Agenda 9/5

1. Warm up

- 2. Muradan Chhay-Env. Science Current Event

- 3. Solar Array: Bring White Boards/ Expo markers

  - 4. Academic Content: Biotic, Abiotic, Food chain, Food Web, Energy Pyramid

- Ecosystem, Ecological Hierarchy of Organization

- 5. Activity: Soil Composting

- 6. HW – Read CH 4 – 7 in ES Book.

- **Research deforestation in Haiti: USA Today 2004**

- **National Public Radio July 15. 2009**

CH 4 The Organization of Life: Ecosystems 9/5

Obj. STW learn about Ecosystems, energy pyramid and biomes how biotic and abiotic factors influence it. P.26NB

1. 1. Explain and give an example of an ecosystem.

2. 2. What are the Biotic & Abiotic Factors in your ecosystem?

3. 3. Compare & Contrast Habitat & Niche.

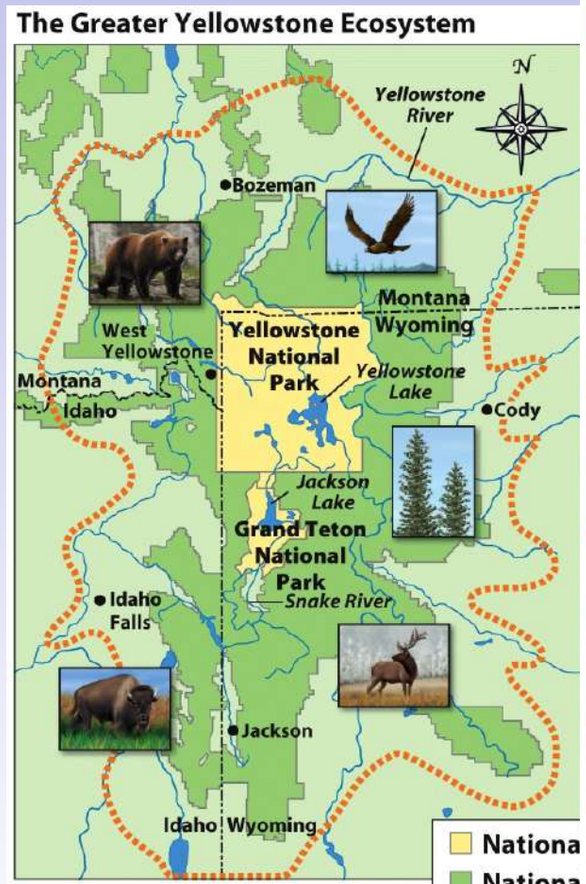


Figure 3.2a
Environmental Science

Chapter 3 Opener
Environmental Science

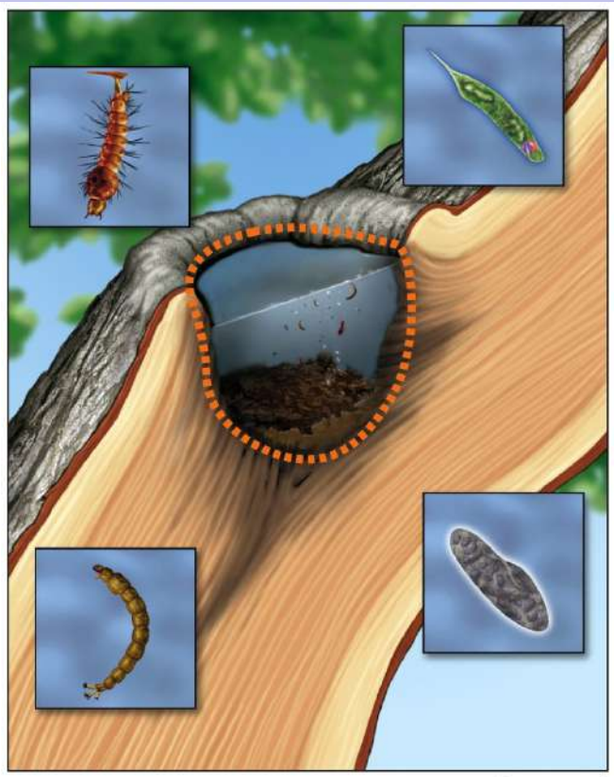


Figure 3.2b
Environmental Science

Chapter 3
Ecosystem Ecology

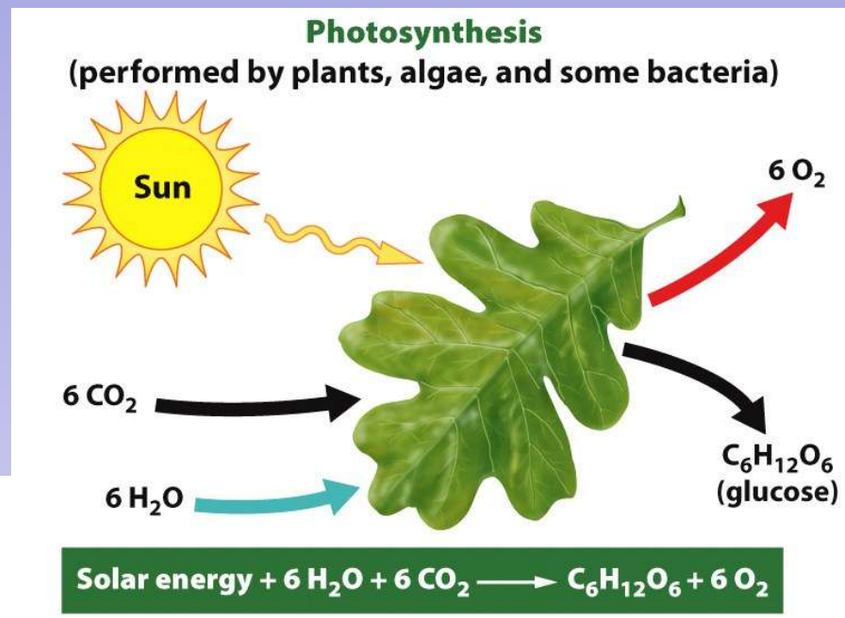
CH 4 & 5 Agenda 9/6

1. Warm Up
2. Notes
3. Dolphin with virus? AXES Paragraph P. 29NB
4. Study Guide CH 3 Answers P. 27NB
5. Soil composting & Biodiversity- water today. P. 31NB
6. CM CH 4 – 7 p. 31 NB
7. HW Study Guide CH 5 due Monday
8. Ecology Project-Oh Deer Activity

9/6 Energy Flow through Ecosystems CH 4 & 5

Obj. TSW explain photosynthesis, Cellular respiration, how energy is cycled through the Ecosystem & Carbon Cycle. P. 28 NB

1. 1. Compare & Contrast Photosynthesis & Cellular Respiration. CH 5
2. 2. What determines the productivity of an ecosystem?
3. 3. Explain the Carbon Cycle. CH 5.2



