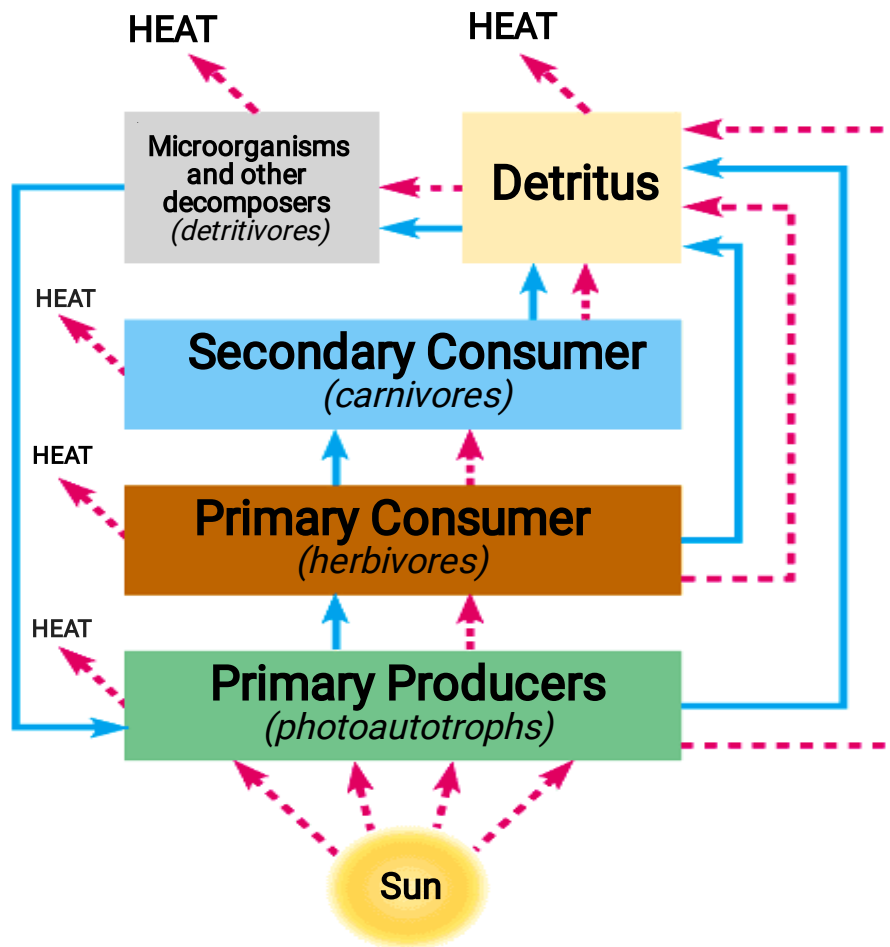


Guided Reading: Chapter 54

52. What is needed to maintain a **self-sustaining ecosystem**?

A constant supply of energy is needed to maintain a self-sustaining ecosystem.

(p.1199)53. Label the diagram below representing an **overview of ecosystem dynamics**. (Activity 54B)



Law of Conservation of Energy: "Energy cannot be created or destroyed but only transformed."

(p.1199)54. What are **detritivores** (decomposers) and what is their major function?

Detritivores are consumers that get their energy from detritus - nonliving ORGANIC material such as dead organisms, feces, fallen leaves and wood.

55. Define the following energy budget terms:

(p.1200) a. Primary productivity – The TOTAL amount of light energy that is converted to chemical energy by photosynthesis per unit time.

(p.1200) b. Gross primary productivity – The amount of light energy that is converted to chemical energy by photosynthesis per unit time.
(GPP)

(p.1200) c. Net primary productivity - Gross Primary Production minus the energy used by producers (autotrophs) to for respiration (R) - represents the storage of chemical energy (G3P → Glucose) that will be available to consumers in an ecosystem.
(NPP)

$$\text{NPP} = \text{GPP} - \text{R}$$

(p.1201) 56. Which ecosystems have the **HIGHEST productivity** per unit area?

- (1) Marine Ecosystems - Open Ocean
- (2) Terrestrial Ecosystems - Rainforests

(p.1201) 57. What factors do you think contribute to such high productivity?

Large surface area and plenty of sunlight.

(p.1201) 58. Which ecosystems have the **LOWEST productivity** per unit area?

