Soil Fertility

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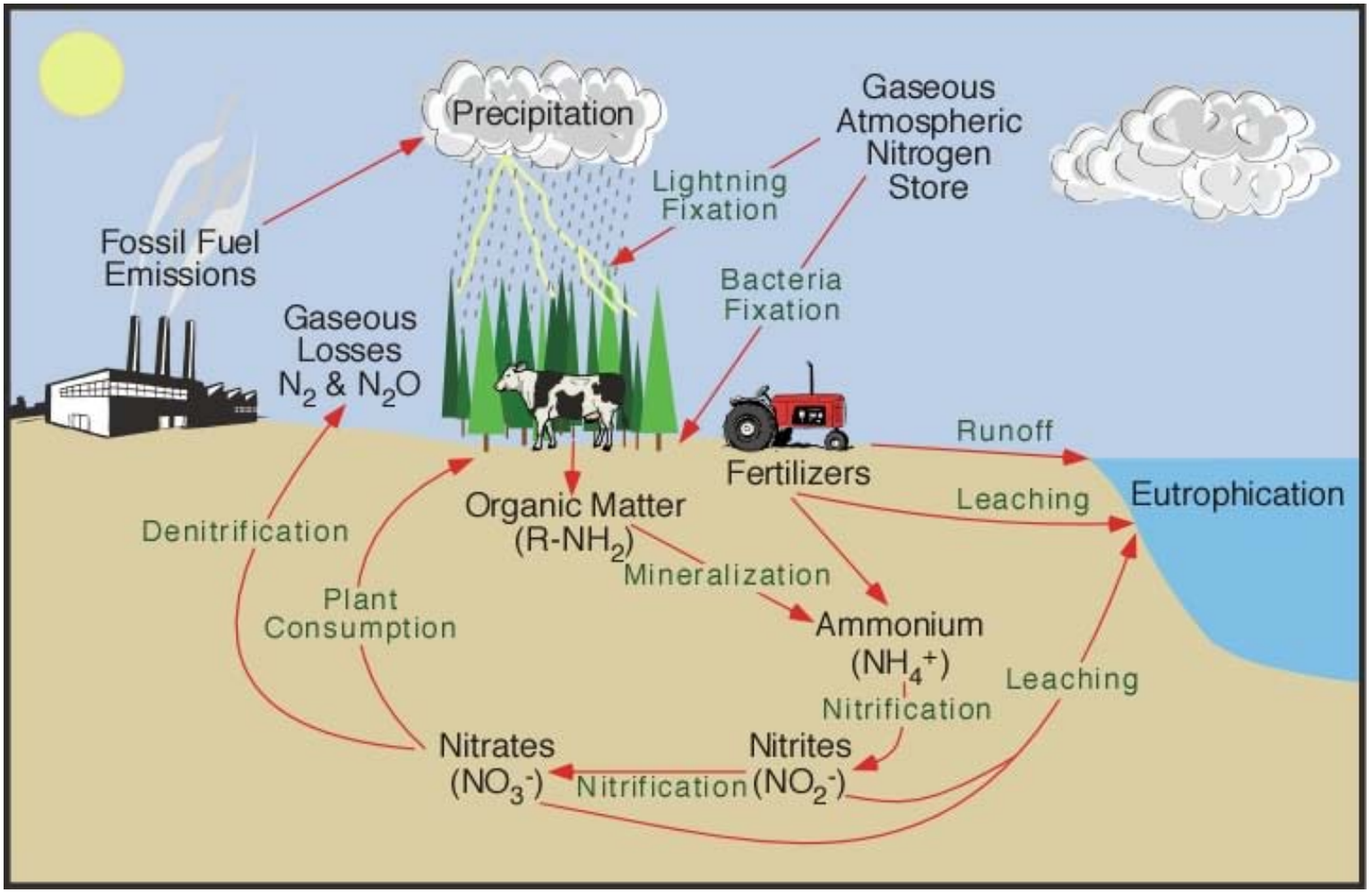
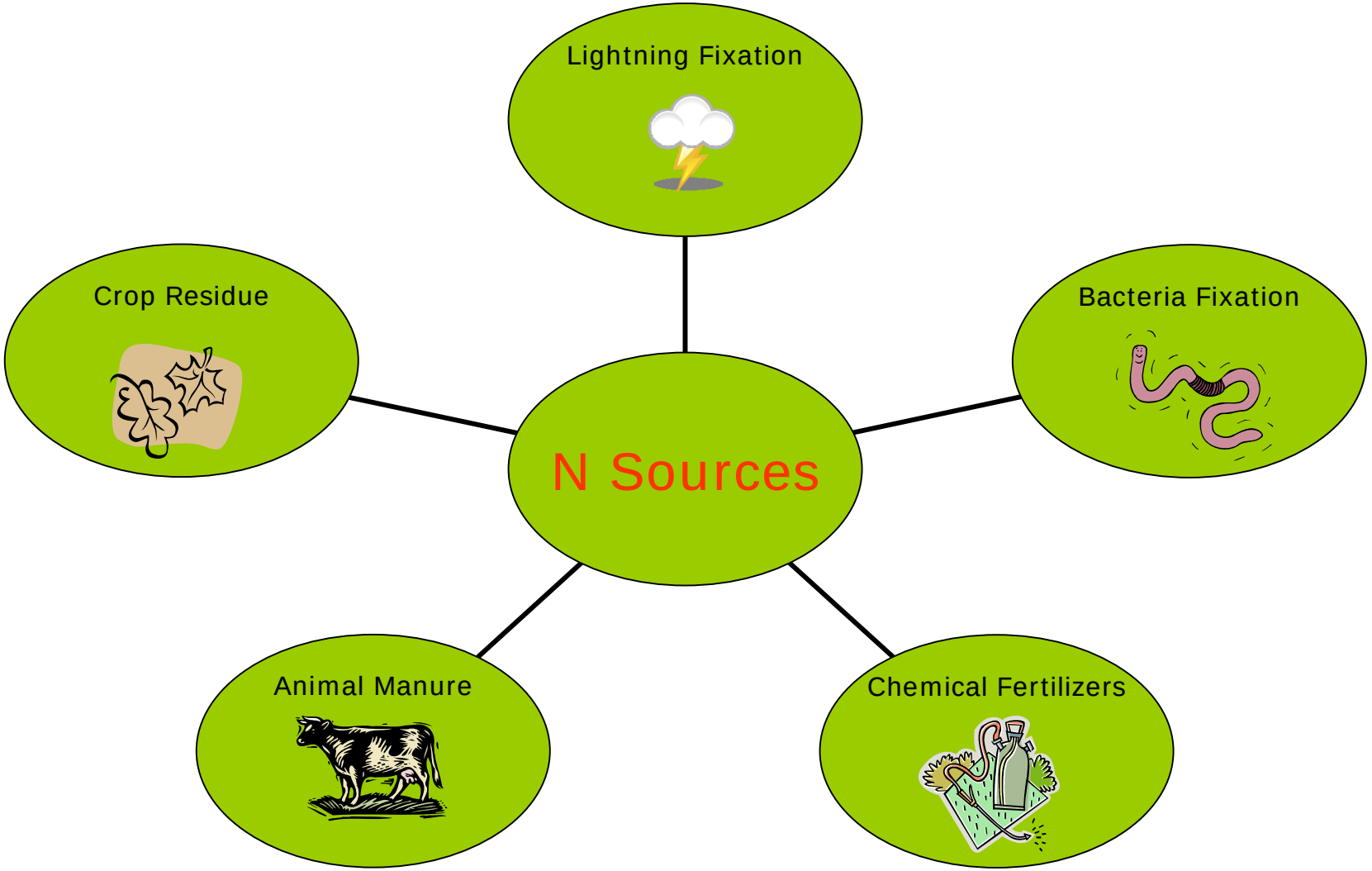
