

Earth's Systems

Ecology- is the scientific study of interactions among organisms and their environments.

An Ecologist is a person who studies the interactions between organisms and the environment.

7 Levels of Organization Studied by Ecologists

- 1) Organism- A single living thing
- 2) Species – organisms so similar to one another that they can breed
- 3) Population- a group of individuals that belong to the same species and live in the same species and live in the same area. Not a count of every single organism altogether. Ex) The human populations is separate from the cow population.
- 4) Community- a collection of different populations that live together in a defined area
- 5) Ecosystems- A collection of all the organisms that live in a particular place together with their non living environment.
- 6) Biome- A collection of animals and plants in an area
- 7) Biosphere- all the parts of the planet Earth where life can be found.

4 Spheres of Earth

1) Geosphere - all the rock on Earth

2) Hydrosphere - all the water on Earth

3) Atmosphere - all the gases surrounding Earth

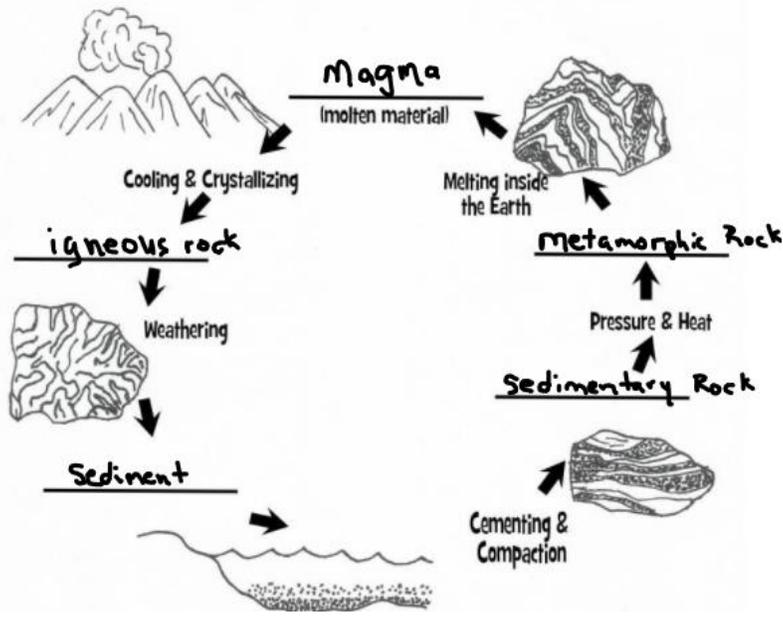
4) Biosphere - all the living things on Earth

Geosphere-

We rely on the geosphere to provide natural resources and a place to grow food. Volcanoes, mountain ranges, and deserts are all part of the geosphere.

Weathering: Sediment comes from larger rocks that have broken down or worn away by a natural process called weathering. This can happen mechanically, chemically or biologically.

Rock Cycle



Whakaari Documentary

Dec. 9, 2019 (A major eruption formed a new crater in 2000, and small eruptions occurred in 2012, 2013, and 2016)

- 22 deaths (20 bodies recovered, 2 missing)

- Youngest victim 13 years old, oldest was 64

- 25 Injured

- Hayden was a tour guide and it was his 1011 trip to the island

Linking Geosphere to other spheres with climate

Biosphere: The carbon cycle, usually linked with the Earth's biosphere, includes deep storage of carbon in the form of fossil fuels like coal, oil, and gas as well as carbonate rocks like limestone.

Cryosphere: Glaciers and ice sheets, parts of the cryosphere, have a large impact on the rocks and sediments below them. They erode rocks on the geosphere and push rocks up and over the land as they melt and move.

Hydrosphere and Atmosphere: The erosion of rocks, a major part of the rock cycle and change in the geosphere over time. Erosion, transportation, and deposition of sediments wouldn't occur without the hydrosphere's rivers, lakes, and ocean or the atmosphere's winds and precipitation.

Mechanical Weathering

This is the physical break up or disintegration of rocks.

Ex: Rocks rolling down a slope or fast moving stream rub and bump against each other.