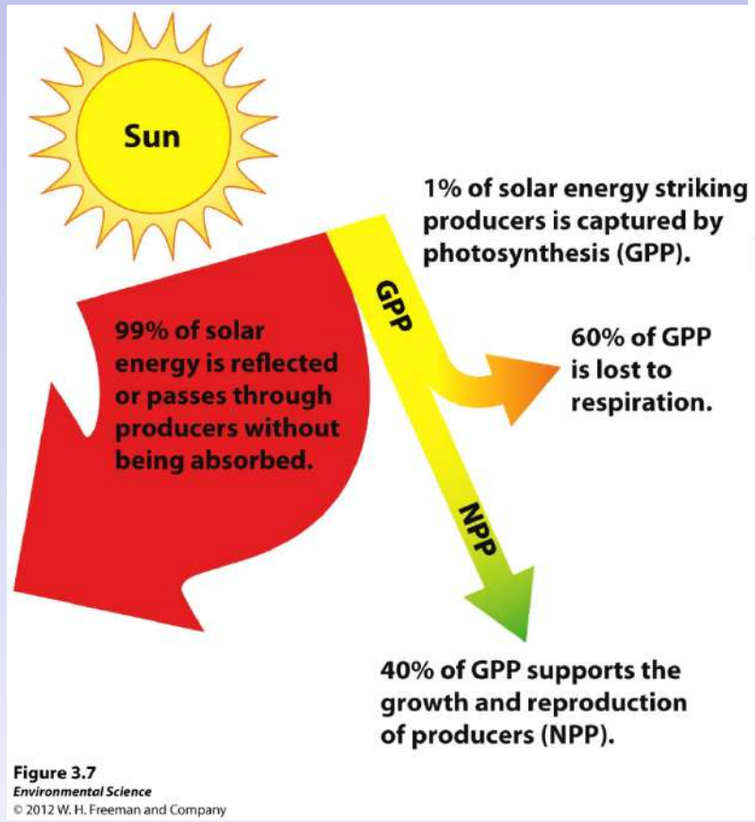


Figure 3.7
Environmental Science

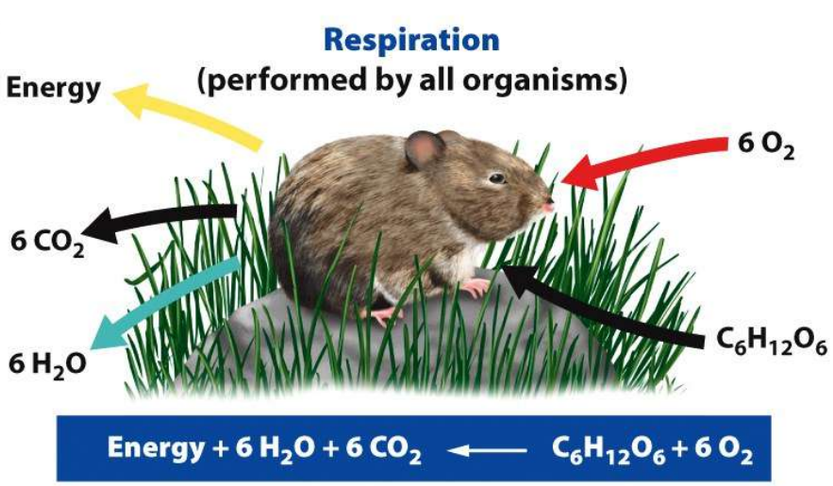


Figure 3.4
Environmental Science

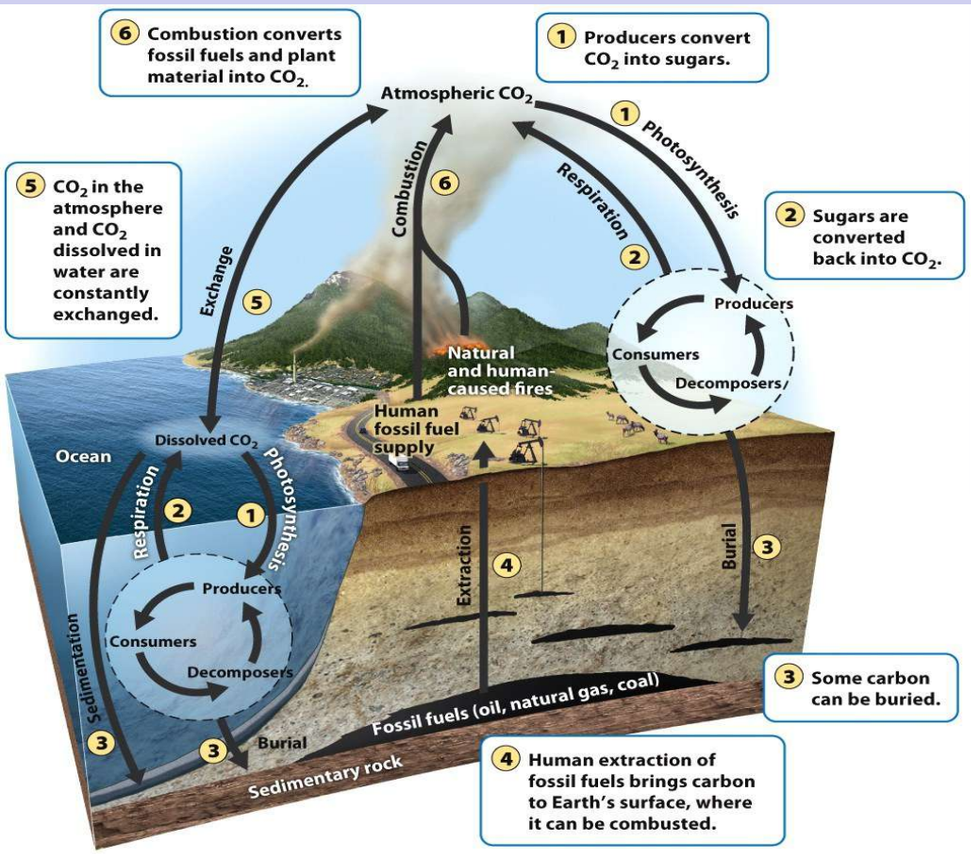


Figure 3.11
Environmental Science

Photosynthesis and Respiration

- Producers (autotrophs) are able to use the suns energy to produce usable energy through the process called photosynthesis.

- Cellular respiration is the process by which other organisms gain energy from eating the tissues of producers.

Photosynthesis and Respiration

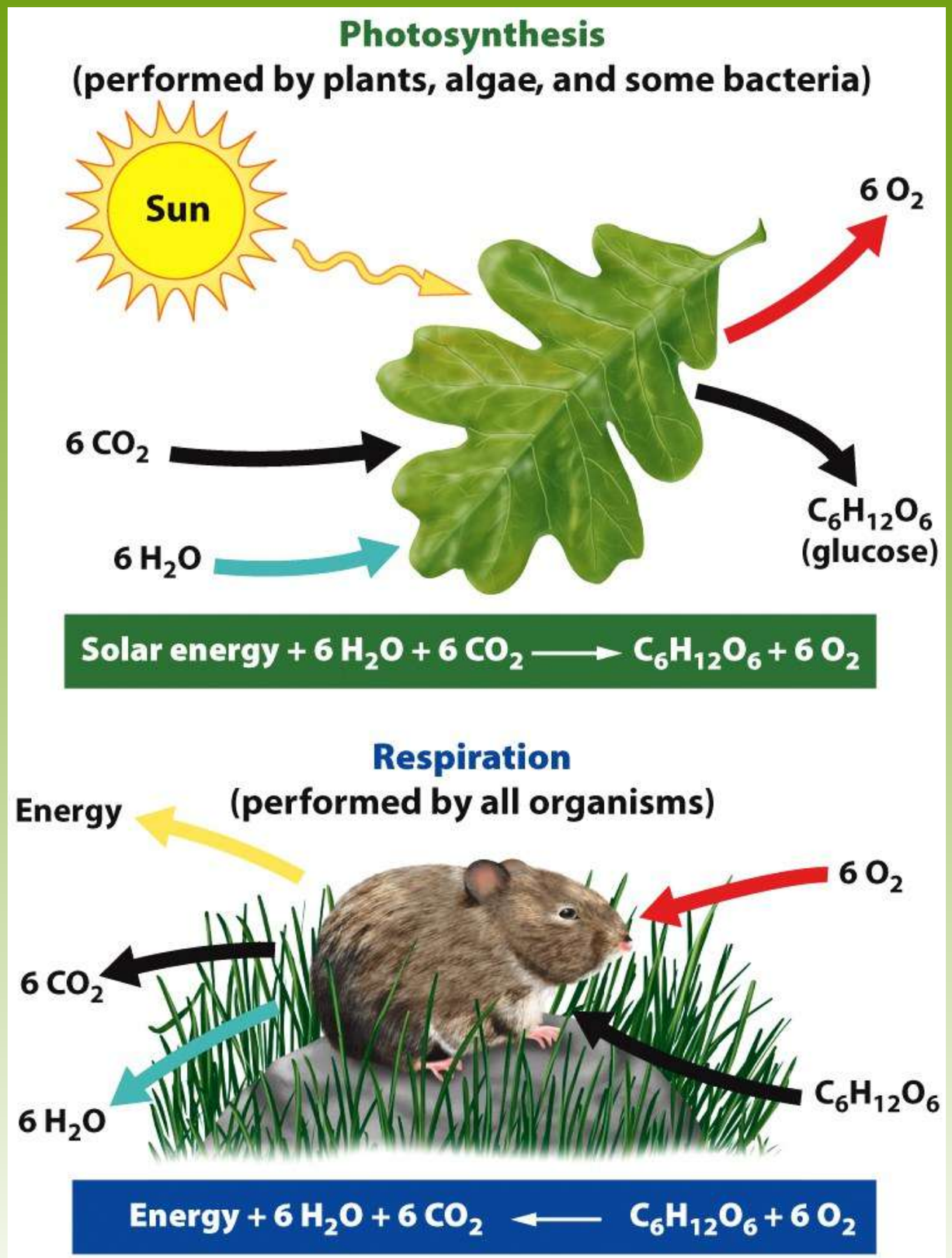


Figure 3.4
Environmental Science

Ecosystem Productivity

- Gross primary productivity (GPP)- The total amount of solar energy that the producers in an ecosystem capture via photosynthesis over a given amount of time.
- Net primary productivity (NPP)- The energy captured (GPP) minus the energy respired by producers.
- NPP = GPP – Respiration by Producers

