

Biology Chapter 26 – Interrelationships

This chapter is mostly common sense. You should have learned half of this material in elementary school and middle school science classes, as well as earlier this year.

1. General Information

Biosphere – all of the Earth's ecosystems

Habitat – where an organism lives

Each organism has a unique habitat, and is adapted to it

Ecosystems are powered by sunlight, which lets plants live, animals eat plants, etc.

Water, physical structure, pH, and mineral composition of soil also play a role

High salt levels inhibit life because the salt absorbs too much water

Fires and other disasters will wipe out areas, but they'll eventually grow back

Succession – the gradual process by which one type of community replaces another

As environments change, populations must adapt

Areas that were once lakes (with fish) are now deserts (with cactus)

As more organisms adapt and survive the change, they start competing

The ones left standing stay to populate the new environment

Species will continue to populate until all niches are filled

Biodiversity – the great diversity of organisms on Earth

It's being threatened as habitats are destroyed for human interests

2. Terrestrial Biomes

Biome – regions with similar physical environments, with similar vegetation

Climate, rainfall, an altitude also define a biome

Tropical Rain Forests – lowlands near the equator, temperatures are constant all year, lots of rain

Little light reaches the ground because of the dense trees, hence little vegetation on the ground

The rain forests are being destroyed for lumber, farming, mining, and land, and that's bad

Savanna – tropical or subtropical grassland with a few scattered trees

Found in areas with low precipitation, in the interior of continents (think Great Plains)

Most animal shelters are underground since there are no trees

Deserts – we live in one – severely hot, dry, ridiculously hot in the summer, ludicrously cold in the winter

Not much vegetation, lots of cactus, animals here are adapted to conserve every drop of water

Many are either light colored to keep cool, or are nocturnal

Mid Latitude Areas – coasts, mild temperatures, lots of evergreen leaves and spiny shrubs

Chaparral – coastlines of Chile, Mediterranean sea, lots of vegetation, constantly destroyed by fires

Many seeds germinate only after a fire, where there is little competition for resources

Temperate Grasslands – similar to savanna, except there are trees near water sources such as streams

They have relatively cold winter temperatures, and are usually relatively high in elevation

Lots of grazing animals live on the vast and open plains

Temperate Forests – mid latitude regions where there is enough moisture to support large trees

Really cold winters to hot summers, with a 5 – 6 month growing season

Lots of rain and snow, rich soil, tall trees, diverse animal life

Taiga – coniferous or boreal forest – spread across all continents, and at higher elevations

Harsh winters, short cool summers, a whole lot of snow, but very little rain

Mostly evergreens live here, very dense, not much vegetation on the ground

Home to squirrels, jays, moose, elk, hares, beavers, porcupines, bears, wolves, etc

Tundra – very high altitudes, above the tree line, with small, shrubby plants

Arctic tundra has permafrost, or permanently frozen soil that prevents plant growth

Alpine Tundra – found on high mountains, not many trees, only small shrubs

Both have lots of snow, really cold, very short or no summer

Animals here burrow into the ground for warmth

3. Aquatic Communities

Rivers and streams are excellent sources of water for plants and animals

They usually start high, pure, with little salt and nutrients, and also very fast moving

As they go down, they lose speed, pick up silt, salt, and nutrients

Upstream, communities are simple and are abundant with trout

Downstream, plants carry on photosynthesis, helping curb the decreasing oxygen levels

Rivers end up in lakes or ponds, and some eventually empty into the ocean

Many aquatic organisms feed on plankton, and are then eaten by larger animals

Zones of the ocean

Intertidal zone – the beach, shallow

Neritic Zone – past the beach, but not very deep

Oceanic Zone – very deep

Photoic Zone – depths where light can penetrate

Aphotic Zone – areas where light cannot reach

Pelagic Zone – the combination of the photoic and aphotic zones

4. Energy

All Life Processes require energy

Energy – Defined as the capacity to do work. **Free Energy** – NRG usable by cells.

Animals use chemical energy, plants use light energy

Autotrophs – Producers - produce their own food – plants, some microbes, use photosynthesis

Plants, some bacteria, Photosynthetic Plankton

Heterotrophs – Consumers - organisms that feed off other organisms. All animals, fungi, microbes

Herbivores – plant eaters

Carnivores – meat eaters

Omnivores – both meat and plant eater

Decomposers – eats decaying material

Cellular Respiration – Carbohydrates + Protein + Fats → ATP

Food Chain – a linear visual of the transfer of food and energy from 1 trophic level to the next

Trophic Level – Feeding Level

Producers → 1st order consumers → 2nd order consumers → 3rd order consumers

Only 4 – 5 levels due to 10 % law

10% law – when energy is transformed from one form to another, 90% of NRG is lost as heat.

Food Web – Shows ALL feeding relationships in a ecosystem, a collection of Food Chains

Energy Flows and Matter Cycles – Energy is changed from one form to another, matter is recycled

Energy is infinite, matter is finite

Energy Pyramid – the producers are at the bottom, most abundant, 10,000 kcal energy

Primary consumers eat the producers, 1,000 kcal energy

Secondary consumers, eats primary consumers, 100 kcal energy

Top Level Consumers – eats secondary consumers, 10 kcal energy

If a primary consumer dies off, everyone suffers because everything is dependent on everyone else

5. Matter

Matter is finite, there is only so much resources, so it is recycled

The Water Cycle – the recycling and reusing of water

Evaporation – water from the oceans turns into gas and rises into the atmosphere

Transpiration – water from plants evaporates and rises into the atmosphere

Condensation – H₂O gas in the atmosphere condenses on dust and forms clouds

Precipitation – clouds release water in the forms of rain, snow, hail, etc

Surface Runoff – water on the ground flows back into the ocean

Ground Runoff – water soaks into the soil, into ground wells, and then to the ocean

Nitrogen Cycle – the recycling of nitrogen gas in the air

Nitrogen through lightning, industry, and biological processes become nitrate ions (NO₃)

Nitrate is a very good fertilizer, and is used by plants and animals

When the plants and animals die, they release the nitrogen and the process starts over

Carbon Cycle – the recycling of CO₂ and O₂

Animals breathe oxygen and release carbon dioxide (cellular respiration)

Plants breathe carbon dioxide and release oxygen (photosynthesis)

Dead organisms also release carbon dioxide

There is always a delicate balance of the two gasses

Burning of the rain forest and fossil fuels is increasing CO₂, leading to greenhouse effect

6. Disposing of Wastes

We basically bury wastes in the ground in landfills

It contaminates the land and contaminates the groundwater, poisoning animals and ourselves