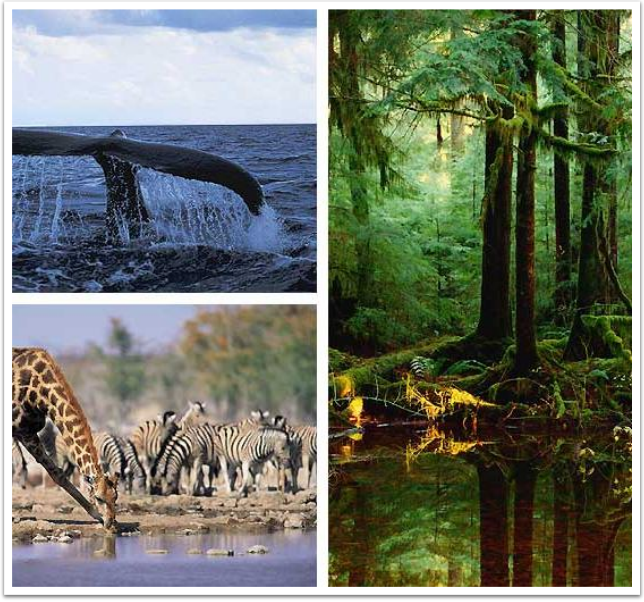
Chapter 1 Introduction

- Definition
- Differences among Ecological and Environmental Studies
- Why Studying Ecology and Environmental Science
- Levels of Studying Ecology



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What is

Ecology ?

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Ecology is:

A science – and as such is concerned with:

- Attempting to describe and explain as objectively as possible patterns and processes that occur in the physical world
- Also attempts to make predictions about future events based on past history and current circumstances

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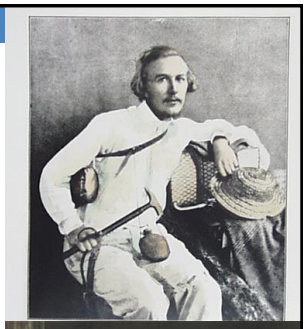
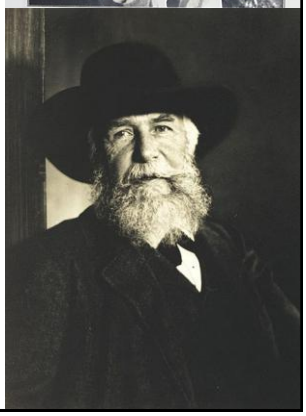
Overview of Ecology

- **Ernst Haeckel,** The Founders of the term "ECOLOGY" was the German zoologist, in 1866
  - Haeckel – 1870 – "By ecology we mean the body of knowledge concerning the economy of nature – the investigation of the total relations of the animal both to its inorganic and organic environment"





Ernst Haeckel

Ecology

- Ecology (from the Greek *oikos*, home, and *logos*, study)
- Ecology is the scientific study of the interactions between organisms and the environment
  - Interactions determine both the distribution of organisms and their abundance
  - Ecological interactions occur at a hierarchy of scales that ecologists study, from **single organisms to the globe**

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Levels (subfields) of Ecology:

1. **Organismal ecology**: Studies how an organism's structure, physiology, and (for animals) behavior meet the challenges posed by the environment.
2. **Population ecology**: Concentrates mainly on factors that affect how many individuals of a particular species live in an area
3. **Community ecology**: Deals with the whole array of interacting species in a community
4. **Ecosystem ecology**: Emphasizes energy flow and chemical cycling among the various biotic and abiotic components
5. **Large scale ecology:**
   - **Lanndscape ecology**: Deals with arrays of ecosystems and how they are arranged in a geographic region
   - **Biomes**
   - **Global Ecology (The biosphere)**: is the global ecosystem, the sum of all the planet's ecosystems.

