Ecosystem ecology

A more complete picture

Community + Abiotic

- Ecosystems are...
- Focus is on energy flow and nutrient cycling

Ecosystem dynamics

- Energy (carbon) flow
- Nutrient cycling (esp. N & P)

Primary production

- The base of the food web
- \( \text{GPP} = \text{all the light energy converted into chemical energy by photosynthesis per unit time} \)
- \( \text{NPP} = \text{GPP} - \text{R} \)
  - The amount of energy available to...

Global NPP visualized

- Lots of variation...what limits NPP?
Limitation in action

- **Eutrophication**: an experiment to determine causes

C + N + P
(2 mo)

Curtain

C + N

Secondary production

- Animal productivity
- Net or gross?

Energy flow

- Where does the food go?

```
Plant material
 eaten by caterpillar
```

```
200 J
```

```
67 J
```

```
33 J
```

```
Growth (new biomass; secondary production)
```

```
Not assimilated
```

```
100 J
```

```
Assimilated
```

Pyramid of production

- How efficient?

```
1,000,000 J of sunlight
```

Nutrient cycling

- Unlike energy, nutrients can be recycled through an ecosystem
- Nutrients move between both biotic and abiotic portions of ecosystems
- Biogeochemical cycles

```
Nutrient uptake, photosynthesis
```

```
Respiration, decomposition, excretion
```

```
Waterlogging, fossilization
```

```
Burning of fossil fuels
```

```
Nutrient cycling model
```

- Where do organisms fit into these ‘black boxes’?