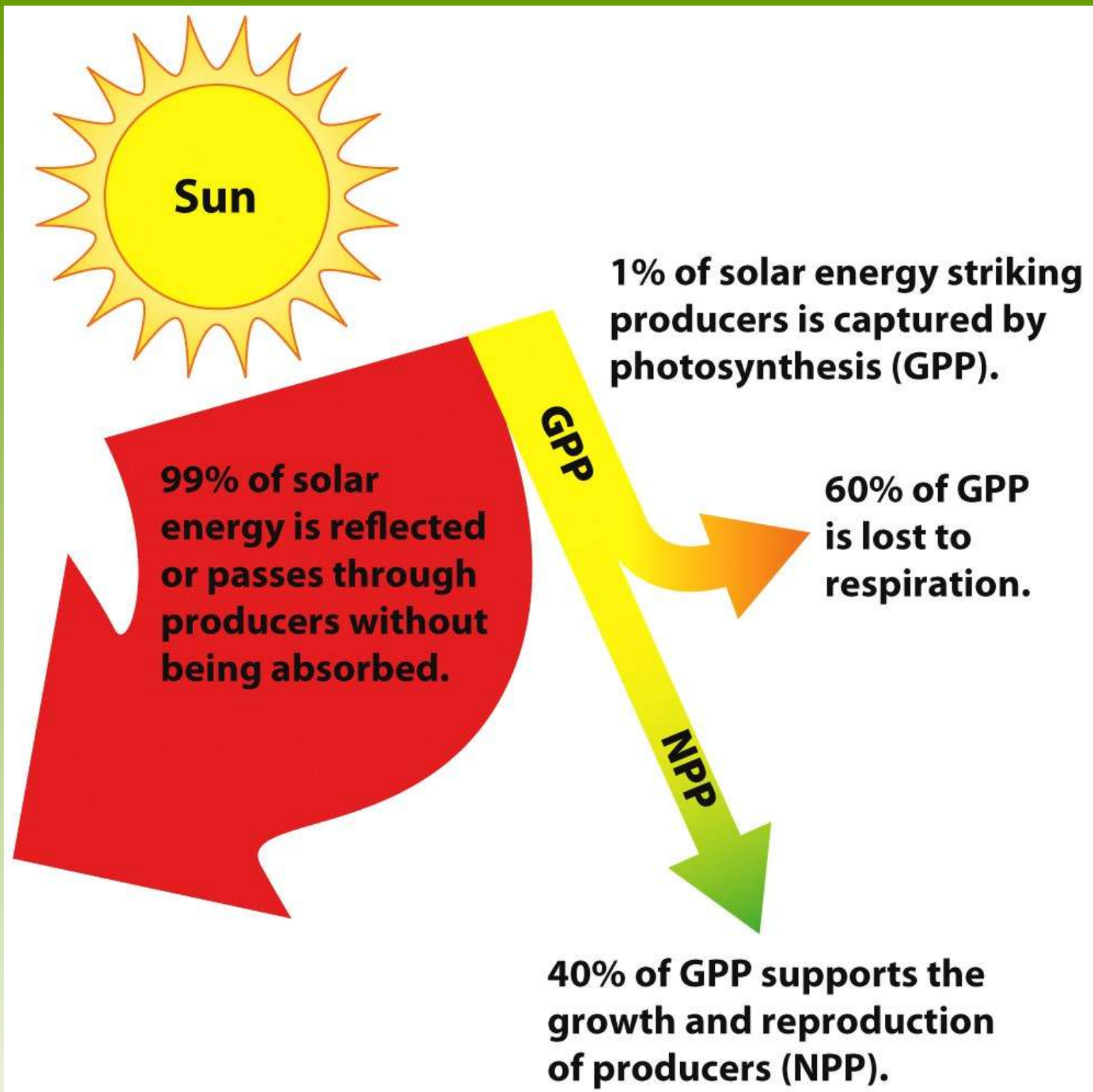


Figure 3.7
Environmental Science

Matter cycles through the biosphere

- Biosphere- The combination of all ecosystems on Earth.
- Biogeochemical cycles- The movement of matter within and between ecosystems involving biological, geologic and chemical processes.

