

Natural Resources and Associated Problems

LEARNING OBJECTIVES

*Introduction • Types of Natural Resources • Depletion of Natural Resources
• Conservation of Natural Resources • Problems Associated with Natural Resources*

Introduction

The natural resource is the stock that can be drawn from nature. The earth is a storehouse of various resources such as land, water, soil, minerals, vegetation, forests, fuels, solar energy etc. that are of immense importance to mankind. Thus, natural resources are the components of the environment that can be drawn upon for supporting life. Any such material which can be used directly or after transformation to sustain life is resource. Without these natural resources, life on earth would not have been possible. Man satisfies his primary needs of food, shelter and clothing and fulfils his other requirements with the resources made available to him from nature.

The term 'resource' is dynamic but its meaning got changed with the advancement in science and technology. Previously, natural resources were defined as those materials which were of value to a particular human culture (Dasman, 1968). But, now everything on this earth is useful to man. Some of the resources such as land, water, air, light, plants and animals are readily available whereas others such as minerals, coal, oil etc. are hidden under earth's surface and are to be taken out.

TYPES OF NATURAL RESOURCES

The earth's natural resources can be categorised on the basis of their

chemical nature, availability or abundance, area of occurrence, origin and utility etc.

(I) Natural Resources Based on Chemical Nature

Based on chemical nature, natural resources may be of the following types:

1. **Inorganic resources.** These natural resources are inorganic in nature. Inorganic resources include air, water, rocks, mineral ores, minerals etc.

2. **Organic resources.** These natural resources are organic in nature. Organic resources include organisms such as plants (forests), animals, microbes and their products like fossil fuel (oil, coal, natural gas etc.).

3. **Mixed resources.** These natural resources are a combination of both inorganic and organic components. Soil is the best example of mixed resources as it is formed of both inorganic components, *i.e.*, inorganic matter of the soil which results from weathering of rocks and organic components, *i.e.*, humus from the plants and animals formed by the activity of microorganisms.

(II) Natural Resources Based on Availability or Abundance

Based on availability or abundance natural resources may be of the following types:

1. **Inexhaustible resources.** These natural resources are found in such abundance so as to unlikely deplete or get exhausted. They are not likely to be exhausted by man's consumption. Inexhaustible resources include solar energy, air, water, sand, clay, tidal energy, hydropower, wind, temperature, precipitation etc.

2. **Exhaustible resources.** These natural resources are likely to be depleted and then exhausted upon their continuous exploitation as they have a limited supply on the earth. Exhaustible resources may be non-renewable or renewable.

(a) **Non-renewable resources.** Non-renewable natural resources lack ability of recycling and replacement or are replaced after a very long time. They are unevenly distributed in the world. Some are found abundant in one country and poorly present or even absent in another country. Similarly a country may be rich in one kind of resource and poor in other kinds of resources. Non-renewable resources may be natural, *e.g.* fossil fuels or man made, *e.g.* polythene. Naturally occurring non-renewable resources include mineral rocks, minerals, metals and fossil fuels. These occur in earth's crust and are difficult to be taken out. Fossil

fuels such as coal, oil, natural gas have a limited stock and require millions of years to reform. Their consumption rate is very high. At this rate of consumption it is likely that these may be exhausted before they are formed. They cannot come back to their entity and cause severe pollution. Minerals are also being used at a very fast rate. The recycling period of minerals and fossil fuels is very long. Similarly soil is often considered as non-renewable resource as it can be degenerated only in few years but need several hundred years for its formation. Loss of biodiversity leading to extinction of species is also a non-renewable natural resource. Care should be taken in use of these resources so that they may not be exhausted so that nothing is left for future.

(b) **Renewable Resources.** Renewable natural resources can be replenished, reproduced or recycled. They have the inherent capacity of reappearing or replacement within a reasonable time and maintain themselves. They can last indefinitely. A judicious balance is required to be maintained between their exploitation and replenishment. Over-use or improper management can diminish or exhaust renewable resources. The chief renewable resources are soil fertility, water and living organisms: plants (forests), animals and microorganisms. If consumption of these resources exceeds their rate of renewal, not only their quality becomes affected but they may become non-renewable. For example, excessive felling of trees results in deforestation and overgrazing causes denudation of the land and desertification. Damage to biodiversity may cause extinction of species whereas over consumption of ground water may lead to lowering of water table. Thus these resources need judicious management and conservation so that future generations may not be deprived of them.

