

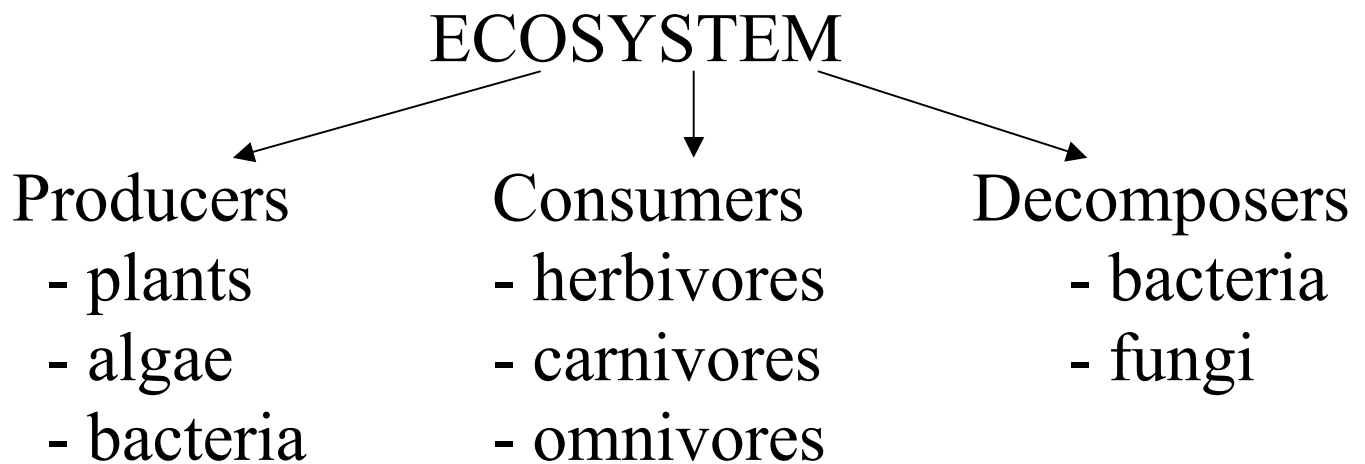
Practical division of marine organisms

PLANKTON – plants and animals that float or drift with the movement of water

NEKTON – animals that swim freely and purposefully in the sea

BENTHOS – animals that live attached to the bottom or on or in the sea floor

Ecosystems and energy transfer



UNIDIRECTIONAL ENERGY FLOW



What is primary production?

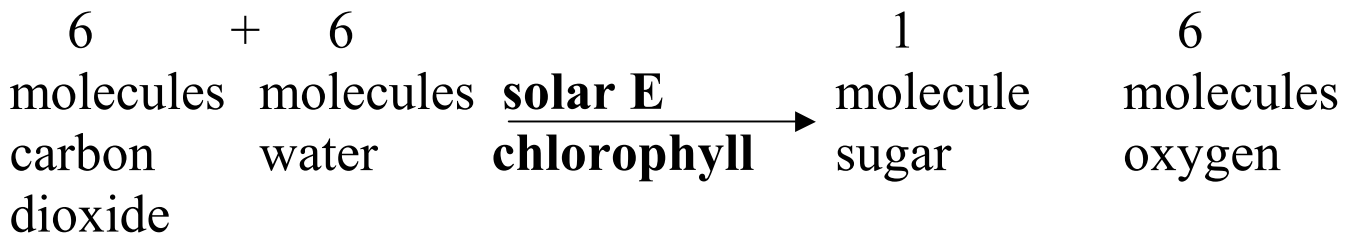
Phytoplankton
+ sunlight (or chemical rxn)
+ fertilizers
+ carbon dioxide
+ water

PHOTOSYNTHESIS



New plant material

PRIMARY
PRODUCTION



$$\text{Gross primary production} - \text{Plant respiration} = \text{Net primary production}$$

See figures 14.1 and 14.2

What controls the primary production?

1. light
2. nutrients
3. carbon dioxide

LIGHT

- Phytoplankton growth depends on latitude
 - A. High latitudes (polar regions)
Growth limited to a brief period in midsummer
 - B. Middle latitudes (regions with 4 seasons)
Seasonal light changes increase growth in early spring and continue it through the summer
 - C. Low latitudes (tropics)
Growth is nearly uniform throughout the year

See Figure 14.17

NUTRIENTS

- * Many elements
- * Most important
 - Phosphorus
 - Nitrogen
 - Iron
 - Silicate

Where do they come from?

- Land runoff (manure and artificial fertilizers)
- dead plants and animals decomposed at the bottom of the ocean

Where would you expect the highest primary productivity?

1. Upwelling zones
2. Coastal ocean
3. Open ocean

Remember, **total** primary productivity is highest in **open ocean** due to its vast size (85% of the ocean's total surface)