The Carbon Cycle

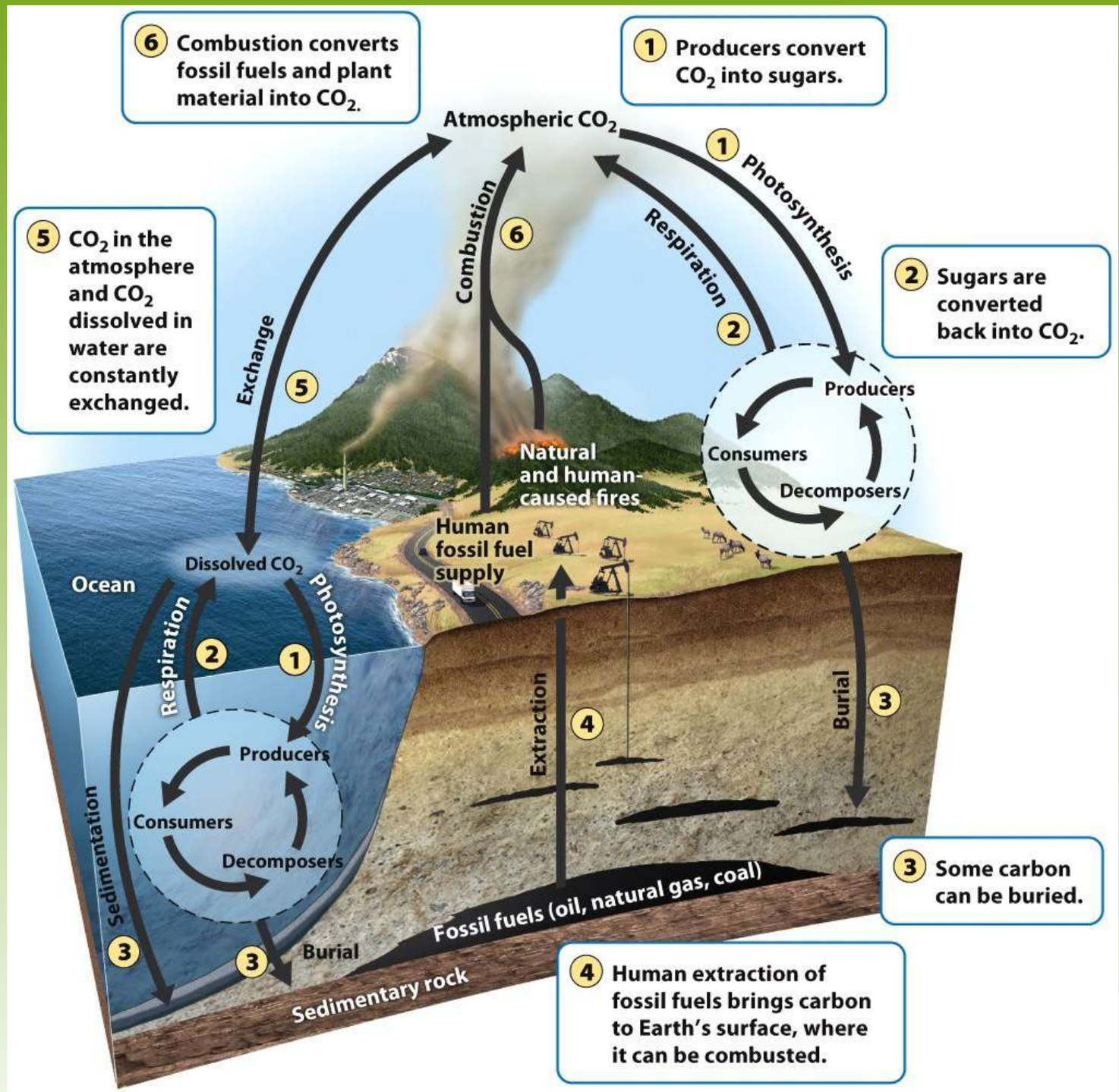


Figure 3.11
Environmental Science

Ecosystem Ecology Examines Interactions Between the Living and Non-Living World

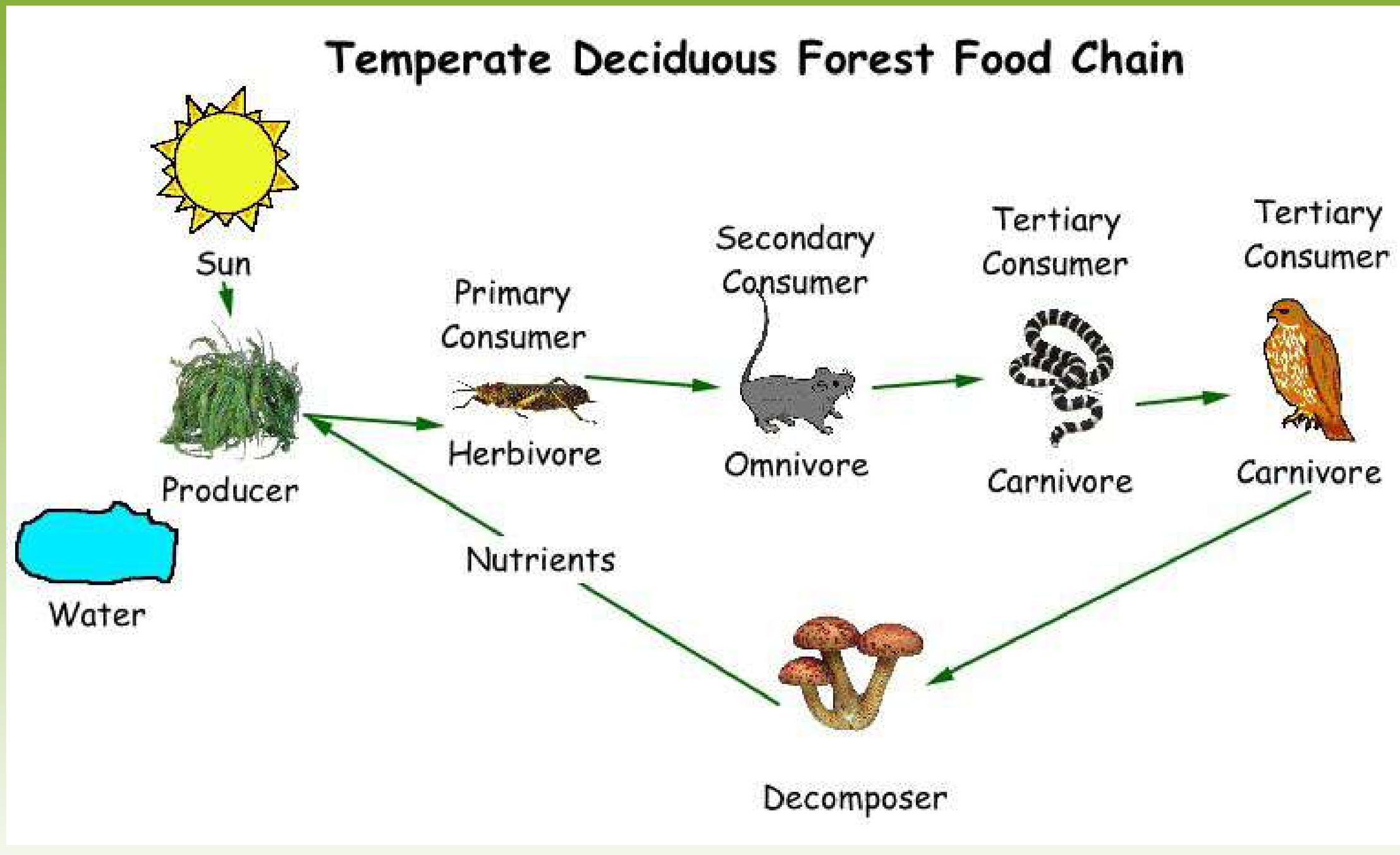
- Ecosystem- A particular location on Earth distinguished by its particular mix of interacting biotic and abiotic components.

- Food Chain- The sequence of consumption from producers through tertiary consumers.
- Food Web- A more realistic type of food chain that takes into account the complexity of nature.

Ecosystem Boundaries

- Some ecosystems, such as a caves and lakes have very distinctive boundaries. However, in most ecosystems it is difficult to determine where one ecosystems stops and the next begins.
- Even though it is helpful to distinguish between two different ecosystems, ecosystems interact with other ecosystems.

Energy Flows through Ecosystems



Trophic Levels, Food Chains, and Food Webs

- Consumers (heterotrophs)- obtain energy by consuming other organisms.
- Primary Consumers (herbivores)- consume producers.
- Secondary Consumers (carnivores)- obtain their energy by eating primary consumers.
- Tertiary Consumers (carnivores)- eat secondary consumers.

