ECOLOGY NOTES

ECOLOGY

• ________________ - the scientific study of interactions among organisms and between organisms and their environment or surroundings.

LEVELS OF ORGANIZATION

• ________________ - a group of organisms so similar to one another that they can breed and produce fertile offspring.
• ________________ - groups of individuals that belong to the same species and live in the same area.
• ________________ - assemblies of different populations that live together in a different area.
• ________________ - a collection of all the organisms that live in a particular place together with their nonliving or physical environments.
• ________________ - a group of ecosystems that have the same climate and similar dominant communities.
• ________________ - combined portions of the planet in which all life exists.
  ○ This is the ________________ level of organization.
  ○ Includes ____________, ____________, and ________________________________

PRODUCERS

• Without a constant source of ________________, living systems cannot function.
  ○ ________________ is the main energy source for life on Earth.
  ○ Some organisms obtain energy stored in ________________________________
    ________________________________.
    ▪ Ex: mineral water flowing underground
• ________________ - capture energy from sunlight or chemicals and use it to produce their own food.
  ○ Ex: plants, some algae, some bacteria.
Because they make their own food, autotrophs are referred to as _______________.

There are 2 types of producers, those that capture energy from ____________, and those that use ________________________________.

- __________________________ - a process where autotrophs use light energy to power chemical reactions that convert carbon dioxide and water into oxygen and energy-rich carbohydrates, such as sugars and starches.
  - Land- __________
  - Water- __________
  - Wet ecosystems- __________________________

- __________________________ - the process where organisms use chemical energy to produce carbohydrates.
  - ________________________________
  - ________________________________

CONSUMERS

- __________________________ - organisms that rely on other organisms for their energy and food supply.
  (Also known as _______________.)
  - ________________ - plant eaters
  - ________________ - eat animals/meat
  - ________________ - eat both plants and animals
  - ________________ - feed on plant and animal remains or dead matter, known as detritus
  - ________________ - break down organic matter

FEEDING RELATIONSHIPS

- Energy flows through an ecosystem in ________ direction, from the sun or inorganic compounds, to autotrophs (producers), and then to heterotrophs (consumers).
• ________________- a series of steps in which organisms transfer energy by eating and being eaten.

• ________________- links all the food chains in an ecosystem together.

• ________________- each step in a food chain or food web.
  ○ ________________ make up the first trophic level.
  ○ ________________ make up the second, etc. Each consumer depends on the trophic level below it for energy.

**ECOLOGICAL PYRAMIDS**

• ________________- diagram that shows the relative amounts of energy or matter contained within each trophic level in a good chain or food web.
  ○ ________________
  ○ ________________
  ○ ________________
• **Pyramids**- Only about ______ of the energy available within one trophic level is transferred to organisms in the next trophic level.

• **Pyramids**- The total amount of living tissue within a given trophic level is called ____________.
  
  o Typically expressed as grams of organic matter per unit area.
  
  o The biomass pyramid represents the amount of potential food available for each trophic level in an ecosystem.

• **Pyramid of___________**- Based on the number of individual organisms at each trophic level.
  
  o For some ecosystems, the shape of the pyramid of numbers is the same as that of the energy and biomass pyramids, but some are different.

**BIOGEOCHEMICAL CYCLES**

• In most organisms, ______ of the body is made up of 4 elements: ____________, ____________, ____________, ____________, and ____________.

• ________________________________ - the process by which elements, chemical compounds, and other forms of matter are passed from one organism to another and from one part of the biosphere to another.

• **Nutrients**- ________________________________

  o Nutrients are needed to build tissues and carry out essential life functions. They are the body's chemical __________________________.
NUTRIENT LIMITATION

- **Primary Productivity** - Controlled by the amount of ____________.

- ____________ - a nutrient that is scarce or cycles slowly.

THE ROLE OF CLIMATE

- ____________ - the day-to-day condition of Earth’s atmosphere at a particular time and place.

- ____________ - the average, year-after-year conditions of temperature and precipitation in a particular region.

LATITUDE AND CLIMATE

- Earth has 3 main climate zones
  - ____________ Zones - cold areas where the sun’s rays strike Earth at a very low angle (located near North and South poles)
  - ____________ Zones - sit between the polar zones and tropics (climates in these zones range from hot to cold, depending on the season)
  - ____________ Zones - near the equator (receive direct or nearly direct sunlight year-round making the climate almost always warm)

HEAT TRANSPORT

- The unequal heating of Earth’s surface drives ____________ and ____________, which transport heat throughout the biosphere.

