Ecosystems and Biogeochemical Cycling

ECOL 206
January 24, 2007

Upcoming Events of Interest

Andrea Heydlauff, Wildlife Conservation Society
TODAY at Noon
Biosciences East 225

EEB Seminar: “Microbial enzymes and communities under environmental change: Implications for ecosystem processes”
Steven Allison, UC Irvine
Monday, January 29, 4:00 pm
Biosciences West 301

Free Screening of “An Inconvenient Truth” with a Panel Discussion by UA Climate Scientists (ISPE)
Wednesday, January 31, noon
Gallagher Theater, Student Union
Not eligible for Current Events assignment!

Current Events Assignments

• Appropriate sources
• Full citation, not just web address
• Written assignment – Use correct grammar and good sentence structure
• On time
• Summarize article
• Respond to the article

Ecosystem Ecology

• Ecosystems as giant energy-transforming machines

Ecosystem Components

• Biotic Components
  – Autotrophs (inorganic to organic – reduce carbon compounds – fix energy – chemical or light)
  – Heterotrophs (rely on autotrophs or organic matter – macroconsumers (phagotrophs) – microconsumers (saprotrophs – decomposers)

• Abiotic Components
  – Inorganic molecules (C,H,N,P,S,Fe,Sl,O – CO₂, H₂O)
  – Organic molecules (humus, non-bound carbon based molecules)
  – Substrate (parent material and age)
  – Climate (light, temp, precip)

Ecosystems

Ecosystems can range from a microcosm, such as an aquarium to a large area such as a lake or forest
Ecosystem Science is concerned with resource pools, cycles, and feedbacks that regulate process rates and status.

Energy flows through food webs.

The rate of primary production determines the rate of energy supply to the rest of the ecosystem.
Components of Primary Production

- **Gross** primary production (GPP) = total energy assimilated by primary producers
- **Net** primary production (NPP) = energy accumulated (in stored form) by primary producers
- Gross - net = respiration (R), the energy consumed by producers for maintenance and biosynthesis

Ecosystems support **two parallel food chains**:

- **Herbivore-based** (large animals feed on leaves, fruits, seeds)
- **Detritus-based** (microorganisms and small animals consume dead remains of plants and indigestible excreta of herbivores)
  - herbivores consume:
    - 1.5-2.5% of net primary production in temperate forests
    - 12% in old-field habitats
    - 60-99% in plankton communities

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**Atmospheric CO₂ Concentrations**

![Atmospheric CO₂ Concentrations](http://earthobservatory.nasa.gov/Library/CarbonCycle/Images/carbon_cycle_diagram.jpg)


Does elevated CO₂ affect you?