(III) Natural Resources Based on their Occurrence

Based on occurrence, natural resources may be of the following types:

1. **International resources.** These natural resources are available to all countries and have no boundaries. Atmosphere with sunlight and air including many gases is common to all countries.
2. **Multinational resources.** These natural resources are shared by more than one country. Certain rivers and lakes may be shared by more than one country, e.g. Brahmaputra river-common to Tibet, India and Bangladesh. The migratory birds also form multinational resource.
3. **National resources.** These natural resources are restricted to a particular country. Physical features, geological structure, river systems, flora, fauna and human resource constitute the national resource of a country.

(IV) Natural Resources Based on their Origin

Based on origin, natural resources may be of the following types:

1. **Biotic resources.** Biotic resources are basically organic in nature. These include forests and forest produce, vegetation with variety of plants, wide variety of animals such as birds, fish and other marine life forms and microorganisms. Fossil fuels also belong to this category since they originate from organic matter. Some biotic resources such as plants (forests) and livestock are renewable whereas fossil fuels are non-renewable natural resources.

2. **Abiotic resources.** Abiotic resources are basically inorganic in nature. They are composed of non-living matter. Land, water and minerals such as iron, copper, lead, gold etc. are common examples of abiotic resources. Some abiotic resources occur as nodules such as nodules of copper and manganese.

(V) Natural Resources Based on their Utility

Based on utility, natural resources may be forest resource, water resource, food resource, energy resource, land resource or any other resource which may be useful for man.

Certain resources such as energy resources belong to several categories and can be inexhaustible, *e.g.* solar energy, exhaustible renewable, *e.g.* forests and exhaustible non-renewable, *e.g.* fossil fuels-coal, oil, natural gas etc.

DEPLETION OF NATURAL RESOURCES

Man as the superconsumer of resources has overexploited natural resources to serve his primary needs as well as his basic amenities that make his life comfortable. Scientific and technological discoveries have also increased man's demand for natural resources such as fossil fuels, minerals and other sources of energy. The continued and careless use of natural resources will result in their degradation, *i.e.*, loss of quantity and quality and at the last leading to its end.

India, after 500 years of colonial exploitation, 50 years of growth model development and 15 years of corporate rule is depleting its natural capital land, water, forests, air, fossil fuels etc. at an alarming rate and those communities that depend on them for their livelihood are being displaced or marginalised. Undoubtedly the people of the country are extracting natural resources at a rate far greater than their capacity to regenerate.

Life Time and Depletion Time of Resources

Life time of a resource is a period along time scale upto which its availability for human use is assured on a global basis. Depletion time is the period along the time scale when the availability of the resource will decrease to such an extent that it is not available to meet human requirements. Depletion patterns of resources and their managements are of three types (fig. 2.1).

(1) **Rapid depletion time (Boom and Bust).** It is due to policy of extract-use-and-throw away. It was prevalent during early years. There was unrestricted economic extraction, involving wastage at every step. The after use materials were thrown away.

(2) **Extended depletion time.** It involves proper management at the point of extraction, concentration and manufacture so that the wastage can be reduced. Partial recycling extends the depletion period of resource.

(3) **Indefinite depletion time.** It involves various conservation strategies, as such depletion period of the resource can be extended indefinitely. Conservation techniques involve prevention of wastage, recycling and substitution.

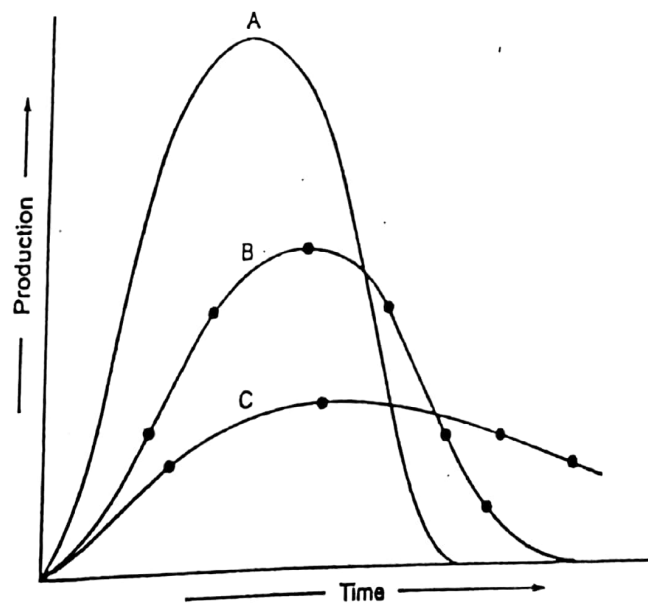


Fig. 2.1. Depletion patterns of resources. A-rapid depletion time, B-extended depletion time, C-indefinite depletion time.

