

Q. Classification of Natural Resources.

Definition:

A natural resource is any material, substance, or energy source found in nature that is useful to humans, can be transformed to create wealth, and is obtained from the Earth.

The study of natural resources involves understanding their origin, distribution, utilization, and, most importantly, their management for sustainable development.

2. Basis of Classification

Natural resources can be classified based on several criteria. The most common and fundamental classifications are:

- i) Based on Origin
- ii) Based on Exhaustibility / Rate of Regeneration
- iii) Based on Stage of Development
- iv) Based on Distribution / Availability

Let's explore each of these in detail.

3. Classification Based on Origin

This classification divides resources based on their source in the ecosystem.

A. Biotic Resources

Origin: Obtained from the biosphere (living and organic material).

Characteristics: They have life or are derived from living organisms.

Examples:

Forests and their products (timber, rubber, fruits)

Animals (fish, livestock)

Fossil Fuels (coal, petroleum, natural gas) - as they are formed from decayed organic matter.

Agricultural crops

B. Abiotic Resources

Origin: Derived from non-living, non-organic material.

Characteristics: Composed of non-living things.

Examples:

Minerals (iron, copper, bauxite)

Rocks

Soil

Air

Water (as a physical substance)

Solar and Wind Energy

4. Classification Based on Exhaustibility / Rate of Regeneration

This is the most critical classification from an environmental and sustainability perspective.

A. Renewable Resources

Definition: Resources that can be replenished naturally over relatively short periods (within a human lifetime).

Characteristics:

They have a sustainable yield; the rate of consumption should not exceed the rate of regeneration.

They are often flow resources (e.g., solar, wind).

Examples:

Continuous/Flow: Solar energy, wind energy, tidal energy, geothermal energy.

Biological: Forests, water, soil, wildlife. Note: These can become non-renewable if exploited unsustainably.

B. Non-Renewable Resources

Definition: Resources that exist in a fixed quantity or that regenerate over extremely long geological time scales (millions of years).

Characteristics:

Finite in quantity.

Once depleted, they are gone for all practical purposes.

Sub-categories:

Recyclable: These can be collected, processed, and reused after their initial application.

Examples: Metals (iron, copper, gold), minerals.

Non-Recyclable (Energy Resources): These are typically used for energy and get dissipated according to the laws of thermodynamics. They cannot be reused.

Examples: Fossil fuels (coal, petroleum, natural gas), nuclear fuels (uranium).

5. Classification Based on Stage of Development

This classification is based on the level of human intervention and exploration.

A. Potential Resources

Definition: Resources that exist in a region and have the potential to be used in the future, but are not currently being used.

Examples:

Mineral oil in sedimentary rocks that has not yet been drilled.

Wind energy in a remote area where no turbines have been installed.

Uranium deposits in a country with no nuclear power program.

B. Actual Resources

Definition: Resources that have been surveyed, quantified, and are currently being used. Their quantity and quality are known.

Examples:

The coal mines of the Ruhr region in Germany.

The petroleum extraction in the Middle East.

The rich forest wood being harvested in Scandinavia.

C. Reserve Resources

Definition: The subset of an Actual Resource that can be developed and extracted profitably with existing technology.

Key Point: Not all of an actual resource may be a reserve. If the cost of extraction is too high, it remains part of the resource base but not a reserve.

Example: A known deposit of copper may be an actual resource, but the portion that is accessible and economically viable to mine with current technology and prices is the reserve.

D. Stock Resources

Definition: Resources that have been surveyed but cannot be used due to a lack of appropriate technology.

Examples:

Hydrogen and Oxygen in water are a stock resource for fuel, as the technology to split them economically on a large scale is still developing.

Minerals found in deep ocean beds that are currently inaccessible.

6. Classification Based on Distribution / Availability

This classification looks at who can access the resource.

A. Ubiquitous Resources

Definition: Resources that are found everywhere.

Examples: Air, sunlight, seawater (in coastal areas).

B. Localized Resources

Definition: Resources that are found only in specific, limited places.

Examples:

Minerals (copper, diamonds).

Fossil fuels.

Geothermal energy (found in geologically active areas).