- (1) Marine Ecosystems - Open Ocean (total)
- (2) Terrestrial Ecosystems - Rainforests (per unit area)

(p.1201)59. Why is the open ocean so low in productivity?

The open ocean is so low in productivity due to its large size and lack of nutrients (N and P) .

(p.1205)60. What is **secondary productivity**?

Secondary productivity is the amount of chemical energy in consumers food that is converted to their own new biomass during a given time period.

(p.1206)61. What happens to the size each level in the idealized **pyramid as energy** is transferred through the trophic levels?

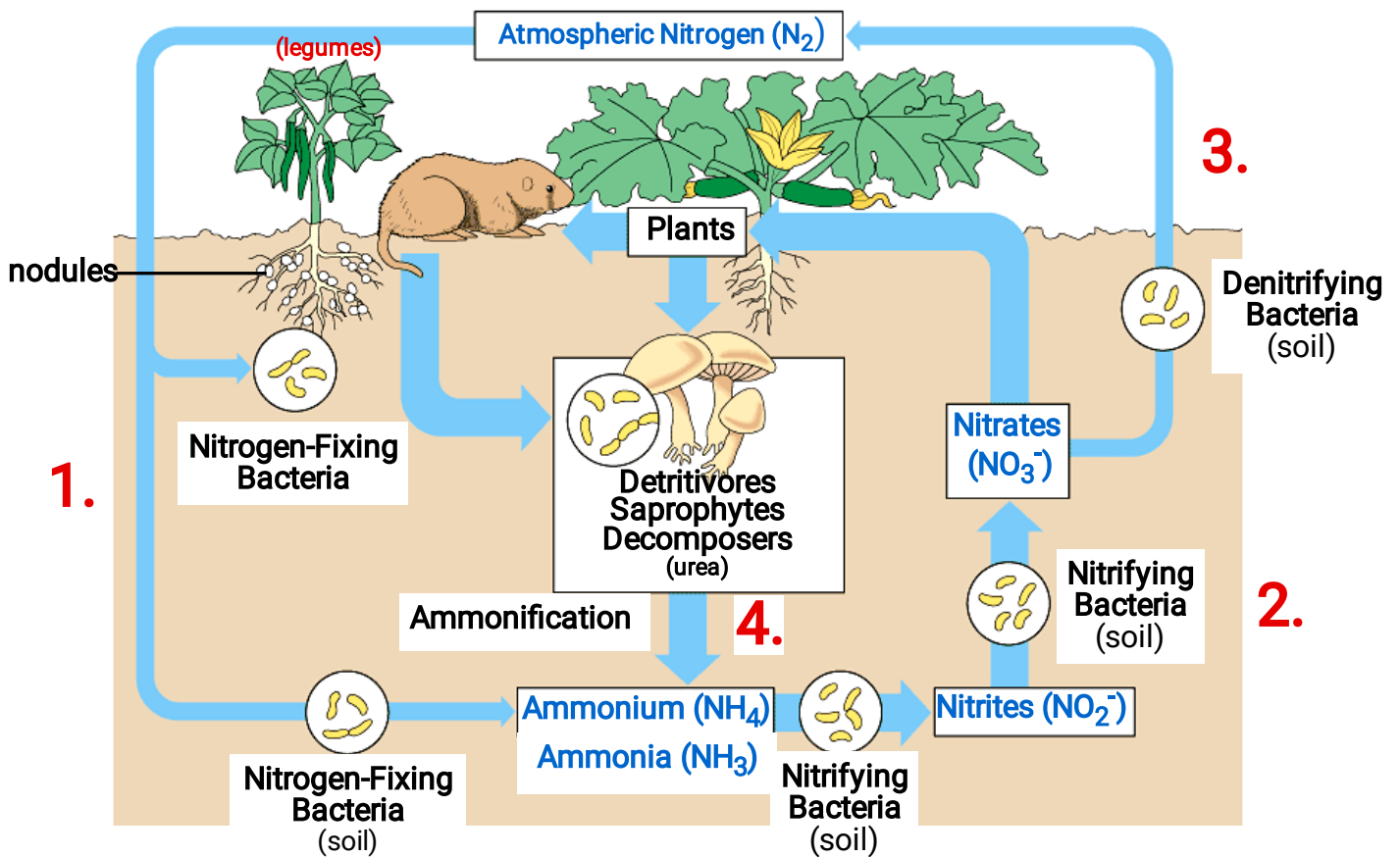
The size **DECREASES**.

