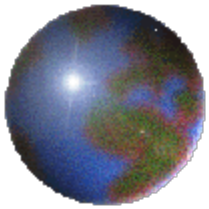
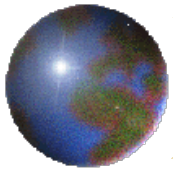


Ecosystem



Contents

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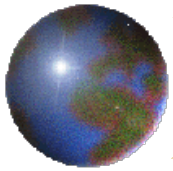
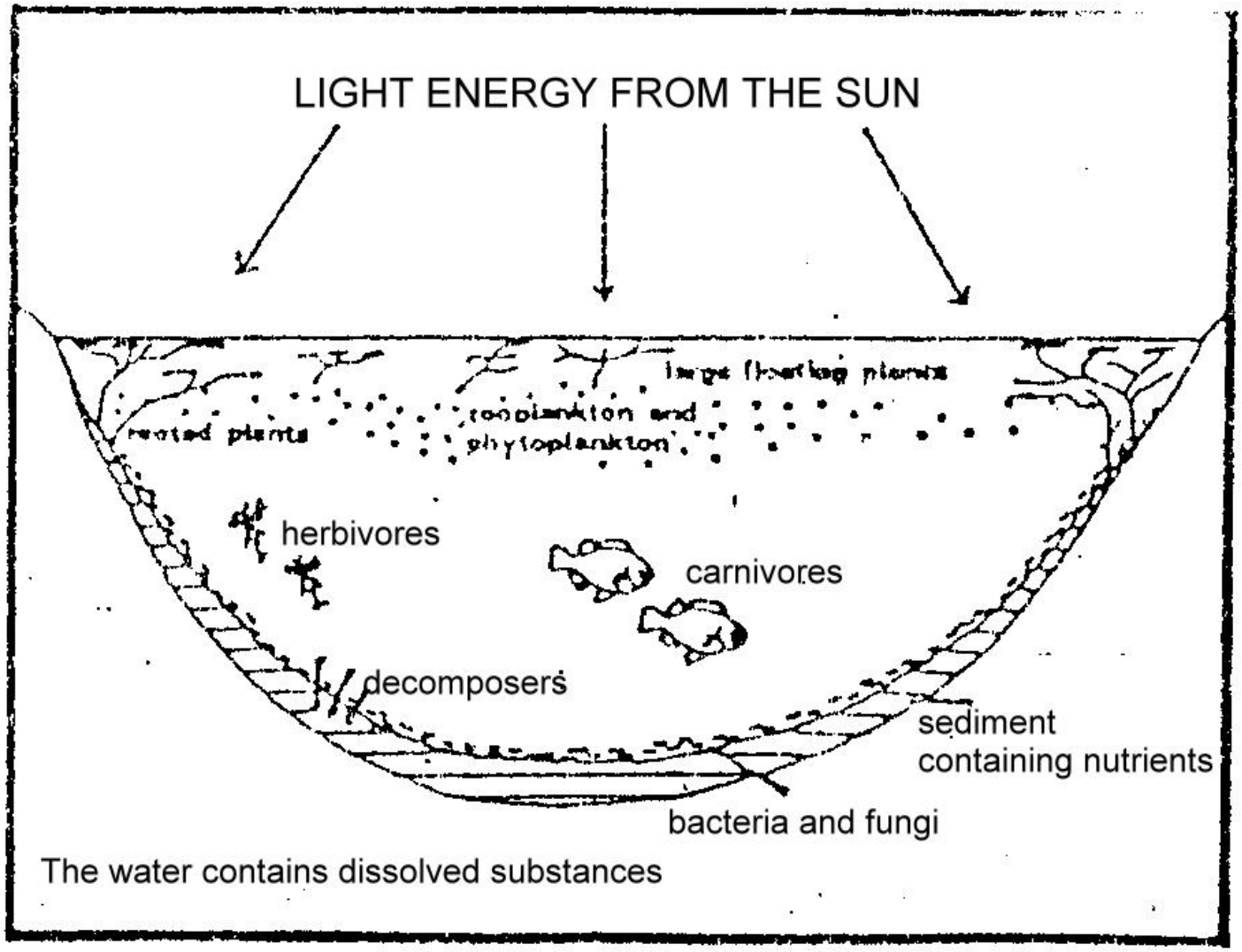