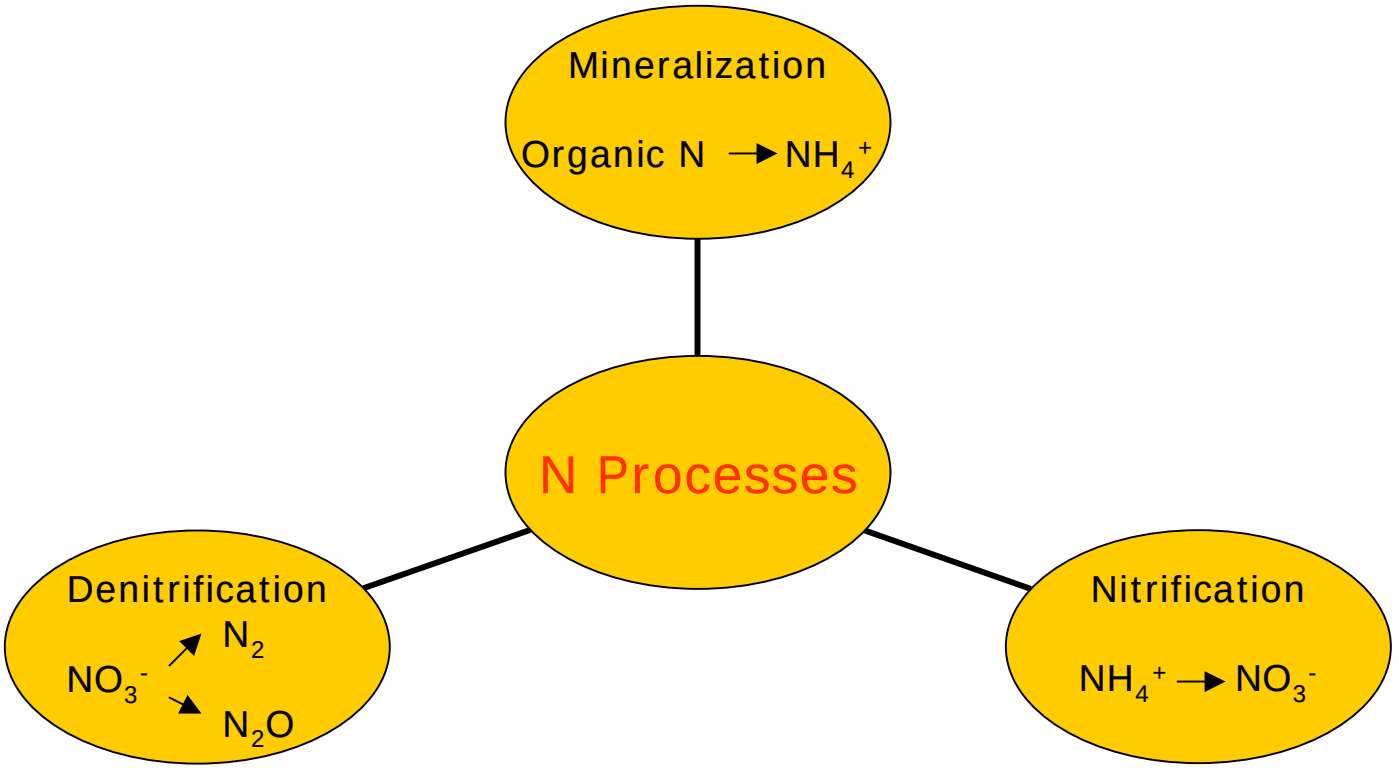
Nitrogen Cycle