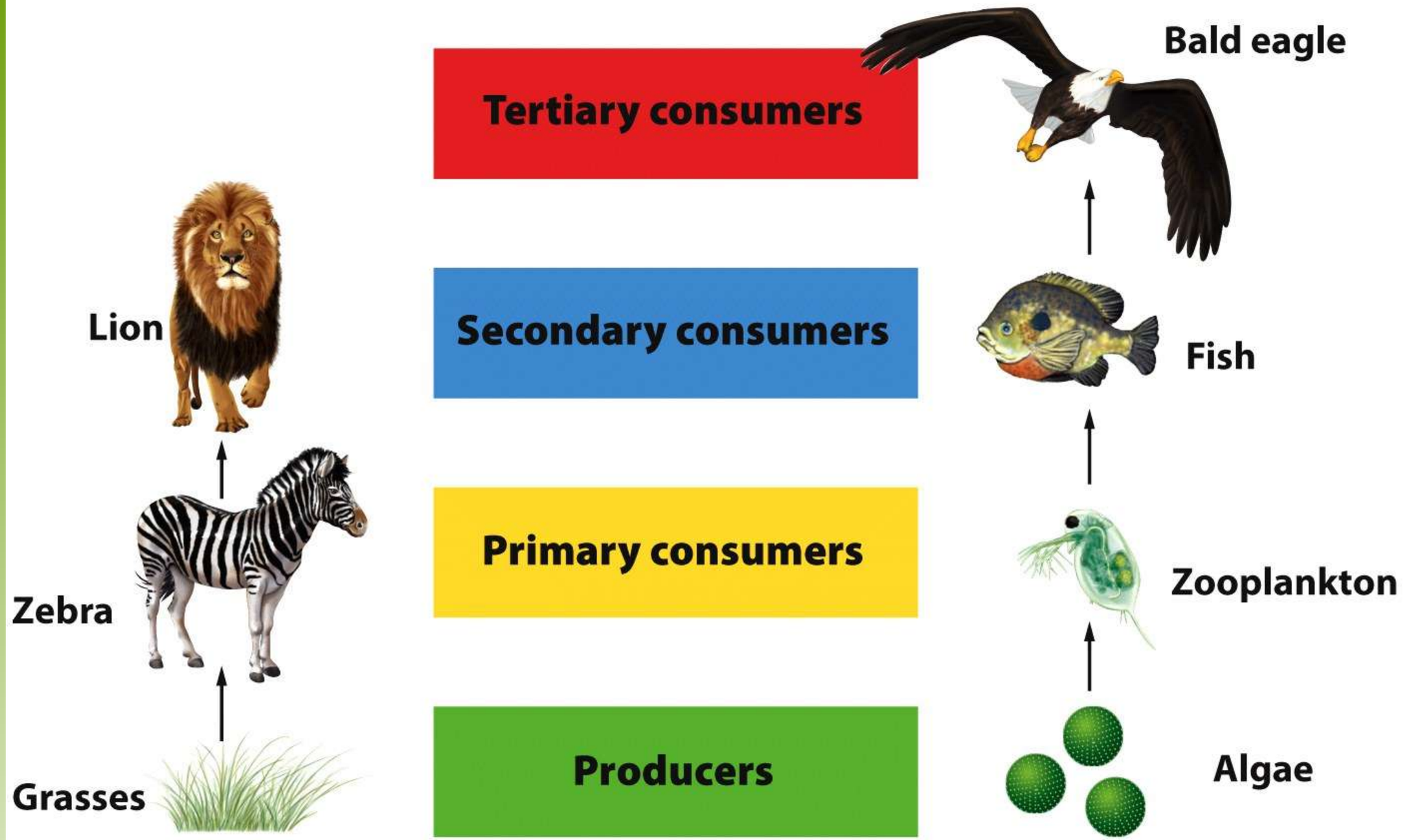


Figure 3.5
Environmental Science

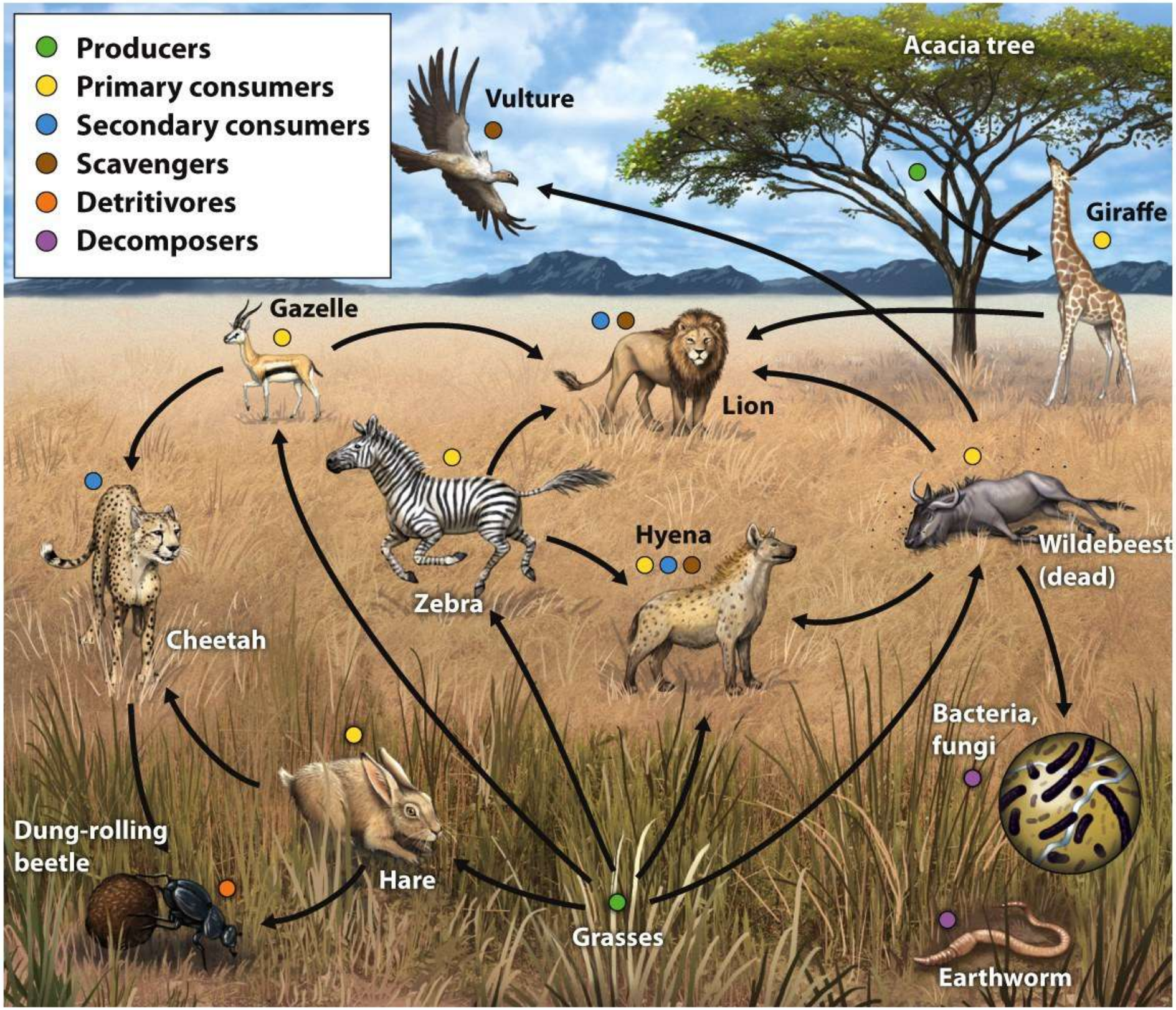


Figure 3.6
Environmental Science

Energy Transfer Efficiency and Trophic Pyramids

- Biomass- The energy in an ecosystem is measured in terms of biomass.

- Standing crop- The amount of biomass present in an ecosystem at a particular time.

- Ecological efficiency- The proportion of consumed energy that can be passed from one trophic level to another.

- Trophic pyramid- The representation of the distribution of biomass among trophic levels.

The Hydrologic Cycle The movement of water through the biosphere.

