

Natural Resources

Framework Text

Earth and Human Activity

How do Earth's surface processes and human activities affect each other?

Earth's surface processes affect and are affected by human activities. Humans depend on all of the planet's systems for a variety of resources, some of which are renewable or replaceable and some of which are not. Natural hazards and other geological events can significantly alter human populations and activities. Human activities, in turn, can contribute to the frequency and intensity of some natural hazards. Indeed, humans have become one of the most significant agents of change in Earth's surface systems. In particular, it has been shown that climate change—which could have large consequences for all of Earth's surface systems, including the biosphere—is driven not only by natural effects but also by human activities. Sustaining the biosphere will require detailed knowledge and modeling of the factors that affect climate, coupled with the responsible management of natural resources.

Natural Resources

How do humans depend on Earth's resources?

Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources, including air, water, soil, minerals, metals, energy, plants, and animals. Some of these resources are renewable over human lifetimes, and some are nonrenewable (mineral resources and fossil fuels) or irreplaceable if lost (extinct species).

Materials important to modern technological societies are not uniformly distributed across the planet (e.g., oil in the Middle East, gold in California). Most elements exist in Earth's crust at concentrations too low to be extracted, but in some locations—where geological processes have concentrated them—extraction is economically viable. Historically, humans have populated regions that are climatically, hydrologically, and geologically advantageous for freshwater availability, food production via agriculture, commerce, and other aspects of civilization. Resource availability affects geopolitical relationships and can limit development. As the global human population increases and people's demands for better living conditions increase, resources considered readily available in the past, such as land for agriculture or drinkable water, are becoming scarcer and more valued.

All forms of resource extraction and land use have associated economic, social, environmental, and geopolitical costs and risks, as well as benefits. New technologies and regulations can change the balance of these factors—for example, scientific modeling of the long-term environmental impacts of resource use can help identify potential problems and suggest desirable changes in the patterns of use. Much energy production today comes from nonrenewable sources, such as coal and oil. However, advances in related science and technology are reducing the cost of energy from renewable resources, such as sunlight, and some regulations are favoring their use. As a result, future energy supplies are likely to come from a much wider range of sources.

Main Concepts (You MUST cover at least five of these in your game)

- Natural resources include water, running water, plants, animals, soil, rocks, minerals, oil, gas, air, wind, sunlight.
- Some resources are renewable (replaced within a human lifetime; e.g., plants and animals; sunlight, wind), some are nonrenewable and exhaustible (can be used up for good; not replaced over a human timescale; e.g., fossil fuels); some are non-renewable, but are inexhaustible (cannot truly be used up, e.g., water, rocks and minerals).
- Renewable resources are replenished by natural processes.
- Everything that we use, all human-made products and synthetic materials, as well as natural products and materials, come from raw or processed natural resources.
- Natural resources are used for food, water, building materials, clothing, heat, electricity, transportation, healthcare, etc.
- Natural resources are not distributed evenly over Earth's surface. Some regions have more or less of certain resources than other regions.
- The distribution of natural resources depends on factors like current and past climate (plants, animals, wind, sunlight, water); geologic history (rocks minerals, oil and gas, groundwater); and history of human use (mining, deforestation).
- Specific examples of ore rocks and minerals, how they form, where they are found, what they are used for, how they are replenished (e.g., iron, lead, zinc, copper, aluminum, uranium, salt, sulfur, diamond, oil, gas, coal, etc.).
- Geologic processes that are important in natural resource formation and replenishment include processes of the water cycle, plate tectonics, rock cycle (weathering, erosion, sedimentation, burial, volcanism, uplift); life cycles of living things.