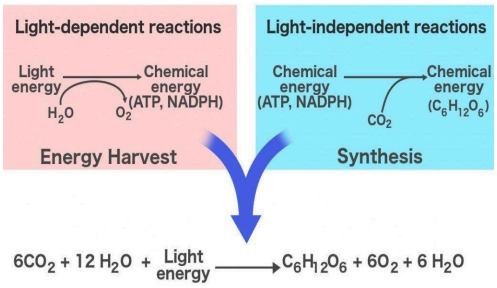
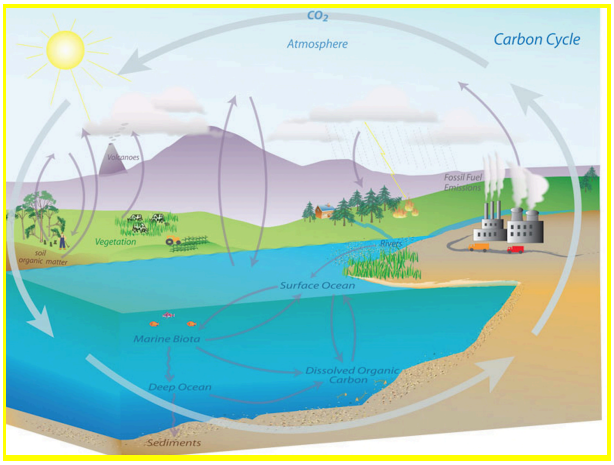
Organization for Matter and Energy Flow in Organisms *(review of producers, consumers, decomposers, and detritivores)*

Photosynthesis: Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from **carbon dioxide** from the atmosphere and water through the process of, which also releases oxygen.



Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials.

Carbon is the chemical backbone of life on Earth. Carbon compounds regulate the Earth's temperature, make up the food that sustains us, and provide energy that fuels our global economy.



Types of interactions among and between organisms and abiotic components of ecosystems

- **Predation:** an interaction between species in which one species (the predator) hunts, kills, and eats the other (prey). This interaction helps regulate the population within an ecosystem thereby causing it to become stable.
- **Parasitism:** symbiotic relationship in which one organism (the parasite) benefits at the expense of the other organism (the host). In general, the parasite does not kill the host.
- **Commensalism:** a symbiotic relationship in which one organism benefits and the organism is not affected.
  For example, barnacles that attach to whales are dispersed to different environments where they can obtain food and reproduce; burdock seeds attach to organisms and are carried to locations where they can germinate.
- **Competition:** a relationship that occurs when two or more organisms need the same resource at the same time; can be among the members of the same or different species and usually occurs with organisms that share the same **niche.** An ecological **niche** refers to the role of an organism in its environment including the type of food it eats, how it obtains its food and how it interacts with other organisms.
  Two species with identical ecological niches cannot coexist in the same habitat. Competition usually results in a decrease in the population of a species **less adapted to compete for a particular resource.**
- **Mutualism:** a symbiotic relationship in which both organisms benefit. Because the two organisms work closely together, they help each other survive. For example, bacteria, which have the ability to digest wood, live within the digestive tracts of termites; plant roots provide food for fungi that break down nutrients the plant needs.

Stability and Change Small changes in one part of a system might cause large changes in another part.

Limiting factors can be biotic (food and predators) and/or abiotic (soil quality and water supply).Growth of organisms and population increases are limited by access to resources.

Habitat Loss: When people cut down forests, build cities, or make roads, they destroy habitats–the places where plants, animals, and other organisms live.
Invasive Species: When species land in a new place, they often either prey upon the species already there or compete with them for food or space.

Anthropogenic forces as well as natural phenomena have contributed to oyster depletion in their distribution and abundance.

- These forces include overharvesting, destruction of habitat, water pollution, and wakes from increasing recreational boat traffic.
- Additionally, oysters are threatened by natural forces influenced by climate change. Sea-level rise and increased storm and hurricane pressures both threaten local oyster populations.
- Restoration and enhancement efforts are necessary to offset the depletion of oyster resources and to conserve this valuable **keystone species.**