# BIOLOGY NOTES

## Ecology #3: Human Impact on Ecosystems- Conservation

*For studying purposes or additional information, most of the following content can be found in…*

- **Biology Book = Chapter 7**

### Section 1: Human Population Growth and Natural Resources

o Earth's human carrying capacity is __unknown__

o The carrying capacity of an environment….

  **can change as the environment changes.**

  - Modified Environments that have increased Earth's Carrying Capacity.

    - Agriculture
    - Transportation
    - Medical Advances
    - Sanitation

    We talked about how each of these have helped to increase Earth's carrying capacity… as well as how they are all related / how they impact each other.

  - The growing population exerts __pressure__ on Earth's __natural resources__.

  - Most used natural resources for energy =

    - Oil
    - Coal

    Both are nonrenewable

    o Nonrenewable resources: Used faster than than they form.

  - Renewable resources:

    Cannot be used up or can replenish themselves over time.

    - Examples: Wind, Solar & Hydro

    - Renewable resources can become…….. "nonrenewable" resources if not used carefully.

      o Example = Water… due to pollution.

- Ecological Footprint: The amount of land needed to support a person.

  - The land must produce and maintain enough
    - food & water
    - shelter
    - energy
    - waste

**Average Ecological Footprint by Region:**
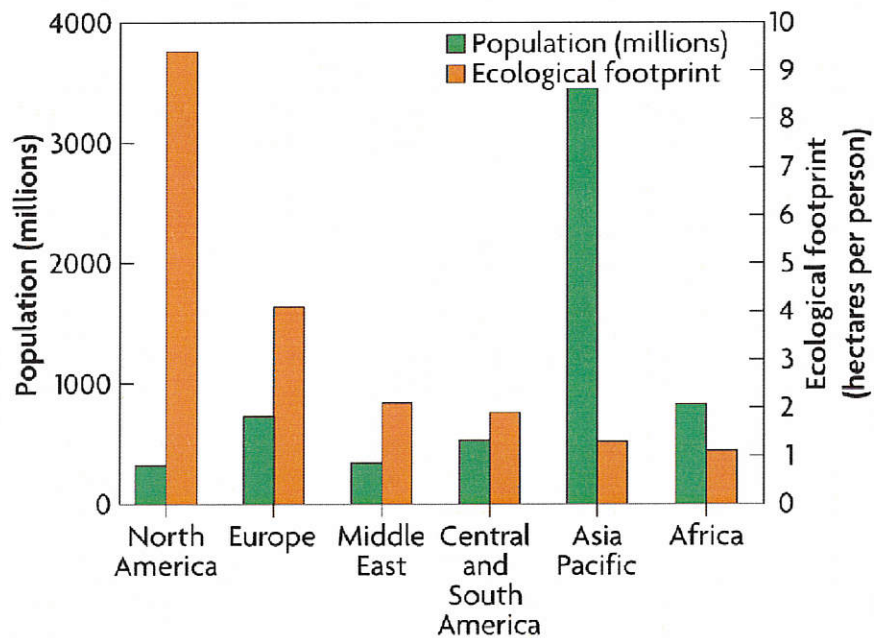


- Factors that affect the size of an ecological footprint:

  - Amount & efficiency of resource used.

  - Amount & toxicity of waste produced.

## Connect and Analyze:

1. Explain how a renewable resource such as water could become a nonrenewable resource?

2. Why is our ecological footprint related to an area of land?

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- Pollutants accumulate in the air.
  - Pollution: Any undesirable factor added to the air, water or soil.

    - Smog: Is one type of air pollution.
      - _Sunlight_ interacts with pollutants in the air.
        - Define Particulates: Microscopic bits of dust, metal & unburned fuel that are suspended in the air
      - Pollutants produced by _fossil fuel emissions_.
      - Made of _particulates_ and _ground-level ozone_.

    - Smog can be harmful to human health:
      - Particulates can be inhaled.
      - Ground level ozone is also harmful to humans & to other ecosystem functions.

  - Acid rain is caused by _fossil fuel emissions_.

    - Produced when pollutants in the water cycle cause: rain pH to drop.
      - Can lower the pH of a lake or stream.
      - Can harm trees.

