroperiod near
edge of discharge
wetland

-water leaves
through
evapotranspiration
allowing iron to
accumulate in the
dark surface

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Gray matrix with redox



F3. Depleted Matrix



Gradient can be variable,
fluctuating
hydroperiod



Soils that Flood



A5. Stratified Layers



Moderate gradient,
overland flow,
recent sediment
deposition



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Soils that Pond



F8. Redox Depressions



Low gradient, often
perched, ponded

-saturation
leaves through
evapotranspiration



Conclusion

Soils and Geology have an influence on the types and functions of wetlands in the landscape.



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