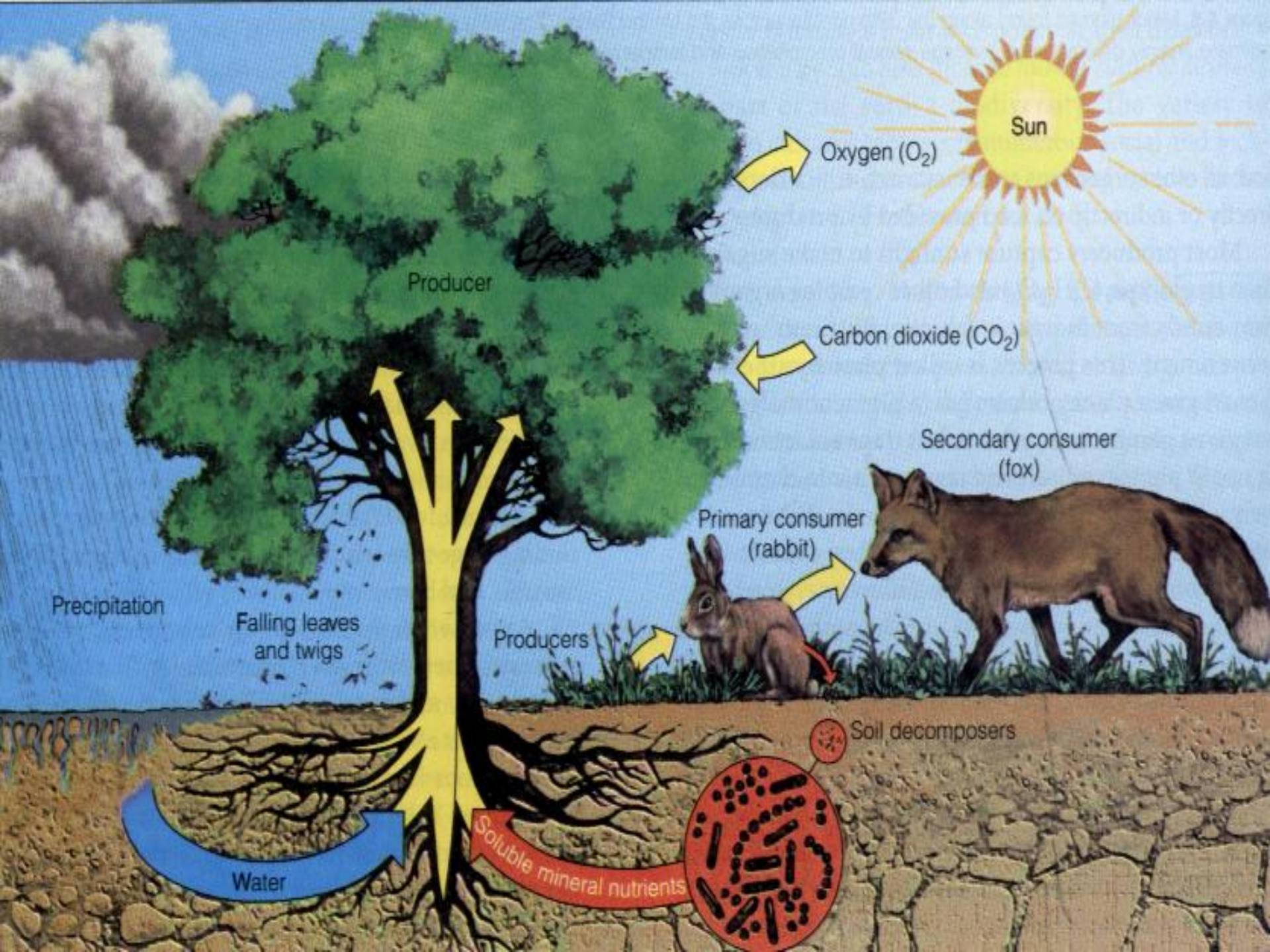
  - Food chain
  - Food webs
  - Trophic levels, biomass and biome
- Linkages and interactions in an ecosystem
  - Carbon cycle and oxygen cycle
  - Model of nutrient cycle
- Environmental Limitation in ecosystem development.