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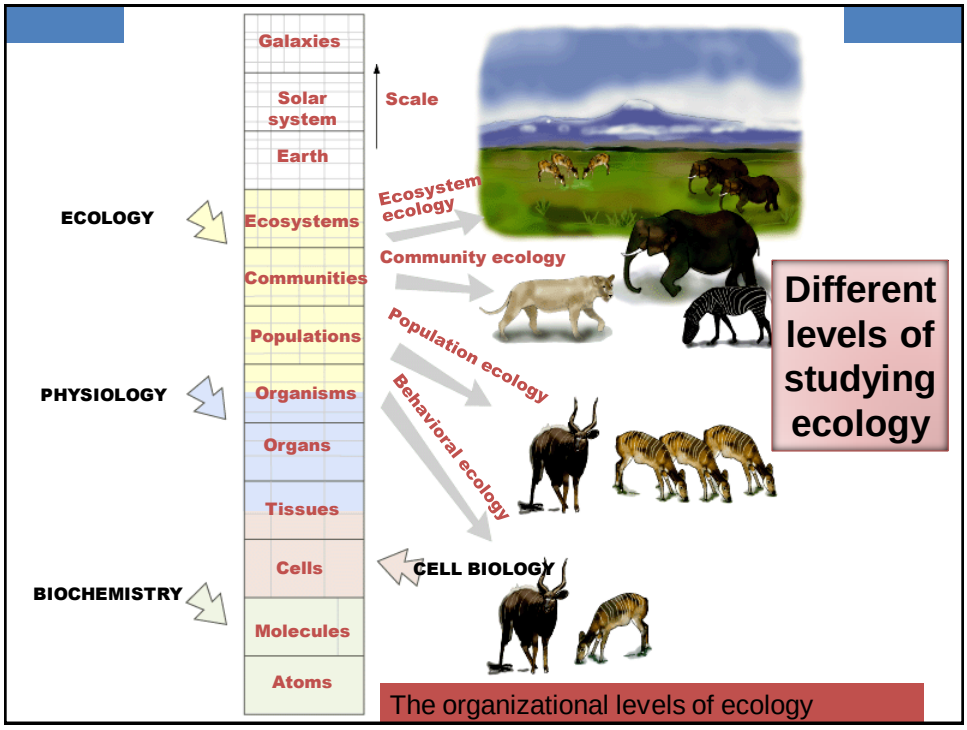
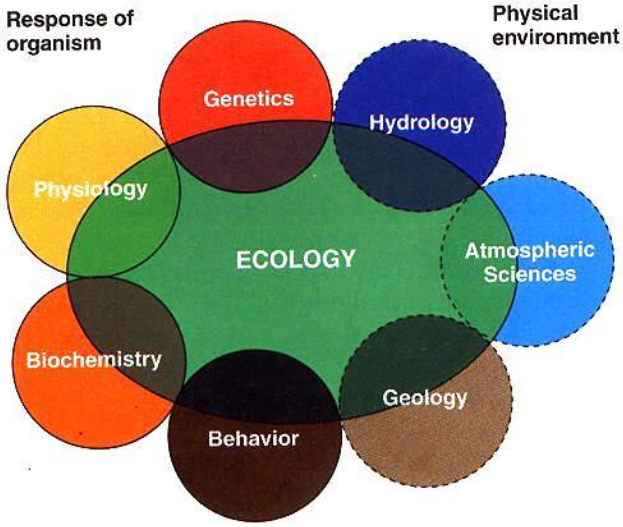


Ecology is an interdisciplinary science



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What is Environmental Science?

- Environment (from the French *environner*: to encircle or surround) can be defined as

  (1) the circumstances or conditions that surround an organism or group of organisms,

  or

  (2) the complex of social or cultural conditions that affect an individual or community
- Environmental science is a group of sciences that attempt to explain how life on the Earth is sustained, what leads to environmental problems, and how these problems can be solved

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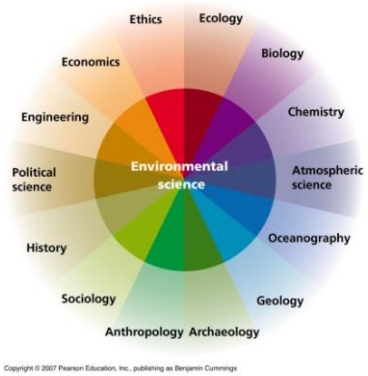
Human Environment: the total of our surroundings



- All the things around us with which we interact:

1. **Abiotic components**: nonliving chemical and physical factors such as temperature, light, water, and nutrients.
2. **Biotic components**: all living organisms in the individual's environment.
3. **Our built environment**: Buildings, human-created living centers
4. **Social relationships and institutions**

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Major themes of Environmental science

1. **Human Population**:
   - underlying nearly all environmental problems is the rapidly increasing human population
2. **Sustainability**:
   - Speaking generally, it means that a resource is used in such a way that it continues to be available
   - Sustainability is a term that has gained popularity recently
3. **A Global Perspective**:
   - An emerging science known as Earth System Science seeks a basic understanding of how our planet's environment works as a global system to help solving global environmental problems.

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Major themes of Environmental science

4. **The Urban World**:
   - Focus on towns and cities as livable environments, since growing number of people are living in urban areas
5. **People and Nature**:
   - People seem to be always interested in environment. How can we keep it that way?
6. **Science and Values**:
   - To solve our environmental problems, we must understand what our values are and which potential solutions are socially just. Then we can apply scientific knowledge about specific problems and find acceptable solutions.

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Humans and the world around us

- Humans change the environment, often in ways not fully understood
- We depend completely on the environment for survival
  - Increased wealth, health, mobility, leisure time
  - But, natural systems have been degraded
    - i.e., pollution, erosion and species extinction
  - Environmental changes threaten long-term health and survival
- Environmental science is the study of:
  - How the natural world works
  - How the environment affects humans and vice versa

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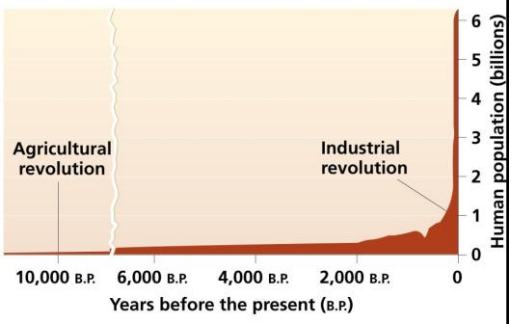
Global Human Population Growth

- More than 7 billion humans
- Why so many humans?
  - Industrial revolution
    - Urbanized society powered by fossil fuels
  - Agricultural revolution
    - Stable food supplies
    - More food
  - Sanitation and medicines
  - Transportation and communication



(a) World population growth

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Natural resources: vital to human survival

- **Natural resources =** substances and energy sources needed for survival

Renewable natural resources

- Sunlight
- Wind energy
- Wave energy
- Geothermal energy

- Agricultural crops
- Fresh water
- Forest products
- Soils

Nonrenewable natural resources

- Crude oil
- Natural gas
- Coal
- Copper, aluminum, and other metals

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It is important to clarify the difference between Ecology and Environmental Science

- Ecology, is the scientific study of the distribution and abundance of organisms, while environmentalism, advocacy for the protection or preservation of the natural environment.
- To address environmental problems, we need to understand the interactions of organisms and the environment where.
  - The science of ecology provides that understanding.
  - Ecology provides a scientific context for evaluating environmental issues

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Why is studying ecology / Environment important?

The lesson of Easter Island (Chile): people annihilated (destroyed) their culture by destroying their environment.

- Easter Island, also called ***Rapa Nui***, was annexed by Chile in 1888.
- Easter Island is small, but its story is a dark one that suggests what can happen when people use up the resources of an isolated area.
- New data suggest that people first arrived about 800 years ago, certainly played a role in the loss of trees (Deforestation), and the rats that arrived with the Polynesians were evidently responsible for eating seeds of the palm trees, preventing regeneration.

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Easter Island

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Ecology and/or Environmental science

- It can help us avoid mistakes made by past civilizations.
- Act more wisely to conserve our resources
- What else???
  - ----------
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Why studying Environmental Science

Environmental Science: The scientific study of the influence of human actions on natural processes

1. Environmental science helps us understand our relationship with the environment and informs our attempts to solve and prevent problems.
2. Identifying a problem is the first step in solving it
3. Solving environmental problems can move us towards health, longevity, peace and prosperity
4. Environmental science can help us find balanced solutions to environmental problems

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