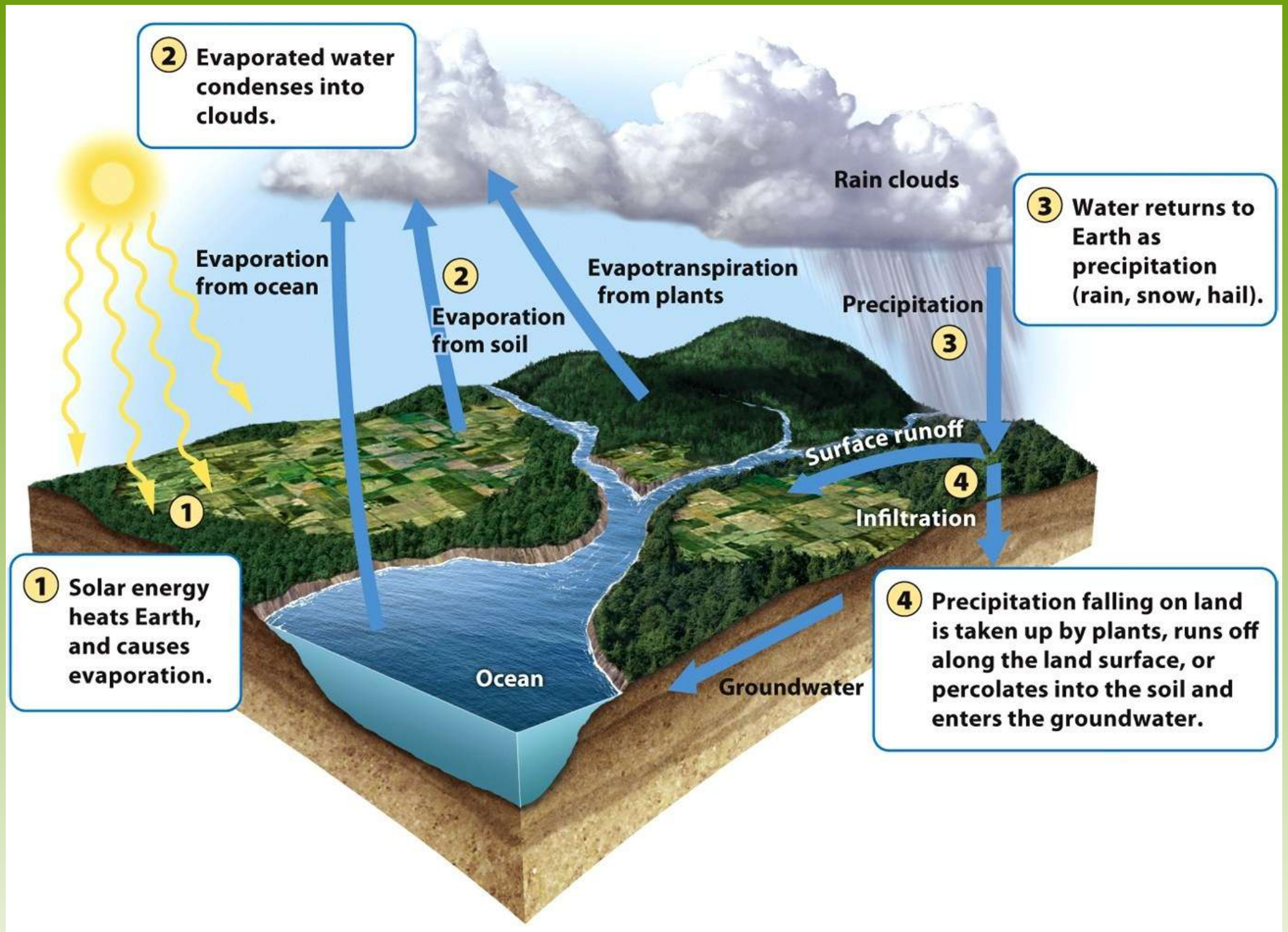


Figure 3.10
Environmental Science

The Hydrologic Cycle

- Transpiration- The process where plants release water from their leaves into the atmosphere.
- Evapotranspiration- The combined amount of evaporation and transpiration.
- Runoff- When water moves across the land surface into streams and rivers, eventually reaching the ocean.

Oh, Deer! Activity – Include in your Project

What do you think happens to a population when resources change?

- ½ of you will start as **RESOURCES**; ½ of you start as **DEER.**
  - Each generation the **resources** choose if you are "**water**," "**food**," or "**shelter.**"

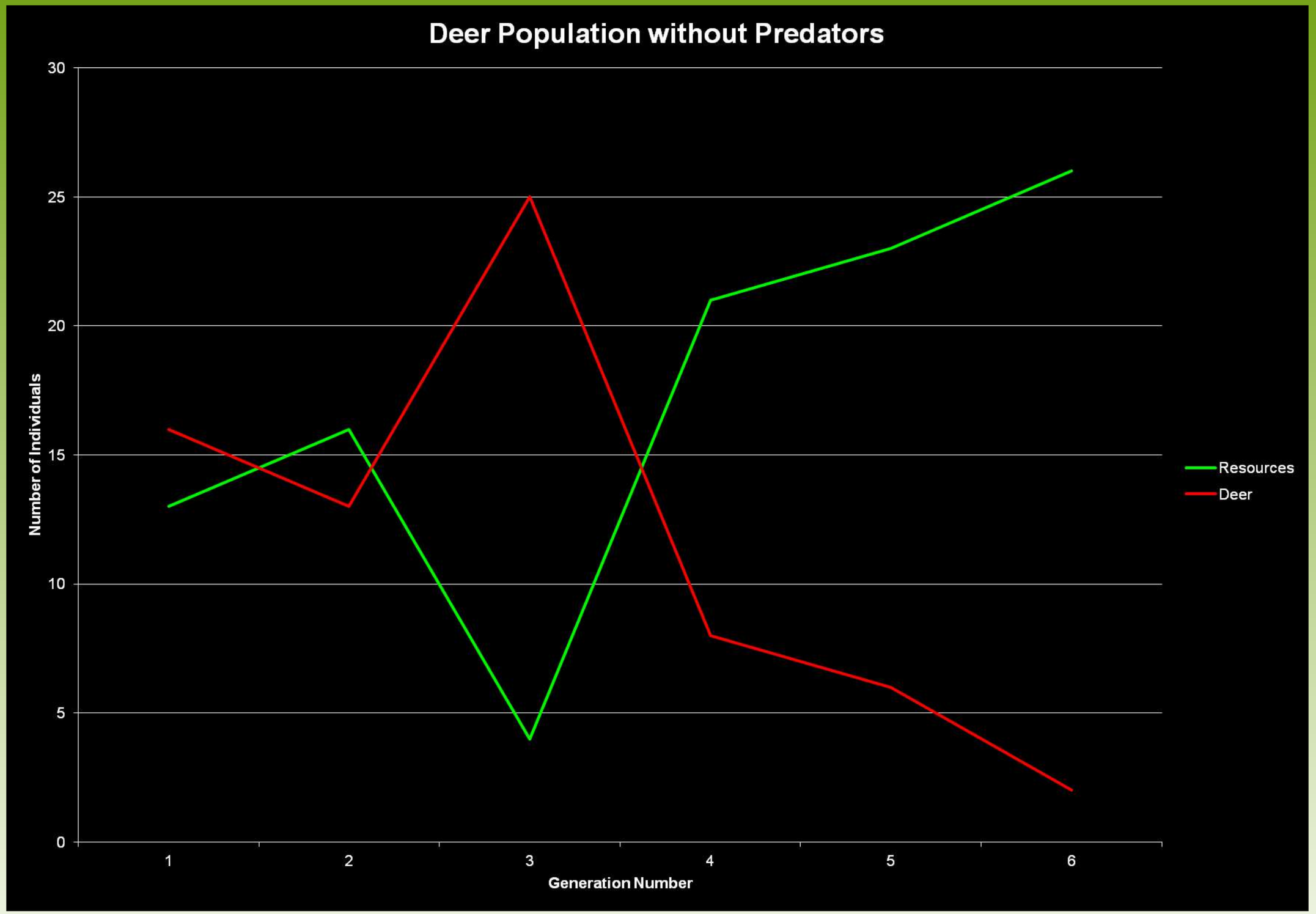
Water = hands on throatFood = hands on stomach Shelter = make a tent shape with hands

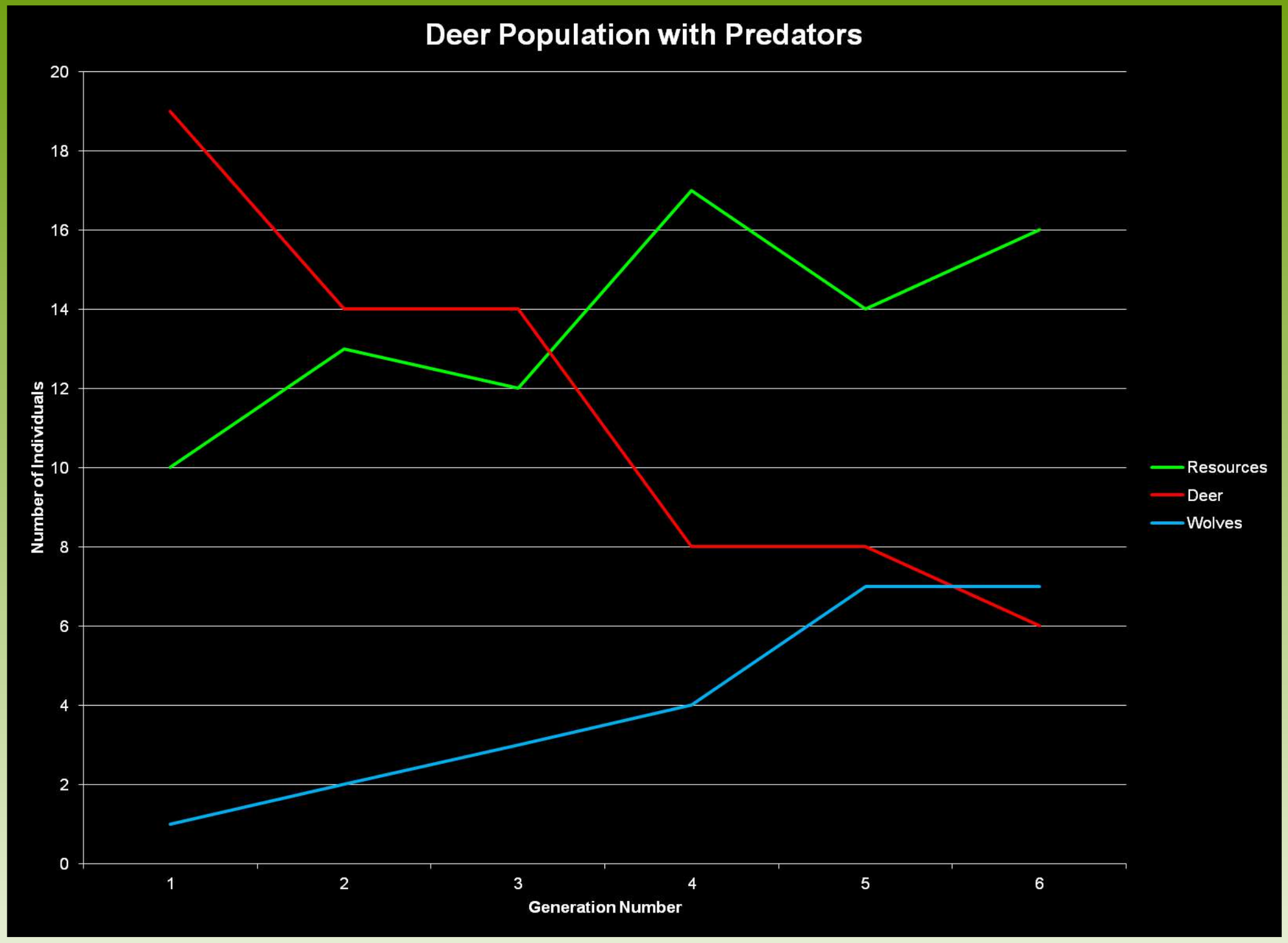
  - Each generation the **deer** choose if you're searching for "**water**," "**food**," or "**shelter.**"