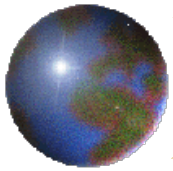


What is an ecosystem

- An ecosystem is a grouping of organisms that interact with each other and their environment in such a way as to preserve the grouping.
- There is a great variety of ecosystems in existence, all of them are characterized by general structural and functional attributes.


LIGHT ENERGY FROM THE SUN
rooted plants
zooplankton and
phytoplankton
herbivores
carnivores
decomposers
sediment
containing nutrients
bacteria and fungi
The water contains dissolved substances


Sun
Oxygen (O_2)
Producer
Carbon dioxide (CO_2)
Secondary consumer
(fox)
Primary consumer
(rabbit)
Precipitation
Falling leaves
and twigs
Producers
Soil decomposers
Water
Soluble mineral nutrients

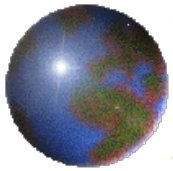


Three major principles of ecosystem

- Nutrient cycling:
  - Movement of chemical elements from the environment into living organisms and from them back into the environment through organisms live, grow, die and decompose.
- Energy flow:
  - Energy is required to transform inorganic nutrients into organic tissues of an organism.
  - Energy is the driving force to the work of ecosystem.
- Structure
  - It refers to the particular pattern of inter-relationships that exists between organisms in an ecosystem.

Abiotic components

- They form the environment and determine the type / structure of ecosystem.
  - Sunlight (temperature)
  - Nutrients
    - Rainfall, minerals, carbon, nitrogen,…..
- Type of ecosystems:
  - Tropical rainforest, Desert, Tundra, Grassland,…..