Climate change can also cause mechanical weathering. During the freeze thaw period we get Frost wedging. (warm in day but temps drop below freezing at night) water seeps into the rocks freezes and expands. This causes cracks and eventually the rocks break apart.

Frost Wedging: Water seeps into rocks and freezes then expands cause rocks to break.

Erosion is another form of mechanical weathering. Erosion is the process of moving soil and rocks from one place to another (wind/water)

Hydrosphere

Hydro means “water.” The hydrosphere includes the oceans, rivers, lakes, groundwater, and water frozen in glaciers.

97.5% of water on Earth is found in the oceans (Salt water- cannot drink)

2.5% being fresh water.

FRESH WATER in The World

1st- Most is from glaciers & polar ice caps

2nd trapped underground

3rd liquid form on the surface as lakes and rivers

4th found in the atmosphere

Water is one of the most important substances needed for life and makes up about 90% of living things. Without water, life would not be possible.

One important source of fresh water that is often overlooked is rainwater. Rainwater is the product of **water from the Earth that has been evaporated into the Earth's atmosphere and is turned into rain (Fresh)**

Brazil has the highest volume of renewable fresh water resources

The volume of renewable fresh water in Canada is approximately 2,902 cubic kilometer. **Most of Canada's fresh water is found in its diverse river system and lakes.**

Evaporation- the process of turning from liquid into vapor using heat

Condensation is the process where water vapor becomes liquid. (Cooling)

Transpiration is the evaporation of water from plants.

Sublimation- is the conversion of a substance from the solid to the gaseous state without its becoming liquid

Deposition- is a change from gaseous state into a solid state without passing through a liquid phase (cooling quick)

Infiltration is the downward movement of water into the top layer of soil

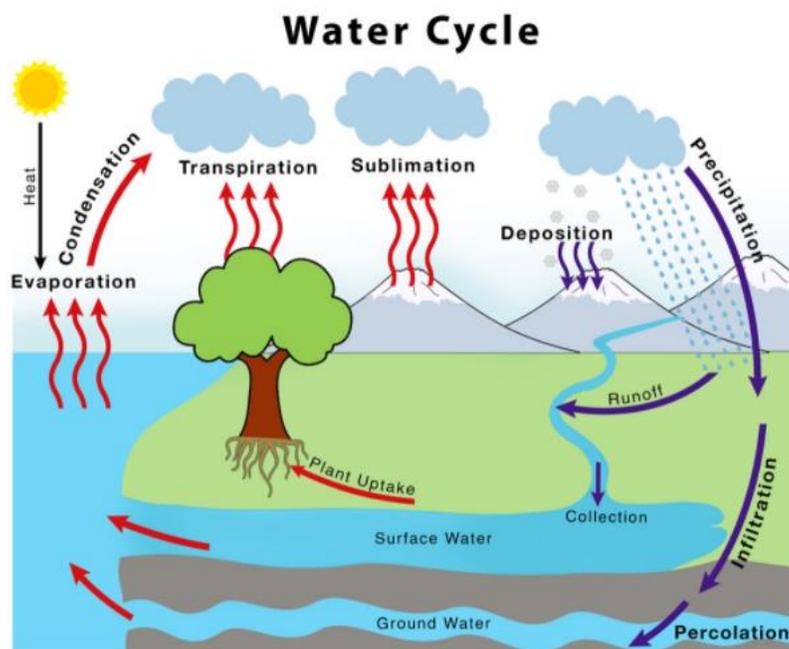
Percolation is the downward movement of water through lower soil layers due to gravity and gaps in soil

Runoff is the excess water that flows over the land surface instead of being absorbed into groundwater or evaporating.

Groundwater is water that occurs below the surface of Earth

Surface water is any body of water above ground, including streams, rivers, lakes, wetlands, reservoirs, and creeks

Plant uptake- are the roots that gather the water and nutrients from the soil



Gravity causes precipitation to fall from clouds and water to flow downward on the land through watersheds. Energy from the sun and the force of gravity drive the continual cycling of water among these reservoirs. As the water is heated, it changes state from a liquid to a gas.