BIOTIC AND ABIOTIC FACTORS

- ____________ - the area where an organism lives.

- ____________ - biological influences on organisms in an ecosystem.
  - Examples: ________________________________
• __________________________ - physical or nonliving factors that shape ecosystems.
  o Examples: ____________________________
  o Together, biotic and abiotic factors determine the __________ and __________ of an organism.

THE NICHE
• ______________________ - the physical and biological conditions in which an organism lives and the way the organism functions under those conditions.
  o Includes: what the organism __________, how it obtains food, what other organism eat it, physical condition needed for survival, when and how it ________________, etc.
• Competitive Exclusion Principle- ______________________________
  __________________________________________________________
  __________________________________________________________

COMMUNITY INTERACTIONS
• __________________________ - organisms of the same or different species attempt to use an ecological resource in the same place at the same time.
• __________________________ - an interaction in which one organism feeds on another organism.
• ________________- any relationship in which two species live closely together.
  o ________________- both species benefit from the relationship.
  o ________________- one member of the association benefits and the other is neither helped nor harmed.
  o ________________- one organism lives on or inside another organism (host) and harms it.

ECOLOGICAL SUCCESSION
• ______________________________- series of predictable changes that occurs in an ecosystem over time.
  o ________________ Succession- occurs on surfaces where no soil exists.
  o ________________ Succession- community interactions restore the ecosystem to its original conditions.

CHARACTERISTICS OF POPULATIONS
• _______________________________ - the area inhabited by a population.
• _______________________________ - the number of individuals per unit area.

POPULATIONS GROWTH
• 3 factors affect population size:
  o ________________________________
  o ________________________________
  o ________________________________
• the movement of individuals into an area. (increase population)
• the movement of individuals out of an area. (decrease population)

EXPERIMENTAL GROWTH
• Occurs when the individuals in a population reproduce at a constant rate.
• Under ideal conditions with unlimited resources, a population will grow exponentially.
• Produces a exponential growth.

LOGISTIC GROWTH
• As resources become less available, the growth of a population slows or stops.
• Logistic growth follows a period of exponential growth.
• Produces a logistic growth.
• Carrying Capacity- become limiting only when the population density reaches a certain level.
  • Ex: }

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- affect all populations in similar ways, regardless of population size.
  - Ex: ________________________________

HUMAN POPULATION GROWTH
- The size of human population tends to ______________ with time.
- ___________________- the scientific study of human populations.

PATTERNS OF POPULATION GROWTH
- ___________________- a dramatic change in birth and death rates.
- ___________________- population profile
  - Shows the population of a country broken down by gender and age group.

Age Structure Diagrams
BIODIVERSITY

- **Biodiversity**
  
  - Ecosystem Diversity
  - Species Diversity
  - Genetic Diversity

THREATS TO BIODIVERSITY

- Human activity can reduce biodiversity by:
  
  - __________________________
  - __________________________
  - __________________________
  - __________________________
  - __________________________

BIOLOGICAL MAGNIFICATION

- ____________________________
  
  concentrations of a harmful substance increase in organisms at higher trophic levels in a food chain/web.

INTRODUCED SPECIES

- **Invasive Species** - plants and animals that have migrated to places where they are not native.
  
  - ____________________________
  - ____________________________
  - ____________________________
  - ____________________________

CONSERVING BIODIVERSITY

- **Conservation**
  
  - ____________________________
THE OZONE LAYER

- **Ozone Layer** - layer of atmosphere with a high concentration of ozone gas (______).
  - Absorbs harmful UV radiation before it reaches Earth. (global sunscreen)
  - Gases called CFC’s (____________________________________________________) damage the ozone layer.

GLOBAL CLIMATE CHANGE

- **Global Warming** - __________________________________________________________________________
  - **Evidence**: melting of polar ice caps.
  - **Question**: is the current warming trend part of a natural cycle of climate change, or due to human activities?
  - **Prediction**: increased CO$_2$ levels are causing increase in temperature.
  - **Problems**: melting ice caps may cause sea levels to rise, flooding coastal areas and affecting nearby ecosystems and human communities. Warmer temperatures may cause drought that affects growing seasons in many areas.