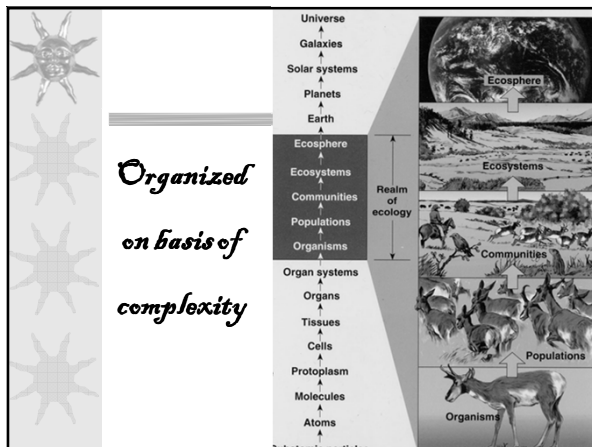


Ecosystems

*How are they and
how do they work?*

Miller Chapter 3

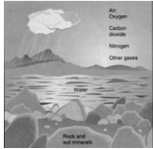



How did life on earth evolve?

- ★ The Primitive atmosphere was devoid of oxygen
- ★ First organisms to appear were bacteria using the process of **chemosynthesis**


→

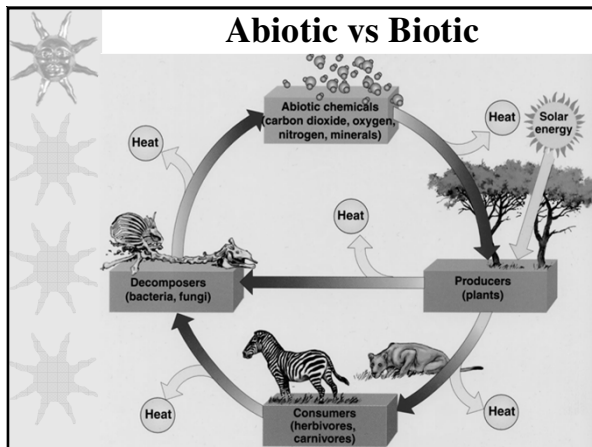
- ★ How do organic and inorganic molecules differ?

Photosynthesis

Cyanobacteria were the first organisms to transform inorganic light energy into organic chemical energy.





The GAIA Hypothesis

Gaia-Greek Earth Goddess

- ★ Proposes by British Chemist James Lovelock and American Biologist Lynn Margulis in the 1970's
- ★ **Abiotic world**
- ★ Living systems act as environmental regulators, ensuring chemical levels stay within limits for health of the biosphere
- ★ These “feedback loops”, react to changes in the
- ★ **Essentially the Earth is a living system!**

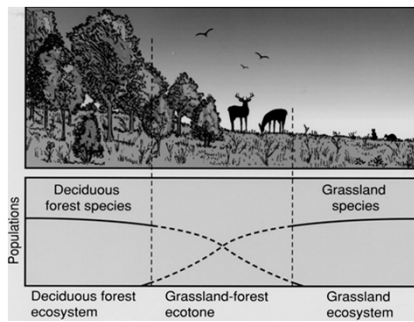


The Biotic Components

autotrophs and heterotrophs

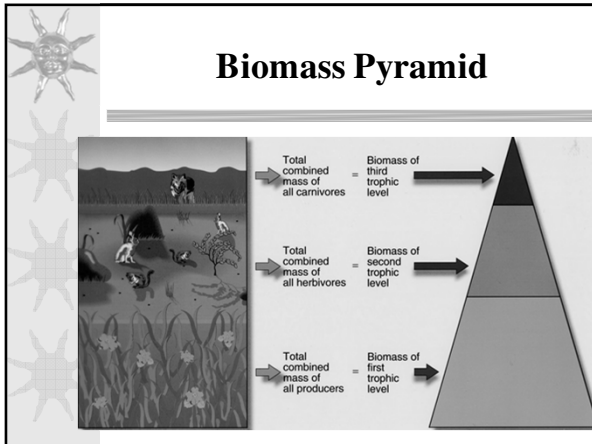
- * Are organized into categories called **trophic levels**.
- * In consumers there are sub-levels
- * These trophic levels live together in a **community** within an **ecosystem**.
- * Are ecosystems boundaries definitive?

