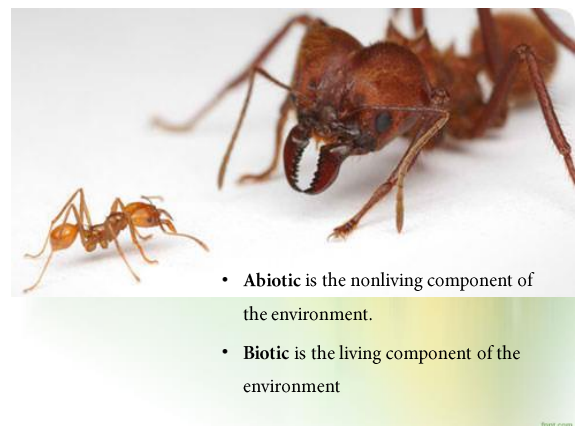
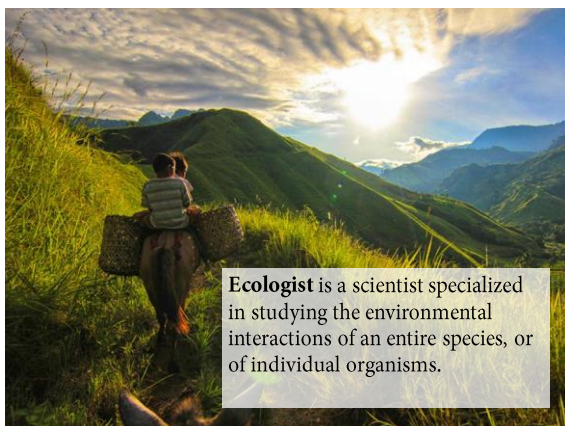
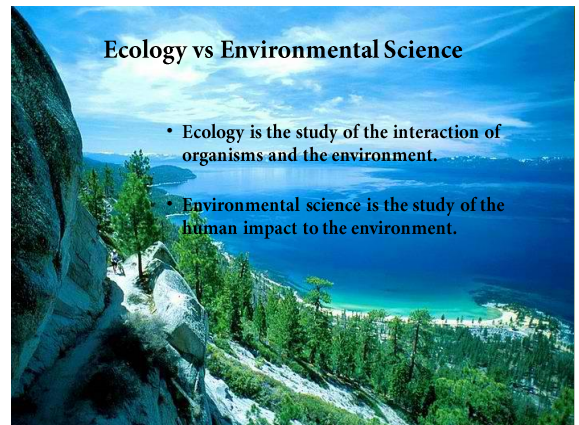
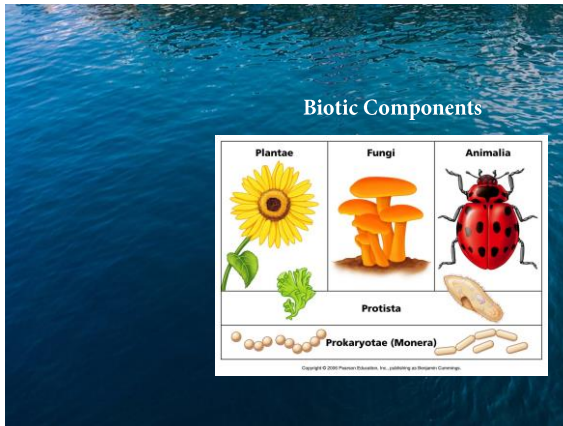



Ecology is the study of the interactions between organisms and their environment;
Greek words: oikos (house) and logos (study of)





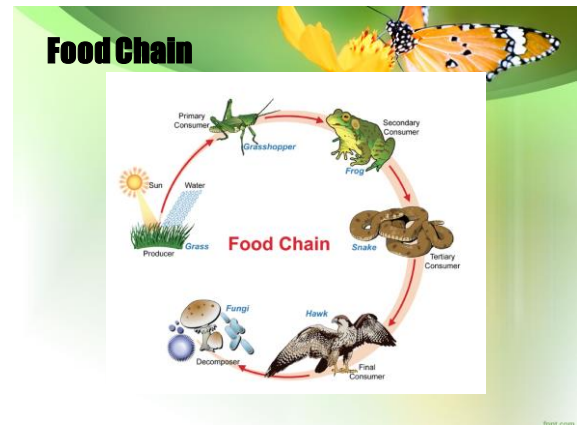
Abiotic Factors

- **Abiotic factors**: involve all those factors that are non-living.
- For example:
 - Soil pH
 - Soil Humidity
 - Soil Temperature
 - Air Temperature
 - Wind Speed
 - Sunlight Intensity
 - Soil Nutrients