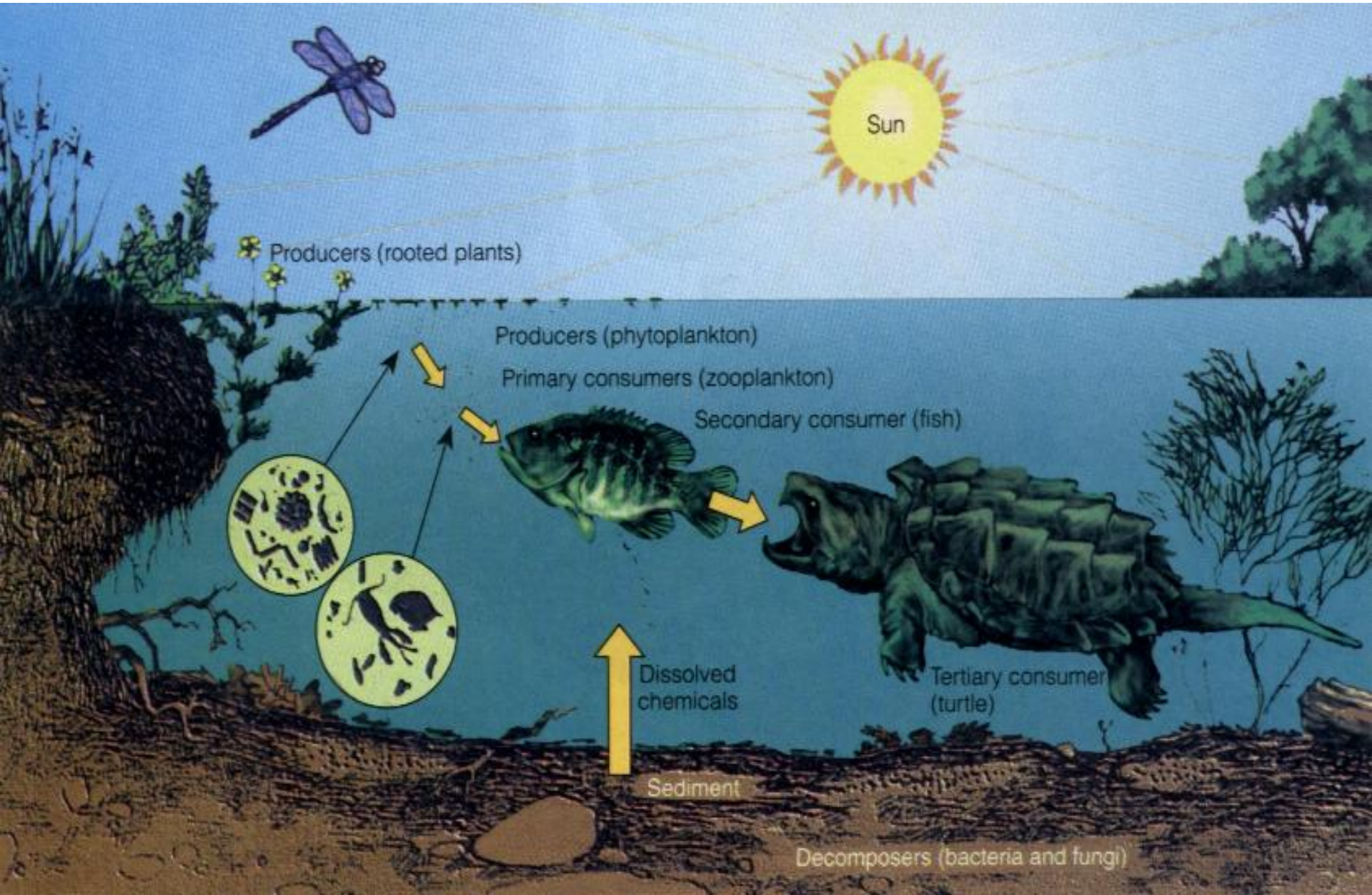


Biotic components

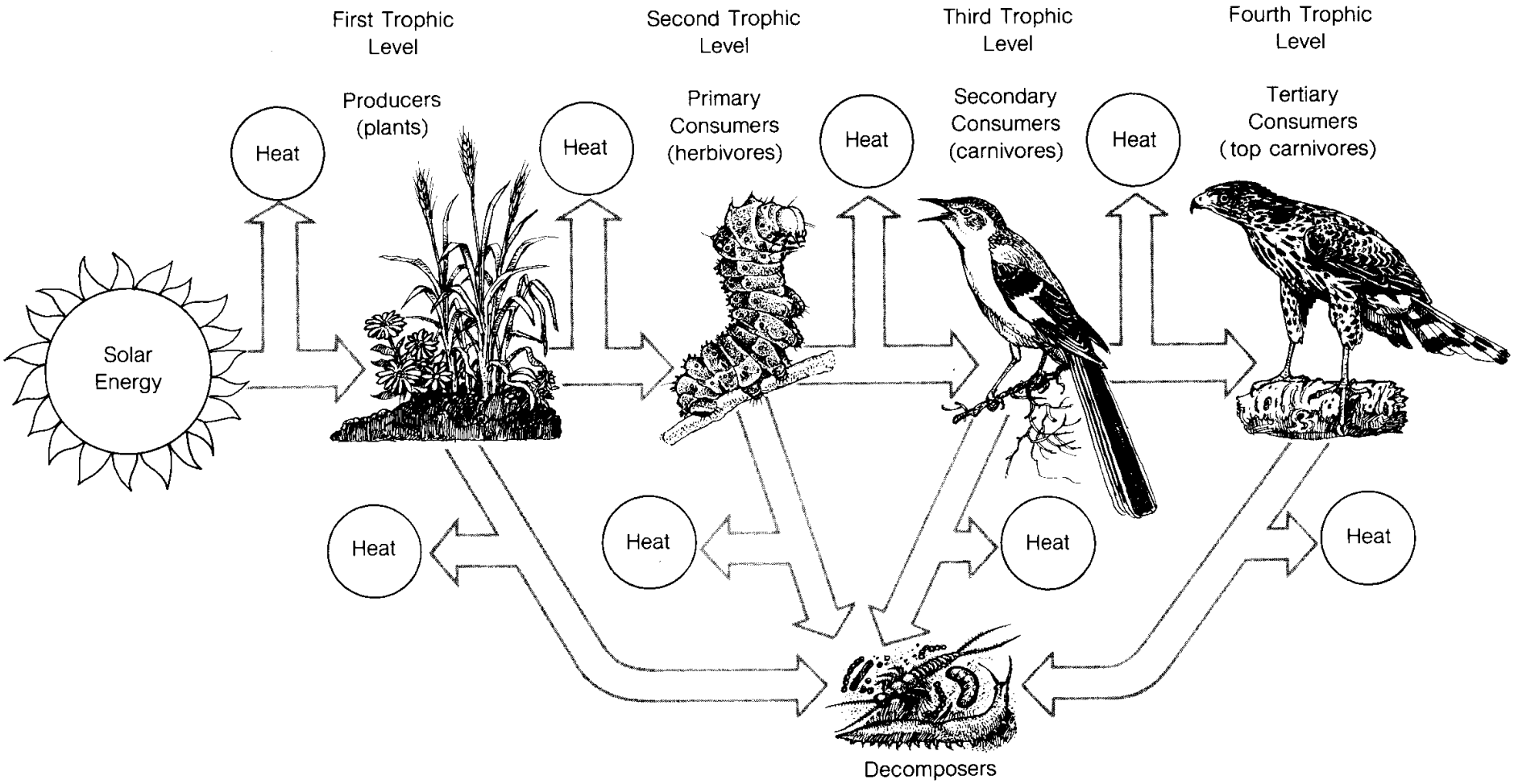
- Producers (Autotrophs):
  - All green plants. They use solar energy, chlorophyll, inorganic nutrients and water to produce their own food. (Photosynthesis)
- Consumers:
  - They consume the organic compounds in plant and animal tissues by eating.
    - Herbivores (plant feeders) — Primary consumers
    - Carnivores (meat eaters) — Secondary consumers
    - Omnivores (general feeders)

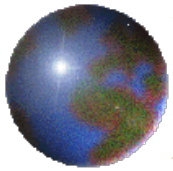
Biotic components

- Decomposers
  - They are tiny organisms includes bacteria and fungi, which turn organic compounds in dead plants and animals into inorganic materials.
  - They cause the continual recirculation of chemicals within ecosystem (nutrient cycle)


Sun
Producers (rooted plants)
Producers (phytoplankton)
Primary consumers (zooplankton)
Secondary consumer (fish)
Tertiary consumer (turtle)
Dissolved chemicals
Sediment
Decomposers (bacteria and fungi)

