

Earth Systems Science

- For over three hundred years the Earth has been studied in parts – the solid earth, the atmosphere, oceans, and its location in space.
- Recently, the Earth is being studied on how all of the parts interact.
- Along with that, man's activities, both positive and negative, have been included to further our understanding and the impact to man's reactions. One example is use and banning of chlorofluorocarbons, CFCs.



- In the study the Earth, large amounts of data is collected and used to create models to help explain unseen details.
- A **model** is a representation of an object, a process, or phenomenon.
- For an example, before an airplane is built a model is made to show physical features and to test it before it is built.
- A **system** is a kind of a model. A system can be defined as a part of the universe that can be studied separately.
- A **closed system** exchanges only energy with its surroundings, self contained. Example: an automobile cooling system.
- An **open system** exchanges both energy and matter to flow in and out of the system. Example: a river system.
- Question, what type of system is the Earth?

Earth as a System

- Earth is a dynamic body with many separate but highly interacting parts.
- Earth system science studies Earth as a system that is composed of numerous parts, or subsystems.

Sources of Energy

- Sun - drives external processes such as weather, ocean circulation and erosional processes.
- Earth's interior - drives internal processes including volcanoes, earthquakes and mountain building.



People and the Environment

Environment

- Surrounds and influences organisms.
- Physical environment encompasses water, air, soil, and rock.
- The term *environmental* is usually reserved for those aspects that focus on the relationships between people and the natural environment.

Resources

Include water, soil, minerals, and energy.

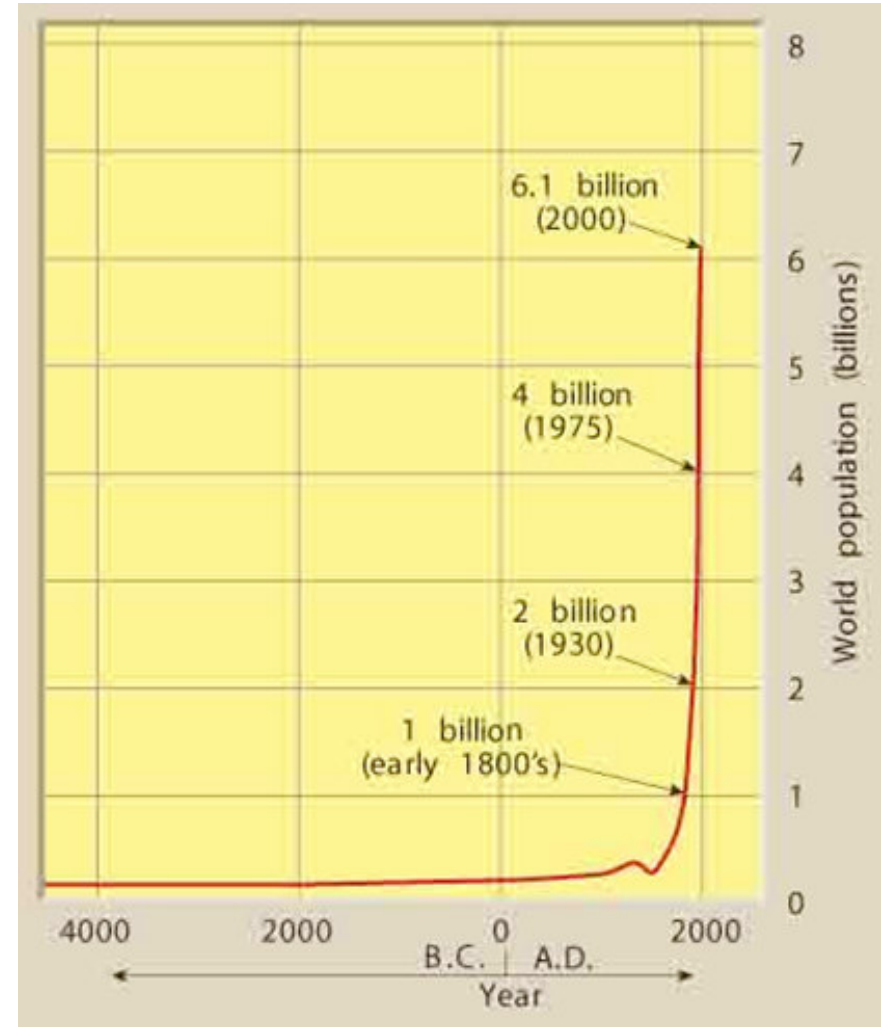
Two categories:

1. **Renewable** - can be replenished (e.g., plants, energy from water and wind, solar).
2. **Nonrenewable** - cannot be replenished in the near future (e.g., metals, fossil fuels, nuclear energy).

People and the Environment

Population

- Population of the planet is growing rapidly.
- Use of minerals/energy has climbed more rapidly than the overall growth of population.



Environmental Problems

- Local, regional, and global.
- Caused by people and societies.
- Urban air pollution and water pollution.
- Acid rain.
- Ozone depletion.
- Global warming.



Caused by natural hazards

- Earthquakes
- Landslides