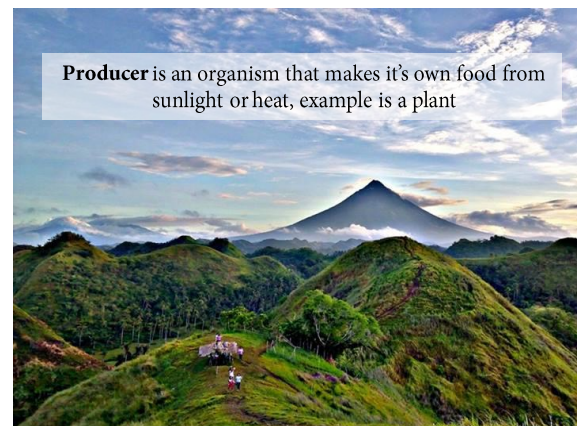
Food Chain

– follows the connection between one producer and a single chain of consumers within an ecosystem.

Categories of Food Chain

- Producer
- Consumer
- Decomposer



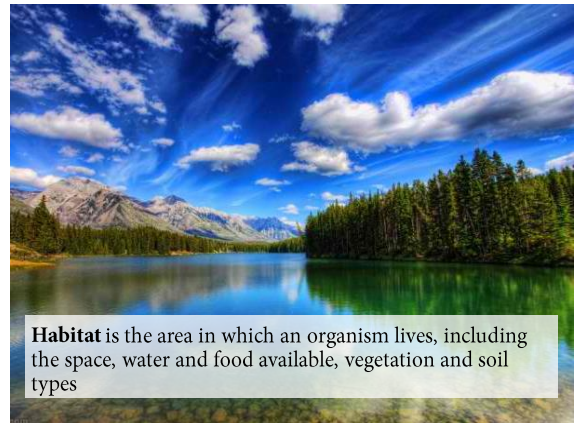
Consumer is an organism that must consume other organisms for energy; all animals are consumers



Types of Consumer
 Herbivores
 Carnivores
 Omnivores



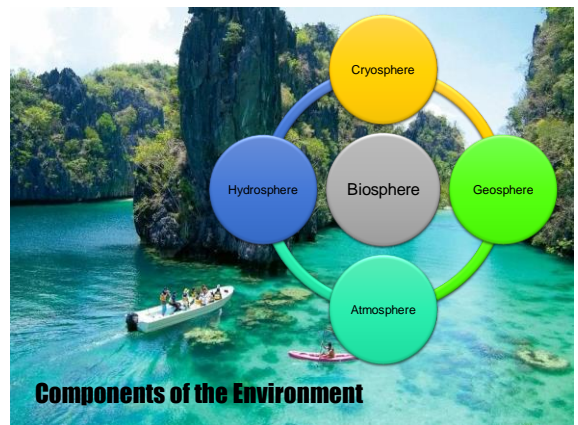
Decomposer is an organism that consumes only dead organisms for food; examples are bacteria, worms, fungus, vultures



Habitat is the area in which an organism lives, including the space, water and food available, vegetation and soil types



Niche is the role of a species in their environment; no two species hold the exact same niche.



Components of the Environment

Defining Populations

- **Population** – is a group of conspecifics inhabiting a specific place at a specific time



Characteristics of Populations

- **Geographic Distribution**, or range, describes the area inhabited by a population
- **Population Density**, the number of individuals per unit area
- **Growth Rate**, affected by the number of births, number of deaths and the number of individuals that enter or leave the population
- **Age Structure**, configuration of the age of the individuals in a population

Community Interactions

Danilo Villar Rogayan Jr.
Faculty, Department of Natural Sciences, College of Teacher Education, Arts and Sciences, RMTU San Marcelino

Community Interactions

- 1. **Competition** – occurs when two organisms fight for the same limited resources; interspecific and intraspecific competition
- **interspecific competition**, occurs when two different species compete for a limited resource, such as space
- **intraspecific competition**, occurs among members of the same species (limited resources)



Community Interactions

- **competitive exclusion principle**, states that no two species can occupy the same niche in the same habitat at the same time

- **Competitive exclusion has different outcomes.**
 - One species is better suited to the niche and the other will either be pushed out or become extinct.
 - The niche will be divided.
 - The two species will further diverge.



