C.6 The nitrogen and phosphorus cycles

Essential idea: Soil cycles are subject to disruption.

Nitrogen Cycle

Key Chemical Ingredient: amino acids/proteins

- Earth's atmosphere 80% nitrogen; unavailable to plants; cannot assimilate
- Nitrogen available to plants as
    1. Ammonia (NH_3)
    2. Ammonium (NH_4^+)
    3. Nitrate (NO_3)
- Bacteria are essential to the nitrogen cycle
- Nitrogen gas in the atmosphere is very abundant, but is such a stable molecule that bacteria are needed to break it apart and this process consumes much energy
- Nitrogen enters ecosystems by atmospheric deposition (5-10%) or Nitrogen fixation
- NH_4^+ & N[illegible] added to soil; dissolved in rain or fine dust (particulates)

The Nitrogen Cycle

Steps in Nitrogen Cycle

- Five steps are involved in the nitrogen cycle
  1. **Nitrogen fixation** Nitrogen must be fixed in order to be used by plants, its atmospheric form (**Azotobacter**).
  2. **Ammonification** Ammonia (NH_3) is made by decomposing bacteria (**Azotobacter**).
  3. **Nitrification** For those plants who refuse to settle with ammonia, they undergo nitrification. Bacteria (***Nitrobacter***) convert most of the ammonia in soil to nitrite ions (NO_3^-)
  4. **Assimilation** This is when plants absorb the substances dropped off by nitrogen fixation and nitrification.
  5. **Denitrification** If the nitrate ions choose not to assimilate they leave the soil and are converted by specialized anaerobic bacteria (**Paracoccus)** in water-logged soil, swamps, lakes.