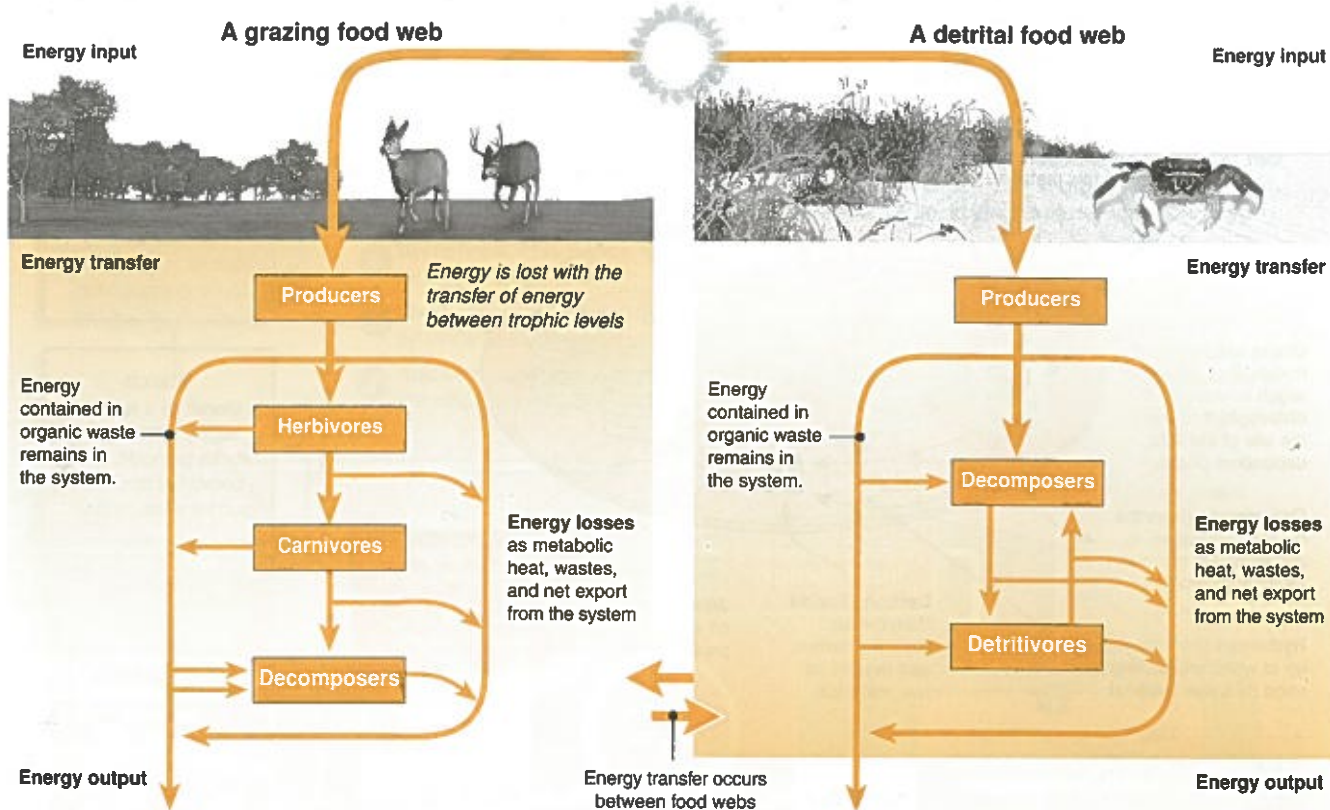


Energy Inputs and Outputs

Within ecosystems, organisms are assigned to **trophic levels** based on the way in which they obtain their energy. **Producers** or **autotrophs** manufacture their own food from simple inorganic substances. Most producers utilize sunlight as their energy source for this, but some use simple chemicals. The **consumers** or

heterotrophs (herbivores, carnivores, omnivores, decomposers, and detritivores), obtain their energy from other organisms. Energy flows through trophic levels rather inefficiently, with only 5-20% of usable energy being transferred to the subsequent level. Energy not used for metabolic processes is lost as heat.



Producers (green plants, algae, and some bacteria) make their own food from simple inorganic carbon sources (e.g. CO₂). Sunlight is the most common energy source for this process.

Consumers: Consumer organisms (animals, non-photosynthetic protists, and some bacteria) rely on other living organisms or organic particulate matter for both their energy and their source of carbon. **First order consumers**, such as aphids (left), feed directly on producers. **Second** (and higher) **order consumers**, such as ladybugs (center) feed on other consumers. **Detritivores** consume (ingest and digest) detritus (decomposing organic material) from every trophic level. In doing so, they contribute to decomposition and the recycling of nutrients. Common detritivores includes millipedes (right), woodlice, and many terrestrial worms.

Decomposers (fungi and some bacteria) obtain their energy and carbon from the extracellular breakdown of (usually dead) organic matter (DOM). Decomposers play a central role in nutrient cycling.

Ecosystems

1. Describe the differences between **producers** and **consumers** with respect to their role in energy transfers: _____
2. With respect to energy flow, describe a major difference between a detrital and a grazing food web: _____
3. Distinguish between detritivores and decomposers with respect to how their contributions to nutrient cycling: _____