Community Interactions

- **ecological equivalents**, species that occupy similar niches but live in different geographical regions

- Ecological equivalents are species that occupy similar niches but live in different geographical regions.



Community Interactions

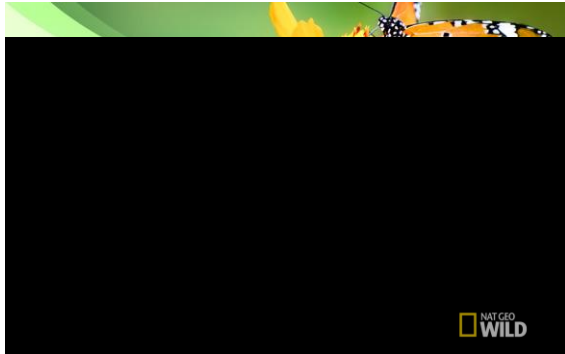
- **2. Predation** – process by which one organism captures and feeds upon another organism; herbivory in plants
- **predator**, organism that does the killing and eating
- **prey**, the food organism
- **cannibalism**, predation by one organism on another of a similar species

NAT GEO
WILD

WORLD'S
deadliest


- **Predation** occurs when one organism captures and eats another.





Community Interactions

- **Symbiosis** – a close ecological relationship between two or more organisms of different species that live in direct contact with one another ('living together')





Community Interactions

- 3. **Mutualism** – interspecies interaction in which both organisms benefit from one another
- **obligatory benefit**, refers to any material or environmental condition that is essential for survival
- ex.: algae and lichen; aphids and ants; insects and flowers; saguaro cactus and long-nosed bat



Mutualism

- **Raccoon and Poison Ivy**
 - The raccoon eats the berries of the poison ivy and disperses the seeds as it poops.
 - Both benefit.



Mutualism

- Black-eyed Susan gets pollinated by Green lacewing.
- Both benefit...lacewing gets food (nectar) and Black-eyed Susan gets pollinated.



James L. Reveal, Norton Brown Herbarium, University of Maryland



Copyright, Edward S. Ross

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Mutualism

- Mushroom and fly
 - Fly lands on and eats mushroom. Some of the spores will adhere to the fly.
 - When the fly dies, (of natural causes) the spores will be on new ground and will allow the mushroom to grow in a new area.



© GardenSofistic/https://www.gardensofistic.net/ fppt.com



CoralReefMultimedia.org

Goby-Shrimp Mutualism



Community Interactions

- 4. **Commensalism** – a relationship between two organisms in which one receives an ecological benefit from another, while the other neither benefits nor is harmed.
- **phoresy**, example of commensalism wherein small animals hitch rides on larger fast-travelling animals
- **inquilism**, kind of commensalism wherein one small organism utilizes another as shelter; epiphytes and trees

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Commensalism

- Red Maple and Eastern Bluebird
 - Bluebird nests in the maple.
 - Maple is unaffected, bluebird benefits



Copyright, Mark Brand, UC Coan Plant Database

Commensalism

- Eastern Chipmunk and Soil mite
 - The chipmunk is a mammal that burrows.
 - The soil mite feeds off of leaf litter but cannot burrow itself.
 - The mite uses the chipmunk's tunnels to travel from place to place.



Commensalism

- Pear-shaped puffball gets opened (and spores dispersed) by Opossum
- Puffball benefits, opossum is not affected.



Copyright, Leon Shernoff

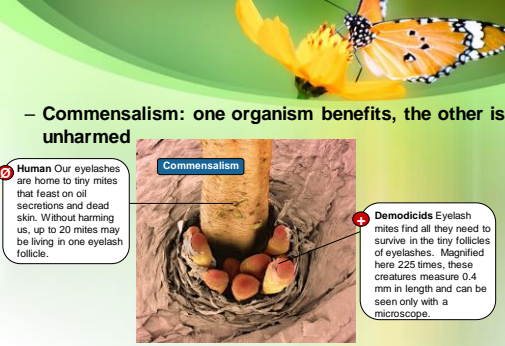


Commensalism

- British soldier lichen provides shelter for centipede.