(p.1206)62. Explain what happens to the **ENERGY** and **BIOMASS** as it is passed through the trophic levels?

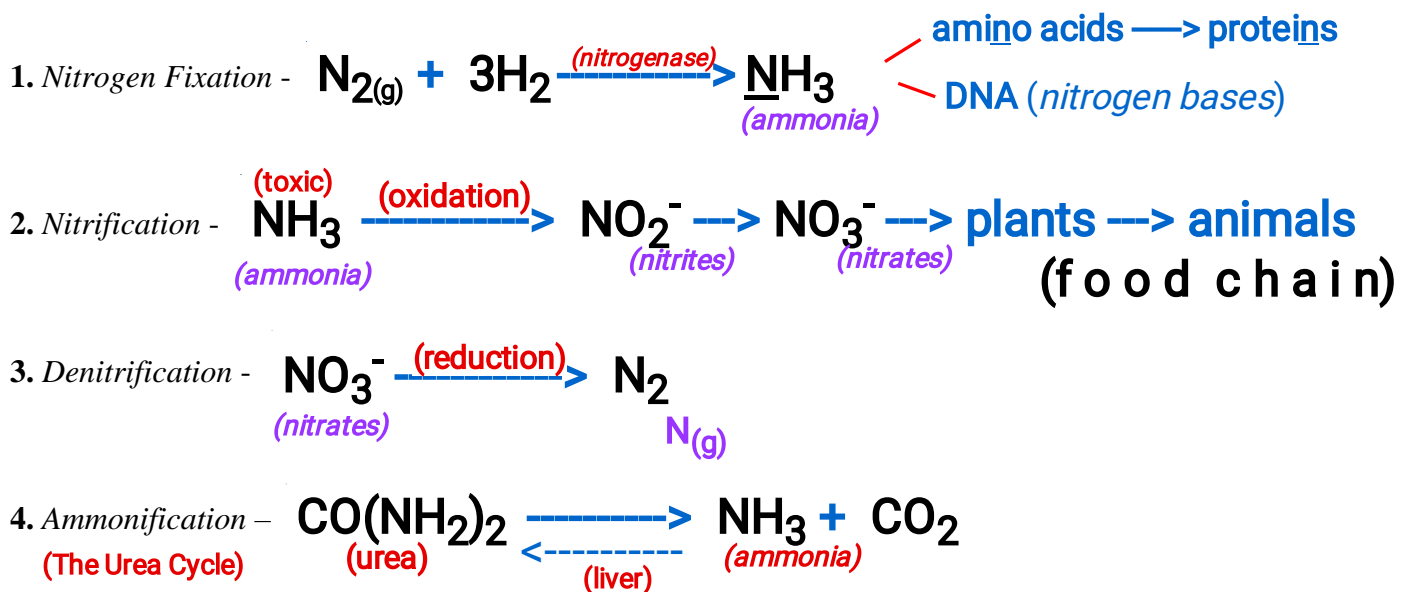
The amount of energy decreases as it is passed through trophic levels mostly due to the energy lost from respiration in the form of heat. This decrease in energy results in less energy being available for the next trophic level resulting in a decrease in biomass as well.