  - Air pollution is changing Earth's _biosphere_.
    - The levels of atmospheric carbon dioxide rise and fall over time.
    - High levels of carbon dioxide Earth's = _warmer periods_.
    - Low levels = Cooler periods = (Ice Age)

  - The Greenhouse Effect:
    - Occurs when carbon dioxide, water and methane molecules absorb energy reradiated by Earth's surface and.... Slows the release of this energy from Earth's atmosphere.

- Global Warming:

  *Refers to the trend of increasing global temperatures.*

  - Over the past 100 years = *Earth's average temp. has increased by 0.6°C or 1.2°F*

  - Most dramatic increase in the last __*40 years*__.
    - Caused by:
      - *Increased levels of Greenhouse gases = Water Vapor ($H_2O$) Carbon dioxide ($CO_2$) + Methane ($CH_4$)*
        - *Industry*
        - *Automobiles*

  - Problems caused by Global Warming:
    - Ecological disasters....

      *Increased Flooding*
      *Stronger Tropical Storms* } *Cause Loss of Biodiversity*

**Synthesize and Connect:**

1. As the human population continues to increase and use more fossil fuels, why might acid rain become a bigger problem?

2. How might global warming affect seasonal temperature changes?

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# Water Quality

- Water pollution affects our ecosystems: *Types of Pollutants :*
    - *Chemicals*
    - *Raw Sewage*
    - *Trash*
    - *Other waste products*

- Define Eutrophication:
  *A choking of rivers, lakes and other waterways by excessive algae growth which has been stimulated by fertilizers or sewage.*

- Indicator Species:
    - AKA = *Bioindicator*
    - *Provides a sign or "indication" of an ecosystem's health.*
        - Example: *Frogs*
            - *Aquatic* indicator species show the *direct effects* of pollution.
        - Example: *Forster's tern is an indicator species for the San Francisco Bay.*

- Biomagnification:
    - Causes accumulation of..... *toxins in the food chain.*
    - Pollutant *moves up the food chain* as predators eat prey.
    - Accumulating in *higher* in the bodies of predators.

**Apply and Compare:**

1. If the population of an indicator species is increasing, what might you infer about the conditions of the ecosystem?

2. Why would tertiary consumers have higher concentrations of toxins than primary consumers?

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**Threats to Biodiversity**

- Preserving biodiversity is important

  - Loss of biodiversity has long-term effects

    - Loss of medical + technological advances.

    - Extinction of species.

    - Loss of ecosystem stability.

- Loss of habitat __eliminates__ species.

  - Habitat fragmentation prevents an organism from __accessing its entire__ home range.

    - Occurs when a __barrier forms__ forms within the habitat

    - Often caused by __human development__

  - Habitat __corridors__ are a solution to the problem.

- Introduced species can disrupt stable relationships in an ecosystem.

  - Introduced species.

    One that is brought to an ecosystem by humans

    Can be { - Accidental

    { - Purposeful

    - Invasive Species:

      Can have an environmental + economic impact.
      " Usually a _Negative_ Impact "

      - Invasive species often push out native species.

        - Examples:

          - Burmese Python = Florida Everglades

          - Kudzu = Southeastern United States

          - Mice = Australia

          ★ Bullfrogs = Arizona

**Connect and Predict:**

- **Why is wetland habitats important for migrating birds?**

- **How might a species of carnivorous fish introduced into a lake have a negative impact on the lake ecosystem?**

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## Conservation

- Sustainable development:
  - Is a practice in which __natural resources__ are used and managed in a way that meets the current needs without hurting __future generations__.
  - Example – __Global Fisheries__
    - Overfishing has depleted fish populations worldwide.
    - Fish stock are not as hardy as they once were.
    - When fish of reproducing age are removed from the population, it actually hurts the fishing industry.
      - Techniques that fisheries can adopt to make the industry sustainable:
        - Rotation
          - Rotating between different species gives the "off" species time to recover.
        - __Fishing Gear__ Review
          - Reviewing and possibly banning certain fishing gear could help avoid damaging the sea floor and prevent ecologically important organisms from being killed.

- o   **_Harvest Reduction_**:
    - Slowing the harvest of deep-water species that grow very slowly allows them more time to recover their populations.
- o   **_Fishing Bans_**:
    - Creating and enforcing fishing bans in certain areas help to replenish populations within that area, which may lea to greater fish numbers in nearby locations.


- Umbrella species:
    - o   When a single species within an ecosystem is places on a list of **_endangered species_**, many other species within the ecosystem benefit.
    - o   The listed species is often called an **_umbrella species_**.