Commensalism: one organism benefits, the other is unharmed



Human Our eyelashes are home to tiny mites that feast on oil secretions and dead skin. Without harming us, up to 20 mites may be living in one eyelash follicle.

Commensalism

Demodex Eyelash mites find all they need to survive in the tiny follicles of eyelashes. Magnified here 225 times, these creatures measure 0.4 mm in length and can be seen only with a microscope.

⊖ Organism is not affected ⊕ Organism benefits

Community Interactions

- amensalism, interaction in which one organism is adversely affected while the other is not affected at all; chemical signals
- ex.: algal bloom

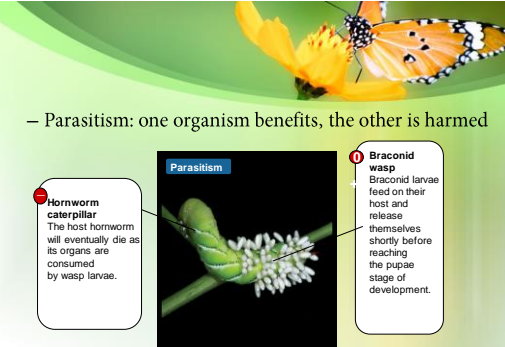
Community Interactions

- 5. **Parasitism** – relationship similar to predation in that one organism benefits while the other is harmed; parasite benefits by keeping its host alive for days or years
- **host**, organism which is consumed
- **parasite**, does the consuming
- **ectoparasites**, parasites which are found externally
- **endoparasites**, parasites which are found inside the host

– Parasitism meet their needs as ectoparasites (such as leeches) and endoparasites (such as hookworms)



– Parasitism: one organism benefits, the other is harmed

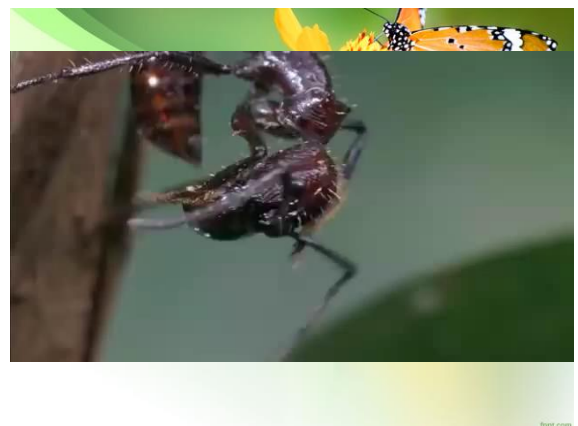


Hornworm caterpillar The host hornworm will eventually die as its organs are consumed by wasp larvae.

Parasitism

Braconid wasp Braconid larvae feed on their host and release themselves shortly before reaching the pupae stage of development.

⊖ Organism is not affected ⊕ Organism benefits



Parasitism

- Chigger lives and eats away at hognose snake.



ATW from Kountry Life



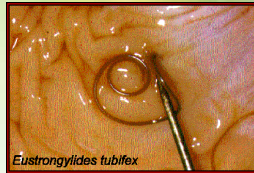
© John White

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Parasitism

- Bullfrog acts as a host of the big red worm parasite.



Eustrongylides tubifex

Ohio State University

fppt.com

Community Interactions

- **parasitoids**, those organisms which lay eggs on or inside the body of a host and often cause the death of the host organism
- ex.: tapeworms and mammals; fleas and dog; hornworm caterpillar and braconid wasp

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Community Interactions

Association	Effects	
	Species A	Species B
Parasitism	+	-
Commensalism	+	0
Ammensalism	-	0
Mutualism	+	+
Predation/ Herbivory	+	-
Competition	-	-

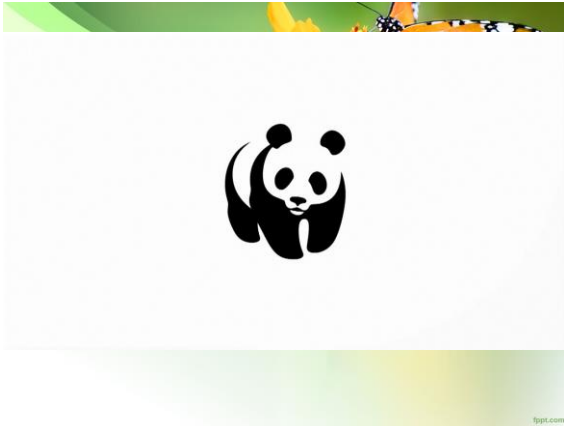
Figure 1. The Effects of Various Kinds of Interactions among Species