The Ocean

The ocean is never still. You can see it moving in the waves that crash ashore. On the open water, sailors witness broad, slow-flowing "rivers" at the ocean's surface. These movements carry enormous amount of water over hundreds of kilometers from one part of the ocean to another. Huge masses of cold water creep along the ocean floor then rise from the depths to the surface.

Ocean **waves** are just large ripples, set in motion by steady winds.

Even on a calm day, there is usually a steady movement of smooth waves near the shore. These smooth waves are called **swells**.

Tsunami - a long high sea wave caused by an earthquake, underwater landslide, or other disturbance

Hawaii is the location that experiences the most Tsunamis since it is surrounded by the ring of fire.

The measure of the amount of salts dissolved in a liquid is known as **salinity**.

Atmosphere-

The atmosphere includes all the gases surrounding the Earth. We often call the atmosphere "air." All planets have an atmosphere

Even though it seems like air is made of nothing, it consists of particles too small to be seen. All these particles have weight that push down on Earth. The weight of air above us is called air pressure.

Layers of the Atmosphere

The earth is surrounded by the atmosphere, which protects us from radiation from the sun, falling meteors and toxic gases. It consists of 5 layers:

- 1) **Troposphere-** starts at the Earth's surface and extends 12 kilometers high. It is the most dense. Almost all weather is in this region and our oxygen that is needed to breathe is found here.
- 2) **Stratosphere** - starts just above the troposphere and extends to 50 kilometers high. The ozone layer, which absorbs and scatters the solar ultraviolet radiation, is in this layer. Ozone layer is getting thinner due to pollution. Airplanes fly in this layer to avoid turbulence.
- 3) **Mesosphere** - starts just above the stratosphere and extends to 80 kilometers high. Meteors burn up in this layer. Coldest layer.
- 4) **Thermosphere-** starts just above the mesosphere and extends to 320 kilometers high. Northern lights and satellites occur in this layer. Warmest layer
- 5) **Exosphere-** upper limit of our atmosphere. It extends from the top of the thermosphere up to 10,000 km. Hydrogen and helium found there and the air is very thin.

Atmospheric Flow- is how air moves around our planet

Atmospheric pressure changes at different altitudes. Pressure is greatest at sea level and decreases with height.

Air is heaviest at sea level because the air molecules are compressed by the weight of the air above them.

Air becomes lighter farther away from Earth's surface as the air molecules become separated by more space

Water in the air

Nearly all of the water is located in the lowest layer of the atmosphere, the troposphere. Clouds form preferentially over dark vegetation and just downwind of mountain ranges.

Water and Solar Energy

Water vapor is a clear, colorless gas. It does not absorb visible light so it is unaffected by most of the solar radiation in the troposphere. However, water vapor is a greenhouse gas. It absorbs heat energy from the Earth.

Clouds and fog are not gas-phase water. These consist of particles of liquid and solid water that reflect approximately 20 percent of the incoming solar radiation in the troposphere. This makes the atmosphere and the Earth's surface cooler than it would be otherwise.

Albedo is the amount of solar radiation that is reflected by some surface.

- It can be calculated and represented with a decimal with 1 being a perfect reflector and 0 absorbing all incoming light
- It can also be calculated as a percent

Humidity is the concentration of water in the gas phase that is present in air.

The dew point is the temperature to which the air must be cooled before water condenses from it.

Bio means "life." The biosphere is made up of all the living things on Earth and it includes fish, birds, plants, and even people.

biome - a group of terrestrial communities that covers a large area and is characterized by certain soil and climate conditions and particular plants and animals

Five Major Types of Biomes

Aquatic
Deserts
Forests
Grasslands
Tundra

biosphere - contains all living things on portions of earth & the combined, including land, water, and air, or atmosphere.