The transformation of N₂ from one chemical form to another

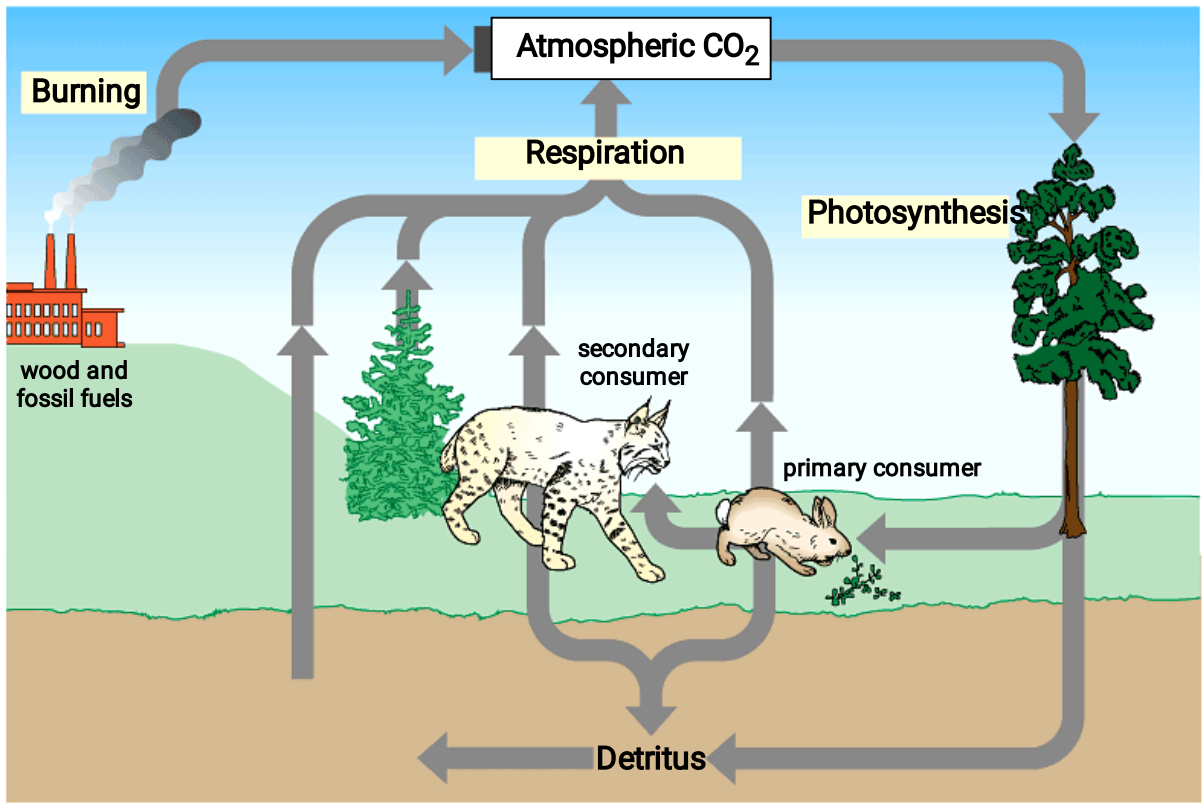
(p.1211) 67. Label the diagram of the **Nitrogen Cycle** below and identify the role each chemical process plays in the cycle. [Video: The Haber Process](#) [Fritz Haber: 1918 Nobel Prize in Chemistry](#) [Diagram: The Haber Process](#)



(The Nitrogen Cycle)



(p.1211) 68. Label the diagram of the Carbon Cycle below and identify the role each chemical process plays in the movement of carbon through the ecosystem.



The Carbon Cycle
(Activity 54B/C and Fig. 54.17)

- a. Combustion - The burning of wood and fossil fuels releasing CO₂ into the atmosphere.
- b. Photosynthesis - The removal of CO₂ from the atmosphere by plants and used to make glucose (C₆H₁₂O₆)
- c. Cellular Respiration - The releasing of CO₂ by plants and animals through the oxidation of glucose and the production of ATP.

(p. 1214) 69. Why is human population growth at the root of environmental issues?

More humans means the more disruptions of trophic structure, energy flow and chemical cycling of ecosystems in most areas of the world.