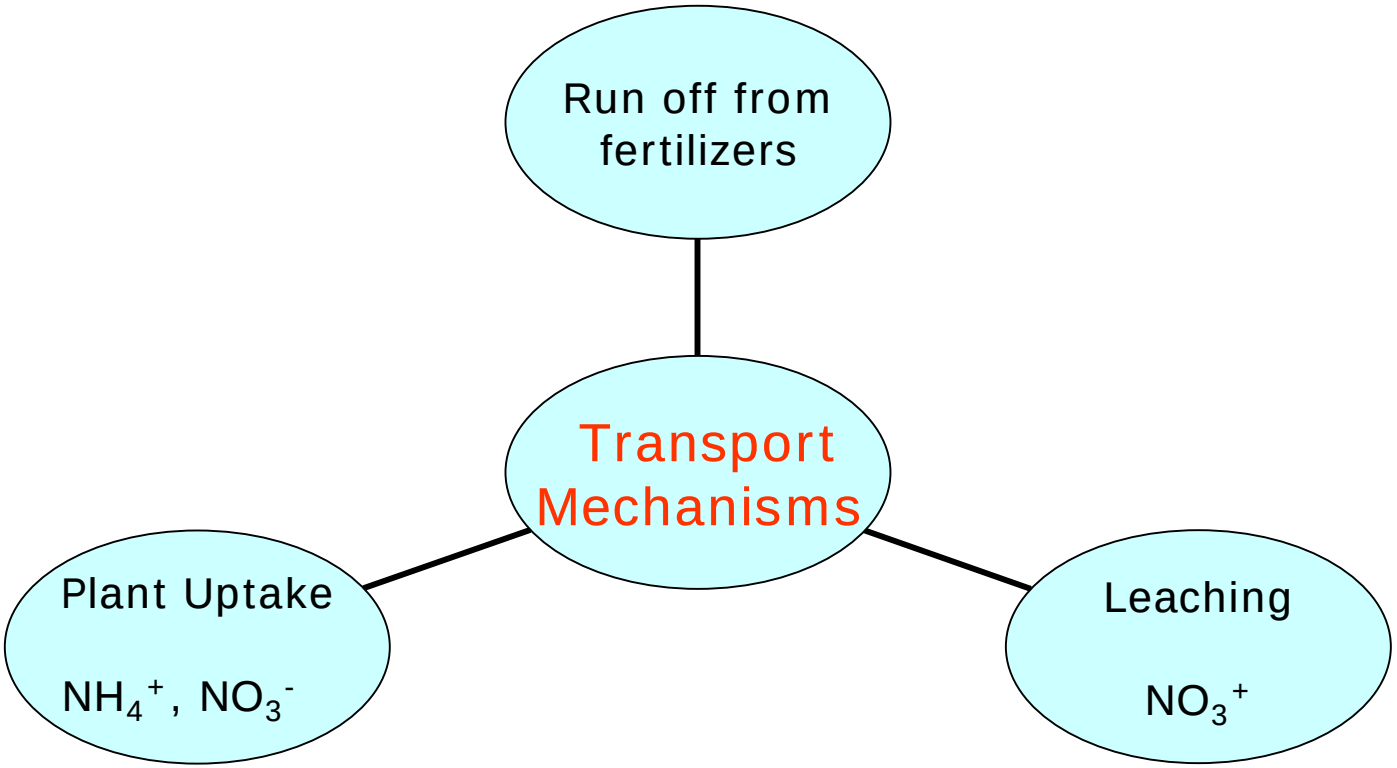
Nitrogen Cycle



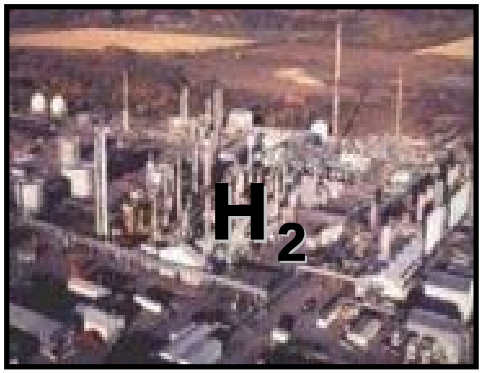
Nitrogen Cycle

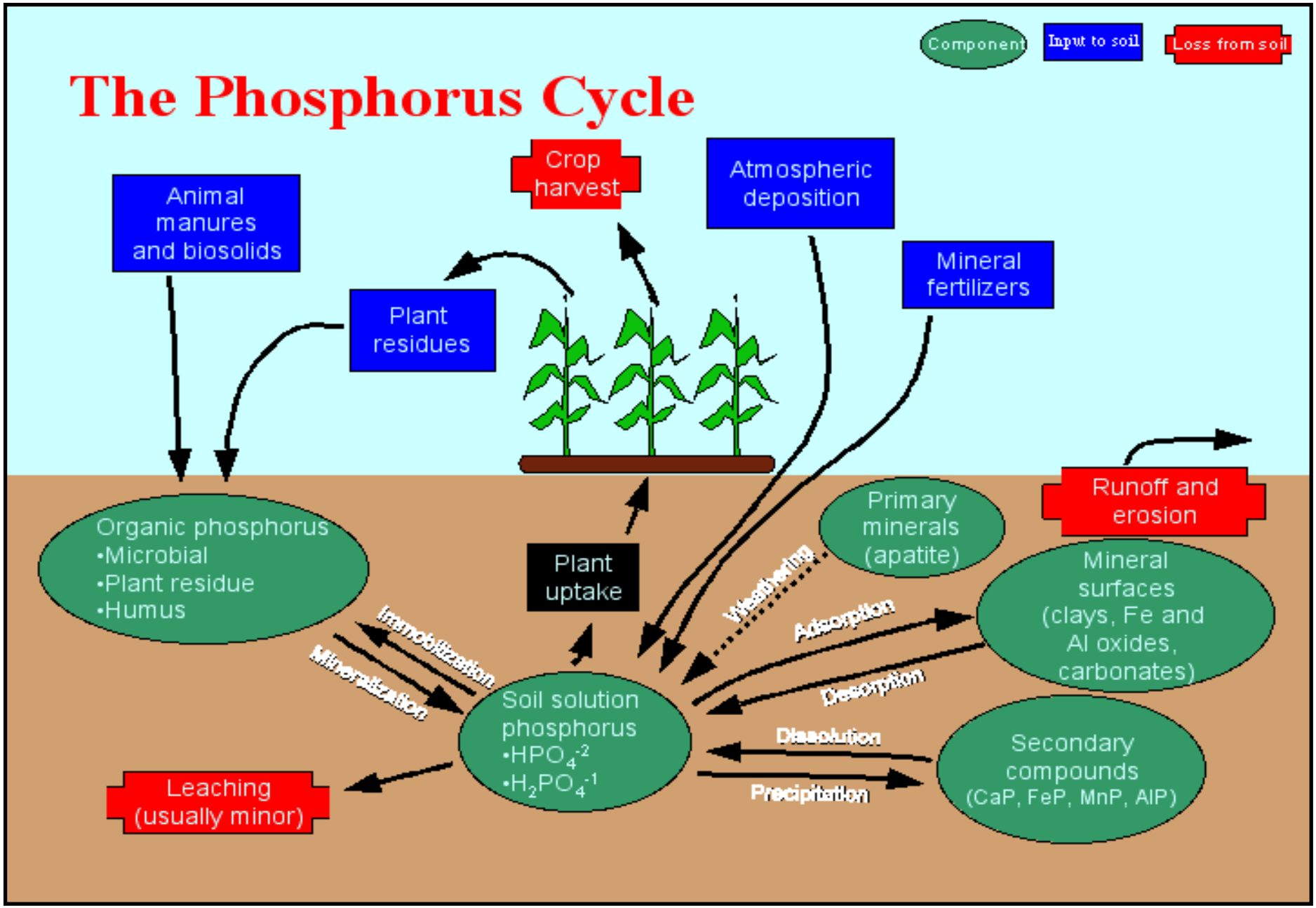


Nitrogen Cycle

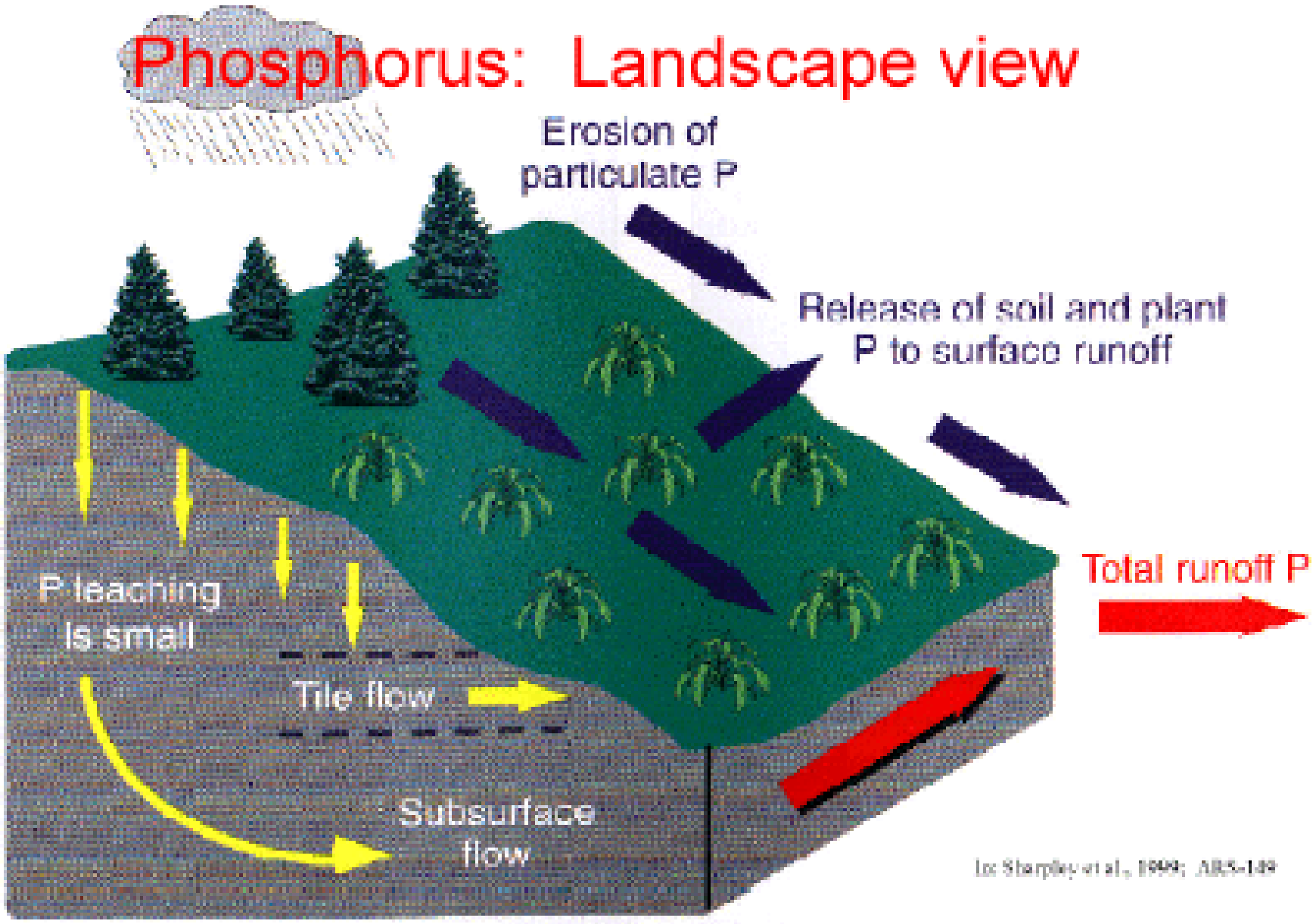


The Harber-Bosch process




Component
Input to soil
Loss from soil
The Phosphorus Cycle
Crop harvest
Atmospheric deposition
Animal manures and biosolids
Mineral fertilizers
Plant residues
Runoff and erosion
Organic phosphorus
•Microbial
•Plant residue
•Humus
Plant uptake
Primary minerals (apatite)
Weathering
Mineral surfaces (clays, Fe and Al oxides, carbonates)
Adsorption
Desorption
Immobilization
Mineralization
Soil solution phosphorus
•HPO_4^{-2}
•$H_2PO_4^{-1}$
Dissolution
Precipitation
Secondary compounds (CaP, FeP, MnP, AlP)
Leaching (usually minor)