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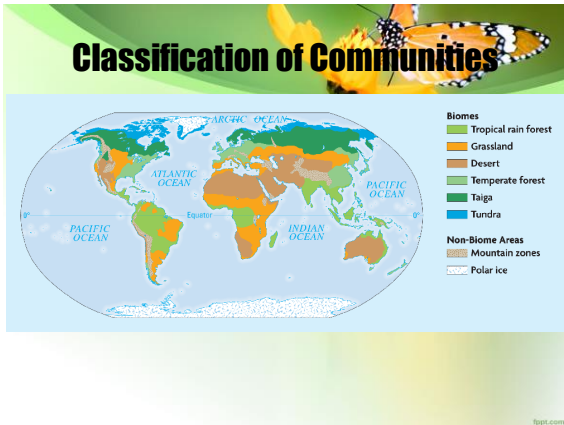
Classification of Communities

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Classification of Communities

- **Biomes** are land-based, global communities of organisms.
- The plants and animals that live in a specific biome are physically well adapted for that area.
- Plants and animals that live in a specific biome share similar characteristics with other plants and animals in that biome throughout the world.
- Earth has six major biomes.



1. Tropical Rainforest

- Tropical rain forest biomes produce lush forests.
 - warm temperature
 - abundant precipitation all year

Manaus, Brazil

Source: World Meteorological Organization

1. Tropical Rainforest

Green Winged Macaw

Jungle Python

More Rainforest Animals

Chimpanzee

Capybara

Flying Dragon

2. Grassland

- Grassland biomes are where the primary plant life is grass.



2.1. Tropical Grassland (Savanna)

- Temperatures are warm throughout the year with definite dry and rainy season
- Vegetation includes tall grasses with scattered trees and shrubs
- Hoofed animals (gazelles)



2.1. Tropical Grassland (Savanna)



Zebras



Chacma Baboon

2.2. Temperate Grassland

- Dry and warm (summer); most precipitation falls as snow (winter)
- Short or tall grasses (amount of precipitation)
- Animals live below ground (dry and windy)



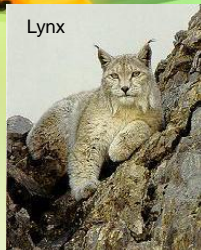
2.2. Temperate Grassland



Corsac fox



Milk vetch

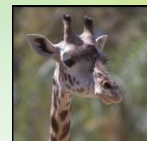


Lynx

More Grassland Animals



Brown Hyena



Giraffe



Black tailed prairie dog



3. Desert

- Desert biomes are characterized by a very arid (dry) climate.

Tucson, Arizona

Month	Average Precipitation (mm)	Average temperature (°C)
J	20	10
F	20	15
M	20	20
A	20	25
M	20	30
J	20	35
J	20	35
A	20	30
S	20	25
O	20	20
N	20	15
D	20	10

Source: National Oceanic Atmospheric Administration



Bob Cat

Armadillo Lizard

Javelina

Gila Monster

Sidewinder

More Desert Animals

Lappet Faced Vulture

Thorny Devil

Cactus Wren

4. Temperate Forest

- Temperate forest biomes include deciduous forests and rain forests.
- Temperate deciduous forests have hot summers and cold winters.




White Tailed Deer

Raccoon

More Temperate Forest Animals



Grey Squirrel

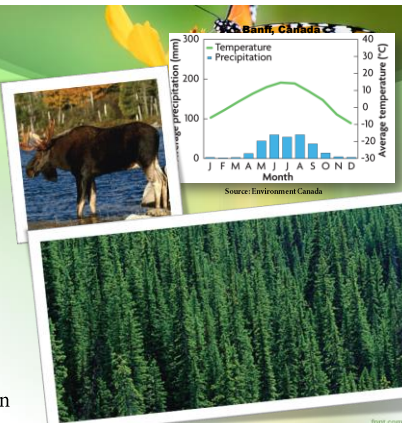
Black Bear

Wild Turkey



5. Taiga

- The taiga biome (boreal forest) is located in cooler northern climates.
- long winters and short summers
- Coniferous trees
- small amount of precipitation