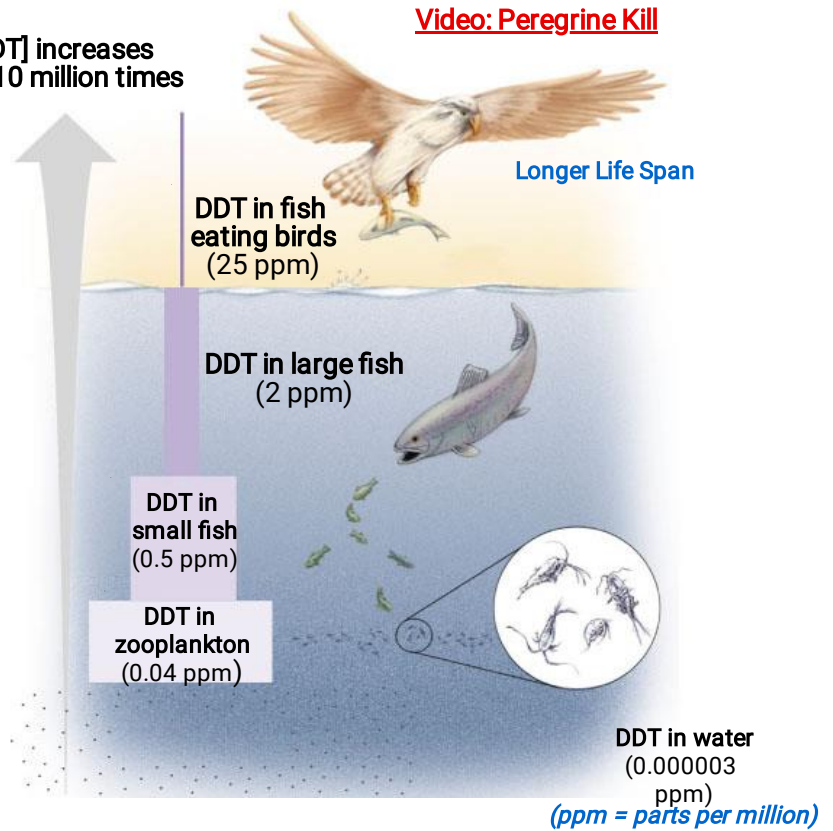
[Video: Massive DDT Spraying](#)

(p.1218)70. Label the diagram of the **Biological Magnification of DDT in the Food Chain** below and use it to explain what happens in the process of biological magnification. (Fig. 54.25)

Biomagnification is the accumulation of a chemical by an organism from water and food exposure that results in a concentration that is greater than would have resulted from water exposure alone.

[DDT] increases over 10 million times

[Video: Peregrine Kill](#)



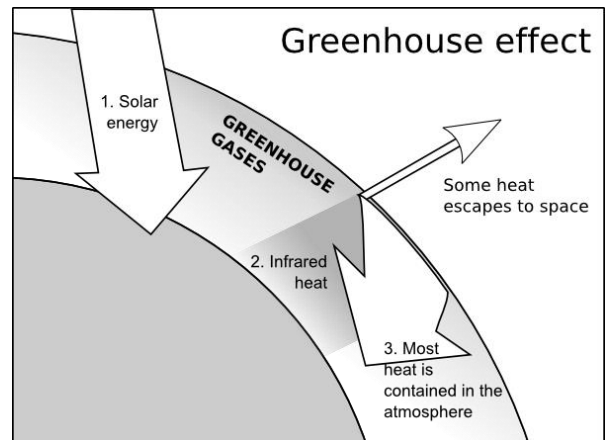
(p.1218)71. What are some of the properties of molecules that could be candidates for **biological magnification**?

Nonpolar (fat soluble) molecules make good candidates for biological magnification.

(Fat soluble molecules are harder for the body to metabolize and so stay in the body longer.)

(p.1219)72. Use the diagram to the right to help you explain the greenhouse effect.

The greenhouse effect is a natural process that warms the Earth's surface. When solar energy reaches the Earth's atmosphere, some of it is reflected back to space and the rest is absorbed and re-radiated by greenhouse gases such as CO₂, H₂O and CH₄.



73. Is the greenhouse effect a **GOOD** or **BAD** thing? Explain.

74. What are possible reasons for **global warming** (*greenhouse effect*)? (Activity 54F)

The main reasons for global warming are:

(1) the additions of heat trapping gases like CO₂ which is released by the combustion of fossil fuels like coal, natural gas and gasoline.

(carbon sources)

(2) deforestation: Less Trees = More CO₂

(carbon sink)

(p.1220)75. What is the function of the ozone layer?

The function of the ozone layer is to protect life on Earth from the damaging effects UV radiation from the sun.

76. List three sources of chlorofluorocarbons (CFC's)

(CFC's were banned in 1996 and 2010)

AC and Refrigeration

Aerosol Cans

Manufacturing Processes

77. Is **depletion of the ozone layer** a possible reason for global warming? YES or

NO

(p.1221)78. List three possible consequences of continued ozone depletion.

a) **Higher incidence of skin cancer**

b) **Higher incidence of skin cataracts.**

c) **Unpredictable effects on phytoplankton.**
