Chapter 2  Principles of Ecology

2.1 Organisms and their Environment

<table>
<thead>
<tr>
<th>Ecology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biosphere</td>
</tr>
<tr>
<td>Abiotic factor</td>
</tr>
<tr>
<td>Biotic factor</td>
</tr>
<tr>
<td>Population</td>
</tr>
<tr>
<td>Biological community</td>
</tr>
<tr>
<td>Ecosystem</td>
</tr>
<tr>
<td>Habitat</td>
</tr>
<tr>
<td>Niche</td>
</tr>
<tr>
<td>Symbiosis</td>
</tr>
<tr>
<td>Commensalism</td>
</tr>
<tr>
<td>Mutualism</td>
</tr>
<tr>
<td>Parasitism</td>
</tr>
</tbody>
</table>
## 2.2 Nutrition and Energy Flow

<table>
<thead>
<tr>
<th>term</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autotroph</td>
<td></td>
</tr>
<tr>
<td>Heterotroph</td>
<td></td>
</tr>
<tr>
<td>Decomposer</td>
<td></td>
</tr>
<tr>
<td>Food chain</td>
<td></td>
</tr>
<tr>
<td>Trophic level</td>
<td></td>
</tr>
<tr>
<td>Food web</td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td></td>
</tr>
</tbody>
</table>
In your textbook, read about what ecology is and about aspects of ecology study.

Use each of the terms below just once to complete the passage.

Living organisms in our world are connected to other (1) ____________________________ in a variety of ways. The branch of biology called (2) ____________________________ is the scientific study of interactions between organisms and their (3) ____________________________, including relationships between living and (4) _____________________________ things.

All living things on Earth can be found in the (5) ________________________________, the portion of Earth that supports life. It extends from high in the (6) __________________________________ to the bottom of the oceans. Many different environments can be found in the biosphere. All living organisms found in an environment are called (7) ______________________________. Nonliving parts of an environment are called (8) ________________________________. For example, whales, trees and (9) ____________________ are biotic factors. Oceans currents, temperature and (10) ___________________________ are abiotic factors.

In your textbook, read about levels of organization in ecology.

Write the correct term in the blank provided.

(11) 11. A group of organisms of one species that interbreed and live in the same place at the same time.


(13) 13. Interacting populations and abiotic factors in a community

(14) 14. Increases when resources are scare

(15) 15. An example of an ecosystem
Chapter 2 Principles of Ecology 2.1 Organisms and Their Environment

*In your textbook, read about organisms in ecosystems.*

For each statement below write **true** or **false**.

_________ 16. A habitat is the role a species plays in a community.

_________ 17. Habitats may change.

_________ 18. A niche is the place where an organism lives its life.

_________ 19. A species’ niche includes how the species meets its needs for food and shelter.

_________ 20. It is an advantage for two species to share the same niche.

_________ 21. Competition between two species is reduced when the species have different niches.

Use the following terms to complete the table below.

<table>
<thead>
<tr>
<th>commensalism</th>
<th>mutualism</th>
<th>parasitism</th>
<th>symbiotic</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Relationships Among Organisms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of Relationship</strong></td>
</tr>
<tr>
<td>24. Organisms of different species live together in a close, permanent relationship.</td>
</tr>
<tr>
<td>25. One species benefits and the other species is neither benefited nor harmed by the relationship.</td>
</tr>
<tr>
<td>26. One species benefits from the relationship at the expense of the other species.</td>
</tr>
<tr>
<td>27. Both species benefit from the relationship.</td>
</tr>
</tbody>
</table>
Chapter 2  Principles of Ecology  2.2 Nutrition and Energy Flow

**Food Web**

All of the organisms in a community are related to each other by the jobs they do. Green plants are living food producers. Animals are consumers; they cannot make their own food. Decomposers are living things that break down dead matter to get food. All of these organisms together make up a food web. The diagram below shows a food web. You can see how important each organism is to all the rest. If one animal population dies out, the entire food web is disrupted.

*Using the diagram below, complete the table with the proper organism or organisms. The following list has been provided to help you identify the organisms in the diagram.*

- mushrooms
- rat
- sparrow
- cricket
- hawk
- snail
- owl
- grass
- bush
- mouse

<table>
<thead>
<tr>
<th>Producers</th>
<th>Herbivores</th>
<th>Carnivores</th>
<th>Omnivores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1st level consumers</th>
<th>2nd level consumers</th>
<th>3rd level consumer(s)</th>
<th>4th level consumer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decomposers</th>
</tr>
</thead>
</table>
Use the above diagram to answer the following questions.

1. Plants lose water to the air through
   a. condensation   b. photosynthesis   c. their roots   d. transpiration

2. Animals lose water when they
   a. breathe in   b. urinate   c. breathe out   d. both b and c

3. The major process by which water in the atmosphere is returned to the earth is
   a. precipitation   b. evaporation   c. photosynthesis   d. decomposition

4. List the ways water gets into the groundwater
Use the above diagram to answer the following question.

1. What is the process by which plants convert carbon dioxide into energy-rich carbon compounds like glucose?

2. After millions of years, the carbon compounds in organisms that died and decomposed became

3. List the ways CO₂ goes back into the atmosphere.

4. What human activities might tend to increase CO₂ in the atmosphere? (greenhouse effect)

5. Heterotrophs get carbon-containing molecules by
   a. making the molecules themselves
   b. decaying
   c. feeding on other animals
   d. growing
Chapter 2  
Principles of Ecology  

2.2 Nutrition and Energy Flow

The Nitrogen Cycle

1. Bacteria in root nodules change nitrogen gas into what form?

__________________________________________________________________________________

2. What is the role of decomposers in the nitrogen cycle?

__________________________________________________________________________________
__________________________________________________________________________________

3. How do plants obtain the nitrogen they need?

__________________________________________________________________________________
__________________________________________________________________________________

4. How do herbivores, like the squirrel, obtain the nitrogen they need?

__________________________________________________________________________________
__________________________________________________________________________________

5. How is nitrogen returned to the atmosphere?

__________________________________________________________________________________
__________________________________________________________________________________
1. From where does the energy in an ecosystem originate?