St. John's, Canada

Month	Temperature (°C)	Precipitation (mm)
J	-15	50
F	-10	60
M	-5	70
A	0	80
M	5	90
J	10	100
J	15	110
A	20	120
S	25	130
O	20	120
N	15	110
D	10	100

Source: Environment Canada



Eurasian Beaver

Moose

More Taiga Animals

Lynx

Red Throated Loon

Wolverine

6. Tundra

- The tundra biome is found in the far northern latitudes with long winters.
 - winter lasts 10 months
 - limited precipitation
 - permafrost

6. Tundra

Caribou

Polar Bear

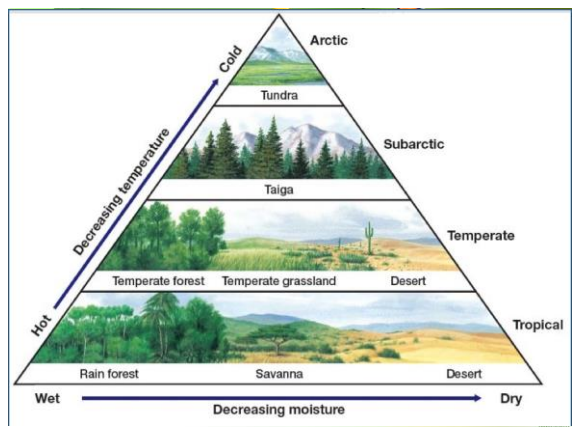
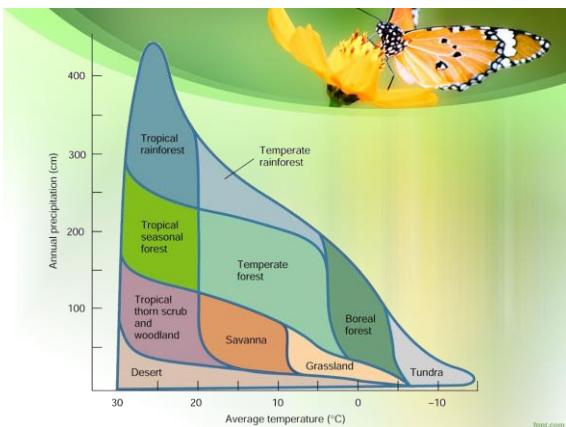
Siberian Lynx

6. Tundra

Arctic fox

snowy owl

Grizzly Bear



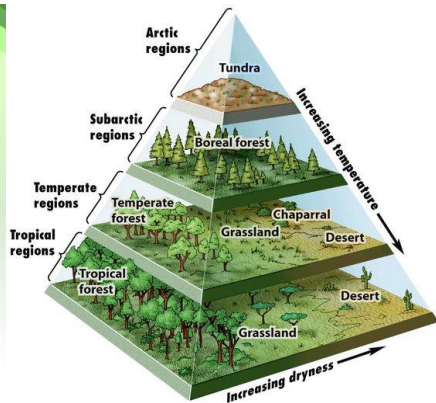
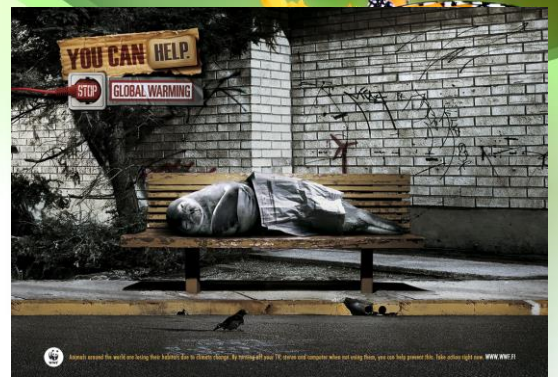


Figure 33-10 Discover Biology 5/e
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The Philippine Environment

- The numerous islands support a broad range of highly productive ecosystems, tropical forests and mountains, mangrove swamps and coral reefs.
- But even in paradise, we endure problems caused by a high incidence of poverty, by industrial expansion, and by rapid population growth.



- There is considerable abuse of our natural resources -- the destruction of coral reefs, poison and dynamite fishing, slash and burn farming on our mountains, and the pollution of our lakes and rivers.