Water = hands on throatFood = hands on stomach Shelter = make a tent shape with hands

All deer and all resources will start in lines facing AWAY from each other.

- When we say go, deer will race to get to the resource they need! **NO CHEATING**! **Stick to the resource that you started with**!
- If a deer "catches" the resource that they were looking for, the resource they caught becomes a deer for the next generation! (The deer that got the resource "reproduced" and the resource became its offspring).
- **If a deer does NOT get the resource** they were looking for, **they die.** ☹ Any dead deer become a resource during the next generation.
- Before each generation we will record the # of deer and the # of resources, and see what happens over time!
- **Predators!** One person will be **the Wolf.** The Wolf will stand in the middle between the resources & the deer. If the wolf catches you then you become a wolf also.
- Environmental Impact: Fire?, Flood?, Clear Cutting


Deer Population without Predators
30
25
20
15
10
5
0
Number of Individuals
1
2
3
4
5
6
Generation Number
Resources
Deer


Deer Population with Predators
Number of Individuals
20
18
16
14
12
10
8
6
4
2
0
1
2
3
4
5
6
Generation Number
Resources
Deer
Wolves

Agenda 9/9

1. Warm up
2. Concept Map
3. Ch 5 Study Guide
4. Activity: Ecosystems, Energy Pyramid/ Trophic Levels
5. Pass out Study Guide for tomorrow's Quiz
6. Go over Test Questions
7. Review Ecosystem Project

9/9 Ecosystems, Energy, & Biodiversity CH 3 & 4

Obj. TSW learn about how energy flows through the biotic and abiotic parts of an ecosystem to prepare for their Quiz tomorrow.

P. 30 NB

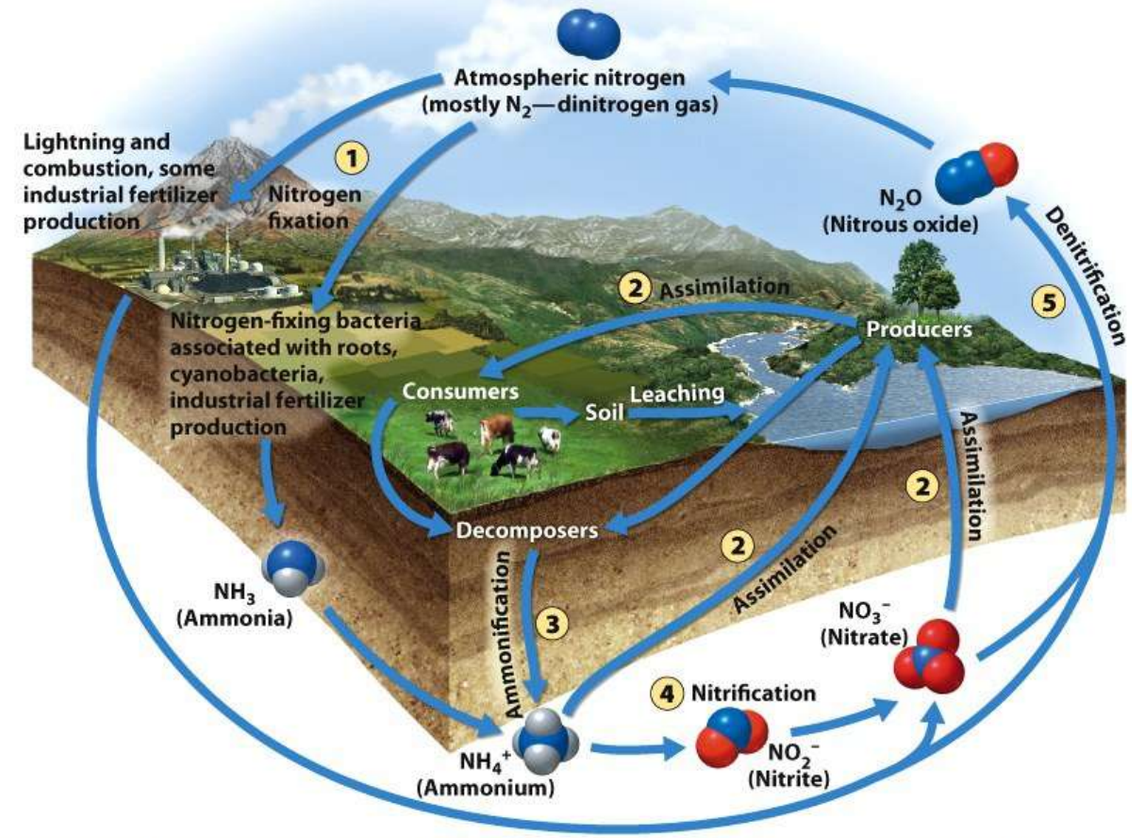
Draw a food web using the following organisms: Grey Whale, phytoplankton, Sea Weed, algae, snail, Sea Otter, Shark

Draw an energy Pyramid using the above organisms, label each trophic level.

Does this Ecosystem have Biological Diversity? Why or Why not?

http://library.thinkquest.org/11353/ecosystems.htm

The Nitrogen Cycle



1 Nitrogen Fixation	2 Assimilation	3 Ammonification	4 Nitrification	5 Denitrification
Nitrogen fixation converts N_2 from the atmosphere. Biotic processes convert N_2 to ammonia (NH_3), whereas abiotic processes convert N_2 to nitrate (NO_3^-).	Producers take up either ammonium (NH_4^+) or nitrate (NO_3^-). Consumers assimilate nitrogen by eating producers.	Decomposers in soil and water break down biological nitrogen compounds into ammonium (NH_4^+).	Nitrifying bacteria convert ammonium (NH_4^+) into nitrite (NO_2^-) and then into nitrate (NO_3^-).	In a series of steps, denitrifying bacteria in oxygen-poor soil and stagnant water convert nitrate (NO_3^-) into nitrous oxide (N_2O) and eventually nitrogen gas (N_2).
				

