

## Ecological framework and interactions

- Skip chapter 3
- Part III of Lifestyle project now posted – due February 14th

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### Lifestyle project: Cost of electricity

Region	¢ / kilowatt-hour
New England	16.52
Middle Atlantic	15.79
East North Central	11.23
West North Central	9.47
South Atlantic	10.94
<b>East South Central</b>	<b>9.39</b>
West South Central	10.91
Mountain	10.61
Pacific	12.55
Hawaii	27.83
Alaska	16.60

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### Lifestyle project: Cost of electricity in other countries

Chili	23.11 (2011)
France	16.79 (2011)
Iceland	8.45 (2010)
New Zealand	24.0 (2011)
The Netherlands	34.70 (2009)
Singapore	20.69 (2011)
Sweden	27.34 (2009)
Tonga	45.70 (2010)
UK	19.18 (2011)
USA	11.20 (2011)

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## Ecology

- Study of the ways organisms interact with each other and with their nonliving surroundings
- Biosphere: part of the earth where life exists; includes the ocean and atmosphere (to the highest mountain)
  - A closed system
  - Divided into terrestrial and aquatic systems

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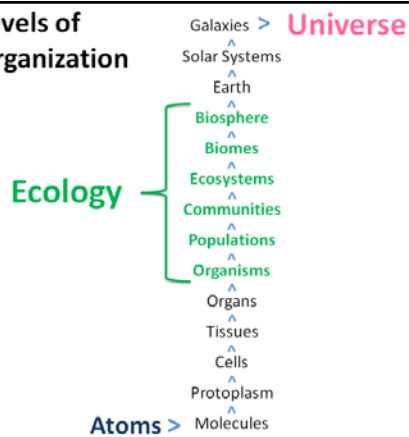
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## Levels of Organization



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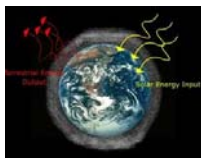
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## Systems

- Open – can have exchanges external components
  - Inputs and outputs
- Closed – no inputs or outputs (generally sunlight is not considered an input)
  - Earth considered a closed system



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## Terrestrial and aquatic systems

- Biosphere divided into units
- Terrestrial units: biomes
  - Similar climate and set of plants and animals
  - 12 major biomes
- Aquatic life zones
  - Similar set of plants and animals
  - Freshwater and marine systems




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## Biosphere basics

- Must have both abiotic and biotic parts in any ecosystem




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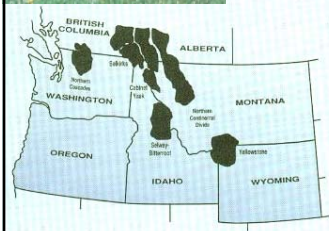
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## Habitat and niche



- **Habitat:** where something can live
- **Niche:** Functional role organism has in its surroundings
  - Best place to live




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## Limiting factors

- Can be abiotic or biotic
- Shortage or absence can limit success
  - Availability of sunlight for a seedling
  - Water clarity for fish
  - Water for a plant
  - Temperature



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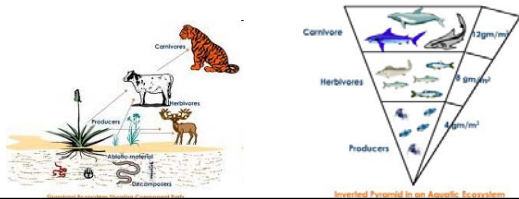
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## Major roles of organisms in an ecosystem

- Three categories: producers, consumers, and decomposers
- Must have all three for a functioning ecosystem



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## Producers:

- Organisms that are able to use sources of energy to make new organic material
  - Photosynthesis
- Taking in carbon dioxide and releasing oxygen
  - Creating its own food from sunlight and CO<sub>2</sub>
  - Relying on abiotic elements



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## Consumers

- Requires organic matter as food source
- Primary consumers (i.e. herbivores) – eat producers
- Secondary consumers (carnivores) – eat other animals
- Omnivores – eat plants and animals



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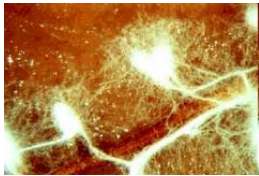
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## Decomposers

- Returns organic material back to inorganic material
- Recyclers
  - Includes small animals, fungi, and bacteria



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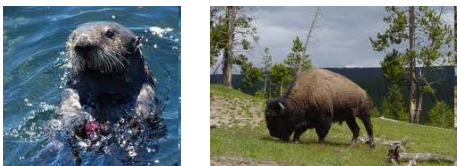
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## Keystone Species

- Organism that plays a critical role in the maintenance of an ecosystem
  - Bison in grasslands increase biodiversity with their grazing
  - Sea otters in a marine ecosystem – eat sea urchins, keeping the grazing of kelp in check



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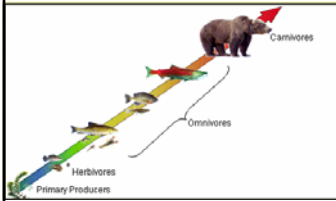
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## Energy flows in ecosystems: Food chain

- Linkage of single species in an ecosystem
- Need to understand what species eats



At least 3 links, but usually 4 links, in a food chain

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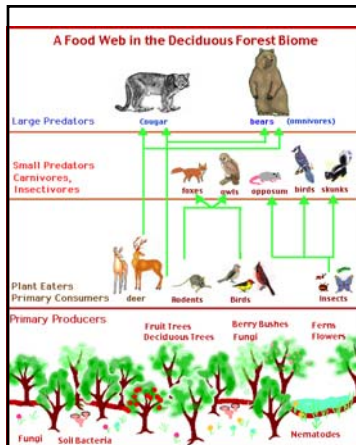
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## Food Web

- Shows the linkages in an **ecosystem**
- Essentially who eats what

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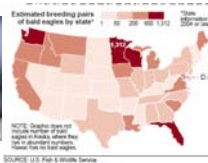
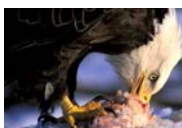
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## Species in a food web

- Generalist species: species capable of eating multiple species, can be carnivores or omnivores; or able to adapt to different environments
- Environmentally adaptable: able to travel in different environments




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## Specialists

- Capable of only eating one plant or animal or living under certain conditions



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## Cycles: nutrients

- Nitrogen
- Carbon
- Oxygen
- Hydrologic
  
- Interconnected systems
- Balances of inputs and outputs
- All cycles are required for life to exist

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