- We have been involved in the effort to diminish four major problems of the Philippine environment, the problems of deforestation, air pollution, water pollution, urban waste and garbage.

Deforestation

- At the start of the 20th century the forested area of the Philippines was some 21 million hectares or almost 70 percent of the country's total land area of 30 million hectares.



Deforestation

- Today our remaining forest cover is below one million hectares. Moreover, on the average, our rate of deforestation was 203,905 hectares annually while our rate of reforestation was only 9,398 hectares. This means that for every tree planted, 21 are cut down.



Deforestation

- The effects of deforestation have been tragic and devastating. Some 6.5 million tribal Filipinos have lost rich hunting and inland fishing grounds.
- Species of flora and fauna have been lost forever. Biological diversity has been greatly diminished and there are periodic erosion and floods everywhere.



Deforestation

- We responded to this problem in two ways. One was a proposed legislation which will ban commercial logging for 25 years, and this legislation is now being carefully deliberated.
- Our second response was to introduce 'Luntiang Pilipinas' or Greening the Philippines Movement. The goal of this movement is to create a tree park in every city and town plaza with at least 100 trees of forest varieties.



Deforestation

- Each tree park serves as "lungs" of the community, beautifying the plaza and raising community consciousness about the environment at the same time. The movement has created forest parks in over 1,800 towns and cities, and the number is rising each month.

Smog and Air Pollution

- High levels of industrial emission and the increasing number of motor vehicles on our roads have seriously degraded air quality in urban areas.
- The consequences are rising levels of respiratory and lung ailments in our population, fatigue and poor concentration among adults, and nervous disorders in children.



Smog and Air Pollution

- Our response was the sponsorship of legislation which became the Philippine Clean Air Act of 1998. Among other things, this law provides an air quality management fund, imposes new vehicle emission standards, and provides incentives for pollution abatement and prevention.



Water Pollution

- Forty-eight percent of our water pollution is caused by household wastes, compounded by the lack of an adequate sewerage system.
- At present, only 7 percent of the settlers in Metro Manila are connected to a sewer system.



Water Pollution

- Sixteen of the Philippines' major rivers, including five in Metro Manila, are biologically dead during the summer months.
- The World Bank estimates that in the Philippines, the economic losses caused by water pollution are about \$1.3 billion or P62 billion per year.



Water Pollution

- In this regard, we came up with the Water Crisis Act of 1995 that stipulated the creation of a commission to undertake nationwide consultations on water crisis and recommend measures that will ensure continuous monitoring of water supply and distribution.
- As of 2003, 86% of the total population has access to an improved water source, with 79% and 91% access in urban and rural areas, respectively.



Waste and Garbage

- Solid waste disposal remains problematic with only 9 of 117 cities and 46 of 1,500 municipalities in the Philippines have solid management programs.



Waste and Garbage

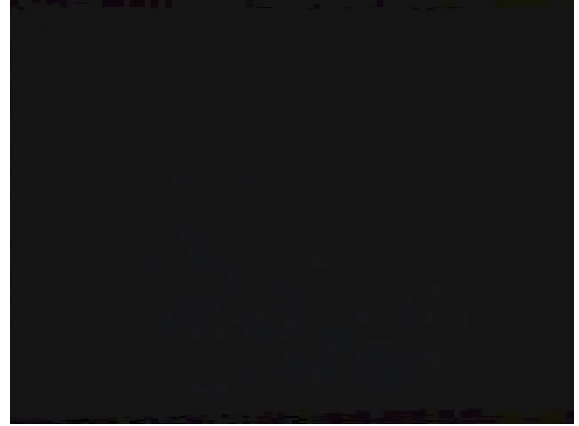
- In Metropolitan Manila, where some 15 million people work and live, some 6,000 tons of garbage is generated daily. An estimated 24 percent is illegally dumped in vacant lands or thrown into our rivers or waterways. This exacerbates the flooding of streets during the rainy season and the poor sanitation conditions of many communities.



Waste and Garbage

- Our response was to author a bill which was enacted as the Integrated Solid Waste Management Act of 2001, the first legislation signed into law by our present President, Her Excellency Gloria Macapagal Arroyo. This law created a structure to provide technology, research, organization and facilities to alleviate the waste problem and reduce health hazards.

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