Types of trees

Deciduous = the dropping of a part that is no longer needed, in this case leaves

Coniferous = bearing pinecones, most of which are evergreen

Evergreen = retaining leaves year round, therefore remaining “forever green”

Broadleaf = a thin, broad leaf structure with a good deal of surface area

Needle = a thin, long modified leaf typical of conifers

Hardwood = another commonly used word for deciduous, broadleaf trees

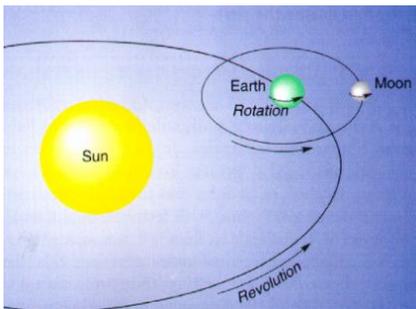
Softwood = usually refers to coniferous trees

An ecosystem is made up of all of the living and nonliving things in an area.

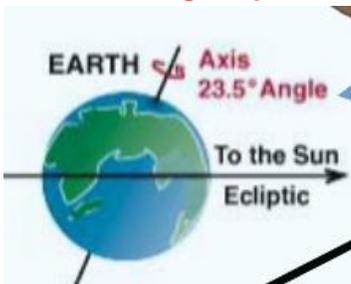
Biotic (living) factors include: Plants & Animals

Abiotic (nonliving) factors include: Air, Water, Soil, Rocks, Light , Temperature, Climate

Revolution-The movement of an object around another. Earth goes around the sun counter clockwise.
Earth takes 1 year=365 days



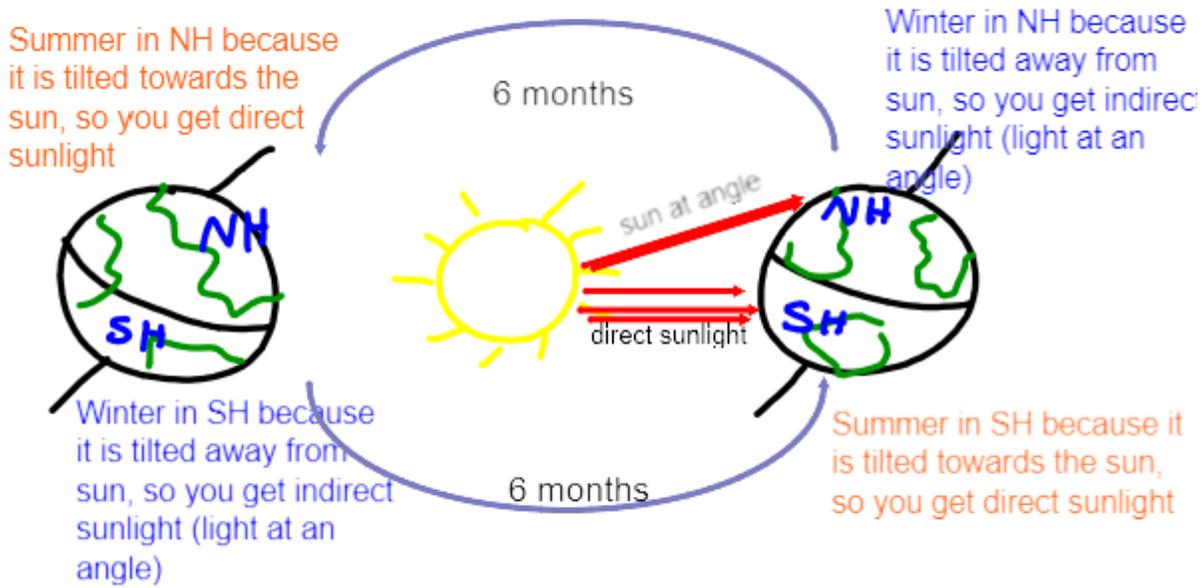
Axis- An imaginary line from the north pole to the south pole. Earth's axis is tilted 23.5 degrees



Rotation- the movement of an object around its axis (Spinning on the stick)

Earth rotates Counter clockwise--> It take 24 hours for 1 rotation

Cycles of Earth



The Revolution of the Earth and the tilt of the Earth both cause the Earth to have Seasons.

Rotation is the Reason for Day & Night



As the Earth spins, the side facing the sun is in the daylight.
The side away from the sun is night.