Phosphorus: Landscape view



Phosphorus Leaching in FL soils

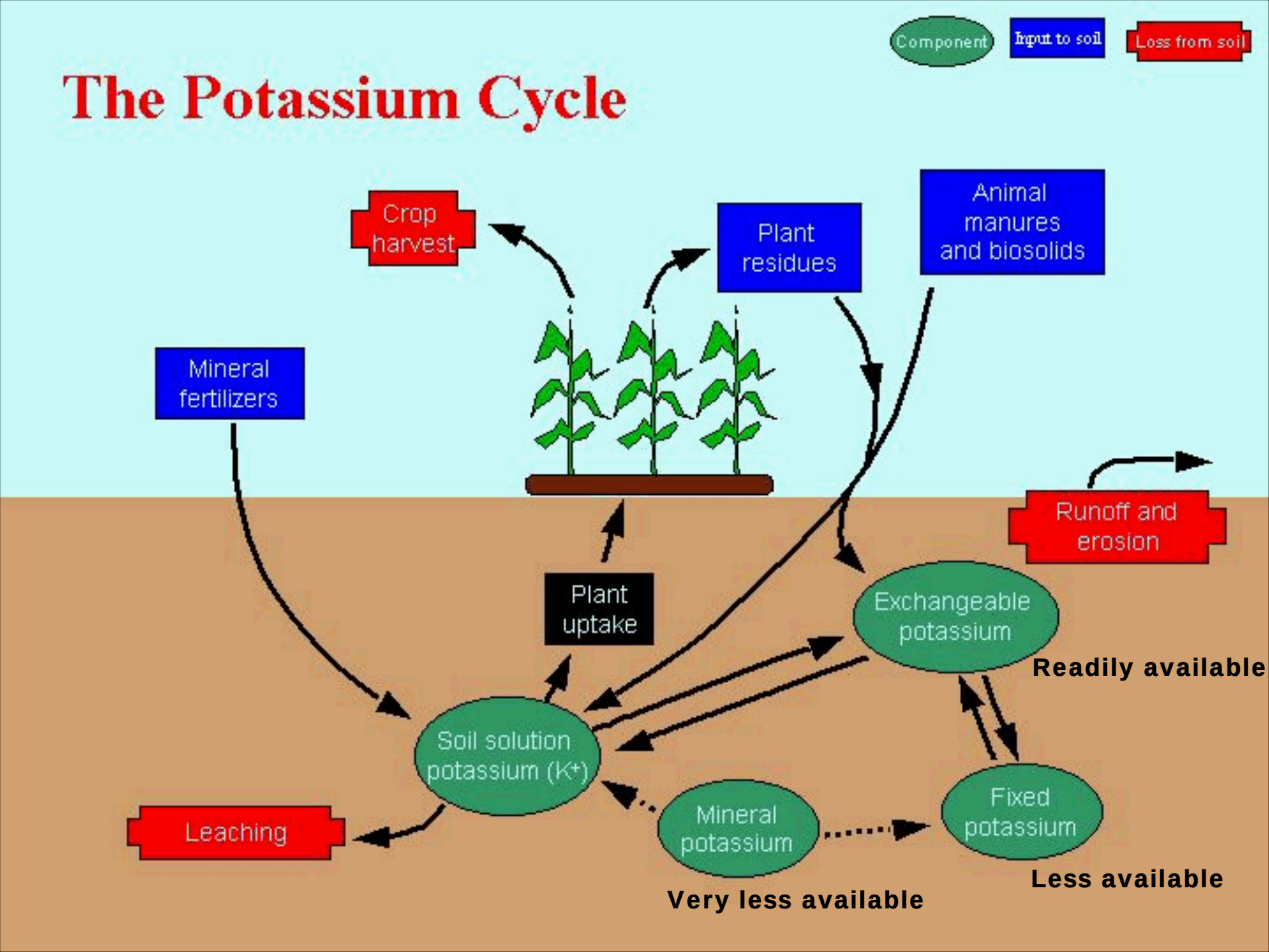
Coated sand

Non-coated sand

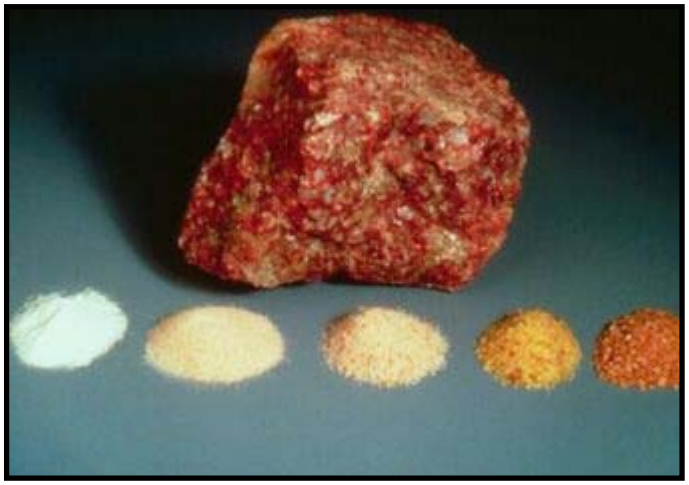
Tavares sand

Immokalee sand

Eutrophication

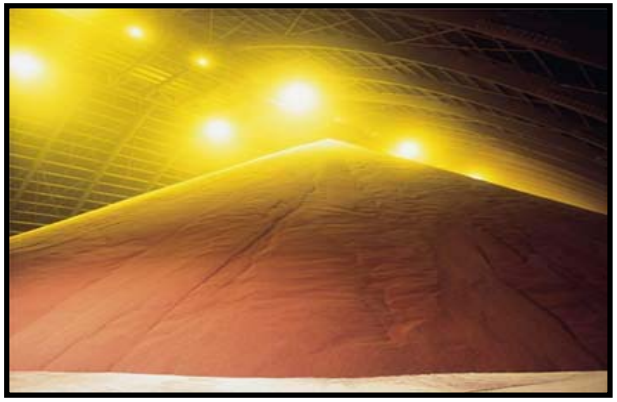

Component
Input to soil
Loss from soil
The Potassium Cycle
Crop harvest
Plant residues
Animal manures and biosolids
Mineral fertilizers
Runoff and erosion
Plant uptake
Exchangeable potassium
Readily available
Soil solution potassium (K+)
Leaching
Mineral potassium
Fixed potassium
Less available
Very less available

Where Potash comes from?