Figure 3.12
Environmental Science

The Phosphorus Cycle

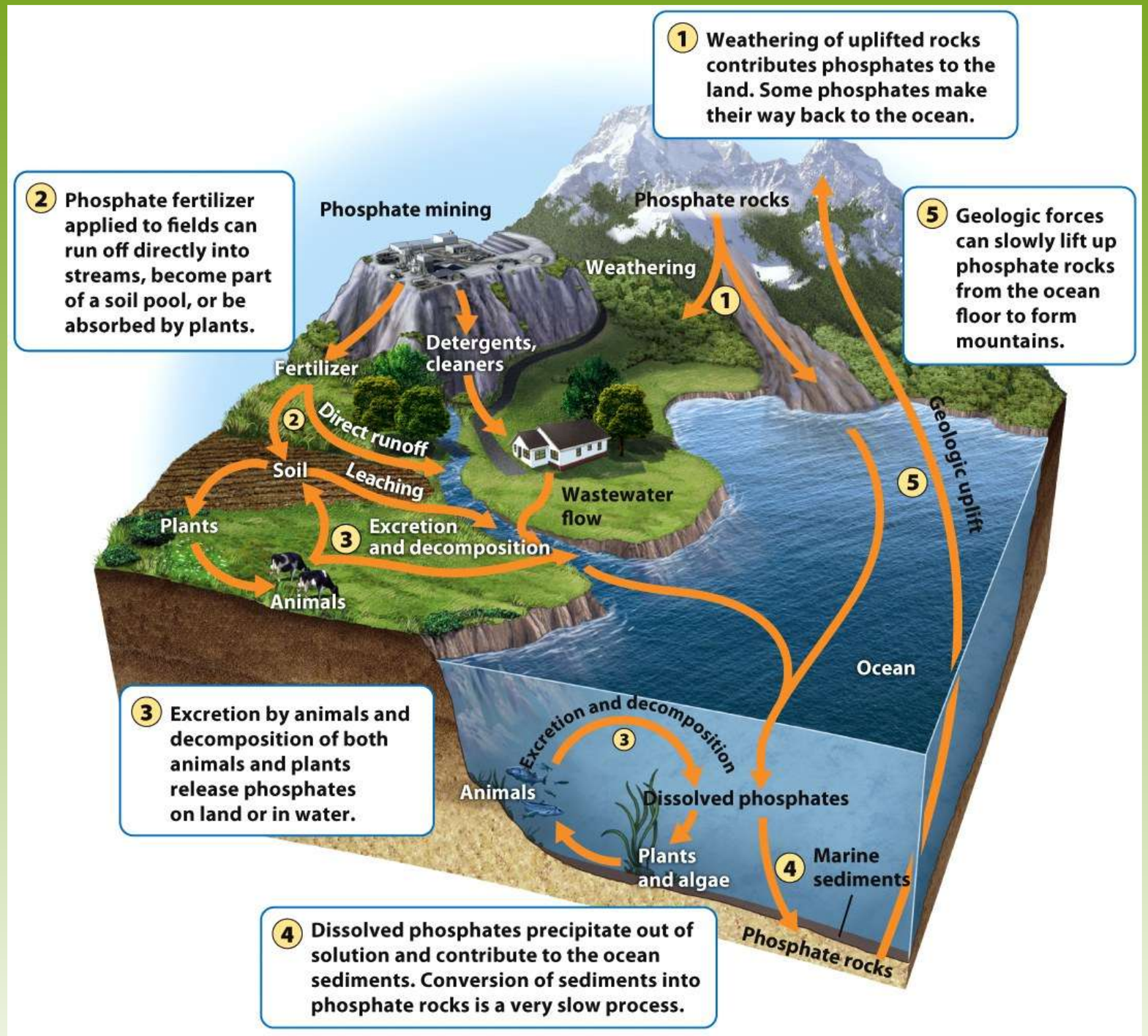


Figure 3.13
Environmental Science

Ecosystems respond to disturbance

- Disturbance- An event caused by physical, chemical or biological agents that results in changes in population size or community composition.

Figure 3.15a
Environmental Science

Figure 3.15b
Environmental Science

Watershed Studies

Watershed- All of the land in a given landscape that drains into a particular stream, river, lake or wetland.

Figure 3.16
Environmental Science

Resistance versus Resilience

- Resistance- A measure of how much a disturbance can affect its flows of energy and matter.
- Resilience- The rate at which an ecosystem returns to its original state after a disturbance.
- Restoration ecology- A new scientific discipline that is interested in restoring damaged ecosystems.

The Intermediate Disturbance Hypothesis

- The intermediate disturbance hypothesis- states that ecosystems experiencing intermediate levels of disturbance are more diverse than those with high or low disturbance levels.

Disturbance affects biodiversity

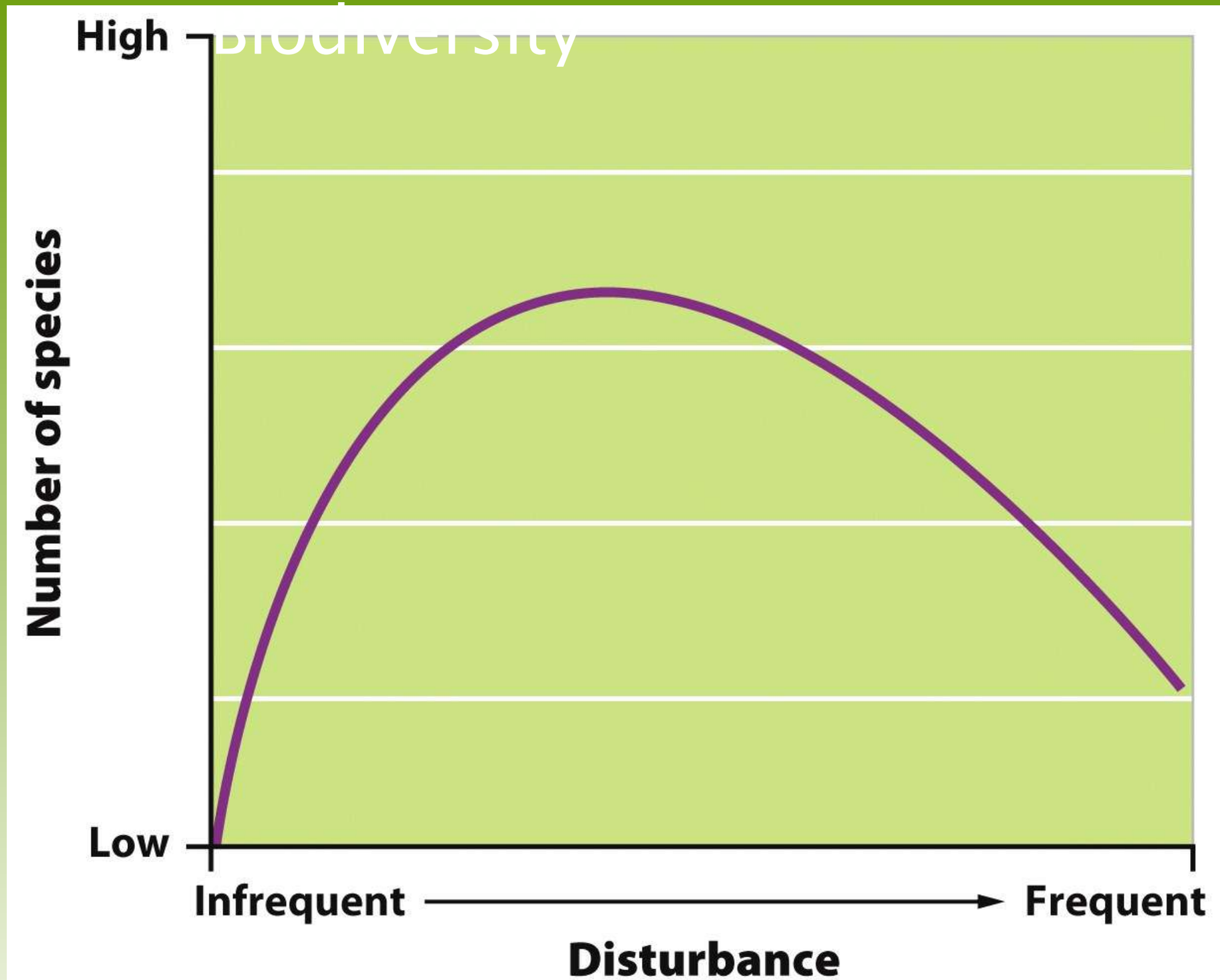


Figure 3.19
Environmental Science

Ecosystems Provide Valuable Services

Can you name some?

Instrumental Values of Ecosystems

- **Provisions**- Goods that humans can use directly.

- **Regulating services-** The service provided by natural systems that helps regulate environmental conditions.

- **Support systems-** The support services that natural ecosystems provide such as pollination, natural filters and pest control.

- **Resilience-** Resilience of an ecosystem ensures that it will continue to provide benefits to humans. This greatly depends on species diversity.

- **Cultural services-** Ecosystems provide cultural or aesthetic benefits to many people.