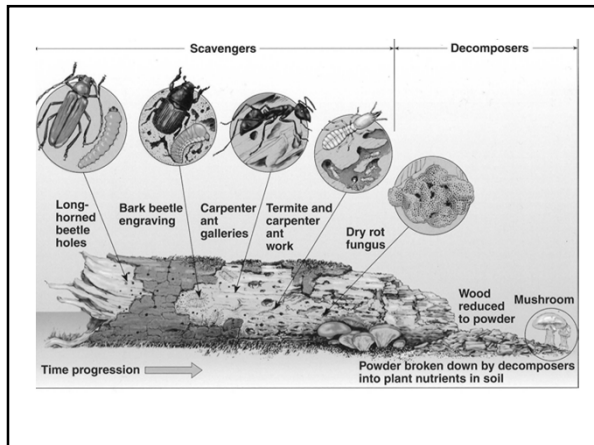
Ecotones





The relationship of
different organisms
is described graphically
by ecologists

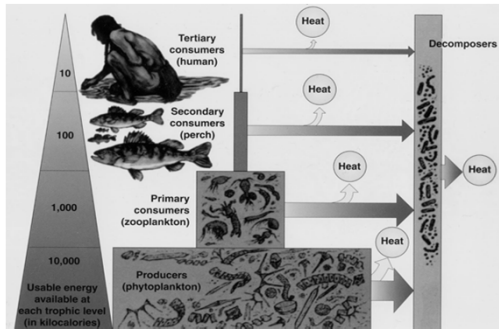




Limiting Factors

★The size of any given population in a ecosystem can be limited by a single factor

Ecological Efficiency

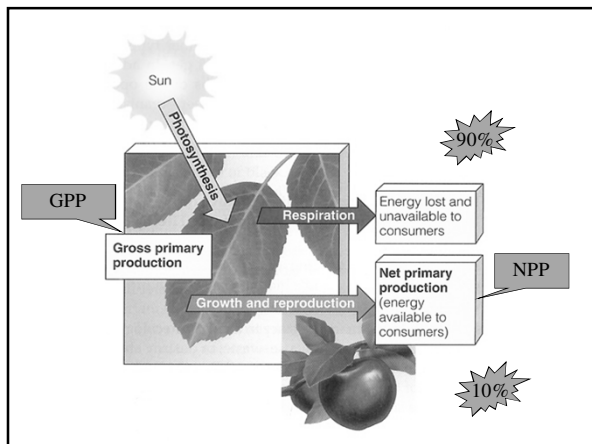


Biomass in the Biomes

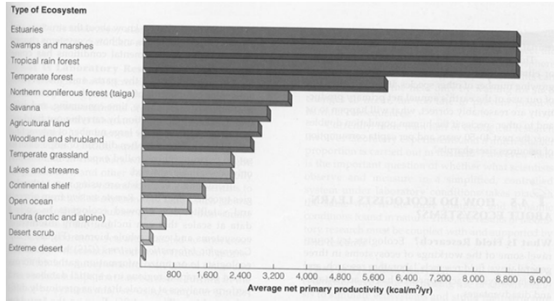
* GPP Gross Primary Productivity

* NPP Net Primary Productivity

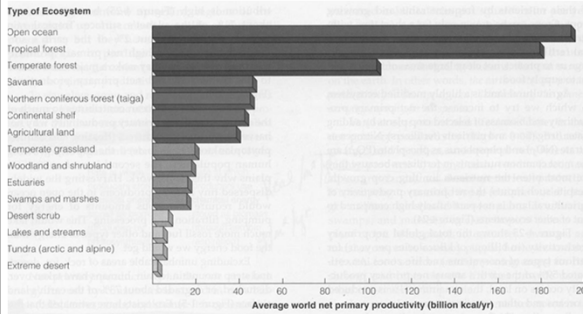
* Earth's Total NPP = Earth's Carrying Capacity



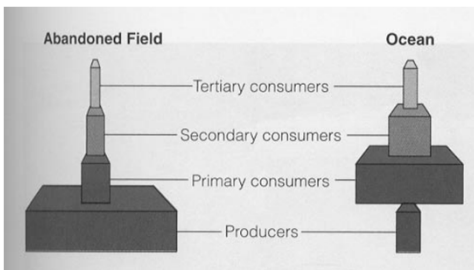
NPP per unit area in Major life zones



Annual Ecosystem contribution to world's NPP



Biomass Pyramids



Why are these so different at the producer level?