CONSERVATION OF NATURAL RESOURCES

It becomes necessary to use the natural resources in such a way that they can also be saved for future use and are not lost. In other words, allocation of resources have to be done in such a manner so that they are

well managed and conserved. Management of resources is controlling its use in such a way as to maintain its sustainable use and equitable availability. Conservation of resource is its prevention from loss, waste or degradation so that it lasts indefinitely, e.g. conservation of wildlife, minerals and fossil fuels. Both management and conservation are important as some of the natural resources are undergoing rapid depletion. Thus, it becomes necessary to protect, manage and conserve natural resources so that they are not exhausted. It does not mean that their use should be stopped but they should be used in such a way that they are saved enough for the future generation. Rapid increase in human population is causing an increasing demand for natural resources. If this pace continues there will be a time when the natural resources will be depleted and future generations will be deprived of them. According to Brundtland report, entitled *Our Common Future* published in 1987 *natural resources are not inexhaustible and development process should be aimed to meet the needs of the present generation without compromising the ability of future generations to meet their own needs.*

Problems Associated with Natural Resources

Man is closely associated with nature as he is a part of it. A striking feature of man's progress through centuries lies in his outright dependence on nature and its resources. Man is affected and in turn affects the other constituents which are as much part of nature as man himself. Rapid increase in population, increased rate of urbanisation, need for increased agricultural land, heavy industrialisation and development without caring the nature, has forced man to consume resources at a rate beyond their regeneration. The developed countries of USA and Europe and Japan are responsible for a very high rate of energy consumption and use of mineral resources. Developing countries of Africa and Asia have far lower rates of consumption of energy and mineral resources.

There are many causes of depletion of natural resources.

(I) **Uneven distribution of resources.** Natural resources are unevenly distributed around the world. Some of the resources may be found in abundance in one country, e.g. petroleum in gulf countries and may be poorly represented or even lacking in another country. Similarly a country may be rich in one kind of resource and poor in other kinds of resources. For example, South Africa contains most of the world's gold and platinum but has little of silver. North America is rich in molybdenum, Malaysia and Indonesia are rich in tin, tungsten and manganese.

Large countries such as USA, Russia, China and Australia have a wide diversity of natural resources and these had been efficiently used for the

development. Africa and Asia, although rich in natural resources, were exploited by foreign rulers for many years and much of their mineral and forest wealth has been depleted. Also, the countries in Asia and Africa lack the money and technologies to develop and use them optimally to bring about the progress in economy. Underdeveloped countries fall into debt traps of developed countries and try to furnish their debts either by large scale deforestation by exporting timber or overexploitation of their mineral resources, both harming the less developed countries.

(2) **Population growth.** Rapid increase in population growth has resulted into expanding needs of man. Continuous increase in the population has caused an increasing demand for resources. A large population requires to be fed. In order to grow more crops, forested areas are being converted into agricultural lands. The need for huge quantities of food crops, resulted in the intensive farming methods that soon deplete the soil of its nutrients. Addition of fertilizers to boost the crop production and use of synthetic pesticides to control pests, destroy the soil quality in the long run. Vast quantities of fresh water is diverted to the agricultural fields for irrigation and fulfilling the needs of man for drinking, cooking and other purposes. A large amount of wood is used as fuel and foliage is used as fodder for animals. Forested areas often give way to human habitats. Transport and communication network further depletes natural habitats and natural resources. Rapid and uncontrolled urbanisation, especially in developing countries, results in environmental pollution and health problems due to lack of infrastructure and proper awareness.

(3) **Industrial development.** Rapid industrial development, without regard for environmental standards, consumes large quantities of minerals, burns huge amount of fossil fuel, uses large quantities of water and consumes plenty of energy-electricity. Setting up of industrial areas and estates results in clearing of forest areas and loss of habitats. Production of cheap electricity for industries requires setting up of hydroelectric projects across the rivers and streams in the upper course. Construction of dams for water results in the incision of forests and uprooting of wildlife and tribal communities.

(4) **Over exploitation for economic development.** Over exploitation of natural resources for fulfilling human demands is causing a great shortage and non-availability of natural resources. Thus, prices of resources are increasing tremendously. The price rise adversely affects economic conditions of many countries. Prices of resources, especially of petroleum, diesel and mineral oil, are undergoing abrupt hike. Intensive agricultural practices are causing decrease in ground water, thereby lowering the water table. Mass scale deforestation, poaching and animal