Biotic components and food chain

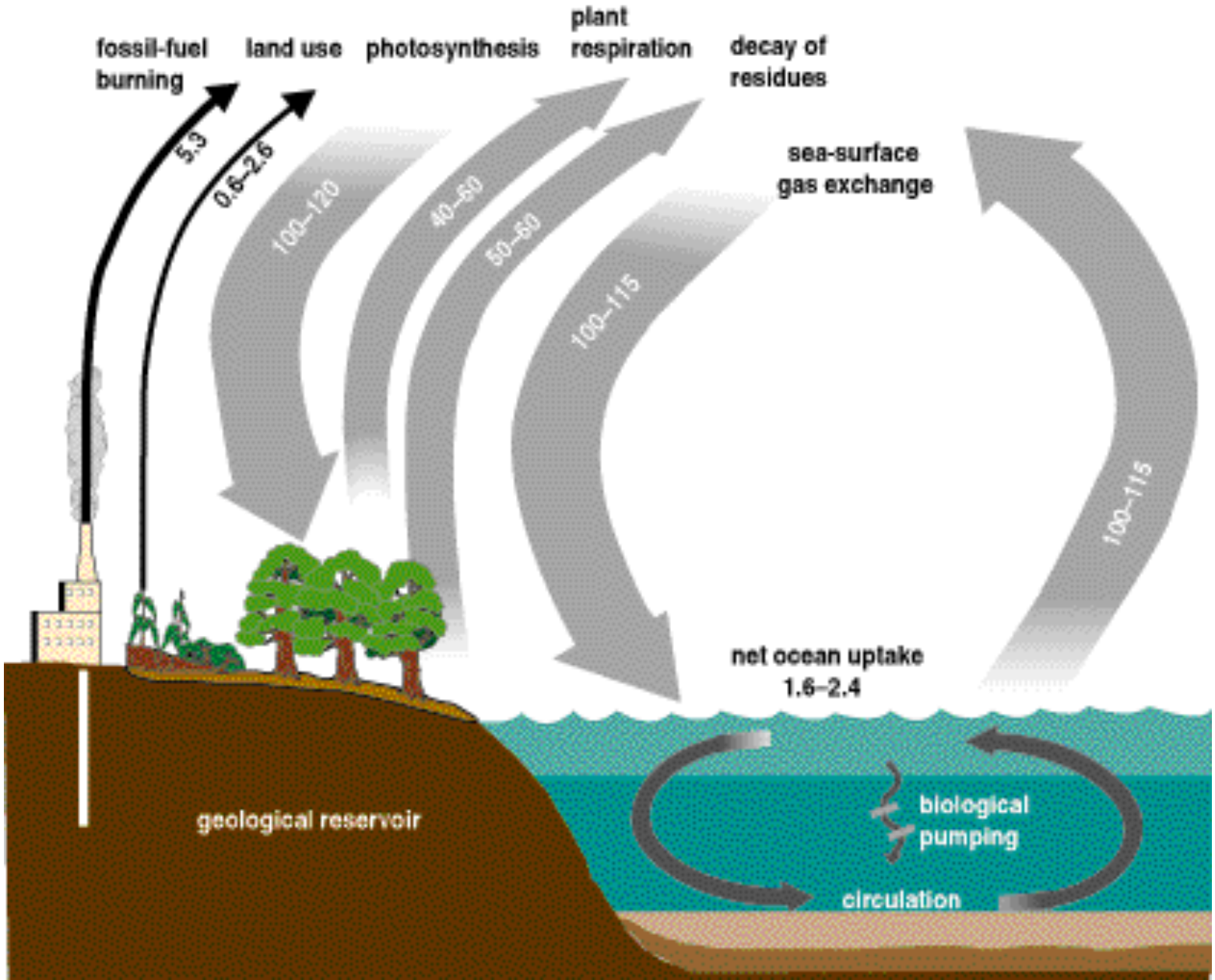


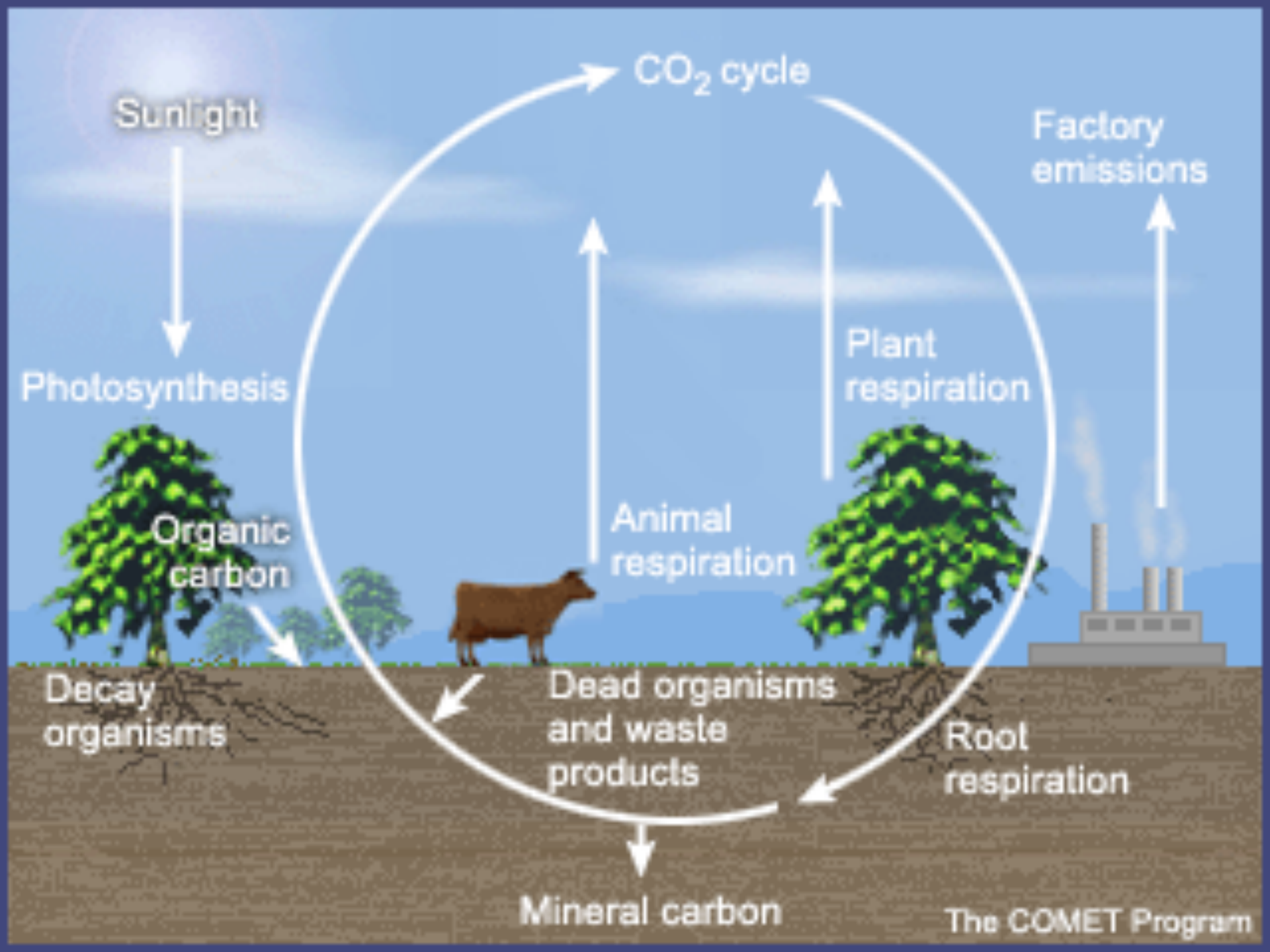


Linkages and Interactions in an ecosystem

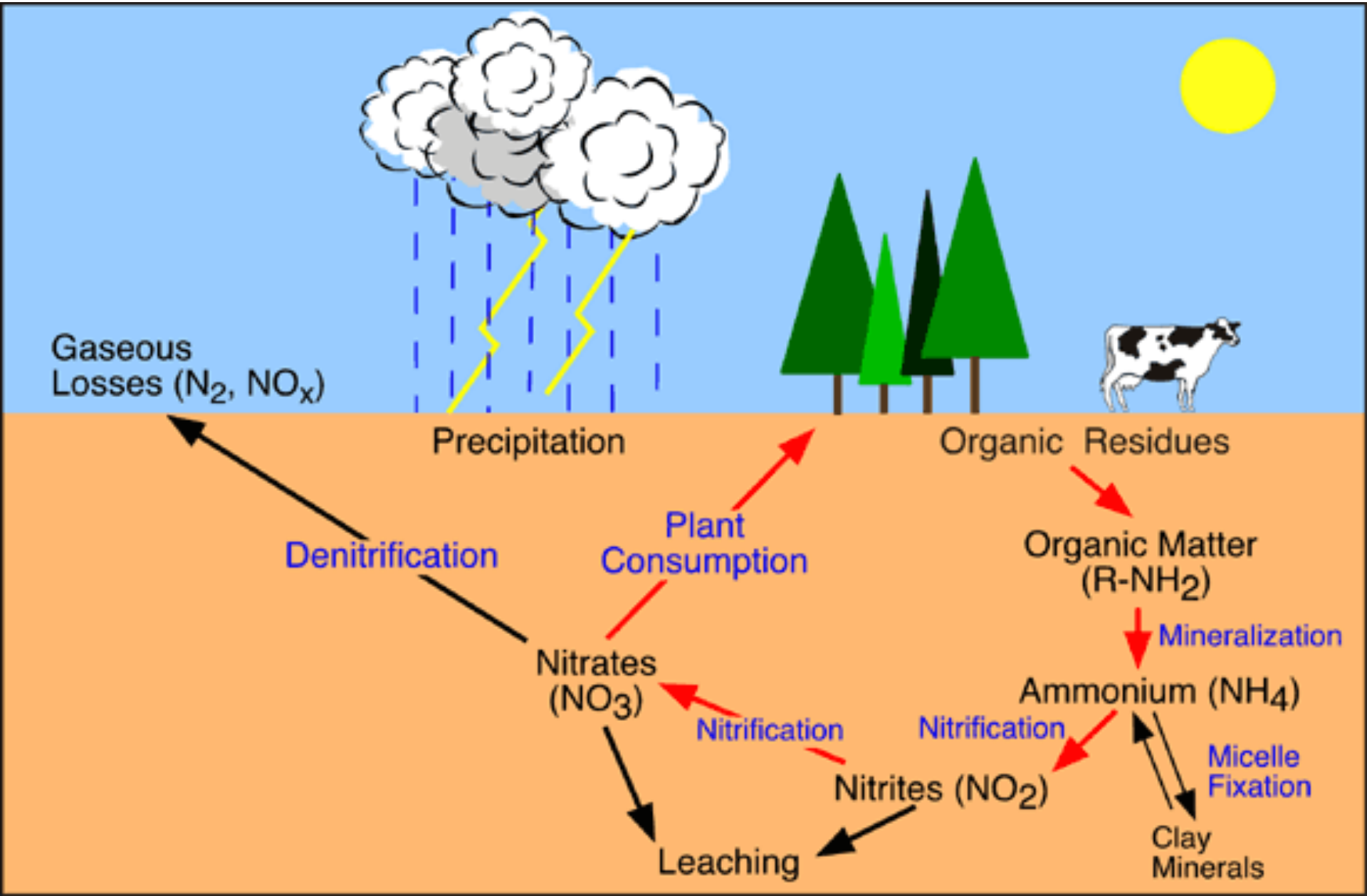
- Carbon and Oxygen cycle
- Nitrogen cycle
- A model of nutrient cycle

Carbon Cycle and Oxygen Cycle



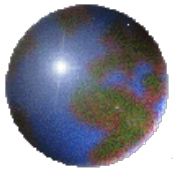

CO_2 cycle
Sunlight
Factory emissions
Photosynthesis
Plant respiration
Organic carbon
Animal respiration
Decay organisms
Dead organisms and waste products
Root respiration
Mineral carbon
The COMET Program

Nitrogen Cycle



Nitrogen cycle

- Nitrogen cycle can be affected by man in five major ways:
  - Fertilizer production (mainly nitrates and ammonium salts) to grow more food by increasing yields, and replenishing lost nitrogen from the soil.
  - Burning of fossil fuels in cars, power plants, and heating which puts nitrogen dioxide into the atmosphere.
  - Increasing animals wastes (nitrates) from more people and from livestock and poultry grown in ranches.
  - Increased sewage flows from industry and urbanization.
  - Increased erosion of and runoff nearby streams, lakes and rivers from cultivation, irrigation, agricultural wastes, mining, urbanization and poor land use.



Limiting factors of an environment

- Light
- Temperature
- Water
- Wind
- Topography
- Soil
- Biotic Factors