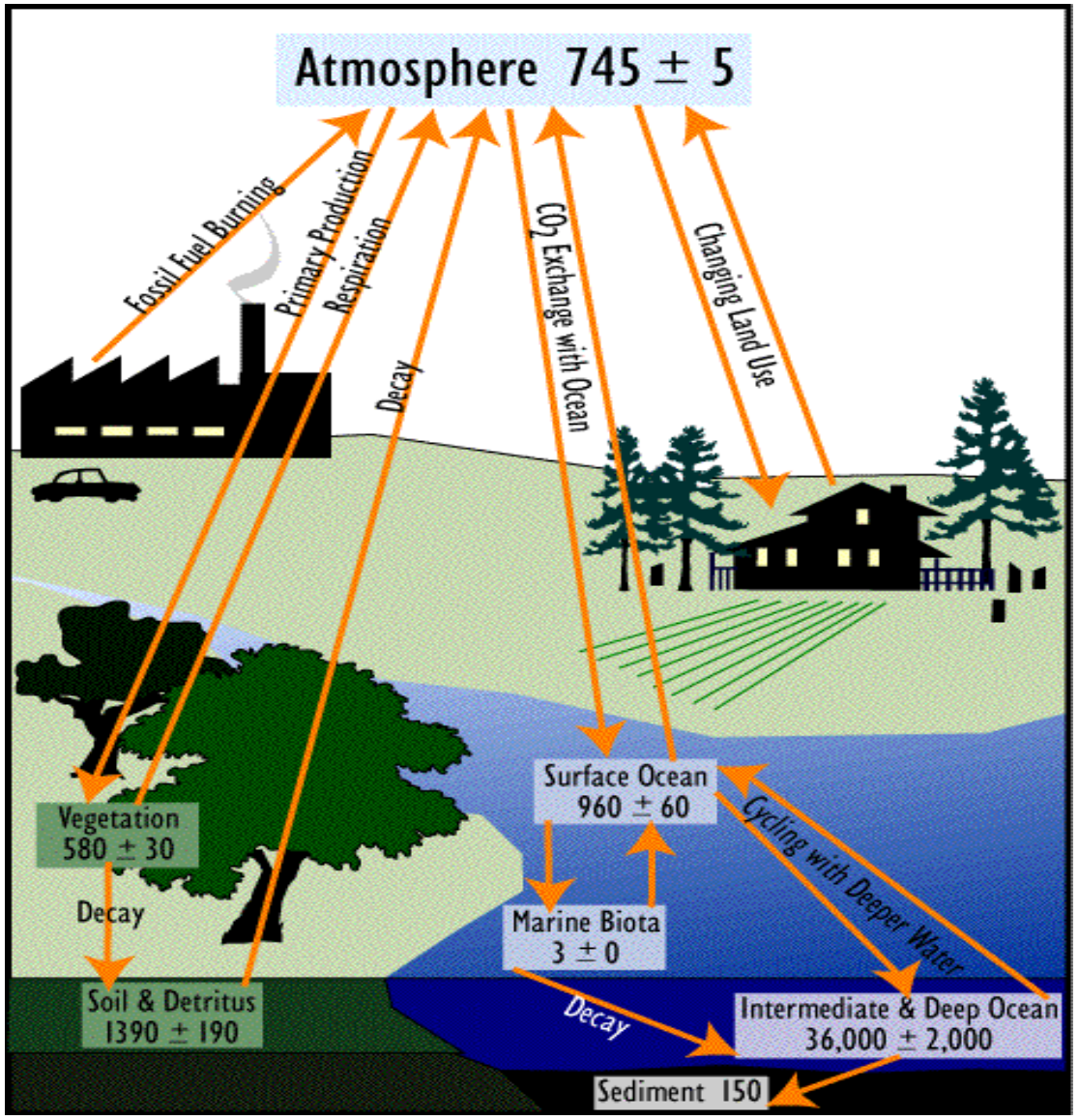
Sylvinite

Mining Equipment



Potash Pile

Carbon Cycle



http://epa.gov/climatechange/kids/carbon_cycle_version2.html

Importance of Soil Organic Matter

- Soil Chemical Properties
  - Cation-exchange capacity
- Soil Physical Properties
  - Soil aggregation
  - Water holding capacity
- Energy source for microbes

Factors determining SOM levels

- Microbial Activity
  - pH
  - Soil Moisture
  - Soil Aeration
  - Soil Temperature
  - C/N Ratio
- Physical Factors
  - Surface placement
  - Particle Size
- Environmental Factors
  - Climate
  - Vegetation