__________________________________________________________________________________

2. What kind of organism is always found at the base of any pyramid?

__________________________________________________________________________________

3. Based on the pyramid of numbers, what does the hawk eat?

__________________________________________________________________________________

4. Energy is lost when going from one trophic level to the next. How is that loss shown in each of the pyramids?

__________________________________________________________________________________
Chapter 2 Principles of Ecology

Chapter Assessment

Reviewing Vocabulary

Part A

Match the definitions with the terms below.

autotrophs  commensalism  food chain  food web  heterotrophy  parasite  decomposer

_____________________  1. Tiny organisms that break down and absorb nutrients from dead organisms
_____________________  2. Obtains energy by feeding on other living organisms
_____________________  3. Steps in the passage of energy and matter through an ecosystem
_____________________  4. Place where an organism lives out its life
_____________________  5. Relationship between species in which one species benefits at the expense of another
_____________________  6. Makes it own food by using energy from the sun or from chemical compounds
_____________________  7. Collection of interacting populations

Part B

Match the definitions with the terms below.

scavenger  trophic level  habitat  community  biosphere  ecology  mutualism

_____________________  8. Simple model for showing how matter and energy move through an ecosystem
_____________________  9. Eats dead organisms
_____________________ 10. Portion of the Earth that supports life
_____________________ 11. Relationship between species in which one species benefits and the other is neither harmed nor benefited
_____________________ 12. Network of interconnected food chains
_____________________ 13. Relationship between species in which both species benefit
_____________________ 14. Study of interactions among organisms and their environment
A farmer notices that his corn crop has been producing less and less healthy ears over the past few years. The farmer knows that corn grows better with the addition of nitrogen to the soil. The nitrogen is essential for the making of amino acids and therefore proteins. He decides to add nitrogen to the soil but he does not know which would be the best method. He knows that legumes are able to fix nitrogen from the atmosphere into usable nitrogen. Should he add nitrogen through the artificial use of liquid nitrogen or the natural method of adding nitrogen by growing legumes the season prior to growing the corn? He decides to experiment on five parcels of land, one acre each, before making a decision on which method to use on all of his acreage.

He follows the following method:

Parcel 1 – he does nothing different
Parcel 2 – he adds 25 Kg of liquid nitrogen
Parcel 3 – he adds 40 Kg of liquid nitrogen
Parcel 4 – he grows a crop of clover (a legume)
Parcel 5 – he grows a crop of alfalfa (a legume)

The following table shows his results

<table>
<thead>
<tr>
<th>Kilograms of corn harvested after one growing season</th>
<th>Parcel 1</th>
<th>Parcel 2</th>
<th>Parcel 3</th>
<th>Parcel 4</th>
<th>Parcel 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>75</td>
<td>90</td>
<td>92</td>
<td>125</td>
<td>140</td>
</tr>
</tbody>
</table>

1. Which parcel is the control?

2. What is the independent variable in his experiment?

3. What is the dependent variable?

4. Which method should he use, based on the amount of corn harvested?

5. Which method is ecologically the best?
Tiger parts are still being widely sold in Sumatra, Indonesia, warns a new report. However, with tiger numbers dwindling, the illegal trade is looking like an increasingly unsustainable, as well as unsavoury, business. Traffic, a wildlife monitoring network which works with WWF and the World Conservation Union, says the number of Sumatran tigers that are being illegally poached and sold is dropping. But that is not good news. The group surveyed 326 shops across the Indonesian island of Sumatra in 2006 and found that 33 were selling body parts amounting to at least 23 tigers. "This is down from an estimate of 52 killed per year in 1999-2000," says Julia Ng, lead author on new report. "Sadly, the decline appears to be due to the dwindling number of tigers left in the wild." Conservation groups say the Indonesian government is not doing enough to protect the tiger subspecies despite ample evidence of their decline.

**Lucky charm**

Tiger body parts, including canine teeth, claws, skin and whiskers, are believed to bring good luck to those who wear them and to give protection from black magic. The bones of the right front paw are sometimes "infused" in a glass of warm water, which is then drunk to treat headaches. With fewer than 500 individuals left in the wild, the Sumatran tiger is classed as critically endangered by the World Conservation Union. To help protect it, Traffic ran a first survey of shops between 1999 and 2002. The names and addresses of the outlets selling tiger parts at the time were handed over to Indonesian authorities. "If Indonesian authorities need enforcement help from the international community they should ask for it. If not, they should demonstrate they are taking enforcement seriously," says Heather Sohl of WWF. Progress may be on its way, however – in December 2007, the Indonesian president announced a 10-year strategy to protect the Sumatran tiger.

| 1. Where are tiger parts being sold? |  |  |
| 2. How many tigers are estimated to have been killed between 1999-2000? |  |  |
| 3. How many tigers are estimated to have been killed in 2006? |  |  |
| 4. What is the estimated number of tigers as of February 2008? |  |  |
| 5. What parts of the tiger are used? |  |  |
| 6. For what are the body parts used? |  |  |
| 7. The World Conservation Union has classified the Sumatran tiger as |  |  |